general rolling bearings

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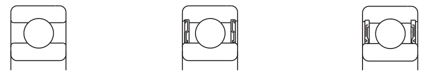
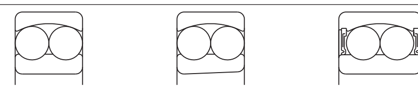
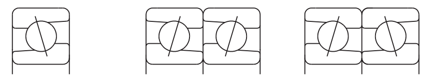
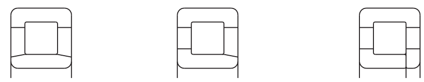
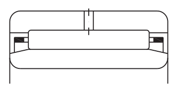
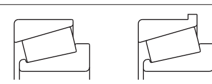
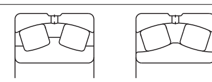
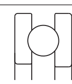
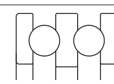
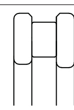
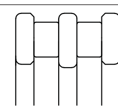
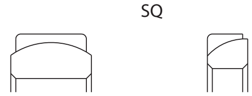
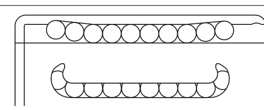
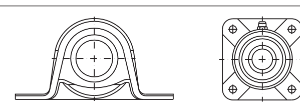
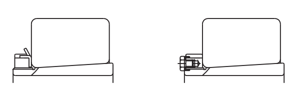
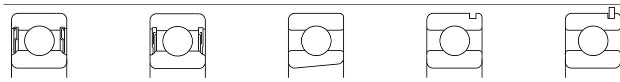
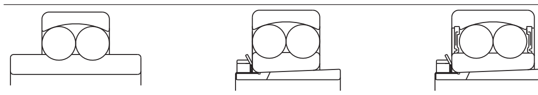
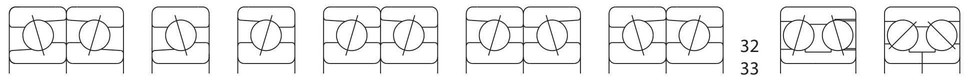
Deep groove ball bearings Stainless steel deep groove ball bearings	page 82	618 619 160 161	60 622 623 63 64	
Self-aligning ball bearings	page 140	12 13	22 23	
Angular contact ball bearings	page 156	72B 73B 70C	72A 72C 72A	
Cylindrical roller bearings single row double row full complement	page 204	28 19 29 10 20	22 3 23 4	
Needle roller bearings	page 336	48 49 40		
Tapered roller bearings single row double row	page 342	329 320 302 322	303 313 323	
Spherical roller bearings	page 372	239 230 240 231 241	222 232 213 223	
Thrust ball and roller bearings single direction double direction	page 500	511 512 513 514	522 523 524	 
Cylindrical roller trust bearings	page 544	811 812 851 852	861 862	 
Spherical plain bearings Rod ends	page 560	GE GA GX		
Linear ball bushing	page 606	KH		
Pillow blocks	page 624	SB UC SA	UE UK UC	
Accessories	page 770	H2 H22 H3 H23	H30 H31 H32	



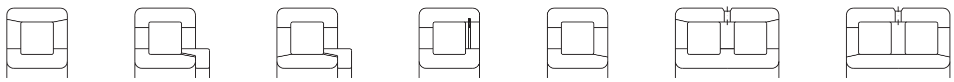
2Z 2RS K N NR



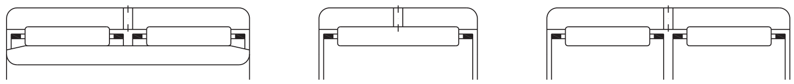
112; 113 K + H K2RSR + H



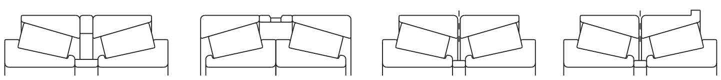
BDF CTA ATA CTB ATB CTADB ATADB CTADT ATADB TTADF ATADF 32 33 D



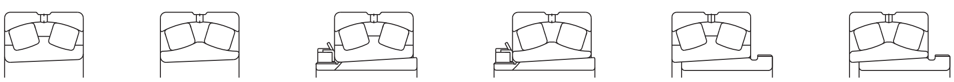
N NJ+HJ NU+HJ NCF...V NJ...VH NN30 NNU49



NA69 RNA RNA69

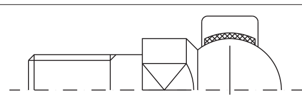


DB DF 35 35R



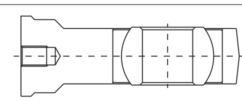
MBK CK MBK+H CK+H MBK+AH CK+AH

SQ

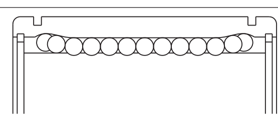


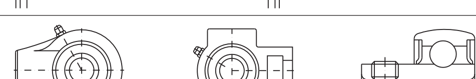
SI
SA
TAC
TAPR
TAPN

POS
PHS
SSR
DIN

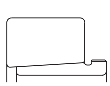


LM
LME
LMB

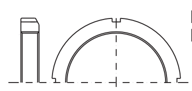




AH30 AH3
AH31 AH23
AH2 AH240
AH22 AH241
AH32



KM
KML
HM
HML



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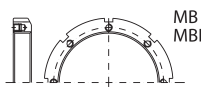
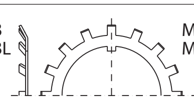


MB
MBL



MS30
MS31

Measuring units of the international system SI

Lenght

1 mm = 0,039 in
1 in = 25,4 mm

Mass

1 kg = 2,205 lb

Force

1 kN = 1 000 N = 225 lbf
1 kgf = 9,81 N
1 lbf = 4,45 N

Moment

1 N mm = 0,102 kgf mm
1 kgf mm = 9,81 N mm
1 N m = 8,85 in lbf
1 in lbf = 0,113 N mm

Pressure per unit of area (surface)

1 N/mm^2 = 1 MPa = 145 psi
1 psi = 0,102 kgf/mm^2
1 kgf/mm^2 = 9,81 N/mm^2

Power

1 W = 1 J/s = 1 N m/s = 0,102 kgf m/s
1 kW = 1,36 CP = 102 kgf m/s
1 kgf m/s = 9,81 N m/s = 9,81 j/s

Mechanical work

1 kgf m = 9,81 W s = 9,81 N m
1 J (Joule) = 1 N m = 1 W s = 0,102 kgf m

Kinematic viscosity

1 mm^2/s = 1 cSt (centiStokes)

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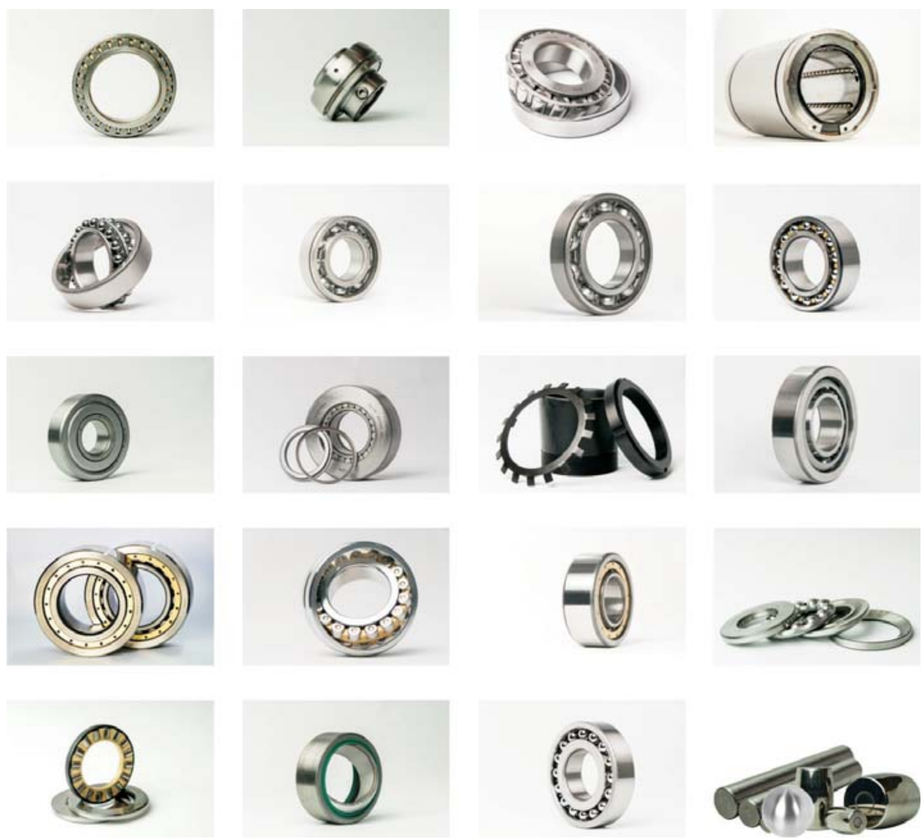


Selection of bearing type

Each type of bearing displays characteristic features which make it suitable for a certain application. Therefore, many bearings types and constructive versions have been developed so that they can satisfy various demands for rolling bearings. Taking into account the great number of factors to be considered when selecting a bearing type, no general rule can be given.

We give further the most important criteria to be considered when selecting the bearing type.

Selection of bearing type, considering the load magnitude and direction

Radial load

Deep groove ball bearings are the most suitable types of bearings for light and moderate pure radial loads. For heavy radial load and where large-diameter shafts are used, double row cylindrical roller bearings are the adequate choice. Needle roller bearings are recomended in case of limited space and heavy loads.

Axial load

For pure axial loads, single direction thrust ball bearings are used in case of loads acting in one direction. For loads acting in both directions, double direction thrust ball bearings are used. Angular contact thrust ball bearings are and single or double row angular contact ball bearings are used in case of light or moderate pure axial loads at moderate speeds.

For light axial loads at high speeds, deep groove ball bearings are suitable. Under the axial load, a contact angle different from 0° is generated in these bearings and therefore they operate as angular contact ball bearings. In order to increase axial load carrying capacity, a larger clearance should be selected (C3, C4, etc.)

For moderate axial loads at high speed, angular contact ball bearings in tandem arrangement are used so that they can take over loads acting in both directions.

Four-point contact ball bearings, QJ type, are also used.

Combined load

In order to carry combined radial and axial loads acting simultaneously, bearings with a contact angle different from 0° are used. The greater the contact angle, the greater the axial load carrying capacity.

Self-aligning ball bearings, spherical roller bearings or cylindrical roller bearings, NJ, NUP, NJ + HJ types, can also accommodate combined loads of certain values. But there are some limit values of the ratio Fa/Fr, which are shown in bearing tables and cannot be exceeded. Cylindrical roller bearings can carry axial loads by means of the sliding friction on ribs. For this reason, the load is limited according to the indications on page 208.

Bearings which accomodate only one direction axial loads should always be mounted in pairs so that they can carry axial loads in both directions.

Selection of bearing type considering the alignment between shaft and housing

Angular misalignments occur generally when the shaft bends under the operating load or when bearings adjoint parts have form or position deviations.

In such cases, self-aligning ball bearings, cylindrical roller bearings or spherical roller thrust bearings should be used.

A certain bearing bent angle can compensate for errors of alignment and maximum angle values are shown for each type in the introductory texts of the table sections.

When misalignments should be compensated, radial and axial clearance are important. The larger the clearance, the greater the possibility of self-aligning.

If the misalignment exceeds the permissible values shown in the introductory texts of the bearing tables, the bearing rating life decreases. The greater the ratio F_r/C_{0r}, the shorter the rating life. If $0{,}1 < F_r / C_{0r} < 3$, the rating life decreases with about 25%.

Selection of bearing type considering the operating temperature

Bearings are generally used up to a temperature of maximum +120°C. In case of higher temperatures, bearings with special heat treatments should be used, in accordance with specifications on page 24.

Sealed bearings, 2RS type, should be used at operating temperatures up to 80°C. If this temperature is exceeded,the efficiency of lubricants is considerably reduced.

Selection of bearing internal clearance

In most cases, while operating, bearings should have a small radial clearance that can be defined as “the possible value of displacement in radial direction of one bearing ring in relation to the other without part deformations”.

While operating, bearing internal clearance is different from the one at delivery, since the latter is reduced when mounting bearings with a certain tight fit.

Under operating conditions, internal clearance change is also caused by different temperatures between the outer and inner ring. Bearings are generally delivered with a normal radial or axial clearance according to the values shown for each rolling bearing group.

The decrease in radial clearance due to the tight fit and operating temperature is considered to be between 60-80% of the tightening value, depending on bearing series and sizes.

After the clearance in bearings has been decreased, a large enough operational clearance should remain, so that the lubricant film shouldn’t be destroyed.

Deep groove ball bearings should have an operational clearance close to zero. There may be often a light preload, due to the point-contact between the rolling elements and raceways.

Small-sized cylindrical roller and needle roller bearings should have an operational clearance of 5-10 µm and larger-sized bearings a clearance of 10-30 µm.

Bearing producers can also manufacture - at request - bearings with radial and axial clearance smaller (C1 and C2) or larger (C3, C4 and C5) than normal, so that the most favorable operating conditions for bearings should be assured.

Cylindrical and needle roller bearings can be manufactured with interchangeable rings (suffix NA).

Bearings with non interchangeable parts have a smaller radial clearance than bearings with interchangeable parts. Changing rings from one bearing to another not allowed.

In case of bearings with interchangeable parts, the rings may be changed and the values of radial clearance will not be altered.

Bearing types and technical characteristics

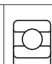
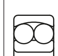
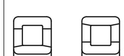
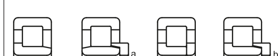
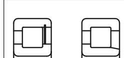
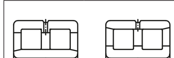
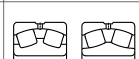
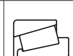
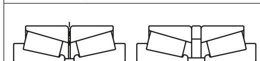
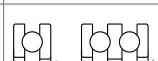
URB Group can manufacture bearings of various types and sizes so that they can meet the customers’ requirements assuring a proper reliability for various applications.

Table 1.1 shows quantitative results of each group of bearings, considering the main technical characteristics.

Bearing type is selected depending on the technical characteristics required by a certain application.

A suggestive graphic symbol has been determined for each main technical characteristic. Thus, a proper bearing for each purpose can be easily chosen. According to the specifications in this catalogue, the proper type and size of bearing can be selected, togheter with all manufacturing and operating technical conditions.

Bearing types and their characteristics

● - excellent	◔ - poor	Purely radial load	Purely axial load	Combined load	Moment load
◕ - good	○ - unsuitable				
◑ - fair	→ - single direction ↔ - double direction				
Deep groove ball bearings		◕	◑ ↔	◑	◔
Self -aligning ball bearings		◑	◔	◔	○
Angular contact ball bearings - single row		◕ a	◕ ⇄ b	◕	◑
- high precision		◕ a	◕ ⇄ b	◕	◑
- double rows		◕	◕ ↔	◕	◑
Cylindrical roller bearings - NU; N		●	○	○	○
- NJ, NU+HJ, NUP, NJ+HJ		●	◑ →	◑	○
- NCF, NJ23VH		●	◑ →	◑	○
- NNU, NN		●	○	○	○
Needle roller bearings - NA		●	○	○	○
Spherical roller bearings		●	◕ ↔	◕	○
Tapered roller bearings - single row		●	◑ →	●	◔
- double row, paired		●	◑ ↔	●	◔
Thrust ball bearing - single direction - double direction		● a	◕ ⇄ b	○	○

◕	◕	◕	◑	◑	●	◑	◕	◕	◑	●	◑	◑	●	Tolerance class
◔	◑	◑	◑	◑	◕	◔	◑	◕	◑	●	◑	◕	●	Quiet running
◑	◑	◕	◑	◑	●	◔	●	●	◑	●	◑	◕	●	High speed
◑	●	◕	◕	◑	●	●	◕	◕	◕	◕	◕	◑	◑	High stiffness
○	○	◔	●	○	○	◔	◔	◔	○	○	○	●	◔	Compensation of misalignement
◑	◑	◑	◑	◔	◕	◔	◕	◕	◑	◕	◑	◑	●	Low friction
○	●	●	●	●	●	●	●	●	◑	◑	◕	○	◑	Shock resistence
○	●	◕	◕	○	○	◑	◑	○	◕	●	●	◑	◕	Located bearing
○	○	○	◑	●	●	◑	◑	○	◕	○	○	◑	◑	Non-located bearing
○	○	○	○	●	●	◑	◑	●	○	○	○	○	○	Axial displacement posible in bearing

Table 1.1

Selection of bearing size

The size of a bearing is selected considering the load in the used rolling bearing and also depends on the operational rating life and prescribed operating safety.

Basic load ratings

The basic dynamic load rating C_r is used to calculate bearing dimensions while rotating under load. It expreses the bearing dimissible load which will give a basic rating life up to 1000 000 revolutions.

The basic dynamic load ratings of URB bearings have been determined in accordance with international standard ISO 281. The values are given in bearing tables.

Considering the basic dynamic load rating, the service time until the fatigue of the material appears is calculated, determining this way the calculated rating life.

Basic static load rating C_{or} is considered in case of low speeds, low oscilating movements or in the stationary case.

The basic static load rating is defined in accordance with ISO 76, as the load acting upon the stationary bearing. It corresponds to a calculated contact stress in the center of the contact area between the most heavily loaded rolling element and the raceway, of:

- 4 600 MPa for self-aligning ball bearings,
- 4 200 MPa for all other ball bearings,
- 4 000 MPa for all roller bearings.

This stress produces a permanent deformations of the rolling element and raceway which is about 0,0001 of the rolling element diameter. The loads are pure radial for radial bearings and pure axial for thrust bearings.

Bearing life

The life of a rolling bearings are defined as the number of revolutions of the number of operating hours, which the bearings are capable to endure, before the first sign of fatigue occurs on one of its rings, on the raceway or the rolling elements.

If we want to consider only the fatigue of the bearing operating surfaces the following conditions have to be observed:

1. The forces and speeds considered when calculating the bearing should correspond to the real operating conditions.
2. Proper lubrication should be assured during the entire operating period.
3. If the bearing carries a light load, its failure is generated by the wear.
4. Experience showed that the failure of many bearings was caused by reasons other than fatigue, such as: selection of an inadequate bearing type in a bearing joint, improper operation or lubrication, outer particles in bearing etc.

Basic rating life

The basic rating life of a single bearing or a group of apparently identical bearings operating under identical conditions, is the life corresponding to a reliability of 90%.

The average life of a group of bearings is approximately five times longer than the basic rating life.

Basic rating life is marked with L_{10} (millions of revolutions) or L_{10h} (operating hours).

L_{10} can be calculated using the equation:

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

L_{10} - basic rating life, milions of revolutions,
C - basic bearing load, kN,
P - equivalent dynamic bearing load, kN,
p - exponent of the life equation with the following values:
p=3 - for ball bearings
p = 10/3 - for roller bearings

The equivalent dynamic bearing load, respectively the radial and axial load, acting simultaneously can be calculated using the following equations (applicable to ball and roller radial bearings):

$P_r = F_r$, kN, - for pure radial load
$P_r = XF_r + YF_a$, kN, - for combined load

For thrust ball bearings, the following equations can be used:

$P_a = F_a$, kN, - for pure axial load
$P_a = XF_r + YF_a$, kN, - for combined load

where:
F_r = the radial component of the load, kN
F_a = the axial component of the load, kN

In the texts preceding the bearing tables, for some groups of bearings there are given details for determinig the equivalent load. Values of the coefficients X and Y can be found in tables.

For bearings operating at constant speed, the basic rating life expressed in operating hours can be calculated using the equation:

$$L_{10h} = \frac{1000000}{60\,n}\,(C/P)^p \text{ or } L_{10h} = \frac{16666}{n}\,(C/P)^p$$

where:
n = rotational speed, r/min

Values of the basic rating life L_{10} (milions of revolutions) as a function of the ratio C/P can be found in the table 2.1.

Values of the basic rating life L_{10h} (operating hours) as a function of the ratio C/P and speed n can be found in table 2.2 for ball bearings and table 2.3 for roller bearings.

When determining the bearing size it is necessary to base the calculations on the rating life corresponding to the purpose of operation.

It usually depends on the machine type, service life and the requirements regarding operational safety.

Approximate values of the service life for various classes of machines and equipments for general purposes are given in table 2.4

The basic rating life L10h of the bearings can be determined as a function of service life, using the life calculation chart on page 18

The basic rating life of road and rail vehicle bearings, for wheel - axle bearing, is expressed as a function of the wheel diameter and covered distance (km), using the equation:

$$L_{10} = \frac{1000}{\pi D} L_{10s}, \text{ respectively: } L_{10s} = \frac{\pi D}{1000} L_{10}$$

where:
L_{10} - basic rating life, millions of revolutions
L_{10s} - service life distance, millions of kilometers
D - wheel diameter, m

Approximate values for the service life distance (kilometers covered), in case of light loaded cars and rail vehicles are given in table 2.5.

Load ratio C/P for various life values L_{10}
(milions of revolutions)

Table 2.1

L_{10}	C/P Ball bearings	Roller bearings
0,5	0,793	0,812
0,75	0,909	0,917
1	1	1
1,5	1,14	1,13
2	1,26	1,24
3	1,44	1,39
4	1,59	1,52
5	1,71	1,62
6	1,82	1,71
8	2	1,87
10	2,15	2
12	2,29	2,11
14	2,41	2,21
16	2,52	2,3
18	2,62	2,38
20	2,71	2,46
25	2,92	2,63
30	3,11	2,77
35	3,27	2,91
40	3,42	3,02
45	3,56	3,13
50	3,68	3,23
60	3,91	3,42
70	4,12	3,58
80	4,31	3,72
90	4,48	3,86
100	4,64	3,98
120	4,93	4,2
140	5,19	4,4
160	5,43	4,58
180	5,65	4,75
200	5,85	4,9
220	6,04	5,04

L_{10}	C/P Ball bearings	Roller bearings
240	6,21	5,18
260	6,38	5,3
280	6,54	5,42
300	6,69	5,54
320	6,84	5,64
340	6,98	5,75
360	7,11	5,85
380	7,24	5,94
400	7,37	6,03
420	7,49	6,12
440	7,61	6,21
460	7,72	6,29
480	7,83	6,37
500	7,94	6,45
550	8,19	6,64
600	8,43	6,81
650	8,66	6,98
700	8,88	7,14
750	9,09	7,29
800	9,28	7,43
850	9,47	7,56
900	9,65	7,7
950	9,83	7,82
1000	10	7,94
1100	10,3	8,17
1200	10,6	8,39
1300	10,9	8,59
1400	11,2	8,79
1500	11,4	8,97
1600	11,7	9,15
1700	11,9	9,31
1800	12,2	9,48
1900	12,4	9,63

L_{10}	C/P Ball bearings	Roller bearings
2000	12,6	9,78
2200	13	10,1
2400	13,4	10,3
2600	13,8	10,6
2800	14,1	10,8
3000	14,4	11
3200	14,7	11,3
3400	15	11,5
3600	15,3	11,7
3800	15,6	11,9
4000	15,9	12
4500	16,5	12,5
5000	17,1	12,9
5500	17,7	13,2
6000	18,2	13,6
6500	18,7	13,9
7000	19,1	14,2
7500	19,6	14,5
8000	20	14,8
8500	20,4	15,1
9000	20,8	15,4
9500	21,2	15,6
10000	21,5	15,8
12000	22,9	16,7
14000	24,1	17,5
16000	25,2	18,2
18000	26,2	18,9
20000	27,1	1,5
25000	29,2	20,9
30000	31,1	22

Ball bearings - load ratio C/P for various basic rating lives L_{10h} (operating hours) at various speeds n (r/min)

Table 2.2

L_{10h}	C/P when n = 50	100	150	200	250	300	400	500	750	1000	1500
100	0,67	0,84	0,97	1,06	1,14	1,22	1,34	1,44	1,65	1,82	2,08
500	1,14	1,44	1,65	1,82	1,96	2,08	2,29	2,47	2,82	3,11	3,56
1000	1,44	1,82	2,08	2,29	2,47	2,62	2,88	3,11	3,56	3,91	4,48
1250	1,55	1,96	2,24	2,47	2,66	2,82	3,11	3,35	3,83	4,22	4,83
1600	1,69	2,13	2,43	2,68	2,88	3,07	3,37	3,63	4,16	4,58	5,24
2000	1,82	2,29	2,62	2,88	3,11	3,30	3,63	3,91	4,48	4,93	5,65
2500	1,96	2,47	2,82	3,11	3,35	3,56	3,91	4,22	4,83	5,31	6,08
3200	2,13	2,68	3,07	3,37	3,63	3,86	4,25	4,58	5,24	5,77	6,60
4000	2,29	2,88	3,30	3,63	3,91	4,16	4,58	4,93	5,65	6,21	7,11
5000	2,47	3,11	3,56	3,91	4,22	4,48	4,93	5,31	6,08	6,69	7,66
6300	2,66	3,36	3,84	4,23	4,55	4,84	5,33	5,74	6,57	7,23	8,28
8000	2,88	3,63	4,16	4,58	4,93	5,24	5,77	6,21	7,11	7,83	8,96
10000	3,11	3,91	4,48	4,93	5,31	5,65	6,21	6,69	7,66	8,43	9,65
12500	3,35	4,22	4,83	5,31	5,27	6,08	6,69	7,21	8,25	9,09	10,4
16000	3,63	4,58	5,24	5,77	6,21	6,60	7,27	7,83	8,96	9,86	11,3
20000	3,91	4,93	5,65	6,21	6,69	7,11	7,83	8,43	9,65	10,6	12,2
25000	4,22	5,31	6,08	6,69	7,21	7,66	8,43	9,09	10,4	11,4	13,1
32000	4,58	5,77	6,60	7,27	7,83	8,32	9,16	9,86	11,3	12,4	14,2
40000	4,93	6,21	7,11	7,83	8,43	8,96	9,86	10,6	12,2	13,4	15,3
50000	5,31	6,69	7,66	8,43	9,09	9,65	10,6	11,4	13,1	14,4	16,5
63000	5,74	7,23	8,28	9,11	9,81	10,4	11,5	12,4	14,2	15,6	17,8
80000	6,21	7,83	8,96	9,86	10,6	11,3	12,4	13,4	15,3	16,9	19,3
100000	6,69	8,43	9,65	10,6	11,4	12,2	13,4	14,4	16,5	18,2	20,8
200000	8,43	10,6	12,2	13,4	14,4	15,3	16,9	18,2	20,8	22,9	26,2

L_{10h}	C/P when n = 2000	2500	3000	4000	5000	6000	8000	10000	15000	20000	30000
100	2,29	2,47	2,62	2,88	3,11	3,30	3,63	3,91	4,48	4,93	5,65
500	3,91	4,22	4,48	4,93	5,31	5,65	6,21	6,69	7,66	8,43	9,65
1000	4,93	5,31	5,65	6,21	6,69	7,11	7,83	8,43	9,65	10,6	12,2
1250	5,31	5,72	6,08	6,69	7,21	7,66	8,43	9,09	10,4	11,4	13,1
1600	5,77	6,21	6,60	7,27	7,83	8,32	9,16	9,86	11,3	12,4	14,2
2000	6,21	6,69	7,11	7,83	8,43	8,96	9,86	10,6	12,2	13,4	15,3
2500	6,69	7,21	7,66	8,43	9,09	9,65	10,6	11,4	13,1	14,4	16,5
3200	7,27	7,83	8,32	9,16	9,86	10,5	11,5	12,4	14,2	15,7	17,9
4000	7,83	8,43	8,96	9,86	10,6	11,3	12,4	13,4	15,3	16,9	19,3
5000	8,43	9,09	9,65	10,6	11,4	12,2	13,4	14,4	16,5	18,2	20,8
6300	9,11	9,81	10,4	11,5	12,4	13,1	14,5	15,6	17,8	19,6	22,5
8000	9,86	10,6	11,3	12,4	13,4	14,2	15,7	16,9	19,3	21,3	24,3
10000	10,6	11,4	12,2	13,4	14,4	15,3	16,9	18,2	20,8	22,9	26,2
12500	11,4	12,3	13,1	14,4	15,5	16,5	18,2	19,6	22,4	24,7	28,2
16000	12,4	13,4	14,2	15,7	16,9	17,9	19,7	21,3	24,3	26,8	30,7
20000	13,4	14,4	15,3	16,9	18,2	19,3	21,3	22,9	26,2	28,8	33,0
25000	14,4	15,5	16,5	18,2	19,6	20,8	22,9	24,7	28,2	31,1	35,6
32000	15,7	16,9	17,9	19,7	21,3	22,6	24,9	26,8	30,7	33,7	38,6
40000	16,9	18,2	19,3	21,3	22,9	24,3	26,8	28,8	33,0	36,3	41,6
50000	18,2	19,6	20,8	22,9	24,7	26,1	28,8	31,1	35,6	39,1	44,8
63000	19,6	21,1	22,5	24,7	26,6	28,3	31,2	33,6	38,4	42,3	48,4
80000	21,3	22,9	24,3	26,8	28,8	30,7	33,7	36,3	41,6	45,8	52,4
100000	22,9	24,7	26,2	28,8	31,1	33,0	36,3	39,1	44,8	49,3	56,5
200000	28,8	31,1	33,0	36,3	39,1	41,6	45,8	49,3	56,5	62,1	71,1

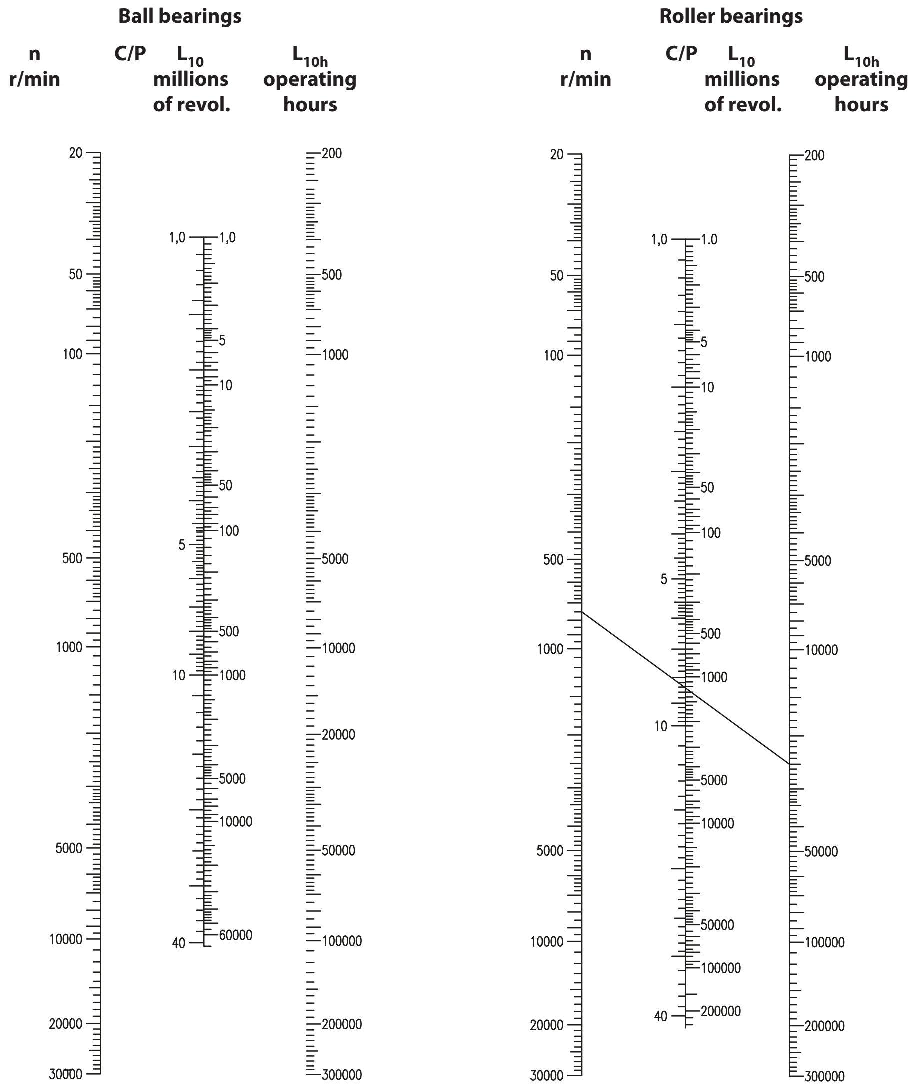
Roller bearings - load ratio C/P for various basic rating lives L_{10h} (operating hours) at various speeds n (r/min)

Table 2.3

L_{10h}	C/P when n = 50	100	150	200	250	300	400	500	750	1000	1500
100	0,70	0,86	0,97	1,06	1,13	1,19	1,30	1,39	1,57	1,71	1,93
500	1,13	1,39	1,57	1,71	1,83	1,93	2,11	2,25	5,24	2,77	3,13
1000	1,39	1,71	1,93	2,11	2,25	2,38	2,59	2,77	3,13	3,42	3,86
1250	1,49	1,83	2,07	2,25	2,41	2,54	2,77	2,97	3,35	3,65	4,12
1600	1,60	1,97	2,23	2,43	2,59	2,74	2,99	3,19	3,61	3,93	4,44
2000	1,71	2,11	2,38	2,59	2,77	2,93	3,19	3,42	3,86	4,20	4,75
2500	1,83	2,25	2,54	2,77	2,97	3,13	3,42	3,65	4,12	4,50	5,08
3200	1,97	2,43	2,74	2,99	3,19	3,37	3,68	3,93	4,44	4,84	5,47
4000	2,11	2,59	2,93	3,19	3,42	3,61	3,93	4,20	4,75	5,18	5,85
5000	2,25	2,77	3,13	3,42	3,65	3,86	4,20	4,50	5,08	5,54	6,25
6300	2,42	2,97	3,36	3,66	3,91	4,13	4,51	4,82	5,44	5,93	6,70
8000	2,59	3,19	3,61	3,93	4,20	4,44	4,84	5,18	5,85	6,37	7,20
10000	2,77	3,42	3,86	4,20	4,50	4,75	5,18	5,54	6,25	6,81	7,70
12500	2,97	3,65	4,12	4,50	4,81	5,08	5,54	5,92	6,68	7,29	8,23
16000	3,19	3,93	4,44	4,84	5,18	5,47	5,96	6,37	7,20	7,85	8,86
20000	3,42	4,20	4,75	5,18	5,54	5,85	6,37	6,81	7,70	8,39	9,48
25000	3,65	4,50	5,08	5,54	5,92	6,25	6,81	7,29	8,23	8,97	10,1
32000	3,93	4,84	5,47	5,96	6,37	6,73	7,34	7,85	8,86	9,66	10,9
40000	4,20	5,18	5,85	6,37	6,81	7,20	7,85	8,39	9,48	10,3	11,7
50000	4,50	5,54	6,25	6,81	7,29	7,70	8,39	8,97	10,1	11,0	12,5
63000	4,82	5,93	6,70	7,30	7,81	8,25	8,99	9,61	10,9	11,8	13,4
80000	5,18	6,37	7,20	7,85	8,39	8,86	9,66	10,3	11,7	12,7	14,4
100000	5,54	6,81	7,70	8,39	8,97	9,48	10,3	11,0	12,5	13,6	15,4
200000	6,81	8,39	9,48	10,3	11,0	11,7	12,7	13,6	15,4	16,7	18,9

L_{10h}	C/P when n = 2000	2500	3000	4000	5000	6000	8000	10000	15000	20000	30000
100	2,11	2,25	2,38	2,59	2,77	2,93	3,19	3,42	3,86	4,20	4,75
500	3,42	3,65	3,86	4,20	4,50	4,75	5,18	5,54	6,25	6,81	7,70
1000	4,20	4,50	4,75	5,18	5,54	5,85	6,37	6,81	7,70	8,39	9,48
1250	4,50	4,81	5,08	5,54	5,92	6,25	6,81	7,29	8,23	8,97	10,1
1600	4,84	5,18	5,47	5,96	6,37	6,73	7,34	1,85	8,86	9,66	10,9
2000	5,18	5,54	5,85	6,37	6,81	7,20	7,85	8,39	9,48	10,3	11,7
2500	5,54	5,92	6,25	6,81	7,29	7,70	8,39	8,97	10,1	11,0	12,5
3200	5,96	6,37	6,73	7,34	7,85	8,29	9,03	9,66	10,9	11,9	13,4
4000	6,37	6,81	7,20	7,85	8,39	8,86	9,66	10,3	11,7	12,7	14,4
5000	6,81	7,29	7,70	8,39	8,97	9,48	10,3	11,0	12,5	13,6	15,4
6300	7,30	7,81	8,25	8,99	9,61	10,2	11,1	11,8	13,4	14,6	16,5
8000	7,85	8,39	8,86	9,66	10,3	10,9	11,9	12,7	14,4	15,7	17,7
10000	8,39	8,97	9,48	10,3	11,0	11,7	12,7	13,6	15,4	16,7	18,9
12500	8,97	9,59	10,1	11,0	11,8	12,5	13,6	14,5	16,4	17,9	20,2
16000	9,66	10,3	10,9	11,9	12,7	13,4	14,6	15,7	17,7	19,3	21,8
20000	10,3	11,0	11,7	12,7	13,6	14,4	15,7	16,7	18,9	20,6	23,3
25000	11,0	11,8	12,5	13,6	14,5	15,4	16,7	17,9	20,2	22,0	24,9
32000	11,9	12,7	13,4	14,6	15,7	16,5	18,0	19,3	21,8	23,7	26,8
40000	12,7	13,6	14,4	15,7	16,7	17,7	19,3	20,6	23,3	25,4	28,7
50000	13,6	14,5	15,4	16,7	17,9	18,9	20,6	22,0	24,9	27,1	30,6
63000	14,6	15,6	16,5	17,9	19,2	20,3	22,1	23,6	26,7	29,1	32,8
80000	15,7	16,7	17,7	19,3	20,6	21,8	23,7	25,4	28,7	31,2	35,3
100000	16,7	17,9	18,9	20,6	22,0	23,3	25,4	27,1	30,6	33,4	37,7
200000	20,6	22,0	23,3	25,4	27,1	28,7	31,2	33,4	37,7	41,1	46,4

Basic rating life calculation chart



Example:

1. It is required to determine the size of a deep groove ball bearing single row, considering the following conditions:
- Basic rating life L_{10h} = 25000 operating hours
- Rotational speed n = 1000 r/min
- Load in bearing Fr = 5 kN

The chart shows that C/P = 11,6; C = 11,6, P = 11,6 x 5 = 58 kN. In the catalogue on page 101, you can select the bearing 6310 type with the following characteristics: Cr = 61,8kN; n = 7000 r/min.

2. What is the basic rating life o the bearing NU 210E which is operating under a radial load of 7,7 kN at rotational speed n = 750 r/min?

See page 220 in the catalogue and you will find for the bearing, NU 210E type, the following values: C_r = 63,7 kN, n = 8000 r/min. From the chart, for a bearing operated at a rotational speed of 750 r/min and C_r/P_r = 63,7/7,7 = 8,3, a basic rating life L_{10h} = 25000.

Recommended basic rating lives for general purpose machines	
	Table 2.4
Application	**Recommended basic rating life L_{10h} (operating hours)**
Household machines, technical apparata for medical use, instruments, agricultural machines:	300...3000
Machines used for short periods or intermittently: electric hand tools, cranes, lifting tackles in workshops, building machines:	3000...8000
Machines used intermittently or for short periods with high operational reliability: lifts, small cranes:	8000...12000
Machines for use 8 hours/day but not always at full capacity: machines for general purposes, electric motors for industrial use, rotary crushes, gear drives for general purposes:	10000...25000
Machines operating 8 hours/day at full capacity: machine tools, woodworking machines, large cranes, printing equipment, ventilators, separators, centrifuges:	20000...30000
Machines for continuous use 24 hours/day: Rolling mill gear units, medium sized electrical machinery, compressors, pumps, textile machines, mine hoists:	40000-50000
Hydraulic machines, rotary furnances, capstans, propulsion machinery for sea vessel (propellers for seat vessels):	50000...100000
Machines for continuous use 24 hour/day with high reliablity: large electric machinery, mine pumps and mine ventilators, power station plants, machines for cellulose industry, pumping units:	100000...

Values for basic rating life L_{10s}	
	Table 2.5
Type of vehicle	**$L_{10s}/10^6$**
	km
Wheel hub bearings for road vehicles	
- light loaded cars	0,3
- trucks, buses	0,6
Axlebox bearings for rail vehicles:	
- goods wagons (according to UIC)	0,8
- suburban vehicles, trams	1,5
- long distance passenger	3
carriages	3-4
- motorailers	3-4
- Diesel and electric locs	

In case of bearings which do not rotate but oscillate from a central position through an angle, as shown in fig. 1, basic rating life can be determined as follows:

$$L_{10sc} = \frac{180}{2\gamma} L_{10} \text{ , where:}$$

L10sc - bearing rating life, millions of cycles

γ - oscillation amplitude (angle of maximum deviation from center position), degrees.

If the amplitude of oscillation is very small, it can be ignored for basic rating life determination.

Fluctuating dynamic load and speeds

In many cases, in operation speed and magnitude of load fluctuate. Therefore a mean dynamic load is to be calculated.

Complete oscillation = 4γ from point 0 to point 4

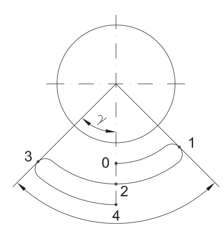


Fig. 1

The load acting on the bearing can vary as shown in fig. 2-a and 2-b.

In this case, the mean load can be determined using the equation:

$$F_m = \sqrt[p]{\frac{F_1^p n_1 + F_2^p n_2 + \ldots + F_n^p n_n}{n}} ,$$

where:

F_m - constant mean load, kN

$F_1, F_2, \ldots F_n$ - constant load during n1, n2, ... nn revolutions, kN

n - total number of revolutions (n=n1+n2+...) during which loads F1, F2, ... act

p - exponent - 3 - for ball bearings,
-10/3 - for roller bearings.

If the bearing speed is constant and the magnitude of the load is between the minimum value F_{min} and a maximum value F_{max} as shown in fig. 3a and b, the mean load can be obtained from:

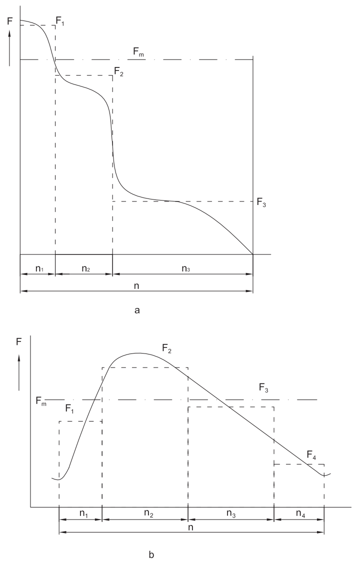


Fig. 2

$$F_m = \frac{F_{min} + 2F_{max}}{3}, \text{ kN}$$

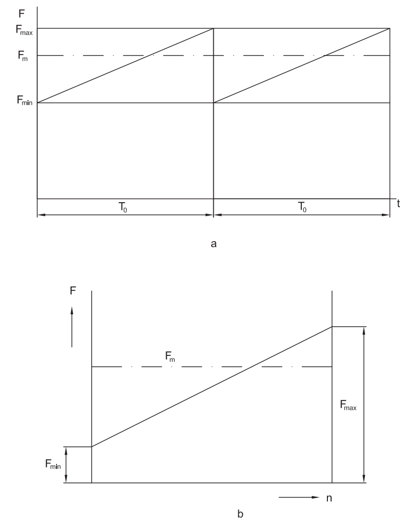


Fig. 3

If the external radial load consists of a load F_1 which is constant in magnitude and direction and a load F_2 which is variable in direction and constant in magnitude (F1 and F2 acting in the same plane) as shown in fig. 4, the mean load can be determined using the equation:

$F_m = f_m (F_1+F_2)$, kN

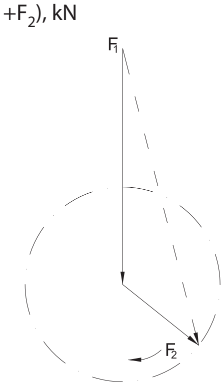


Fig. 4

Values for the factor f_m can be obtained from fig.5.

In case of sinusoidal movement as it is shown in fig 6, the mean load can be obtained from:

$$F_m = \sqrt[p]{\frac{4}{3\pi}} F_{max}, \text{ kN}$$

$F_m \approx 0{,}75\, F_{max}$, kN, for ball bearings
$F_m \approx 0{,}77\, F_{max}$, kN, for roller bearings

In case of oscilating movements with oscillating angle γ , as shown in fig. 7, equivalent mean load can be calculated with the equation:

$$F_m = \sqrt[p]{\frac{\gamma}{90^\circ}}\, F_r,\ \text{kN},$$

If the fluctuating load acts in a pure radical direction for radial bearings and in a pure axial direction for thrust bearings, the equivalent dynamic bearing load will be: $P_r = F_m$.

For combined loads, with radial load Fr and axial load Fa constant in direction and magnitude, the equivalent dynamic load can be calculated using the equation

$$P_r = XF_r + YF_a,\ \text{kN}$$

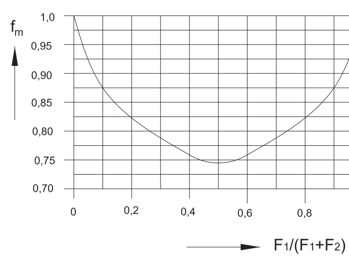


Fig. 5

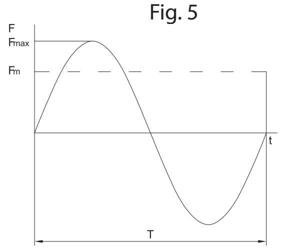


Fig. 6

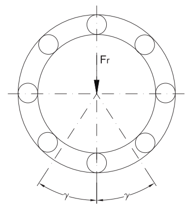


Fig. 7

In case of combined loads, with radial and axial loads changing in time, ratio F_r/F_a being constant, the equivalent dynamic load can be calculated by:

$$P_m = XF_{rm} + YF_{am},$$

where:

- P_m - equivalent mean dynamic load, kN
- F_{rm} - radial mean load, kN
- F_{am} - axial mean load, kN
- X,Y - factors of radial and axial load.

In case the direction and magnitude of the load change in time and speeds fluctuate in time, the equivalent mean dynamic load will be calculated using the equation:

$$P_m = \sqrt[p]{\frac{P_1^p n_1 + P_2^p n_2 + \ldots + P_n^p n_n}{n}}$$

where:

- P_m - equivalent mean dynamic load, kN
- P_1 - equivalent dynamic load for n_1 revolutions, kN
- P_2 - equivalent dynamic load for n_2 revolutions, kN
- P_n - equivalent dynamic load for n_n revolutions, kN
- n_1 - number of revolutions for load P_1
- n_2 - number of revolutions for load P_2
- n_n - number of revolutions for load P_n
- n - number of revolutions ($n=n_1+n_2+ \ldots n_n$)
- p - exponent: - 3 - for ball bearings,
- 10/3 - for roller bearings

Basic dynamic load of a bearing group

In case of ball and roller bearings especially, a bearing group of the same type mounted close together is required, so that heavy radial loads can be carried.

In order to take over the load uniformly these bearings should be mounted in order to equal the diameter deviations to the radial clearances.

These deviations must be kept below 1/2 of the admitted tolerance class.

Basic dynamic load for a bearing group, as a function of the basic load of the single bearing, can be calculated using the equation:

$$C_{ri} = C_r i^n,$$

where:

- C_{ri} - basic dynamic load of the bearing group, kN
- C_r - basic dynamic load of the single bearing, selected from the tables,
- i - number of bearings of the same type, mounted close together,
- n - exponent depending on the bearing type:
0,7 - for ball bearings
7/9 - for roller bearings

Values of i^n are given in table 2.6.

Values for i^n		
		Table 2.6
i	$i^{0,7}$	$i^{7/9}$
2	1,62	1,71
2	2,16	2,35
4	2,64	2,94

The equivalent dynamic load for each group of bearings is calculated considering the specifications in the introductory text preceding the respective group.

Adjusted rating life

Basic rating life $L10_h$ is often satisfactory for bearing performances. This life means a reliability of 90% for material and a modern and usual manufacturing technology, as well as for conventional operating conditions.

For a reliability over 90% (100-n)%, ISO recommends steels elaborated in better conditions, high level manufacturing technologies and specific operating conditions. In this case, adjusted rating life can be calculated as follows:

$$L_{na} = a_1\, a_2\, a_3\, L_{10} \quad \text{or} \quad L_{na} = a_1\, a_2\, a_3 \left(\frac{C}{P}\right)^p$$

where:

L_{na} - adjusted rating life, millions of revolutions

a_1 - life adjustement factor considering reliability

a_2 - life adjustement factor considering the material and manufacturing conditions

a_3 - life adjustement factor considering the operating conditions.

In case of life adjustment factors a_1, a_2, a_3 greater than 1, when calculating adjusted rating life, prudence and familiarity with bearing manufacturing and operating conditions, including shaft bending and housing stiffness are recommended.

Life adjustement factor a_1 for reliability

The bearing failure, caused by fatigue, is subjected to certain statistic laws. Therefore, this fact is recommended to be considered when calculating the bearing life.

Values of the life adjustment factor a_1 for eliabilities over than 90% are given in table 2.7.

Values for factor a_1		
		Table 2.7
Reliability, %	L_{na}	a_1
90	L_{10a}	1
95	L_{5a}	0,62
96	L_{4a}	0,53
97	L_{3a}	0,44
98	L_{2a}	0,33
99	L_{1a}	0,21

Life adjustment factor a_2 for material

Life adjustment factor a_2 takes into account the properties of the material, heat treatment of the steel and maufacturing technologies. For URB bearings, a_2=1 is recommended.

Life adjustment factor a_{23} for operating conditions

The longest life of a bearing can be reached in case of hydrodynamic lubrication, namely where there is no direct contact between rolling elements and raceway due to the lubricant film. In this field, many studies have been done by world leading bearing manufacturing companies. These studies showed that there is relationship between life adjustment factor a_2 for material and life adjustment factor a_3 for operating conditions. Preferably these factors should be unified, obtaining factor a_{23}. In this case, adjusted rating life would be:

$L_{na} = a_1\, a_{23}\, L_{10}$ or $L_{na} = a_1\, a_{23}\, L_{10h}$

These values of a_{23} coefficient depend on the lubricant used for bearing lubrication, namely on the ratio of the oil viscosity at +40°C, ν (initial value) to the viscosity required for adequate lubrication at the operating temperature ν_1. The values are given in table 2.8.

Values for factor a_{23}									
									Table 2.8
$\frac{\nu}{\nu_1}$	0,1	0,2	0,5	1	1,5	2	3	4	5
a_{23}	0,45	0,55	0,75	1	1,3	1,6	2	2,5	2,5

The values of viscosity ν_1, as a function of the mean bearing diameter and operating speed, are given in the diagram fig. 8.

Kinematic viscosity ν at the temperature of +40°C can be determined from the diagram fig. 9 in accordance with ISO, if the bearing operating temperature is known.

In case of grease lubrication, calculation should be done considering the basic oil viscosity and the value of the life adjustment factor a_{23} will be smaller than 1.

Example of oil kinematic viscosity calculation for bearing lubrication:

The bearing 6212 operates at a speed of 3500 r/min and a temperature of +70°C.

Mean diameter will be:

0,5 (d+D) = 0,5 (60+110) = 85 mm

From the diagram fig. 9, at a temperature of +70°C, for a viscosity ν_1 = 8 mm^2/s, the viscosity at +40°C is 20 mm^2/s (cSt).

In this case should be selected an oil in accordance with ISO VG22 with kinematic viscosity limits: ν_{min} = 19,8 mm^2/s (cSt) and ν_{max} = 24,2 mm^2/s (Cst)

In case of bearing operating at temperatures higher than +150°C, an adjustment factor f_t for temperature should be added to the life adjustment factor a_{23}. Adjusted rating life will be:

$$L_{na} = a_1\, a_{23}\, f_t\, L_{10} \text{ or } L_{na} = a_1\, a_{23}\, f_t\, L_{10h}$$

Values for the life adjustment factor ft for temperature are given in table 2.9.

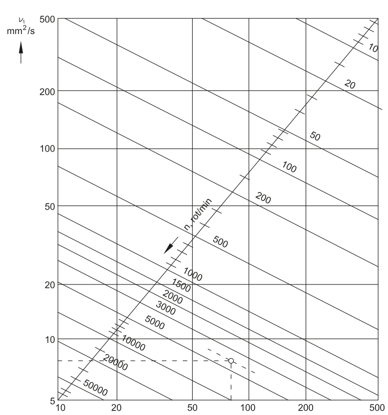


Fig. 8

Values for operating temperature factor f_t Table 2.9				
Operating temperature, t°C	150	200	250	300
f_t	1	0,73	0,42	0,22

Static load

When the bearing is stationary or rotates at slow movements or very low speeds (lower than 10 r/min), basic static load is not determined by the material fatigue but by permanent deformation caused at the rolling element/raceway contact.

It is also the case of rotating bearings, when they have to sustain heavy shock loads which act during a fraction of their revolution.

Generally, the value of the load may increase up to the value of the basic static load C_0, without altering the bearing operating properties.

Equivalent static load

Combined static load (radial and axial load acting simultaneosly on bearing) must be converted into an equivalent static bearing load. This is defined as the load (radial for radial bearings and axial for thrust bearings) which is applied, would cause the same permanent deformation in the bearing as the real load operating upon it.

Equivalent static load is obtained from the general equation:

$$P_0 = X_0\, F_r + Y_0\, Fa, \text{ kN},$$

where:

- P_0 - equivalent static bearing load, kN,
- F_r - radial component of the heaviest static load, kN,
- F_a - axial component of the heaviest static load, kN,
- X_0 - radial load factor of the bearing,
- Y_0 - axial load factor of the bearing.

Data needed to calculate equivalent static load can be found in text and in bearing tables.

Requisite basic static load rating

When determining bearing size on the basis of the static load, a static safety factor s_0 is used.

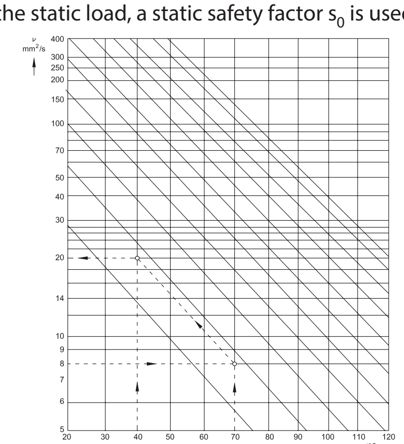


Fig. 9

The requisite basic static load is calculated using the equation:

$C_{r0} = s_0 P_{r0}$, kN,

where:

C_{r0} - basic static load rating, kN,
s_0 - static safety factor, table 2.11,
P_{r0} - equivalent static load, kN.

At high temperatures, life of he material decreases and the static load carrying capacity of bearings is redeuced.

For high temperatures, basic static load is calculated using the equation:

$C_{r0} = f_{0t} s_0 P_{r0}$, kN,

The values of factor f_{0t} depending on temperature is given in table 2.10.

Values for temperature factor f_{0t}

Table 2.10

Operating temperature, t°C	150	200	250	300
f_{0t}	1	0,95	0,85	0,75

Non-rotating bearings

In case of non-rotating bearings, the values of static safetly factor s0, for certain applications are given in table 2.11. These values are also valid for bearings with oscillating movements.

Values for static safety factor s_0

Table 2.11

Application	**s_0**
Variable pitch propeller for aircraft	0,5
Gates for barrages, dams, sluices	
Opening bridges	1,5
Crane hooks for:	
- large cranes without additional loads	1,5
- small cranes with additional dynamic loads	1,6

Rotating bearings

In case of fluctuating or oscillating loads and especially when heavy shock loads are acting during a fraction of revolution, it is necessary to check if the bearing has the proper static load carrying capacity.

Heavy shock loads, higher than the basic static bearing load, produce permanent deformations not uniformly distributed on raceway, which influence negatively upon bearing running.

Generally, heavy shock loads cannot be exactly calculated and in certain cases they produce deformations of bearing housing and consequently an unfavorable load distribution in bearing.

When a bearing rotates under maximum load, raceway becomes uniformly deformed on all its outer surface without any imprint.

For various operating conditions, maximum load acting upon the bearing is calculated with static safety factor s_0, depending on the vibrations and shock loads.

The values of static safety factor are given in table 2.12.

Values for static safety factor s_0

Table 2.12

Type of operation	**Requirements regarding quiet running**					
	Unimportant		**Normal**		**High**	
	Ball bearings	Roller	Ball bearings	Roller	Ball bearings	Roller
Smooth, vibration-free	0,5	1	1	1,5	2	3
Normal	0,5	1	1	1,5	2	3,5
Heavy shock loads	>1,5	>2,5	>1,5	>3	>2	>4

For bearing with a known equivalent static load, static safety factor s_0 is necessary to be checked using the equation:

$$s_0 = \frac{C_{r0}}{P_{r0}}$$

If the value of s_0 is less than recommended in table 2.12, then a bearing with a higher basic static load carrying capacity should be selected.

Basic static load for a group of bearings

Where more bearings of the same type are mounted close together to take over a static load, the load magnitude supported by these bearings will be calculated from:

$C_{0ri} = C_{0r}\, i$,

where:

C_{0ri} - basic static load of the bearing group,
C_{0r} - basic static load of the single bearing (from tables),
i - number of bearings.

URB GROUP

URB-ROMANIA ART-TURKEY MGM-HUNGARY

Bearing tolerances

Bearing tolerances have been internationally standardized in accordance with ISO 492, ISO 199, ISO 582, ISO 1132.

Bearings are generally manufactured to the tolerance class P0. At request, they can also be manufactured to the tolerance classes P6, P6X, P5, P4 and P2. These bearings are used for special applications, such as very accurate shaft guidance or very high speeds.

The values of the limit deviations for these tolerance classes are given for:

- the overall dimensions of:
  - deep groove ball bearings, angular contact ball bearings, self-aligning ball bearings, spherical roller bearings, cylindrical roller bearings, needle roler bearings, tapered roller bearings,
  - tapered roller bearing with metric (mm) and inch dimensions,
  - tapered bore bearings,
  - thrust ball bearings, angular contact thrust ball bearings, cylindrical roller thrust bearings, needle roller thrust bearings,
- mounting chamfer.

Symbols

d - nominal bore diameter or shaft washer nominal bore diameter for thrust bearings

d_1 - nominal diameter at the theoretical large end of the tapered bore

d_2 - nominal bore diameter of the shaft washer for double directions thrust bearings

d_s - deviation of single bore diameter

d_{psmax} - maximum bore diameter, in a single radial plane

d_{psmin} - minimum bore diameter, in a single radial plane

Δ_{ds} - deviation of a single bore diameter $\Delta_{ds} = d_s - d$

d_{mp} - mean bore diameter, in a single radial plane $d_{mp} = (d_{psmax} + d_{psmin})/2$

Δ_{dmp} - deviation of the mean bore diameter in a single radial plane; or deviation of the mean diameter at the theoretical small end of the tapered bore, in case of tapered bore bearings; or deviation of the mean bore diameter of the shaft washer in a single radial plane for single direction thrust bearings $\Delta_{dmp} = d_{mp} - d$

Δ_{d1mp} - deviation of the mean diameter at the theoretical large end of the tapered bore $\Delta_{d1mp} = d_{1mp} - d$

Δ_{d2mp} - deviation of the mean bore diameter of the shaft washer for a double directions thrust bearings, in a single radial plane.

V_{dp} - bore diameter variation in a single radial plane; or bore diameter variation of the shaft washer in a single radial plane, for single direction thrust bearings $V_{dp} = d_{psmax} - d_{psmin}$

V_{d2p} - bore diameter variation of the shaft washer for double directions thrust bearings, in a single radial plane

V_{dmp} - mean bore diameter variation (valid only for cylindrical bore) $V_{dmp} = d_{mpmax} - d_{mpmin}$

α - nominal half-angle of the tapered bore

D - nominal outside diameter or housing washer nominal diameter

D_1 - nominal outside diameter of the outer ring rib

D_s - single outside diameter

D_{psmax} - maximum outside diameter in a single radial plane

D_{psmin} - minimum outside diameter in a single radial plane

ΔD_s - deviation of the single outside diameter $\Delta D_s = D_s - D$

D_{mp} - mean outside diameter, in a single plane = $(D_{psmax} + D_{psmin})/2$

Δ_{Dmp} - deviation of the mean outside diameter in a single radial plane; or deviation of the mean diameter of housing washer in a single radial plane, for thrust bearings $\Delta D_{mp} = D_{mp} - D$

V_{DP} - outside diameter variation in a single radial plane; or housing washer diameter variation in a single radial plane for double direction thrust bearings $V_{DP} = D_{psmax} - D_{psmin}$

V_{Dmp} - mean outside diameter variation

B - nominal width of the inner ring

B_s - single width of the inner ring

Δ_{Bs} - inner ring single width deviation $\Delta B_s = B_s - B$

V_{Bs} - inner ring single width variation

C - nominal width of the outer ring

C_s - single width of the outer ring

Δ_{Cs} - deviation of the outer ring single width $\Delta C_s = C_s - C$

V_{Cs} - single width variation of the outer ring $V_{Cs} = C_{smax} - C_{smin}$

T - nominal width of tapered roller bearings

T_s - single width of tapered roller bearings

Δ_{Ts} - deviation of the single width of taper roller bearings $\Delta T_s = T_s - T$

T_1 - nominal width of the inner ring and tapered roller assembly

T_{1s} - single width of the inner ring and tapered roller assembly

Δ_{T1s} - deviation of the single width of inner ring and tapered roller assembly $\Delta T_{1s} = T_{1s} - T_1$

T_2 - nominal width of the outer ring assembly

T_{2s} - single width of the outer ring assembly

Δ_{T2s} - deviation of the single width of outer ring assembly $\Delta T_{2s} = T_{2s} - T_2$

K_{ia} - radial runout of assembled bearing inner ring

K_{ea} - radial runout of assembled bearing outer ring

S_d - side face runout with reference to bore of the inner ring

S_D - variation in inclination of outside cylindrical surface to outer ring side face

S_{ia} - side face runout of assembled inner ring with reference to raceway

S_{ea} - side face runout of assembled outer ring with reference to raceway

S_i - thickness variation measured from middle of raceway to back seating face of shaft washer

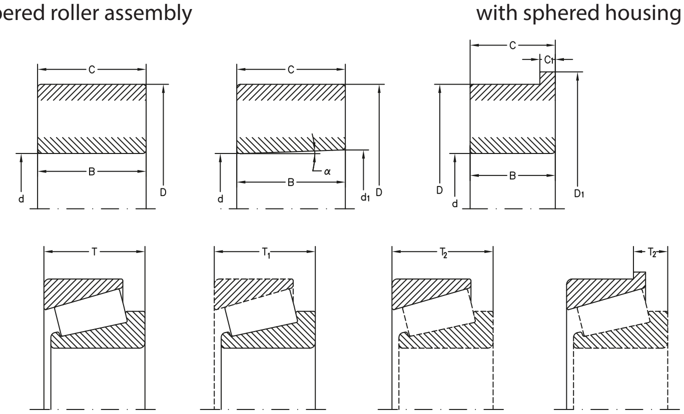
S_e - thickness variation measured from middle of raceway to back face of housing washer

Δ_{Hs} - deviation of mounting height of single direction thrust ball and roller bearings

Δ_{H1s} - deviation of mounting height of thrust ball bearings with sphered housing washer

Δ_{H2s} - deviation of mounting height of double direction thrust ball and roller bearings

Δ_{H3s} - deviation of mounting height of double direction thrust ball bearings with sphered housing washer



Radial bearings (excepting tapered roller bearings)
Tolerance class P0

Inner ring

Deviations µm — Table 3.1

d mm		Δ_{dmp}		V_{dp} Diameter series 7,8,9	V_{dp} Diameter series 0,1	V_{dp} Diameter series 2,3,4	V_{dmp}	K_{ia}	Δ_{Bs} all	Δ_{Bs} normal	Δ_{Bs} modified[2)]	V_{Bs}
over	up to	high	low	max.	max.	max.	max.	max.	high	low	low	max.
0,6[1)]	**2,5**	0	-8	10	8	6	6	10	0	-40	-	12
2,5	**10**	0	-8	10	8	6	6	10	0	-120	-250	15
10	**18**	0	-8	10	8	6	6	10	0	-120	-250	20
18	**30**	0	-10	13	10	8	8	13	0	-120	-250	20
30	**50**	0	-12	15	12	9	9	15	0	-120	-250	20
50	**80**	0	-15	19	19	11	11	20	0	-150	-380	25
80	**120**	0	-20	25	25	15	15	25	0	-200	-380	25
120	**180**	0	-25	31	31	19	19	30	0	-250	-500	30
180	**250**	0	-30	38	38	23	23	40	0	-300	-500	30
250	**315**	0	-35	44	44	26	26	50	0	-350	-500	35
315	**400**	0	-40	50	50	30	30	60	0	-400	-630	40
400	**500**	0	-45	56	56	34	34	65	0	-450	-	50
500	**630**	0	-50	63	63	38	38	70	0	-500	-	60
630	**800**	0	-75	-	-	-	-	80	0	-750	-	70

1) This value included.
2) It refers to isolated bearing ring for paired mounting or stack mounting.

Outer ring

Deviations µm — Table 3.2

D mm		Δ_{Dmp}		V_{Dp}[3] Open bearings, Diameter series 7,8,9	V_{Dp}[3] Open bearings, Diameter series 0,1	V_{Dp}[3] Open bearings, Diameter series 2,3,4	V_{Dp}[3] Shielded bearings[2)] 2,3,4	V_{Dmp}[3]	K_{ea}	Δ_{Cs}		V_{Cs}
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	max.
2,5[1)]	**6**	0	-8	10	8	6	10	6	15	Values are identical to Δ_{Bs} and V_{Bs} for the inner ring of the same bearing.		
6	**18**	0	-8	10	8	6	10	6	15			
18	**30**	0	-9	12	9	7	12	7	15			
30	**50**	0	-11	14	11	8	16	8	20			
50	**80**	0	-13	16	13	10	20	10	25			
80	**120**	0	-15	19	19	11	26	11	35			
120	**150**	0	-18	23	23	14	30	14	40			
150	**180**	0	-25	31	31	19	38	19	45			
180	**250**	0	-30	38	38	23	-	23	50			
250	**315**	0	-35	44	44	26	-	26	60			
315	**400**	0	-40	50	50	30	-	30	70			
400	**500**	0	-45	56	56	34	-	34	80			
500	**630**	0	-50	63	63	38	-	38	100			
630	**800**	0	-75	94	94	55	-	55	120			
800	**1000**	0	-10	125	125	75	-	75	140			

1)This value included.
2)For bearings of diameter series 7,8,9,0 and 1 values are not indicated
3)Values are valid before mounting the snap ring or shields or after their dismounting.

Tolerance class P6

Inner ring

Deviations µm — Table 3.3

d mm		Δ_{dmp}		V_{dp}			V_{dmp}	K_{ia}	Δ_{Bs}			V_{Bs}
				Diameter series					all	normal	modified[2)]	
				7,8,9	0,1	2,3,4						
over	up to	high	low	max.	max.	max.	max.	max.	high	low	low	max.
0,6[1)]	**2,5**	0	– 7	9	7	5	5	5	0	– 40	–	12
2,5	**10**	0	– 7	9	7	5	5	6	0	– 120	– 250	15
10	**18**	0	– 7	9	7	5	5	7	0	– 120	– 250	20
18	**30**	0	– 8	10	8	6	6	8	0	– 120	– 250	20
30	**50**	0	– 10	13	10	8	8	10	0	– 120	– 250	20
50	**80**	0	– 12	15	15	9	9	10	0	– 150	– 380	25
80	**120**	0	– 15	19	19	11	11	13	0	– 200	– 380	25
120	**180**	0	– 18	23	23	14	14	18	0	– 250	– 500	30
180	**250**	0	– 22	28	28	17	17	20	0	– 300	– 500	30
250	**315**	0	– 25	31	31	19	19	25	0	– 350	– 500	35
315	**400**	0	– 30	38	38	23	23	30	0	– 400	– 630	40
400	**500**	0	– 35	44	44	26	26	35	0	– 450	–	55
500	**630**	0	– 40	50	50	30	30	40	0	– 500	–	50

1) This value included.
2) It refers to isolated bearing ring for paired mounting or stack mounting.

Outer ring

Deviations µm — Table 3.4

D mm		Δ_{Dmp}		V_{Dp}[3]				V_{Dmp}[3]	K_{ea}	Δ_{Cs}		V_{Cs}
				Open bearings			Shielded bearings[2]					
				Diameter series								
				7,8,9	0,1	2,3,4	0,1,2,3,4					
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	max.
2,5[1)]	**6**	0	-7	9	7	5	9	5	8	Values are identical to Δ_{Bs} and V_{Bs} for the inner ring		
6	**18**	0	-7	9	7	5	9	5	8			
18	**30**	0	-8	10	8	6	10	6	9			
30	**50**	0	-9	11	9	7	13	7	10			
50	**80**	0	-11	14	11	8	16	8	13			
80	**120**	0	-13	16	16	10	20	10	18			
120	**150**	0	-15	19	19	11	25	11	20			
150	**180**	0	-18	23	23	14	30	14	23			
180	**250**	0	-20	25	25	15	-	15	25			
250	**315**	0	-25	31	31	19	-	19	30			
315	**400**	0	-28	35	35	21	-	21	35			
400	**500**	0	-33	41	41	25	-	25	40			
500	**630**	0	-38	48	48	29	-	29	50			
630	**800**	0	-45	56	56	34	-	34	60			
800	**1000**	0	-60	75	75	45	-	45	75			

1) This value included.
2) For bearings of diameter series 7,8,9,0 and 1 values are not indicated
3) Values are valid before mounting the snap ring or shields or after their dismounting

Tolerance class P5

Inner ring													
Deviations µm													Table 3.5
d mm		**Δ_{dp}**		**V_{dp}**		**V_{dmp}**	**K_{ia}**	**S_d**	**S_{ia}**[2)]	**Δ_{Bs}**			**V_{Bs}**
				Diameter series						all	normal	modified[3)]	
				7,8,9	0,1,2,3,4								
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	low	max.
0,6[1)]	**2,5**	0	-5	5	4	3	4	7	7	0	-40	-250	5
2,5	**10**	0	-5	5	4	3	4	7	7	0	-40	-250	5
10	**18**	0	-5	5	4	3	4	7	7	0	-80	-250	5
18	**30**	0	-6	6	5	3	4	8	8	0	-120	-250	5
30	**50**	0	-8	8	6	4	5	8	8	0	-120	-250	5
50	**80**	0	-9	9	7	5	5	8	8	0	-150	-250	6
80	**120**	0	-10	10	8	5	6	9	9	0	-200	-380	7
120	**180**	0	-13	13	10	7	8	10	10	0	-250	-380	8
180	**250**	0	-15	15	12	8	10	11	13	0	-300	-500	10
250	**315**	0	-18	18	14	9	13	13	15	0	-350	-500	13
315	**400**	0	-23	23	18	12	15	15	20	0	-400	-630	15

1) This value included.
2) Applies only to ball bearings.
3) It refers to single bearing ring for paired mounting or stack mounting.

Outer ring												
Deviations µm												Table 3.6
D mm		**Δ_{Dmp}**		**V_{Dp}**[2]		**V_{Dmp}**	**K_{ea}**	**S_D**	**S_{ea}**[3]	**Δ_{Cs}**		**V_{Cs}**
				Diameter series								
				7,8,9	0,1,2,3,4							
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	max.
2,5[1)]	**6**	0	-5	5	4	3	5	8	8	Identical to Δ_{Bs} for the inner ring		5
6	**18**	0	-5	5	4	3	5	8	8			5
18	**30**	0	-6	6	5	3	6	8	8			5
30	**50**	0	-7	7	5	4	7	8	8			5
50	**80**	0	-9	9	7	5	8	8	10			6
80	**120**	0	-10	10	8	5	10	9	11			8
120	**150**	0	-11	11	8	6	11	10	13			8
150	**180**	0	-13	13	10	7	13	10	14			8
180	**250**	0	-15	15	11	8	15	11	15			10
250	**315**	0	-18	18	14	9	18	13	18			11
315	**400**	0	-20	20	15	10	20	13	20			13
400	**500**	0	-23	23	17	12	23	15	23			15
500	**630**	0	-28	28	21	14	25	18	25			18
630	**800**	0	-35	35	26	18	30	20	30			20

1) This value included.
2) Do not apply to shielded bearings.
3) Apply to ball bearings.

Tolerance class P4

Inner ring

Deviations µm — Table 3.7

d mm		Δ_{dmp}, Δ_{ds} 2)		V_{dp} Diameter series 7,8,9	V_{dp} Diameter series 0,1,2,3,4	V_{dmp}	K_{ia}	S_d	S_{ia} 3)	Δ_{Bs} all	Δ_{Bs} normal	Δ_{Bs} modified 4)	V_{Bs}
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	low	max.
0,6 1)	**2,5**	0	-4	4	3	2	2,5	3	3	0	-40	-250	2,5
2,5	**10**	0	-4	4	3	2	2,5	3	3	0	-40	-250	2,5
10	**18**	0	-4	4	3	2	2,5	3	3	0	-80	-250	2,5
18	**30**	0	-5	5	4	2,5	3	4	4	0	-120	-250	2,5
30	**50**	0	-6	6	5	3	4	4	4	0	-120	-250	3
50	**80**	0	-7	7	5	3,5	4	5	5	0	-150	-250	4
80	**120**	0	-8	8	6	4	5	5	5	0	-200	-380	4
120	**180**	0	-10	10	8	5	6	6	7	0	-250	-380	5
180	**250**	0	-12	12	9	6	8	7	8	0	-300	-500	6

1) This value included.
2) Applies only to bearings of diameter series 0,1,2,3,4.
3) Apply only to ball bearings.
4) It refers to single bearing ring for paired mounting or stack mounting.

Outer ring

Deviations µm — Table 3.8

D mm		Δ_{Dmp}, Δ_{Ds} 2		V_{Dp} 3 Diameter series 7,8,9	V_{Dp} 3 Diameter series 0,1,2,3,4	V_{Dmp}	K_{ea}	S_D	S_{ea} 4	Δ_{Cs}		V_{Cs}
over	up to	high	low	max.	max.	max.	max.	max.	max.	high	low	max.
2,5 1)	**6**	0	-4	4	3	2	3	4	5	Identical to Δ_{Bs} for the inner ring		2,5
6	**18**	0	-4	4	3	2	3	4	5			2,5
18	**30**	0	-5	5	4	2,5	4	4	5			2,5
30	**50**	0	-6	6	5	3	5	4	5			2,5
50	**80**	0	-7	7	5	3,5	5	4	5			3
80	**120**	0	-8	8	6	4	6	5	6			4
120	**150**	0	-9	9	7	5	7	5	7			5
150	**180**	0	-10	10	8	5	8	5	8			5
180	**250**	0	-11	11	8	6	10	7	10			7
250	**315**	0	-13	13	10	7	11	8	10			7
315	**400**	0	-15	15	11	8	13	10	13			8

1) This value included.
2) Apply to bearings of diameter series 0,1,2,3 and 4.
3) Do not apply to sealed and shielded bearings.
4) Apply only to ball bearings.

Tolerance class P2

Inner ring

Deviations µm — Table 3.9

d mm over	up to	Δ_{dmp}, Δ_{ds} high	low	max.	V_{dp} max.	V_{dmp} max.	K_{ia} max.	S_d max.	S_{ia}[2] all high	Δ_{Bs} normal low	modified[4] low	V_{Bs} max
0,6[1]	**2,5**	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-40	-250	1,5
2,5	**10**	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-40	-250	1,5
10	**18**	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-80	-250	1,5
18	**30**	0	-2,5	2,5	1,5	2,5	1,5	2,5	0	-120	-250	1,5
30	**50**	0	-2,5	2,5	1,5	2,5	1,5	2,5	0	-120	-250	1,5
50	**80**	0	-4	4	2	2,5	1,5	2,5	0	-150	-250	1,5
80	**120**	0	-5	5	2,5	2,5	2,5	2,5	0	-200	-380	2,5
120	**150**	0	-7	7	3,5	2,5	2,5	2,5	0	-250	-380	2,5
150	**180**	0	-7	7	3,5	5	4	5	0	-300	-380	4
180	**250**	0	-8	8	4	5	5	5	0	-350	-500	5

1) This value included.
2) Apply only to ball bearings.

Outer ring

Deviations µm — Table 3.10

D mm over	up to	Δ_{Dmp}, Δ_{Ds} high	low	V_{Dp} max.	V_{Dmp} max.	K_{ea} max.	S_D[2),3)] max.	S_{ea}[3] max.	Δ_{Cs} high	low	V_{Cs} max.
2,5[1]	**6**	0	-2,5	2,5	1,5	1,5	1,5	1,5	Identical to ΔB_s for the inner ring.		1,5
6	**18**	0	-2,5	2,5	1,5	1,5	1,5	1,5			1,5
18	**30**	0	-4	4	2	2,5	1,5	2,5			1,5
30	**50**	0	-4	4	2	2,5	1,5	2,5			1,5
50	**80**	0	-4	4	2	4	1,5	4			1,5
80	**120**	0	-5	5	2,5	5	2,5	5			2,5
120	**150**	0	-5	5	2,5	5	2,5	5			2,5
150	**180**	0	-7	7	3,5	5	2,5	5			2,5
180	**250**	0	-8	8	4	7	4	7			4
250	**315**	0	-8	8	4	7	5	7			5
315	**400**	0	-10	10	5	8	7	8			7

1) This value included.
2) De not apply to bearings with rib on the outer ring
3) Apply only to ball bearings.

Tolerance class SP

Inner ring															
Deviations µm															Table 3.11
		Cylindrical bore			Tapered bore										
d mm		**Δ_{dmp}, Δ_{ds}** 2)		**V_{dp}**	**Δ_{ds}**		**V_{dp}**	**Δ_{d1mp}-Δ_{dmp}**		**Δ_{Bs}**		**V_{Bs}**	**K_{ia}**	**S_d**	**S_{ia}**
over	up to	low	high	max.	low	high	max.	low	high	low	high	max.	max.	max.	max
-	**18**	-5	0	3	-	-	-	-	-	-100	0	5	3	8	8
18	**30**	-6	0	3	0	+10	3	0	+4	-100	0	5	3	8	8
30	**50**	-8	0	4	0	+12	4	0	+4	-125	0	5	4	8	8
50	**80**	-9	0	5	0	+15	5	0	+5	-150	0	6	4	8	8
80	**120**	-10	0	5	0	+20	5	0	+6	-200	0	7	5	9	9
120	**180**	-13	0	7	0	+25	7	0	+8	-250	0	8	6	10	10
180	**250**	-15	0	8	0	+30	8	0	+10	-300	0	10	8	11	13
250	**315**	-18	0	9	0	+35	9	0	+12	-350	0	13	10	13	15
315	**400**	-23	0	12	0	+40	12	0	+13	-400	0	15	12	15	20

Outer ring									
Deviations µm									Table 3.12
D mm		**Δ_{Dmp}, Δ_{Ds}**		**V_{Dp}**	**K_{ea}**	**S_D**	**S_{ea}**	**Δ_{Cs}**	**V_{Cs}**
over	up to	low	high	max.	max.	max.	max.	high	max.
30	**50**	-7	0	4	5	8	8	Identical to Δ_{BS} and V_{BS} for the inner ring	
50	**80**	-9	0	5	5	8	10		
80	**120**	-10	0	5	6	9	11		
120	**150**	-11	0	6	7	10	13		
150	**180**	-13	0	7	8	10	14		
180	**250**	-15	0	8	10	11	15		
250	**315**	-18	0	9	11	13	18		
315	**400**	-20	0	10	13	13	20		
400	**500**	-23	0	18	20	20	30		

Tolerance class UP

Inner ring

Deviations µm — Table 3.13

d mm		Cylindrical bore $\Delta_{dmp}, \Delta_{ds}$ [2]		V_{dp}	Δ_{ds}	Tapered bore V_{dp}		$\Delta_{d1mp}-\Delta_{dmp}$		Δ_{Bs}		V_{Bs}	K_{ia}	S_d	S_{ia}
over	up to	low	high	max.	low	high	max.	low	high	low	high	max.	max.	max.	max
-	**18**	-4	0	2	0	-	-	-	-	-25	0	1,5	1,5	2	3
18	**30**	-5	0	3	0	+6	3	0	+2	-25	0	1,5	1,5	3	3
30	**50**	-6	0	3	0	+8	3	0	+3	-30	0	2	2	3	3
50	**80**	-7	0	4	0	+9	4	0	+3	-40	0	3	2	4	3
80	**120**	-8	0	4	0	+10	4	0	+4	-50	0	3	3	4	4
120	**180**	-10	0	5	0	+13	5	0	+5	-60	0	4	3	5	6
180	**250**	-12	0	6	0	+15	6	0	+7	-75	0	5	4	6	7
250	**315**	-18	0	9	0	+18	9	0	+8	-90	0	6	5	6	8
315	**400**	-23	0	12	0	+23	12	0	+9	-100	0	8	6	8	9

Outer ring

Deviations µm — Table 3.14

D mm		$\Delta_{Dmp}, \Delta_{Ds}$		V_{Dp}	K_{ea}	S_D	S_{ea}	Δ_{Cs}	V_{Cs}
over	up to	low	high	max.	max.	max.	max.	high	max.
30	**50**	-5	0	3	3	2	4	Identical to Δ_{BS} and V_{BS} for the inner ring	
50	**80**	-6	0	3	3	2	4		
80	**120**	-7	0	4	3	3	5		
120	**150**	-8	0	4	4	3	6		
150	**180**	-9	0	5	4	3	7		
180	**250**	-10	0	5	5	4	9		
250	**315**	-12	0	6	6	4	9		
315	**400**	-14	0	7	7	5	12		
400	**500**	-23	0	12	8	-	12		

3.2. Tappered roller bearings
Tolerance class P0 and P6X

Inner ring

Deviations µm — Table 3.15

d mm		Δ_{dmp}		V_{dp}	V_{dmp}	K_{ia}
over	up to	high	low	max.	max.	max.
10[1)]	**18**	0	-12	12	9	15
18	**30**	0	-12	12	9	18
30	**50**	0	-12	12	9	20
50	**80**	0	-15	15	11	25
80	**120**	0	-20	20	15	30
120	**180**	0	-25	25	19	35
180	**250**	0	-30	30	23	50
250	**315**	0	-35	35	26	60
315	**400**	0	-40	40	30	70

1) This value included.

Outer ring

Deviations µm — Table 3.16

D mm		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{ea}
over	up to	high	low	max.	max.	max.
18[1)]	**30**	0	-12	12	9	18
30	**50**	0	-14	14	11	20
50	**80**	0	-16	16	12	25
80	**120**	0	-18	18	14	35
120	**150**	0	-20	20	15	40
150	**180**	0	-25	25	19	45
180	**250**	0	-30	30	23	50
250	**315**	0	-35	35	26	60
315	**400**	0	-40	40	30	70
400	**500**	0	-45	45	34	80

1) This value included.
Note: Limit deviations of the diameter D_1 of the outer ring rib for bearings with ribs are in accordance with tolerance class h9.

Tolerance class P0

Inner and outer ring

Deviations µm — Table 3.17

d mm		Δ_{Bs}, Δ_{Cs}		Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
over	up to	high	low	high	low	high	low	high	low
10[1)]	**18**	0	-120	+200	0	+100	0	+100	0
18	**30**	0	-120	+200	0	+100	0	+100	0
30	**50**	0	-120	+200	0	+100	0	+100	0
50	**80**	0	-150	+200	0	+100	0	+100	0
80	**120**	0	-200	+200	-200	+100	-100	+100	-100
120	**180**	0	-250	+350	-250	+150	-150	+200	-100
180	**250**	0	-300	+350	-250	+150	-150	+200	-100
250	**315**	0	-350	+350	-250	+150	-150	+200	-100
315	**400**	0	-400	+400	-400	+200	-200	+200	-200

1) This value included.

Tolerance class P6X
Inner and outer ring

Diameter limit deviations and radial runout of the inner and outer ring for this tolerance class are the same as those of tolerance class P0.

Table 3.18

Deviations µm d mm		Δ_{Bs}		Δ_{Cs}		Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
over	up to	high	low	high	low	high	low	high	low	high	low
101)	**18**	0	-50	0	-100	+100	0	+50	0	+50	0
18	**30**	0	-50	0	-100	+100	0	+50	0	+50	0
30	**50**	0	-50	0	-100	+100	0	+50	0	+50	0
50	**80**	0	-50	0	-100	+100	0	+50	0	+50	0
80	**120**	0	-50	0	-100	+100	0	+50	0	+50	0
120	**180**	0	-50	0	-100	+150	0	+50	0	+100	0
180	**250**	0	-50	0	-100	+150	0	+50	0	+100	0
250	**315**	0	-50	0	-100	+200	0	+100	0	+100	0
315	**400**	0	-50	0	-100	+200	0	+100	0	+100	0

1) This value included.

Tolerance class P5

Inner ring

Table 3.19

Deviations µm d mm		Δ_{dmp}		V_{dp}	V_{dmp}	K_{ia}	S_d	Δ_{Bs}		Δ_{Ts}	
over	up to	high	low	max.	max.	max.	max.	high	low	high	low
101)	**18**	0	-7	5	5	5	7	0	-200	+200	-200
18	**30**	0	-8	6	5	5	8	0	-200	+200	-200
30	**50**	0	-10	8	5	6	8	0	-240	+200	-200
50	**80**	0	-12	9	6	7	8	0	-300	+200	-200
80	**120**	0	-15	11	8	8	9	0	-400	+200	-200
120	**180**	0	-18	14	9	11	10	0	-500	+350	-250
180	**250**	0	-22	17	11	13	11	0	-600	+350	-250

1) This value included.

Outer ring

Table 3.20

Deviations µm D mm		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{ea}	S_D	Δ_{Cs}	
over	up to	high	low	max.	max.	max.	max.	high	low
181)	**30**	0	-8	6	5	6	8	Identical to Δ_{Bs} for the inner ring	
30	**50**	0	-9	7	5	7	8		
50	**80**	0	-11	8	6	8	8		
80	**120**	0	-13	10	7	10	9		
120	**150**	0	-15	11	8	11	10		
150	**180**	0	-18	14	9	13	10		
180	**250**	0	-20	15	10	15	11		
250	**315**	0	-25	19	13	18	13		
315	**400**	0	-28	22	14	20	13		

1) This value included.

Tolerance class P4

Inner ring												
Deviations µm												Table 3.21
d mm		**Δ_{dmp}, Δ_{ds}**			**V_{dp}**	**V_{dmp}**	**K_{ia}**	**S_d**	**S_{ia}**	**Δ_{Bs}**		**Δ_{Ts}**
over	up to	high	low	max.	max.	max.	max.	max.	high	low	high	low
10[1)]	**18**	0	-5	4	4	3	3	3	0	-200	+200	-200
18	**30**	0	-6	5	4	3	4	4	0	-200	+200	-200
30	**50**	0	-8	6	5	4	4	4	0	-240	+200	-200
50	**80**	0	-9	7	5	4	5	4	0	-300	+200	-200
80	**120**	0	-10	8	5	5	5	5	0	-400	+200	-200
120	**180**	0	-13	10	7	6	6	7	0	-500	+350	-250
180	**250**	0	-15	11	8	7	7	8	0	-600	+350	-250

1) This value included.

Outer ring										
Deviations µm										Table 3.22
D mm		**Δ_{Dmp}, Δ_{Ds}**		**V_{Dp}**	**V_{Dmp}**	**K_{ea}**	**S_D**	**S_{ea}**	**Δ_{Cs}**	
over	up to	high	low	max.	max.	max.	max.		high	low
18[1)]	**30**	0	-6	5	4	4	4	5	Identical to Δ_{Bs} for the inner ring	
30	**50**	0	-7	5	5	5	4	5		
50	**80**	0	-9	7	5	5	4	5		
80	**120**	0	-10	8	5	6	5	6		
120	**150**	0	-11	8	6	7	5	7		
150	**180**	0	-13	10	7	8	5	8		
180	**250**	0	-15	11	8	10	7	10		
250	**315**	0	-18	14	9	11	8	10		
315	**400**	0	-20	15	10	13	10	13		

1) This value included.

Note: Limit deviations of the diameter D_1 of the outer ring rib for bearings with ribs are in accordance with tolerance class h9.

Tapered roller bearings, inch-metric sizes (AFBMA)

Inner ring - Δ_{dmp}

Deviations µm

Table 3.23

d mm		**Tolerances classes**									
		4		2		3		0		00	
over	up to	high	low	high	low	high	low	high	low	high	low
-	**76,2**	+13	0	+13	0	+13	0	+13	0	+8	0
76,2	**266,7**	+25	0	+25	0	+13	0	+13	0	+8	0
266,7	**304,8**	+25	0	+25	0	+13	0	+13	0	-	-

Outer ring - Δ_{Dmp}

Deviations µm

Table 3.24

D mm		**Tolerances classes**									
		4		2		3		0		00	
over	up to	high	low	high	low	high	low	high	low	high	low
-	**266,7**	+25	0	+25	0	+13	0	+13	0	+8	0
266,7	**304,8**	+25	0	+25	0	+13	0	+13	0	-	-
304,8	**609,6**	+51	0	+51	0	+25	0	-	-	-	-

Assembled bearing - K_{ia}, K_{ea}

Deviations µm

Table 3.25

D mm		**Tolerances classes**				
		4	2	3	0	00
over	up to	max.	max.	max.	max.	max.
-	**266,7**	51	38	8	4	2
266,7	**304,8**	51	38	8	4	-
304,8	**609,6**	51	38	18	-	-

Tapered roller bearings, inch-metric sizes (AFBMA)

Assembled bearing - Δ_{Ts}

Table 3.26

Deviations µm **d** mm		**Tolerances classes** 4		2		3		0		00	
over	up to	high	low	high	low	high	low	high	low	high	low
-	**101,6**	+203	-	+203	0	+203	-203	+203	-203	+203	-203
101,6	**266,7**	+356	-254	+203	0	+203	-203	+203	-203	+203	-203
266,7	**304,8**	+356	-254	+203	0	+203	-203	+203	-203	-	-

Inner roller ring - standard outer ring assembly - Δ_{T1s}

Table 3.27

Deviations µm **d** mm		**Tolerances classes** 4		2		3		0		00	
over	up to	high	low	high	low	high	low	high	low	high	low
-	**101,6**	+102	0	+102	0	+102	-102	+102	-102	+102	-102
101,6	**304,8**	+152	-152	+102	0	+102	-102	+102	-102	+102	-102

Outer ring with gauge inner ring assembly - Δ_{T2s}

Table 3.28

Deviations µm **d** mm		**Tolerances classes** 4		2		3		0		00	
over	up to	high	low	high	low	high	low	high	low	high	low
-	**101,6**	+102	0	+102	0	+102	-102	+102	-102	+102	-102
101,6	**304,8**	+203	-102	+102	0	+102	-102	+102	-102	+102	-102

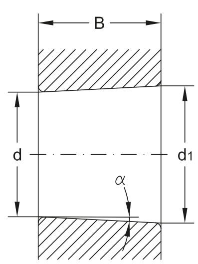
Tapered bore bearings

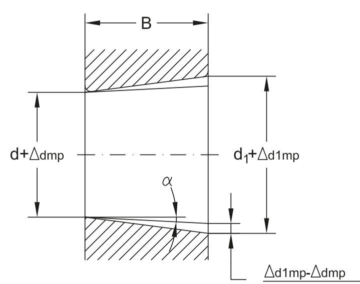
Taper 1:12											
Deviations µm											Table 3.29
d mm		**Normal tolerance class, P6**					**Tolerance class P5**				
		Δ_{dmp}		V_{dp} 1)	$\Delta_{d1mp} - \Delta_{dmp}$		Δ_{dmp}		V_{dp} 1)	$\Delta_{d1mp} - \Delta_{dmp}$	
over	up to	high	low	max.	high	low	high	low	max.	high	low
18	**30**	+21	0	13	+21	0	+13	0	13	+13	0
30	**50**	+25	0	15	+25	0	+16	0	15	+16	0
50	**80**	+30	0	19	+30	0	+19	0	19	+19	0
80	**120**	+35	0	25	+35	0	+22	0	22	+22	0
120	**180**	+40	0	31	+40	0	+25	0	25	+25	0
180	**250**	+46	0	38	+46	0	+29	0	29	+29	0
250	**315**	+52	0	44	+52	0	+32	0	32	+32	0
315	**400**	+57	0	50	+57	0	+36	0	36	+36	0

1) Applies in all single radial planes of the bore.

Taper 1:30						
Deviations µm						Table 3.30
d mm		**Normal tolerance class**				
		Δ_{dmp}		V_{dp} 1)	$\Delta_{d1mp} - \Delta_{dmp}$	
over	up to	high	low	max.	high	low
80	**120**	+20	0	25	+40	0
120	**180**	+25	0	31	+50	0
180	**250**	+30	0	38	+55	0
250	**315**	+35	0	44	+60	0
315	**400**	+40	0	50	+65	0

1) Applies in all singular planes.





Tapered bore
Half angle of taper, α

α =2º23'9,4" (taper 1:12)
α =0º57'17,4" (taper 1:30)

Nominal diameter, d_1 at the theoretical large end of bore

$$d1 = d + \frac{1}{12} B \text{ (taper 1:12)}$$

$$d1 = d + \frac{1}{30} B \text{ (taper 1:30)}$$

Thrust ball bearings

Shaft washer							
Deviations µm							Table 3.31
d şi d_2 mm		**P0;P6;P5** Δ_{dmp} Δ_{d2mp}		V_{dp} V_{d2p}	**P4;P2** Δ_{dmp} Δ_{d2mp}		V_{dp} V_{d2p}
over	up to	high	low	max.	high	low	max.
-	**18**	0	-8	6	0	-7	5
18	**30**	0	-10	8	0	-8	6
30	**50**	0	-12	9	0	-10	8
50	**80**	0	-15	11	0	-12	9
80	**120**	0	-20	15	0	-15	11
120	**180**	0	-25	19	0	-18	14
180	**250**	0	-30	23	0	-22	17
250	**315**	0	-35	26	0	-25	19
315	**400**	0	-40	30	0	-30	23
400	**500**	0	-45	34	0	-35	26
500	**630**	0	-50	38	0	-40	30

Housing washer							
Deviations µm							Table 3.32
D mm		**P0;P6;P5** Δ_{Dmp}		V_{Dp}	**P4;P2** Δ_{Dmp}		V_{Dp}
over	up to	high	low	max.	high	low	max.
10[1)]	**18**	0	-11	8	0	-7	5
18	**30**	0	-13	10	0	-8	6
30	**50**	0	-16	12	0	-9	7
50	**80**	0	-19	14	0	-11	8
80	**120**	0	-22	17	0	-13	10
120	**180**	0	-25	19	0	-15	11
180	**250**	0	-30	23	0	-20	15
250	**315**	0	-35	26	0	-25	19
315	**400**	0	-40	30	0	-28	21
400	**500**	0	-45	34	0	-33	25
500	**630**	0	-50	38	0	-38	29
630	**800**	0	-75	55	0	-45	34

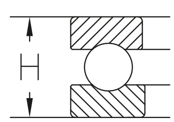
1) This value included.

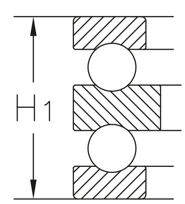
Variation of shaft washer and housing washer thickness							
Deviations µm							Table 3.33
d* mm		**S_i** **P0**	**P6**	**P5**	**P4**	**P2**	**Se** **P0;P6;P5;P4;P2**
over	up to	max.	max.	max.	max.	max.	max.
-	**18**	10	5	3	2	1	Identical to S_i for the shaft washer
18	**30**	10	5	3	2	1,2	
30	**50**	10	6	3	2	1,5	
50	**80**	10	7	4	3	2	
80	**120**	15	8	4	3	2	
120	**180**	15	9	5	4	3	
180	**250**	20	10	5	4	3	
250	**315**	25	13	7	5	4	
315	**400**	30	15	7	5	4	
400	**500**	30	18	9	6	-	
500	**630**	35	21	11	7	-	

*The values of S_i and S_e admitted for double direction thrust bearings are equal to the coresponding values of the single direction thrust bearings and are functions of the bore diameter d, of the single direction bearings.

Assembled thrust ball bearings
Bearing height

Deviations µm					Table 3.34
d mm		**Δ_{Hs}**		**Δ_{H1}**	
over	up to	high	low	high	low
18	**30**	+20	-250	+150	-400
30	**50**	+20	-250	+150	-400
50	**80**	+20	-300	+150	-500
80	**120**	+25	-300	+200	-500
120	**180**	+25	-400	+200	-600
180	**250**	+30	-400	+250	-600
250	**315**	+40	-400	+350	-700
315	**400**	+40	-500	+350	-700
400	**500**	+50	-500	+400	-900
500	**630**	+60	-600	+500	-1100





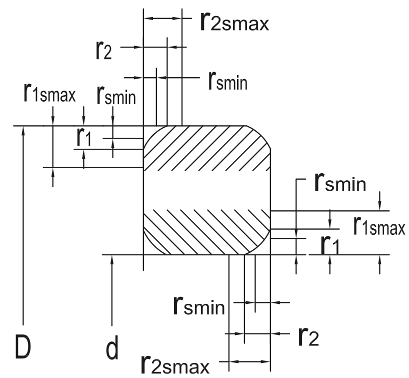
Mounting chamfer dimensions tolerances

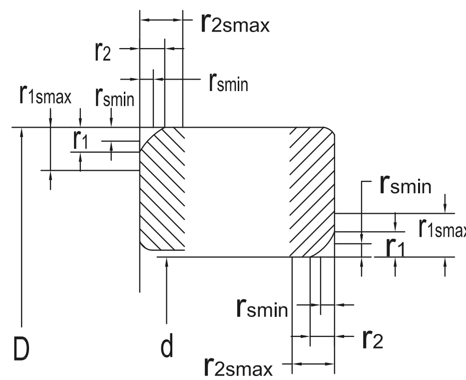
Symbols:
r_1, r_3 - chamfer dimension in radial direction,
r_2, r_4 - chamfer dimension in axial direction,
$r_{s\,min}$ - general symbol for minimum limit of r_1, r_2, r_3, r_4,
$r_{1s\,max}$, $r_{3s\,max}$ - maximum dimension in radial direction,
$r_{2s\,max}$, $r_{4s\,max}$ - maximum dimension in axial direction.

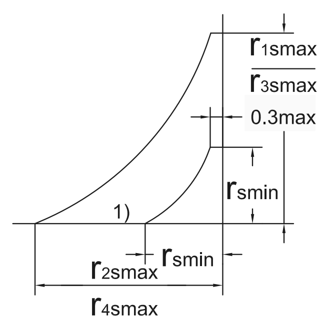
Mounting chamfer dimension limits for radial and thrust bearings

Values in mm Table 3.35

$r_{s\,min}$	d		Radial bearings r_{1s}, r_{3s}	Radial bearings r_{2s}, r_{4s}	Thrust bearings r_{1s}, r_{2s}
	over	up to	max.	max.	max.
0,1	-	-	0,2	0,4	0,2
0,15	-	-	0,3	0,6	0,3
0,2	-	-	0,5	0,8	0,5
0,3	-	40	0,6	1	0,8
	40	-	0,8	1	0,8
0,6	-	40	1	2	1,5
	40	-	1,3	2	1,5
1	-	50	1,5	3	2,2
	50	-	1,9	3	2,2
1,1	-	120	2	3,5	2,7
	120	-	2,5	4	2,7
1,5	-	120	2,3	4	3,5
	120	-	3	5	3,5
2	-	80	3	4,5	4
	220	-	3,8	6	4
	80	220	3,5	5	4
2,1	-	100	3,8	6	4,5
	-	280	4	6,5	4,5
	280	-	4,5	7	4,5
2,5	100	280	4,5	6	-
	280	-	5	7	-
3	-	280	5	8	5,5
	280	-	5,5	8	5,5
4	-	-	6,5	9	6,5
5	-	-	8	10	8
6	-	-	10	13	10
7,5	-	-	12,5	17	12,5

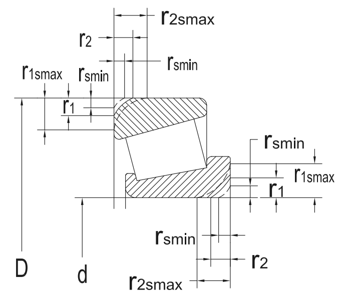






1) Only for d<30 mm

Mounting chamfer dimension limits for tapered roller bearings				
Values in mm				Table 3.36
$r_{s\,min}$	d,D		r_{1s}, r_{3s}	r_{2s}, r_{4s}
	high	low	max.	max.
0,3	- 40	40 -	0,7 0,9	1,4 1,6
0,6	- 40	40 -	1,1 1,3	1,7 2
1	- 50	50 -	1,6 1,9	2,5 3
1,5	- 120 250	120 250	2,3 2,8 3,5	3 3,5 4
2	- 120 250 250	120 250 - -	2,8 3,5 4 4,5	4 4,5 5 6
2,5	- 120	120 250	3,5 4	5 5,5
3	- 120 250 400	120 250 400 -	4 4,5 5 5,5	5,5 6,5 7 7,5
4	- 120 250 400	120 250 400 -	5 5,5 6 6,5	7 7,5 8 8,5
5	- 180	180 -	6,5 7,5	8 9
6	- 180	180 -	7,5 9	10 11



Mounting chamfer dimension limits for tapered roller bearings (inch-metric sizes)								
Values in mm								Table 3.37
Minimum values $r_{s\,min}$	**Inner ring Nominal bore diameter d**		**Maximum values** $r_{1s\,max}$	$r_{2s\,max}$	**Outer ring Nominal outer diameter D**		**Maximum** $r_{3s\,max}$	$r_{4s\,max}$
	over	up to			over	up to		
See bearing tables	- 50,8	50,8 101,6	$r_{s\,min}$+0,4 $r_{s\,min}$+0,5	$r_{s\,min}$+0,9 $r_{s\,min}$+1,3	- 101,6	101,6 168,3	$r_{s\,min}$+0,6 $r_{s\,min}$+0,6	$r_{s\,min}$+1,1 $r_{s\,min}$+1,2
	101,6	254	$r_{s\,min}$+0,6	$r_{s\,min}$+1,18	168,3 266,7	266,7 355,6	$r_{s\,min}$+0,8 $r_{s\,min}$+1,7	$r_{s\,min}$+1,4 $r_{s\,min}$+1,7
1 **1,5**	254 254	- -	1,9 3,5	3 4	355,6 355,6	- -	1,9 3,5	3 4
2,5 **3**	254 254	- -	4,5 5,5	6 7,5	355,6 355,6	- -	4,5 5,5	6 7,5
3,3 **3,5**	254 254	- -	6,5 6,5	9 9	355,6 355,6	- -	6,5 6,5	9 9
6,4 **8,5**	254 254	- -	12,5 15	17 19	355,6 355,6	- -	12,5 15	17 19

URB

Bearing applications

Locating bearings and non-locating bearings

Radial and axial loads in bearing units can be transmitted by locating and non-locating bearings.

A locations bearing is generally used for medium and large-sized shafts that can reach high temperatures during operation. It has to support radially the shaft assembly and to locate it axially in both directions.

A non-locating bearing supports the shaft assembly only radialy. It also allows axial displacement in relation to the housing to take place so that additional axial loading is avoided.

Axial displacement can take place either in the housing bore seating or in the bearing itseft.

In case the shaft is supported by more than two bearings, only one of them will be a locating bearing and it will be the one with the lightest radial load.

In case of small-sized shaft, two non-locating bearings with limited displacement can be used. Each of them can accommodate axial loads in a single direction, having thus mutual location.

Fig. 4.1 shows a few of the most representative applications of locating and non-locating bearings, as follows:

a) The locating bearing is a single row deep groove ball bearing and the non-locating one is a cylindrical roller bearing with both rings tightly fitted on the shaft and into the housing, respectively.

b) Both bearings are supported by spherical roller berings. The locating bearing is tightly fitted both on the shaft and into the housing. The non-locating bearing has the outer ring mounted with clearance into the housing and thus allows aaxial displacement in both directions.

c) The locating bearing consist of a cylindrical roller bearing, NUP type and the non-locating bearing consists of a cylindrical roller bearing, NU type.

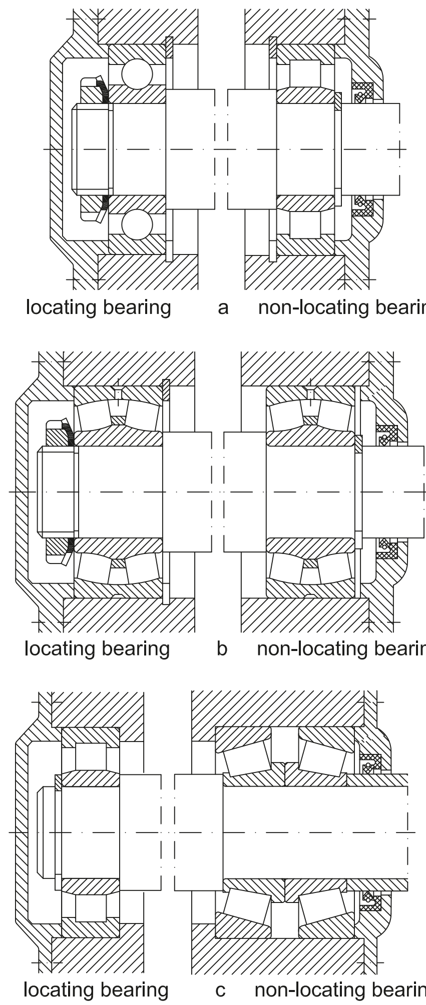


Fig. 4.1

d) The locating bearing consist of a cylindrical roller bearing, NUP type. The non-locating bearing consists of a cylindrical roller bearing, NU type.

e) The locating bearings consists of a cylindrical roller bearing, NU type which takes over radial loads and of a four-point contact ball bearing (unloaded on the outside). The non-locating bearing consists of a cylindrical roller bearing, NU type.

f) The locating bearing consists of a needle roller bearing, NA type which takes over radial loads and of a single row deep groove ball bearing (unloaded on the outside) which takes over axial loads in both directions. The non-locating bearing consists of a needle roller bearing, NA type.

g) The shafts bearings can also be X-type arrangement of two tapererd roller bearings which can be considered mutual located bearing.

Recommendation for bearing fit selection

Three main criteria have to be considered when selecting the bearing fit:

1. Firm loaction and uniform support of rings
2. Ease of mounting and dismounting
3. Axial displacement of non-locating bearing

The most common location is assured by tight fit.

A high tightening is recommended for roller bearings and large- sized bearings in comparasion to ball bearings of the same size.

In case of a tight fit, the inner ring is supported by the entire shaft contact surface, thus bearing is used at full load carrying capacity.

The tolerance classes given in table 4.1 and 4.3 are available for bearing fits which do not exceed +120°C during operation.

As a general rule, the selection of the tolerance class "H" is recommended for bearings of separable design and tolerance class "J" for bearings of non-separable design.

When selecting a fit, the load of rotating ring has to consider, namely:

- If the inner ring rotates and the load is stationary, the outer ring should be mounted with clearance fit.
- If the inner ring rotates and the load is stationary, the outer ring should be mounted with tight fit.
- If the inner ring rotates and the direction of load is not determined, both rings should be mounted with tight fit.

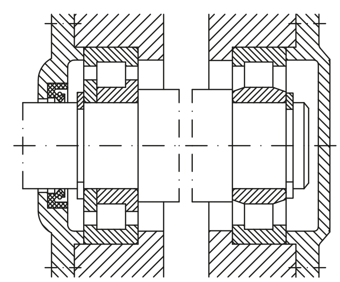
In table 4.1, there are given recommendations to select the tolerance class for shaft as function of: bearing type, loading and shaft diameter. In table 4.3, one can find recommendations to select the tolerance class for housing.

Figure 4.2 shows schematically the tolerance classes for shaft and housing and their influence over fit type i.e. clearance, transition or tight fit for housing and transition fit or tight fit for shaft, respectively.

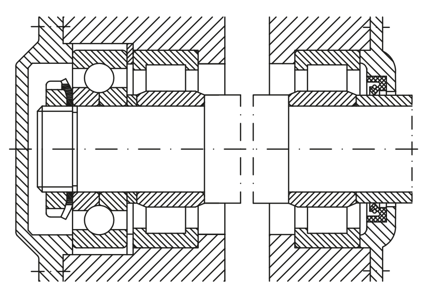
In tables 4.2 and 4.4, the deviations of the shaft diameter (4.2) and of the housing diameter (4.4) are given, considering the following:

- upper and lower limits
- theoretical minimum and maximum values of tightening (+) or clearance (-) in the fit
- the minimum and maximum values of the probable tightening or clearance in the fit (99% of fits are between these limits).

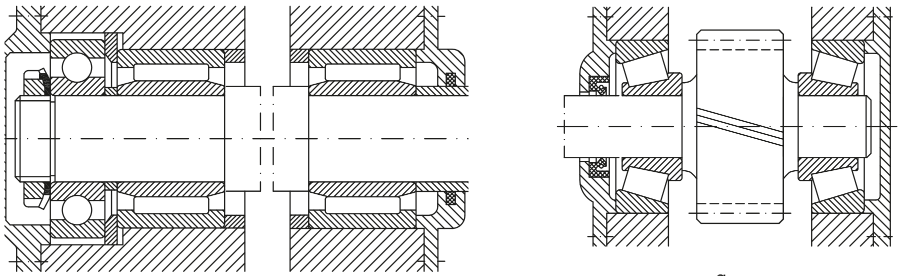
The tolerances of bore diameter d_{mp} and outside diameter D_{mp} are valid for all metric sized bearings, except tapered roller bearings with d<30 mm and D<150 mm and thrust ball bearings with D≤150 mm, (see table 3.15 and 3.16 on page 35 and table 3.31 and 3.32 on page 41)



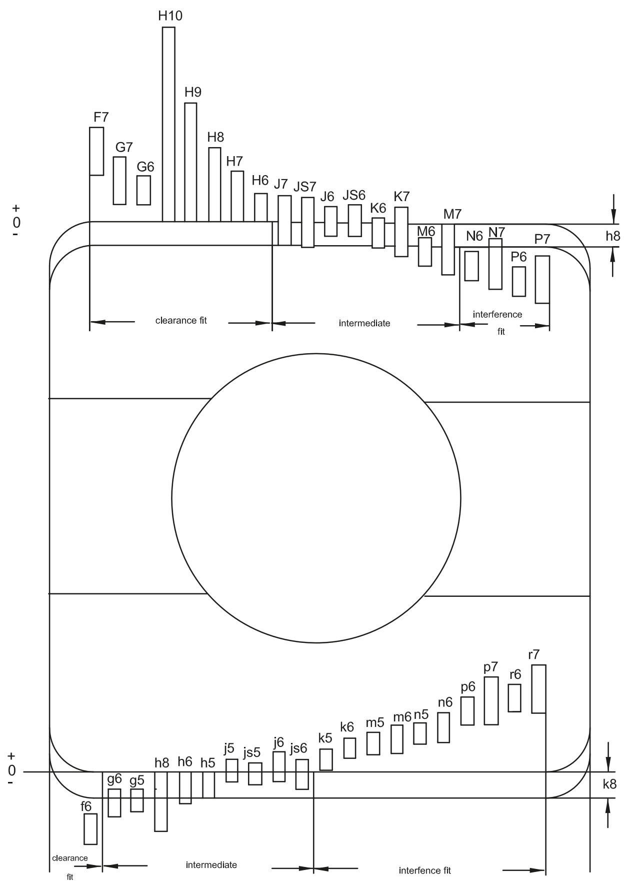
locating bearing d non-locating bearing



locating bearing e non-locating bearing



locating bearing
f
non-locating bearing
g



H10
H9
F7
H8
G7
H7
G6
H6
J7
JS7
J6
JS6
K6
K7
M7
M6
N6
N7
P7
P6
h8
+
0
-
clearance fit
intermediate
interference fit
r7
p7
r6
p6
n6
m5
m6
n5
k6
k5
j5
js5
j6
js6
h8
h6
h5
g6
g5
f6
k8
clearance fit
intermediate
interfence fit

Fig.4.2

Bearing application
Tolerance classes for shafts

Table 4.1

Operating conditions	Examples	Shaft diameter (mm) Ball bearings	Cylindrical, neddle and tapered roller bearings	Spherical roller bearings	Tolerance class symbol
Radial bearings with cylindrical core **Stationary inner ring load**					
Easy axial displacement of inner ring on shaft desirable	Wheels on non-rotating shafts (free wheels)	All diameters			g6(f6)
Axial displacement of inner ring on shaft not necessary	Tension pullyes, sheaves				h6
Rotating inner ring load					
Light and variable loads (P<0,006C)	Conveyers lightly loaded mechanisms, bearings	18...100 >100...140	≤40 >40...100	- -	j6 k6
Normal and heavy loads (P>0,06C)	General mechanical engineering, electric motors, turbines, pups, gearboxes, woodworking machines	≤18 >18...100 >100...140 >140...200 >200...280 - - -	- ≤40 >40...100 >100...140 >140...200 >200...400 - -	- ≤40 >40...65 >65...100 >100...140 >140...280 >280...500 >500	j5 k5(k6) m5(m6) m6 n6 p6 r6 r7
Heavy loads and shock loads, ardous working conditions (P>0,12C)	Heavy duty railway vehicles axle bearings, traction motors, rolling mills	- - -	>50...140 >140...200 200	>50...100 >100...200 >200	n6 p6 r6
High running accuracy, light loads (P<0,06C)	Machine tools	≤18 >18...100 >100...200 -	- ≤40 >40...100 >140...200	- - - -	h5 j5 k5 m5
Axial loads					
	All kind of bearing application	≤250 >250	≤250 >250	<250 >250	j6 js6

Bearing application
Tolerance classes for shafts

Table 4.1 (continue)

Operating conditions	Examples	Shaft diameter (mm) Ball bearings	Cylindrical, neddle and tapered roller bearings	Spherical roller bearings	Tolerance class symbol
Tapered bore bearings with withdrawal or adapter sleeve					
	Axle shaft for railway vehicles	All diameters			h9
	General mechanical engineering				h10
Thrust bearings **Axial loads**					
Thrust ball bearings		All sizes			h6
Cylindrical and needle roller thrust bearings		All sizes			h6(h8)
Cylindrical, needle roller and cage thrust assembly		All sizes			h8
Combined loads on spherical roller trust bearings					
Stationary load on shaft washer		⩽250			j6
		>250			js6
Rotating load on shaft washer or indeterminate load direction		⩽200			k6
		>200...400			m6
		>400			n8

Bearing application
Shaft fits

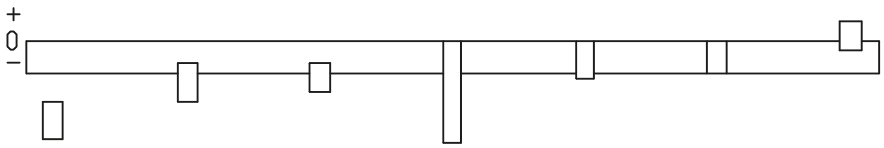


Table 4.2

Shaft Diameter nominal d		Bearing Bore diameter tolerance Δ_{dmp}		Deviations of shaft diameter, resultant fits Tolerances														
					f6		g6		g5		h8		h6		h5		j5	
over	up to	low	high	a) Deviations (shaft diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance														
mm		µm																
1	**3**	**-8**	**0**	a)	-6	-12	-2	-8	-2	-6	0	-14	0	-6	0	-4	+2	-2
				b)	+2	-12	+6	-8	+6	-6	+8	-14	+8	-6	+8	-4	+10	-0
				c)	0	-10	+4	-6	+5	-5	+6	-12	+6	-4	+7	-3	+9	-1
3	**6**	**-8**	**0**		-10	-18	-4	-12	-4	-9	0	-18	0	-8	0	-5	+3	-2
					-2	-18	+4	-12	+4	-9	+8	-18	+8	-8	+8	-5	+11	-2
					-4	-16	+2	-10	+3	-8	+5	-15	+6	-6	+7	-4	+10	-1
6	**10**	**-8**	**0**		-13	-22	-5	-14	-5	-11	0	-22	0	-9	0	-6	+4	-2
					-5	-22	+3	-14	+3	-11	+8	-22	+8	-9	+8	-6	+12	-2
					-7	-20	+1	-12	+1	-9	+5	-19	+6	-7	+6	-4	+10	0
10	**18**	**-8**	**0**		-16	-27	-6	-17	-6	-14	0	-27	0	-11	0	-8	+5	-3
					-8	-27	+2	-17	+2	-14	+8	-27	+8	-11	+8	-8	+13	-3
					-10	-25	0	-15	0	-12	+5	-24	+6	-9	+6	-6	+11	-1
18	**30**	**-10**	**0**		-20	-33	-7	-20	-7	-16	0	-33	0	-13	0	-9	+5	-4
					-10	-33	+3	-20	+3	-16	+10	-33	+10	-13	+10	-9	+15	-4
					-13	-30	0	-17	+1	-14	+6	-29	+7	-10	+8	-7	+13	-2
30	**50**	**-12**	**0**		-25	-41	-9	-25	-9	-20	0	-39	0	-16	0	-11	+6	-5
					-13	-41	+3	-25	+3	-20	+12	-39	+12	-16	+12	-11	+18	-5
					-17	-37	-1	-21	0	-17	+7	-34	+8	-12	+9	-8	+15	-2
50	**80**	**-15**	**0**		-30	-49	-10	-29	-10	-23	0	-46	0	-19	0	-13	+6	-7
					-15	-49	+5	-29	+5	-23	+15	-46	+15	-19	+15	-13	+21	-7
					-19	-45	+1	-25	+1	-19	+9	-40	+11	-15	+11	-9	+17	-3
80	**120**	**-20**	**0**		-36	-58	-12	-34	-12	-27	0	-54	0	-22	0	-15	+6	-9
					-16	-58	+8	-34	+8	-27	+20	-54	+20	-22	+20	-15	+26	-9
					-22	-52	+2	-28	+3	-22	+12	-46	+14	-16	+15	-10	+21	-4
120	**180**	**-25**	**0**		-43	-68	-14	-39	-14	-32	0	-63	0	-25	0	-18	+7	-11
					-18	-68	+11	-39	+11	-32	+25	-63	+25	-25	+25	-18	+32	-11
					-25	-61	+4	-32	+5	-26	+15	-53	+18	-18	+19	-12	+26	-5
180	**250**	**-30**	**0**		-50	-79	-15	-44	-15	-35	0	-72	0	-29	0	-20	+7	-13
					-20	-79	+15	-44	+15	-35	+30	-72	+30	-29	+30	-20	+37	-13
					-28	-71	+7	-36	+9	-29	+18	-60	+22	-21	+24	-14	+31	-7
250	**315**	**-35**	**0**		-56	-88	-17	-49	-17	-40	0	-81	0	-32	0	-23	+7	-16
					-21	-88	+18	-49	+18	-40	+35	-81	+35	-32	+35	-23	+42	-16
					-30	-79	+9	-40	+10	-32	+22	-68	+26	-23	+27	-15	+34	-8
315	**400**	**-40**	**0**		-62	-98	-18	-54	-18	-43	0	-89	0	-36	0	-25	+7	-18
					-22	-98	+22	-54	+22	-43	+40	-89	+40	-36	+40	-25	+47	-18
					-33	-87	+11	-43	+14	-35	+25	-74	+29	-25	+32	-17	+39	-10

Bearing application
Shaft fits

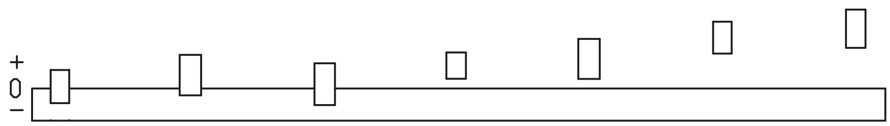


Table 4.2 (continued)

Shaft Diameter nominal d		Bearing Bore diameter tolerance Δ_{dmp}		Deviations of shaft diameter, resultant fits Tolerances	js5		j6		js6		k5		k6		m5		m6	
over	up to	low	high	a) Deviations (shaft diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance														
mm		µm																
1	**3**	**-8**	**0**	a)	+2	-2	+4	-2	+3	-3	+4	0	+6	0	+6	+2	+8	+2
				b)	+10	-2	+12	-2	+11	-3	+12	0	+14	0	+14	+2	+16	+2
				c)	+9	-1	+10	0	+9	-1	+11	+1	+12	+2	+13	+3	+14	+4
3	**6**	**-8**	**0**		+2,5	-2,5	+6	-2	+4	-4	+6	+1	+9	+1	+9	+4	+12	+4
					+10,5	-2,5	+14	-2	+12	-4	+14	+1	+17	+1	+17	+4	+20	+4
					+9	-1	+12	0	+10	-2	+13	+2	+15	+3	+16	+5	+18	+6
6	**10**	**-8**	**0**		+3	-3	+7	-2	+4,5	-4,5	+7	+1	+10	+1	+12	+6	+15	+6
					+11	-3	+15	-2	+12,5	-4,5	+15	+1	+18	+1	+20	+6	+23	+6
					+9	-1	+13	0	+11	-3	+13	+3	+16	+3	+18	+8	+21	+8
10	**18**	**-8**	**0**		+4	-4	+8	-3	+5,5	-5,5	+9	+1	+12	+1	+15	+7	+18	+7
					+12	-4	+16	-3	+13,5	-5,5	+17	+1	+20	+1	+23	+7	+26	+7
					+10	-2	+14	-1	+11	-3	+15	+3	+18	+3	+21	+9	+24	+9
18	**30**	**-10**	**0**		+4,5	-4,5	+9	-4	+6,5	-6,5	+11	+2	+15	+2	+17	+8	+21	+8
					+14,5	-4,5	+19	-4	+16,5	-6,5	+21	+2	+25	+2	+27	+8	+31	+8
					+12	-2	+16	-1	+14	-4	+19	+4	+22	+5	+25	+10	+28	+11
30	**50**	**-12**	**0**		+5,5	-5,5	+11	-5	+8	-8	+13	+2	+18	+2	+20	+9	+25	+9
					+17,5	-5,5	+23	-5	+20	-8	+25	+2	+30	+2	+32	+9	+37	+9
					+15	-3	+19	-1	+16	-4	+22	+5	+26	+6	+29	+12	+33	+13
50	**80**	**-15**	**0**		+6,5	-6,5	+12	-7	+9,5	-9,5	+15	+2	+21	+2	+24	+11	+30	+11
					+21,5	-6,5	+27	-7	+24,5	-9,5	+30	+2	+36	+2	+39	+11	+45	+11
					+18	-3	+23	-3	+20	-5	+26	+6	+32	+6	+35	+15	+41	+15
80	**120**	**-20**	**0**		+7,5	-7,5	+13	-9	+11	-11	+18	+3	+25	+3	+28	+13	+35	+13
					+27,5	-7,5	+33	-9	+31	-11	+38	+3	+45	+3	+48	+13	+55	+13
					+23	-3	+27	-3	+25	-5	+33	+8	+39	+9	+43	+18	+49	+19
120	**180**	**-25**	**0**		+9	-9	+14	-11	+12,5	-12,5	+21	+3	+28	+3	+33	+15	+40	+15
					+34	-9	+39	-11	+37,5	-12,5	+46	+3	+53	+3	+58	+15	+65	+15
					+28	-3	+32	-4	+31	-6	+40	+9	+46	+10	+52	+21	+58	+22
180	**250**	**-30**	**0**		+10	-10	+16	-13	+14,5	-14,5	+24	+4	+33	+4	+37	+17	+46	+17
					+40	-10	+46	-13	+44,5	-14,5	+54	+4	+63	+4	+67	+17	+76	+17
					+34	-4	+38	-5	+36	-6	+48	+10	+55	+12	+61	+23	+68	+25
250	**315**	**-35**	**0**		+11,5	-11,5	+16	-16	+16	-16	+27	+4	+36	+4	+43	+20	+52	+20
					+46,5	-11,5	+51	-16	+51	-16	+62	+4	+71	+4	+78	+20	+87	+20
					+39	-4	+42	-7	+42	-7	+54	+12	+62	+13	+70	+28	+78	+29
315	**400**	**-40**	**0**		+12,5	-12,5	+18	-18	+18	-18	+29	+4	+40	+4	+46	+21	+57	+21
					+52,5	-12,5	+58	-18	+58	-18	+69	+4	+80	+4	+86	+21	+97	+21
					+44	-4	+47	-7	+47	-7	+61	+12	+69	+15	+78	+29	+86	+32

Bearing application
Shaft fits

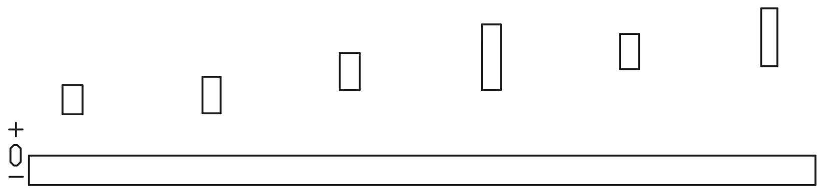


Table 4.2 (continued)

Shaft Diameter nominal d		Bearing Bore diameter tolerance Δ_{dmp}		Deviations of shaft diameter, resultant fits Tolerances	n5		n6		p6		p7		r6		r7	
over	up to	low	high	a) Deviations (shaft diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance												
mm		µm														
1	**3**	**-8**	**0**	a)	+8	+4	+10	+4	+12	+6	+16	+6	+16	+10	+20	+10
				b)	+16	+4	+18	+4	+20	+6	+24	+6	+24	+10	+28	+10
				c)	+15	+5	+16	+6	+18	+8	+22	+8	+22	+12	+26	+12
3	**6**	**-8**	**0**		+13	+8	+16	+8	+20	+12	+24	+12	+23	+15	+27	+15
					+21	+8	+24	+8	+28	+12	+32	+12	+31	+15	+35	+15
					+20	+9	+22	+10	+26	+14	+30	+14	+29	+17	+33	+17
6	**10**	**-8**	**0**		+16	+10	+19	+10	+24	+15	+30	+15	+28	+19	+34	+19
					+24	+10	+27	+10	+32	+15	+38	+15	+36	+19	+42	+19
					+22	+12	+25	+12	+30	+17	+35	+18	+34	+21	+39	+22
10	**18**	**-8**	**0**		+20	+12	+23	12	+29	+18	+36	+18	+34	+23	+41	+23
					+28	+12	+31	+12	+37	+18	+44	+18	+42	+23	+49	+23
					+26	+14	+29	+14	+35	+20	+41	+21	+40	+25	+46	+26
18	**30**	**-10**	**0**		+24	+15	+28	+15	+35	+22	+43	+22	+41	+28	+49	+28
					+34	+15	+38	+15	+45	+22	+53	+22	+51	+28	+59	+28
					+32	+17	+35	+18	+42	+25	+50	+25	+48	+31	+56	+31
30	**50**	**-12**	**0**		+28	+17	+33	+17	+42	+26	+51	+26	+50	+34	+59	+34
					+40	+17	+45	+17	+54	+26	+63	+26	+62	+34	+71	+34
					+37	+20	+41	+21	+50	+30	+59	+30	+58	+38	+67	+38
50	**65**	**-15**	**0**		+33	+20	+39	+20	+51	+32	+62	+32	+60	+41	+71	+41
					+48	+20	+54	+20	+66	+32	+77	+32	+75	+41	+86	+41
					+44	+24	+50	+24	+62	+36	+72	+37	+71	+45	+81	+46
65	**80**	**-15**	**0**		+33	+20	+39	+20	+51	+32	+62	+32	+62	+43	+73	+43
					+48	+20	+54	+20	+66	+32	+77	+32	+77	+43	+88	+43
					+44	+24	+50	+24	+62	+36	+72	+37	+73	+47	+83	+48
80	**100**	**-20**	**0**		+38	+23	+45	+23	+59	+37	+72	+37	+73	+51	+86	+51
					+58	+23	+65	+23	+79	+37	+92	+37	+93	+51	+106	+51
					+53	+28	+59	+29	+73	+43	+85	+44	+87	+57	+99	+58
100	**120**	**-20**	**0**		+38	+23	+45	+23	+59	+37	+72	+37	+76	+54	+89	+54
					+58	+23	+65	+23	+79	+37	+92	+37	+96	+54	+109	+54
					+53	+28	+59	+29	+73	+43	+85	+44	+90	+60	+102	+61
120	**140**	**-25**	**0**		+45	+27	+52	+27	+68	+43	+83	+43	+88	+63	+103	+63
					+70	+27	+77	+27	+93	+43	+108	+43	+113	+63	+128	+63
					+64	+33	+70	+34	+86	+50	+100	+51	+106	+70	+120	+71
140	**160**	**-25**	**0**		+45	+27	+52	+27	+68	+43	+83	+43	+90	+65	+105	+65
					+70	+27	+77	+27	+93	+43	+108	+43	+115	+65	+130	+65
					+64	+33	+70	+34	+86	+50	+100	+51	+108	+72	+122	+73
160	**180**	**-25**	**0**		+45	+27	+52	+27	+68	+43	+83	+43	+93	+68	+108	+68
					+70	+27	+77	+27	+93	+43	+108	+43	+118	+68	+133	+68
					+64	+33	+70	+34	+86	+50	+100	+51	+111	+75	+125	+76

Bearing application
Shaft fits

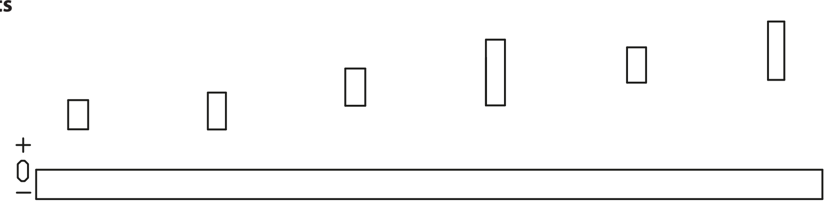


Table 4.2 (continued)

Shaft Diameter nominal d over	up to	Bearing Bore diameter tolerance Δ_{dmp} low	high	Deviations of shaft diameter, resultant fits Tolerances	n5		n6		p6		p7		r6		r7	
				a) Deviations (shaft diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance												
mm		µm														
180	**200**	**-30**	**0**	a)	+51	+31	+60	+31	+79	+50	+96	+50	+106	+77	+123	+77
				b)	+81	+31	+90	+31	+109	+50	+126	+50	+136	+77	+153	+77
				c)	+75	+37	+82	+39	+101	+58	+116	+60	+128	+85	+143	+87
200	**225**	**-30**	**0**		+51	+31	+60	+31	+79	+50	+96	+50	+109	+80	+126	+80
					+81	+31	+90	+31	+109	+50	+126	+50	+139	+80	+156	+80
					+75	+37	+82	+39	+101	+58	+116	+60	+131	+88	+146	+90
225	**250**	**-30**	**0**		+51	+31	+60	+31	+79	+50	+96	+50	+113	+84	+130	+84
					+81	+31	+90	+31	+109	+50	+126	+50	+143	+84	+160	+84
					+75	+37	+82	+39	+101	+58	+116	+60	+135	+92	+150	+94
250	**280**	**-35**	**0**		+57	+34	+66	+34	+88	+56	+108	+56	+126	+94	+146	+94
					+92	+34	+101	+34	+123	+56	+143	+56	+161	+94	+181	+94
					+84	+42	+92	+43	+114	+65	+131	+68	+152	+103	+169	+106
280	**315**	**-35**	**0**		+57	+34	+66	+34	+88	+56	+108	+56	+130	+98	+150	+98
					+92	+34	+101	+34	+123	+56	+143	+56	+165	+98	+185	+98
					+84	+42	+92	+43	+114	+65	+131	+68	+156	+107	+173	+110
315	**355**	**-40**	**0**		+62	+37	+73	+37	+98	+62	+119	+62	+144	+108	+165	+108
					+102	+37	+113	+37	+138	+62	+159	+62	+184	+108	+205	+108
					+94	+45	+102	+48	+127	+73	+146	+75	+173	+119	+192	+121
355	**400**	**-40**	**0**		+62	+37	+73	+37	+98	+62	+119	+62	+150	+114	+171	+114
					+102	+37	+113	+37	+138	+62	+159	+62	+190	+114	+211	+114
					+94	+45	+102	+48	+127	+73	+146	+75	+179	+125	+198	+127

Bearing application
Tolerance classes for housing bores
Radial bearings

Table 4.3

Solid housing

Operating conditions	Examples	Tolerance class symbol	Outer ring displacement
Rotating outer ring load			
Heavy loads on bearings in thin-walled housings, heavy shock lads (P>0,12C)	Roller bearing wheel hubs, connecting rod bearing	P7	Outer ring cannot be displaced
Normal and heavy loads (P>0,06C)	Ball bearing wheel hubs, connecting rod bearings, crane traveling wheels	N7	
Light and variable loads (P≤0,06C)	Conveyer rollers, rope sheaves, belt tension pulleys	M7	
Direction of load indeterminate			
Heavy shock loads	Traction motors	M7	Outer ring cannot be displaced
Normal and heavy loads (P > 0,06C). Outer ring displacement is not necessary	Electric motors, pumps crankshaft main bearings	K7	

Split or solid housing

Operating conditions	Examples	Tolerance class symbol	Outer ring displacement
Direction of load indeterminate			
Light and normal loads Desirable outer ring displacement (P≤0,12 C)	Medium-sized electric motors, pumps, crankshaft main bearings	J7	The outer ring can be displaced
Stationary outer ring load			
Loads of all kinds	General mechanical engineering, railway axleboxes	H7	The outer ring can be easily displaced
Light and normal loads with simple conditions (P≤0,12C)		H8	
Heat conduction through shaft	Drying cylinders, large electrical machines with spherical roller bearings	G7	

Bearing application

Tolerance classes for housing bores

Radial bearings

Split housing — Table 4.3 (continued)

Operating conditions	Examples	Tolerance class symbol	Outer ring displacement	
High accuracy rotation, quiet running				
High shiftness at variable loads	Main shafts for machine-tools with roller bearings	D≤125 D>125	M6 N6	The outer ring cannot be displaced
Light loads, indeterminate load direction	Shaft operating surface for grinding machines with ball bearing, free bearing for high speed superchargers	K6		The outer ring cannot be displaced
Desirable outer ring displacement	Shaft operating surface for grinding machines with ball bearings, free bearing for high speed superchargers	J6		The outer ring can be displaced
Quiet running	Small-sized electrical machines	H6		The outer ring can be easily displaced

Tolerance classes for housing bores

Thrust bearings

Thrust bearings

Operating conditions	Tolerance class symbol	Remarks
Axial load		
Thrust ball bearings Cylindrical and needle roller thrust bearings	H8 H7 (H9)	For less accurate bearing arrangements, radial clerance in housing can be up to 0,001 D
Combined loads on spherical roller thrust bearings		
Local load on housing washer Peripheral load on housing washer	H7(H9) M7	
Axial or combined load on spherical roller thrust bearings		
Bearing rdial location is ensured by another bearing	-	Housing washer fitted with clearance up to 0,001 D

Bearing application

Housing fits

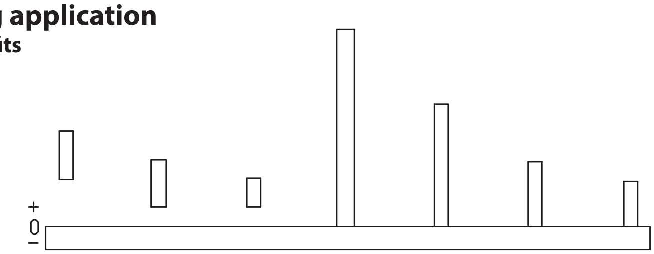


Table 4.4

Housing Diameter nominal D		Bearing Outside diameter tolerance Δ_{Dmp}		Deviations of housing bore diameter, resultant fits Tolerances	F7		G7		G6		H10		H9		H8		H7	
over	up to	low	high	a) Deviations (housing bore diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance														
mm		µm																
6	**10**	**0**	**-8**	a)	+13	+28	+5	+20	+5	+14	0	+58	0	+36	0	+22	0	+15
				b)	-13	-36	-5	-28	-5	-22	0	-66	0	-44	0	-30	0	-23
				c)	-16	-33	-8	-25	-7	-20	-3	-63	-3	-41	-3	-27	-3	-20
10	**18**	**0**	**-8**		+16	+34	+6	+24	+6	+17	0	+70	0	+43	0	+27	0	+18
					-16	-42	-6	-32	-6	-25	0	-78	0	-51	0	-35	0	-26
					-19	-39	-9	-29	-8	-23	-3	-75	-3	-48	-3	-32	-3	-23
18	**30**	**0**	**-9**		+20	+41	+7	+28	+7	+20	0	+84	0	+52	0	+33	0	+21
					-20	-50	-7	-37	-7	-29	0	-93	0	-61	0	-42	0	-30
					-23	-47	-10	-34	-10	-26	-4	-89	-4	-57	-3	-39	-3	-27
30	**50**	**0**	**-11**		+25	+50	-9	+34	+9	+25	0	+100	0	+62	0	+39	0	+25
					-25	-61	-9	-45	-9	-36	0	-111	0	-73	0	-50	0	-36
					-29	-57	-13	-41	-12	-33	-5	-106	-5	-68	-4	-46	-4	-32
50	**80**	**0**	**-13**		+30	+60	+10	+40	+10	+29	0	+120	0	+74	0	+46	0	+30
					-30	-73	-10	-53	-10	-42	0	-133	0	-87	0	-59	0	-43
					-35	-68	-15	-48	-14	-38	-6	-127	-5	-82	-5	-54	-5	-38
80	**120**	**0**	**-15**		+36	+71	+12	+47	+12	+34	0	+140	0	+87	0	+54	0	+35
					-36	-86	-12	-62	-12	-49	0	-155	0	-102	0	-69	0	-50
					-41	-81	-17	-57	-17	-44	-7	-148	-6	-96	-6	-63	-5	-45
120	**150**	**0**	**-18**		+43	+83	+14	+54	+14	+39	0	+160	0	+100	0	+63	0	+40
					-43	-101	-14	-72	-14	-57	0	-178	0	-118	0	-81	0	-58
					-50	-94	-21	-65	-20	-51	-8	-170	-8	-110	-7	-74	-7	-51
150	**180**	**0**	**-25**		+43	+83	+14	+54	+14	+39	0	+160	0	+100	0	+63	0	+40
					-43	-108	-14	-79	-14	-64	0	-185	0	-125	0	+88	0	-65
					-51	-100	-22	-71	-21	-57	-11	-174	-10	-115	-10	-78	-8	-57
180	**250**	**0**	**-30**		+50	+96	+15	+61	+15	+44	0	+185	0	+115	0	+72	0	+46
					-50	-126	-15	-91	-15	-74	0	-215	0	-145	0	-102	0	-76
					-60	-116	-25	-81	-23	-66	-13	-202	-13	-132	-12	-90	-10	-66
250	**315**	**0**	**-35**		+56	+108	-17	+69	+17	+49	0	+210	0	+130	0	+81	0	+52
					-56	-143	-17	-104	-17	-84	0	-245	0	-165	0	-116	0	-87
					-68	-131	-29	-92	-26	-75	-16	-229	-15	-150	-13	-103	-12	-75
315	**400**	**0**	**-40**		+62	+119	+18	+75	+18	+54	0	+230	0	+140	0	+89	0	+57
					-62	-159	-18	-115	-18	-94	0	-270	0	-180	0	-129	0	-97
					-75	-146	-31	-102	-29	-83	-18	-252	-17	-163	-15	-114	-13	-84
400	**500**	**0**	**-45**		+68	+131	+20	+83	+20	+60	0	+250	0	+155	0	+97	0	+63
					-68	-176	-20	-128	-20	-105	0	-295	0	-200	0	-142	0	-108
					-83	-161	-35	-113	-32	-93	-20	-275	-19	-181	-17	-125	-15	-93

Bearing application
Housing fits

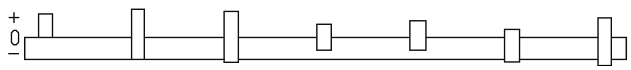


Table 4.4 (continued)

Housing Diameter nominal D		Bearing Outside diameter tolerance Δ_{Dmp}		Deviations of housing bore diameter, resultant fits Tolerances	H6		J7		JS7		J6		JS6		K6		K7	
over	up to	low	high	a) Deviations (housing bore diameter) b) Tightening/Theoretical clearance c) Tightening/Probable clearance														
mm		µm																
6	**10**	**0**	**-8**	a)	0	+9	-7	+8	-7,5	+7,5	-4	+5	-4,5	+4,5	-7	+2	-10	+5
				b)	0	-17	+7	-16	+7,5	-15,5	+4	-13	+4,5	-12,5	+7	-10	+10	-13
				c)	-2	-15	+4	-13	+5	-13	+2	-11	+3	-11	+5	-8	+7	-10
10	**18**	**0**	**-8**		0	+11	-8	+10	-9	+9	-5	+6	-5,5	+5,5	-9	+2	-12	+6
					0	-19	+8	-18	+9	-17	+5	-14	+5,5	-13,5	+9	-10	+12	-14
					-2	-17	+5	-15	+6	-14	+3	-12	+3	-11	+7	-8	+9	-11
18	**30**	**0**	**-9**		0	+13	-9	+12	-10,5	+10,5	-5	+8	-6,5	+6,5	-11	+2	-15	+6
					0	-22	+9	-21	+10,5	-19,5	+5	-17	+6,5	-15,5	+11	-11	+15	-15
					-3	-19	+6	-18	+7	-16	+2	-14	+4	-13	+8	-8	+12	-12
30	**50**	**0**	**-11**		0	+16	-11	+14	-12,5	+12,5	-6	+10	-8	+8	-13	+3	-18	+7
					0	-27	+11	-25	+12,5	-23,5	+6	-21	+8	-19	+13	-14	+18	-18
					-3	-24	+7	-21	+9	-20	+3	-18	+5	-16	+10	-11	+14	-14
50	**80**	**0**	**-13**		0	+19	-12	+18	-15	+15	-6	+13	-9,5	+9,5	-15	+4	-21	+9
					0	-32	+12	-31	+15	-28	+6	-26	+9,5	-22,5	+15	-17	+21	-22
					-4	-28	+7	-26	+10	-23	+2	-22	+6	-19	+11	-13	+16	-17
80	**120**	**0**	**-15**		0	+22	-13	+22	-17,5	+17,5	-6	+16	-11	+11	-18	+4	-25	+10
					0	-37	+13	-37	+17,5	-32,5	+6	-31	+11	-26	+18	-19	+25	-25
					-5	-32	+8	-32	+12	-27	+1	-26	+6	-21	+13	-14	+20	-20
120	**150**	**0**	**-18**		0	+25	-14	+26	-20	+20	-7	+18	-12,5	+12,5	-21	+4	-28	+12
					0	-43	+14	-44	+20	-38	+7	-36	+12,5	-30,5	+21	-22	+28	-30
					-6	-37	+7	-37	+13	-31	+1	-30	+7	-25	+15	-16	+21	-23
150	**180**	**0**	**-25**		0	+25	-14	+26	-20	+20	-7	+18	-12,5	+12,5	-21	+4	-28	+12
					0	-50	+14	-51	+20	-45	+7	-43	+2,5	-37,5	+21	-29	+28	-37
					-7	-43	+6	-43	+12	-37	0	-36	+6	-31	+14	-22	+20	-29
180	**250**	**0**	**-30**		0	+29	-16	+30	-23	+23	-7	+22	-14,5	+14,5	-24	+5	-33	+13
					0	-59	+16	-60	+23	-53	+7	-52	+14,5	-44,5	+24	-35	+33	-43
					-8	-51	+6	-50	+13	-43	-1	-44	+6	-36	+16	-27	+23	-33
250	**315**	**0**	**-35**		0	+32	-16	+36	-26	+26	-7	+25	-16	+16	-27	+5	-36	+16
					0	-67	+16	-71	+26	-61	+7	-60	+16	+51	+27	-40	+36	-51
					-9	-58	+4	-59	+14	-49	-2	-51	+7	-42	+18	-31	+24	-39
315	**400**	**0**	**-40**		0	+36	-18	+39	-28,5	+28,5	-7	+29	-18	+18	-29	+7	-40	+17
					0	-76	+18	-79	+28,5	-68,5	+7	-69	+18	-58	+29	-47	+40	-57
					-11	-65	+5	-66	+15	-55	-4	-58	+7	-47	+18	-36	+27	-44
400	**500**	**0**	**-45**		0	+40	-20	+43	-31,5	+31,5	-7	+33	-20	+20	-32	+8	-45	+18
					0	-85	+20	-88	+31,5	-76,5	+7	-78	+20	-65	+32	-53	+45	-63
					-12	-73	+5	-73	+17	-62	-5	-66	+8	-53	+20	-41	+30	-48

Bearing application
Housing fits

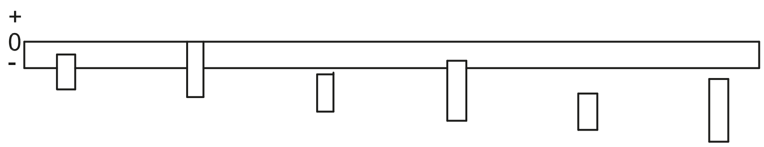


Table 4.4 (continued)

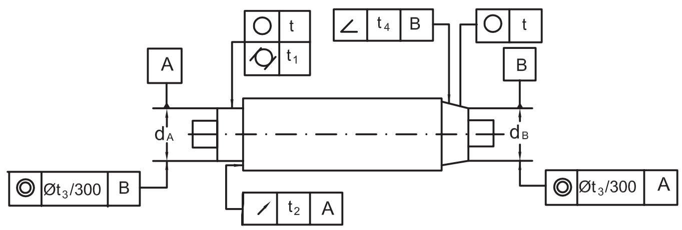
Deviations of housing bore diameter, resultant fits Tolerances

a) Deviations (housing bore diameter)
b) Tightening/Theoretical clearance
c) Tightening/Probable clearance

Housing Diameter nominal D over	up to	**Bearing Outside diameter tolerance Δ_{Dmp}** low	high		**M6**		**M7**		**N6**		**N7**		**P6**		**P7**	
mm		µm														
6	**10**	**0**	**-8**	a)	-12	-3	-15	0	-16	-7	-19	-4	-21	-12	-24	-9
				b)	+12	-5	+15	-8	+16	-1	+19	-4	+21	+4	+24	+1
				c)	+10	-3	+12	-5	+14	+1	+16	-1	+19	+6	+21	+4
10	**18**	**0**	**-8**		-15	-4	-18	0	-20	-9	-23	-5	-26	-15	-29	-11
					+15	-4	+18	-8	+20	+1	+23	-3	+26	+7	+29	+3
					+13	-2	+15	-5	+18	+3	+20	0	+24	+9	+26	+6
18	**30**	**0**	**-9**		-17	-4	-21	0	-24	-11	-28	-7	-31	-18	-35	-14
					+17	-5	+21	-9	+24	+2	+28	-2	+31	+9	+35	+5
					+14	-2	+18	-6	+21	+5	+25	+1	+28	+12	+32	+8
30	**50**	**0**	**-11**		-20	-4	-25	0	-28	-12	-33	-8	-37	-21	-42	-17
					+20	-7	+25	-11	+28	+1	+33	-3	+37	+10	+42	+6
					+17	-4	+21	-7	+25	+4	+29	+1	+34	+13	+38	+10
50	**80**	**0**	**-13**		-24	-5	-30	0	-33	-14	-39	-9	-45	-26	-51	-21
					+24	-8	+30	-13	+33	+1	+39	-4	+45	+13	+51	+8
					+20	-4	+25	-8	+29	+5	+34	+1	+41	+17	+46	+13
80	**120**	**0**	**-15**		-28	-6	-35	0	-38	-16	-45	-10	-52	-30	-59	-24
					+28	-9	+35	-15	+38	+1	+45	-5	+52	+15	+59	+9
					+23	-4	+30	-10	+33	+6	+40	0	+47	+20	+54	+14
120	**150**	**0**	**-18**		-33	-8	-40	0	-45	-20	-52	-12	-61	-36	-68	-28
					+33	-10	+40	-18	+45	+2	+52	-6	+61	+18	+68	+10
					+27	-4	+33	-11	+39	+8	+45	+1	+55	+24	+61	+17
150	**180**	**0**	**-25**		-33	-8	-40	0	-45	-20	-52	-12	-61	-36	-68	-28
					+33	-17	+40	-25	+45	-5	+52	-13	+61	+11	+68	+3
					+26	-10	+32	-17	+38	+2	+44	-5	+54	+18	+60	+11
180	**250**	**0**	**-30**		-37	-8	-46	0	-51	-22	-60	-14	-70	-41	-79	-33
					+37	-22	+46	-30	+51	-8	+60	-16	70	+11	+79	+3
					+29	-14	+36	-20	+43	0	+50	6	+62	+19	+69	+13
250	**315**	**0**	**-35**		-41	-9	-52	0	-57	-25	-66	-14	-79	-47	-88	-36
					+41	-26	+52	-35	+57	-10	+66	-21	+79	+12	+88	+1
					+32	-17	+40	-23	+48	-1	+54	-9	70	+21	+76	+13
315	**400**	**0**	**-40**		-46	-10	-57	0	-62	-26	-73	-16	-87	-51	-98	-41
					+46	-30	+57	-40	+62	-14	+73	-24	+87	+11	+98	+1
					+35	-19	+44	-27	+51	-3	+60	-11	+76	+22	+85	+14
400	**500**	**0**	**-45**		-50	-10	-63	0	-67	-27	-80	-17	-95	-55	-108	-45
					+50	-35	+63	-45	+67	-18	+80	-28	+95	+10	+108	0
					+38	-23	+48	-30	+55	-6	+65	-13	+83	+22	+93	+15

Deviations of form and position

Permissible deviations of form and position for shaft and housing where bearings are to be mounted are given in fig. 4.3 and table 4.5.



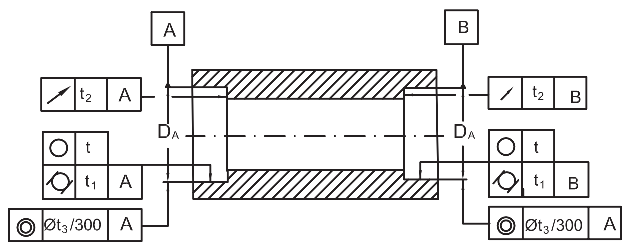


Table 4.5

Tolerance name	Fit	Symbol of deviation		Permissible deviation depending on the tolerance class				
				P0 P6X	P6	P5	P4(SP)	P2(UP)
Tolerance of dimension	shaft housing	-	-	IT6(IT5) IT7(IT6)	IT5 IT6	IT4 IT5	IT4 IT4	IT3 IT4
Tolerance of roundness and cylindricity	shaft	○ ⌭	t,t_1	$\frac{IT4}{2}\left(\frac{IT3}{2}\right)$	$\frac{IT3}{2}\left(\frac{IT2}{2}\right)$	$\frac{IT2}{2}$	$\frac{IT1}{2}$	$\frac{IT0}{2}$
	housing		t,t_1	$\frac{IT5}{2}\left(\frac{IT4}{2}\right)$	$\frac{IT4}{2}\left(\frac{IT2}{2}\right)$	$\frac{IT3}{2}$	$\frac{IT2}{2}$	$\frac{IT1}{2}$
Tolerance of face runout	shaft housing	↗	t_2	IT4 (IT3) IT5(IT4)	IT3 (IT2) IT4(IT3)	IT2 IT3	IT1 IT2	IT0 IT1
Tolerance of concentricity	shaft housing	◎	t_3	IT5 IT6	IT4 IT5	IT4 IT5	IT3 IT4	IT3 IT3
Tolerance of angularity	shaft	∠	t_4	$\frac{IT7}{2}$	$\frac{IT6}{2}$	$\frac{IT4}{2}$	$\frac{IT3}{2}$	$\frac{IT2}{2}$

In case of bearings on which adapter or withdrawal sleeves are to be mounted, the shaft tolerances for deviations of form and position should be to IT 5/2 tolerance class for shafts with diameter tolerance h9 and IT7/2 for shaft tolerance h10.

Surface roughness of bearing seating is given in table 4.6.

Shaft and housing mounting surfaces roughness

Table 4.6

Bearing tolerance class	Shaft Diameter d, mm		Housing Diameter D, mm	
	≤80	**80...500**	**≤80**	**80...500**
	Roughness R_a, µm			
P0, P6X and P6	0,8 (N6)	1,6 (N7)	0,8 (N6)	1,6 (N7)
P5, SP and P4	0,4 (N5)	0,8 (N6)	0,8 (N6)	1,6 (N7)
P2 and UP	0,2 (N4)	0,4 (N5)	0,4 (N5)	0,8 (N6)

If bearings are mounted with adapter or withdrawal sleeves, shaft surface roughness should be of max. R_a = 1,6 µm.

The values of fundamental tolerances - ISO (tolerance classes IT0...IT12) are given in table 4.7.

Tolerance ISO (IT)

Table 4.7

Nominal dimension														
over	**1**	**3**	**6**	**10**	**18**	**30**	**50**	**80**	**120**	**180**	**250**	**315**	**400**	**500**
up to	**3**	**6**	**10**	**18**	**30**	**50**	**80**	**120**	**180**	**250**	**315**	400	500	630
mm	Tolerances in micrometers (0,001 mm)													
IT0	0,5	0,6	0,6	0,8	1	1	1,2	1,5	2	3	4	5	6	
IT1	0,8	1	1	1,2	1,5	1,5	2	2,5	3,5	4,5	6	7	8	
IT2	1,2	1,5	1,5	2	2,5	2,5	3	4	5	7	8	9	10	
IT3	2	2,5	2,5	3	4	4	5	6	8	10	12	13	15	
IT4	3	4	4	5	6	7	8	10	12	14	16	18	20	
IT5	4	5	6	8	9	11	13	15	18	20	23	25	27	29
IT6	6	8	9	11	13	16	19	22	25	29	32	36	40	44
IT7	10	12	15	18	21	25	30	35	40	46	52	57	63	70
IT8	14	18	22	27	33	39	46	54	63	72	81	89	97	110
IT9	25	30	36	43	52	62	74	87	100	115	130	140	155	175
IT10	40	48	58	70	84	100	120	140	160	185	210	230	250	280
IT11	60	75	90	110	130	160	190	220	250	290	320	360	400	440
IT12	100	120	150	180	210	250	300	350	400	460	520	570	630	700

Bearing axial location

Axial location of bearings is necessary for a proper guiding of bearing in an assembly under operation.

An tight fit is iandequate for the axial location of bearing. In case of locating bearings, axial location for both rings is generally needed. Some important solutions of bearing axial location, on shaft or into the housing are shown in Fig. 4.4.

In case of bearings with light axial loads, bearings can be located using a lock nut and a lock waher (a), an end plate fastened by a screw at the shaft end (b) and, for bearings carryng light axial loads, by lock rings mounted in shaft and housing grooves (c).

Bearings with NR design, with groove and snap ring on the outer ring, can be easily located by the lock ring (d). Tapered roller bearings can be located by supporting the inner ring on the shaft shoulder and the outer ring with a threaded ring and a safety plate fastened by a screw (e).

Tapered bore bearings can be mounted and axially located by adapter or withdrawal sleeves (f, g).

The axial load carrying capacity of the bearings mounted with adapter or withdrawal sleeves is governed by the friction between shaft and sleeve (g).

To locate radial bearings, where axial adjustment of the shaft is required, setting washers (i) or spacer rings (i) are used between the outer rings, the width of the spacer ring being experimentally determined, during mounting.

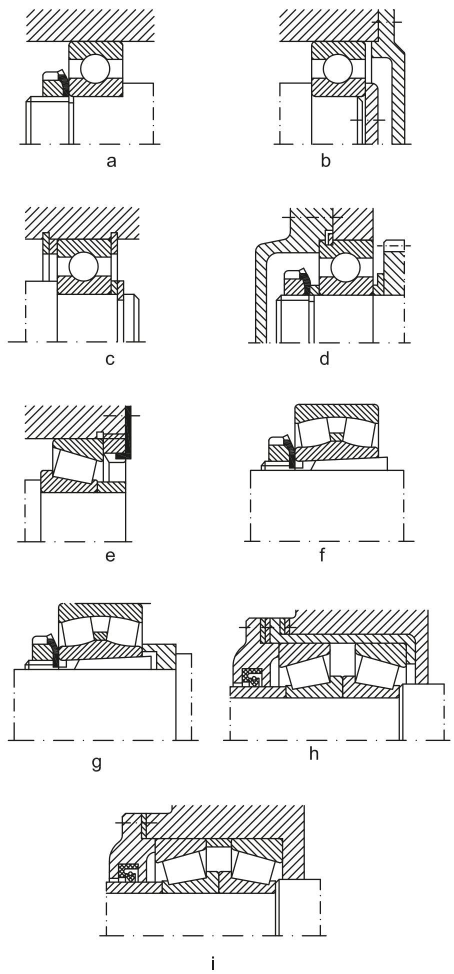


Fig. 4.4

Bearing sealing

Seals are used in most of bearing arrangements and they must ensure the conditions of a proper operation.

For such a purpose, they have to prevent solid contaminants (dust, hard particles, water, aggressive substances etc.) from penetrading into the bearing and at the same time to retain the lubricant in the bearing.

Seals for rolling bearings can be classified considering some important criteria such as: design, operation, type of lubricant etc.

Considering their design and operation, seals can be: stationary seals between the stationary bearing elements (housing and cover), rotary seals, between the rotating bearing elements and they also can be rubbing seals or non-rubbing seals, which are used in special applications (surrounding conditions and loading stress).

Rotary non-rubbing seals are often used due to their simple design. They are particulary used at high speeds or temperatures, bothh for grease and oil, and have practically no friction and do not wear.

In case of bearing grease lubrication, bearing operating temperature must be lower with 20ºC than the dropping point of the grease (melting temperature).

The main constructive types of rotary non-rubbing seals have narrow gaps, labyrinths and their combinations are shown in fig. 4.5 a-c.

Gap seals represent the simplest constructive solution for a rotary non-rubbing seal which have to retain grease in the bearing housing. The efficacy of sealing depends on the gap lenght (L)

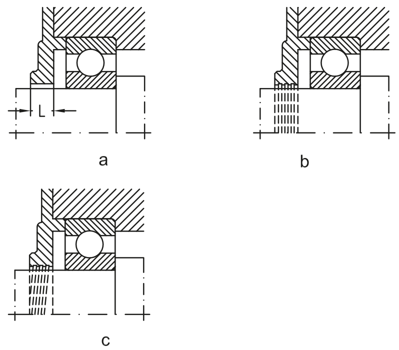


Fig. 4.5

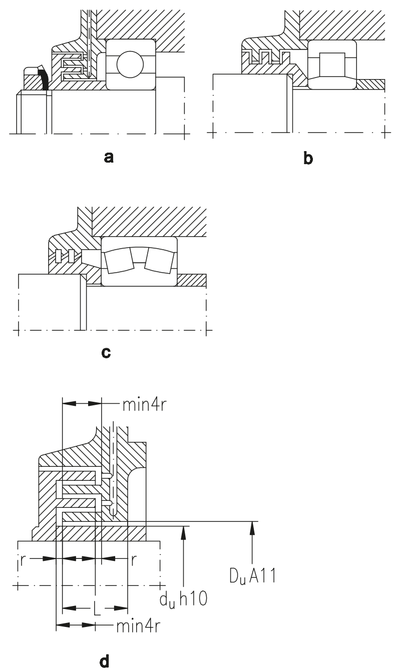


Fig. 4.6

and the clearance between shaft and housing. It can be improved by providing one or more circular grooves on the shaft or in the housing, which are to be filled with grease (b). In case of oil lubrication, the grooves on the shaft must be helical (c) and their direction must be the same with the direction of the shaft rotary movement.

Experiments proved that most favorable clearance is obtained between the limits of the fit A11/h10, geometrical deviations should be IT6 and gap surface roughness R_a = 12,6 µm.

Labyrinth seals are used at high peripheral speeds, in impure surroundings.

They are shown in fig. 4.6 a-d.

The labyrinths are spaces where periodically water-in-soluble grease (e.g. Lithium or Calcium base grease) is to be supplied.

The tongues of the labyrinth seals can be radically (a), axially (b) arranged or they can have inclined passages.

Details of an axial labyrinth design are given in fig. 4.6 d and values of axial clearance r and length L are given in table 4.8.

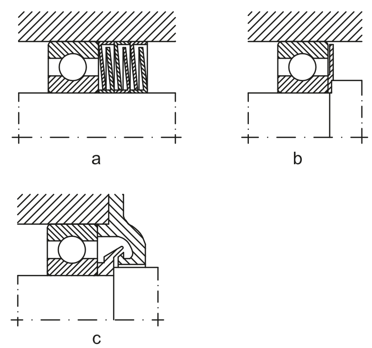


Fig. 4.7

In case of rotary rubbing seals there is a direct contact between a seal elastic element and the rotating element. They are shown in fig. 4.8.

When selecting the proper rotary rubbing seal, the folowing factors have to be considered: material and its elasticity (felt, rubber, plastics, leather, graphite, asbestos etc.); resistance at varoius temperatures, maximum peripherical speed on sealing surface; sealing direction etc.

These systems have sealing properties higher than those corresponding to non-rubbing seals. In case of grease lubrication at peripheral speeds higher than 4 m/s and temperatures over +100ºC, felt ring seals (a) are frequently used because of their simple design and cheapness.

Before mounting, felt rings are impregnated during an hour with a mixture of mineral oil (66%) and paraffin (34%), at a temperature of +70...+80ºC so that sealing properties are improved as the friction is reduced.

At higher temperatures and peripheral speeds over 12 m/s, surface roughness is R_a=1,6 µm and the space between the ends of the seal should be filled with grease. Two felt rings can be used for sealing.

Rubbing seals with a spring incorporated are preferably to be used in case of oil lubricated bearings which are operated under peripherical speeds of 5-10 m/s, temperatures between -40ºC and +20ºC. Their efficacy depends on the material and operating surroundings.

In most cases, rubbing seals with a spring incorporated are made of synthetic rubber and have a metallic hardering fixture.

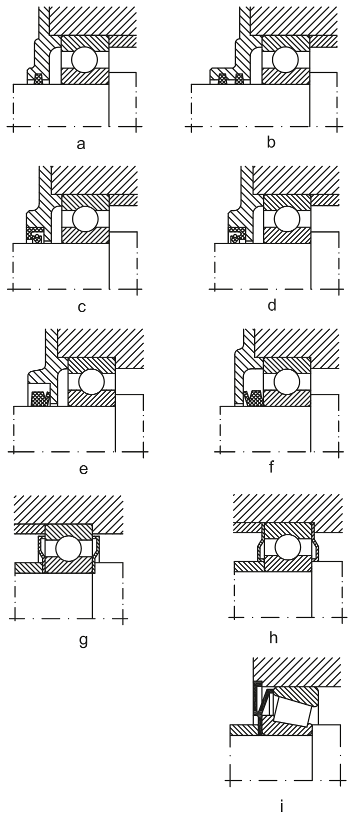


Fig. 4.8

Inclined sealing surfaces are recommended to be ground R_a=0,8 µm and hardened at 45 HRC, when operating at peripheral speeds over 8 m/s. Lubricant outflow can be stopped by monting the rubbing seal with incorporated spring with the edge inwards (c) or outwards (d) if sealing has to prevent dust or ohter impurities from penetrating into the bearing.

Double sealing with these rubbing seals can also be used.

V-ring seal is used to prevent dust or contaminants from penetrating into the bearing with best results both in case of grease or oil lubrication. The elastic rubber lip of the V-ring seal is notched on the plane sealing surface, drawing the fluids in centrifugal motion. V-ring seals are used at temperatures of -40ºC... +100ºC, roughness of sealing surface being Ra = 1,5 - 3 µm. Generally, at peripheral speeds up to 15 m/s, the V-ring seal operates as a rubbing seal (seal lip reaches sealing surface), and at peripheral speeds over 15 m/s the seal lip will lift from the sealing surface, operating as a centrifugal sealing.

V-ring seals can also be used in case of angular misalignments of the shaft (2º... 3º), as they are made of high quality, elastic rubber, easy to be mounted.

The efficacy of sealing depends on the fact that the ring body acts as a flinger for dirt and fluids. Therefore, with grease lubrication the seal is generally arranged outside the housing and with oil lubrication it is placed inside the housing.

Pressed sheet washers provide simple, inexpensive and space - saving sealing especially for grease lubricated deep groove ball bearings. The washers are clamped against either the outer ring or the inner ring and exert a resilient pressure axially against the rubbing ring. In case of usual applications, the types of seals mentioned above or their combinations shown in fig. 4.9 are used, some of them becoming standard seals for rolling bearings (e.g. labyrinths, felt rings, V-rings etc.). Thus, better sealing can be obtained if felt ring (a) or V-ring (b) rubbing seals are combined with radial or axial labyrinth non-rubbing seals.

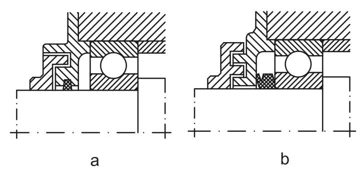


Fig. 4.9

Special seals are used in case of unusual surroundings and loading conditions (e.g. rolling mills, helm of ocean-vessels, main shaft of grinding machines etc.)

Sealed bearings of the type 2RS (2RSR) (a) or shielded bearings of the type 2Z (2ZR) (b) shown in fig. 4.10 a.b. provide simple and inexpresive sealing, with upper operating results. These rolling bearings are delivered ready greased, provision for relubrication and maintenance are not needed. They are used in case of bearings with small free space where other seals cannot be used.

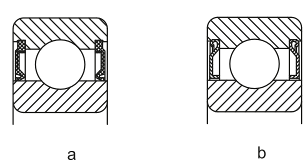


Fig. 4.10

Bearing lubrication

Safe operating and long rating life of bearings depend on the lubricant type and quality and on the lubrication method. Bearing lubrication in used for certain purposes, such as:

- to reduce friction between rolling elements and raceway, rolling elements and cage, cage and guiding ribs of rings during operation;
- to ensure anticorrosive protection of bearings;
- to reduce noise in bearing within certain limits;
- to distribute heat uniformly in contact areas and to remove it outside through lubricant circulation.

Lubricants for bearings lubrication should satisfy the following conditions:

- they should have physical and chemical stability;
- foreign mechanical substances (abrasive, metallic substances etc.) are not admitted in lubricant;
- they should have a minimal coefficient of friction;
- to be non-corrosive;
- good unctuosity (lubricating capacity).

There are two categories of lubricants used for bearing lubrication:

- fluid lubricants (oils);
- plastic lubricants (greases).

Table 5.1 shows comparison between fluid and plastic lubricants.

Although fluid lubricants have better characteristics than plastic lubricants, they cannot be used in all cases because of sealing difficulties.

Comparative values for lubricants

Table 5.1

Characteristics	Lubricant Fluid	Plastic
speed	any value	low and medium
friction	low (reduced)	high
unctuosity	excellent	good
service life	long	short
cooling effect	high	low
replacement	easy	difficult

Selection of lubricants

When selecting lubricants, much care is needed and all operating conditions and lubricant properties should be considered.

No lubrication system can be considered universal.

The most important criteria when selecting a lubricant have to be as follows:

- size of bearing
- speed
- load
- bearing operating temperature

These characteristic act upon lubricant viscosity as follows:

- the higher the bearing size, value of load and temperature, the higher the viscosity
- bearing speed acts by product $D_{m\,n}$, as show in table 5.2.

Corelation between $D_{m\,n}$ and lubricant type

Table 5.2

$D_{m\,n}$ over	up to	Lubricant type
-	$150x10^3$	Mineral oil and grease with medium or high viscosity
$150x10^3$	$300x10^3$	Mineral oil with medium viscosity and grease
$300x10^3$	$500x10^3$	Mineral oil with low viscosity and grease
$500x10^3$	$1200x10^3$	Mineral oil with low viscosity and lubricating equipment

Grease lubrication

Grease can be used to lubricate rolling bearings only when product Dm n≤ 500x103 and it offers the following advantages:

- it is more easily retained in the bearing;
- it assures anti-corrosive protection to bearing as it is water-resistant;
- low expenses for sealing.

The grease quantity to be supplied shouldn't be excesive, otherwise rotation is bracked, friction increases and also operating temperature without extending the bearing rating life.

The quantity of grease that is to be inserted in bearing seating should be as follows, considering the free space inside the housing:
- 1/2... 3/4 of the free space in the housing, in case of normal speeds;
- 1/3 of the free space in the housing, in case of high speeds and speed limit;
- the whole housing space should be free, in case of low speeds and product Dm n < $10x10^3$.

The quantity of grease can be calculated as a function of bearing bore diameter using the equation:

$$G = K\, d^{2.5}\ ,\ g.$$

where:
K = 1/900 - for ball bearings
K = 1/350 - for roller bearings
d = bore diameter, mm
Relubrication intervals in most cases can be experimentally determined and depend on:
- bearing type
- bearing size
- operating temperature
- grease properties

Grease service life and relubricating interval can be calculated from:

$$T_{ur} = k_0\left(\frac{14x10^6}{n\sqrt{d}} - 4d\right)f_1 f_2$$

where:
T_{ur} = service life or relubricating interval, in operating hours
k_0 = coefficient depending on the bearing type, table 5.3
n = speed, r/min
d = bore diameter, mm
f_1 = temperature factor, table 5.4
f_2 = factor depending on the operating conditions, table 5.5

Values for coefficient k_0

Table 5.3

Bearing type	Value of k_0 Relubrication interval service life	Grease
Angular contact ball bearings Tapered roller bearings Thrust ball bearings	1	2
Cylindrical roller bearings Needle roller bearings	5	15
Deep groove ball bearings	10	20...40

Values for factor f_1

Table 5.4

Temperature	70°C	85°C	100°C
Factor f_1	1	0,5	0,25

Values for factor f_2

Table 5.5

Operating conditions	Light	Moderate	Hard	Very hard
Factor f_2	1	0,7...0,9	0,4...0,7	0,1...0,4

Low values are valid for deep groove ball bearings with shields, 2Z type, or with seals, 2RS type, series 60, 62 and 63.
Bearing relubrication interval can be also determined using the chart - fig. 5.1, as a function of bearing type, bore diameter and speed.

Example:
A bearing 6208-2RSR is operated under reduced load (it is not considered for calculation), at a speed n = 1500 r/min, at a temperature of +60 deg C, light operating conditions. What is the grease service life abd relubrication interval?

Grease service life will be:

$$T_u = k_0\left(\frac{14x10^6}{n\sqrt{d}} - 4d\right)f_1 f_2 = 32893\,\text{hours.}$$

k_0 = 25 from table 5.3
d = 40 mm
f_1 = 1, from table 5.4
f_2 = 1, from table 5.5

Relubrication interval:

$$T_r = k_0\left(\frac{14x10^6}{n\sqrt{d}} - 4d\right)f_1 f_2 = 13157\text{hours.}$$

k_0 = 10, from table 5.3
f_1, f_2 = 1, from tables 5.4, 5.5.

Values for coefficient K

Table 5.6

Relubrication interval	K
weekly	0,0015...0,0020
monthly	0,0020...0,0030
yearly	0,0030...0,0045
after 2...3 years	0,0045...0,0055

From the diagram fig. 5.1, the value of the relubrication interval will be of 13500 operating hours.

The grease quantity to be supplied can be determined using the equation:
G = K D B, g,

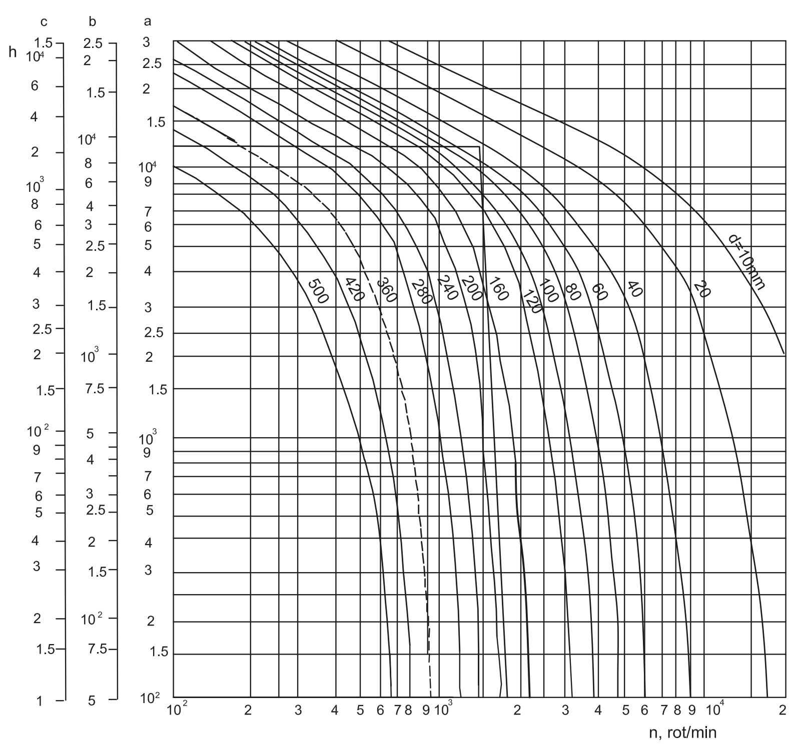


Fig.5.1

Scale a; deep groove ball bearings
Scale b; cylindrical roller bearings
Scale c; spherical roller bearings, thrust ball bearings, cylindrical roller bearings without cage.

where:
G = grease quantity, g
K = coefficient depending on the relubrication interval, table 5.6
D = bearing outside diameter, mm
B = total bearing width for radial bearings, mm and total bearing height for thrust bearings, mm

The chart in fig. 5.1 applies to operating temperatures which do not exceed +70ºC. For operating temperatures over +70ºC, see table 5.4.

Grease service life can be defined as the period of time when it preserves physical and mechanical characteristics in time and oxidizing due to temperature and vaporization of base oil doesn't occur.

A more accurate calculation of grease service life, considering grease quality and bearing operating conditions (load, size, speed, temperature etc.) can be done using the equation:

$$L = 10^{a-(m1 + m2 + m3)}$$

where
L = service life, operating hours
a = exponent depending on the grease quality ($a = 5{,}8 ... 6{,}1$)
$m_1 ... m_3$ = exponents which take into account the following factors:
$m_1 = 4{,}4 \times 10^{-6}\, D_m\, n$,
$m_2 = 2{,}5\, (P/C - 0{,}05)$,
$m_3 = (0{,}021 - 1{,}80 \times 10\text{-}6\ Dm\ n)\ t$,
D_m = bearing mean diameter, mm
n = bearing speeds, r/min,
P = equivalent radial load, kN,
C = basic dynamic load, kN,
t = bearing operating temperature, ºC

When calculating the values of t, Dm n and P/C, the following have to be considered:
- when bearing operating temperature is lower than +50ºC, then t = +50ºC
- when speed factor Dm n < 125000, then Dm n = 125000
- when ratio P/C < 0,05, then P/C = 0,05

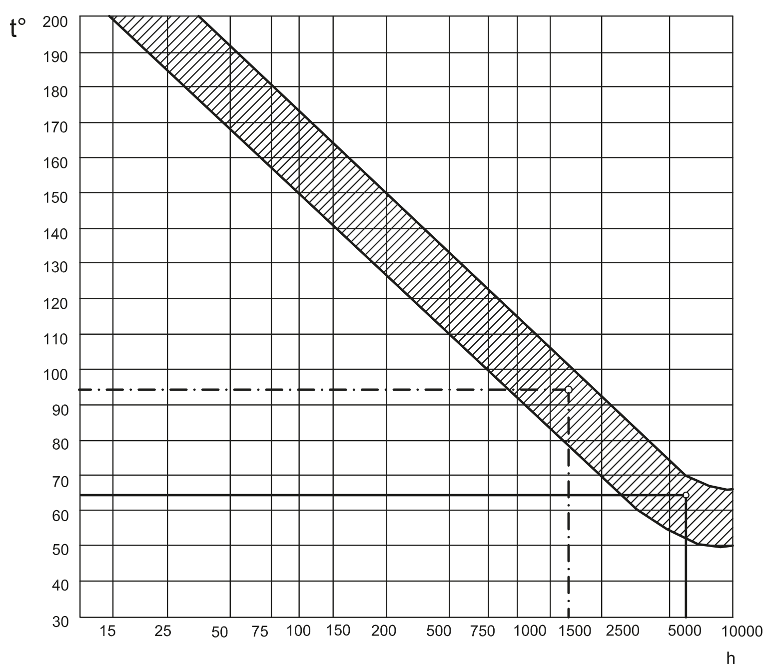


Fig.5.2.

Grease service life, as a function of operating temperature can be approximately determined using the diagram fig. 5.2.

Example 1

A bearing 6210 operates under a load $P_r = 5$ kN, speed n = 3000 r/min at an operating temperature $t = 50^0$C. What is the service life of the grease used for bearing lubrication?

$C_r = 35{,}1$ kN, tables on page 101. bearing 6210

$L = 10^{a-(m1+m2+m3)} = 10^{6{,}1-2.273} = 6214$ hours

a = 6,1, for Mobil grease,

$D_m\ n = 65x3000 = 195x10^3$

$P_r/C_r = 5/35{,}1 = 0{,}143$

$m_1 = 4{,}4 \times 10^{-6}\ D_m\ n = 0{,}858$

$m_2 = 2{,}5\ (P_r/C_r - 0{,}05) = 0{,}23$

$m_3 = (0{,}021 - 1{,}80 \times 10^{-8}\ D_m\ n)\ 65 = 1{,}119$

Example 2

For the same bearing and operating conditions as in Example 1, it is required to find the service life of the same grease at a temperature of t = 95ºC.

$m_3 = 1{,}66$

$m_1 + m_2 + m_3 = 2{,}794$

$L = 10^{6{,}1-2{,}794} = 10^{3{,}306} = 1774$ operating hours

From the diagram fig. 5.2, we can find approximately the same value, respectively 6000 operating hours at + 65ºC and 170º operating hours at +95ºC.

Table 5.7 shows technical characteristics of usual grease, which are recommended for lubrication of sealed and shielded bearings, 2RS and 2Z types and also for rolling bearings in various assemblied and machines.

Technical characteristics for usual greases for bearing lubrication

Table 5.7

Grease main components		**Dropping point °C**	**Temperature range (continuous running)**	**Application**	**Grease type, producer**
Base oil	Thickener				
Mineral oil	Lithium soap	170°C-190°C	-30°C...+130°C	Ball, roller and needle roller bearings: -small and medium sized; - moderate speed, - temeratures up to 70°C	- Mobilux 2-3, Mobil Austria, - Castrol Spherol SRB2, Castrol Germany - Shell Alvania R 2-3, Shell England - Aguila Nr30, Brugarolas Spain
Mineral oil + additive for excessive pressure (EP)	Lithium soap	185°C-190°C	-30°C...+150°C	Ball and roller bearings, - moderate speeds, - heavy loads, schock loads, - continuous running temperature +130°C, - initial lubrication and relubrication at periods of 6-9 months	- Mobilux EP 2-3, Mobil Austria - Shell Alvania EP 2-3, Shell England - Beacon EP 2, Esso Germany
Synthetic oil (diesteric)	Lithium soap	180°C-230°C	-50°C...+120°C	Bearings for electrical motors, generators, electronic equipment, - small sizes, - light loads, - high speeds D_m x n ≤ 1000 x 10^3	- Beacon 325, Esso Germany
Synthetic oil (diesteric)	Lithium soap	190°C-230°C	-50°C...-120°C	Bearings for electrical motors, generators, electronic equipment, - small sizes, - light loads, - high speeds D_m x n ≤ 1000 x 10^3	- Izoflex LDS 18 Special A, Kluber Lubrication Germany
Mineral oil	Complex calcium soap	100°C-180°C	-30°C..+130°C	Bearings for general applications, - heavy loads, moderate speeds - continuous running temperature 100°C	- Beacon 2-3, Esso Germany - Beacon EP1, Esso Germany
Synthetic oil	Whithout soap, syntetic thickener	indeterminate	-30°C...-250°C	Bearings for general applications, - large sizes, - low speeds D_m x n < 200 x 10^3, - high temperature	- Barleta 1S, Kluber Lubrication Germany
Syntetic oil + additive for excessive pressure (EP)	Whithout soap, syntetic thickener	265°C	-54°C...+177°C	Spherical roller thrust bearings, roller thrust bearings etc., bearings operating with high friction, - moderate and high speeds, - low and high temperatures	- Mobilgrease 28, Mobil Austria
Synthetic oil	Whithout soap, inorganic thickener	260°C	-50°C...+177°C	Bearings for general applications, - light loads, - high speeds, - low and high temperatures	- Armingras BT-2, Brugarolas Spain
			-30°C...+140°C	Cylindrical roller bearings, - moderate and high speeds D_m x n ≤ 300 x 10^3	- Staburags NBU12, Kluber Lubrication Germany
			0°C...+260°C	Roller bearings operating at high temperatures	- Mobilitemp 1-2, Mobil Austria

Oil lubrication

Oil lubrication can be used in any operating condition, but this kind of lubrication is compulsory when the value of the product Dm n from table 5.2 is exceeded for grease, namely Dm n>500 x 10^3 and when high temperatures occur in bearing. Then, oil has to lubricate and to remove heat from bearing.

Oils used for bearing lubrication can be:

- mineral oils, used up to a temperature of +150ºC.
- synthetic oils, used up to a temperature of +220ºC.

For a proper lubrication of bearings, low quantities of lubricants to reach the rolling elements are needed.

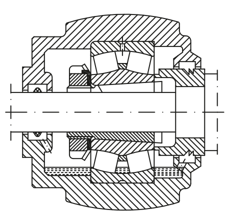
The lubricating systems must provide oil quantity necessary to prevent oil draining from bearing and heat removal in case of high speeds.

Most usual oil lubricating systems depending on factor D_m n are given in tables 5.8.

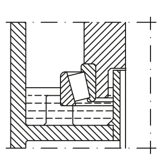
Oil lubricating systems

Table 5.8

Lubricating system	Operating conditions	Factor D_m n	Oil viscosity at 40ºC	Example in fig.
			m^2/s	
Oil bath	Bath is filled up to th lowest rolling element for horizontal shaft and 70-80% of bath width for vertical shaft	< 250 x 10^3	(17.....300) x 10^{-6}	5.3 a), b)
Oil bath with external circulation	Central tank, oil circulates under a pressure of 1,5 MPa. High speeds.	< 600 x 10^3	(45...175) x 10^{-6}	5.4
Oil injection	Oil is injected into the operating area under a pressure of 0,1...0,5 MPa, with flow capacity of 0,5...10 l/min depending on temperature. Heavy loads and high speeds.	< 900 x 10^3	(13,5...80) x 10^{-6}	5.5
Oil spot	Oil in air current under a pressure of (0,05...0,5) MPa, flow capacity of (0,5...4) m^3/hour for small and medium sized bearings, heavy loads and high speeds.	< 1200 x 10^3	(10...45) x 10^{-6}	5.6



a



b

Fig. 5.3

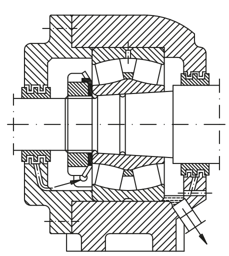


Fig. 5.4

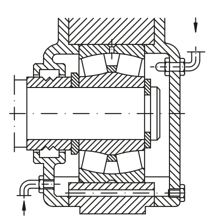


Fig. 5.5

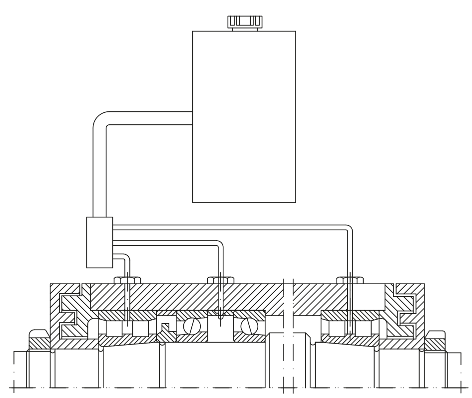


Fig. 5.6

Approximate values of oil kinematic viscosity at +40^{0}C depending on the operating temperature are given in table 5.9.

Corelation between viscosity and temperature		
		Table 5.9
Temperature t^{0}C		**Viscosity at 40^{0}C, cSt**
over	up to	
-	50	12...60
50	80	37...75,5
80	120	> 75,5
120	150	227

Diagram fig. 5.7 shows kinematic viscosity classes at 40^{0}C in accordance with ISO, its variation depending on the operating temperature (t^{0}C) in relation to speed and bearing mean diameter (D_m).

Example

A bearing 6204 is to operate under a speed n = 2 000 r/min at a temperature t = +65^{0}C. D_m = 0,5 (d+D) = 35,5 mm.

The viscosity of the oil for bearing lubrication is required.

From the diagram, for D_m = 35,5 mm, we can find viscosity at +65^{0}C, v1 = 13 cSt and viscosity at + 40^{0}C, v = 32cSt.

Table 5.10 shows oils which are recommended by ISO for bearing lubrication. Values of kinematic viscosity at +40^{0}C, mm^2/s are also given.

Recommended oils by ISO standards				
				Table 5.10
Class ISO	**Kinematic viscosity at +40^{0}C, mm^2/s (cSt)**			
		mean	low	high
ISO VG	2	2,2	1,98	2,42
ISO VG	3	3,2	2,88	3,52
ISO VG	5	4,6	4,14	5,06
ISO VG	7	6,8	6,12	7,48
ISO VG	10	10	9	11
ISO VG	15	15	13,5	16,5
ISO VG	22	22	19,8	24,2
ISO VG	32	32	28,8	35,2
ISO VG	46	46	41,4	50,6
ISO VG	68	68	61,2	74,8
ISO VG	100	100	90	110
ISO VG	150	150	135	165
ISO VG	220	220	198	242
ISO VG	320	320	288	352
ISO VG	460	460	414	506
ISO VG	680	680	612	748
ISO VG	1000	1000	900	1100
ISO VG	1500	1500	1350	1650

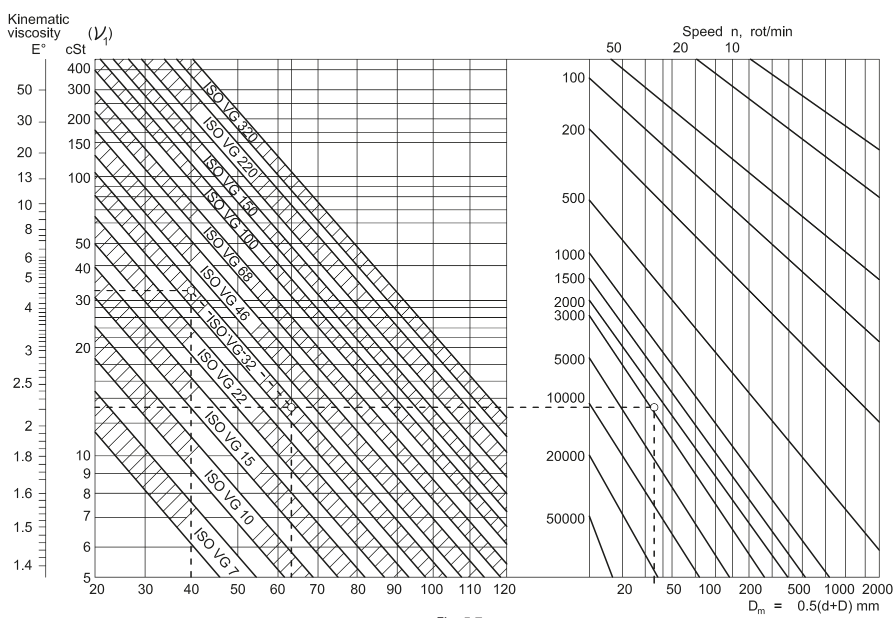


Fig. 5.7

Bearing designation

The purpose of designation is that of identification of bearings, so that bearings with the same designation to be interchangeable both dimensionally and operationally, no matter who the producers may be. Designation of URB rolling bearings are in accordance with those used by world-know bearing companies: SKF, GAF, INA, KOYO etc.

The completedesignation of a bearing consists of a basic design and may include one or more supplementary designations (prefixes and suffixes), as shown in chart fig. 6.1.

Prefixes		**Basic designation**				**Suffixes**			
						Group I	Group II	Group III	Group IV
Materials	Special designs, component parts	Bearing type	Dimension series		Bore diameter identification	Internal design, contact angle	Constructive characteristics, taper, seals	Cages, materials, guiding surfaces	Tolerance class, clearance
		Bearing series designation							

Fig. 6.1.

The basic designation consists of an identification of the type of bearing (figure or letter), the series designation, in accordance with ISO and the bore diameter identification.

The designation of the bearing type and dimension series, for main standardized bearing types, are given in table 6.1.

Bore diameter identification consist of one, two or more figures as follows:

- bore diameter from 1 to 9 mm — - one figure, representing the bore diameter (e.g. 623, 608);

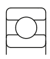
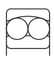
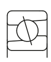
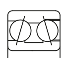
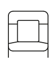
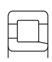
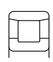
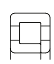
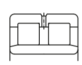
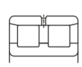
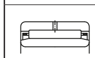
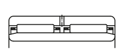
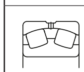
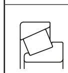
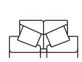
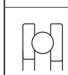
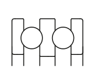
- bore diameter from 10 to 495 mm — - two figures, as follows: 00 for 10 mm, 01 for 12 mm, 02 for 15 mm, 03 for 17 mm, 04 and up to 99 for bore diameter from 20 to 495 mm. (bore diameter = bore diameter identification x 5, e.g. 6230, d = 150 mm);

- bore diameter of 500 mm and over 500 mm — - is stated directly separated by a slash, the same applies to the values which are not perfect multiples of 5, or if they include a decimal point (e.g. 610/560, 62/32, 62/1,5).

Tapered roller bearings with inch dimensions listed in this catalogues make an exception from this rule.

Prefixes

Prefixes are letter-identifications which indicate the material, other than steel for bearings or component parts of bearing. The prefix for material is separated by a horizontal line from the rest of designation.

Designation of the type and dimension series for the standardized bearings			
			Table 6.1
Bearing design	**Bearing type identification**	**Series designation**	**Example**
	6	18 10 03 19 02 23 00 22 04	61952 6208
	1	10 03 02 23 22	1205 11210
	7	10 02 03	7030C 7210B
	0	32 33	3207 3316D
	NU	10 02 22 03	NU208
	NJ	23 04	NJ2206
	N		N310
	NUP		NUP209
	NNU	49	NNU4920
	NN	30	NN3015
	NA	48 49	NA4905 NA121815 NA 85/26
	NA	69	NA6912
	2	30 41 13 40 22 23 31 32	22216 25130
	3	29 22 23 20 03 02 13	32010 32208 34115
	35	0	35130
	5	11 13 12 14	51115 51212
	5	22 23 24	52205 52308

Prefixes for materials

- **H** - heat-resisting steel (e.g. H - NUP 210)
- **M** - copper alloy (e.g. M - 6008)
- **S** - plastics, glass, ceramics etc. (e.g. S - 6204)
- **SS** - stainless steel (e.g. SS - 6202)
- **T** - case-hardening steel (e.g. T - 35352)

Prefixes for special designs or parts of bearings

- **K** - cage with rolling elements of dismountable bearing (e.g. KNU205)
- **L** - free ring of dismountable bearing (e.g. LNU205) (interchangeable ring, e.g. L30205)
- **R** - dismountable bearing without free ring (e.g. RNU205; RN205)
- **E** - shaft washer of thrust ball bearing (e.g. E51210)
- **W** - housing washer of thrust ball bearing (e.g. W51216)

Suffixes

Suffixes are used to identify various constructive modifications of the bearing in comparison to normal design. They are classified in four different groups, as follows:

- Group I - Modifications of internal design, design with increased basic load (e.g. A, C, E etc.), contact angle (e.g. A, B, C) and others.
- Group II - Modifications of external design, tapered bore, groove on outer ring etc. (e.g. 30205A, 1210K, 6210NR, 6310-2RS)
- Group III - Modifcations of cage design, material, guiding surfaces etc. (e.g. 6205TN, NU310MA)
- Group IV - Modifcations of normal design regarding tolerance classes, bearing radial or axial clearance, stability of dimensions at high temperatures, bearing matching etc. (e.g. 6206P5, 6310P53, NU210SO, 7010CDB).

These suffixes for bearing designation are listed considering the groups they belong to, at the beginning of each bearing group.

Mounting and dismounting

Proper operation of rolling bearings is also determined by a proper selection of the solution of mounting and dismounting, considering the type and size of bearing, fit, adequate tools for these operations, performance etc.

As being precision components, rolling bearings should be handled carefully when storing or monting. Thus, the following conditions should be observed:

- storing in their original package, on special shelves, in dry room, temperature of $+18^0$C...$+20^0$C, maximum moisture degree of 60%
- handling bearings, while storing and mounting, should be carrefully done so that original package to be preotected and not to be deteriorated.
- bearings should be unpacked only when they are to be mounted.

They shouldn't be washed if original package hasn't been destroyed.

- as the adjoint parts of bearing are accurate, without burrs, chips or hits, special care should be taken.

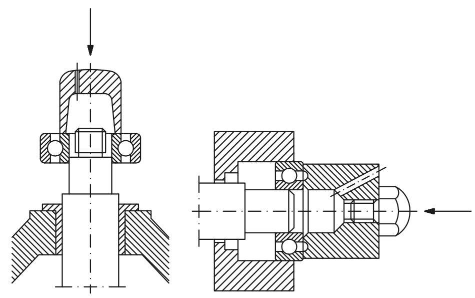


Fig. 7.1

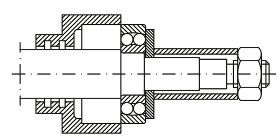


Fig. 7.2

Mounting of bearings with cylindrical bore

Bearings with cylindrical bore which are to have tight fit on shaft on in housing respectively, will be mounted by mechanical, thermic or hydraulic means.

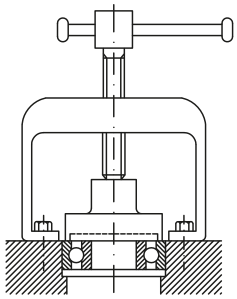
The pressing force should be transmitted only by the ring which is pressed on the shaft or into the housing bore. Transmission by rolling bearings should be avoided as they can get defromed and premature damage can occur.

Special sleeves with one or two ribs, fig. 7.1, a and b are used when mounting small and medium-sized bearings, which are to be mounted with transition fit. In case of self-aligning ball bearings or spherical roller thrust bearings, a plate is mounted for a proper location of the outer rings, as shown in fig. 7.2.

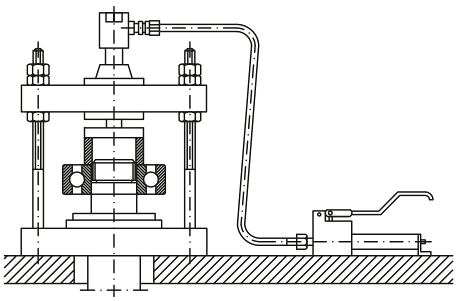
Mechanical or hydraulic presses are used as shown in fig. 7.3, in case of serial production so that force can be continuously and gradually applied.

For the mounting of bearings with clearance fit into the housing or on the shaft, the ring with transition or tight fit should be mounted first, after which the shaft-bearing assenbly will be mounted into the housing as shown in fig. 7.4, a and b.

In case of dismountable bearings, rings can be mounted separately - fig. 7.5, even if an tight fit is required for both rings.

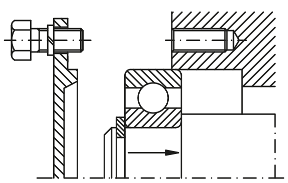


a

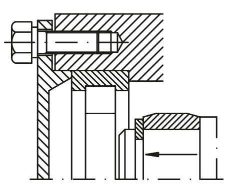


b

Fig. 7.3



a



b

Fig. 7.4

The mounting of medium (d > 50 mm) and large-sized bearings with tight fit, requires much greater pressing forces. That's why in this case heating of bearings up to $+80^0$C...$+110^0$C should be used instead of pressing, excepting shielded bearings, 2Z (2ZR) type and sealed bearings, 2RS (2RSR) type.

For the bearings heating, oil bath, electric range, heating device with thermic ring or induction heating device etc. can be used as shown in fig. 7.6, a-d.
The device with thermic ring - fig. 7.6 c consists of a split aluminium ring with three grips and cuts which make it be elastic.

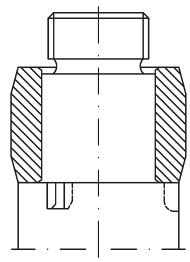


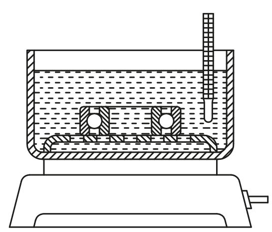
Fig. 7.5

Thermic ring bore diameter is equal to inner ring raceway diameter of dismountable bearings.
The ring outside diameter can be calculated using the equation:

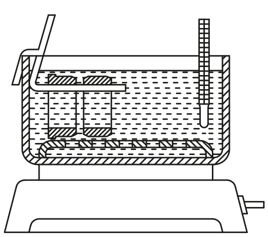
$$D_{ex} = \sqrt{4d_1^2 - 3d^2}\ , \mathrm{mm}$$

where:

D_{ex} = outside diameter of the thermic ring,
d_1 = diameter of the inner ring raceway, mm
d = bearing bore diameter, mm

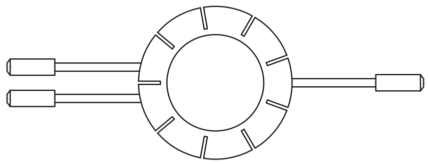


a



b

Fig. 7.6



c

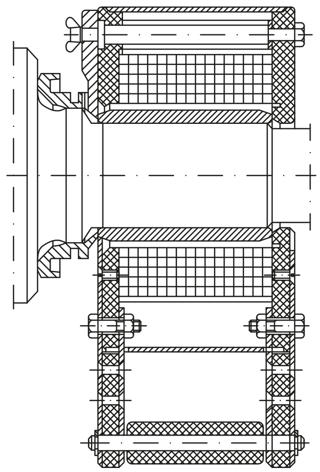


Fig. 7.6 (continued)

The mass of the thermic ring is approximately equal to the mass of the bearing inner ring.

In case of large-sized cylindrical roller bearings, heating is done with induction devices. These devices consist of a coil inductor, thermal relays for temperature adjustment and timers. 380 V voltage and 50 - 60 Hz frequency inductors are used for bearings with bore diameter up to 200 mm. For larger-sized bearings, 20... 40 V voltage and 50 - 60 Hz inductors are used.

This device is schematically shown in fig. 7.6.d.

Mounting of bearings with tapered bore

Tapered bore bearings can be mounted directly on the shaft, on adapter sleeve or withdrawal sleeve. These bearings should always be mounted only with a tight fit. The tight fit can be done by an axial displacement of the bearing inner ring which is mounted directly on the tapered spindle of the shaft or by an axial disaplacement of the adapter or withdrawal sleeve.

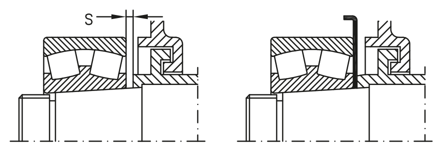
The values of reduction in radial clearance are given in tables 7.1 and 7.2, as function of axial displacement on shaft of self-aligning ball bearings and spherical roller thrust bearings. After mounting the initial radial clearance is to be considered.

After mounting, radial clearance of radial and self-aligning ball bearings are in accordance with table 7.1.

The values of tightening are estimated by the values of the radial clearance reduction or of axial displacement. Axial displacement of the mounted bearings is measured by means of a limit gauge, as shown in fig. 7.7, a and b. The thickness of the limit gauge can be calculated from:

m = S - a

where:
m = thickness of the limit gauge, mm
S = distance initially measured, mm
a = axial displacement, from table 7.1, mm



a b

Fig. 7.7

Example

A bearing 22252, d = 260 mm, taper: 1:12, distance s = 10 mm, distance "a" from table 7.1 = 1,90 mm, m = 10 - 1,9 = 8,10 mm

Small-sized bearings with tapered bore which are to be mounted directly on the shaft or with adapter or withdrawal sleeves can be axially displaced by means of a nut as shown in fig. 7.8, a, or by means of a special sleeve as in fig. 7.8 b,c.

Medium-sized bearings can be axially displaced by means of a special nut as shown in fig. 7.9 and some screws. Then, the nut is to be dismounted and replaced with a nut for axial fastening.

Special hydraulic presses - fig. 7.11 are used to mount medium and large-sized bearings.

To reduce the bearing displacing force in case of large-sized bearings, pressurized oil is to be introduced between the tapered surfaces of the shaft spindle, bearing and b, by means of an oil pump - fig. 7.10 or oil injector - fig. 7.12.

One or more grooves, should be provided as shown in fig. 7.13, a and b so that oil can be distributed between the mounting surfaces.

Values for self-aligning ball bearings radial clearance, after mounting

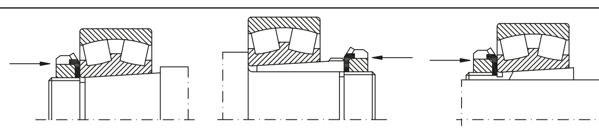
Values in mm | Table 7.1

Bore diameter d		Reduction of radial clearance		Axial displacement "a", taper 1:12				Minimum radial clearance after mounting, in case of clearance group	
				on tapered shaft		on tapered sleeve			
over	up to	low	high	low	high	low	high	normal	C3
-	**20**	0,003	0,010	0,22	0,23	0,24	0,25	0,01	0,02
20	**30**	0,005	0,010	0,22	0,23	0,23	0,24	0,01	0,02
30	**40**	0,009	0,015	0,30	0,30	0,32	0,32	0,01	0,02
40	**50**	0,010	0,016	0,31	0,34	0,35	0,37	0,015	0,025
50	**65**	0,012	0,018	0,9	0,41	0,40	0,42	0,015	0,03
65	**80**	0,015	0,025	0,43	0,47	0,45	0,50	0,02	0,04
80	**100**	0,022	0,030	0,54	0,60	0,56	0,62	0,02	0,04
100	**120**	0,025	0,035	0,58	0,70	0,60	0,75	0,025	0,055

Values for spherical roller bearings radial clearance, after mounting

Values in mm | Table 7.2

Bore diameter d		Reduction of radial clearance		Axial displacement "a", taper 1:12				Axial displacement "a", taper 1:30				Minimum radial clearance after mounting, in case of clearance group		
				on tapered shaft		on tapered sleeve		on tapered shaft		on tapered sleeve				
over	up to	low	high	low	high	low	high	low	high	low	high	normal	C3	C4
30	**40**	0,02	0,025	0,35	0,4	0,35	0,45	-	-	-	-	0,015	0,025	0,04
40	**50**	0,025	0,03	0,4	0,45	0,45	0,5	-	-	-	-	0,02	0,03	0,05
50	**65**	0,03	0,04	0,45	0,6	0,5	0,7	-	-	-	-	0,025	0,035	0,055
65	**80**	0,04	0,05	0,6	0,75	0,7	0,85	-	-	-	-	0,025	0,04	0,07
80	**100**	0,045	0,06	0,7	0,9	0,75	1	1,7	2,2	1,8	2,4	0,035	0,05	0,08
100	**120**	0,05	0,07	0,7	1,1	0,8	1,2	1,9	2,7	2	2,8	0,05	0,065	0,1
120	**140**	0,065	0,09	1,1	1,4	1,2	1,5	2,7	3,5	2,8	3,6	0,055	0,08	0,11
140	**160**	0,075	0,1	1,2	1,6	1,3	1,7	3	4	3,1	4,2	0,055	0,09	0,13
160	**180**	0,08	0,11	1,3	1,7	1,4	1,9	3,2	4,2	3,3	4,6	0,06	0,1	0,15
180	**200**	0,09	0,13	1,4	2	1,5	2,2	3,5	4,5	3,6	5	0,07	0,1	0,16
200	**225**	0,1	0,14	1,6	2,2	1,7	2,4	4	5,5	4,2	5,7	0,08	0,12	0,18
225	**250**	0,11	0,15	1,7	2,4	1,8	2,6	4,2	6	4,6	6,2	0,09	0,13	0,2
250	**280**	0,12	0,17	1,9	2,6	2	2,9	4,7	6,7	4,8	6,9	0,1	0,14	0,22
280	**315**	0,13	0,19	2	3	2,2	3,2	5	7,5	5,2	7,7	0,11	0,15	0,24
315	**355**	0,15	0,21	2,4	3,4	2,6	3,6	6	8,2	6,2	8,4	0,12	0,17	0,26
355	**400**	0,17	0,23	2,6	3,6	2,9	3,9	6,5	9	6,8	9,2	0,13	0,19	0,29
400	**450**	0,2	0,26	3,1	4,1	3,4	4,4	7,7	10	8	10,2	0,13	0,2	0,31
450	**500**	0,21	0,28	3,3	4,4	3,6	4,8	8,2	11	8,4	11,2	0,16	0,23	0,35
500	**560**	0,24	0,32	3,7	5	4,1	5,4	9,2	12,5	9,6	12,8	0,17	0,25	0,36
560	**630**	0,26	0,35	4	5,4	4,4	5,9	10	13,5	10,4	14	0,2	0,29	0,41
630	**710**	0,3	0,4	4,6	6,2	5,1	6,8	11,5	15,5	12	16	0,21	0,31	0,45



a b c

Fig. 7.8

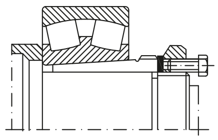


Fig. 7.9

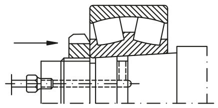
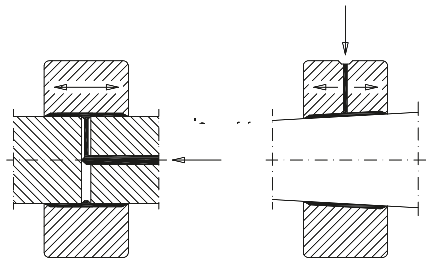


Fig. 7.10



a

b

Fig. 7.11

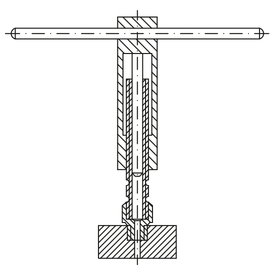
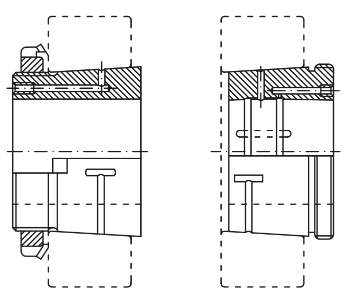


Fig. 7.12



a

b

Fig. 7.13

Bearing dismounting

When bearings with tapered bore are to be dismounted from the shaft or housing, the succession of operations is inversely done than in case of mounting.

Thus, the assembly mounted with clearance fit or small tightening is to be dismounted first and then the parts mounted with greater tightening, as shown in fig. 7.14 and fig. 7.15.

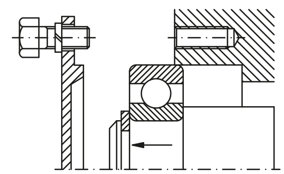


Fig. 7.14

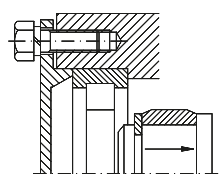
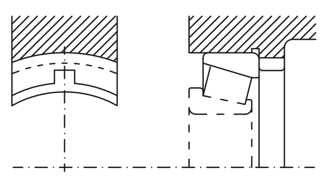
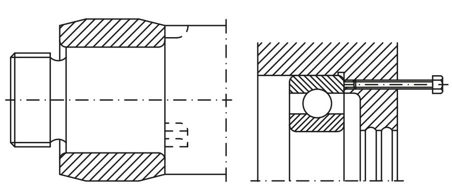


Fig. 7.15

To use mechanical or hydraulic instruments, when dismounting bearings, a special design of the shaft and housing is required, as shown in fig. 7.16, a-c: withdrawal grooves (a) and (b), threaded bores (c), grooves for oil distribution, fig. 7.13.



a



b

c

Fig. 7.16

Medium and small-sized bearings which are mounted with an tight fit are dismounted from the shaft by means of a soft steel or copper mandrel or by means of mechanical or hydraulic presses - fig. 7.17, a-c.

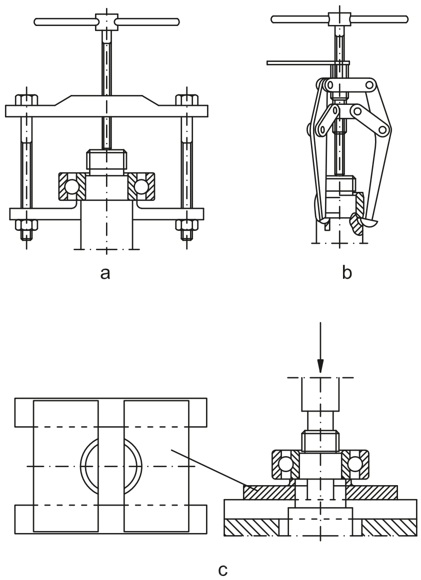


Fig. 7.17

To reduce the frictional force when dismounting largesized bearings which were mounted on shaft with tight fit, pressurized oil should be introduced, as in case of mounting - fig. 7.11.

To dismount bearings with tapered bore which were mounted directly on the shaft or bearings which were mounted with withdrawal or adapter sleeves, the nut axially fastened should be first stripped. Then, dismounting is to be done by light hammering on the inner ring by means of a soft steel or copper mandrel, as shown in fig. 7,18 a and b.

In case of bearings mounted with withdrawal sleeves, a nut is to be screwed up to the threaded part provided for this purpose, as shown in fig. 7.19, a and b.

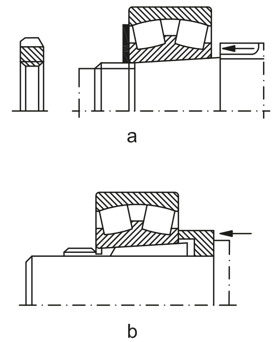


Fig. 7.18

In case of large-sized bearings, hydraulic devices are used as in case of mounting.

Some solutions for dismounting bearings with tapered bore mounted direclty on the shaft spindle, with adapter or withdrawal sleeve are given in fig. 7.20, a and b.

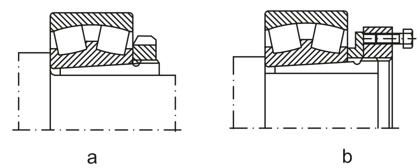


Fig. 7.19

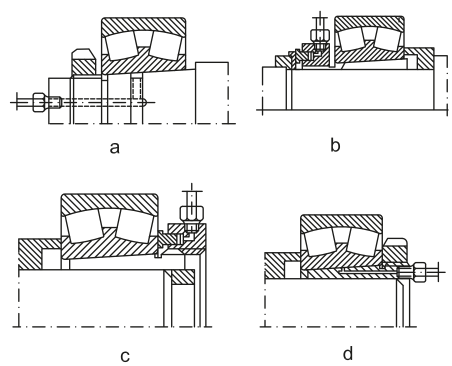


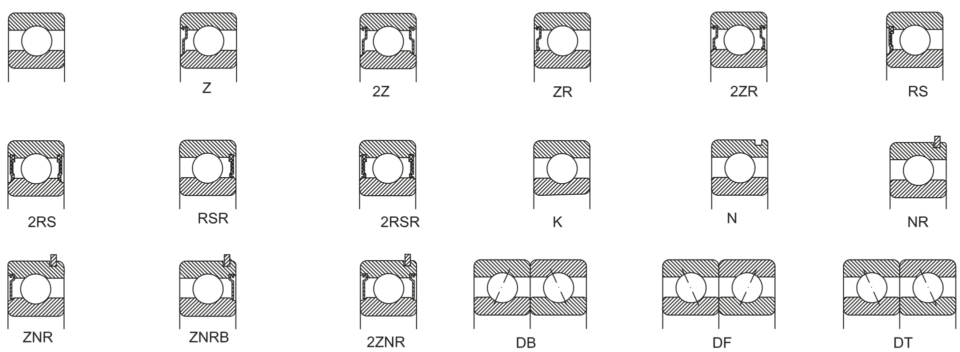
Fig. 7.20

Deep groove ball bearing

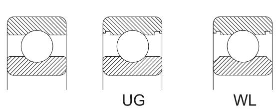
Deep groove ball bearings are manufactured in a varied range, both of standard design and various constructive versions.

Deep groove ball bearings can take double direction radial and axial loads and also allow good operation at high speeds.

For these reasons, they can be widely used. Therefor, single row deep groove ball bearings are manufactured in many constructive versions as shown below.



Besides deep groove ball bearings of basic design, bearings with UG design, with grooves on the outer ring and WL design, with grooves on both rings are also used for the purpose of mounting seals or shields on the bearings. 2ZR, 2RSR or 2RS type, as shown in the bellow figure.



Suffixes

A	- bearing with extended outer ring
B	- bearing with extended inner ring
C2	- radial clearance smaller than normal
C3	- radial clearance larger than normal
FA	- machined cage of steel or cast iron guided in the outer ring
F2	- constructive modifications
K	- bearing with tapered bore
M	- machined cage of brass guided on the rolling elements
MA	- machined cage of brass guided in the outer ring
MB	- machined cage of brass guided on the inner ring
N	- circular groove for snap ring on the outer ring
NR	- circular groove on the outer ring and snap ring
P0	- normal tolerance class (it is not marked)
P6	- tolerance class more accurate than normal
P63	- tolerance class P6 and radial clearance C3
P5	- tolerance class more accurate than P6
P4	- tolerance class more accurate than P5
R	- rib on the outer ring
RS	- bearing with seal on the side, with friction on the inner ring recess

RSA - bearing with special seal
2RS - bearing with 2 seals, friction on the inner ring recess
RSR - bearing with seal on one side, friction on the rib of the inner ring
2RSR - bearing with 2 seals, friction on the rib of the inner ring
S0 - bearing which can operate up to a temperature of +150°C
S1 - bearing which can operate up to a temperature of +200°C
SP - snap ring, diameter series 0, 2, 3, 4
SR - snap ring, diameter series 18 and 19
T30 - bearing which can operate up to a temperature of +300°C, radial clearance 0,20...0,25 mm; phosphate-treated surfaces
TN - polyamide cage
V - bearing without cage
Z - bearing with shield and recess on the inner ring
2Z - bearing with 2 shields and recess on the inner ring
ZNRB - bearing with shield and snap ring on the same side
ZR -bearing with shield, without recess on the inner ring
2ZR - bearing with 2 shields, without recess on the inner ring

Sealed and shielded deep groove ball bearings

URB manufactures two versions of sealed and shielded bearings, namely:

- bearings RS and Z type, with recess on the inner ring for sealing or shielding.

- bearings RSR and ZR type, when shielding and sealing respectively are done directly on the outside surface of the inner ring.

In case of bearings with non-rubbing shields, there is a small interstice between the shield and the rib of the inner ring; in case of bearings with seals, the gasoline and oil resistant elastic rubber lip rubs on the groove on the inner ring side or directly on the outside surface.

Bearings sealed and shielded on both sides manufactured in series are delivered filled with lithium base grease and used at temperatures between -30ºC and +110ºC, in accordance with the specifications in chapter 5. Bearings can also be greased with special greases, relubrication not being necessary. Washing or heating are not allowed before bearing mounting in the assembly.

Bearings with shields have been designed first of all for cases when the inner ring rotates.

When the outer ring rotates, the lubricant can flow out of the bearing at a certain speed. In such cases, we recommend you to consult our experts.

Deep grooveball bearings with the snap ring groove

Deep groove ball bearings, with snap ring groove on the outer ring can be located in the housing with snap rings.

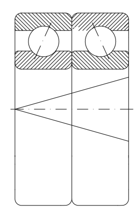
Because of their simple and space saving mounting, these bearings simplify the assembly design. The groove for the snap ring and the snap rings are in accordance with ISO 464 and tables 7 and 8 respectively.

Paired deep groove ball bearings

If the basic load of a single bearing is inadequate or the shaft has to be axially located in both directions with a certain clearance, paired deep groove ball bearings are recommended to be used.

These bearings can be delivered matched in pairs in three versions, as follows: DT (tandem arrangement), DB (back-to-back arrangement) or DF (face-to-face arrangement). They can be delivered with axial clearance or preloaded. The values of clearance or preload are given in table 2.

The producer marks "V" on the bearing outside surface as shown in the next figure, so that pired bearings to be correctly mounted.



The multiple speed limit of these bearings can be calculated multiplying the speed of the basic bearing by 0,8.

Paired bearings are packed and delivered in the same box.

Stainless steel deep groove ball bearings

Deep groove ball bearings can be made and constructive version of stainless steel.

Dimensions

The overall dimensions of deep groove ball bearings are in accordance with the stipulations of ISO 15.

Misalignments

Deep groove ball bearings have limited abilities to compensate for bearing error of alignment. The permissible misalignment between the outer ring and the inner ring, which will not produce inadmissible high additional loads in the bearing, depends on the bearing size, operational radial clearance, inner bearing design and also on the magnitude of loads and moments acting upon the bearing.

Because of the complex relationship of these influence factors, definite and universally valid values of permissible misalignment cannot be determined.

Considering the above mentioned factors, under normal operation conditions the permissible misalignments are between 2 and 10 minutes of arc, depending on the bearing series and load.

Tolerances

Deep groove ball bearings are generally manufactured to the normal tolerance class P0.

At request, they can also be manufactured to the tolerance classes P6, P5 or P4.

The values of tolerances are given in chapter 3 on page 26.

Radial and axial clearance

Deep groove ball bearings are generally manufactured with normal radial clearance. At request, they can also be manufactured with radial clearance different from the normal one, according to ISO 5753. The values of radial clearance are given in table 1.

Paired bearings can be manufactured with axial clearance (suffix A) or preloaded (suffix L). Values for axial clearance and preload are given in table 2.

If a certain axial clearance is prescribed, this has to be measured and marked on the bearing by "A", followed by clearance actual value.

Radial clearance of deep groove ball bearings

Table 1

Bore diameter		**Clearance group symbol for bearings with cylindrical bore**									
		C2		**Normal**		**C3**		**C4**		**C5**	
d		**Clearance group symbol for bearings with tapered bore**									
		-		**C2**		**Normal**		**C3**		**C4**	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm											
2,5	**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	6	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

Axial clearance and mounting preload of paired bearings series 60, 62, 63						
						Table 2
Bore diameter d		**Axial clearance (suffix A)**		**Preload (suffix L)**		
over	up to	min.	max.	Bearing series		
				60	62	63
mm		µm		N		
-	**10**	15	35	30	30	-
10	**18**	20	40	50	50	100
18	**30**	25	45	100	100	100
30	**50**	35	55	100	100	200
50	**80**	40	70	200	200	350
80	**120**	50	80	300	400	600
120	**180**	60	100	500	700	900
180	**250**	70	110	800	1000	1200

Cages

Deep groove ball bearings are generally fitted with cages of pressed steel sheet.

Cages of glass fibre reinforced polyamide 6.6 are also suitable if the operating temperature doesn't exceed +120ºC. They have reduced mass, low coefficient of friction and are noiseless in operation. Large-sized bearings are fitted with machined brass cages.

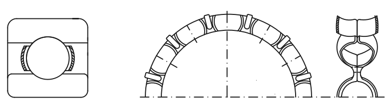
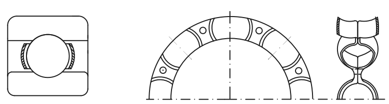
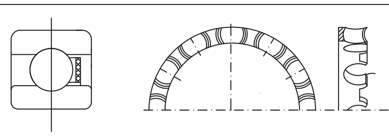
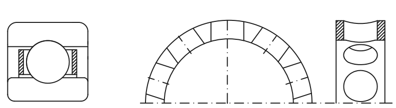
Cage design and some technical data are given in table 3.

Bearing minimum radial load

A minimum load must be applied on a deep groove ball bearing so that they can operate correctly, especially in case of operating under heavy loads.

The forces of inertia which occur in bearing as well as the friction in lubricant influence negatively the operating conditions and can cause detrimental sliding movements between balls and raceways.

Table 3

Cage	Design: bearing / cage	Application	Max. value $D_m n$ oil	grease
Pressed cage of sheet with fins		- General application - Bearings with d > 10 mm - Low frictional moment - Low inertia - Moderate speeds	$100x10^3$	$550x10^3$
Pressed cage of riveted sheet		- General application - Bearings with d > 10 mm - Low frictional moment - Low inertia - Moderate speeds	$1000x10^3$	$550x10^3$
Polyamide cage		- General application - Low frictional - High speeds	$1400x10^3$	$1100x10^3$
Brass machined cage		- General application - Bearings: 61836-618/1400 61936-619/950 16036-16072 6030-60/630 6230-6248 6320-6330	$1000x10^3$	$800x10^3$

Minimum radial load depends on the bearing size, speed and lubricant viscosity at operating temperature. It can be roughly calculated from the equation:

$F_{r\ min} = 0{,}01\ C_r$, (C_r = basic dynamic radial load).

Equivalent dynamic radial load

Deep groove ball bearing can take also radial and axial combined loads.

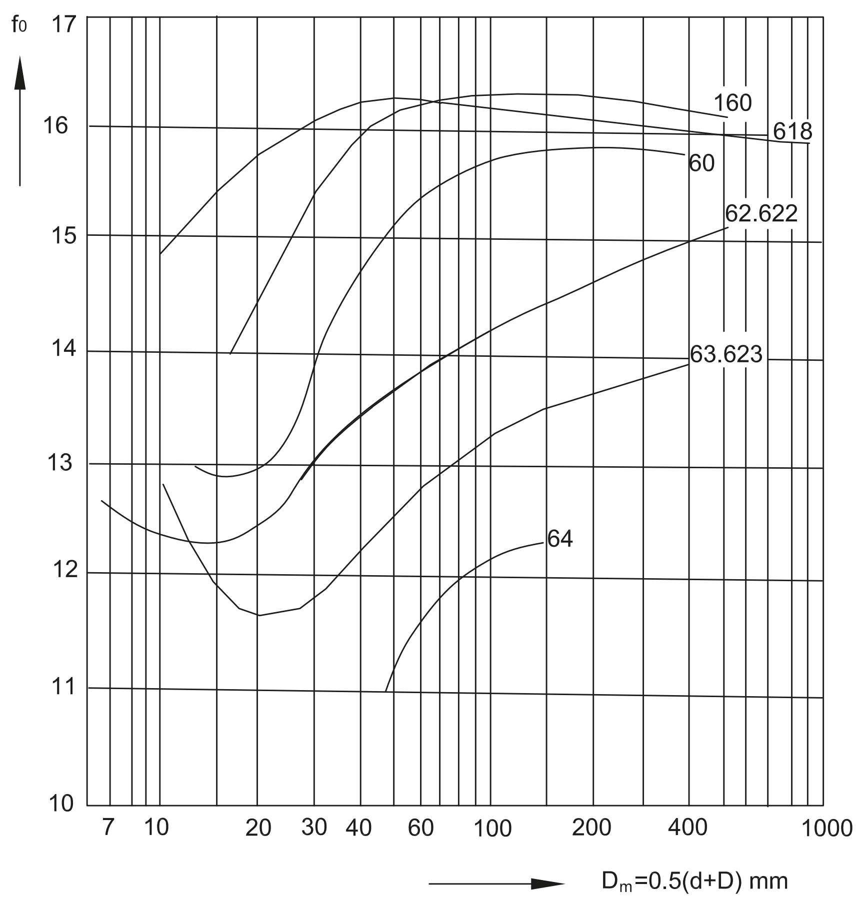
For deep groove ball bearings, single or paired in tandem arrangement DT, equivalent dynamic radial load can be calculated using the equation:

$P_r = F_r$, kN, when $F_a/F_r < e$
$P_r = XF_r + YF_a$, when $F_a/F_r > e$

The greater the axial load, the greater the contact angle of these bearings.

Factor e, X and Y depend on the ratio f_0F_a/C_{0r}. Factor f_0 can be determined using the diagram in the bellow figure, as a function of dimension series and mean diameter (d+D)/2. Fa is the axial and C0r is the static basic load of the bearing.

The values of factors e, X, Y which depend on the bearing clearance can be determined from table 4, coresponding to the values of the ratio f_0F_a/C_{0r}. The values in table 4 apply to bearings mounted with normal fit, i.e. shaft manufactured to tolerance class j5 or k5 and housing in J6, respectively.



Calculation factors e, X and Z for deep groove ball bearings, single mounted or matched in tandem Table 4									
	Normal radial clearance			Radial clearance C3			Radial clearance C4		
f0Fa/C0r	e	X	Y	e	X	Y	e	X	Y
0,2	0,19	0,56	2,25	0,32	0,46	1,77	0,38	0,44	1,44
0,4	0,22	0,56	1,95	0,34	0,46	1,63	0,42	0,44	1,36
0,8	0,26	0,56	1,68	0,38	0,46	1,44	0,45	0,44	1,25
1,6	0,31	0,56	1,40	0,43	0,46	1,27	0,48	0,44	1,16
3	0,37	0,56	1,20	0,48	0,46	1,14	0,52	0,44	1,08
6	0,44	0,56	1,02	0,54	0,46	1	0,56	0,44	1

For bearings matched in DB or DT arrangement, equivalent dynamic radial load can be calculated using the equation:

$P_r = F_r + Y_1 F_a$, kN when $F_a/F_e < e$

$P_r = 0{,}75F_r + Y_2 F_a$, kN when $F_1/F_r > e$.

The values of factors e, Y_1 and Y_2, as functions of ratio F_a/C_{0r} are given in table 5.

Calculation factors e, Y1, Y2 for DB and DF arrangements Table 5			
f0Fa/C0r	e	Y_1	Y_2
0,03	0,32	2	2,8
0,10	0,4	1,55	2,2
0,25	0,47	3	1,65

Equivalent static radial load

For deep groove ball bearings, single or matched in tandem (DT), equivalent static load can be calculated using the equations:

$P_0 = F_r$, kN, when $F_a/F_r < 0{,}8$

$P_0 = 0{,}6F_r + 0{,}5\ F_a$, kN, when $F_a/F_r > 0{,}8$

For bearings matched in DB or DF arrangement, it can be calculated from

$P_0 = F_r + 1{,}7\ F_a$, kN.

Axial load

If deep groove ball bearings are purelz axial loaded, the axial load should not exceed 0,5 C_{0r}. In case of small-sized bearings and bearings of light series (diameter series 8, 9, 0 and 1), the axial load should not exceed 0,25 C_{0r}.

Heavy axial loads cause a significant decrease of bearing rating life. In such cases, we recommend you to consult our experts

Abutment dimensions

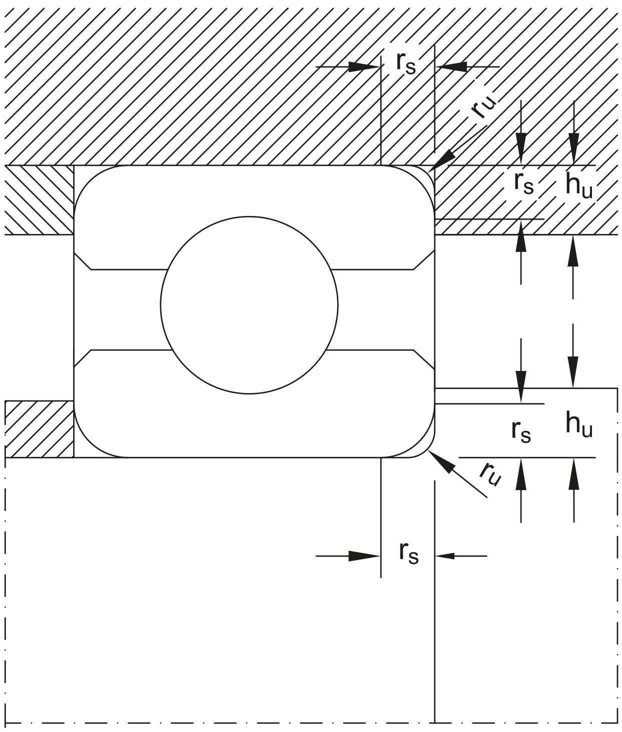
For a proper location of bearing rings on the shaft shoulder and housing, respectively, maximum shaft (housing) connection radius

Abutment dimension Table 6				
r_s min	r_u max	h_u min Bearing series		
		618, 619, 160	161, 60, 62, 63	64
0,15	0,15	0,4	0,7	-
0,2	0,20	0,7	0,9	-
0,3	0,30	1	1,2	-
0,6	0,60	1,6	2,1	-
1	1	2,3	2,8	-
1,1	1	3	3,5	4,5
1,5	1,5	3,5	4,5	5,5
2	2	4,4	5,5	6,5
2,1	2,1	5,1	6	7
3	2,5	6,2	7	8
4	3	7,3	8,5	10
5	4	9	10	12
6	5	11,5	13	15
7,5	6	14	-	-

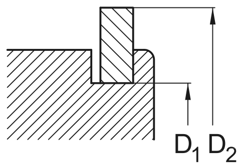
$r_{u\ max}$ should be less than minimum bearing mounting chamfer $r_{s\ min}$.

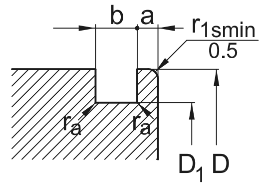
The shoulder should have the proper height corresponding to maximum bearing mounting chamfer,

The values of the connection radius (r_u) and support shoulder height (h_u) as function of mounting chamfers are given in table 6.



Snap ring groove and snap ring dimensions and tolerances



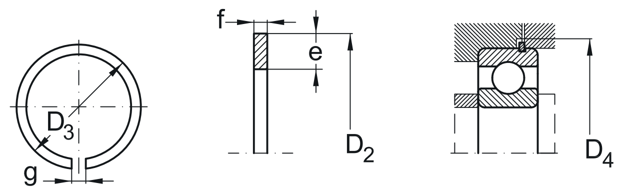


Snap ring groove

Table 7

Outer diameter	**D₁**		**a**		**Dimensions series**		**b**		**r₀**	
			18		19					
D	nom.	toler.	nom.	toler.	nom.	toler.	nom.	toler.	nom.	toler.
mm										
22	20,8	- 0,3	-	-	1,05	- 0,15	0,8	+ 0,25	0,2	- 0,1
24	22,8	- 0,3	-	-	1,05	- 0,15	0,8	+ 0,25	0,2	- 0,1
28	26,7	- 0,3	-	-	1,3	- 0,15	0,95	+ 0,25	0,25	- 0,12
30	28,7	- 0,3	-	-	1,3	- 0,15	0,95	+ 0,25	0,25	- 0,12
32	30,7	- 0,3	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
34	32,7	- 0,3	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
37	35,7	- 0,3	1,3	- 0,15	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
39	37,7	- 0,3	-	-	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
40	38,7	- 0,3	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
42	40,7	- 0,3	1,3	- 0,15	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
44	42,7	- 0,3	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
45	43,7	- 0,3	-	-	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
47	45,7	- 0,3	1,3	- 0,15	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
52	50,7	- 0,3	1,3	- 0,15	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
55	53,7	- 0,3	-	-	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
58	56,7	- 0,3	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
62	60,7	- 0,3	-	-	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
65	63,7	- 0,4	1,3	- 0,15	-	-	0,95	+ 0,25	0,25	- 0,12
68	66,7	- 0,4	-	-	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
72	70,7	- 0,4	1,7	- 0,15	1,7	- 0,15	0,95	+ 0,25	0,25	- 0,12
78	76,2	- 0,4	1,7	- 0,15	-	-	1,3	+ 0,3	0,4	- 0,2
80	77,9	- 0,4	-	-	2,1	- 0,2	1,3	+ 0,3	0,4	- 0,2
85	82,9	- 0,4	1,7	- 0,15	2,1	- 0,2	1,3	+ 0,3	0,4	- 0,2
90	87,9	- 0,4	1,7	- 0,15	2,1	- 0,2	1,3	+ 0,3	0,4	- 0,2
95	92,9	- 0,4	1,7	- 0,15	-	-	1,3	+ 0,3	0,4	- 0,2
100	97,9	- 0,4	1,7	- 0,15	2,5	- 0,2	1,3	+ 0,3	0,4	- 0,2
105	102,6	- 0,5	-	-	2,5	- 0,2	1,3	+ 0,3	0,4	- 0,2
110	107,6	- 0,5	2,1	- 0,2	2,5	- 0,2	1,3	+ 0,3	0,4	- 0,2
115	112,6	- 0,5	2,1	- 0,2	-	-	1,3	+ 0,3	0,4	- 0,2
120	117,6	- 0,5	2,1	- 0,2	3,3	- 0,2	1,3	+ 0,3	0,4	- 0,2
125	122,6	- 0,5	2,1	- 0,2	3,3	- 0,2	1,3	+ 0,3	0,4	- 0,2
130	127,6	- 0,5	2,1	- 0,2	3,3	- 0,2	1,3	+ 0,3	0,4	- 0,2
140	137,6	- 0,5	2,5	- 0,2	3,3	- 0,2	1,9	+ 0,3	0,6	- 0,2
145	142,7	- 0,5	-	-	3,3	- 0,2	1,9	+ 0,3	0,6	- 0,3
150	147,6	- 0,5	2,5	- 0,2	3,3	- 0,2	1,9	+ 0,3	0,6	- 0,3
165	161,8	- 0,5	3,3	- 0,2	3,7	- 0,2	1,9	+ 0,3	0,6	- 0,3
175	171,8	- 0,5	3,3	- 0,2	-	-	1,9	+ 0,3	0,6	- 0,3
180	176,8	- 0,5	-	-	3,7	- 0,2	1,9	+ 0,3	0,6	- 0,3
190	186,8	- 0,5	3,3	- 0,2	3,7	- 0,2	1,9	+ 0,3	0,6	- 0,3
200	196,8	- 0,5	3,3	- 0,2	-	-	1,9	+ 0,3	0,6	- 0,3

The outer ring chamfer on the side of snap ring groove should allow a housing connection radius of:
0,3 mm for dimensions series 18, up to D = 78 mm included and for dimensions series 19, up to D = 47 mm included;
0,5 mm for dimensions series 18, for D > 78 mm and for dimensions series 19, for D > 47 mm



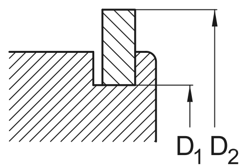
Snap ring

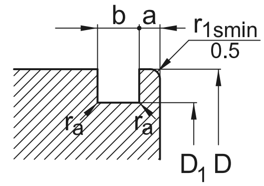
Table 7 (continue)

Outer diameter	D_2 [1]	D_3 [2]		D_4	e	f	g	r	Mass	Snap ring designation
D	max.	nom.	toler.	min.	nom.	nom.	nom.	min.		
mm									g	-
22	24,8	20,5	- 0,3	25	2	0,7	2	0,2	0,812	**SR22**
24	26,8	22,5	- 0,3	28	2	0,7	2	0,2	0,886	**SR24**
28	30,8	26,4	- 0,3	32	2,05	0,85	3	0,2	1,269	**SR28**
30	32,8	28,3	- 0,3	34	2,05	0,85	3	0,2	1,39	**SR30**
32	34,8	30,3	- 0,3	36	2,05	0,85	3	0,2	1,483	**SR32**
34	36,8	32,3	- 0,3	38	2,05	0,85	3	0,2	1,577	**SR34**
37	39,8	35,3	- 0,3	41	2,05	0,85	3	0,2	1,718	**SR37**
39	41,8	37,3	- 0,3	43	2,05	0,85	3	0,2	1,811	**SR39**
40	42,8	38,3	- 0,3	44	2,05	0,85	3	0,2	1,858	**SR40**
42	44,8	40,3	- 0,4	46	2,05	0,85	3	0,2	1,952	**SR42**
44	46,8	42,3	- 0,4	48	2,05	0,85	4	0,2	2,032	**SR44**
45	47,8	43,3	- 0,4	49	2,05	0,85	4	0,2	2,079	**SR45**
47	49,8	45,3	- 0,4	51	2,05	0,85	4	0,2	2,173	**SR47**
52	54,8	50,3	- 0,4	56	2,05	0,85	4	0,2	2,407	**SR52**
55	57,8	53,3	- 0,4	59	2,05	0,85	4	0,2	2,547	**SR55**
58	60,8	56,3	- 0,6	62	2,05	0,85	4	0,2	2,688	**SR58**
62	64,8	60,2	- 0,6	66	2,05	0,85	4	0,2	2,938	**SR62**
65	67,8	63,2	- 0,6	69	2,05	0,85	4	0,2	3,081	**SR65**
68	70,8	66,2	- 0,6	72	2,05	0,85	5	0,2	3,212	**SR68**
72	74,8	70,2	- 0,6	76	2,05	0,85	5	0,2	3,403	**SR72**
78	82,7	75,7	- 0,6	84	3,25	1,12	5	0,4	7,462	**SR78**
80	84,4	77,4	- 0,6	86	3,25	1,12	5	0,4	7,625	**SR80**
85	89,4	82,4	- 0,6	91	3,25	1,12	5	0,4	8,105	**SR85**
90	94,4	87,4	- 0,6	96	3,25	1,12	5	0,4	8,585	**SR90**
95	99,4	92,4	- 0,6	101	3,25	1,12	5	0,4	9,065	**SR95**
100	104,4	97,4	- 0,6	106	3,25	1,12	5	0,4	9,545	**SR100**
105	110,7	101,9	- 0,8	112	4,04	1,12	5	0,4	12,653	**SR105**
110	115,7	106,9	- 0,8	117	4,04	1,12	5	0,4	13,257	**SR110**
115	120,7	111,9	- 0,8	122	4,04	1,12	5	0,4	13,861	**SR115**
120	125,7	116,9	- 0,8	127	4,04	1,12	7	0,4	14,393	**SR120**
125	130,7	121,8	- 0,8	132	4,04	1,12	7	0,4	15,164	**SR125**
130	135,7	126,8	- 0,8	137	4,04	1,12	7	0,4	15,774	**SR130**
140	145,7	136,8	- 1	147	4,04	1,7	7	0,4	25,796	**SR140**
145	150,7	141,8	- 1	152	4,04	1,7	7	0,6	26,722	**SR145**
150	155,7	146,8	- 1,2	157	4,04	1,7	7	0,6	27,648	**SR150**
165	171,5	161	- 1,2	173	4,85	1,7	7	0,6	35,89	**SR165**
175	181,5	171	- 1,2	183	4,85	1,7	10	0,6	37,883	**SR175**
180	186,5	176	- 1,2	187	4,85	1,7	10	0,6	38,976	**SR180**
190	196,5	186	- 1,4	198	4,85	1,7	10	0,6	41,162	**SR190**
200	206,5	196	- 1,4	208	4,85	1,7	10	0,6	43,348	**SR200**

1) D_2 dimensions refers to the mounted snap ring
2) D_3 represents dimensions before mounting

Snap ring groove and snap ring dimensions and tolerances



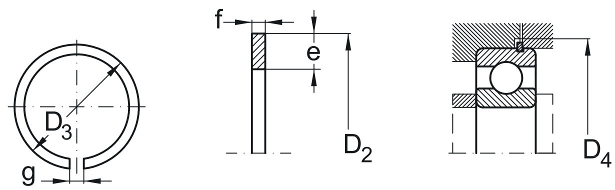


Snap ring groove

Table 8

Outer diameter	**D_1**		**a**		**Dimensions series**		**b**		**r_0**	
			60		62, 63, 64					
D	nom.	toler.	nom.	toler.	nom.	toler.	nom.	toler.	nom.	toler.
mm										
30	28,17	- 0,25				- 0,3				
32	30,15	- 0,25	2	- 0,15	1,35	+ 0,3	0,4	- 0,2		
35	33,17	- 0,25	2	- 0,15	1,35	+ 0,3	0,4	- 0,2		
40	38,10	- 0,25				- 0,2				
42	39,75	- 0,25	2	- 0,15	1,35	+ 0,3	0,4	- 0,2		
47	44,60	- 0,25	2	- 0,15	0,35	+ 0,3	0,4	- 0,2		
52	49,73	- 0,25	2	- 0,15	1,35	+ 0,3	0,4	- 0,2		
55	52,60	- 0,25	2			- 0,2				
62	59,61	-0,5	2,08	- 0,2	3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
68	64,82	-0,5	2,49	- 0,2	3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
72	68,81	-0,5			3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
75	71,83	-0,5	2,49	- 0,2	3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
80	76,81	-0,5	2,49	- 0,2	3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
85	81,81	-0,5			3,28	- 0,2	1,90	+ 0,3	0,6	- 0,3
90	86,79	-0,5	2,87	- 0,2	3,28	- 0,2	2,70	+ 0,3	0,6	- 0,3
95	91,82	-0,5			2,87	- 0,2	2,70	+ 0,3	0,6	- 0,3
100	96,80	-0,5	2,87	- 0,2	3,28	- 0,2	2,70	+ 0,3	0,6	- 0,3
110	106,81	-0,5	2,87	- 0,2	3,28	- 0,2	2,70	+ 0,3	0,6	- 0,3
115	111,81	-0,5	2,87	- 0,2			2,70	+ 0,3	0,6	- 0,3
120	115,21	-0,5			4,06	- 0,2	3,10	+ 0,3	0,6	- 0,3
125	120,22	-0,5	2,87	- 0,2	4,06	- 0,2	3,10	+ 0,3	0,6	- 0,3
130	125,22	-0,5	2,87	- 0,2	4,06	- 0,2	3,10	+ 0,3	0,6	- 0,3
140	135,23	-0,5	3,71	- 0,25	4,90	- 0,25	3,10	+ 0,3	0,6	- 0,3
145	140,23	-0,5	3,71	- 0,25			3,10	+ 0,3	0,6	- 0,3
150	145,24	-0,5	3,71	- 0,25	4,90	- 0,25	3,10	+ 0,3	0,6	- 0,3
160	155,22	-0,5	3,71	- 0,25	4,90	- 0,25	3,10	+ 0,3	0,6	- 0,3
170	163,65	-0,5	3,71	- 0,25	5,69	- 0,25	3,50	+ 0,3	0,6	- 0,3
180	173,66	-0,5	3,71	- 0,25	5,69	- 0,25	3,50	+ 0,3	0,6	- 0,3
200	193,65	-0,5	5,69	- 0,25	5,69	- 0,25	3,50	+ 0,3	0,6	- 0,3

The outer ring chamfer on the side of snap ring groove should allow a housing connection radius of:
0,3 mm for dimensions series 18, up to D = 78 mm included and for dimensions series 19, up to D = 47 mm included;
0,5 mm for dimensions series 18, for D > 78 mm and for dimensions series 19, for D > 47 mm



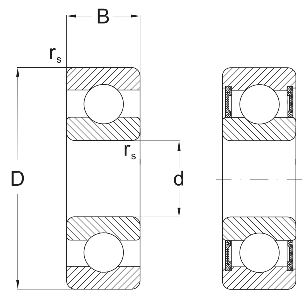
Snap ring

Table 8 (continue)

Outer diameter	D_2 1)	D_3 2)		D_4	e	f	g	r	Mass	Snap ring designation
D	max.	nom.	toler.	min.	nom.	nom.	nom.	min.		
mm									g	-
30	34,7	27,9	- 0,4	36	3,25	1,12	3	0,4	2,78	**SP30**
32	36,7	29,9	- 0,4	38	3,25	1,12	3	0,4	2,98	**SP32**
35	39,7	32,9	- 0,4	41	3,25	1,12	3	0,4	3,22	**SP35**
40	44,6	37,8	- 0,4	46	3,25	1,12	3	0,4	3,60	**SP40**
42	46,3	39,5	- 0,5	47	3,25	1,12	3	0,4	3,75	**SP42**
47	52,7	44,3	- 0,5	54	4,04	1,12	4	0,4	5,30	**SP47**
52	57,9	49,4	- 0,5	59	4,04	1,12	4	0,4	5,92	**SP52**
55	60,7	52,3	- 0,5	62	4,04	1,12	4	0,4	6,17	**SP55**
62	67,7	59,0	- 0,6	69	4,04	1,70	4	0,6	10,5	**SP62**
68	74,6	64,2	- 0,6	76	4,85	1,70	5	0,6	12,6	**SP68**
72	78,6	68,2	- 0,6	80	4,85	1,70	5	0,6	14,7	**SP72**
75	81,6	71,2	- 0,6	83	4,85	1,70	5	0,6	15,3	**SP75**
80	86,6	76,2	- 0,6	88	4,85	1,70	5	0,6	16,3	**SP80**
85	91,6	81,2	- 0,6	93	4,85	1,70	5	0,6	17,5	**SP85**
90	96,5	86,2	- 0,6	98	4,85	2,46	5	0,6	26,6	**SP90**
95	101,6	91,2	- 0,6	103	4,85	2,46	5	0,6	28,2	**SP95**
100	106,5	96,2	- 0,8	108	4,85	2,46	5	0,6	29,2	**SP100**
110	116,6	106,2	- 0,8	118	4,85	2,46	5	0,6	32,8	**SP110**
115	121,6	111,2	- 0,8	123	4,85	2,46	5	0,6	34,4	**SP115**
120	129,7	114,6	- 0,8	131	7,21	2,82	7	0,6	60,6	**SP120**
125	134,7	119,6	- 0,8	136	7,21	2,82	7	0,6	63,0	**SP125**
130	139,7	124,6	- 0,8	141	7,21	2,82	7	0,6	65,6	**SP130**
140	149,7	134,6	- 1,2	151	7,21	2,82	7	0,6	70,6	**SP140**
145	154,7	139,6	- 1,2	156	7,21	2,82	7	0,6	73,0	**SP145**
150	159,7	144,5	- 1,2	161	7,21	2,82	7	0,6	77,2	**SP150**
160	169,7	154,5	- 1,2	172	7,21	2,82	7	0,6	81,0	**SP160**
170	182,9	162,9	- 1,2	185	9,60	3,10	10	0,6	122	**SP170**
180	192,9	172,8	- 1,2	195	9,60	3,10	10	0,6	128	**SP180**
200	212,9	192,8	- 1,4	215	9,60	3,10	10	0,6	148	**SP200**

1) D_2 dimensions refers to the mounted snap ring
2) D_3 represents dimensions before mounting

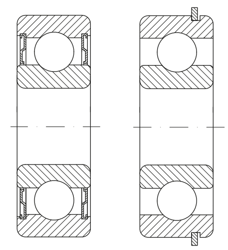
Single Row Deep Groove Ball Bearings



2RSR

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
3	10	4	0,1	0,64	0,23	40000	48000	**623**		0,002
	10	4	0,1	0,64	0,23	40000		**623 2ZR**		0,002
4	13	5	0,2	1,3	0,49	38000	45000	**624**		0,003
	13	5	0,2	1,3	0,49	38000		**624 2ZR**		0,003
	16	5	0,3	1,2	0,5	34000	40000	**634**		0,005
	16	5	0,3	1,2	0,5	34000		**634 2ZR**		0,005
5	11	3	0,1	0,64	0,26	55000	65000	**618/5**		0,001
	16	5	0,3	1,9	0,69	34000	40000	**625**		0,005
	16	5	0,3	1,9	0,69	34000		**625 2ZR**		0,005
	16	5	0,3	1,9	0,69	22000		**625 2RSR**		0,005
	19	6	0,3	1,7	0,72	32000	38000	**635**		0,009
	19	6	0,3	1,7	0,72	32000		**635 2ZR**		0,009
6	13	3,5	0,1	1	0,44	50000	59000	**618/6**		0,002
	15	5	0,2	1,45	0,6	47000	56000	**619/6**		0,004
	19	6	0,3	2,2	0,89	32000	38000	**626**		0,008
	19	6	0,3	2,2	0,89	32000		**626 2ZR**		0,008
	19	6	0,3	2,2	0,89	22000		**626 2RSR**		0,008
7	14	3,5	0,1	0,96	0,4	47000	56000	**618/7**		0,002
	17	5	0,3	2,1	0,8	44000	51000	**619/7Y**		0,005
	19	6	0,3	2,25	0,89	32000	38000	**607**		0,008
	19	6	0,3	2,25	0,89	32000		**607 2ZR**		0,008
	19	6	0,3	2,25	0,89	22000		**607 2RSR**		0,008
	22	7	0,3	3,3	1,35	30000	36000	**627**		0,012
	22	7	0,3	3,3	1,35	30000		**627 2ZR**		0,012
	22	7	0,3	3,3	1,35	20000		**627 2RSR**		0,012
8	16	4	0,2	1,35	0,57	44000	51000	**618/8**		0,003
	19	6	0,3	1,6	0,74	40000	47000	**619/8**		0,007
	22	7	0,3	3,3	1,35	30000	36000	**608**		0,015
	22	7	0,3	3,3	1,35	30000		**608 2ZR**		0,015
	22	7	0,3	3,3	1,35	20000		**608 2RSR**		0,015
9	17	4	0,2	1,45	0,64	40000	47000	**618/9**		0,003
	20	6	0,3	2,65	1,1	37000	43000	**619/9**		0,007
	24	7	0,3	3,35	1,4	30000	36000	**609**		0,018
	24	7	0,3	3,35	1,4	30000		**609 2ZR**		0,018
	24	7	0,3	3,35	1,4	20000		**609 2RSR**		0,018

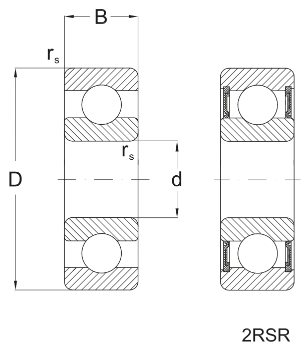
Single Row Deep Groove Ball Bearings



2ZR NR

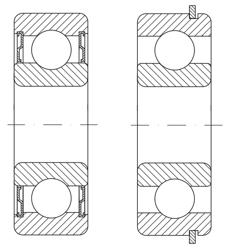
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
d	D	B	r_s min	dyn. C_r	stat. C_{0r}	grease	oil			
mm				kN		min^{-1}		-		kg
9	26	8	0,3	4,55	1,95	28000	34000	**629**		0,020
	26	8	0,3	4,55	1,95	26000		**629 2ZR**		0,020
	26	8	0,3	4,55	1,95	18000		**629 2RSR**		0,020
10	19	5	0,3	1,7	0,83	37000	43000	**61800**		0,005
	22	6	0,3	1,95	0,75	34000	41000	**61900 TN**		0,010
	26	8	0,3	4,6	1,95	28000	34000	**6000 TN**		0,020
	26	8	0,3	4,6	1,95	28000		**6000 2ZR**		0,020
	26	8	0,3	4,6	1,95	17000		**6000 2RSR**		0,020
	28	8	0,3	4,6	1,95	28000	34000	**16100**		0,023
	30	9	0,6	5,1	2,4	32000	38000	**6200 TN**		0,032
	30	9	0,6	5,1	2,4	26000		**6200 2ZR**		0,032
	30	9	0,6	5,1	2,4	17000		**6200 2RSR**		0,032
	35	11	0,6	8,1	3,45	20000	26000	**6300**		0,057
	35	11	0,6	8,2	3,5	20000		**6300 2ZR**		0,057
	35	11	0,6	8,2	3,5	15000		**6300 2RSR**		0,057
12	21	5	0,3	1,8	0,95	33000	39000	**61801**		0,006
	21	5	0,3	1,45	0,67	33000	39000	**61801 NR**	**SR21**	0,006
	24	6	0,3	2,9	1,45	31000	36000	**61901**		0,011
	24	6	0,3	2,9	1,45	31000	36000	**61901 NR**	**SR24**	0,011
	28	8	0,3	5,1	2,4	26000	32000	**6001**		0,022
	28	8	0,3	5,1	2,4	26000	32000	**6001 TN**		0,022
	28	8	0,3	5,1	2,4	26000		**6001 2ZR**		0,022
	28	8	0,3	5,1	2,4	17000		**6001 2RSR**		0,022
	30	8	0,3	5,1	2,4	26000	32000	**16101**		0,026
	32	10	0,6	6,9	3,1	22000	28000	**6201**		0,037
	32	10	0,6	6,9	3,1	22000	28000	**6201 TN**		0,037
	32	10	0,6	6,9	3,1	22000		**6201 2ZR**		0,037
	32	10	0,6	6,9	3,1	15000		**6201 2RSR**		0,037
	32	14	0,6	6,9	3,1	22000		**62201 2RSR**		0,049
	37	12	1	9,8	4,2	19000	24000	**6301**		0,065
	37	12	1	9,8	4,2	19000		**6301 2ZR**		0,065
	37	12	1	9,8	4,2	12000		**6301 2RSR**		0,065
15	24	5	0,3	2	1,25	28000	33000	**61802**		0,007
	24	5	0,3	2	1,25	28000	33000	**61802 NR**	**SR24**	0,007
	28	7	0,3	4	2,05	26000	30000	**61902**		0,017

Single Row Deep Groove Ball Bearings



Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
15	28	7	0,3	4	2,05	26000	30000	**61902 NR**	**SR28**	0,017
	30	8	0,3	4	2,05	22000	28000	**16002**		0,037
	32	9	0,3	5,6	2,9	22000	28000	**6002**		0,031
	32	9	0,3	5,6	2,9	22000		**6002 2ZR**		0,031
	32	9	0,3	5,6	2,9	14000		**6002 2RSR**		0,031
	35	11	0,6	7,8	3,8	19000	24000	**6202**		0,046
	35	11	0,6	7,8	3,8	19000		**6202 2ZR**		0,046
	35	11	0,6	7,65	3,75	19000	24000	**6202 TN**		0,046
	35	11	0,6	7,8	3,8	13000		**6202 2RSR**		0,146
	35	14	0,6	7,8	3,8	13000		**62202 2RSR**		0,053
	42	13	1	11,5	5,5	17000	20000	**6302**		0,092
	42	13	1	11,5	5,5	17000		**6302 2ZR**		0,092
	42	13	1	11,5	5,5	11000		**6302 2RSR**		0,092
	42	17	1	11,5	5,5	17000		**62302 2RSR**		0,099
17	26	5	0,3	2,2	1,4	26000	32000	**61803**		0,009
	30	7	0,3	4,35	2,3	26000	32000	**61903**		0,018
	35	8	0,3	6	3,25	20000	26000	**16003**		0,040
	35	10	0,3	6	3,3	20000	26000	**6003**		0,042
	35	10	0,3	6	3,3	20000		**6003 2ZR**		0,042
	35	10	0,3	6	3,3	12000		**6003 2RSR**		0,042
	40	12	0,6	9,6	4,8	17000	20000	**6203**		0,070
	40	12	0,6	9,6	4,8	17000	20000	**6203 TN**		0,070
	40	12	0,6	9,6	4,8	17000		**6203 2ZR**		0,070
	40	12	0,6	9,6	4,8	11000		**6203 2RSR**		0,070
	40	12	0,6	9,6	4,8	17000	20000	**6203 NR**	**SP40**	0,070
	40	16	1	9,55	4,8	17000	20000	**62203 2RSR**		0,082
	47	14	1	13,7	6,7	16000	19000	**6303**		0,120
	47	14	1	13,7	6,7	16000		**6303 2ZR**		0,120
	47	14	1	13,7	6,7	11000		**6303 2RSR**		0,120
	47	19	1	13,4	6,55	16000		**62303 2RSR**		0,145
	62	17	1,1	22,7	11	12000	15000	**6403**		0,285
	62	17	1,1	22,7	11	12000	15000	**6403 NR**	**SP62**	0,285
20	32	7	0,3	3,45	2,25	20000	26000	**61804**		0,020
	32	7	0,3	3,45	2,25	21000	25000	**61804 NR**	**SR32**	0,020
	37	9	0,3	6,55	3,65	19000	23000	**61904**		0,036

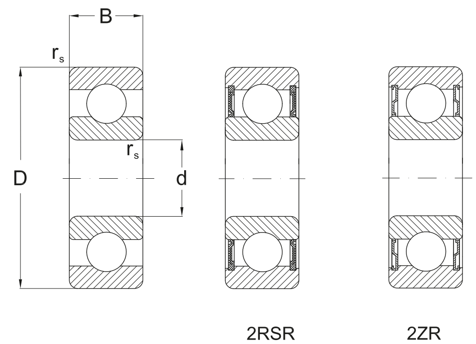
Single Row Deep Groove Ball Bearings



2ZR NR

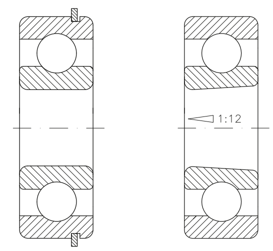
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
20	37	9	0,3	6,55	3,65	19000	23000	**61904 NR**	**SR37**	0,036
	42	8	0,3	7,95	4,5	17000	20000	**16004**		0,050
	42	12	0,6	9,4	5,1	17000	20000	**6004**		0,070
	42	12	0,6	9,4	5,1	17000		**6004 2ZR**		0,070
	42	12	0,6	9,4	5,1	11000		**6004 2RSR**		0,070
	47	14	1	12,8	6,7	15000	18000	**6204**		0,118
	47	14	1	12,8	6,7	15000	18000	**6204 TN**		0,118
	47	14	1	12,8	6,7	15000		**6204 2ZR**		0,118
	47	14	1	12,8	6,7	10000		**6204 2RSR**		0,118
	47	14	1	12,8	6,7	15000	18000	**6204 NR**	**SP47**	0,118
	47	18	1	12,8	6,7	15000		**62204 2RSR**		0,131
	52	15	1,1	15,9	7,9	13000	16000	**6304**		0,158
	52	15	1,1	15,9	7,9	13000	16000	**6304 TN**		0,158
	52	15	1,1	15,9	7,9	13000	16000	**6304 MAP5**		0,158
	52	15	1,1	15,9	7,9	13000		**6304 2ZR**		0,158
	52	15	1,1	15,9	7,9	8000		**6304 2RSR**		0,158
	52	15	1,1	15,9	7,9	13000	16000	**6304 NR**	**SP52**	0,158
	52	21	1,1	15,9	7,9	13000		**62304 2RSR**		0,197
	72	19	1,1	31	15,2	10000	13000	**6404**		0,420
22	50	14	1	12,9	6,8	15000	17000	**62/22**		0,118
	50	14	1	12,9	6,8	15000		**62/22 2ZR**		0,118
	50	14	1	12,9	6,8	15000		**62/22 2RSR**		0,118
	56	16	1,1	18,5	9,5	13000	15000	**63/22**		0,201
	56	16	1,1	18,5	9,5	13000		**63/22 2ZR**		0,201
	56	16	1,1	18,5	9,5	13000		**63/22 2RSR**		0,201
25	37	7	0,3	4,35	2,6	18000	25000	**61805**		0,022
	42	9	0,3	6,65	4,1	16000	19000	**61905**		0,041
	47	8	0,3	8,4	5,1	15000	18000	**16005**		0,058
	47	12	0,6	10,1	5,9	15000	18000	**6005 TN**		0,086
	47	12	0,6	10,1	5,9	15000		**6005 2ZR**		0,086
	47	12	0,6	10,1	5,9	9500		**6005 2RSR**		0,086
	52	15	1	14	7,9	12000	15000	**6205**		0,142
	52	15	1	14	7,9	12000		**6205 2ZR**		0,142
	52	15	1	14	7,9	8000		**6205 2RSR**		0,142
	52	15	1	14	7,9	12000	15000	**6205 NR**	**SP52**	0,142

Single Row Deep Groove Ball Bearings



Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
25	52	18	1	14	7,9	12000		**62205 2RSR**		0,148
	62	17	1,1	20,6	11,3	11000	14000	**6305**		0,250
	62	17	1,1	20,6	11,3	11000	14000	**6305 MAP5**		0,250
	62	17	1,1	20,6	11,3	11000		**6305 2ZR**		0,250
	62	17	1,1	20,6	11,3	7500		**6305 2RSR**		0,250
	62	17	1,1	20,6	11,3	11000	14000	**6305 NR**	**SP62**	0,250
	62	24	1,1	20,6	11,3	11000		**62305 2RSR**		0,317
	80	21	1,5	37,6	19	9000	11000	**6405**		0,575
	80	21	1,5	37,6	19	9000	11000	**6405 NR**	**SP80**	0,575
28	58	16	1	10,7	6,65	14000	16000	**62/28**		0,173
	58	16	1	10,7	6,65	14000		**62/28 2ZR**		0,173
	58	16	1	10,7	6,65	14000		**62/28 2RSR**		0,173
	68	18	1,1	19,5	11,5	10000	12000	**63/28**		0,328
	68	18	1,1	19,5	11,5	10000		**63/28 2ZR**		0,328
	68	18	1,1	19,5	11,5	10000		**63/28 RSR**		0,328
30	42	7	0,3	4,4	2,9	15000	18000	**61806**		0,027
	42	7	0,3	4,4	2,9	15000	18000	**61806 NR**	**SR42**	0,027
	47	9	0,3	7,8	4,7	14000	17000	**61906**		0,045
	47	9	0,3	7,8	4,7	14000	17000	**61906 NR**	**SR47**	0,045
	55	9	3	11,2	7,35	12000	15000	**16006**		0,087
	55	13	1	13,2	8,25	12000	15000	**6006TN**		0,129
	55	13	1	13,2	8,25	12000		**6006 2ZR**		0,129
	55	13	1	13,2	8,25	7000		**6006 2RSR**		0,129
	55	13	1	13,2	8,25	12000	15000	**6006 NR**	**SP55**	0,129
	62	16	1	19,5	11,3	10000	13000	**6206**		0,210
	62	16	1	19,5	11,3	10000		**6206 2ZR**		0,210
	62	16	1	19,5	11,3	7500		**6206 2RSR**		0,210
	62	16	1	19,5	11,3	10000	13000	**6206 NR**	**SP62**	0,210
	62	20	1	19,5	11,3	10000		**62206 2RSR**		0,236
	72	19	1,1	29,5	15,8	9000	11000	**6306**		0,371
	72	19	1,1	29,5	15,8	9000	11000	**6306 MAP5**		0,371
	72	19	1,1	29,5	15,8	9000		**6306 2ZR**		0,371
	72	19	1,1	29,5	15,8	6000		**6306 2RSR**		0,371
	72	19	1,1	29,5	15,8	9000	11000	**6306 NR**	**SP72**	0,371
	72	27	1,1	26,6	14,9	9000		**62306 2RSR**		0,473

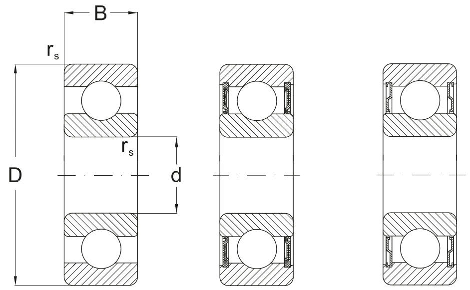
Single Row Deep Groove Ball Bearings



NR K

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
30	90	23	1,5	47,3	24,5	8500	10000	**6406**		0,785
	90	23	1,5	47,3	24,5	8500	10000	**6406 NR**	**SP90**	0,785
32	65	17	1	23	13	10000	12000	**62/32**		0,228
	65	17	1	23	13	10000		**62/32 2ZR**		0,228
	65	17	1	23	13	10000		**62/32 2RSR**		0,228
	75	20	1,1	30	16	9000	11000	**63/32**		0,437
	75	20	1,1	30	16	9000		**63/32 2ZR**		0,437
	75	20	1,1	30	16	9000		**63/32 2RSR**		0,437
35	47	7	0,3	4	3,25	13000	16000	**61807**		0,031
	55	10	0,6	9,5	6,2	12000	14000	**61907**		0,073
	62	9	0,3	12,2	8,85	10000	13000	**16007**		0,111
	62	14	1	15,9	10,3	10000	13000	**6007**		0,164
	62	14	1	15,9	10,3	10000		**6007 2ZR**		0,164
	62	14	1	15,9	10,3	7000		**6007 2RSR**		0,164
	62	14	1	15,9	10,3	10000	13000	**6007 NR**	**SP62**	0,164
	72	17	1,1	25,7	15,6	9000	11000	**6207 K**		0,315
	72	17	1,1	25,7	15,4	9000	11000	**6207 TN**		0,315
	72	17	1,1	25,7	15,4	9000	11000	**6207 MAP6**		0,315
	72	17	1,1	25,7	15,4	9000	11000	**6207 P6**		0,315
	72	17	1,1	25,7	15,4	9000	11000	**6207 P5**		0,315
	72	17	1,1	25,7	15,6	9000		**6207 2ZR**		0,315
	72	17	1,1	25,7	15,6	6000		**6207 2RSR**		0,315
	72	17	1,1	25,7	15,6	9000	11000	**6207 NR**	**SP72**	0,315
	72	17	1,1	25,7	15,6	9000	11000	**6207 NRP6**	**SP72**	0,315
	72	17	1,1	25,7	15,6	9000	11000	**6207 MA**		0,315
	72	23	1,1	25,7	15,6	9000		**62207 2RSR**		0,375
	80	21	1,5	33,5	19,2	8500	10000	**6307**		0,450
	80	21	1,5	33,5	19,2	8500	10000	**6307 K**		0,450
	80	21	1,5	33,5	19,2	8500	10000	**6307 P6**		0,450
	80	21	1,5	33,5	19,2	8500	10000	**6307 P5**		0,450
	80	21	1,5	33,5	19,2	8500		**6307 2ZR**		0,450
	80	21	1,5	33,5	19,2	8500		**6307 2ZRP5**		0,450
	80	21	1,5	33,5	19,2	6500		**6307 2RSR**		0,450
	80	21	1,5	33,5	19,2	6500		**6307 2RSRP6**		0,450
	80	21	1,5	33,5	19,2	6500		**6307 2RSRP5**		0,450

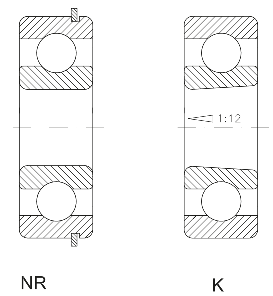
Single Row Deep Groove Ball Bearings



2RSR 2ZR

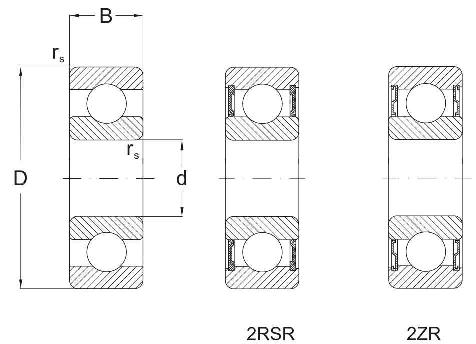
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
35	80	31	1,5	33,5	19,2	8500	10000	**6307 NR**	**SP80**	0,450
	80	31	1,5	33,5	19,2	8500		**62307 2RSR**		0,658
	100	25	1,5	55,5	29,4	7000	8500	**6407**		0,954
	100	25	1,5	55,5	29,4	7000	8500	**6407 NR**	**SP100**	0,954
40	52	7	0,3	4,5	4,05	11000	14000	**61808 P5**		0,034
	52	7	0,3	4,5	4,05	12000	14000	**61808 NR**	**SR52**	0,034
	62	12	0,6	14,5	10,2	11000	13000	**61908**		0,110
	62	12	0,6	14,5	10,2	11000	13000	**61908 NR**	**SR62**	0,110
	68	9	0,3	13,3	9,8	95000	12000	**16008**		0,130
	68	15	1	16,8	11,6	9500	12000	**6008**		0,210
	68	15	1	16,8	11,6	9500		**6008 2ZR**		0,210
	68	15	1	16,8	11,6	6000		**6008 2RSR**		0,210
	68	15	1	16,8	11,6	9500	12000	**6008 NR**	**SP68**	0,210
	80	18	1,1	32,6	20	8500	10000	**6208**		0,402
	80	18	1,1	32,6	20	8500	10000	**6208 K**		0,402
	80	18	1,1	32,6	20	8500	10000	**6208 P6**		0,402
	80	18	1,1	32,6	20	8500	10000	**6208 P5**		0,402
	80	18	1,1	32,6	20	8500		**6208 2ZR**		0,402
	80	18	1,1	32,6	20	8500		**6208 2ZRP5**		0,402
	80	18	1,1	32,6	20	5600		**6208 2RSR**		0,402
	80	18	1,1	32,6	20	5600		**6208 2RSRP5**		0,402
	80	18	1,1	32,6	20	8500	10000	**6208 NR**	**SP80**	0,402
	80	18	1,1	32,6	20	8500	10000	**6208 MB**		0,402
	80	18	1,1	32,6	20	8500	10000	**6208 NMA**		0,402
	80	23	1,1	32	19,8	8500		**62208 2RSR**		0,460
	90	23	1,5	40,8	24	7500	9000	**6308**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 K**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 TN**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 P6**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 P5**		0,635
	90	23	1,5	40,8	24	7500		**6308 2ZR**		0,635
	90	23	1,5	40,8	24	7500		**6308 2ZRP5**		0,635
	90	23	1,5	40,8	24	7500		**6308 2RSR**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 NMA**		0,635
	90	23	1,5	40,8	24	7500	9000	**6308 NR**	**SP90**	0,635

Single Row Deep Groove Ball Bearings



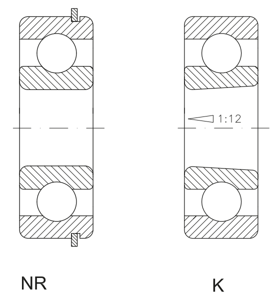
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
40	90	33	1,5	40,8	24	7500		**62308 2RSR**		0,874
	110	27	2	64	35	6700	7500	**6408**		1,23
	110	27	2	64	35	6700	8000	**6408 NR**	**SP110**	1,23
45	58	7	0,3	6,4	5,6	9500	12000	**61809**		0,043
	68	12	0,6	14	9,8	9700	11000	**61909**		0,120
	75	10	0,6	15,5	12,3	9000	11000	**16009**		0,170
	75	16	1	21	15	9000	11000	**6009**		0,261
	75	16	1	21	15	9000	11000	**6009 P5**		0,261
	75	16	1	21	15	9000	11000	**6009 P4**		0,261
	75	16	1	21	15	9000		**6009 2ZR**		0,261
	75	16	1	21	15	9000		**6009 2ZRP4**		0,261
	75	16	1	21	15	5600		**6009 2RSR**		0,261
	75	16	1	21	15	9000	11000	**6009 NR**	**SP75**	0,261
	85	19	1,1	32,7	20,6	7500	9000	**6209**		0,414
	85	19	1,1	32,7	20,6	7500	9000	**6209 K**		0,414
	85	19	1,1	32,7	20,6	7500	9000	**6209 P6**		0,414
	85	19	1,1	32,7	20,6	7500	9000	**6209 P5**		0,414
	85	19	1,1	32,7	20,6	9000		**6209 2ZR**		0,414
	85	19	1,1	32,7	20,6	8000		**6209 2ZRP5**		0,414
	85	19	1,1	32,7	20,6	5600		**6209 2RSR**		0,414
	85	19	1,1	32,7	20,6	5600		**6209 2RSRP6**		0,414
	85	19	1,1	32,7	20,6	5600		**6209 2RSRP5**		0,414
	85	19	1,1	32,7	20,6	8000	9500	**6209 NR**	**SP85**	0,414
	85	23	1,1	32,7	20,2	8000		**62209 2RSR**		0,481
	100	25	1,5	52,8	31,7	6700	8000	**6309**		0,838
	100	25	1,5	52,8	31,7	6700	8000	**6309 K**		0,838
	100	25	1,5	52,8	31,7	6700	8000	**6309 MB**		0,838
	100	25	1,5	52,8	31,7	6700	8000	**6309 MAP6**		0,838
	100	25	1,5	52,8	31,7	6700	8000	**6309 P6**		0,838
	100	25	1,5	52,8	31,7	6700	8000	**6309 P5**		0,838
	100	25	1,5	52,8	31,7	6700		**6309 2ZR**		0,838
	100	25	1,5	52,8	31,7	6700		**6309 2ZRP5**		0,838
	100	25	1,5	52,8	31,7	4500		**6309 2RSR**		0,838
	100	25	1,5	52,8	31,7	4500		**6309 2RSRP6**		0,838
	100	25	1,5	52,8	31,7	4500		**6309 2RSRP5**		0,838

Single Row Deep Groove Ball Bearings



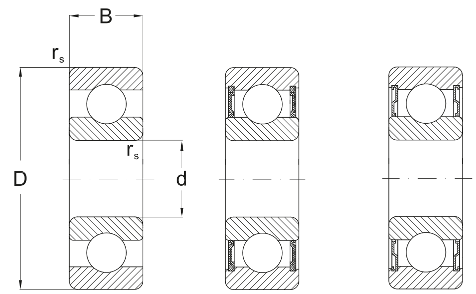
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
45	100	25	1,5	52,8	31,7	6700	8000	**6309 NR**	**SP100**	0,838
	100	36	1,5	52,8	31,7	6700		**62309 2RSR**		1,18
	120	29	2	76,8	44,9	5600	6700	**6409**		1,54
	120	29	2	76,8	44,9	5600	6700	**6409 NR**	**SP120**	1,54
50	65	7	0,3	6,8	6,3	9500	12000	**61810**		0,057
	65	7	0,3	6,8	6,3	9700	11000	**61810 NR**	**SR65**	0,057
	72	12	0,6	14,5	10,4	9000	11000	**61910**		0,130
	72	12	0,6	14,5	10,4	9000	11000	**61910 NR**	**SR72**	0,130
	80	10	0,6	16,3	13,1	8500	10000	**16010**		0,188
	80	16	1	21,8	16,6	8500	10000	**6010 K**		0,260
	80	16	1	21,8	16,6	8500		**6010 2ZR**		0,260
	80	16	1	21,8	16,6	5300		**6010 2RSR**		0,260
	90	20	1,1	35,1	23,2	7000	8500	**6210**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 K**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 M**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 MAP6**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 P6**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 P5**		0,460
	90	20	1,1	35,1	23,2	7000		**6210 2ZR**		0,460
	90	20	1,1	35,1	23,2	7000		**6210 2ZRP5**		0,460
	90	20	1,1	35,1	23,2	4500		**6210 2RSR**		0,460
	90	20	1,1	35,1	23,2	4500		**6210 2RSRP6**		0,460
	90	20	1,1	35,1	23,2	4500		**6210 2RSRP5**		0,460
	90	20	1,1	35,1	23,2	7000	8500	**6210 NR**	**SP90**	0,460
	90	23	1,1	35,1	23,2	7000		**62210 2RSR**		0,514
	110	27	2	61,8	37,9	6300	7000	**6310**		1,06
	110	27	2	61,8	37,9	6300	7000	**6310 K**		1,06
	110	27	2	61,8	37,9	6300	7000	**6310 MAP6**		1,06
	110	27	2	61,8	37,9	6300		**6310 2ZR**		1,06
	110	27	2	61,8	37,9	4000		**6310 2RSR**		1,06
	110	27	2	61,8	37,9	6000	7000	**6310 NR**	**SP10**	1,06
	110	40	2	61,8	37,9	6000		**62310 2RSR**		1,65
	130	31	2,1	87,1	52	5000	6000	**6410**		1,89
	130	31	2,1	87,1	52	5000	6000	**6410 NR**	**SP130**	1,89

Single Row Deep Groove Ball Bearings



Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
55	72	9	0,3	9	8,5	8500	10000	**61811**		0,083
	90	11	0,6	19,3	16,3	7500	9000	**16011**		0,26
	90	18	1,1	28,3	21,3	7500	9000	**6011 MB**		0,39
	90	18	1,1	28,3	21,3	7500		**6011 2ZR**		0,39
	90	18	1,1	28,3	21,3	4500		**6011 2RSR**		0,39
	90	18	1,1	28,3	21,3	7500	9000	**6011 NR**	**SP90**	0,39
	100	21	1,5	43,4	29,4	6300	7500	**6211**		0,611
	100	21	1,5	43,4	29,4	6300	7500	**6211 K**		0,611
	100	21	1,5	43,4	29,4	6300	7500	**6211 MA**		0,611
	100	21	1,5	43,4	29,4	6300		**6211 2ZR**		0,611
	100	21	1,5	43,4	29,4	4000		**6211 2RSR**		0,611
	100	21	1,5	43,4	29,4	6300	7500	**6211 NR**	**SP100**	0,611
	120	29	2	71,7	45	5300	6300	**6311**		1,38
	120	29	2	71,7	45	5300	6300	**6311 K**		1,38
	120	29	2	71,7	45	5300	6300	**6311 MA**		1,38
	120	29	2	71,7	45	5300		**6311 2ZR**		1,38
	120	29	2	71,7	45	3600		**6311 2RSR**		1,38
	120	29	2	71,7	45	5300	6300	**6311 NR**	**SP120**	1,38
	140	33	2,1	100	62	4800	5600	**6411**		2,30
	140	33	2,1	100	62	4800	5600	**6411 NR**	**SP140**	2,30
60	78	10	0,3	8,7	6,7	8000	9500	**61812**		0,120
	95	11	0,6	20	17,6	7000	8500	**16012**		0,280
	95	18	1,1	29,4	23,3	6700	8000	**6012**		0,420
	95	18	1,1	29,4	23,3	6700		**6012 2ZR**		0,420
	95	18	1,1	29,4	23,3	4300		**6012 2RSR**		0,420
	95	18	1,1	29,4	23,3	7000	8500	**6012 NR**	**SP95**	0,420
	110	22	1,5	52,4	36,3	6000	7000	**6212**		0,780
	110	22	1,5	52,4	36,3	6000	7000	**6212 K**		0,780
	110	22	1,5	52,4	36,3	6000	7000	**6212 MA**		0,780
	110	22	1,5	52,4	36,3	6000		**6212 2ZR**		0,780
	110	22	1,5	52,4	36,3	4000		**6212 2RSR**		0,780
	110	22	1,5	52,4	36,3	6000	7000	**6212 NR**	**SP110**	0,780
	130	31	2,1	81,9	52,2	5000	6000	**6312**		1,72
	130	31	2,1	81,9	52,2	5000	6000	**6312 K**		1,72
	130	31	2,1	81,9	52,2	5000		**6312 2ZR**		1,72

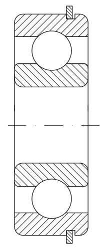
Single Row Deep Groove Ball Bearings



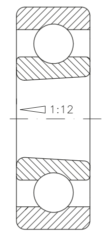
2RSR 2ZR

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
d	D	B	r_s min	dyn. C_r	stat. C_{0r}	grease	oil			
mm				kN		min^{-1}		-		kg
60	130	31	2,1	81,9	52,2	3400		**6312 2RSR**		1,72
	130	31	2,1	81,9	52,2	5000	6000	**6312 NR**	**SP130**	1,72
	150	35	2,1	110	70,8	4300	5000	**6412**		2,76
	150	35	2,1	110	70,8	4300	5000	**6412 NR**	**SP150**	2,76
62	110	22	1,5	47,5	28	6000	7000	**62/62**		0,600
65	85	10	0,6	12,2	12	7000	8500	**61813**		0,130
	100	11	0,6	22,9	19,6	6300	7500	**16013**		0,300
	100	18	1,1	30,5	25,4	6300	7500	**6013 K**		0,440
	100	18	1,1	30,5	25,4	6300		**6013 2ZR**		0,440
	100	18	1,1	30,5	25,4	4000		**6013 2RSR**		0,440
	100	18	1,1	30,5	25,4	6300	7500	**6013 NR**	**SP100**	0,440
	120	23	1,5	57,2	40	5300	6300	**6213**		0,995
	120	23	1,5	57,2	40	5300	6300	**6213 M**		0,995
	120	23	1,5	57,2	40	5300	6300	**6213 MA**		0,995
	120	23	1,5	57,2	40	5300		**6213 2ZR**		0,995
	120	23	1,5	57,2	40	3600		**6213 2RSR**		0,995
	120	23	1,5	57,2	40	5300	6300	**6213 NR**	**SP120**	0,995
	140	33	2,1	92,7	59,7	4800	5600	**6313**		2,10
	140	33	2,1	92,7	59,7	4800	5600	**6313 MA**		2,10
	140	33	2,1	92,7	59,7	4800	5600	**6313 MB**		2,10
	140	33	2,1	92,7	59,7	4800		**6313 2ZR**		2,10
	140	33	2,1	92,7	59,7	3000		**6313 2RSR**		2,10
	140	33	2,1	92,7	59,7	4800	5600	**6313 NR**	**SP140**	2,10
	160	37	2,1	118	79	4000	4800	**6413**		3,300
	160	37	2,1	118	79	4000	4800	**6413 NR**	**SP160**	3,300
70	90	10	0,6	12,5	10	6700	8000	**61814**		0,160
	110	13	0,6	27,9	25	6000	7000	**16014**		0,433
	110	20	1,1	38,1	30,9	6000	7000	**6014**		0,600
	110	20	1,1	38,1	30,9	6000	7000	**6014 MAP5**		0,600
	110	20	1,1	38,1	30,9	6000		**6014 2ZR**		0,600
	110	20	1,1	38,1	30,9	3600		**6014 2RSR**		0,600
	110	20	1,1	38,1	30,9	6000	7000	**6014 NR**	**SP110**	0,600
	125	24	1,5	62,2	44,1	5000	6000	**6214**		1,07
	125	24	1,5	62,2	44,1	5000	6000	**6214 MA**		1,07
	125	24	1,5	62,2	44	5000		**6214 2ZR**		1,07

Single Row Deep Groove Ball Bearings



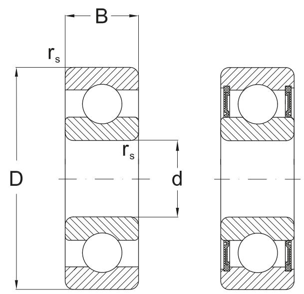
NR



K

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
70	125	24	1,5	62,2	44	3400		**6214 2RSR**		1,07
	125	24	1,5	62,2	44	5000	6000	**6214 NR**	**SP125**	1,07
	150	35	2,1	104	68,1	4500	5300	**6314**		2,50
	150	35	2,1	104	68,1	4500	5300	**6314 K**		2,50
	150	35	2,1	104	68,1	4500	5300	**6314 MAP6**		2,50
	150	35	2,1	104	68,1	4500		**6314 2ZR**		2,50
	150	35	2,1	104	68,1	2800		**6314 2RSR**		2,50
	150	35	2,1	104	68,1	4500	5300	**6314 NR**	**SP150**	2,50
	180	42	3	144	104	3800	4500	**6414**		4,85
75	95	10	0,6	12,8	12,1	6300	7500	**61815 P5**		0,160
	95	10	0,6	12,8	12,1	4000		**61815 2RSR**		0,160
	115	13	0,6	28,5	26,8	5600	6700	**16015**		0,460
	115	20	1,1	39,7	33,5	5600	6700	**6015 M**		0,640
	115	20	1,1	39,7	33,5	5600	6700	**6015 MAP5**		0,640
	115	20	1,1	39,7	33,5	5600		**6015 2ZR**		0,640
	115	20	1,1	39,7	33,5	3400		**6015 2RSR**		0,640
	115	20	1,1	39,7	33,5	5600	6700	**6015 NR**	**SP115**	0,640
	130	25	1,5	67,4	49,3	4800	5600	**6215**		1,18
	130	25	1,5	67,4	49,3	4800	5600	**6215 K**		1,18
	130	25	1,5	67,4	49,3	4800		**6215 2ZR**		1,18
	130	25	1,5	67,4	49,3	3200		**6215 2RSR**		1,18
	130	25	1,5	67,4	49,3	4800	5600	**6215 NR**	**SP130**	1,18
	160	37	2,1	113	77	4000	4800	**6315**		3,03
	160	37	2,1	113	77	4000	4800	**6315 MP6**		3,03
	160	37	2,1	113	77	4000		**6315 2ZR**		3,03
	160	37	2,1	113	77	2800		**6315 2RSR**		3,03
	160	37	2,1	113	77	4000	5000	**6315 NR**	**SP160**	3,03
	190	45	3	154	115	3600	4300	**6415**		6,50
80	100	10	0,6	12,9	13,7	6000	7000	**61816**		0,160
	110	16	1	25,1	20,5	5600	6700	**61916**		0,380
	125	14	0,6	31,9	29,7	5300	6300	**16016**		0,600
	125	22	1,1	47,6	39,8	5300	6300	**6016 MA**		0,850
	125	22	1,1	47,6	39,8	5300		**6016 2ZR**		0,850
	125	22	1,1	47,6	39,8	3600		**6016 2RSR**		0,850
	125	22	1,1	47,6	39,8	5300	6300	**6016 NR**	**SP125**	0,850

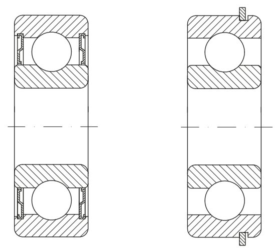
Single Row Deep Groove Ball Bearings



2RSR

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
80	140	26	2	72,7	53	4500	5300	**6216**		1,40
	140	26	2	72,7	53	4500	5300	**6216 K**		1,40
	140	26	2	72,7	53	4500	5300	**6216 MA**		1,40
	140	26	2	72,7	53	4500		**6216 2ZR**		1,40
	140	26	2	72,7	53	3000		**6216 2RSR**		1,40
	140	26	2	72,7	53	4500	5300	**6216 NR**	**SP140**	1,40
	170	39	2,1	123	86,5	3800	4500	**6316 K**		3,60
	170	39	2,1	123	86,5	3800	4500	**6316 M**		3,60
	170	39	2,1	123	86,5	3800		**6316 2ZR**		3,60
	170	39	2,1	123	86,5	3800	4500	**6316 NR**	**SP170**	3,60
	200	48	3	164	125	3400	4000	**6416**		7,50
85	110	13	1	19,3	20	5300	6300	**61817**		0,290
	130	14	1	33,8	33,5	5000	6000	**16017**		0,630
	130	22	1,1	49,5	43,1	5000	6000	**6017**		0,890
	130	22	1,1	49,5	43,1	5000		**6017 2ZR**		0,890
	130	22	1,1	49,5	43,1	3400		**6017 2RSR**		0,890
	130	22	1,1	49,5	43,1	5000	6000	**6017 NR**	**SP130**	0,890
	150	28	2	84	61,9	4300	5000	**6217**		1,80
	150	28	2	84	61,9	4300	5000	**6217 K**		1,80
	150	28	2	84	61,9	4300	5000	**6217 MP6**		1,80
	150	28	2	84	61,9	4300		**6217 2ZR**		1,80
	150	28	2	84	61,9	2800		**6217 2RSR**		1,80
	150	28	2	84	61,9	4300	5000	**6217 NR**	**SP150**	1,80
	180	41	3	133	96,9	3600	4300	**6317**		4,20
	180	41	3	133	96,9	3600	4300	**6317 K**		4,20
	180	41	3	133	96,9	3600	4300	**6317 MA**		4,20
	180	41	3	133	96,9	3600	4300	**6317 MB**		4,20
	180	41	3	133	96,9	3600		**6317 2ZR**		4,20
	180	41	3	133	96,9	3600	4300	**6317 NR**	**SP180**	4,20
	210	52	4	173	136	3200	3800	**6417**		9,00
90	115	13	1	19,6	20,4	5300	6300	**61818**		0,300
	140	16	1	41,9	40,4	4500	5300	**16018**		0,850
	140	24	1,5	58,2	49,7	4500	5300	**6018 MA**		1,16
	140	24	1,5	58,2	49,7	4500	5300	**6018 MP6**		1,16
	140	24	1,5	58,2	49,7	4500		**6018 2ZR**		1,16

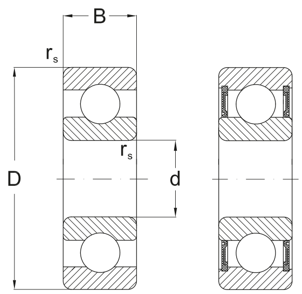
Single Row Deep Groove Ball Bearings



2ZR NR

Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
90	140	24	1,5	58,2	49,7	3000		**6018 2RSR**		1,16
	140	24	1,5	58,2	49,7	4500	5600	**6018 NR**	**SP140**	1,6
	160	30	2	96	71,5	3800	4500	**6218**		2,16
	160	30	2	96	71,5	3800	4500	**6218 K**		2,16
	160	30	2	96	71,5	3800	4500	**6218 MA**		2,16
	160	30	2	96	71,5	3800	4500	**6218 MP6**		2,16
	160	30	2	96	71,5	3800		**6218 2ZR**		2,16
	160	30	2	96	71,5	3800	4500	**6218 NR**	**SP160**	2,16
	190	43	3	143	107	3400	4000	**6318**		4,90
	190	43	3	143	107	3400	4000	**6318 K**		4,90
	190	43	3	143	107	3400	4000	**6318 M**		4,90
	190	43	3	143	107	3400		**6318 2ZR**		4,90
	190	43	3	143	107	3400	4000	**6318 NR**	**SP190**	4,90
	225	54	4	190	160	3000	3600	**6418**		11,5
	145	16	1	42,3	41,5	4300	5000	**16019**		0,890
	145	24	1,5	60,5	53,6	4300	5000	**6019**		1,20
95	145	24	1,5	60,5	53,6	4300		**6019 2ZR**		1,20
	145	24	1,5	60,5	53,6	2800		**6019 2RSR**		1,20
	145	24	1,5	60,5	53,6	4300	5000	**6019 NR**	**SP145**	1,20
	170	32	2,1	109	81,9	3600	4300	**6219 MBP6**		2,60
	170	32	2,1	109	81,9	3600	4300	**6219 NR**	**SP170**	2,60
	200	45	3	153	118	3200	3800	**6319**		5,60
	200	45	3	153	118	3200	3800	**6319 MAP6**		5,60
100	125	13	1	19,6	21,2	4800	5600	**61820 MAP5**		0,320
	150	16	1	45	44	4300	5000	**16020**		0,910
	150	24	1,5	60,5	54	4300	5000	**6020 MAP6**		1,25
	150	24	1,5	60,5	54	4300		**6020 2ZR**		1,25
	150	24	1,5	60,5	54	2800		**6020 2RSR**		1,25
	150	24	1,5	60,5	54	4300	5000	**6020 NR**	**SP150**	1,25
	180	34	2,1	124	93	3400	4000	**6220**		3,10
	180	34	2,1	124	93	3400	4000	**6220 MA**		3,15
	180	34	2,1	124	93	3400	4000	**6220 MP6**		3,15
	180	34	2,1	124	93	3400	4000	**6220 NR**	**SP180**	3,15
	215	47	3	173	140	3000		**6320 2ZR**		7,00
	215	47	3	173	140	3000	3600	**6320 MAP6**		7,00

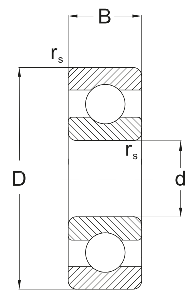
Single Row Deep Groove Ball Bearings



2RSR

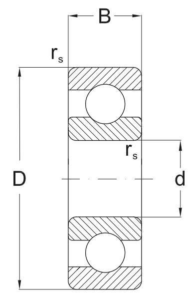
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
105	130	13	1	20,8	19,	4500	5300	**61821 MAP5**		0,350
	160	18	1	52	51	4000	4800	**16021**		1,20
	160	26	2	72,3	65,8	3800	4500	**6021 M**		1,60
	190	36	2,1	133	104	3200	3800	**6221**		3,70
	190	36	2,1	133	104	3200	3800	**6221 MA**		3,70
	225	49	3	184	153	2800	3400	**6321 MA**		8,00
110	140	16	1	28,1	29	4300	5000	**61882**		0,600
	170	19	1	57,5	56,7	3800	4500	**16022**		1,46
	170	28	2	82	73	3600	4300	**6022**		1,95
	200	38	2,1	143	118	3000	3600	**6222**		4,35
	200	38	2,1	143	118	3000	3600	**6222 M**		4,35
	200	38	2,1	143	118	3000	3600	**6222 NR**	**SP200**	4,35
	240	50	3	203	178	2600	3200	**6322**		9,58
	240	50	3	203	178	2600	3200	**6322 MA**		9,58
120	150	16	1	29,1	32,5	3800	4500	**61824**		0,650
	180	19	1	63,2	63,3	3400	4000	**16024**		1,70
	180	28	2	85	79,3	3400	4000	**6024 MP6**		2,09
	215	40	2,1	155	131	2800	3400	**6224**		5,15
	215	40	2,1	155	131	2800	3400	**6224 MB**		5,15
	215	40	2,1	155	131	2800	3400	**6224 MAP6**		5,15
	215	40	2,1	155	131	2800		**6224 2ZR**		5,15
	215	40	2,1	155	131	2800	3400	**6224 NR**	**SP215**	5,15
	260	55	3	212	190	2400	3000	**6324 MA**		13,6
130	165	18	1,1	38	43	3600	4300	**61826 MAP5**		0,930
	200	22	1,1	79	81	3200	3800	**16026**		2,50
	200	33	2	106	101	3000	3600	**6026**		3,25
	230	40	3	167	146	2600	3200	**6226**		6,00
	230	40	3	167	146	2600	3200	**6226 M**		6,00
	280	58	4	229	214	2200	2800	**6326 MA**		17,0
140	175	18	1,1	39	46	3400	4000	**61828 MAP5**		1,00
	210	22	1,1	80,5	86	2800	3400	**16028**		2,70
	210	33	2	110	109	2800	3400	**6028 MP6**		3,35
	250	42	3	176	164	2400	3000	**6228**		7,50
	250	42	3	176	164	2400	3000	**6228 MA**		7,50
	300	62	4	253	246	2000	2600	**6328 MA**		21,0

Single Row Deep Groove Ball Bearings



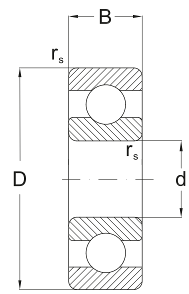
Dimensions				Basical radial load		Speed limit		Designation		Mass
								bearing	snap ring	
				dyn.	stat.	grease	oil			
d	D	B	r_s min	C_r	C_{0r}					
mm				kN		min^{-1}		-		kg
150	190	20	1,1	48,8	61	3000	3600	**61830**		1,40
	225	24	1,1	92,3	98	2600	3200	**16030**		3,40
	225	35	2,1	125	126	2600	3200	**6030 MA**		4,75
	270	45	3	176	170	2000	2600	**6230 MA**		9,60
	320	65	4	275	284	1900	2400	**6330 MA**		25,0
160	200	20	1,1	52	62	2800	3400	**61832**		1,49
	240	25	1,5	99,4	107	2400	3000	**16032**		3,60
	240	38	2,1	140	143	2400	3000	**6032 MA**		5,85
	290	48	3	185	186	1900	2400	**6232 MA**		15,0
170	215	22	1,1	61,8	73,5	2600	3200	**61834 P6**		2,00
	260	28	1,5	118	127	2200	2800	**16034**		5,70
	260	42	2,1	168	172	2200	2800	**6034 MA**		7,80
	310	52	4	212	224	1900	2400	**6234 MA**		17,5
180	225	22	1,1	62,3	78,5	2400	3000	**61836 P5**		2,00
	250	33	2	128	137	2200	2800	**61936 MA**		4,90
	280	31	2	140	146	2000	2600	**16036 MA**		7,00
	280	46	2,1	186	194	2000	2600	**6036**		10,5
	320	52	4	227	242	1800	2200	**6236**		18,5
190	240	24	1,5	74,1	92	2200	2800	**61838**		2,60
	290	31	2	148	162	2000	2600	**16038**		7,90
	290	46	2,1	194	210	2000	2600	**6038 MA**		11,0
	290	46	2,1	194	210	2000	2600	**6038 MB**		11,0
	290	46	2,1	194	210	2000	2600	**6038 MBP6**		11,0
	290	46	2,1	194	210	2000	2600	**6038 MBP5**		11,0
	340	55	4	255	278	1700	2000	**6238 MA**		23,0
	340	55	4	255	278	1700	2000	**6238 MB**		23,0
200	250	24	1,5	78	93	2200	2800	**61840 MB**		2,70
	280	38	2,1	151	160	2200	2800	**61940 MB**		7,25
	310	34	2	168	187	1900	2400	**16040 MBP6**		9,00
	310	34	2	168	187	1900	2400	**16040 MBP5**		9,00
	310	51	2,1	208	226	1900	2400	**6040 MA**		13,5
	310	51	2,1	208	226	1900	2400	**6040 MB**		13,5
	310	51	2,1	208	226	1900	2400	**6040 MBP52**		13,5
	360	58	4	280	314	1700	2000	**6240 M**		28,0
	360	58	4	280	314	1700	2000	**6240 MB**		27,0

Single Row Deep Groove Ball Bearings



Dimensions				Basical radial load		Speed limit		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_s min.	Cr	C0r				
mm				kN		min^{-1}			kg
220	270	24	1,5	78	110	1900	2400	**61844**	3
	300	38	2,1	151	180	1900	2400	**61944**	8
	340	37	2,1	174	204	1800	2200	**16044**	12
	340	56	3	245	290	1700	2000	**6044**	18
	400	65	4	290	354	1500	1800	**6244**	36,9
	460	88	5	410	520	1300	1600	**6344**	74,5
240	300	28	2	108	150	1800	2200	**61848**	4,5
	320	38	2,1	159	200	1800	2200	**61948**	8,6
	360	37	2,1	185	228	1600	1900	**16048**	14,3
	360	56	3	255	315	1600	1900	**6048**	19,9
	440	72	4	358	475	1400	1700	**6248**	50,2
	500	95	5	442	585	1100	1400	**6348**	96
260	320	28	2	96	125	1700	2000	**61852**	4,8
	360	46	2,1	212	270	1600	1900	**61952**	14,5
	400	44	3	238	310	1500	1800	**16052**	21,2
	400	65	4	300	390	1400	1700	**6052**	31,1
	480	80	5	390	530	1100	1400	**6252**	66,6
	540	102	6	507	710	1000	1300	**6352**	119
280	350	33	2	125	170	1600	1900	**61856**	7,4
	380	46	2,1	216	285	1500	1800	**61956**	15,5
	420	44	3	240	325	1400	1700	**16056**	23,1
	420	65	4	305	425	1400	1700	**6056**	33
	500	80	5	423	600	1100	1400	**6256**	70,5
	580	108	6	572	850	950	1200	**6356**	146

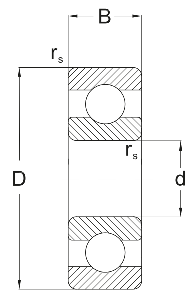
Single Row Deep Groove Ball Bearings



Abutment and fillet dimensions see on page 88

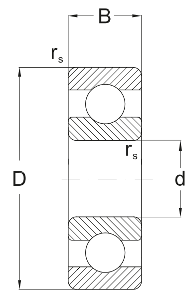
Dimensions				Basical radial load		Speed limit		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_s min.	Cr	C0r				
mm				kN		min $^{-1}$			kg
300	380	38	2,1	150	195	1400	1700	**61860**	10,5
	420	56	3	270	375	1300	1600	**61960**	24,5
	460	50	4	295	415	1300	1600	**16060**	32,7
	460	74	4	360	510	1200	1500	**6060**	43,2
320	400	38	2,1	172	255	1300	1600	**61864**	11
	440	56	3	276	400	1200	1500	**61964**	25,5
	480	50	4	305	446	1200	1500	**16064**	34,4
	480	74	4	375	550	1200	1500	**6064**	49,4
340	420	38	2,1	178	275	1200	1500	**61868**	11,5
	460	56	3	281	425	1100	1400	**61968**	26,5
	520	57	4	347	528	1100	1400	**16068**	47,3
	520	74	5	440	658	1100	1400	**6068**	61,4
360	440	38	2,1	182	285	1100	1400	**61872**	12
	480	56	3	291	450	1100	1400	**61972**	28
	540	57	4	351	550	1000	1300	**16072**	49,5
	540	82	5	455	735	1000	1300	**6072**	64,4
380	480	38	2,1	242	390	1000	1300	**61876**	20
	520	56	4	338	540	1000	1300	**61976**	40
	560	57	4	377	620	950	1200	**16076**	50,5
	560	82	5	450	723	1000	1300	**6076**	67,6
400	500	46	2,1	220	335	1000	1300	**61880**	20,5
	540	65	4	345	570	950	1200	**61980**	41,5
	600	90	5	523	857	900	1100	**6080**	87,2

Single Row Deep Groove Ball Bearings



Dimensions				Basical radial load		Speed limit		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_s min.	Cr	C0r				
mm				kN		min $^{-1}$			kg
420	520	46	2,1	224	345	950	1200	**61884**	21,5
	560	65	4	351	600	900	1100	**61984**	43
	620	90	5	507	880	900	1100	**6084**	93
440	540	46	2,1	228	355	900	1100	**61888**	22,5
	600	74	4	410	720	900	1100	**61988**	60,5
	650	94	6	553	965	850	1000	**6088**	105
460	580	56	3	319	570	900	1100	**61892**	35
	620	74	4	423	750	850	1000	**61992**	62,5
	680	100	6	580	1056	900	950	**6092**	121
480	600	56	3	325	600	850	1000	**61896**	36,5
	650	78	5	449	815	800	950	**61996**	74
	700	100	6	615	1130	750	900	**6096**	126
500	620	56	3	332	620	800	950	**618/500**	37,5
	670	78	5	462	865	750	900	**619/500**	77
	720	100	6	607	1138	740	890	**60/500**	135
530	650	56	3	332	655	850	900	**618/530**	39,5
	710	82	5	488	930	700	850	**619/530**	90,5
	780	112	6	670	1290	670	800	**60/530**	186
560	680	56	3	345	695	700	850	**618/560**	42
	750	85	5	494	980	670	800	**619/560**	105
	820	115	6	720	1400	630	750	**60/560**	208
600	730	60	3	364	765	670	800	**618/600**	52
	800	90	5	585	1220	630	750	**619/600**	125
	870	118	6	826	1753	670	750	**60/600**	236

Single Row Deep Groove Ball Bearings



Abutment and fillet dimensions see on page 88

Dimensions				Basical radial load		Speed limit		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_s min.	Cr	C0r				
mm				kN		min $^{-1}$			kg
630	920	128	7,5	819	1760	560	670	**60/630**	285
670	820	69	4	442	1000	560	670	**618/670**	77,5
	900	103	6	676	1500	530	630	**619/670**	185
	980	136	7,5	904	2040	500	600	**60/670**	345
750	920	78	5	527	1250	500	600	**618/750**	110
	1000	112	6	663	1500	500	600	**619/750**	255


URB
ROMANIA

Single Row Deep Groove Ball Bearing - Stainless Steel Series

Standards, Boundary dimensions

Standard plans	DIN 616
Deep groove ball bearing	DIN 625

General

URB produce small and medium sized deep groove ball bearing, including thin section bearing in stainless steel.
These bearing have rings and balls made from high - chromium alloy stainless steel.
The cage material for bearings with pressed cages is also stainless steel.

The **URB stainless steel bearings** feature similar load ratings as the standard bearings made from normal bearing steel.

URB Stainless steel bearings are resistant to humidity, water, steam and many alkaline solutions.
The resistance to acids, however, is limited. It is dependant upon the individual operating conditions (i.e. acid concentration and its temperature).
In some applications, using sealed stainless steel bearings also the resistance of the lubricant used and the seal material must be considered.

Design variants

URB stainless steel deep groove ball bearings are standard open design.
Sealed (suffixes **RSR** or **.2RSR**) or Shield versions (suffix **ZR** or **.2ZR**) are also produced to order request.

Tolerances

URB stainless steel deep groove ball bearings are produced to normal tolerance class (**PN**) as standard.

The dimensional tolerance values are listed in the chapter **"Bearing tolerances"** on page 26.

Cages

URB stainless steel deep groove ball bearings are fitted with pressed stainless steel cages are standard.

There are several bearing types, cage designs and materials available on request.

Internal clearance

The URB range of stainless steel deep groove ball bearings are produced with **normal internal clearance** (**CN**) as standard.
Other internal clearance groups may be produced upon request (i.e. **C2** or **C3** etc).

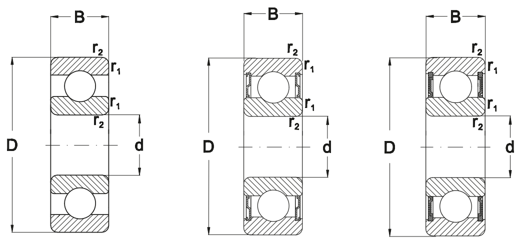
The values of internal clearance groups are as for standard deep groove ball bearings according to DIN 620/part 4 and ISO 5753-1981, respectively.

Designation

URB - Stainless Steel Deep groove ball bearing are identified by a prefix "**SS**" (**SS** stands for "**S**tainless **S**teel").

Example: **SS 6205.2RSR**

Single Row Deep Groove Ball Bearings - Stainless Steel Series



SS 6... SS 6...2ZR SS 6...2RSR

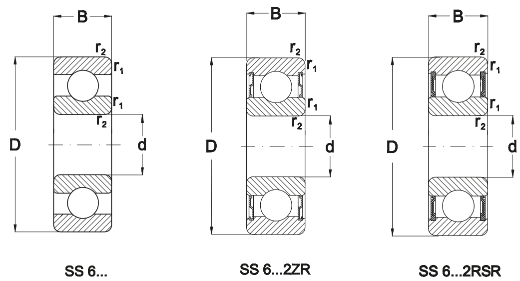
Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min $^{-1}$			kg
3	10	4	0,15	0,64	0,32	40000	48000	**SS623**	0,002
	10	4	0,15	0,64	0,32	40000	-	**SS623 2ZR**	0,002
4	11	4	0,15	0,96	0,35	48000	56000	**SS619/4**	0,01
	12	4	0,2	0,8	0,28	52000	62000	**SS604**	0,002
	13	5	0,2	1,29	0,49	38000	45000	**SS624**	0,003
	13	5	0,2	1,29	0,49	38000	45000	**SS624 ZR**	0,003
	13	5	0,2	1,29	0,49	38000	-	**SS624 2ZR**	0,003
	16	5	0,3	1,46	0,6	36000	43000	**SS634**	0,006
	16	5	0,3	1,46	0,6	36000	-	**SS634 2ZR**	0,006
5	13	4	0,2	1,08	0,43	43000	50000	**SS619/5**	0,02
	16	5	0,3	1,46	0,6	36000	43000	**SS625**	0,005
	16	5	0,3	1,46	0,6	36000	43000	**SS625 ZR**	0,005
	16	5	0,3	1,46	0,6	36000	-	**SS625 2ZR**	0,005
	19	6	0,3	2,45	1,06	32000	38000	**SS635**	0,009
	19	6	0,3	2,45	1,06	32000	-	**SS635 2ZR**	0,009
6	17	6	0,3	2,25	0,84	38000	45000	**SS619/6**	0,04
	19	6	0,3	2,45	1,06	32000	38000	**SS626**	0,009
	19	6	0,3	2,45	1,06	21500	-	**SS626 RSR**	0,009
	19	6	0,3	2,45	1,06	21500	-	**SS626 2RSR**	0,009
	19	6	0,3	2,45	1,06	32000	38000	**SS626 ZR**	0,009
	19	6	0,3	2,45	1,06	32000	-	**SS626 2ZR**	0,009
7	17	6	0,3	1,6	0,7	36000	43000	**SS619/7**	0,05
	19	6	0,3	2,45	1,06	32000	38000	**SS607**	0,008
	19	6	0,3	2,45	1,06	20000	-	**SS607 2RSR**	0,008
	19	6	0,3	2,45	1,06	32000	-	**SS607 2ZR**	0,008
	22	7	0,3	3,25	1,37	30000	36000	**SS627**	0,013

Single Row Deep Groove Ball Bearings - Stainless Steel Series

Abutment and fillet dimensions see on page 88

Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min^{-1}			kg
7	22	7	0,3	3,25	1,37	20000	-	**SS627 RSR**	0,013
	22	7	0,3	3,25	1,37	20000	-	**SS627 2RSR**	0,013
	22	7	0,3	3,25	1,37	30000	36000	**SS627 ZR**	0,013
	22	7	0,3	3,25	1,37	30000	-	**SS627 2ZR**	0,013
8	19	6	0,3	2,24	0,91	36000	43000	**SS619/8**	0,07
	22	7	0,3	3,25	1,37	30000	36000	**SS608**	0,013
	22	7	0,3	3,25	1,37	20000	-	**SS608 2RSR**	0,013
	22	7	0,3	3,25	1,37	30000	-	**SS608 2ZR**	0,013
9	20	6	0,3	1,72	0,84	34000	40000	**SS619/9**	0,08
	24	7	0,3	3,65	1,63	30000	36000	**SS609**	0,015
	24	7	0,3	3,65	1,63	18000	-	**SS609 2RSR**	0,015
	24	7	0,3	3,65	1,63	30000	-	**SS609 2ZR**	0,015
	26	8	0,6	4,55	1,96	28000	34000	**SS629**	0,02
	26	8	0,6	4,55	1,96	18500	-	**SS629 RSR**	0,02
	26	8	0,6	4,55	1,96	18500	-	**SS629 2RSR**	0,02
	26	8	0,6	4,55	1,96	28000	34000	**SS629 2ZR**	0,02
	26	8	0,6	4,55	1,96	28000	-	**SS629 2ZR**	0,02
10	19	5	0,3	1,73	0,83	34000	40000	**SS61800**	0,005
	19	5	0,3	1,38	0,59	22000	-	**61800/2RSR**	0,005
	19	5	0,3	1,38	0,59	34000	-	**SS61800 2ZR**	0,005
	22	6	0,3	0,95	0,75	34000	40000	**SS61900**	0,01
	22	6	0,3	0,95	0,75	22000	-	**61900 2RSR**	0,01
	22	6	0,3	0,95	0,75	34000	-	**SS61900 2ZR**	0,01
	26	8	0,3	4,5	1,95	28000	34000	**SS6000**	0,018
	26	8	0,3	4,5	1,95	17000	-	**SS6000 2RSR**	0,02
	26	8	0,3	4,5	1,95	28000	-	**SS6000 2ZR**	0,02

Single Row Deep Groove Ball Bearings - Stainless Steel Series



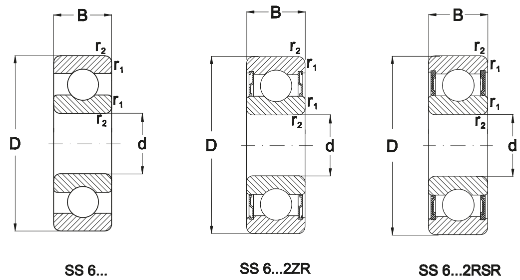
Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min^{-1}			kg
10	30	9	0,6	6	2,6	26000	32000	**SS6200**	0,03
	30	9	0,6	6	2,6	17000	-	**SS6200 2RSR**	0,032
	30	9	0,6	6	2,6	26000	-	**SS6200 2ZR**	0,032
	35	11	0,6	8,2	3,5	22000	28000	**SS6300**	0,055
	35	11	0,6	8,2	3,5	14500	-	**SS6300 2RSR**	0,057
	35	11	0,6	8,2	3,5	22000	-	**SS6300 2ZR**	0,057
12	21	5	0,3	1,4	0,65	32000	37000	**SS61801**	0,006
	21	5	0,3	1,4	0,65	21000	-	**61801 2RSR**	0,006
	21	5	0,3	1,4	0,65	32000	-	**SS61801 2ZR**	0,006
	24	6	0,3	2,3	1,0	30000	36000	**SS61901**	0,011
	24	6	0,3	2,3	1,0	20000	-	**61901 2RSR**	0,011
	24	6	0,3	2,3	1,0	30000	-	**SS61901 2ZR**	0,011
	28	8	0,3	5,1	2,4	26000	32000	**SS6001**	0,018
	28	8	0,3	5,1	2,4	17000	-	**SS6001 2RSR**	0,02
	28	8	0,3	5,1	2,4	26000	-	**SS6001 2ZR**	0,02
	32	10	0,6	6,95	3,1	24000	30000	**SS6201**	0,037
	32	10	0,6	6,95	3,1	16000	-	**SS6201 2RSR**	0,04
	32	10	0,6	6,95	3,1	24000	-	**SS6201 2ZR**	0,04
	37	12	1	9,8	4,2	20000	26000	**SS6301**	0,06
	37	12	1	9,8	4,2	13000	-	**SS6301 2RSR**	0,065
	37	12	1	9,8	4,2	20000	-	**SS6301 2ZR**	0,065
15	24	5	0,3	1,56	0,8	28000	34000	**SS61802**	0,007
	24	5	0,3	1,56	0,8	18500	-	**61802 2RSR**	0,007
	24	5	0,3	1,56	0,8	28000	-	**SS61802 2ZR**	0,007
	28	7	0,3	4,0	2,0	24000	30000	**SS61902**	0,016
	28	7	0,3	4,0	2,0	16000	-	**61902 2RSR**	0,016
	28	7	0,3	4,0	2,0	24000	-	**SS61902 2ZR**	0,016
	32	9	0,3	5,6	2,9	24000	30000	**SS6002**	0,029

Single Row Deep Groove Ball Bearings - Stainless Steel Series

Abutment and fillet dimensions see on page 88

Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min^{-1}			kg
15	32	9	0,3	5,6	2,9	15000	-	**SS6002 2RSR**	0,031
	32	9	0,3	5,6	2,9	24000	-	**SS6002 2ZR**	0,031
	35	11	0,6	7,8	3,8	20000	26000	**SS6202**	0,043
	35	11	0,6	7,8	3,8	13000	-	**SS6202 2RSR**	0,046
	35	11	0,6	7,8	3,8	20000	-	**SS6202 2ZR**	0,046
	42	13	1	11,5	5,5	18000	22000	**SS6302**	0,09
	42	13	1	11,5	5,5	12000	-	**SS6302 2RSR**	0,092
	42	13	1	11,5	5,5	18000	-	**SS6302 2ZR**	0,092
17	26	5	0,3	1,7	0,95	24000	30000	**SS61803**	0,008
	26	5	0,3	1,7	0,95	16000	-	**61803 2RSR**	0,008
	26	5	0,3	1,7	0,95	24000	-	**SS61803 2ZR**	0,008
	28	7	0,3	4,35	2,3	22000	28000	**SS61903**	0,018
	28	7	0,3	4,35	2,3	14500	-	**61903 2RSR**	0,018
	28	7	0,3	4,35	2,3	22000	-	**SS61903 2ZR**	0,018
	35	10	0,3	6	3,25	22000	28000	**SS6003**	0,037
	35	10	0,3	6	3,25	13000	-	**SS6003 2RSR**	0,04
	35	10	0,3	6	3,25	22000	-	**SS6003 2ZR**	0,04
	40	12	0,6	9,6	4,8	18000	22000	**SS6203**	0,063
	40	12	0,6	9,6	4,8	12000	-	**SS6203 2RSR**	0,07
	40	12	0,6	9,6	4,8	18000	-	**SS6203 2ZR**	0,07
	47	14	1	13,7	6,7	16000	19000	**SS6303**	0,11
	47	14	1	13,7	6,7	10500	-	**SS6303 2RSR**	0,119
	47	14	1	13,7	6,7	16000	-	**SS6303 2ZR**	0,119
20	32	7	0,3	2,7	1,5	19000	24000	**SS61804**	0,018
	32	7	0,3	2,7	1,5	12500	-	**61804 2RSR**	0,018
	32	7	0,3	2,7	1,5	19000	-	**SS61804 2ZR**	0,018
	37	9	0,3	6,4	3,7	18000	22000	**SS61904**	0,018
	37	9	0,3	6,4	3,7	12000	-	**61904 2RSR**	0,018

Single Row Deep Groove Ball Bearings - Stainless Steel Series



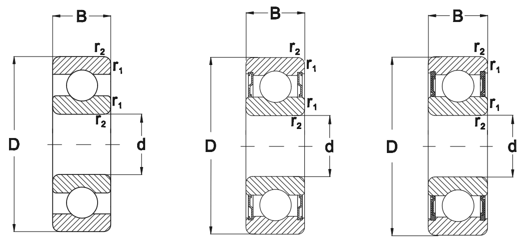
Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min $^{-1}$			kg
20	37	9	0,3	6,4	3,7	18000	-	**SS61904 2ZR**	0,018
	42	12	0,6	9,4	5,1	17000	20000	**SS6004**	0,057
	42	12	0,6	9,4	5,1	11000	-	**SS6004 2RSR**	0,06
	42	12	0,6	9,4	5,1	17000	-	**SS6004 2ZR**	0,06
	47	14	1	12,8	6,7	15000	18000	**SS6204**	0,104
	47	14	1	12,8	6,7	9900	-	**SS6204 2RSR**	0,105
	47	14	1	12,8	6,7	15000	-	**SS6204 2ZR**	0,105
	52	15	1,1	17,3	8,5	14000	17000	**SS6304**	0,148
	52	15	1,1	17,3	8,5	9300	-	**SS6304 2RSR**	0,158
	52	15	1,1	17,3	8,5	14000	-	**SS6304 2ZR**	0,158
25	37	7	0,3	4,35	2,6	17000	20000	**SS61805**	0,022
	37	7	0,3	4,35	2,6	11000	-	**SS61805 2RSR**	0,022
	37	7	0,3	4,35	2,6	17000	-	**SS61805 2ZR**	0,022
	42	9	0,3	6,6	4	16000	19000	**SS61950**	0,045
	42	9	0,3	6,6	4	10500	-	**SS61950 2RSR**	0,045
	42	9	0,3	6,6	4	16000	-	**SS61950 2ZR**	0,045
	47	12	0,6	10,1	5,9	16000	19000	**SS6005**	0,071
	47	12	0,6	10,1	5,9	10500	-	**SS6005 2RSR**	0,081
	47	12	0,6	10,1	5,9	16000	-	**SS6005 2ZR**	0,081
	52	15	1	14,3	8	14000	17000	**SS6205**	0,134
	52	15	1	14,3	8	9300	-	**SS6205 2RSR**	0,142
	52	15	1	14,3	8	14000	-	**SS6205 2ZR**	0,142
	62	17	1,1	22,4	11,4	11000	14000	**SS6305**	0,25
	62	17	1,1	22,4	11,4	7300	-	**SS6305 2RSR**	0,269
	62	17	1,1	22,4	11,4	11000	-	**SS6305 2ZR**	0,269
30	42	7	0,3	4,49	2,9	15000	18000	**SS61806**	0,027
	42	7	0,3	4,49	2,9	10000	-	**SS61806 2RSR**	0,027
	42	7	0,3	4,49	2,9	15000	-	**SS61806 2ZR**	0,027

Single Row Deep Groove Ball Bearings - Stainless Steel Series

Abutment and fillet dimensions see on page 88

Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min $^{-1}$			kg
30	47	9	0,3	7,25	4,55	14000	17000	**SS61906**	0,051
	47	9	0,3	7,25	4,55	9500	-	**SS61906 2RSR**	0,051
	47	9	0,3	7,25	4,55	14000	-	**SS61906 2ZR**	0,051
	55	13	1	13,2	8,2	13000	16000	**SS6006**	0,126
	55	13	1	13,2	8,2	8500	-	**SS6006 2RSR**	0,131
	55	13	1	13,2	8,2	13000	-	**SS6006 2ZR**	0,131
	62	16	1	19,3	11,2	11000	14000	**SS6206**	0,193
	62	16	1	19,3	11,2	7300	-	**SS6206 2RSR**	0,2
	62	16	1	19,3	11,2	11000	-	**SS6206 2ZR**	0,2
	72	19	1,1	29	16,3	9500	12000	**SS6306**	0,348
	72	19	1,1	29	16,3	6300	-	**SS6306 2RSR**	0,369
	72	19	1,1	29	16,3	9500	-	**SS6306 2ZR**	0,369
35	47	7	0,3	4,75	3,2	13000	16000	**SS61807**	0,03
	47	7	0,3	4,75	3,2	8500	-	**SS61807 2RSR**	0,03
	47	7	0,3	4,75	3,2	13000	-	**SS61807 2ZR**	0,03
	55	10	0,6	9,55	6,2	11000	14000	**SS61907**	0,08
	55	10	0,6	9,55	6,2	7500	-	**SS61907 2RSR**	0,08
	55	10	0,6	9,55	6,2	11000	-	**SS61907 2ZR**	0,08
	62	14	1	16,3	10,4	11000	14000	**SS6007**	0,14
	62	14	1	16,3	10,4	7300	-	**SS6007 2RSR**	0,147
	62	14	1	16,3	10,4	11000	-	**SS6007 2ZR**	0,147
	72	17	1,1	25,7	15,6	9500	12000	**SS6207**	0,287
	72	17	1,1	25,7	15,6	6300	-	**SS6207 2RSR**	0,295
	72	17	1,1	25,7	15,6	9500	-	**SS6207 2ZR**	0,295
	80	21	1,5	33,5	19,2	8500	10000	**SS6307**	0,448
	80	21	1,5	33,5	19,2	5600	-	**SS6307 2RSR**	0,438
	80	21	1,5	33,5	19,2	8500	-	**SS6307 2ZR**	0,438
40	52	7	0,3	4,9	3,4	11000	14000	**SS61808**	0,034
	52	7	0,3	4,9	3,4	7000	-	**SS61808 2RSR**	0,034

Single Row Deep Groove Ball Bearings - Stainless Steel Series



SS 6... SS 6...2ZR SS 6...2RSR

Dimensions				Basic load ratings		Speed ratings		Designation	Mass
				dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	C_r	C_{0r}				
mm				kN		min $^{-1}$			kg
40	52	7	0,3	4,9	3,4	11000	-	**SS61808 2ZR**	0,034
	62	12	0,6	13,7	9,2	10000	13000	**SS61908**	0,12
	62	12	0,6	13,7	9,2	6500	-	**SS61908 2RSR**	0,12
	62	12	0,6	13,7	9,2	10000	-	**SS61908 2ZR**	0,12
	68	15	1	17	11,8	10000	13000	**SS6008**	0,182
	68	15	1	17	11,8	6600	-	**SS6008 2RSR**	0,19
	68	15	1	17	11,8	10000	-	**SS6008 2ZR**	0,19
	80	18	1,1	32,6	20	8500	10000	**SS6208**	0,342
	80	18	1,1	32,6	20	5600	-	**SS6208 2RSR**	0,353
	80	18	1,1	32,6	20	8500	-	**SS6208 2ZR**	0,353
	90	23	1,5	42,5	25	7500	9000	**SS6308**	0,641
	90	23	1,5	42,5	25	5000	-	**SS6308 2RSR**	0,641
	90	23	1,5	42,5	25	7500	-	**SS6308 2ZR**	0,641
45	58	7	0,3	6,05	4,3	9500	12000	**SS61809**	0,04
	58	7	0,3	6,05	4,3	6300	-	**SS61809 2RSR**	0,04
	58	7	0,3	6,05	4,3	9500	-	**SS61809 2ZR**	0,04
	68	12	0,6	10	6,5	9000	11000	**SS61909**	0,14
	68	12	0,6	10	6,5	6000	-	**SS61909 2RSR**	0,14
	68	12	0,6	10	6,5	9000	-	**SS61909 2ZR**	0,14
	100	25	1,5	53	32	6700	8000	**SS6309**	0,795
	100	25	1,5	53	32	4400	-	**SS6309 2RSR**	0,819
	100	25	1,5	53	32	6700	-	**SS6309 2ZR**	0,819

Single Row Deep Groove Ball Bearing - with filling slots

Designs

A single row deep groove ball bearing with filling slots has a filling slot in both the inner and outer rings (fig. 1) enabling more and larger balls to be incorporated than in standard deep groove ball bearings. Filling slot bearings have a higher radial load carrying capacity than bearings without filling slots, but their axial load carrying capacity is small. They are also unable to operate at such high speeds as bearings without filling slots.

The standard assortment of URB deep groove ball bearings with filling slots comprises

- basic design open bearings
- shielded bearings
- bearings with a snap ring groove.

Basic design bearings

Basic design bearings with filling slots are open. Those bearings that are also produced in shielded version may have seal recesses in the outer ring, for manufacturing reason (fig. 2).

Shielded bearings

URB deep groove ball bearings with filling slots are available with shields on one or both sides, designation suffixes ZR or 2ZR. The shield forms a narrow gap to the inner ring shoulder (fig. 3).

Bearings up to and including sizes 217 and 314 are filled with a high-quality NLGI class 2 grease with polyurea thickener, for a temperature range of -30°C to +150°C. The base oil viscosity is 115 mm^2/s at 40°C and 9,4 mm^2/s at 100°C.

The quantity of grease fills some 25 to 35% of the free space in the bearing. The bearings are lubricated for life and are maintenance-free. They should therefore not be washed or heated above 80°C before mounting.

Bearings with a snap ring groove

For easy, space saving axial location of the bearing in the housing, URB deep groove ball bearings with filling slots are available with a snap ring groove in the outer ring, designation suffix N (fig. 4a). The appropriate snap ring is shown in the product table with designation and dimensions and may be supplied separately or already mounted on the bearing, designation suffix NR (fig. 4b). URB deep groove ball bearings with filling slots and a snap ring groove can also be supplied with a shield on the side opposite the snap ring groove (fig. 5a) or with two shields (fig. 5b).

Bearing data - general

Dimensions

The boundary dimensions of URB deep groove ball bearings with filling slots are in accordance with ISO 15:1998.

The dimensions of the snap ring groove and snap rings follow ISO 464:1995.

Tolerances

URB deep groove ball bearings with filling slots are produced to Normal tolerances. The tolerances are in accordance with ISO 492:2002 and can be found in table 3.1/3.2 on page 28.

Internal clearance

URB single row deep groove ball bearings with filling slots are manufactured with Normal radial internal clearance. The values for radial internal clearance are provided in tab. 1 on pag. 84. They are in accordance with ISO 5753:1991 and are valid for unmounted bearings under zero measuring load.

Misalignment

The conditions concerning misalignment of the outer ring with respect to the inner ring are the same for deep groove ball bearings. However, the filling slots limit the angular misalignment may lead to the balls running over the edges of the filling slot. This will cause increased bearing noise and reduced bearing service life.

Cages

URB deep groove ball bearings with filling slots are fitted with a pressed riveted steel cage, ball centred, no designation suffix (fig. 6).

Minimum load

In order to provide satisfactory operation, deep groove ball bearings with filling slots, like all ball and roller bearings, must always be subjected to a given minimum load, particularly if they are to operate at high speeds or are subjected to high accelerations or rapid changes in the direction of load. Under such conditions, the inertia forces of the balls and cage, and friction in the lubricant, can have a detrimental influence on the rolling conditions in the bearing arrangement and may cause damaging sliding movements to occur between the balls and raceways.

The requisite minimum radial load to be applied to deep groove ball bearings with filling slots can be eatimated using

$$F_{rm} = k_r \left(\frac{\nu n}{1000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$$

where

F_{rm}	= minimum radial load
k_r	= minimum load factor 0,04 for bearings in the 2 series 0,05 for bearings in the 3 series
ν	= oil viscosity al operating temperature, mm^2/s
n	= rotational speed, r/min
d_m	= bearing mean diameter = 0,5 (d+D), mm

When starting up at low temperatures or when the lubricant is highly viscous, even greater minimum loads may be required. The weight of the components supported by the bearing, together with external forces, generally exceeds the requisite minimum load. If this is not the case, the deep groove ball bearing must be subjected to on additional radial load.

Equivalent dynamic bearing load

$P = F_r + F_a$

provided $F_a/F_r \leq 0,6$ and $P \leq 0,5\ C_0$.

If the axial load $F_a > 0,6\ F_r$ then deep groove ball bearings without filling slots should be used instead.

Equivalent static bearing load

$P_0 = F_r + 0,5\ F_a$

provided $F_a/F_r \leq 0,6$.

Supplementary designations

The designation suffixes used to identify certain features of URB deep groove ball bearings with filling slots are explained in the following.

C3	Radial internal clearance greater than Normal
N	Snap ring groove in the outer ring
NR	Snap ring groove in the outer ring, with appropiate snap ring
ZR	Shield of pressed sheet on one side of the bearing
2ZR	ZR shield on both sides of the bearing
ZRNR	Shield of pressed sheet steel on one side of the bearing and snap ring groove in the outer ring with snap ring on the opposite side of the shield
2ZRNR	ZR shield on both sides of the bearing and snap ring groove in the outer ring with snap ring

Fig. 1

Fig. 2

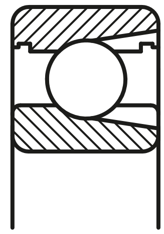
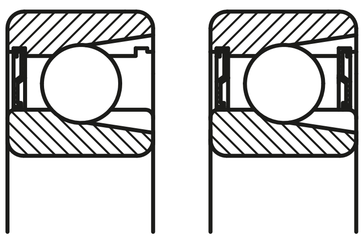
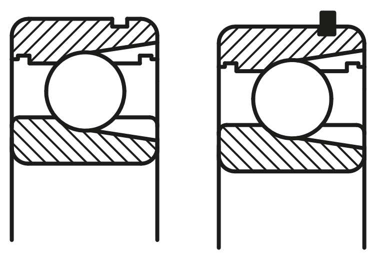


Fig. 3



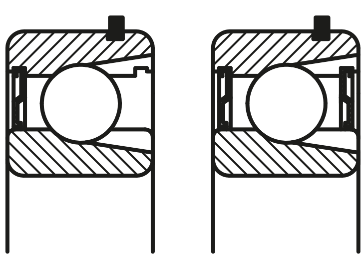
a. b.

Fig. 4



a. b.

Fig. 5

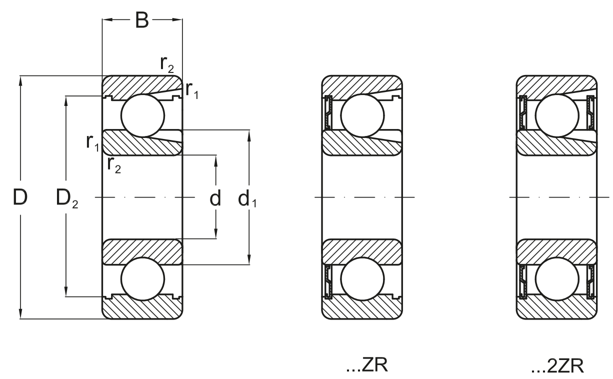


a. b.

Fig. 6

Single Row Deep Groove Ball Bearings with filling slots

d 25-85 mm

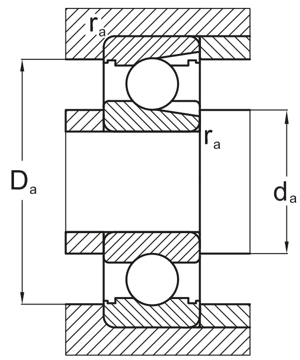


Dimensions			**Basical load ratings** dynamic static		**Fatigue load limit**	**Speed ratings**		**Mass**
d	D	B	C	C_0	P_u	Reference speed	Limiting speed [1)]	
mm			kN			min^{-1}		kg
25	62	17	22,9	15,6	0,67	20000	13000	0,24
30	62	16	22,9	17,3	0,735	20000	12000	0,21
	72	19	29,2	20,8	0,88	18000	11000	0,37
35	72	17	29,7	22,8	0,965	17000	11000	0,31
	80	21	39,1	28,5	1,2	16000	10000	0,48
40	80	18	33,6	26,5	1,12	15000	9500	0,39
	90	23	46,8	36	1,53	14000	9000	0,64
45	85	19	39,6	32,5	1,37	14000	9000	0,44
	100	25	59,4	46,5	1,96	13000	8000	0,88
50	90	20	39,1	34,5	1,46	13000	8000	0,5
	110	27	64,4	52	2,2	11000	7000	1,15
55	100	21	48,4	44	1,86	12000	7500	0,66
	120	29	79,2	67	2,85	10000	6700	1,5
60	110	22	56,1	50	2,12	11000	6700	0,85
	130	31	91,3	78	3,35	9500	6000	1,85
65	120	23	60,5	58,5	2,5	10000	6000	1,05
	140	33	102	90	3,75	9000	5600	2,3
70	125	24	66	65,5	2,75	9500	6000	1,15
	150	35	114	102	4,15	8000	5000	2,75
75	130	25	72,1	72	3	9000	5600	1,25
	160	37	125	116	4,55	7500	4800	3,25
80	140	26	88	85	3,45	8500	5300	1,55
	170	39	138	129	4,9	7000	4500	3,95
85	150	28	96,8	100	3,9	7500	4800	1,95
	180	41	147	146	5,3	6700	4300	4,6

[1)] For 2ZR design, limiting speeds are about 80% of the quoted value.

Single Row Deep Groove Ball Bearings with filling slots

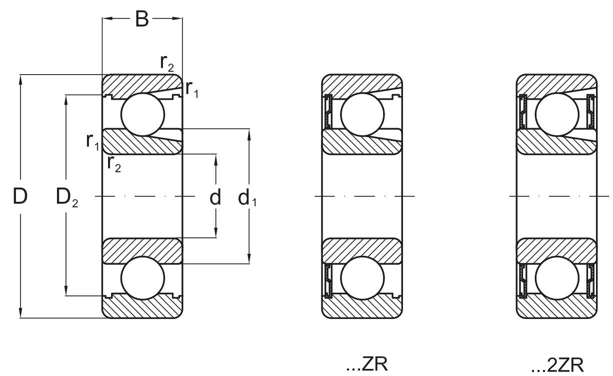
d 25-85 mm



Dimensions				**Designations** Bearing open	with shields on		**Abutment and fillet dimensions**		
d	d_1	D_2	$r_{1,2}$ min		one side	two sides	d_a min	D_a max	r_a max
mm									
25	32,8	52,7	1,1	**305**	**305 ZR**	**305 2ZR**	31,5	55,5	1
30	36,2	54,1	1	**206**	**206 ZR**	**206 2ZR**	35	57	1
	43,9	61,9	1,1	**306**	**306 ZR**	**306 2ZR**	36,5	65,5	1
35	41,7	62,7	1,1	**207**	**207 ZR**	**207 2ZR**	41,5	65,5	1
	43,7	69,2	1,5	**307**	**307 ZR**	**307 2ZR**	43	72	1,5
40	48,9	69,8	1,1	**208**	**208 ZR**	**208 2ZR**	46,5	73,8	1
	50,5	77,7	1,5	**308**	**308 ZR**	**308 2ZR**	48	82	1,5
45	52,5	75,2	1,1	**209**	**209 ZR**	**209 2ZR**	51,5	78,5	1
	55,9	86,7	1,5	**309**	**309 ZR**	**309 2ZR**	53	92	1,5
50	57,5	81,7	1,1	**210**	**210 ZR**	**210 2ZR**	56,5	83,5	1
	67,5	95,2	2	**310**	**310 ZR**	**310 2ZR**	61	99	2
55	63,1	89,4	1,5	**211**	**211 ZR**	**211 2ZR**	63	92	1,5
	74	104	2	**311**	**311 ZR**	**311 2ZR**	64	111	2
60	70,1	97	1,5	**212**	**212 ZR**	**212 2ZR**	68	102	1,5
	80,3	113	2,1	**312**	**312 ZR**	**312 2ZR**	71	119	2
65	83,3	106	1,5	**213**	**213 ZR**	**213 2ZR**	73	112	1,5
	86,8	122	2,1	**313**	**313 ZR**	**313 2ZR**	76	129	2
70	87,1	111	1,5	**214**	**214 ZR**	**214 2ZR**	78	117	1,5
	93,2	130	2,1	**314**	**314 ZR**	**314 2ZR**	81	139	2
75	92,1	117	1,5	**215**	**215 ZR**	**215 2ZR**	83	122	1,5
	99,7	139	2,1	**315**	**315 ZR**	**315 2ZR**	86	149	2
80	88,8	127	2	**216**	**216 ZR**	**216 2ZR**	89	131	2
	106	147	2,1	**316**	**316 ZR**	**316 2ZR**	91	159	2
85	97	135	2	**217**	**217 ZR**	**217 2ZR**	96	139	2
	113	156	3	**317**	**317 ZR**	**317 2ZR**	98	167	2,5

Single Row Deep Groove Ball Bearings with filling slots

d 90-100 mm

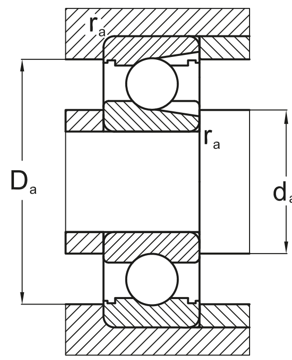


Dimensions			**Basical load ratings** dynamic static		**Fatigue load limit**	**Speed ratings**		**Mass**
d	D	B	C	C_0	P_u	Reference speed	Limiting speed [1]	
mm			kN			min^{-1}		kg
90	160	30	112	114	4,3	7000	4500	2,35
	190	43	157	160	5,7	6300	4000	5,40
95	170	32	121	122	4,5	6700	4300	2,70
100	180	34	134	140	5	6300	4000	3,45

[1] For 2ZR design, limiting speeds are about 80% of the quoted value.

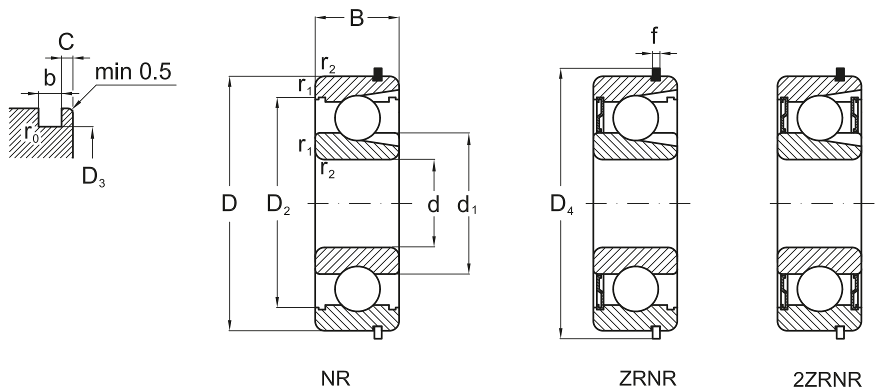
Single Row Deep Groove Ball Bearings with filling slots

d 90-100 mm



Dimensions				**Designations** Bearing open	with shields on		**Abutment and fillet dimensions**		
d	d_1	D_2	$r_{1,2}$ min		one side	two sides	d_a min	D_a max	r_a max
mm									
90	110	143	2	**218**	**218 ZR**	**218 2ZR**	99	151	2
	119	164	3	**318**	**318 ZR**	**318 2ZR**	103	177	2,5
95	117	152	2,1	**219**	**219 ZR**	**219 2ZR**	107	158	2
100	123	160	2,1	**220**	**220Z**	**220 2ZR**	112	168	2

Single Row Deep Groove Ball Bearings with filling slots and snap rings
d 25-95 mm

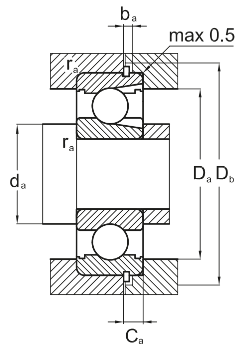


Dimensions			Basical load ratings dynamic	static	Fatigue load limit	Speed ratings		Mass	Designations Bearing open	with shields on		Snap ring
d	D	B	C	C_0	P_u	Reference speed	Limiting speed [1]			one side	two sides	
mm			kN			min $^{-1}$		kg	-			
25	62	17	23	16	1	20000	13000	0,24	**305 NR**	**305 ZRNR**	**305 2ZRNR**	**SP 62**
30	62	16	22,9	17,3	0,735	20000	12000	0,21	**206 NR**	**206 ZRNR**	**206 2ZRNR**	**SP 62**
	72	19	29,2	20,8	0,88	18000	11000	0,37	**306 NR**	**306 ZRNR**	**306 2ZRNR**	**SP 72**
35	72	17	29,7	22,8	0,965	17000	11000	0,31	**207 NR**	**207 ZRNR**	**207 2ZRNR**	**SP 72**
	80	21	39,1	28,5	1,2	16000	10000	0,48	**307 NR**	**307 ZRNR**	**307 2ZRNR**	**SP 80**
40	80	18	33,6	26,5	1,12	15000	9500	0,39	**208 NR**	**208 ZRNR**	**208 2ZRNR**	**SP 80**
	90	23	46,8	36	1,53	14000	9000	0,64	**308 NR**	**308 ZRNR**	**308 2ZRNR**	**SP 90**
45	85	19	39,6	32,5	1,37	14000	9000	0,44	**209 NR**	**209 ZRNR**	**209 2ZRNR**	**SP 85**
	100	25	59,4	46,5	1,96	13000	8000	0,88	**309 NR**	**309 ZRNR**	**309 2ZRNR**	**SP 100**
50	90	20	39,1	34,5	1,46	13000	8000	0,50	**210 NR**	**210 ZRNR**	**210 2ZRNR**	**SP 90**
	110	27	64,4	52	2,2	11000	7000	1,15	**310 NR**	**310 ZRNR**	**310 2ZRNR**	**SP 110**
55	100	21	48,4	44	1,86	12000	7500	0,66	**211 NR**	**211 ZRNR**	**211 2ZRNR**	**SP 100**
	120	29	79,2	67	2,85	10000	6700	1,50	**311 NR**	**311 ZRNR**	**311 2ZRNR**	**SP 120**

[1] For 2ZR design, limiting speeds are about 80% of the quoted value.

Single Row Deep Groove Ball Bearings with filling slots and snap rings

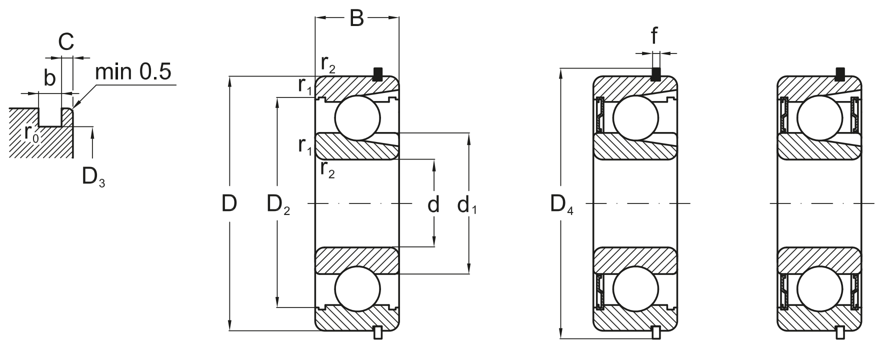
d 25-95 mm



Dimensions										**Abutment and fillet dimensions**				
d	d_1	D_2	D_3	D_4	f	b	C	r_0 max	$r_{1,2}$ min	d_2 min	D_a max	D_b min	b_a min	C_a max	r_a max
mm										mm					
25	32,8	52,7	59,61	67,7	1,7	1,9	3,28	0,6	1,1	31,5	55,5	69	2,2	4,98	1
30	36,2	54,1	59,61	67,7	1,7	1,9	3,28	0,6	1	35	57	69	2,2	4,98	1
	40,1	61,9	68,81	78,6	1,7	1,9	3,28	0,6	1,1	36,5	65,5	80	2,2	4,98	1
35	41,7	62,7	68,81	78,6	1,7	1,9	3,28	0,6	1,1	41,5	65,5	80	2,2	4,98	1
	43,7	69,2	76,81	86,6	1,7	1,9	3,28	0,6	1,5	43	72	88	2,2	4,98	1,5
40	48,9	69,8	76,81	86,6	1,7	1,9	3,28	0,6	1,1	46,5	73,5	88	2,2	4,98	1
	50,5	77,7	86,79	96,5	2,46	2,7	3,28	0,6	1,5	48	82	98	3	5,74	1,5
45	52,5	75,2	81,81	91,6	1,7	1,9	3,28	0,6	1,1	51,5	78,5	93	2,2	4,98	1
	55,9	86,7	96,8	106,5	2,46	2,7	3,28	0,6	1,5	53	92	108	3	5,74	1,5
50	57,5	81,7	86,79	96,5	2,46	2,7	3,28	0,6	1,1	56,5	83,5	98	3	5,74	1
	62,5	95,2	106,81	116,6	2,46	2,7	3,28	0,6	2	61	99	118	3	5,74	2
55	63,1	89,4	96,8	106,5	2,46	2,7	3,28	0,6	1,5	63	92	108	3	5,74	1,5
	74	104	115,21	129,7	2,82	3,1	4,06	0,6	2	64	111	131	3,5	6,88	2

Single Row Deep Groove Ball Bearings with filling slots and snap rings

d 25-95 mm

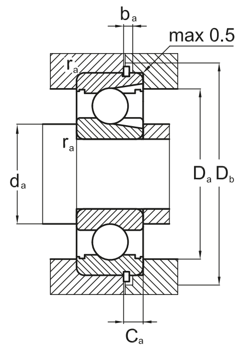


NR ZRNR 2ZRNR

Dimensions			**Basical load ratings** dynamic static		**Fatigue load limit**	**Speed ratings**		**Mass**	**Designations** Bearing open	with shields on		**Snap ring**
d	D	B	C	C_0	P_u	Reference speed	Limiting speed 1)			one side	two sides	
mm			kN			min $^{-1}$		kg	-			
60	110	22	56,1	50	2,12	11000	6700	0,85	**212 NR**	**212 ZRNR**	**212 2ZRNR**	**SP 110**
	130	31	91,3	78	3,35	9500	6000	1,85	**312 NR**	**312 ZRNR**	**312 2ZRNR**	**SP 130**
65	120	23	60,5	58,5	2,5	10000	6000	1,05	**213 NR**	**213 ZRNR**	**213 2ZRNR**	**SP 120**
	140	33	102	90	3,75	9000	5600	2,30	**313 NR**	**313 ZRNR**	**313 2ZRNR**	**SP 140**
70	125	24	66	65,5	2,75	9500	6000	1,15	**214 NR**	**214 ZRNR**	**214 2ZRNR**	**SP 125**
	150	35	114	102	4,15	8000	5000	2,75	**314 NR**	**314 ZRNR**	**314 2ZRNR**	**SP 150**
75	130	25	72,1	72	3	9000	5600	1,25	**215 NR**	**215 ZRNR**	**215 2ZRNR**	**SP 130**
80	140	26	88	85	3,45	8500	5300	1,55	**216 NR**	**216 ZRNR**	**216 2ZRNR**	**SP 140**
85	150	28	96,8	100	3,9	7500	4800	1,95	**217 NR**	-	-	**SP 150**
90	160	30	112	114	4,3	7000	4500	2,35	**218 NR**	-	-	**SP 160**
95	170	32	121	122	4,5	6700	4300	2,70	**219 NR**	-	-	**SP 170**

Single Row Deep Groove Ball Bearings with filling slots and snap rings

d 25-95 mm



Dimensions										Abutment and fillet dimensions					
d	d_1	D_2	D_3	D_4	f	b	C	r_0 max	$r_{1,2}$ min	d_2 min	D_a max	D_b min	b_a min	C_a max	r_a max
mm										mm					
60	70,1	97	106,81	116,6	2,46	2,7	3,28	0,6	1,5	68	102	118	3	5,74	1,5
	80,3	113	125,22	139,7	2,82	3,1	4,06	0,6	2,1	71	119	141	3,5	6,88	2
65	83,3	106	115,21	129,7	2,82	3,1	4,06	0,6	1,5	73	112	131	3,5	6,88	1,5
	86,8	122	135,23	149,7	2,82	3,1	4,9	0,6	2,1	76	129	151	3,5	7,72	2
70	87,1	111	120,22	134,7	2,82	3,1	4,06	0,6	1,5	78	117	136	3,5	6,88	1,5
	87,2	130	145,24	159,7	2,82	3,1	4,9	0,6	2,1	81	139	162	3,5	7,72	2
75	92,1	117	125,22	139,7	2,82	3,1	4,06	0,6	1,5	83	122	141	3,5	6,88	1,5
80	88,8	127	135,23	149,7	2,82	3,1	4,9	0,6	2	89	131	151	3,5	7,72	2
85	97	135	145,24	159,7	2,82	3,1	4,9	0,6	2	96	139	162	3,5	7,72	2
90	110	143	155,22	169,7	2,82	3,1	4,9	0,6	2	99	151	172	3,5	7,72	2
95	117	152	163,65	182,9	3,1	3,5	5,69	0,6	2,1	107	158	185	4	8,79	2

Double Row Deep Groove Ball Bearing

Standards, Boundary dimensions

Standard plans	DIN 616
Deep groove ball bearing	DIN 625

General

Double Row Deep groove ball bearings feature higher load ratings when compared to single row bearings.

This two row bearing gives a very rigid arrangement, but they are very sensitive to misalignments.

Tolerances

URB Double Row Deep groove bearings are produced in normal tolerance class (**PN**) as standard.

Internal clearance

URB Double Row Deep groove ball bearings are produced with **normal internal clearance**, (**CN**) as standard. Other internal clearance groups may be produced upon request.

Design variants, Cages

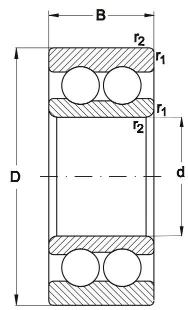
URB Double Row Deep groove ball bearings have the latest design (suffix B) without filling slots.

Thus they are able to support thrust loads equally well in both directions. These bearings are fitted with **polyamide cages**, (suffix **TN**) as standard.

These bearing sizes are also available with **pressed steel cages**.

But, it must be considered that some of these bearings may have filling slots which limit the ability to support thrust loads in the direction of these filling slots.

Double Row Deep Groove Ball Bearings



Dimensions				Basical load ratings		Speed ratings		Designation	Mass
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	grease	oil		
mm				kN		min $^{-1}$			kg
10	30	14	0,6	9,2	5,2	18000	22000	**4200 BTN**	0,049
12	32	14	0,6	10,6	6,2	17000	20000	**4201 BTN**	0,053
15	35	14	0,6	11,9	7,5	14000	17000	**4202 BTN**	0,059
	42	17	1	14,8	9,5	12000	15000	**4302 BTN**	0,12
17	40	16	0,6	14,8	9,5	12000	15000	**4203 BTN**	0,090
	47	19	1	19,5	13,5	10000	13000	**4303 BTN**	0,16
20	47	18	1	17,8	12,5	10000	13000	**4204 BTN**	0,14
	52	21	1,1	23,4	16	9500	12000	**4304 BTN**	0,21
25	52	18	1	19	14,5	9000	11000	**4205 BTN**	0,16
	62	24	1,1	31,9	22,5	8500	10000	**4305 BTN**	0,34
30	62	20	1	26	20,5	8000	9500	**4206 BTN**	0,26
	72	27	1,1	41,2	30	7000	8500	**4306 BTN**	0,50
35	72	23	1,1	35,1	28,5	6700	8000	**4207 BTN**	0,40
	80	31	1,5	50,5	38	6300	7500	**4307 BTN**	0,69
40	80	23	1,1	37,05	32,5	6000	7000	**4208 BTN**	0,50
	90	33	1,5	55,7	45	5600	6700	**4308 BTN**	0,95

Double Row Deep Groove Ball Bearings

Abutment and fillet dimensions see on page 88

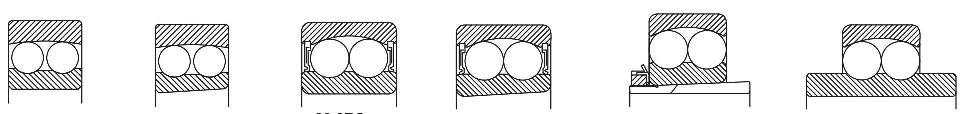
Dimensions				Basical load ratings		Speed ratings		Designation	Mass
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	grease	oil		
mm				kN		min $^{-1}$			kg
45	85	23	1,1	39	36	5600	6700	**4209 BTN**	0,54
	100	36	1,5	68,5	56	5000	6000	**4309 BTN**	1,25
50	90	23	1,1	40,5	40	5000	6000	**4210 BTN**	0,58
	110	40	2	81.5	70	4500	5300	**4310 BTN**	1,70
55	100	25	1.5	45	44	4800	5600	**4211 BTN**	0,80
	120	43	2	97.5	83	4300	5000	**4311 BTN**	2,15
60	110	28	1.5	57	55	4500	5300	**4212 BTN**	1,10
	130	46	2.1	112	98	3800	4500	**4312 BTN**	2,65
65	120	31	1.5	67.5	67	4000	4800	**4213 BTN**	1,45
70	125	31	1.5	70	73.5	3600	4300	**4214 BTN**	1,50
75	130	31	1.5	72.5	80	3400	4000	**4215 BTN**	1,60
80	140	33	2	80.5	90	3200	3800	**4216 BTN**	2,00
85	150	36	2	93.6	102	3000	3600	**4217 BTN**	2,55
90	160	40	2	112	122	2800	3400	**4218 BTN**	3,20


ROMANIA

Self-aligning ball bearings

Self-aligning ball bearings have a common sphered raceway in the outer ring. This feature allows angular misalignment of the shaft relative to the housing. Therefore self-aligning ball bearings are particularly used in case of bearings where misalignment can occur from errors in mounting or from shaft bending.

Double row self-aligning ball bearings are manufactured both with cylindrical bore and tapered bore (taper 1:12). Self-aligning bearings with tapered bore can be delivered, at request, with adapter sleeves.



12 13 22 23 | 12 K 13 K 22 K 23 K | 22 2RS 23 2RS | 22 K2RS 23 K2RS | K+H | 112 113

Suffixes

C2 - radial clearance smaller than normal
C3 - radial clearance larger than normal
H - adapter sleeve
K - tapered bore bearings
M - machined brass cage, ball guided
MB - machined brass cage, guided on the inner ring
P6 - tolerance class more accurate than normal
P63 - tolerance class P6 with radial clearance C3
2RS - bearing with two seals
TN - polyamide cage

Sealed self-aligning ball bearings

Self aligning ball bearings are also available in a sealed version with seals at both sides. The seals are made of gasoline, oil and wear-resistant synthetic ruber. Sealed bearings are delivered filled with a certain grease quantity. Sealed bearing operating temperatures are between -30⁰C and +80⁰C. Grease sevice life is much reduced if bearing operates at a temperature higher than +80⁰C (see page 66).

Sealed bearings are greased for the entire operating period, relubrication not being necessary. Sealed bearings washing or heating before mounting in assembly is not allowed.

Self -aligning ball bearings with extended inner ring

Self -aligning ball bearings with extended inner ring of series 112 and 113 are used in applications where high accuracy is not necessary and generally, they can be mounted directly on rolled shafts. The bore manufactured to tolerance class J7 allows fast mounting and dismounting. The inner ring has a groove for bearing axial location which can be done by means of a screw or pin.

Dimensions

Overall dimensions of self-aligning ball bearings are in accordance with ISO 15.

Misalignment

Self-aligning ball bearings allow within certain limits an angular misalignement of the outer ring in relation to the inner ring, without detrimental effects in bearing unit.

Approximate values for permissible misalignment, under normal operating conditions are given in table 1.

Permissible misalignment

Table 1

Bearing series	**Permissible misalignment**
degrees	
108, 126, 127, 129, 135	3
12, 112	2,5
13, 113	3
22	2,5
22-2 RS	1,5
23	3
23-2 RS	1,5

Tolerances and radial clearance

Bearings of serial production are manufactured to normal tolerance class and with normal radial clearance. Tapered bore bearings of serial production are also manufactured with radial clearance C3.

Self-aligning ball bearings with extended inner ring are manufactured with radial clearance C2 and normal clearance.

At request, these bearings can also be manufactured to other tolerance classes and with smaller or larger radial clearance.

The bore of self-aligning ball bearings with extended inner ring is manufactured to tolerance class J7.

Bearing tolerances are given on page 28 and the values of radial clearance are given in tables 2 and 3.

Radial clearance of self-aligning ball bearings
With cylindrical bore

Table 2

Bore diameter d		**Designation of clearance group**									
		C2		**Normal**		**C3**		**C4**		**C5**	
		Bearing radial clearance									
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm									
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
With tapered bore											Table 3
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

Equivalent dynamic radial load

$P_r = F_r + Y_1 F_a$, kN,   when $F_a/F_r \le e$,
$P_r = 0{,}65\ F_r + Y_2 F_a$, kN   when $F_a/F_r > e$,

The values of factors e, Y_1 and Y_2 which depend on bearings are given in bearing tables.

Equivalent static radial load

$P_{0r} = F_r + Y_0 F_a$, kN
The values of the factor Y_0 which depends on bearing are given in bearing tables.

Axial load on bearings with adapter sleeves

If self-aligning ball bearings are mounted with adapter sleeves on smooth shafts, without side location, their axial carryng capacity depends on the friction between the sleeve bore and shaft.

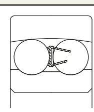
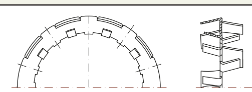
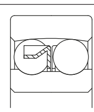
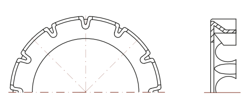
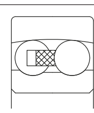
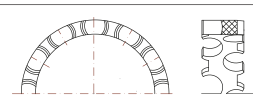
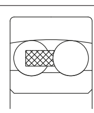
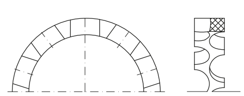
Permissible axial load can be precisely enough determined using the equation:
$F_{a\ max} = 3\ B\ d$,
where:
$F_{a\ max}$ - maximum permissible axial load, N
B - bearing width, mm
d - bearing bore diameter, mm

Cages

Self-aligning ball bearings are generally fitted with presses cages of sheet. At special request, when bearings operate under fluctuating loads, at high speeds and where large sizes are required, machined brass cages are recommended to be used. Glass fibre reinforced polyamide 6.6 cages are also suitable if the operating temperatures do not exceed +120⁰C. They have low mass, a low coefficient of friction and are noiseless while running.
Cage design and technical data are given in table 4.

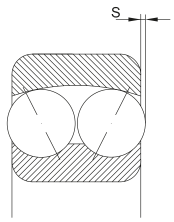
Cage design and technical data

Table 4

Cage	**Design** bearing	cage	**Application**	**Max. value** D_m n oil	grease
Pressed sheet cage			- General application - Moderate speeds - Sealed bearings series 12, 13, 22, 23	600x10^3	450x10^3
Pressed sheet cage			- General application - Moderate speeds - Bearings series 22, 23	600x10^3	450x10^3
Polyamide cage TN			- High speeds - Bearings series 12, 13, 22, 23	1000x10^3	800x10^3
Machined brass cage M			- High speeds - Bearings: 1220-1222; 1317-1322; 2217-2222; 2317-2320	900x10^3	700x10^3

Special characteristics

In case of some dimensions of self-aligning ball bearings series 12 and 13, the balls protrude somewhat from the bearing, as shown in the adjacent design and table. This should be considered both by designer and user.



Values of dimension S

Table 5

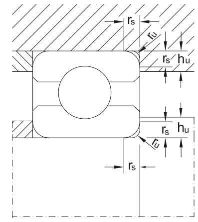
Bearing	S
	mm
1224	1,3
1226	0,7
1318	1,0
1319	1,5
1320	2,5
1321	2,6
1322	2,6

Abutment dimensions

For a proper location of bearing rings on the shaft shoulder and housing shoulder respectively, maximum connection radius $r_{u\ max.}$ of shaft (housing) should be less than minimum mounting chamfer $r_{s\ min}$ of bearing.

Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

In case of self-aligning ball bearings with tapered bore which are mounted directly on a tapered shaft or with an adapter sleeve, proper tightening and minimum radial clearance of 10-20 µm should be assured for normal clearance and of 20-55 µm for clearance C3, depending on bearing size and series. The values of the connection radius and support shoulder height are given in table 6 and mounting dimensions for bearings mounted with adapter sleeves are given in table 7.

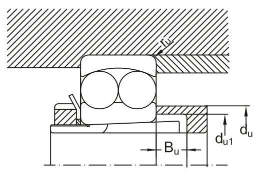


Abutment dimensions

Table 6

r_s min.	r_u max.	u_{umin} min. Bearing series 12, 13, 112, 22, 23, 113
mm		
0,3	0,2	1,2
0,6	0,6	2,1
1	1	2,8
1,1	1	3,5
1,5	1,5	4,5
2	2	5,5
2,1	2,1	6

Self-aligning ball bearings with adapter sleeves
Abutment dimensions



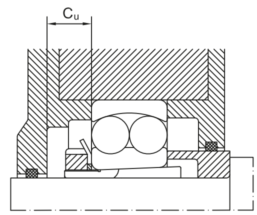
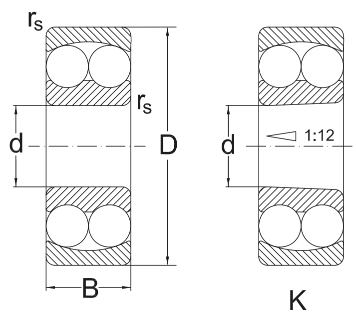


Table 7

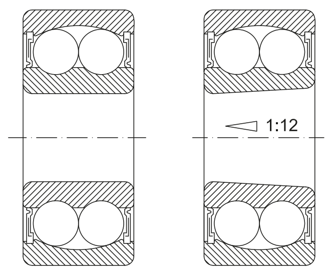
Bore symbol	Shaft diameter	Bearing series 12K d_{u1} min.	d_u max.	B_u min.	22K d_{u1} min.	d_u max.	B_u min.	13K d_{u1} min.	d_u max.	B_u min.	23K d_{u1} min.	d_u max.	B_u min.	All series C_u min.
	mm													
04	**17**	23	27	5	23	27	5	23	30	8	24	28	5	
05	**20**	28	32	6	28	32	5	28	35	6	30	34	5	15
06	**25**	33	38	6	33	38	5	33	42	6	35	40	5	15
07	**30**	38	45	5	39	44	5	39	49	7	40	45	5	17
08	**35**	43	52	5	44	50	5	44	55	5	45	51	5	17
09	**40**	48	57	5	50	56	7	50	61	5	50	57	5	17
10	**45**	53	62	5	55	61	9	50	61	5	56	63	5	19
11	**50**	60	69	6	60	68	10	60	74	6	61	69	6	19
12	**55**	64	75	6	65	73	9	65	83	6	66	74	6	20
13	**60**	70	83	6	70	79	8	70	89	6	72	82	6	21
14	**60**	75	86	6	75	85	11	75	94	6	77	88	6	21
15	**65**	80	92	6	80	90	12	80	100	6	82	94	6	23
16	**70**	85	99	6	85	96	12	85	107	6	88	100	6	25
17	**75**	90	105	7	91	102	12	91	114	7	94	106	7	27
18	**80**	95	110	7	96	108	10	96	120	7	100	112	7	28
19	**85**	100	117	7	102	114	9	102	126	7	105	117	7	29
20	**90**	106	124	7	108	120	8	108	132	7	110	125	7	30
21	**95**	111	131	7										31
22	**100**	116	138	7										32

Self-aligning ball bearings



Dimensions				Basical radial load dyn.	Factors			stat.		Speed limit		Designation	Mass
d	D	B	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm				kN	-			kN	-	min^{-1}		-	Kg
5	19	6	0,3	2,55	0,33	1,9	3	0,48	2	30000	36000	**135**	0,010
6	19	6	0,3	2,5	0,33	1,9	3	0,48	2	30000	36000	**126**	0,010
7	22	7	0,3	2,65	0,33	1,9	3	0,56	2	30000	36000	**127**	0,010
8	22	7	0,3	2,65	0,33	1,9	3	0,56	2	30000	36000	**108**	0,010
9	26	8	0,6	3,8	0,33	1,9	3	0,8	2	26000	32000	**129**	0,020
10	30	9	0,6	5,5	0,33	1,9	3	1,2	2	24000	30000	**1200**	0,030
	30	14	0,6	7,2	0,54	1,2	1,8	1,6	1,2	22000	28000	**2200**	0,040
	35	11	0,6	7,2	0,34	1,9	2,9	1,6	1,9	20000	26000	**1300**	0,620
12	32	10	0,6	5,6	0,37	1,7	2,6	1,25	1,8	22000	28000	**1201**	0,040
	32	14	0,6	7,6	0,53	1,2	1,8	1,75	1,2	20000	26000	**2201**	0,050
	37	12	1	9,4	0,35	1,8	2,8	2,15	1,9	18000	22000	**1301**	0,060
	37	17	1	9,4	0,54	1,2	1,8	2,3	1,2	17000	20000	**2301**	0,090
15	35	11	0,6	7,5	0,36	1,8	2,7	1,75	1,9	19000	24000	**1202**	0,040
	35	14	0,6	7,7	0,5	1,3	2	1,85	1,3	18000	22000	**2202**	0,060
	42	13	1	9,55	0,35	1,8	2,8	2,3	1,9	17000	20000	**1302**	0,090
	42	17	1	12,1	0,5	1,3	2	2,9	1,3	15000	18000	**2302**	0,110
17	40	12	0,6	7,9	0,32	1,9	3	2,05	2	18000	22000	**1203**	0,070
	40	16	0,6	9,8	0,5	1,3	2	2,4	1,3	17000	20000	**2203**	0,080
	47	14	1	12,5	0,34	1,8	2,9	3,15	2	14000	17000	**1303**	0,130
	47	19	1	14,5	0,49	1,3	2	3,6	1,3	13000	16000	**2303**	0,160
20	47	14	1	9,9	0,28	2,2	3,5	2,65	2,4	15000	18000	**1204**	0,120
	47	14	1	9,9	0,28	2,2	3,5	2,65	2,4	15000	18000	**1204 K**	0,120
	47	18	1	12,6	0,28	2,2	3,5	3,3	2,4	14000	17000	**2204**	0,140
	47	18	1	12,6	0,28	2,2	3,5	3,3	2,4	14000	17000	**2204 K**	0,140
	52	15	1,1	12,4	0,3	2,1	3,3	3,35	2,2	12000	15000	**1304**	0,160
	52	15	1,1	12,4	0,3	2,1	3,3	3,35	2,2	12000	15000	**1304 K**	0,160
	52	21	1,1	18,2	0,52	1,2	1,9	4,7	1,3	11000	14000	**2304**	0,210
	52	21	1,1	18,2	0,52	1,2	1,9	4,7	1,3	11000	14000	**2304 K**	0,210
25	52	15	1	12,2	0,29	2,2	3,4	3,3	2,3	13000	16000	**1205**	0,140
	52	15	1	12,2	0,29	2,2	3,4	3,3	2,3	13000	16000	**1205 K**	0,140
	52	15	1	12,2	0,29	2,2	3,4	3,3	2,3	13000	16000	**1205 M**	0,140
	52	18	1	12,5	0,43	1,5	2,3	3,45	1,6	11000	14000	**2205**	0,160
	52	18	1	12,5	0,43	1,5	2,3	3,45	1,6	11000	14000	**2205 K**	0,160
	52	18	1	12,2	0,29	2,2	3,4	3,3	2,3	7000		**2205 2RS**	0,160
	52	18	1	12,2	0,29	2,2	3,4	3,3	2,3	7000		**2205 K2RS**	0,160
	62	17	1,1	17,8	0,28	2,2	3,5	4,9	2,4	9500	12000	**1305**	0,260
	62	17	1,1	17,8	0,28	2,2	3,5	4,9	2,4	9500	12000	**1305 K**	0,260
	62	24	1,1	24,5	0,44	1,4	2,2	6,55	1,5	9500	12000	**2305**	0,340
	62	24	1,1	24,5	0,44	1,4	2,2	6,55	1,5	9500	12000	**2305 K**	0,340
	62	24	1,1	17,8	0,28	2,2	3,5	4,9	2,4	6300		**2305 2RS**	0,330

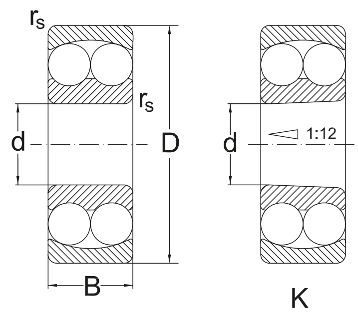
Self-aligning ball bearings



2RS K2RS

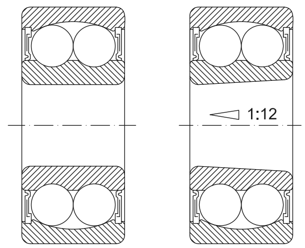
Dimensions				Basical radial load	Factors					Speed limit		Designation	Mass
				dyn.				stat.					
d	D	B	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm				kN	-			kN	-	min^{-1}		-	Kg
30	62	16	1	15,7	0,25	2,5	3,9	4,7	2,7	10000	13000	**1206**	0,220
	62	16	1	15,7	0,25	2,5	3,9	4,7	2,7	10000	13000	**1206 K**	0,220
	62	20	1	15,3	0,4	1,6	2,5	4,6	1,7	9500	12000	**2206**	0,260
	62	20	1	15,3	0,4	1,6	2,5	4,6	1,7	9500	12000	**2206 K**	0,260
	62	20	1	15,3	0,4	1,6	2,5	4,6	1,7	9500	12000	**2206 M**	0,260
	62	20	1	15,7	0,25	2,5	3,9	4,7	2,7	5300		**2206 2RS**	0,260
	62	20	1	15,7	0,25	2,5	3,9	4,7	2,7	5300		**2206 K2RS**	0,260
	72	19	1,1	21,4	0,24	2,6	4,1	6,35	2,8	9000	11000	**1306**	0,380
	72	19	1,1	21,4	0,24	2,6	4,1	6,35	2,8	9000	11000	**1306 K**	0,380
	72	27	1,1	31,4	0,4	1,6	2,5	8,7	1,7	8500	10000	**2306**	0,500
	72	27	1,1	31,4	0,4	1,6	2,5	8,7	1,7	8500	10000	**2306 K**	0,500
	72	27	1,1	21,4	0,24	2,6	4,1	6,35	2,8	5600		**2306 2RS**	0,500
35	72	17	1,1	15,8	0,23	2,8	4,2	5,15	2,9	9000	11000	**1207**	0,320
	72	17	1,1	15,8	0,23	2,8	4,2	5,15	2,9	9000	11000	**1207 K**	0,320
	72	17	1,1	15,8	0,23	2,8	4,2	5,15	2,9	9000	11000	**1207 M**	0,320
	72	23	1,1	21,7	0,37	1,7	2,6	6,7	1,8	8500	10000	**2207**	0,400
	72	23	1,1	21,7	0,37	1,7	2,6	6,7	1,8	8500	10000	**2207K**	0,400
	72	23	1,1	15,8	0,23	2,8	4,2	5,15	2,9	5600		**2207 RS**	0,400
	72	23	1,1	15,8	0,23	2,8	4,2	5,15	2,9	5600		**2207 K2RS**	0,400
	80	21	1,5	25,1	0,25	2,5	3,9	7,95	2,7	7500	9000	**1307**	0,510
	80	21	1,5	25,1	0,25	2,5	3,9	7,95	2,7	7500	9000	**1307 K**	0,510
	80	31	1,5	39,7	0,43	1,5	2,3	12,9	1,6	7000	8500	**2307**	0,670
	80	31	1,5	39,7	0,43	1,5	2,3	12,9	1,6	7000	8500	**2307 K**	0,670
	80	31	1,5	25,1	0,25	2,5	3,9	7,95	2,7	4500		**2307 2RS**	0,670
40	80	18	1,1	19,2	0,22	2,9	4,5	6,5	3	8500	10000	**1208**	0,410
	80	18	1,1	19,2	0,22	2,9	4,5	6,5	3	8500	10000	**1208 K**	0,410
	80	23	1,1	22,4	0,33	1,9	3	7,4	2	7500	9000	**2208**	0,500
	80	23	1,1	22,4	0,33	1,9	3	7,4	2	7500	9000	**2208 K**	0,500
	80	23	1,1	22,4	0,33	1,9	3	7,4	2	7500	9000	**2208 M**	0,500
	80	23	1,1	19,2	0,22	2,9	4,5	6,5	3	4800		**2208 2RS**	0,500
	80	23	1,1	19,2	0,22	2,9	4,5	6,5	3	4800		**2208 K2RS**	0,500
	90	23	1,5	29,5	0,24	2,6	4,1	9,75	2,8	6700	8000	**1308**	0,710
	90	23	1,5	29,5	0,24	2,6	4,1	9,75	2,8	6700	8000	**1308 K**	0,710
	90	33	1,5	44,9	0,39	1,6	2,5	15,1	1,7	6300	7500	**2308**	0,920
	90	33	1,5	44,9	0,39	1,6	2,5	15,1	1,7	6300	7500	**2308 K**	0,920
	90	33	1,5	44,9	0,39	1,6	2,5	15,1	1,7	6300	7500	**2308 M**	0,920
	90	33	1,5	29,5	0,24	2,6	4,1	9,75	2,8	4000		**2308 2RS**	0,920
45	85	19	1,1	21,8	0,21	3	4,7	7,4	3,2	7500	9000	**1209**	0,460
	85	19	1,1	21,8	0,21	3	4,7	7,4	3,2	7500	9000	**1209 K**	0,460
	85	23	1,1	23,3	0,31	2	3,1	8,15	2,1	7000	8500	**2209**	0,540

Self-aligning ball bearings



Dimensions				Basical radial load	Factors					Speed limit		Designation	Mass
				dyn.				stat.					
d	D	B	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm				kN	-			kN	-	min^{-1}		-	Kg
45	85	23	1,1	23,3	0,31	2	3,1	8,15	2,1	7000	8500	**2209 K**	0,540
	85	23	1,1	21,8	0,21	3	4,7	7,4	3,2	4500		**2209 2RS**	0,540
	85	23	1,1	21,8	0,21	3	4,7	7,4	3,2	4500		**2209 K2RS**	0,540
	100	25	1,5	37,7	0,24	2,6	4,1	12,9	2,8	6300	7500	**1309**	0,950
	100	25	1,5	37,7	0,24	2,6	4,1	12,9	2,8	6300	7500	**1309 K**	0,950
	100	36	1,5	54,1	0,31	2	3,1	16,5	2,1	5600	6700	**2309**	1,23
	100	36	1,5	54,1	0,31	2	3,1	16,5	2,1	5600	6700	**2309 K**	1,23
	100	36	1,5	37,7	0,24	2,6	4,1	12,9	2,8	3600		**2309 2RS**	1,23
50	90	20	1,1	22,9	0,21	3	4,7	8,1	3,2	7000	8500	**1210**	0,520
	90	20	1,1	22,9	0,21	3	4,7	8,16	3,2	7000	8500	**1210 K**	0,520
	90	23	1,1	23,3	0,29	2,2	3,4	8,5	2,3	6300	7500	**2210**	0,590
	90	23	1,1	23,3	0,29	2,2	3,4	8,5	2,3	6300	7500	**2210 K**	0,590
	90	23	1,1	22,9	0,21	3	4,6	8,1	3,2	4000		**2210 2RS**	0,590
	90	23	1,1	22,9	0,21	3	4,6	8,1	3,2	4000		**2210 K2RS**	0,590
	110	27	2	43,4	0,24	2,6	4,1	14,2	2,8	5600	6700	**1310**	1,21
	110	27	2	43,4	0,24	2,6	4,1	14,2	2,8	5600	6700	**1310 K**	1,21
	110	40	2	64,4	0,42	1,5	2,3	20	1,6	5300	6300	**2310**	1,23
	110	40	2	64,4	0,42	1,5	2,3	20	1,6	5300	6300	**2310 K**	1,23
	110	40	2	43,4	0,24	2,6	4,1	14,2	2,8	3400		**2310 2RS**	1,64
55	100	21	1,5	26,6	0,2	3,2	4,9	10,1	3,3	6300	7500	**1211**	0,700
	100	21	1,5	26,6	0,2	3,2	4,1	10,1	3,3	6300	7500	**1211 K**	0,700
	100	25	1,5	26,5	0,27	2,3	3,6	9,9	2,5	6000	7000	**2211**	0,810
	100	25	1,5	26,5	0,27	2,3	3,6	9,9	2,5	6000	7000	**2211 K**	0,810
	120	29	2	51,3	0,23	2,3	4,2	18,1	2,9	5000	6000	**1311**	1,58
	120	29	2	51,3	0,23	2,8	4,2	18,1	2,9	5000	6000	**1311 K**	1,58
	120	43	2	75,3	0,41	1,5	2,4	23,8	1,6	4800	5600	**2311**	2,10
	120	43	2	75,3	0,41	1,5	2,4	23,8	1,6	4800	5600	**2311 K**	2,10
60	110	22	1,5	30,2	0,19	3,4	5,2	11,6	3,5	5600	6700	**1212**	0,900
	110	22	1,5	30,2	0,19	3,4	5,2	11,6	3,5	5600	6700	**1212 K**	0,900
	110	28	1,5	33,8	0,28	2,2	3,5	12,6	2,4	5300	6300	**2212**	1,10
	110	28	1,5	33,8	0,28	2,2	3,5	12,6	2,4	5300	6300	**2212 K**	1,10
	130	31	2,1	57,1	0,23	2,8	4,2	20,8	2,9	4500	5300	**1312**	1,96
	130	31	2,1	57,1	0,23	2,8	4,2	20,8	2,9	4500	5300	**1312 K**	1,96
	130	46	2,1	87,1	0,41	1,5	2,4	28	1,6	4300	5000	**2312**	2,60
	130	46	2,1	87,1	0,41	1,5	2,4	28	1,6	4300	5000	**2312 K**	2,60
65	120	23	1,5	31	0,17	3,7	5,7	12,4	3,9	5300	6300	**1213**	1,15
	120	23	1,5	31	0,17	3,7	5,7	12,4	3,9	5300	6300	**1213 K**	1,15
	120	31	1,5	43,6	0,28	2,2	3,5	16,4	2,4	5000	6000	**2213**	1,45
	120	31	1,5	43,6	0,28	2,2	3,5	16,4	2,4	5000	6000	**2213 K**	1,45
	140	33	2,1	62	0,23	2,8	4,2	22,9	2,8	4300	5000	**1313**	2,45

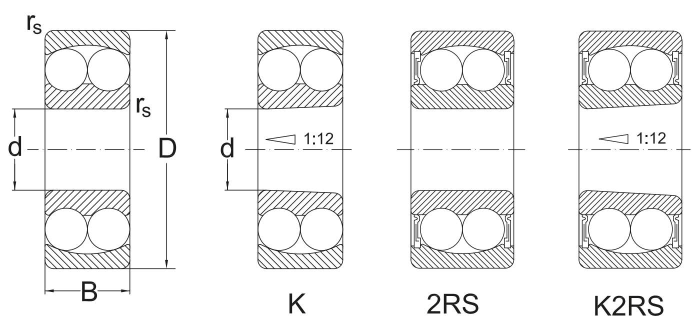
Self-aligning ball bearings



2RS K2RS

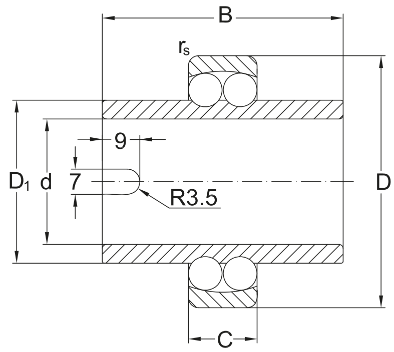
Dimensions				Basical radial load	Factors					Speed limit		Designation	Mass
				dyn.				stat.					
d	D	B	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm				kN	-			kN	-	min $^{-1}$		-	Kg
65	140	33	2,1	62	0,23	2,8	4,2	22,9	2,8	4300	5000	**1313 K**	2,45
	140	48	2,1	95,6	0,38	1,7	2,6	32,5	1,7	4000	4800	**2313**	3,25
	140	48	2,1	95,6	0,38	1,7	2,6	32,5	1,7	4000	4800	**2313 K**	3,25
70	125	24	1,5	34,6	0,18	3,5	5,4	13,7	3,7	5000	6000	**1214**	1,25
	125	24	1,5	34,6	0,18	3,5	5,4	13,7	3,7	5000	6000	**1214 K**	1,25
	125	31	1,5	44,2	0,27	2,3	3,6	17,1	2,5	4800	5600	**2214**	1,50
	125	31	1,5	44,2	0,27	2,3	3,6	17,1	2,5	4800	5600	**2214 K**	1,50
	150	35	2,1	74,1	0,22	2,9	4,5	27,7	3	4000	4800	**1314**	3,00
	150	35	2,1	74,1	0,22	2,9	4,5	27,7	3	4000	4800	**1314 K**	3,00
	150	51	2,1	111	0,35	1,8	2,8	31,7	1,9	3600	4300	**2314**	3,90
	150	51	2,1	111	0,35	1,8	2,8	31,7	1,9	3600	4300	**2314 K**	3,90
75	130	25	1,5	38,9	0,18	3,5	5,4	15,6	3,7	4800	5600	**1215**	1,35
	130	25	1,5	38,9	0,18	3,5	5,4	15,6	3,7	4800	5600	**1215 K**	1,35
	130	31	1,5	44	0,25	2,5	3,9	17,8	2,7	4500	5300	**2215**	1,60
	130	31	1,5	44	0,25	2,5	3,9	17,8	2,7	4500	5300	**2215 K**	1,60
	160	37	2,1	79,2	0,22	2,9	4,5	30	3	3600	4300	**1315**	3,55
	160	37	2,1	79,2	0,22	2,9	4,5	30	3	3600	4300	**1315 K**	3,55
	160	55	2,1	123	0,38	1,7	2,6	42,8	1,7	3400	4000	**2315**	4,70
	160	55	2,1	123	0,38	1,7	2,6	42,8	1,7	3400	4000	**2315 K**	4,70
	160	55	2,1	123	0,38	1,7	2,6	42,8	1,7	3400	4000	**2315 KM**	4,70
80	140	26	2	39,8	0,16	3,9	6,1	17	4,1	4300	5000	**1216**	1,65
	140	26	2	39,8	0,16	3,9	6,1	17	4,1	4300	5000	**1216 K**	1,65
	140	33	2	48,8	0,26	2,4	3,7	19,9	2,5	4000	4800	**2216**	2,00
	140	33	2	48,8	0,26	2,4	3,7	19,9	2,5	4000	4800	**2216 K**	2,00
	170	39	2,1	88,4	0,22	2,9	4,5	33	3	3400	4000	**1316**	4,20
	170	39	2,1	88,4	0,22	2,9	4,5	33	3	3400	4000	**1316 K**	4,20
	170	58	2,1	136	0,34	1,9	2,9	48,5	2	3200	3800	**2316**	6,10
	170	58	2,1	136	0,34	1,9	2,9	48,5	2	3200	3800	**2316 K**	6,10
	170	58	2,1	136	0,34	1,9	2,9	48,5	2	3200	3800	**2316 M**	6,10
85	150	28	2	48,2	0,17	3,7	5,7	20,8	3,9	4000	4800	**1217**	2,05
	150	28	2	48,2	0,17	3,7	5,7	20,8	3,9	4000	4800	**1217 K**	2,05
	150	36	2	58,5	0,25	2,5	3,9	23,8	2,7	3800	4800	**2217**	2,50
	150	36	2	58,5	0,25	2,5	3,9	23,8	2,7	3800	4500	**2217 K**	2,50
	180	41	3	97,5	0,22	2,9	4,5	37,9	3	3200	4800	**1317**	5,00
	180	41	3	97,5	0,22	2,9	4,5	37,9	3	3200	3800	**1317 K**	5,00
	180	60	3	140	0,37	1,7	2,6	51,5	1,8	3000	3600	**2317**	7,05
	180	60	3	140	0,37	1,7	2,6	51,5	1,8	3000	3600	**2317 K**	7,05
90	160	30	2	57	0,17	3,7	5,7	23,1	3,9	3800	4500	**1218**	2,50
	160	30	2	57	0,17	3,7	5,7	23,1	3,9	3800	4500	**1218 K**	2,50
	160	40	2	70,2	0,27	2,3	3,6	27,2	2,5	3600	4300	**2218**	3,40

Self-aligning ball bearings



Dimensions				Basical radial load	Factors					Speed limit		Designation	Mass
				dyn.				stat.					
d	D	B	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm				kN	-			kN	-	min $^{-1}$		-	Kg
90	160	40	2	70,2	0,27	2,3	3,6	27,2	2,5	3600	4300	**2218 K**	3,40
	190	43	3	117	0,22	2,9	4,5	44,5	3	3000	3600	**1318**	5,80
	190	43	3	117	0,22	2,9	4,5	44,5	3	3000	3600	**1318 K**	5,80
	190	64	3	153	0,38	1,7	2,6	57,7	1,7	2800	3400	**2318**	8,45
	190	64	3	153	0,38	1,7	2,6	57,7	1,7	2800	3400	**2318 K**	8,45
95	170	32	2,1	63,7	0,17	3,7	5,7	24,3	3,9	3400	4000	**1219**	3,10
	170	32	2,1	63,7	0,17	3,7	5,7	24,3	3,9	3400	4000	**1219 K**	3,10
	200	45	3	133	0,23	2,8	4,2	50,8	2,9	2800	3400	**1319**	6,70
	200	45	3	133	0,23	2,8	4,2	50,8	2,9	2800	3400	**1319 K**	6,70
100	180	34	2,1	68,9	0,17	3,7	5,7	29,7	3,9	3200	3800	**1220**	3,70
	180	34	2,1	68,9	0,17	3,7	5,7	29,7	3,9	3200	3800	**1220 K**	3,70
	180	46	2,1	97,5	0,24	2,6	4,1	34	2,8	3200	3800	**2220**	5,0
	180	46	2,1	97,5	0,24	2,6	4,1	34	2,8	3200	3800	**2220 K**	5,0
	215	47	3	143	0,24	2,6	4,1	57,3	2,8	2600	3200	**1320**	8,30
	215	47	3	143	0,24	2,6	4,1	57,3	2,8	2600	3200	**1320 K**	8,30
	215	73	3	193	0,34	1,9	2,9	73,4	2	2400	3000	**2320**	12,2
	215	73	3	193	0,34	1,9	2,9	73,4	2	2400	3000	**2320 K**	12,5
110	200	38	2,1	88	0,17	3,7	5,7	35,2	3,9	2800	3400	**1222**	5,15
	200	38	2,1	88	0,17	3,7	5,7	35,2	3,9	2800	3400	**1222 K**	5,15
	200	53	2,1	124	0,26	2,4	3,7	48,9	2,5	2800	3400	**2222**	7,10
	200	53	2,1	124	0,26	2,4	3,7	48,9	2,5	2800	3400	**2222 K**	7,10
	240	50	3	163	0,22	2,9	4,5	67,5	3	2400	3000	**1322**	12,0
	240	50	3	163	0,22	2,9	4,5	67,5	3	2400	3000	**1322 K**	12,0

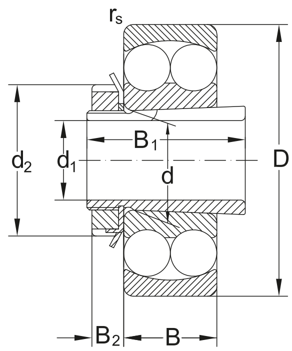
Self-aligning ball bearings with extended inner ring



Dimensions						Basical radial load		Factors				Speed limit		Designation	Mass
						dyn.				stat.					
d[1]	D	C	B	D_1	r_s min.	C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil		
mm						kN	-			kN	-	min^{-1}		-	Kg
20	47	14	40	29,2	1	9,9	0,28	2,2	3,5	2,65	2,4	7100	9000	**11204**	0,180
	52	15	44	31,5	1,1	12,4	0,3	2,1	3,3	3,35	2,2	8000	6300	**11304**	0,270
25	52	15	44	33,3	1	12,2	0,29	2,2	3,4	3,3	2,3	6300	8000	**11205**	0,220
	62	17	48	38	1,1	17,8	0,28	2,2	3,5	4,9	2,4	5000	6300	**11305**	0,410
30	62	16	48	40,1	1	15,7	0,25	2,5	3,9	4,7	2,7	5000	6300	**11206**	0,350
	72	19	52	45	1,1	21,4	0,24	2,6	4,1	6,35	2,8	4000	5000	**11306**	0,610
35	72	17	52	47,7	1,1	15,8	0,23	2,8	4,2	5,15	2,9	4000	5000	**11207**	0,540
	80	21	56	51,7	1,5	25,1	0,25	2,5	3,9	7,95	2,7	3600	4500	**11307**	0,810
40	80	18	56	54	1,1	19,2	0,22	2,9	4,5	6,5	3	3600	4500	**11208**	0,720
	90	23	58	57,7	1,5	29,5	0,24	2,6	4,1	9,75	2,8	3200	4000	**11308**	1,08
45	85	19	58	57,7	1,1	21,8	0,21	3	4,7	7,4	3,2	3600	4500	**11209**	0,770
	100	25	60	63,9	1,5	37,7	0,24	2,6	4,1	12,8	2,8	2800	3600	**11309**	1,38
50	90	20	58	62,7	1,1	22,9	0,21	3	4,7	8,1	3,2	3200	4000	**11210**	0,850
	110	27	62	70,3	2	43,4	0,24	2,6	4,1	14,1	2,8	2500	3200	**11310**	1,72
55	100	21	60	69,5	1,5	26,6	0,2	3,2	4,9	10,0	3,3	2800	3600	**11211**	1,13
60	110	22	62	78	1,5	30,2	0,19	3,4	5,2	11,6	3,5	2500	3200	**11212**	1,50

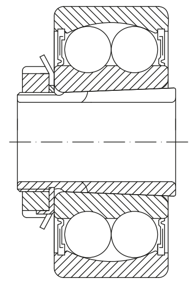
1) Tolerance J7

Self-aligning ball bearings with adapter sleeve



K+H

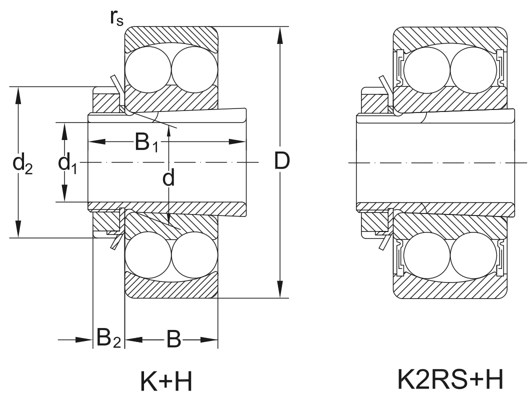
Dimensions								Designation		Mass
d_1	d	D	B	r_s min.	d_2	B_1	B_2	bearing	adapter sleeve	
mm								-		Kg
17	20	47	14	1	32	24	7	**1204 K**	**H204**	0,167
	20	47	18	1	32	28	7	**2204 K**	**H304**	0,201
	20	52	15	1,1	32	28	7	**1304 K**	**H304**	0,221
	20	52	21	1,1	32	31	7	**2304 K**	**H2304**	0,281
20	25	52	15	1	38	26	8	**1205 K**	**H205**	0,219
	25	52	18	1	38	29	8	**2205 K**	**H305**	0,233
	25	52	18	1	38	29	8	**2205 K2RS**	**H305**	0,236
	25	62	17	1,1	38	29	8	**1305 K**	**H305**	0,227
	25	62	24	1,1	38	35	8	**2305 K**	**H2305**	0,414
25	30	62	16	1	45	27	8	**1206 K**	**H206**	0,33
	30	62	20	1	45	31	8	**2206 K**	**H306**	0,363
	30	62	20	1	45	31	8	**2206 K2RS**	**H306**	0,363
	30	72	19	1,1	45	31	8	**1306 K**	**H306**	0,49
	30	72	27	1,1	45	38	8	**2306 K**	**H2306**	0,615
30	35	72	17	1,1	52	29	9	**1207 K**	**H207**	0,422
	35	72	23	1,1	52	35	9	**2207 K**	**H307**	0,538
	35	72	23	1,1	52	35	9	**2207 K2RS**	**H307**	0,538
	35	80	21	1,5	52	35	9	**1307 K**	**H307**	0,644
	35	80	31	1,5	52	43	9	**2307 K**	**H2307**	0,822
35	40	80	18	1,1	58	31	10	**1208 K**	**H208**	0,585
	40	80	23	1,1	58	36	10	**2208 K**	**H308**	0,683
	40	80	23	1,1	58	36	10	**2208 K2RS**	**H308**	0,683
	40	90	23	1,1	58	36	10	**1308 K**	**H308**	0,893
	40	90	33	1,5	58	46	10	**2308 K**	**H2308**	1,13
40	45	85	19	1,1	65	33	11	**1209 K**	**H209**	0,686
	45	85	23	1,1	65	39	11	**2209 K**	**H309**	0,781
	45	85	23	1,1	65	39	11	**2209 K2RS**	**H309**	0,781
	45	100	25	1,5	65	39	11	**1309 K**	**H309**	1,19
	45	100	36	1,5	65	50	11	**2309 K**	**H2309**	1,48
45	50	90	20	1,1	70	35	12	**1210 K**	**H210**	0,789
	50	90	23	1,1	70	42	12	**2210 K**	**H310**	0,88
	50	90	23	1,1	70	42	12	**2210 K2RS**	**H310**	0,88
	50	110	27	2	70	42	12	**1310 K**	**H310**	1,49
	50	110	40	2	70	55	12	**2310 K**	**H2310**	1,96
50	55	100	21	1,5	75	37	12	**1211 K**	**H211**	1
	55	100	25	1,5	75	45	12	**2211 K**	**H311**	1,2
	55	120	29	2	75	45	12	**1311 K**	**H311**	1,91
	55	120	43	2	75	59	12	**2311 K**	**H2311**	2,47
55	60	110	22	1,5	80	38	13	**1212 K**	**H212**	1,03
	60	110	28	1,5	80	47	13	**2212 K**	**H312**	1,55
	60	130	31	2,1	80	47	13	**1312 K**	**H312**	2,32
	60	130	46	2,1	80	62	13	**2312 K**	**H2312**	3,01
60	65	120	23	1,5	85	40	14	**1213 K**	**H213**	1,53



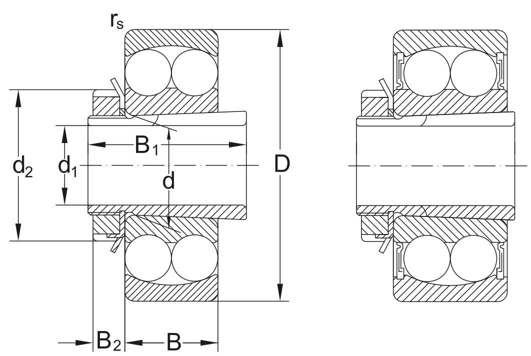
K2RS+H

Basic radial load.		Factors				Speed limit	
dyn. C_r	e	Y_1	Y_2	stat. C_{0r}	Y_0	grease	oil
kN	-			kN	-	min^{-1}	
9,9	0,28	2,2	3,5	2,65	2,4	15000	18000
12,6	0,28	2,2	3,5	3,3	2,4	14000	17000
12,4	0,3	2,1	3,3	3,35	2,2	12000	15000
18,2	0,52	1,2	1,9	4,7	1,3	11000	14000
12,2	0,29	2,2	3,4	3,3	2,3	13000	16000
12,5	0,43	1,5	2,3	3,45	1,6	11000	14000
12,2	0,29	2,2	3,4	3,3	2,3	7000	
17,8	0,28	2,2	3,5	4,9	2,4	9500	12000
24,5	0,44	1,4	2,2	6,55	1,5	9500	12000
15,7	0,25	2,5	3,9	4,7	2,7	10000	13000
15,3	0,4	1,6	2,5	4,6	1,7	9500	12000
15,7	0,25	2,5	3,9	4,7	2,7	5300	
21,4	0,24	2,6	4,1	6,35	2,8	9000	11000
31,4	0,4	1,6	2,5	8,7	1,7	8500	10000
15,8	0,23	2,8	4,2	5,15	2,9	9000	11000
21,7	0,37	1,7	2,6	6,7	1,8	8500	10000
15,8	0,23	2,8	4,2	5,15	2,9	5600	
25,1	0,25	2,5	3,9	7,95	2,7	7500	9000
39,7	0,43	1,5	2,3	12,9	1,6	7000	8500
19,2	0,22	2,9	4,5	6,5	3	8500	10000
22,4	0,33	1,9	3	7,4	2	7500	9000
19,2	0,22	2,9	4,5	6,5	3	4800	
29,5	0,24	2,6	4,1	9,75	2,8	6700	8000
44,9	0,39	1,6	2,5	15,1	1,7	6300	7500
21,8	0,21	3	4,7	7,4	3,2	7500	9000
23,3	0,31	2	3,1	8,15	2,1	7000	8500
21,8	0,21	3	4,7	7,4	3,2	4500	
37,7	0,24	2,6	4,1	12,9	2,8	6300	7500
54,1	0,31	2	3,1	16,5	2,1	5600	6700
22,9	0,21	3	4,7	8,16	3,2	7000	8500
23,3	0,29	2,2	3,4	8,5	2,3	6300	7500
22,9	0,21	3	4,6	8,1	3,2	4000	
43,4	0,24	2,6	4,1	14,2	2,8	5600	6700
64,4	0,42	1,5	2,3	20	1,6	5300	6300
26,6	0,2	3,2	4,1	10,1	3,3	6300	7500
26,5	0,27	2,3	3,6	9,9	2,5	6000	7000
51,3	0,23	2,8	4,2	18,1	2,9	5000	6000
75,3	0,41	1,5	2,4	23,8	1,6	4800	5600
30,2	0,19	3,4	5,2	11,6	3,5	5600	6700
33,8	0,28	2,2	3,5	12,6	2,4	5300	6300
57,1	0,23	2,8	4,2	20,8	2,9	4500	5300
87,1	0,41	1,5	2,4	28	1,6	4300	5000
31	0,17	3,7	5,7	12,4	3,9	5300	6300

Self-aligning ball bearings with adapter sleeve



Dimensions								Designation		Mass
d_1	d	D	B	r_s min.	d_2	B_1	B_2	bearing	adapter sleeve	
mm								-		Kg
60	65	120	31	1,5	85	50	14	**2213 K**	**H313**	2,00
	65	140	33	2,1	85	50	14	**1313 K**	**H313**	2,87
	65	140	48	2,1	85	65	14	**2313 K**	**H2313**	3,71
65	75	130	25	1,5	98	43	15	**1215 K**	**H215**	2,05
	75	130	31	1,5	98	55	15	**2215**	**H315**	2,52
	75	160	37	2,1	98	55	15	**1315 K**	**H315**	4,34
	75	160	55	2,1	98	73	15	**2315 K**	**H2315**	5,66
70	80	140	26	2	105	46	17	**1216 K**	**H216**	2,52
	80	140	33	2	105	59	17	**2216 K**	**H316**	3,18
	80	170	39	2,1	105	59	17	**1316 K**	**H316**	5,33
	80	170	58	2,1	105	78	17	**2316 K**	**H2316**	7,24
75	85	150	28	2	110	50	18	**1217 K**	**H217**	3,06
	85	150	36	2	110	63	18	**2217 K**	**H317**	3,85
	85	180	41	3	110	63	18	**1317 K**	**H317**	6,27
	85	180	60	3	110	82	18	**2317 K**	**H2317**	8,34
80	90	160	30	2	120	52	18	**1218 K**	**H218**	3,67
	90	160	40	2	120	65	18	**2218 K**	**H318**	4,74
	90	190	43	3	120	65	18	**1318 K**	**H318**	7,36
	90	190	64	3	120	86	18	**2318 K**	**H2318**	9,94
85	95	170	32	2,1	125	55	19	**1219 K**	**H219**	4,42
	95	200	45	3	125	68	19	**1319 K**	**H319**	8,30
90	100	180	34	2,1	130	58	20	**1220 K**	**H220**	5,13
	100	180	46	2,1	130	71	20	**2220 K**	**H320**	6,63
	100	215	47	3	130	71	20	**1320 K**	**H320**	9,96
	100	215	73	3	130	97	20	**2320 K**	**H2320**	14,3
100	110	200	38	2,1	145	63	21	**1222 K**	**H222**	7,00
	110	200	53	2,1	145	77	21	**2222 K**	**H322**	9,15
	110	240	50	3	145	77	21	**1322 K**	**H322**	13,9



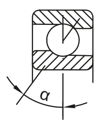
K+H

K2RS+H

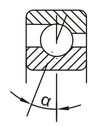
Basic radial load.		Factors				Speed limit	
dyn. C_r	e	Y_1	Y_2	stat. C_{0r}	Y_0	grease	oil
kN	-			kN	-	min^{-1}	
43,6	0,28	2,2	3,5	16,4	2,4	5000	6000
62	0,23	2,8	4,2	22,9	2,8	4300	5000
95,6	0,38	1,7	2,6	32,5	1,7	4000	4800
38,9	0,18	3,5	5,4	15,6	3,7	4800	5600
44	0,25	2,5	3,9	17,8	2,7	4500	5300
79,2	0,22	2,9	4,5	30	3	3600	4300
123	0,38	1,7	2,6	42,8	1,7	4300	4000
39,8	0,16	3,9	6,1	17	4,1	4300	5000
48,8	0,26	2,4	3,7	19,9	2,5	4000	4800
88,4	0,22	2,9	4,5	33	3	3400	4000
136	0,34	1,9	2,9	48,5	2	3200	3800
48,8	0,17	3,7	5,7	20,8	3,9	4000	4800
58,5	0,25	2,5	3,9	23,8	2,7	3800	4500
97,5	0,22	2,9	4,5	37,9	3	3200	3800
140	0,37	1,7	2,6	51,5	1,8	3000	3600
57	0,17	3,7	5,7	23,1	3,9	3800	4500
70,2	0,27	2,3	3,6	27,2	2,5	3600	4300
117	0,22	2,9	4,5	44,5	3	3000	3600
153	0,38	1,7	2,6	57,7	1,7	2800	3400
63,7	0,17	3,7	5,7	24,3	3,9	3400	4000
133	0,23	2,8	4,2	50,8	2,9	2800	3400
68,9	0,17	3,7	5,7	29,7	3,9	3200	3800
97,5	0,24	2,6	4,1	34	2,8	2200	3800
143	0,24	2,6	4,1	57,3	2,8	2600	3200
193	0,34	1,9	2,9	73,4	2	2400	3000
88	0,17	3,7	5,7	35,2	3,9	2800	3400
124	0,26	2,4	3,7	48,9	2,5	2800	3400
163	0,22	2,9	4,5	67,5	3	2400	3000

Angular contact ball bearings, single row

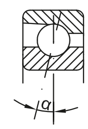
Single row angular contact bearings are manufactured in various constructive versions, with various contact angles, depending on the application. Bearings series 72B and 73B for general applications have a contact agle $\alpha = 40^\circ$. Bearings series 718, 719, 70 and 72 generally used for tool-holders, have phenol resins (textolite) cages or machined brass cages. Those with bore diameters up to d = 100 mm are manufactured to tolerance classes P5, P4 and P2 and have a contact angle of 15°(C) and 25°(A) respectively.



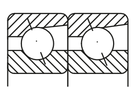
Series 72B, 73B
Contact angle $\alpha = 40^\circ$



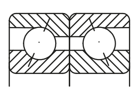
Series 70A, 72A
Contact angle $\alpha = 25^\circ$



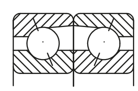
Series 70C, 72C
Contact angle $\alpha = 15^\circ$



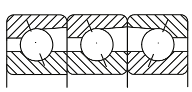
DT arrangement (Tandem)



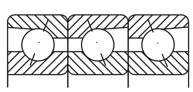
DB arrangement
(Back-to-back)



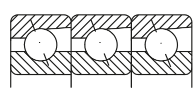
DF arrangement
(Face-to-face)



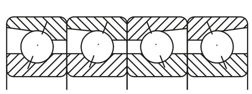
TFT arrangement



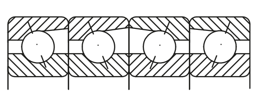
TBT arrangement



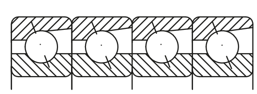
TT arrangement



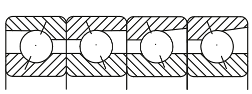
QBC arrangement



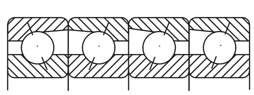
QFC arrangement



QT arrangement



QBT arrangement



QFT arrangement

Suffixes

A - bearing with extended outer ring
A - bearing with contact angle α= 25°
B - bearing with extended outer ring
B - bearing with contact angle α= 40°
BB - bearing with α= 40° and extended inner ring
C - bearing with contact angle α= 15°
CA - bearing with radial clearance smaller than normal
CB - bearing with normal radial clearance
CC - radial bearing with axial clearance larger than normal
D - two bearings set
D - bearing with two-pieces inner ring
DB - two bearings set in back-to-back arrangement, (O)
DF - two bearings set in face-to-face arrangement, (X)
DT - two bearings set in tandem arrangement
E - bearing with contact angle α= 20°
FA - bearing with machined cage of steel or cast iron, guided in the outer ring
FB - bearing with machined cage of steel or cast iron, guided on the inner ring
GA - light preload, bearings series 72B, 73B
GB - moderate preload, bearings series 72B, 73B
GC - heavy preload, bearings series 72B, 73B
L - light preload, bearings series 70C, 70A, 72A
M - moderate preload, bearings series 70C, 70A, 72A
M - machined brass cage, ball guided
MA - machined brass cage, guided in the outer ring
MB - machined brass cage, guided in the inner ring
O - bearing set without axial clearance
P0 - normal tolerance class
P6 - tolerance class more accurate than normal
P5 - tolerance class more accurate than P6
P4 - tolerance class more accurate than P5
P2 - tolerance class more accurate than P4
Q - four bearings set
QBC - tandem pairs in O arrangement
QBT - tandem pairs plus O arrangement
QFC - tandem pairs in X arrangement
QFT - tandem pairs plus X arrangement
QT - tandem pairs
S - heavy preload, bearings series 70C, 70A, 72A
S0 - bearings operating up to a temperature of + 150°C
S1 - bearings operating up to a temperature of + 200°C
T - three bearings set
T - bearing set total width (T168, T200)
TBT - three bearings set in O arrangement, plus T
TFT - three bearings set in X arrangement, plus T
TT - three bearings set in tandem arrangement
TN - polyamide cage
V - full complement bearing
U - bearings of universal design, with deviations of d and D and K_i, K_e in P2 class
UA - bearings with small axial clearance at DB and DF arrangements
UL - bearings with light preload at DB and DF arrangements
UO - bearings without small axial clearance at DB and DF arrangements
UP - tolerance class with deviations of d and D in P4 class and of K_i and K_e in P2 class.

Single row angular contact ball bearings can take only one direction axial loads. When being radially loaded, in bearing occurs an axially acting load which has to be compensated.

For this reason, a bearing or paired bearings are mounted on each shaft end.

Single row angular contact ball bearings with B suffix have a contact angle α= 40° and are suitable in case of heavy loads.

These bearings are not dismountable and their use at relatively high speeds is allowed.

Pair mounting of bearings as shown in figures on page 156 is used when the load carryng capacity of a sigle bearing is inadequate (tandem arrangement), respectively when axial loads have to be taken in both directions (DB or DF arrangements).

In case of DT tandem arrangement, the contact lines are in parallel. Radial and axial loads are uniformly distributed on both bearings. The bearing pair can take axial loads in only one direction. Therefore, a thirs bearing should take axial loads in the opposite direction.

DB arrangement is considered to be a relatively stiff arrangement and can also take tilting moments.

The contact lines of DF arrangement converge towards the bearing axis and form letter “X“. Axial loads are taken in the same way as in case of DB arrangement, but the arrangement is not so stiff and it is less suitable for taking tilting moments.

Universal design

Single row angular contact ball bearings of universal design are suitable for DB, DF and DT arrangements.

Bearings of universal design are manufactured to more accurate tolerance classes and can be matched if the mounting conditions UA, UO and UL are observed.

The values of clearance or preload are obtained when the shaft is manufactured to tolerance class J5 and the housing bore to tolerance class J6.

Dimensions

Main dimensions of bearings given in tables are in accordance with ISO 15.

Misalignment

In case of single row angular contact ball bearings the conditions regarding the permissible error of alignment of the outer ring relative to the inner ring are as complex as for single row deep groove ball bearings.

When the bearings are paired in DB arrangement, angular misalignments of the outer ring in relation to the inner ring can only be accommodated between the balls and raceways by force, leading to a reduction in bearing life.

Tolerances

Single row angular contact ball bearings of series 72B and 73B, with a contact angle $\alpha = 40^\circ$ (B) are generally manufactured to the normal tolerance class.

At request, they also can be manufactured to normal tolerance classes P6 and P5.

Single row angular contact ball bearings of high accuracy, series 70C, 72C, 70A and 72A, with a contact angle $\alpha = 15^\circ$ (C) and $\alpha = 25^\circ$ are manufactured to tolerance classes SP, P4, UP and P2.

The deviations of bore diameter, outside diameter and width of high accuracy single row angular contact ball bearings of universal design (UL) are given in table 1.

In case of single row angular contact ball bearings manufactured and delivered in sets of 2, 3 or 4 bearings, outside and bore diameter should be chosen considering the mean tolerance values, which are given on the package.

Deviation of main dimensions of high accuracy row angular contact bearings

Deviations in µm

Table 1

Bore d		Δ_{dmp}, Δ_{Dmp}						Δ_{BS}	
over	up to	low	high	low	high	low	high	low	high
(mm)		P4		UP		P2			
-	**18**	-3	-1	-3	-1	-2	0	-250	0
18	**30**	-3,5	-1,5	-3	-1	-2	0	-250	0
30	**50**	-4	-1,5	-3	-1	-2	0	-250	0
50	**80**	-5	-2	-3,5	-1,5	-3	-1	-250	0
80	**120**	-5,5	-2			-3,5	-1,5	-380	0

Contact angle

In case of single row angular contact ball bearings, the efforts between rings and rolling elements (contact points of rolling elements / outer or inner ring) are transmitted at an angle α (<90°) to a plane perpendicular to the bearing axis.

The value of this angle depends on the magnitude of the raceway radius, rolling element diameter and radial clearance in bearing, when the curvature centres of the raceway in the outer or in the inner ring are in the same plane.

High accuracy single row angular contact ball bearings series 70C, 70A and 72A, with a contact angle $\alpha = 15^\circ$ (C) and $\alpha = 25^\circ$ (A), which are generally used for grinding stone holders, paired mounted in DB and DF arrangement, are manufactured with an initial preload. It can be: light (L), moderate (M), heavly (S). The values of these preloads are given in table 3.

Axial clearance - preload

Axial clearance or preload can be obtained only when single row angular contact ball bearings is mounted in the assembly and depends on the location of the second bearing which assures the shaft axial guiding.

Single row angular contact ball bearings series 72B and 73B, paired mounted in DB and DF arrangements are manufactured with normal axial clearance CB, smaller than normal, CA, larger than normal, CC, or with light preload, GA, moderate preload GB, or heavy preload, GC, according to the values given in table 2.

Axial clearance or preload of single row angular contact ball bearings series 72B and 73B, pair mounted in DB or DF arrangements

Table 2

Bore		**Axial clearance**						**Preload**										
d		**CA**		**CB**		**CC**		**GA**			**GB**				**GC**			
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	min.	max.	min.	max.	min.	max	min.	max.
mm	µm									N	µm		N		µm		N	
-	**10**	4	12	14	22	22	30	-	-	-	-	-	-	-	-	-	-	-
10	**18**	5	13	15	23	24	32	+4	-4	80	-2	-10	30	330	-8	-16	230	260
18	**30**	7	15	18	26	32	40	+4	-4	120	-2	-10	40	480	-8	-16	340	970
30	**50**	9	17	22	30	40	48	+4	-4	160	-2	-10	60	630	-8	-16	450	1280
50	**80**	11	23	26	38	48	60	+6	-6	380	-3	-15	140	1500	-12	-24	1080	3050
80	**120**	14	26	32	44	55	67	+6	-6	410	-3	-15	150	1600	-12	-24	1150	3250
120	**180**	17	29	35	47	62	74	+6	-6	540	-3	-15	200	2150	-12	-24	1500	4300
180	**250**	21	37	45	61	74	90	+8	-8	940	-4	-20	330	3700	-16	-32	2650	7500
250	**315**	26	42	52	68	90	106	+8	-8	1080	-4	-20	380	4250	-16	-32	3000	8600

High accuracy single row angular contact ball bearings series 70C, 70A and 72A, with a contact angle $\alpha = 15^{\circ}$ (C) and $\alpha = 25^{\circ}$ (A), which are generally used for grinding stone holders, paired mounted in DB and DF arrangement, are manufactured with an initial preload. It can be: light (L), moderate (M), heavy (S). The values of these preloads are given in table 3.

Values of axial preload of bearings of series 70C, 70A and 72A, in DB and DF arrangements

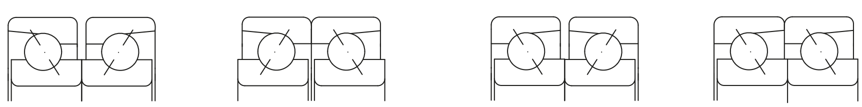
Table 3

Bore		**Axial preload**											
		Series 70C			**Series 72C**			**Series 70A**			**Series 72A**		
d	**Symbol**	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**
mm	-	N											
10	**00**	15	30	60	20	40	80	25	50	100	35	70	140
12	**01**	15	30	60	20	40	80	25	50	100	35	70	140
15	**02**	20	40	80	30	60	120	30	60	120	45	90	180
17	**03**	25	50	100	35	70	140	40	80	160	60	120	240
20	**04**	35	70	140	45	90	180	50	100	200	70	140	280
25	**05**	35	70	140	50	100	200	60	120	240	80	160	320
30	**06**	50	100	200	90	180	360	90	180	360	150	300	600
35	**07**	60	120	240	120	240	480	90	180	360	190	380	760
40	**08**	60	120	240	150	300	600	100	200	400	240	480	960
45	**09**	110	220	440	160	320	640	170	340	680	260	520	1040
50	**10**	110	220	440	170	340	680	180	360	720	260	520	1040
55	**11**	150	300	600	210	420	840	230	460	920	330	660	1320
60	**12**	150	300	600	250	500	1000	240	480	960	400	800	1600
65	**13**	160	320	640	290	580	1160	240	480	960	450	900	1800
70	**14**	200	400	800	300	600	1200	300	600	1200	480	960	1920

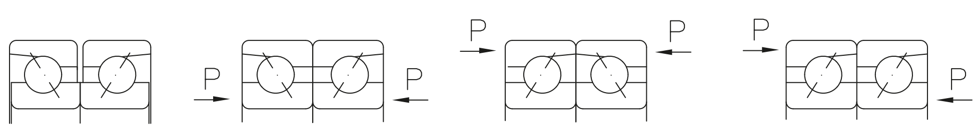
Values of axial preload of bearings of series 70C, 70A and 72A, in DB and DF arrangements Table 3 (continued)													
Bore		**Axial preload**											
		Series 70C			**Series 72C**			**Series 70A**			**Series 72A**		
d	**Symbol**	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**
mm	-	N											
75	**15**	200	400	800	310	620	1240	310	620	1240	500	1000	2000
80	**16**	240	480	960	370	740	1480	390	780	1560	580	1160	2320
85	**17**	250	500	1000	370	740	1480	400	800	1600	600	1200	2400
90	**18**	300	600	1200	480	960	1920	460	920	1840	750	1500	3000
95	**19**	310	620	1240	520	1040	2080	480	960	1920	850	1700	3400
100	**20**	310	620	1240	590	1180	2360	500	1000	2000	950	1900	3800
105	**21**	360	720	1440	650	1300	2600	560	1120	2240	1000	2000	4000
110	**22**	420	840	1680	670	1340	2680	650	1300	2600	1050	2100	4200
120	**24**	430	860	1720	750	1500	3000	690	1380	2760	1200	2400	4800
130	**26**	560	1120	2240	800	1600	3200	900	1800	3600	1250	2500	5000
140	**28**	570	1140	2280	-	-	-	900	1800	3600	-	-	-
150	**30**	650	1300	2600	-	-	-	1000	2000	4000	-	-	-
160	**32**	730	1460	2920	-	-	-	1150	2300	4600	-	-	-
170	**34**	800	1600	3200	-	-	-	1250	2500	5000	-	-	-
180	**36**	900	1800	3600	-	-	-	1450	2900	5800	-	-	-
190	**38**	950	1900	3800	-	-	-	1450	2900	5800	-	-	-

Designs of single row angular contact ball bearings with clearance or initial preload are given in the figures below.

Before mounting (preload)



After mounting (preload)



Cages

Single row angular contact ball bearings series 72B and 73B are generally fitted with pressed sheet cages.

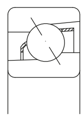
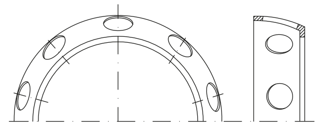
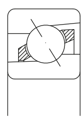
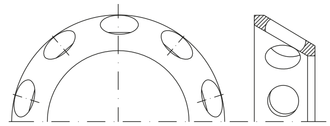
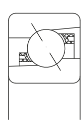
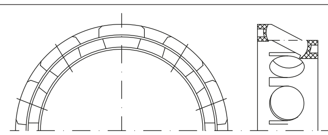
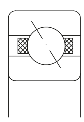
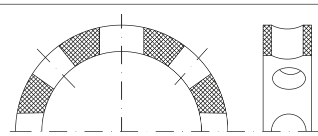
High precision single row angular contact ball bearings series 70C, 72C, 70A and 72A are fitted with textolite cages (textile fibre reinforced phenol resins).

At special request (high speeds, large sizes), bearings series 70C, 72C, 70A and 72A are fitted with machined brass cages. Cages of glass fibre reinforced polyamide 6.6 are also used with good results if operating temperature doesn't exceed +120°C.

Cages design and some technical data are given in table 4

Cages design and some technical data

Table 4

Cage	Design bearing	Design cage	Application	Max. value $D_m\,n$ oil	Max. value $D_m\,n$ grease
mm	-	N			
Pressed sheet cage			- General application - Moderate speeds - Bearings series 72B, 73B	600×10^3	450×10^3
Machined brass cage M, MA, MB			- General application - High speeds - Bearings: 7231B-7238B 7310B-7338B	1100×10^3	800×10^3
Polyamide cage TN			- General application - Low friction moment - High speeds	1100×10^3	900×10^3
Textolite cage T, TA,TB			- High accuracy bearings series: 70C, 72C, 70A, 72A - High speeds - Low vibration level	1200×10^3	900×10^3

Equivalent dynamic radial load

For single row angular contact ball bearings series 72B and 73B, single and in tandem arrangement the following equations are used:

$P_r = F_r$, kN, when $F_a/F_r \le 1{,}14$,
$P_r = 0{,}35\,Fr + 0{,}57\,F_a$, kN, when $F_a/F_r > 1{,}14$

For bearings in DB or DF arrangement
$P_r = F_r + 0{,}65\,F_a$, kN when $F_a/F_r \le 1{,}14$
$P_r = 0{,}57\,Fr + 0{,}93\,F_a$, kN, when $F_a/F_r > 1{,}14$

In case of paired bearings, F_r and F_a are the loads acting upon the bearings pair.

As the load is transmitted from one raceway to the other under a certain angle to the bearings axis, the actual load will cause an axial load. This has to be considered when calculating the equivalent dynamic load, in case of two single bearings or tandem arrangements. The equations needed for calculation are given in table 5, for various arrangements and loading versions.

These equations are available for bearings mounted without clearance and without preload (clearance equal to zero).

For single row angular contact ball bearings series 70C and 72C with a contact angle $\alpha = 15^\circ$(C), single or in DT arrangement, the following equations are available:

$P_r = F_r$, kN, for $F_a/F_r \le e$,
$P_r = 0{,}44\,F_r + Y\,F_a$, kN, for $F_a/F_r > e$

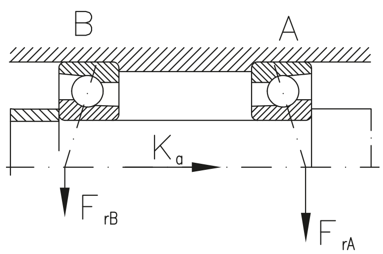
The values of factor Y depend on the values of the ratio f_0 i F_a/C_{0r} and are given in table 6. Factor f_0 can be found in diagram in page 163 as a funtion of dimensions series and bearing mean diameter. "i" represents the number of bearings or bearings pairs in a bearing join.

For bearings in DB and DF arrangements, the following equations are available:

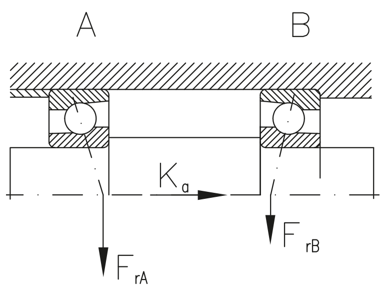
$P_r = F_r + Y_1\,F_a$, kN, for $F_a/F_r \le e$,
$P_r = 0{,}72\,F_r + Y_2\,F_a$, kN, for $F_a/F_r > e$

The values of factors Y_1 and Y_2 depend on the ratio $f_0 i F_a/C_{0r}$ and are given in table 6 (f_0 from diagram below).

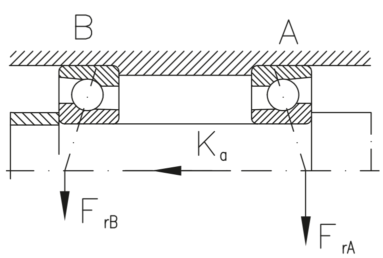
Back to back arrangement
DB



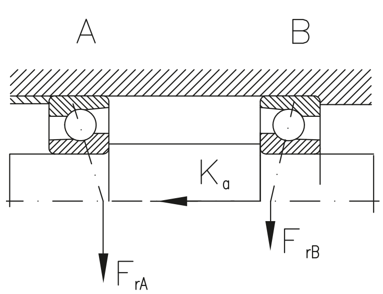
Face to face arrangement
DF



Back to back arrangement
DB



Face to face arrangement
DF



Determination of axial loads

Table 5

Loading version	Axial load
1a) $F_{rA} \geq F_{rB}$ $Ka \geq 0$	$F_{aA} = 1{,}14\ F_{rA}$ $F_{aB} = F_{aA} + K_a$
1b) $F_{rA} < F_{rB}$ $K_a \geq 1{,}14\ (F_{rB} - F_{rA})$	$F_{aA} = 1{,}14\ F_{rA}$ $F_{aB} = F_{aA} + K_a$
1c) $F_{rA} < F_{rB}$ $K_a \leq 1{,}14\ (F_{rB} - F_{rA})$	$F_{aB} = F_{aB} - K_a$ $F_{aB} = 1{,}14\ F_{rB}$
2a) $F_{rA} \leq F_{rB}$ $K_a \geq 0$	$F_{aB} = F_{aB} + K_a$ $F_{aB} = 1{,}14\ F_{rB}$
2b) $F_{rA} > F_{rB}$ $K_a \geq 1{,}14\ (F_{rA} - F_{rB})$	$F_{aB} = F_{aB} + K_a$ $F_{aB} = 1{,}14\ F_{rB}$
2c) $F_{rA} > F_{rB}$ $K_a < 1{,}14\ (F_{rA} - F_{rB})$	$F_{aA} = 1{,}14\ F_{rA}$ $F_{aB} = F_{aA} - K_a$

For single row angular contact ball bearings series 70A and 72A, with a contact angle α= 25°, single or in DT arrangement, the following equation are available:

$P_r = F_r$, kN, for $F_a/F_r \leq 0{,}68$
$P_r = 0{,}41\ F_r + 0{,}87\ F_a$, kN, for $F_a/F_r > 0{,}68$

For bearings in DB and DF arrangement, the following equations are available:

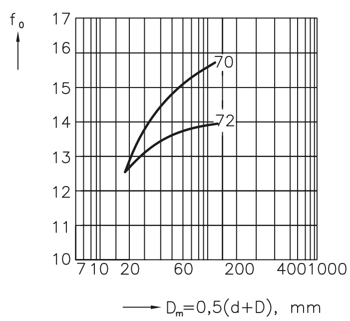
$P_r = F_r + Y_1 F_a$, kN, for $F_a/F_r \leq e$
$P_r = 0{,}72\ F_r + Y_2 F_a$, kN, for $F_a/F_r > e$

Values for Y_1 and Y_2 are given in table 6.

Values of factors e, Y, Y_1 and Y_2

Table 6

$\frac{f_0 \text{ i } F_a}{C_{0r}}$	e	Single and DT Y	Arrangement DB or DF Y_1	 Y_2
0,2	0,38	1,46	1,64	2,37
0,4	0,41	1,36	1,52	2,21
0,8	0,44	1,28	1,44	2,11
1,6	0,48	1,16	1,31	1,90
3	0,52	1,08	1,21	1,78
6	0,56	1	1,12	1,66



Equivalent static load

For single row angular contact ball bearings series 72B and 73B with a contact angle α = 40°, single and in DT arrangement, the following equation is available:

$P_{0r} = 0{,}6\ F_r + 0{,}26\ F_a$, kN

If $P_{0r} < F_r$, then we consider $P_0 = F_r$
For bearings in DB and DT arrangement, the following equation is available:

$P_{0r} = F_r + 0{,}52\ F_a$, kN

For single row angular contact ball bearings series 70C and 72C, with a contact angle α = 15°, single and in DT arrangement, the following equation is available:

$P_{0r} = 0{,}5\ F_r + 0{,}46\ F_a$, kN

For bearings in DB and DF arrangement, the following equation is available:

$P_{0r} = 0{,}5\ F_r + 0{,}92\ F_a$, kN

For single row angular contact ball bearings series 70A and 72A with a contact angle α = 25°, single and in DT arrangement, the following equation is available:

$P_{0r} = 0{,}5\ F_r + 0{,}38\ F_a$, kN

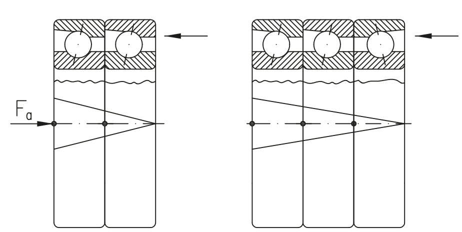
For bearings in DB and DF arrangement, the following equation in available:

$P_{0r} = F_r + 0{,}76\ F_a$, kN

Two "V" scratches are marked on the outside surface where the runout is maximum, i.e. where the outer ring thickness is maximum, so that the bearings of a set can be mounted in the manufacturing order. The place of maximum runout is marked on the chamfer between the inner ring bore and side face. Thus, the possible fit ovalnesses on the shaft can be compensated.

Every set is delivered as an unit, separately packed. In each unit, bearings are singly packed.

If distance rings are necessary to be mounted between bearings, they have not to be adjusted when being mounted. There is only one condition to be observed: the inner distance ring width should be equal to that of the outer ring, the side faces being parallel to each other. This can be easily done if both distance rings are simultaneously ground on a grinding and lapping machine. If bearings are mounted with distance rings, the mounting is also done observing the "V" marked as mentioned above. The cone vertex should be on the ring side oposite to that one on which the load acts (see next figure).



Basic dynamic load of paired bearings

Basic dynamic load given in bearings tables is valid for each single bearing. Basic dynamic load of a paired bearings set can be determined according to the specifications on page 21.

Basic static load of paired bearings

Basic static load of paired bearings can be similarly determined, multiplying the values of C_{0r} in the tables by 2, 3 and 4 respectively.

Bearing speed limit

Single row angular contact ball bearings are used at high speeds.

High precision bearings allow operation at higher speeds than those in the catalogue, depending on the oil lubrication system (oil bath, dropping lubrication, oil spot, with oil cooling).

The values of speeds for bearings series 72B and 73B, normal tolerance class, without preload are given in this catalogue.

In case of preloaded bearings, for single mounted bearing and bearings in DB, DF or DT arrangements, speed should be multiplied by the coefficients in table 7.

For bearings series 70C, 72C, 70A and 72A, speeds are given for the tolerance class P4 and light preload.

In case of bearings with other values of preloads or arrangements of 3 or 4 bearing sets, the speeds of the bearing of basic design should be multiplied by the values of the coefficients in table 7.

Speed limit reduction factor

Table 7

Arrangement	**Bearing preload**			
	UA,UO	L	M	S
Single	1,0	1,0	0,90	0,80
Tandem, DT	0,90	0,90	0,80	0,65
Back-to-back, DB	0,80	0,80	0,70	0,55
Face-to-face, DF	0,80	0,75	0,60	0,40
Three bearings set	0,75	0,70	0,55	0,35
Four bearings set	0,70	0,65	0,45	0,25

Abutment dimensions

For a proper location of bearing rings on the shaft and housing shoulder respectively, shaft (housing) maximum connection radius $r_{u\ max}$ should be less than bearing minimum mounting chamfer r_{1min}, r_{2min}.

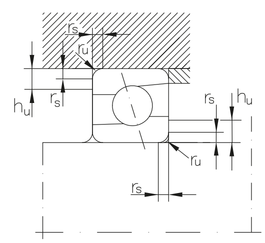
Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

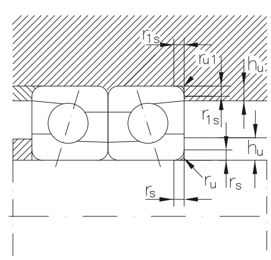
The values of the connection radii and support shoulder height are given in table 8.

Abutment dimensions

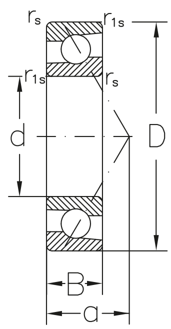
Table 8

r_s, r_{1s} **min**	r_u, r_{u1} **max**	h_u, h_{u1} **min**	
		Bearing series	
		718, 728, 719, 729, 70	72 73
mm			
0,3	0,3	1	1,2
0,6	0,6	1,6	2,1
1	1	2,3	2,6
1,1	1	3	3,5
1,5	1,5	3,5	4,5
2	2	4,4	5,5
2,1	2,1	5,1	6
3	2,5	6,2	7
4	3	7,3	8,5



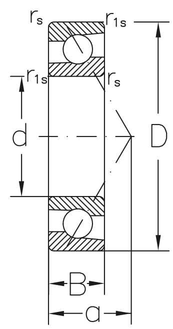


Angular contact ball bearings, single row



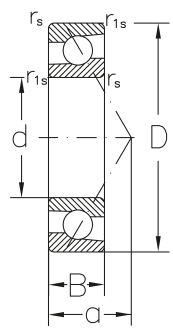
Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
10	30	9	0,6	0,3	13	4,95	2,5	19000	28000	**7200 B**	0,031
12	32	10	0,6	0,3	14	7,4	3,75	17000	24000	**72101 B**	0,045
15	35	11	0,6	0,3	16	7,45	3,9	16000	22000	**7202 B**	0,048
	35	11	0,6	0,3	16	7,45	3,9	16000	22000	**7202 BP6**	0,048
	35	11	0,6	0,3	16	7,45	3,9	16000	22000	**7202 BP5**	0,048
	42	13	1	0,6	19	12,9	6,5	14000	19000	**7302 B**	0,090
17	40	12	0,6	0,6	18	11	6,1	14000	19000	**7203 B**	0,070
	40	12	0,6	0,6	18	11	6,1	14000	19000	**7203 BP6**	0,070
	40	12	0,6	0,6	18	11	6,1	14000	19000	**7203 BP5**	0,070
	47	14	1	0,6	21	14,8	8,1	12000	17000	**7303 B**	0,120
20	47	14	1	0,6	21	14,1	8,4	11000	16000	**7204 B**	0,110
	47	14	1	0,6	21	14,1	8,4	11000	16000	**7204 BP6**	0,110
	47	14	1	0,6	21	14,1	8,4	11000	16000	**7204 BP5**	0,110
	52	15	1,1	0,6	23	17,3	9,7	10000	15000	**7304 B**	0,150
	52	15	1,1	0,6	23	17,3	9,7	10000	15000	**7304 BP6**	0,150
25	52	15	1	0,6	24	15,5	10,1	9500	14000	**7205 B**	0,130
	52	15	1	0,6	24	15,5	10,1	9500	14000	**7205 BP6**	0,130
	52	15	1	0,6	24	15,5	10,1	9500	14000	**7205 BP5**	0,130
	62	17	1,1	0,6	27	24,4	14,6	8500	12000	**7305 B**	0,250
	62	17	1,1	0,6	27	24,4	14,6	8500	12000	**7305 BP6**	0,250
	62	17	1,1	0,6	27	24,4	14,6	8500	12000	**7305 AMA**	0,250
30	62	16	1	0,6	27	20,5	13,6	8500	12000	**7206 B**	0,210
	62	16	1	0,6	27	20,5	13,6	8500	12000	**7206 BP6**	0,210
	62	16	1	0,6	27	20,5	13,6	8500	12000	**7206 BP5**	0,210
	62	16	1	0,6	27	20,5	13,6	8500	12000	**7206 ATAP2**	0,210
	72	19	1,1	0,6	31	29,3	19	7500	10000	**7306 B**	0,370
	72	19	1,1	0,6	31	29,3	19	7500	10000	**7306 BP6**	0,370
	72	19	1,1	0,6	31	29,3	19	7500	10000	**7306 BP5**	0,370
	72	19	1,1	0,6	31	29,3	19	7500	10000	**7306 AMA**	0,370
35	72	17	1,1	0,6	31	28,5	19,8	7500	10000	**7207 B**	0,300
	72	17	1,1	0,6	31	28,5	19,8	7500	10000	**7207 BP5**	0,300
	80	21	1,5	1	35	36,7	24,3	7000	9500	**7307 B**	0,510
	80	21	1,5	1	35	36,7	24,3	7000	9500	**7307 BP5**	0,510
40	80	18	1,1	0,6	34	32,1	23	6700	9000	**7208 B**	0,390
	80	18	1,1	0,6	34	32,1	23	6700	9000	**7208 BP6**	0,390
	80	18	1,1	0,6	34	32,1	23	6700	9000	**7208 BP5**	0,390
	90	23	1,5	1	39	44,8	30,3	6300	8500	**7308 B**	0,670
	90	23	1,5	1	39	44,8	30,3	6300	8500	**7308 BP6**	0,670
	90	23	1,5	1	39	44,8	30,3	6300	8500	**7308 BP5**	0,670
45	85	19	1,1	0,6	37	36,1	26,2	6300	8500	**7209 B**	0,440

Angular contact ball bearings, single row



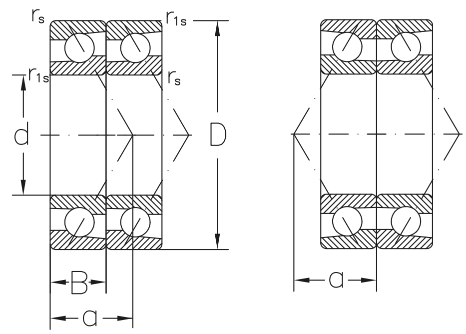
Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
45	85	19	1,1	0,6	37	36,1	26,2	6300	8500	**7209 BP5**	0,440
	100	25	1,5	1	43	58,3	40,1	5600	7500	**7309 B**	0,900
	100	25	1,5	1	43	58,3	40,1	5600	7500	**7309 BP6**	0,900
	100	25	1,5	1	43	58,3	40,1	5600	7500	**7309 BP5**	0,900
50	90	20	1,1	0,6	39	37,4	28,6	5600	7500	**7210 B**	0,490
	90	20	1,1	0,6	39	37,4	28,6	5600	7500	**7210 BP6**	0,490
	90	20	1,1	0,6	39	37,4	28,6	5600	7500	**7210 BP5**	0,490
	110	27	2	1	47	68,2	47,9	5000	6700	**7310 B**	1,15
	110	27	2	1	47	68,2	47,9	5000	6700	**7310 BP6**	1,15
	110	27	2	1	47	68,2	47,9	5000	6700	**7310 BP5**	1,15
55	100	21	1,5	1	43	46,2	36,2	5300	7000	**7211 B**	0,650
	120	29	2	1	52	78,8	56,4	4500	6000	**7311 B**	1,45
60	110	22	1,5	1	47	56,3	44,7	4800	6300	**7212 B**	0,840
	110	22	1,5	1	47	56,3	44,7	4800	6300	**7212 BP5**	0,840
	130	31	2,1	1,1	56	90	65,5	4300	5600	**7312 B**	1,85
	130	31	2,1	1,1	56	90	65,5	4300	5600	**7312 BP5**	1,85
65	120	23	1,5	1	50	63,6	52,5	4300	5600	**7213 B**	1,05
	120	23	1,5	1	50	63,6	52,5	4300	5600	**7213 BP6**	1,05
	120	23	1,5	1	50	63,6	52,5	4300	5600	**7213 BP5**	1,05
	140	33	2,1	1,1	60	101	75,3	4000	5300	**7313 B**	2,25
70	125	24	1,5	1	53	69,1	57,8	4300	5600	**7214 B**	1,15
	125	24	1,5	1	53	69,1	57,8	4300	5600	**7214 B**	1,15
	150	35	2,1	1,1	64	114	86	3800	5000	**7314 B**	2,75
	150	35	2,1	1,1	64	114	86	3800	5000	**7314 BP6**	2,75
	150	35	2,1	1,1	64	114	86	3800	5000	**7314 BP5**	2,75
	150	35	2,1	1,1	64	114	86	3800	5000	**7314 BTN**	2,75
75	130	25	1,5	1	56	74,8	63,2	4000	5300	**7215 B**	1,30
	130	25	1,5	1	56	74,8	63,2	4000	5300	**7215 BP6**	1,30
	130	25	1,5	1	56	74,8	63,2	4000	5300	**7215 BP5**	1,30
	160	37	2,1	1,1	68	125	97,5	3400	4500	**7315 B**	3,30
	160	37	2,1	1,1	68	125	97,3	3400	4500	**7315 BMAP6**	3,30
	160	37	2,1	1,1	68	125	97,5	3400	4500	**7315 AMA**	3,30
80	140	26	2	1	59	80,5	69,3	3800	5000	**7216 B**	1,55
	170	39	2,1	1,1	72	135	109	3200	4300	**7316 B**	3,90
	170	39	2,1	1,1	72	135	109	3200	4300	**7316 BP6**	3,903
	170	39	2,1	1,1	72	135	109	3200	4300	**7316 BMAP6**	3,903
85	150	28	2	1	64	93,1	81,1	3400	4500	**7217 B**	1,953
	180	41	3	1,1	76	145	122	3000	4000	**7317 B**	4,603
	180	41	3	1,1	76	145	122	3000	4000	**7317 BP6**	4,603
	180	41	3	1,1	76	145	122	3000	4000	**7317 BMP6**	4,603

Angular contact ball bearings, single row



Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
90	160	30	2	1	67	107	93,8	3200	4300	**7218 B**	2,403
	160	30	2	1	67	107	93,8	3200	4300	**7218 BMB**	2,403
	190	43	3	1,1	80	156	135	2800	3800	**7318 B**	5,403
95	170	32	2,1	1,1	71	116	101	3000	4000	**7219 B**	2,903
	200	45	3	1,1	84	168	150	2600	3600	**7319 B**	6,253
100	180	34	2,1	1,1	76	129	116	2800	3800	**7220 B**	3,453
	180	34	2,1	1,1	76	129	116	2800	3800	**7220 BP6**	3,453
	180	34	2,1	1,1	76	129	116	2800	3800	**7220 BMA**	3,453
	180	34	2,1	1,1	76	129	116	2800	3800	**7220 BMAP6**	3,453
	180	34	2,1	1,1	76	129	116	2800	3800	**7220 BMAP4**	3,453
	180	34	2,1	1,1	76	129	116	2800	3800	**7220 BMB**	3,453
	215	47	3	1,1	90	190	178	2400	3400	**7320 B**	7,753
	215	47	3	1,1	90	190	178	2400	3400	**7320 BP6**	7,753
	215	47	3	1,1	90	190	178	2400	3400	**7320 BM**	7,753
110	200	38	2,1	1,1	84	153	145	2400	3400	**7222 B**	4,803
	200	38	2,1	1,1	84	153	145	2400	3400	**7222 BMB**	4,803
	240	50	3	1,1	99	248	229	2000	3000	**7322 B**	10,53
	240	50	3	1,1	99	248	229	2000	3000	**7322 BP5**	10,53
	240	50	3	1,1	99	248	229	2000	3000	**7322 BM**	10,53
140	250	42	3	1,1	10,3	191	210	1700	2400	**7228 B**	8,803
	300	62	4	1,5	123	290	334	1700	2400	**7328 B**	21,63
	300	62	4	1,5	123	290	334	1700	2400	**7328 BMBP5**	21,63
150	190	24	1,1	0,6	35	60,5	79,2	2200	3000	**72830 CMA**	3,363
	270	45	3	1,1	111	195	222	2000	2800	**7230 BM**	11,63
	320	65	4	1,5	131	317	380	1600	2000	**7330 BM**	26,53
	320	65	4	1,5	131	317	380	1600	2000	**7330 BMP5**	26,53
160	220	28	2	1	58	110	134	2200	3000	**71932 AMAP5**	3,263
180	250	33	2	2	33	131	162	2000	2800	**71936 AM**	5,36
200	250	30	1,5	0,6	45	102	141	3000	5600	**72840 CMAP4**	3,43

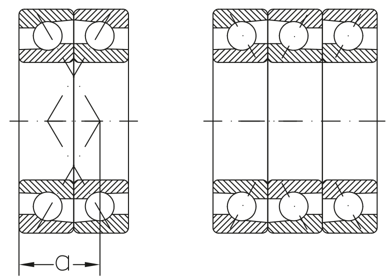
Angular contact ball bearings, single row, for paired and stack mounted



DT DB

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
15	35	11	0,6	0,3	16	12	7,8	14000	20000	**7202 BDT**	0,096
	35	11	0,6	0,3	16	12	7,8	13000	18000	**7202 BDB**	0,096
	35	11	0,6	0,3	16	12	7,8	14000	20000	**7202 BP6DT**	0,096
	35	11	0,6	0,3	16	12	7,8	13000	18000	**7202 BP5DB**	0,096
17	40	12	0,6	0,6	18	17,8	12,2	13000	17000	**7203 BDT**	0,140
	40	12	0,6	0,6	18	17,8	12,2	11000	15000	**7203 BDB**	0,140
	40	12	0,6	0,6	18	17,8	12,2	11000	15000	**7203 BDF**	0,140
	40	12	0,6	0,6	18	17,8	12,2	11000	15000	**7203 BP6DB**	0,140
	40	12	0,6	0,6	18	17,8	12,2	11000	15000	**7203 BP5DB**	0,140
	47	14	1	0,6	21	24	16,2	11000	15000	**7303 BDT**	0,240
20	47	14	1	0,6	21	22,8	16,8	10000	14000	**7204 BDT**	0,220
	47	14	1	0,6	21	22,8	16,8	10000	14000	**7204 BDB**	0,220
	47	14	1	0,6	21	22,8	16,8	9000	13000	**7204 BDF**	0,220
	47	14	1	0,6	21	22,8	16,8	9000	13000	**7204 BP6DB**	0,220
	47	14	1	0,6	21	22,8	16,8	9000	13000	**7204 BP5DB**	0,220
	52	15	1,1	0,6	23	28	19,4	9000	14000	**7304 BDT**	0,303
	52	15	1,1	0,6	23	28	19,4	8000	12000	**7304 BDB**	0,303
	52	15	1,1	0,6	23	28	19,4	8000	12000	**7304 BDF**	0,303
25	52	15	1	0,6	24	25,1	20,2	9000	13000	**7205 BDT**	0,260
	52	15	1	0,6	24	25,1	20,2	7500	11000	**7205 BDB**	0,260
	52	15	1	0,6	24	25,1	20,2	7500	11000	**7205 BDF**	0,260
	52	15	1	0,6	24	25,1	20,2	7500	11000	**7205 BP6DB**	0,260
	52	15	1	0,6	24	25,1	20,2	9000	13000	**7205 BP5DT**	0,260
	52	15	1	0,6	24	25,1	20,2	7500	11000	**7205 BP5DB**	0,260
	52	15	1	0,6	24	33,5	30,3	7000	10000	**7205 BP5TFT**	0,390
	62	17	1,1	0,6	27	39,5	29,2	7500	11000	**7305 BDT**	0,500
	62	17	1,1	0,6	27	39,5	29,2	6700	9500	**7305 BDB**	0,500
	62	17	1,1	0,6	27	39,5	29,2	6700	9500	**7305 BDF**	0,500
	62	17	1,1	0,6	27	39,5	29,2	6700	9500	**7305 AMADF**	0,500
30	62	16	1	0,6	27	33,2	27,2	7500	11000	**7206 BDT**	0,420
	62	16	1	0,6	27	33,2	27,2	6700	9500	**7206 BDB**	0,420
	62	16	1	0,6	27	33,2	27,2	6700	9500	**7206 BDF**	0,420
	62	16	1	0,6	27	33,2	27,2	6700	9500	**7206 BP6DB**	0,420
	62	16	1	0,6	27	33,2	27,2	6700	9500	**7206 BP5DB**	0,420
	62	16	1	0,6	27	33,2	27,2	6700	9500	**7206 BP5DF**	0,420
	62	16	1	0,6	27	44,3	40,8	6000	8500	**7206 BP5TFT**	0,630
	62	16	1	0,6	27	33,2	27,2	7500	11000	**7206 ATAP2DT**	0,420
	72	19	1,1	0,6	31	47,5	38	6700	9000	**7306 BDT**	0,740
	72	19	1,1	0,6	31	47,5	38	6000	8000	**7306 BDB**	0,740
	72	19	1,1	0,6	31	47,5	38	6000	8000	**7306 BDF**	0,740
	72	19	1,1	0,6	31	63,3	57	5300	7000	**7306 BTFT**	1,113
	72	19	1,1	0,6	31	77,4	76	5300	7000	**7306 BQFC**	1,483

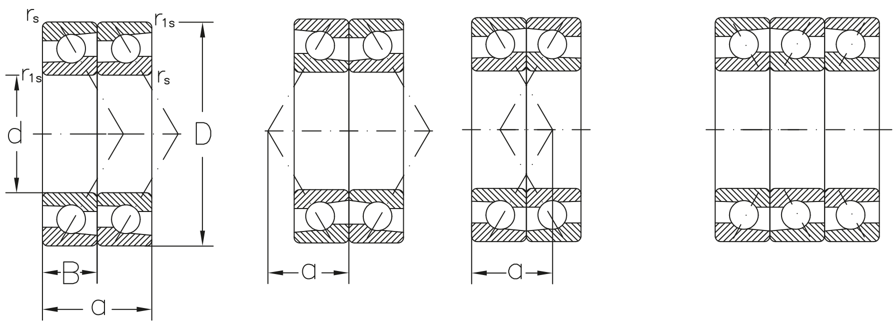
Angular contact ball bearings, single row, for paired and stack mounted



DF TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
30	72	19	1,1	0,6	31	47,5	38	6700	9000	**7306 BP5DT**	0,740
	72	19	1,1	0,6	31	47,5	38	6700	9000	**7306 AMADT**	0,740
	72	19	1,1	0,6	31	47,5	38	6700	8000	**7306 AMADF**	0,740
35	72	17	1,1	0,6	31	46,2	39,6	6700	9000	**7207 BDT**	0,600
	72	17	1,1	0,6	31	46,2	39,6	6000	8000	**7207 BDB**	0,600
	72	17	1,1	0,6	31	46,2	39,6	6000	8000	**7207 BDF**	0,600
	72	17	1,1	0,6	31	46,2	39,6	6700	9000	**7207 BP5DT**	0,600
	72	17	1,1	0,6	31	46,2	39,6	6000	8000	**7207 BP5DB**	0,600
	72	17	1,1	0,6	31	61,6	59,4	5300	7000	**7207 BP5TBT**	0,900
	72	17	1,1	0,6	31	75,2	79,2	5300	7000	**7207 BP5QFC**	1,203
	80	21	1,5	1	35	59,5	48,6	6300	8500	**7307 BDT**	1,023
	80	21	1,5	1	35	59,5	48,6	5600	7500	**7307 BDB**	1,023
	80	21	1,5	1	35	59,5	48,6	5600	7500	**7307 BDF**	1,023
	80	21	1,5	1	35	59,5	48,6	5600	7500	**7307 BP6DB**	1,023
40	80	18	1,1	0,6	34	52	46	6000	8000	**7208 BDT**	0,780
	80	18	1,1	0,6	34	52	46	6030	8100	**7208 BDB**	0,780
	80	18	1,1	0,6	34	52	46	5300	7000	**7208 BDF**	0,780
	80	18	1,1	0,6	34	52	46	6000	8000	**7208 BP5DT**	0,780
	80	18	1,1	0,6	34	52	46	5300	7000	**7208 BP5DB**	0,780
	90	23	1,5	1	39	72,6	60,6	5600	7500	**7308 BDT**	1,343
	90	23	1,5	1	39	72,6	60,6	5000	6700	**7308 BDB**	1,343
	90	23	1,5	1	39	72,6	60,6	5000	6700	**7308 BDF**	1,343
	90	23	1,5	1	39	96,8	91,8	4500	6000	**7308 BTFT**	0,670
	90	23	1,5	1	39	118	121	4500	6000	**7308 BQFC**	2,683
	90	23	1,5	1	39	72,6	60,6	5000	6700	**7308 BP6DF**	1,343
	90	23	1,5	1	39	72,6	60,6	5000	6700	**7308 BP5DB**	1,343
	90	23	1,5	1	39	96,8	91,8	4500	6000	**7308 BP5TFT**	2,013
	90	23	1,5	1	39	118	121	4500	6000	**7308 BP5QFC**	2,683
45	85	19	1,1	0,6	37	58,5	52,4	5600	7500	**7209 BDT**	0,880
	85	19	1,1	0,6	37	58,5	52,4	5000	6700	**7209 BDB**	0,880
	85	19	1,1	0,6	37	58,5	52,4	5000	6700	**7209 BDF**	0,880
	85	19	1,1	0,6	37	58,5	52,4	5000	6700	**7209 BP5DB**	0,880
	100	25	1,5	1	43	94,4	80,2	5000	6700	**7309 BDT**	1,803
	100	25	1,5	1	43	94,4	80,2	4500	6000	**7309 BDB**	1,803
	100	25	1,5	1	43	94,4	80,2	4480	6000	**7309 BDF**	1,803
	100	25	1,5	1	43	94,4	80,2	4500	6000	**7309 BP6DB**	1,803
	100	25	1,5	1	43	94,4	80,2	4500	6000	**7309 BP6DF**	1,803
50	90	20	1,1	0,6	39	60,6	57,2	5000	6700	**7210 BDT**	0,980
	90	20	1,1	0,6	39	60,6	57,2	4500	6000	**7210 BDF**	0,980
	90	20	1,1	0,6	39	60,6	57,2	5000	6700	**7210 BP5DT**	0,980
	90	20	1,1	0,6	39	60,6	57,2	4500	6000	**7210 BP5DB**	0,980
	110	27	2	1	47	111	95,8	4500	6000	**7310 BDT**	2,303

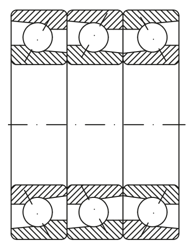
Angular contact ball bearings, single row, for paired and stack mounted



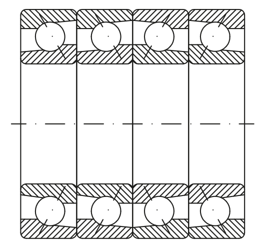
DT DB DF TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
50	110	27	2	1	47	111	95,8	4000	5300	**7310 BDB**	2,303
	110	27	2	1	47	111	95,8	4000	5300	**7310 BDF**	2,303
	110	27	2	1	47	205	144	3600	4800	**7310 BP5TFT**	3,453
	110	27	2	1	47	273	192	3600	4800	**7310 BP5QFC**	4,603
55	100	21	1,5	1	43	74,8	72,4	4800	6300	**7211 BDT**	1,303
	100	21	1,5	1	43	74,8	72,4	4300	5600	**7211 BDB**	1,303
	100	21	1,5	1	43	74,8	72,4	4300	5600	**7211 BDF**	1,303
	120	29	2	1	51	128	113	4000	5300	**7311 BDT**	2,903
	120	29	2	1	51	128	113	3600	4800	**7311 BDB**	2,903
	120	29	2	1	52	128	113	3600	4800	**7311 BDF**	2,903
60	110	22	1,5	1	47	91,2	89,4	4300	5600	**7212 BDT**	1,683
	110	22	1,5	1	47	91,2	89,4	3800	5000	**7212 BDB**	1,683
	110	22	1,5	1	47	91,2	89,4	3800	5000	**7212 BDF**	1,683
	110	22	1,5	1	47	91,2	89,4	3800	5000	**7212 BP5DB**	1,683
	130	31	2,1	1,1	55	146	131	3800	5000	**7312 BDT**	3,703
	130	31	2,1	1,1	55	146	131	3400	4500	**7312 BDB**	3,703
	130	31	2,1	1,1	55	146	131	3400	4500	**7312 BDF**	3,703
	130	31	2,1	1,1	55	146	131	3400	4500	**7312 BP5DB**	3,703
65	120	23	1,5	1	50	103	105	3800	5000	**7213 BDT**	2,103
	120	23	1,5	1,1	50	103	105	3800	5000	**7213 BDB**	2,103
	120	23	1,5	1,1	50	103	105	3800	5000	**7213 BDF**	2,103
	120	23	1,5	1	50	103	105	3400	4500	**7213 BP6DB**	2,103
	120	23	1,5	1	50	103	105	3400	4500	**7213 BP6DF**	2,103
	140	33	2,1	1,1	60	164	151	3600	4800	**7313 BDT**	4,503
	140	33	2,1	1,1	60	164	151	3200	4300	**7313 BDB**	4,503
	140	33	2,1	1,1	60	164	151	3200	4300	**7313 BDF**	4,503
70	125	24	1,5	1	53	112	116	3800	5000	**7214 BDT**	2,303
	125	24	1,5	1	53	112	116	3400	4500	**7214 BDB**	2,303
	125	24	1,5	1	53	112	116	3400	4500	**7214 BDF**	2,303
	150	35	2,1	1,1	64	185	172	3400	4500	**7314 BDT**	5,503
	150	35	2,1	1,1	64	185	172	3000	4000	**7314 BDB**	5,503
	150	35	2,1	1,1	64	185	172	3000	4000	**7314 BDF**	5,503
	150	35	2,1	1,1	64	185	172	3400	4500	**7314 BP6DT**	5,503
	150	35	2,1	1,1	64	185	172	3400	4500	**7314 BP5DT**	5,503
	150	35	2,1	1,1	64	185	172	3000	4000	**7314 BP5DB**	5,503
75	130	25	1,5	1	56	121	126	3600	4300	**7215 BDT**	2,603
	130	25	1,5	1	56	121	126	3200	4300	**7215 BDB**	2,603
	130	25	1,5	1	56	121	126	3200	4300	**7215 BDF**	2,603
	130	25	1,5	1	56	121	126	3200	4300	**7215 BP6DB**	2,603
	130	25	1,5	1	56	121	126	3200	4300	**7215 BMAP6DB**	2,603
	160	37	2,1	1,1	68	203	195	3200	4000	**7315 BDT**	6,603
	160	37	2,1	1,1	68	203	195	2800	3600	**7315 BDB**	6,603

Angular contact ball bearings, single row, for paired and stack mounted



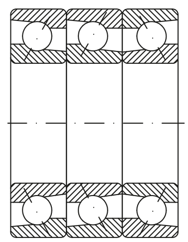
TBT



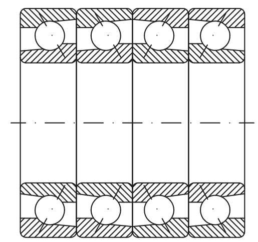
QFC

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
75	160	37	2,1	1,1	68	203	195	2800	3600	**7315 BDF**	6,603
	160	37	2,1	1,1	68	203	195	2800	3600	**7315 AMADF**	6,603
80	110	16	1	1	21	55,1	69,2	4000	5300	**71916 CTAP4DT**	0,736
	140	26	2	1	59	130	139	3200	4300	**7216 BDT**	3,103
	140	26	2	1	59	130	139	2800	3800	**7216 BDB**	3,103
	140	26	2	1	59	130	139	2800	3800	**7216 BDF**	3,103
	170	39	2,1	1,1	72	219	218	2800	3800	**7316 BDT**	7,803
	170	39	2,1	1,1	72	219	218	2600	3400	**7316 BDB**	7,803
	170	39	2,1	1,1	72	219	218	2600	3400	**7316 BDF**	7,803
	170	39	2,1	1,1	72	292	327	2200	3000	**7316 BTBT**	11,73
	170	39	2,1	1,1	72	219	218	2800	3800	**7316 BP6DT**	7,803
	170	39	2,1	1,1	72	292	327	2200	3000	**7316 BMAP6TBT**	11,73
85	150	28	2	1	64	151	162	3000	4000	**7217 BDT**	3,903
	150	28	2	1	64	151	162	2800	3600	**7217 BDB**	3,903
	150	28	2	1	64	151	162	2800	3600	**7217 BDF**	3,903
	180	41	3	1,1	76	235	244	2800	3600	**7317 BDT**	9,203
	180	41	3	1,1	76	235	244	2400	3200	**7317 BDB**	9,203
	180	41	3	1,1	76	235	244	2400	3200	**7317 BDF**	9,203
90	160	30	2	1	67	173	188	2800	3800	**7218 BDT**	4,803
	160	30	2	1	67	173	188	2600	3400	**7218 BDB**	4,803
	160	30	2	1	67	173	188	2600	3400	**7218 BDF**	4,803
	190	43	3	1,1	80	253	270	2600	3400	**7318 BDT**	10,83
	190	43	3	1,1	80	253	270	2200	3000	**7318 BDB**	10,83
	190	43	3	1,1	80	253	270	2200	3000	**7318 BDF**	10,83
	190	43	3	1,1	80	337	405	2000	2600	**7318 BTBT**	16,23
95	170	32	2,1	1,1	72	188	202	2800	3600	**7219 BDT**	5,803
	170	32	2,1	1,1	72	188	202	2400	3200	**7219 BDB**	5,803
	170	32	2,1	1,1	72	188	202	2400	3200	**7219 BDF**	5,803
	200	45	3	1,1	84	272	300	2400	3200	**7319 BDT**	12,53
	200	45	3	1,1	84	272	300	2000	2800	**7319 BDB**	12,53
	200	45	3	1,1	84	272	300	2000	2800	**7319 BDF**	12,53
100	180	34	2,1	1,1	76	208	232	2600	3400	**7220 BDT**	6,903
	180	34	2,1	1,1	76	208	232	2200	3000	**7220 BDB**	6,903
	180	34	2,1	1,1	76	208	232	2200	3000	**7220 BDF**	6,903
	180	34	2,1	1,1	76	208	232	2200	3000	**7220 BMADB**	6,903
	180	34	2,1	1,1	76	208	232	2200	3000	**7220 BMAP6DB**	6,903
	180	34	2,1	1,1	76	208	232	2600	2800	**7220 BMAP4DT**	6,903
	215	47	3	1,1	90	308	356	2200	3000	**7320 BDT**	15,53
	215	47	3	1,1	90	308	356	1900	2800	**7320 BDB**	15,53
	215	47	3	1,1	90	308	356	1900	2800	**7320 BDF**	15,53
	215	47	3	1,1	90	308	356	2200	3000	**7320 BP6DT**	15,53

Angular contact ball bearings, single row, for paired and stack mounted



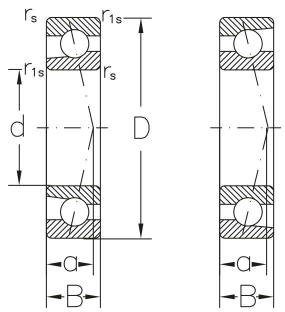
TBT



QFC

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
100	215	47	3	1,1	90	308	356	2200	3000	**7320 BMDT**	15,53
110	200	38	2,1	1,1	84	248	290	2200	3000	**7222 BDT**	9,603
	200	38	2,1	1,1	84	248	290	1900	2800	**7222 BDB**	9,603
	240	50	3	1,1	99	365	458	1800	2800	**7322 BDT**	21,03
	240	50	3	1,1	99	365	458	1600	2400	**7322 BDB**	21,03
	240	50	3	1,1	99	536	687	1400	2200	**7322 BTBT**	31,53
	240	50	3	1,1	99	365	458	1800	2800	**7322 BP5DT**	21,03
	240	50	3	1,1	99	365	458	1600	2400	**7322 BMDF**	21,03
140	250	42	3	1,1	103	172	189	1400	1900	**7228 BDT**	17,63
	300	62	4	1,5	123	470	668	1400	2200	**7328 BDT**	43,23
	300	62	4	1,5	123	470	668	1200	1900	**7328 BDB**	43,23
	300	62	4	1,5	123	470	668	1400	2200	**7328 BMBP5DT**	43,23
150	270	45	3	1,1	111	156	444	2400	3800	**7230 BDB**	23,23
	270	45	3	1,1	111	156	444	2400	3800	**7230 BMDB**	23,23
	320	65	4	1,5	131	254	760	1400	1800	**7330 BMDF**	53,03
	320	65	4	1,5	131	254	760	1400	1800	**7330 BMP5DT**	53,03
160	220	28	2	1	58	176	268	1600	2400	**71932 AMAP5DB**	6,523
180	250	33	2	2	33	210	324	1500	2200	**71936 AMDB**	10,83
200	250	30	1,5	0,6	45	165	282	1400	2000	**72840 CMAP4DB**	6,863
	250	30	1,5	0,6	45	220	423	1300	1800	**72840 CMAP4TBT**	10,23

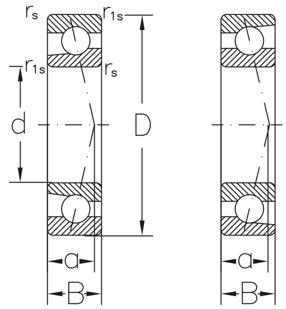
High precision angular contact ball bearings single row



TA TB

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
10	26	8	0,3	0,1	6	5,3	2,45	56000	90000	**7000 CTAP4**	0,020
	26	8	0,3	0,1	6	5,3	2,45	56000	90000	**7000 CTAP2**	0,020
	30	9	0,6	0,3	7	5,8	2,95	50000	80000	**7200 CTAP4**	0,029
	30	9	0,6	0,3	7	9,4	2,95	50000	80000	**7200 CTAP2**	0,029
12	28	8	0,3	0,1	7	5,4	2,6	50000	80000	**7001 CTAP4**	0,023
	28	8	0,3	0,1	7	5,4	2,6	50000	80000	**7001 CTAP2**	0,023
	32	10	0,6	0,3	10	7,5	3,4	45000	70000	**7201 CTAP4**	0,030
	32	10	0,6	0,3	10	7,5	3,4	45000	70000	**7201 CTAP2**	0,030
15	32	9	0,3	0,1	8	6,3	3,4	43000	67000	**7002 CTAP4**	0,030
	32	9	0,3	0,1	8	6,3	3,4	43000	67000	**7002 CTAP2**	0,030
	35	11	0,6	0,3	9	8,9	4,5	40000	63000	**7202 CTAP4**	0,042
	35	11	0,6	0,3	9	8,9	4,5	40000	63000	**7202 CTAP2**	0,042
	35	11	0,6	0,3	12	8,7	4,4	36000	56000	**7202 ATAP4**	0,042
	35	11	0,6	0,3	12	8,7	4,4	36000	56000	**7202 ATAP2**	0,042
17	35	10	0,3	0,1	9	7,2	4,2	38000	60000	**7003 CTAP4**	0,039
	35	10	0,3	0,1	9	7,2	4,2	38000	60000	**7003 CTAP2**	0,039
	40	12	0,6	0,3	10	10,9	5,8	36000	56000	**7003 CTAP4**	0,060
	40	12	0,6	0,3	10	10,9	5,8	36000	56000	**7203 CTAP2**	0,060
	40	12	0,6	0,3	13	9	5,1	30000	48000	**7203 ATAP4**	0,060
	40	12	0,6	0,3	13	9	5,1	30000	48000	**7203 ATAP2**	0,060
20	42	12	0,6	0,3	10	10,5	6,1	32000	50000	**7004 CTAP4**	0,070
	42	12	0,6	0,3	10	10,5	6,1	32000	50000	**7004 CTAP2**	0,070
	42	12	0,6	0,3	10	10,5	6,1	32000	50000	**7004 CTBP4**	0,070
	42	12	0,6	0,3	10	10,5	6,1	32000	50000	**7004 CTBP2**	0,070
	42	12	0,6	0,3	13	10	5,8	28000	45000	**7004 ATAP4**	0,070
	42	12	0,6	0,3	13	10	5,8	28000	45000	**7004 ATAP2**	0,070
	47	14	1	0,6	12	15,6	9	30000	48000	**7204 CTAP4**	0,100
	47	14	1	0,6	12	15,6	9	30000	48000	**7204 CTAP2**	0,100
	47	14	1	0,6	12	15,6	9	30000	48000	**7204 CTBP4**	0,100
	47	14	1	0,6	12	15,6	9	30000	48000	**7204 CTBP2**	0,100
	47	14	1	0,6	15	14,9	8,6	26000	43000	**7204 ATAP4**	0,100
	47	14	1	0,6	15	14,9	8,6	26000	43000	**7204 ATAP2**	0,100
25	47	12	0,6	0,3	11	11,7	7,4	28000	45000	**7005 CTAP4**	0,080
	47	12	0,6	0,3	11	11,7	7,4	28000	45000	**7005 CTAP2**	0,080
	47	12	0,6	0,3	11	11,7	7,4	28000	45000	**7005 CTBP4**	0,080
	47	12	0,6	0,3	11	11,7	7,4	28000	45000	**7005 CTBP2**	0,080
	47	12	0,6	0,3	15	10,4	6,95	24000	40000	**7005 ATAP4**	0,080
	47	12	0,6	0,3	15	10,4	6,95	24000	40000	**7005 ATAP2**	0,080
	52	15	1	0,6	13	16,6	10,3	26000	43000	**7205 CTAP4**	0,120
	52	15	1	0,6	13	16,6	10,3	26000	43000	**7205 CTAP2**	0,120
	52	15	1	0,6	13	16,6	10,3	26000	43000	**7205 CTBP4**	0,120
	52	15	1	0,6	13	16,6	10,3	26000	43000	**7205 CTBP2**	0,120

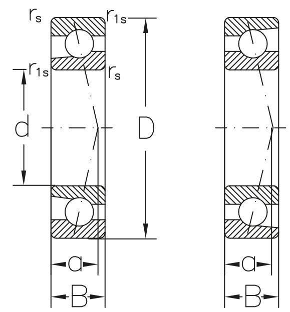
High precision angular contact ball bearings single row



TA TB

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
25	52	15	1	0,6	17	13,7	8,8	22000	38000	**7205 ATAP4**	0,120
	52	15	1	0,6	17	13,7	8,8	22000	38000	**7205 ATAP2**	0,120
30	55	13	1	0,3	12	15,1	10,3	24000	40000	**7006 CTAP4**	0,120
	55	13	1	0,3	12	15,1	10,3	24000	40000	**7006 CTAP2**	0,120
	55	13	1	0,3	12	15,1	10,3	24000	40000	**7006 CTBP4**	0,120
	55	13	1	0,3	12	15,1	10,3	24000	40000	**7006 CTAB2**	0,120
	55	13	1	0,3	17	13,4	9,5	20000	36000	**7006 ATAP4**	0,120
	55	13	1	0,3	17	13,4	9,5	20000	36000	**7006 ATAP2**	0,120
	62	16	1	0,6	14	23	14,8	22000	38000	**7206 CTAP4**	0,190
	62	16	1	0,6	14	23	14,8	22000	38000	**7206 CTAP2**	0,190
	62	16	1	0,6	14	23	14,8	22000	38000	**7206 CTBP4**	0,190
	62	16	1	0,6	14	23	14,8	22000	38000	**7206 CTBP2**	0,190
	62	16	1	0,6	19	22	14,1	19000	34000	**7206 ATAP4**	0,190
	62	16	1	0,6	19	22	14,1	19000	34000	**7206 ATAP2**	0,190
35	62	14	1	0,3	14	19,2	13,7	20000	36000	**7007 CTAP4**	0,160
	62	14	1	0,3	14	19,2	13,7	20000	36000	**7007 CTAP2**	0,160
	62	14	1	0,3	14	19,2	13,7	20000	36000	**7007 CTBP4**	0,160
	62	14	1	0,3	14	19,2	13,7	20000	36000	**7007 CTBP2**	0,160
	62	14	1	0,3	19	18,2	13,1	18000	32000	**7007 ATAP4**	0,160
	62	14	1	0,3	19	18,2	13,1	18000	32000	**7007 ATAP2**	0,160
	62	14	1	0,3	19	18,2	13,1	18000	32000	**7007 ATBP4**	0,160
	72	17	1,1	0,6	16	30,4	20,2	19000	34000	**7207 CTAP4**	0,270
	72	17	1,1	0,6	16	30,4	20,2	19000	34000	**7207 CTAP2**	0,270
	72	17	1,1	0,6	16	30,4	20,2	19000	34000	**7207 CTBP4**	0,270
	72	17	1,1	0,6	16	30,4	20,2	19000	34000	**7207 CTAP2**	0,270
	72	17	1,1	0,6	21	24,5	17	16000	28000	**7207 ATAP4**	0,270
	72	17	1,1	0,6	21	24,5	17	16000	28000	**7207 ATAP2**	6,270
40	68	15	1	0,3	15	20,6	15,9	19000	34000	**7008 CTAP4**	0,190
	68	15	1	0,3	15	20,6	15,9	19000	34000	**7008 CTAP2**	0,190
	68	15	1	0,3	20	19,5	15	16000	28000	**7008 ATAP4**	0,190
	68	15	1	0,3	20	19,5	15	16000	28000	**7008 ATAP2**	0,190
	68	15	1	0,3	20	19,5	15	16000	28000	**7008 ATBP4**	0,190
	80	18	1,1	0,6	17	36,3	25,2	17000	30000	**7208 CTAP4**	0,350
	80	18	1,1	0,6	17	36,3	25,2	17000	30000	**7208 CTAP2**	0,350
	80	18	1,1	0,6	17	36,3	25,2	17000	30000	**7208 CTBP4**	0,350
	80	18	1,1	0,6	17	36,3	25,2	17000	30000	**7208 CTBP2**	0,350
	80	18	1,1	0,6	23	35,2	24,4	15000	26000	**7208 ATAP4**	0,350
	80	18	1,1	0,6	23	35,2	24,4	15000	26000	**7208 ATAP2**	0,350
	80	18	1,1	0,6	23	35,2	24,4	15000	26000	**7208 ATBP4**	0,350
45	75	16	1	0,3	16	24,4	19,3	16000	28000	**7009 CTAP4**	0,250
	75	16	1	0,3	16	24,4	19,3	15000	28000	**7009 CTAP2**	0,250
	75	16	1	0,3	22	22	17,3	15000	26000	**7009 ATAP4**	0,250

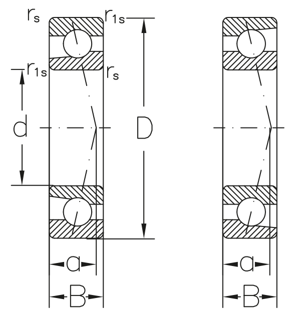
High precision angular contact ball bearings single row



TA TB

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
45	75	16	1	0,3	22	22	17,3	15000	26000	**7009 ATAP2**	0,250
	85	19	1,1	0,6	18	40	29	15000	26000	**7209 CTAP4**	0,400
	85	19	1,1	0,6	18	40	29	15000	26000	**7209 CTAP2**	0,400
	85	19	1,1	0,6	25	36,8	27,5	13000	22000	**7209 ATAP4**	0,400
	85	19	1,1	0,6	25	36,8	27,5	13000	22000	**7209 ATAP2**	0,400
	85	19	1,1	0,6	25	36,8	27,5	13000	22000	**7209 ATBP4**	0,400
	85	19	1,1	0,6	25	36,8	27,5	13000	22000	**7209 ATBP2**	0,400
50	80	16	1	0,3	17	25,1	20,7	15000	26000	**7010 CTAP4**	0,260
	80	16	1	0,3	17	25,1	20,7	15000	26000	**7010 CTAP2**	0,260
	80	16	1	0,3	23	23,2	20	13000	22000	**7010 ATAP4**	0,260
	80	16	1	0,3	23	23,2	20	13000	22000	**7010 ATAP2**	0,260
	90	20	1,1	0,6	20	42,8	31,7	14000	24000	**7210 CTAP4**	0,450
	90	20	1,1	0,6	20	42,8	31,7	14000	24000	**7210 CTAP2**	0,450
	90	20	1,1	0,6	27	42	31	12000	20000	**7210 ATAP4**	0,450
	90	20	1,1	0,6	27	42	31	12000	20000	**7210 ATAP2**	0,450
	90	20	1,1	0,6	27	42	31	12000	20000	**7210 ATBP4**	0,450
	90	20	1,1	0,6	27	42	31	12000	20000	**7210 ATBP2**	0,450
55	90	18	1,1	0,6	19	34,1	28,6	13000	22000	**7011 CTAP4**	0,390
	90	18	1,1	0,6	19	34,1	28,6	13000	22000	**7011 CTAP2**	0,390
	90	18	1,1	0,6	19	34,1	28,6	13000	22000	**7011 CTBP4**	0,390
	90	18	1,1	0,6	26	32,3	27,1	12000	20000	**7011 ATAP4**	0,390
	90	18	1,1	0,6	26	32,3	27,1	12000	20000	**7011 ATAP2**	0,390
	100	21	1,5	1	21	53	40	12000	20000	**7211 CTAP4**	0,600
	100	21	1,5	1	21	53	40	12000	20000	**7211 CTAP2**	0,600
	100	21	1,5	1	29	50,6	38,3	11000	19000	**7211 ATAP4**	0,600
	100	21	1,5	1	29	50,6	38,3	11000	19000	**7211 ATAP2**	0,600
	100	21	1,5	1	29	50,6	38,3	11000	19000	**7211 ATBP4**	0,600
	100	21	1,5	1	29	50,6	38,3	11000	19000	**7211 ATBP2**	0,600
60	95	18	1,1	0,6	20	35	30,5	12000	20000	**7012 CTAP4**	0,420
	95	18	1,1	0,6	20	35	30,5	12000	20000	**7012 CTAP2**	0,420
	95	18	1,1	0,6	20	35	30,5	12000	20000	**7012 CTBP2**	0,420
	95	18	1,1	0,6	27	33,2	29,1	11000	19000	**7012 ATAP4**	0,420
	95	18	1,1	0,6	27	33,2	29,1	11000	19000	**7012 ATAP2**	0,420
	110	22	1,5	1	23	64,2	49	11000	19000	**7212 CTAP4**	0,770
	110	22	1,5	1	23	64	49	11000	19000	**7212 CTAP2**	0,770
	110	22	1,5	1	31	61	47,5	9500	17000	**7212 ATAP4**	0,770
	110	22	1,5	1	31	61	47,5	9500	17000	**7212 ATAP2**	0,770
	110	22	1,5	1	31	61	47,5	9500	17000	**7212 ATBP4**	0,770
	110	22	1,5	1	31	61	47,5	9500	17000	**7212 ATBP2**	0,770
65	100	18	1,1	0,6	20	36	32,5	12000	20000	**7013 CTAP4**	0,460
	100	18	1,1	0,6	20	36	32,5	12000	20000	**7013 CTAP2**	0,460
	100	18	1,1	0,6	28	34	31	10000	18000	**7013 AMBP4**	0,460

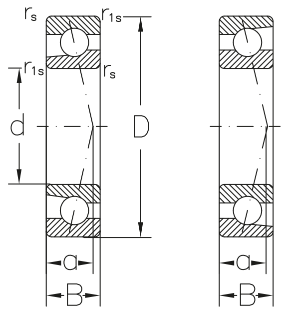
High precision angular contact ball bearings single row



TA TB

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
65	100	18	1,1	0,6	28	34	31	10000	18000	**7013 ATAP4**	0,460
	100	18	1,1	0,6	28	34	31	10000	18000	**7013 ATAP2**	0,460
	100	18	1,1	0,6	28	34	31	10000	18000	**7013 ATBP4**	0,460
	120	23	1,5	1	24	72	57	10000	18000	**7213 CTAP4**	0,970
	120	23	1,5	1	24	72	57	10000	18000	**7213 CTAP2**	0,970
	120	23	1,5	1	33	69,5	54	9000	16000	**7213 ATAP4**	0,970
	120	23	1,5	1	33	69,5	54	9000	16000	**7213 ATAP2**	0,970
	120	23	1,5	1	33	69,5	54	9000	16000	**7213 ATBP4**	0,970
	120	23	1,5	1	33	69,5	54	9000	16000	**7213 ATBP2**	0,970
70	110	20	1,1	0,6	22	45,3	40,8	10000	18000	**7014 CTAP4**	0,640
	110	20	1,1	0,6	22	45,3	40,8	10000	18000	**7014 CTAP2**	0,640
	110	20	1,1	0,6	22	45,3	40,8	10000	18000	**7014 CTBP4**	0,640
	110	20	1,1	0,6	31	43	34	9000	16000	**7014 ATAP4**	0,640
	110	20	1,1	0,6	31	43	34	9000	16000	**7014 ATAP2**	0,640
	125	24	1,5	1	25	76	60,2	95000	17000	**7214 CTAP4**	1,053
	125	24	1,5	1	25	76	60,2	95000	17000	**7214 CTAP2**	1,053
	125	24	1,5	1	35	78	57	8500	15000	**7214 ATAP4**	1,053
	125	24	1,5	1	35	78	57	8500	15000	**7214 ATAP2**	1,053
	125	24	1,5	1	35	78	57	8500	15000	**7214 ATBP4**	1,053
	125	24	1,5	1	35	78	57	8500	15000	**7214 ATBP2**	1,053
75	115	20	1,1	0,6	23	46,5	43,5	10000	18000	**7015 CTAP4**	0,680
	115	20	1,1	0,6	23	46,5	43,5	10000	18000	**7015 CTAP2**	0,680
	115	20	1,1	0,6	32	44	41,2	8500	15000	**7015 ATAP4**	0,680
	115	20	1,1	0,6	32	44	41,2	8500	15000	**7015 ATAP2**	0,680
	115	20	1,1	0,6	32	44	41,2	8500	15000	**7015 ATBP2**	0,680
	130	25	1,5	1	26	80	65,5	9000	16000	**7215 CTAP4**	1,153
	130	25	1,5	1	26	80	65,5	9000	16000	**7215 CTAP2**	1,153
	130	25	1,5	1	37	73	60,5	8000	14000	**7215 ATAP4**	1,153
	130	25	1,5	1	37	73	60,5	8000	14000	**7215 ATAP2**	1,153
	130	25	1,5	1	37	73	60,5	8000	14000	**7215 ATBP4**	1,153
	130	25	1,5	1	37	73	60,5	8000	14000	**7215 ATBP2**	1,153
80	125	22	1,1	0,6	25	58,6	55	9000	16000	**7016 CTAP4**	0,890
	125	22	1,1	0,6	25	58,7	55,2	9000	16000	**7016 CTAP2**	0,890
	125	22	1,1	0,6	35	56	63	8000	14000	**7016 AMAP4**	0,890
	125	22	1,1	0,6	35	56,2	63	8000	14000	**7016 ATAP4**	0,890
	125	22	1,1	0,6	35	56	63	8000	14000	**7016 ATAP2**	0,890
	140	26	2	1	28	92,6	78	7500	13000	**7216 CTAP4**	1,403
	140	26	2	1	28	93,2	78	8000	14000	**7216 CTAP2**	1,403
	140	26	2	1	39	86	73,5	7000	12000	**7216 ATAP4**	1,403
	140	26	2	1	39	86	73,5	7000	12000	**7216 ATAP2**	1,403
	140	26	2	1	39	86	73,5	7000	12000	**7216 ATBP4**	1,403
	140	26	2	1	39	86	73,5	7000	12000	**7216 ATBP2**	1,403

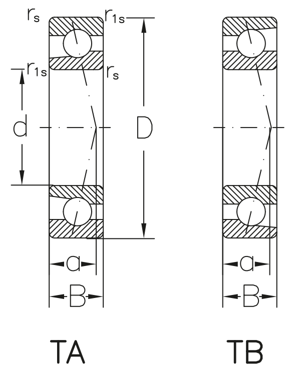
High precision angular contact ball bearings single row



TA TB

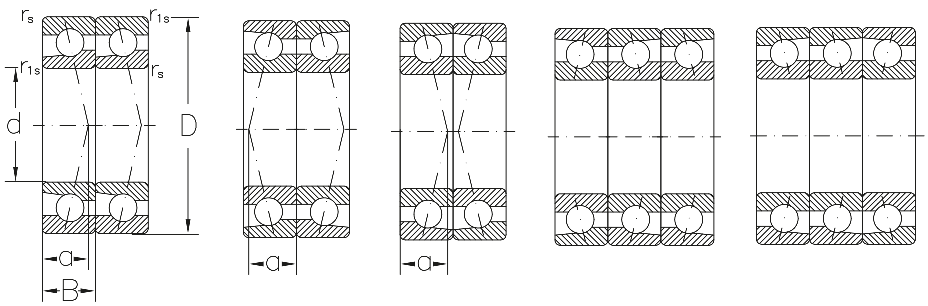
Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
85	130	22	1,1	0,6	26	60,2	58,6	8500	15000	**7017 CTAP4**	0,930
	130	22	1,1	0,6	26	60,2	58,6	8500	15000	**7017 CTAP2**	0,930
	130	22	1,1	0,6	36	57	56	7500	13000	**7017 ATAP4**	0,930
	130	22	1,1	0,6	36	57	56	7500	13000	**7017 ATAP2**	0,930
	150	28	2	1	30	104	90	7500	13000	**7217 CTAP4**	1,753
	150	28	2	1	30	104	90	7500	13000	**7217 CTAP2**	1,753
	150	28	2	1	42	98	76,5	6700	11000	**7217 ATAP4**	1,753
	150	28	2	1	42	98	76,5	6700	11000	**7217 ATAP2**	1,753
	150	28	2	1	42	98	76,5	6700	11000	**7217 ATBP4**	1,753
	150	28	2	1	42	98	76,5	6700	11000	**7217 ATBP2**	1,753
90	140	24	1,5	0,6	28	71,6	69	7000	12000	**7018 CTAP4**	1,203
	140	24	1,5	0,6	28	71,7	69,1	7500	13000	**7018 CTAP2**	1,203
	140	24	1,5	0,6	28	71,7	69,1	7500	13000	**7018 CTBP4**	1,203
	140	24	1,5	0,6	39	68	65,5	6700	11000	**7018 ATAP4**	1,203
	140	24	1,5	0,6	39	68	65,5	6700	11000	**7018 ATAP2**	1,203
	160	30	2	1	32	123	105	7000	12000	**7218 CTAP4**	2,153
	160	30	2	1	32	123	105	7000	12000	**7218 CTAP2**	2,153
	160	30	2	1	44	117	100	6000	9500	**7218 AMAP4**	2,153
	160	30	2	1	44	117	100	6000	9500	**7218 ATAP4**	2,153
	160	30	2	1	44	117	100	6000	9500	**7218 ATAP2**	2,153
	160	30	2	1	44	117	100	6000	9500	**7218 ATBP4**	2,153
	160	30	2	1	44	189	100	6000	9500	**7218 ATBP2**	2,153
95	145	24	1,5	0,6	28	73,4	73,4	8000	14000	**7019 CTAP4**	1,253
	145	24	1,5	0,6	28	73,4	73,4	8000	14000	**7019 CTAP2**	1,253
	145	24	1,5	0,6	40	68	66	6300	10000	**7019 ATAP4**	1,253
	145	24	1,5	0,6	40	68	66	6300	10000	**7019 ATAP2**	1,253
	170	32	2,1	1,1	34	130	115	6300	10000	**7219 CTAP4**	2,653
	170	32	2,1	1,1	34	130	115	6300	10000	**7219 CTAP2**	2,653
	170	32	2,1	1,1	47	126	110	5600	9000	**7219 ATAP4**	2,653
	170	32	2,1	1,1	47	126	110	5600	9000	**7219 ATAP2**	2,653
	170	32	2,1	1,1	47	126	110	5600	9000	**7219 ATBP4**	2,653
	170	32	2,1	1,1	47	126	110	5600	9000	**7219 ATBP2**	2,653
100	150	24	1,5	0,6	29	75,3	77,2	7000	12000	**7020 CTAP4**	1,303
	150	24	1,5	0,6	29	75,3	77,2	7000	12000	**7020 CTAP2**	1,303
	150	24	1,5	0,6	41	71,1	73	6000	9500	**7020 AMBP4**	1,303
	150	24	1,5	0,6	41	71	73	6000	9500	**7020 ATAP2**	1,303
	150	24	1,5	0,6	41	71	73	6000	9500	**7020 ATAP4**	1,303
	180	34	2,1	1,1	36	148	127	6000	9500	**7220 CTAP4**	3,203
	180	34	2,1	1,1	36	150	127	6000	9500	**7220 CTAP2**	3,153
	180	34	2,1	1,1	50	142	121	5300	8500	**7220 AMAP4**	3,153
	180	34	2,1	1,1	50	142	121	5300	8500	**7220 ATAP4**	3,153
	180	34	2,1	1,1	50	142	121	5300	8500	**7220 ATAP2**	3,153
	180	34	2,1	1,1	50	142	121	5300	8500	**7220 ATBP4**	3,153

High precision angular contact ball bearings single row



Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
100	180	34	2,1	1,1	50	142	121	5300	8000	**7220 ATBP2**	3,153
105	160	26	2	1	31	87	89	5600	8500	**7021 CTAP4**	1,663
110	170	28	2	1	47	104	104	5300	8000	**7022 ATAP4**	3,203
120	180	28	2	2	34	109	111	5000	7500	**7024 CTBP4**	2,083
	180	28	2	2	49	104	105	5000	7500	**7024 AMAP4**	2,293
	180	28	2	2	49	104	105	5000	7500	**7024 ATAP4**	2,293
130	200	33	2	1	39	145	99	6300	8500	**7026 CMAP4**	3,193
	200	33	2	1	39	145	149	5600	7500	**7026 CTAP4**	3,193
150	225	35	2,1	1,1	61	159	173	4500	6000	**7030 CMAP4**	4,323
	225	35	2,1	1,1	61	159	173	4500	6000	**7030 CTAP4**	4,323
	225	35	2,1	1,1	61	159	173	5000	6700	**7030 AMAP4**	4,323

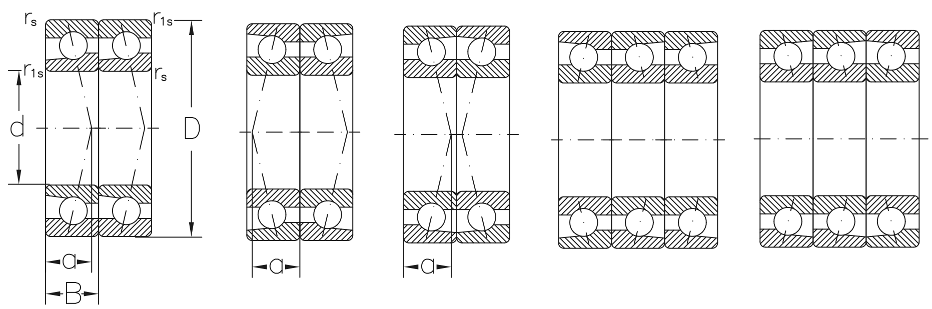
High precision angular contact ball bearings, single row, for paired and stack mounted



DT DB DF TBT TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
10	26	8	0,3	0,1	6	8,6	4,9	48000	80000	**7000 CTAP4DT**	0,040
	26	8	0,3	0,1	6	8,6	4,9	43000	70000	**7000 CTAP4DB**	0,040
	26	8	0,3	0,1	6	8,6	4,9	43000	70000	**7000 CTAP4DF**	0,040
	30	9	0,6	0,3	7	9,4	5,9	43000	70000	**7200 CTAP4DT**	0,058
	30	9	0,6	0,3	7	9,4	5,9	38000	63000	**7200 CTAP4DB**	0,058
	30	9	0,6	0,3	7	9,4	5,9	38000	63000	**7200 CTAP4DF**	0,058
12	28	8	0,3	0,1	7	8,75	5,2	43000	70000	**7001 CTAP4DT**	0,046
	28	8	0,3	0,1	7	8,75	5,2	38000	63000	**7001 CTAP4DB**	0,046
	28	8	0,3	0,1	7	8,75	5,2	38000	63000	**7001 CTAP4DF**	0,046
	32	10	0,6	0,3	10	12,2	6,8	38000	63000	**7201 ATAP4DT**	0,060
	32	10	0,6	0,3	10	12,2	6,8	34000	56000	**7201 ATAP4DB**	0,060
	32	10	0,6	0,3	10	12,2	6,8	34000	56000	**7201 ATAP4DF**	0,060
15	32	9	0,3	0,1	8	10,2	6,8	36000	60000	**7002 CTAP4DT**	0,060
	32	9	0,3	0,1	8	10,2	6,8	32000	53000	**7002 CTPA4DB**	0,060
	32	9	0,3	0,1	8	10,2	6,8	32000	53000	**7002 CTAP4DF**	0,060
	32	9	0,3	0,1	8	16,6	13,6	28000	48000	**7002 CTAP4QBC**	0,120
	32	9	0,3	0,1	8	10,2	6,8	36000	60000	**7002 CTAP2DT**	0,060
	32	9	0,3	0,1	8	10,2	6,8	36000	60000	**7002 CTBP4DT**	0,060
	35	11	0,6	0,3	9	14,4	9	34000	56000	**7202 CTAP4DT**	0,084
	35	11	0,6	0,3	9	14,4	9	30000	50000	**7202 CTAP4DB**	0,084
	35	11	0,6	0,3	9	14,4	9	30000	50000	**7202 CTAP4DF**	0,084
	35	11	0,6	0,3	12	14,1	8,8	30000	50000	**7202 CTAP4DT**	0,048
	35	11	0,6	0,3	12	14,1	8,8	28000	45000	**7202 ATAP4DB**	0,048
	35	11	0,6	0,3	12	14,1	8,8	28000	45000	**7202 ATAP4DF**	0,048
	35	11	0,6	0,3	12	14,1	8,8	28000	45000	**7202 ATAP2DB**	0,084
17	35	10	0,3	0,1	9	11,7	8,4	32000	53000	**7003 CTAP4DT**	0,078
	35	10	0,3	0,1	9	11,7	8,4	28000	48000	**7003 CTAP4DB**	0,078
	35	10	0,3	0,1	9	11,7	8,4	28000	48000	**7003 CTAP4DF**	0,078
	35	10	0,3	0,1	9	15,6	16,8	28000	45000	**7003 CTAP4TBT**	0,117
	35	10	0,3	0,1	9	11,7	8,4	28000	48000	**7003 CTAP2DB**	0,078
	40	12	0,6	0,3	10	17,7	11,6	30000	50000	**7203 CTAP4DT**	0,120
	40	12	0,6	0,3	10	17,7	11,6	28000	45000	**7203 CTAP4DB**	0,120
	40	12	0,6	0,3	10	17,7	11,6	28000	45000	**7203 CTAP4DF**	0,120
	40	12	0,6	0,3	13	14,6	10,2	26000	43000	**7203 ATAP4DT**	0,120
	40	12	0,6	0,3	13	14,6	10,2	22000	38000	**7203 ATAP4DB**	0,120
	40	12	0,6	0,3	13	14,6	10,2	22000	38000	**7203 ATAP4DF**	0,120
20	42	12	0,6	0,3	10	17	12,2	28000	45000	**7004 CTAP4DT**	0,140
	42	12	0,6	0,3	10	17	12,2	24000	40000	**7004 CTAP4DB**	0,140
	42	12	0,6	0,3	10	17	12,2	24000	40000	**7004 CTAP4DF**	0,140
	42	12	0,6	0,3	10	27,7	24,2	22000	36000	**7004 CTAP4QBC**	0,280

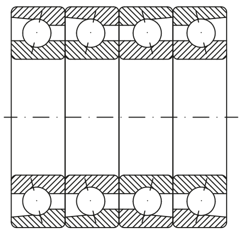
High precision angular contact ball bearings, single row, for paired and stack mounted



DT DB DF TBT TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
20	42	12	0,6	0,3	10	17	12,2	24000	40000	**7004 CTAP2DB**	0,140
	42	12	0,6	0,3	10	17	12,2	24000	40000	**7004 CTBP4DB**	0,140
	42	12	0,6	0,3	10	17	12,2	28000	45000	**7004 CTBP2DT**	0,140
	42	12	0,6	0,3	13	16,2	11,6	24000	40000	**7004 ATAP4DT**	0,140
	42	12	0,6	0,3	13	16,2	11,6	22000	36000	**7004 ATAP4DB**	0,140
	42	12	0,6	0,3	13	16,2	11,6	22000	36000	**7004 ATAP4DF**	0,140
	47	14	1	0,6	12	25,3	18	26000	43000	**7204 CTAP4DT**	0,200
	47	14	1	0,6	12	25,3	18	22000	38000	**7204 CTAP4DB**	0,200
	47	14	1	0,6	12	25,3	18	22000	38000	**7204 CTAP4DF**	0,200
	47	14	1	0,6	12	25,3	18	26000	43000	**7204 CTBP4DT**	0,200
	47	14	1	0,6	12	25,3	18	22000	38000	**7204 CTBP4DB**	0,200
	47	14	1	0,6	12	25,3	18	22000	38000	**7204 CTBP4DF**	0,200
	47	14	1	0,6	12	25,3	18	22000	38000	**7204 CTBP2DF**	0,200
	47	14	1	0,6	15	24,2	17,2	22000	38000	**7204 ATAP4DT**	0,200
	47	14	1	0,6	15	24,2	17,2	20000	34000	**7204 ATAP4DB**	0,200
	47	14	1	0,6	15	24,2	17,2	20000	34000	**7204 ATAP4DF**	0,200
25	47	12	0,6	0,3	11	17	14,8	24000	40000	**7005 CTAP4DT**	0,160
	47	12	0,6	0,3	11	19	14,8	22000	36000	**7005 CTAP4DB**	0,160
	47	12	0,6	0,3	11	19	14,8	22000	36000	**7005 CTAP4DF**	0,160
	47	12	0,6	0,3	11	19	14,8	24000	40000	**7005 CTAP2DT**	0,160
	47	12	0,6	0,3	11	19	14,8	22000	36000	**7005 CTAP2DB**	0,160
	47	12	0,6	0,3	11	25,3	22,2	20000	34000	**7005 CTAP2TBT**	0,240
	47	12	0,6	0,3	11	19	14,8	24000	40000	**7005 CTBP2DT**	0,160
	47	12	0,6	0,3	11	19	14,8	22000	36000	**7005 CTBP2DB**	0,160
	47	12	0,6	0,3	15	16,9	13,9	22000	36000	**7005 ATAP4DT**	0,160
	47	12	0,6	0,3	15	16,9	13,9	19000	32000	**7005 ATAP4DB**	0,160
	47	12	0,6	0,3	15	16,9	13,9	19000	32000	**7005 ATAP4DF**	0,160
	52	15	1	0,6	13	26,9	20,6	22000	38000	**7205 CTAP4DT**	0,240
	52	15	1	0,6	13	26,9	20,6	20000	34000	**7205 CTAP4DB**	0,240
	52	15	1	0,6	13	26,9	20,6	20000	34000	**7205 CTAP4DF**	0,240
	52	15	1	0,6	13	43,8	41,2	18000	30000	**7205 CTAP4QBC**	0,120
	52	15	1	0,6	13	26,9	20,6	22000	38000	**7205 CTAP2DT**	0,240
	52	15	1	0,6	13	26,9	20,6	20000	34000	**7205 CTAP2DB**	0,240
	52	15	1	0,6	13	26,9	20,6	22000	38000	**7205 CTBP4DT**	0,240
	52	15	1	0,6	13	26,9	20,6	20000	34000	**7205 CTBP4DB**	0,240
	52	15	1	0,6	13	26,9	20,6	20000	34000	**7205 CTBP4DF**	0,240
	52	15	1	0,6	13	43,8	41,2	18000	30000	**7205 CTBP4QBC**	0,480
	52	15	1	0,6	17	22,2	17,6	20000	34000	**7205 ATAP4DT**	0,240
	52	15	1	0,6	17	22,2	17,6	18000	30000	**7205 ATAP4DB**	0,240
	52	15	1	0,6	17	22,2	17,6	18000	30000	**7205 ATAP4DF**	0,240
	52	15	1	0,6	17	29,6	26,4	17000	28000	**7205 ATAP4TFT**	0,360

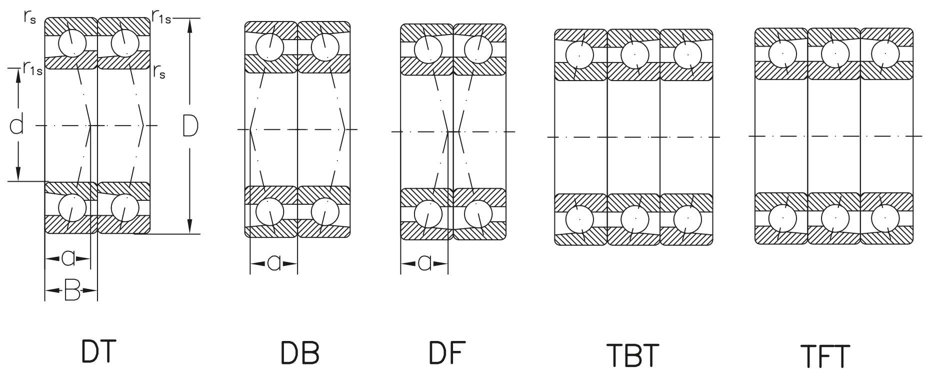
High precision angular contact ball bearings, single row, for paired and stack mounted



QBC

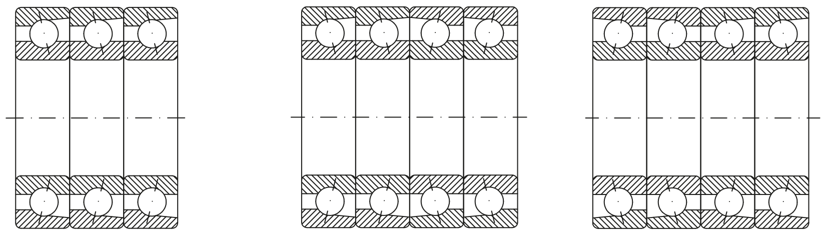
Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
30	55	13	1	0,3	12	24,5	20,6	22000	36000	**7006 CTAP4DT**	0,240
	55	13	1	0,3	12	24,5	20,6	19000	32000	**7006 CTAP4DB**	0,240
	55	13	1	0,3	12	24,5	20,6	19000	32000	**7006 CTAP4DF**	0,240
	55	13	1	0,3	12	32,6	30,9	18000	30000	**7006 CTAP4TBT**	0,360
	55	13	1	0,3	12	24,5	20,6	19000	32000	**7006 CTAP2DB**	0,240
	55	13	1	0,3	12	24,5	20,6	22000	36000	**7006 CTBP2DT**	0,240
	55	13	1	0,3	17	21,7	19	19000	32000	**7006 ATAP4DT**	0,240
	55	13	1	0,3	17	21,7	19	17000	28000	**7006 ATAP4DB**	0,240
	55	13	1	0,3	17	21,7	19	17000	28000	**7006 ATAP4DF**	0,240
	62	16	1	0,6	14	37,3	29,6	20000	34000	**7206 CTAP4DT**	0,380
	62	16	1	0,6	14	37,3	29,6	18000	30000	**7206 CTAP4DB**	0,380
	62	16	1	0,6	14	37,3	29,6	18000	30000	**7206 CTAP4DF**	0,380
	62	16	1	0,6	14	49,7	44,4	17000	28000	**7206 CTAP4TT**	0,570
	62	16	1	0,6	14	49,7	44,4	17000	28000	**7206 CTAP4TBT**	0,570
	62	16	1	0,6	14	60,7	59,2	16000	26000	**7206 CTAP4QFC**	0,760
	62	16	1	0,6	14	37,3	29,6	20000	34000	**7206 CTAP2DT**	0,380
	62	16	1	0,6	14	37,3	29,6	18000	30000	**7206 CTAP2DB**	0,380
	62	16	1	0,6	14	37,3	29,6	20000	34000	**7206 BTBP4DT**	0,380
	62	16	1	0,6	14	37,3	29,6	18000	30000	**7206 CTBP4DB**	0,380
	62	16	1	0,6	14	37,3	29,6	18000	30000	**7206 CTBP4DF**	0,380
	62	16	1	0,6	14	49,7	44,4	17000	28000	**7206 CTBP4TT**	0,570
	62	16	1	0,6	14	60,7	59,2	16000	26000	**7206 CTBP4QFC**	0,760
	62	16	1	0,6	19	35,7	28,2	18000	30000	**7206 ATAP4DT**	0,380
	62	16	1	0,6	19	35,7	28,2	17000	28000	**7206 ATP4DB**	0,380
	62	16	1	0,6	19	35,7	28,2	17000	28000	**7206 ATAP4DF**	0,380
35	62	14	1	0,3	14	31,1	27,4	19000	32000	**7007 CTAP4DT**	0,320
	62	14	1	0,3	14	31,1	27,4	17000	28000	**7007 CTAP4DB**	0,320
	62	14	1	0,3	14	31,1	27,4	17000	28000	**7007 CTAP4DF**	0,320
	62	14	1	0,3	14	31,1	27,4	17000	28000	**7007 CTAP2DB**	0,320
	62	14	1	0,3	14	31,1	27,4	17000	28000	**7007 CTBP4DB**	0,320
	62	14	1	0,3	14	31,1	27,4	19000	32000	**7007 CTBP2DT**	0,320
	62	14	1	0,3	19	29,5	26,2	17000	28000	**7007 ATAP4DT**	0,320
	62	14	1	0,3	19	29,5	26,2	16000	26000	**7007 ATAP4DB**	0,320
	62	14	1	0,3	19	29,5	26,2	16000	26000	**7007 ATAP4DF**	0,320
	72	17	1,1	0,6	16	49,3	40,4	18000	30000	**7207 CTAP4DT**	0,540
	72	17	1,1	0,6	16	49,3	40,4	17000	28000	**7207 CTAP4DB**	0,540
	72	17	1,1	0,6	16	49,3	40,4	17000	28000	**7207 CTAP4DF**	0,540
	72	17	1,1	0,6	16	65,7	60,6	16000	26000	**7207 CTAP4TFT**	0,810
	72	17	1,1	0,6	16	80,3	80,8	14000	24000	**7207 CTAP4QFC**	1,083

High precision angular contact ball bearings, single row, for paired and stack mounted



Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
35	72	17	1,1	0,6	16	49,3	40,4	18000	30000	**7207 CTBP4DT**	0,540
	72	17	1,1	0,6	16	49,3	40,4	17000	28000	**7207 CTBP4DB**	0,540
	72	17	1,1	0,6	16	49,3	40,4	17000	28000	**7207 CTBP4DF**	0,540
	72	17	1,1	0,6	21	39,7	34	16000	26000	**7207 ATAP4DT**	0,540
	72	17	1,1	0,6	21	39,7	34	13000	22000	**7207 ATAP4DB**	0,540
	72	17	1,1	0,6	21	39,7	34	13000	22000	**7207 ATAP4DF**	0,540
40	68	15	1	0,3	15	33,4	31,8	18000	30000	**7008 CTAP4DT**	0,380
	68	15	1	0,3	15	33,4	31,8	17000	28000	**7008 CTAP4DB**	0,380
	68	15	1	0,3	15	33,4	31,8	17000	28000	**7008 CTAP4DF**	0,380
	68	15	1	0,3	15	33,4	31,8	18000	30000	**7008 CTAP2DT**	0,380
	68	15	1	0,3	15	33,4	31,8	17000	28000	**7008 CTAP2DB**	0,380
	68	15	1	0,3	15	33,4	31,8	18000	30000	**7008 CTBP4DT**	0,380
	68	15	1	0,3	15	33,4	31,8	17000	28000	**7008 CTBP4DB**	0,380
	68	15	1	0,3	20	31,6	30	16000	26000	**7008 ATAP4DT**	0,380
	68	15	1	0,3	20	31,6	30	13000	22000	**7008 ATAP4DB**	0,380
	68	15	1	0,3	20	31,6	30	13000	22000	**7008 ATAP4DF**	0,380
	68	15	1	0,3	20	31,6	30	13000	22000	**7008 ATBP4DB**	0,380
	68	15	1	0,3	15	44,5	47,7	13000	22000	**7008 ATBP4TBT**	0,570
	80	18	1,1	0,6	17	58,8	50,4	17000	28000	**7208 CTAP4DT**	0,700
	80	18	1,1	0,6	17	58,8	50,4	14000	24000	**7208 CTAP4DB**	0,700
	80	18	1,1	0,6	17	58,8	50,4	14000	24000	**7208 CTAP4DF**	0,700
	80	18	1,1	0,6	17	58,8	50,4	17000	28000	**7208 CTBP4DT**	0,700
	80	18	1,1	0,6	17	58,8	50,4	14000	24000	**7208 CTBP4DB**	0,700
	80	18	1,1	0,6	17	58,8	50,4	14000	24000	**7208 CTBP4DF**	0,700
	80	18	1,1	0,6	17	78,4	75,6	13000	22000	**7208 CTBP4TT**	1,053
	80	18	1,1	0,6	17	95,8	101	13000	22000	**7208 CTBP4QT**	1,403
	80	18	1,1	0,6	17	95,8	101	13000	22000	**7208 CTBP4QFC**	1,403
	80	18	1,1	0,6	23	57	48,8	14000	24000	**7208 ATAP4DT**	0,700
	80	18	1,1	0,6	23	57	48,8	12000	20000	**7208 ATAP4DB**	0,700
	80	18	1,1	0,6	23	57	48,8	12000	20000	**7208 ATAP4DF**	0,700
	80	18	1,1	0,6	23	57	48,8	14000	24000	**7208 ATBP4DT**	0,700
	80	18	1,1	0,6	23	57	48,8	12000	20000	**7208 ATBP4DB**	0,700
	80	18	1,1	0,6	17	95,8	101	11000	18000	**7208 ATBP4QT**	1,403
45	75	16	1	0,3	16	39,5	38,6	16000	26000	**7009 CTAP4DT**	0,500
	75	16	1	0,3	16	39,5	38,6	13000	22000	**7009 CTAP4DB**	0,500
	75	16	1	0,3	16	39,5	38,6	13000	22000	**7009 CTAP4DF**	0,500
	75	16	1	0,3	16	52,7	57,9	13000	22000	**7009 CTAP4BT**	0,750
	75	16	1	0,3	16	64,5	77,2	12000	20000	**7009 CTAP4QBC**	1,003
	75	16	1	0,3	16	39,5	38,6	16000	26000	**7009 CTAP2DT**	0,500
	75	16	1	0,3	16	39,5	38,6	13000	22000	**7009 CTAP2DB**	0,500

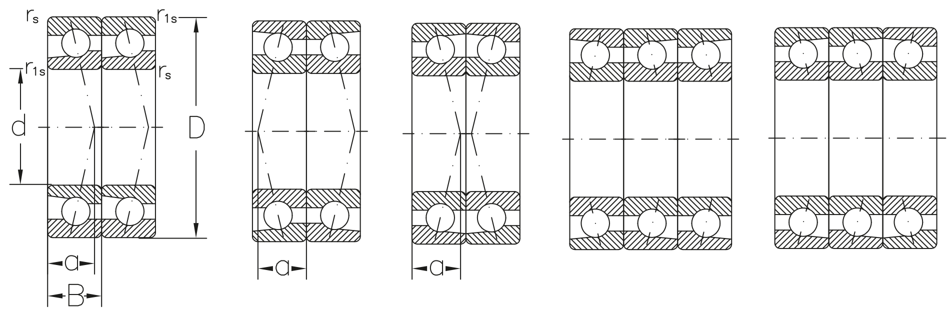
High precision angular contact ball bearings, single row, for paired and stack mounted



TT QFC QBC

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
45	75	16	1	0,3	22	35,7	34,6	14000	24000	**7009 ATAP4DT**	0,500
	75	16	1	0,3	22	35,7	34,6	12000	20000	**7009 ATAP4DB**	0,500
	75	16	1	0,3	22	35,7	34,6	12000	20000	**7009 ATAP4DF**	0,500
	85	19	1,1	0,6	18	64,8	58	14000	24000	**7209 CTAP4DT**	0,800
	85	19	1,1	0,6	18	64,8	58	12000	20000	**7209 CTAP4DB**	0,800
	85	19	1,1	0,6	18	64,8	58	12000	20000	**7209 CTAP4DF**	0,800
	85	19	1,1	0,6	18	64,8	58	14000	24000	**7209 CTAP2DT**	0,800
	85	19	1,1	0,6	25	59,6	55	12000	20000	**7209 ATAP4DT**	0,800
	85	19	1,1	0,6	25	59,6	55	11000	18000	**7209 ATAP4DB**	0,800
	85	19	1,1	0,6	25	59,6	55	11000	18000	**7209 ATAP4DF**	0,800
	85	19	1,1	0,6	18	64,8	58	11000	18000	**7209 CTAP2DB**	0,800
	85	19	1,1	0,6	25	59,6	55	12000	20000	**7209 ATBP4DT**	0,800
	85	19	1,1	0,6	25	59,6	55	11000	18000	**7209 ATBP4DB**	0,800
	85	19	1,1	0,6	25	59,6	55	11000	18000	**7209 ATBP4DF**	0,800
50	80	16	1	0,3	17	40,7	41,4	14000	24000	**7010 CTAP4DT**	0,520
	80	16	1	0,3	17	40,7	41,4	12000	20000	**7010 CTAP4DB**	0,520
	80	16	1	0,3	17	40,7	41,4	12000	20000	**7010 CTAP4DF**	0,520
	80	16	1	0,3	17	66,3	82,8	11000	18000	**7010 CTAP4QBC**	1,043
	80	16	1	0,3	17	40,7	41,4	14000	24000	**7010 CTAP2DT**	0,520
	80	16	1	0,3	17	40,7	41,4	12000	20000	**7010 CTAP2DB**	0,520
	80	16	1	0,3	23	37,6	40	12000	20000	**7010 ATAP4DT**	0,520
	80	16	1	0,3	23	37,6	40	11000	18000	**7010 ATAP4DB**	0,520
	80	16	1	0,3	23	37,6	40	11000	18000	**7010 ATAP4DF**	0,520
	90	20	1,1	0,6	20	69,4	63,4	13000	22000	**7210 CTAP4DT**	0,900
	90	20	1,1	0,6	20	69,4	63,4	11000	19000	**7210 CTAP4DB**	0,900
	90	20	1,1	0,6	20	69,4	63,4	11000	19000	**7210 CTAP4DF**	0,900
	90	20	1,1	0,6	27	68	62	11000	18000	**7210 ATAP4DT**	0,900
	90	20	1,1	0,6	27	68	62	9500	16000	**7210 ATAP4DB**	0,900
	90	20	1,1	0,6	27	68	62	9500	16000	**7210 ATAP4DF**	0,900
	90	20	1,1	0,6	27	68	62	11000	18000	**7210 ATBP4DT**	0,900
	90	20	1,1	0,6	27	68	62	9500	16000	**7210 ATBP4DB**	0,900
	90	20	1,1	0,6	27	68	62	9500	16000	**7210 ATBP4DF**	0,900
	90	20	1,1	0,6	27	68	62	11000	18000	**7210 ATAP2DT**	0,900
55	90	18	1,1	0,6	19	55,3	57,2	12000	20000	**7011 CTAP4DT**	0,780
	90	18	1,1	0,6	19	55,3	57,2	11000	18000	**7011 CTAP4DB**	0,780
	90	18	1,1	0,6	19	55,3	57,2	11000	18000	**7011 CTAP4DF**	0,780
	90	18	1,1	0,6	19	73,7	85,2	10000	17000	**7011 CTAP4TT**	1,173
	90	18	1,1	0,6	19	73,7	85,2	10000	17000	**7011 CTAP4TBT**	1,173
	90	18	1,1	0,6	26	52,3	54,2	11000	18000	**7011 ATAP4DT**	0,780
	90	18	1,1	0,6	26	52,3	54,2	9500	16000	**7011 ATAP4DB**	0,780

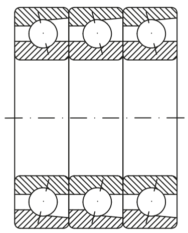
High precision angular contact ball bearings, single row, for paired and stack mounted



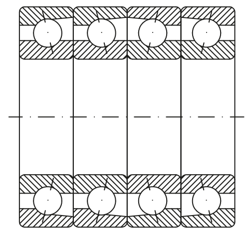
DT DB DF TBT TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
55	90	18	1,1	0,6	26	523,	54,2	9500	16000	**7011 ATAP4DF**	0,780
	100	21	1,5	1	21	85,9	80	11000	18000	**7211 CTAP4DT**	1,203
	100	21	1,5	1	21	85,9	80	9500	16000	**7211 CTAP4DB**	1,203
	100	21	1,5	1	21	85,9	80	9500	16000	**7211 CTAP4DF**	1,203
	100	21	1,5	1	29	82	76,6	10000	17000	**7211 ATAP4DT**	1,203
	100	21	1,5	1	29	82	76,6	9000	15000	**7211 ATAP4DB**	1,203
	100	21	1,5	1	29	82	76,6	9000	15000	**7211 ATAP4DF**	1,203
	100	21	1,5	1	29	82	76,6	9000	15000	**7211 ATAP2DB**	1,203
	100	21	1,5	1	29	82	76,6	10000	17000	**7211 ATBP4DT**	1,203
	100	21	1,5	1	29	82	76,6	9000	15000	**7211 ATBP4DB**	1,203
	100	21	1,5	1	29	82	76,6	9000	15000	**7211 ATBP4DF**	1,203
60	95	18	1,1	0,6	20	56,7	61	11000	18000	**7012 CTAP4DT**	0,840
	95	18	1,1	0,6	20	56,7	61	9500	16000	**7012 CTAP4DB**	0,840
	95	18	1,1	0,6	20	56,7	61	9500	16000	**7012 CTAP4DF**	0,840
	95	18	1,1	0,6	20	75,6	91,5	9500	15000	**7012 CTAP4TBT**	1,263
	95	18	1,1	0,6	20	92,4	122	8500	14000	**7012 CTAP4QBC**	1,683
	95	18	1,1	0,6	20	56,7	61	9500	16000	**7012 CTBP2DB**	0,840
	95	18	1,1	0,6	27	53,8	58,2	10000	17000	**7012 ATAP4DT**	0,840
	95	18	1,1	0,6	27	53,8	58,2	9000	15000	**7012 ATAP4DB**	0,840
	95	18	1,1	0,6	27	53,8	58,2	9000	15000	**7012 ATAP4DF**	0,840
	95	18	1,1	0,6	27	53,8	58,2	9000	15000	**7012 ATAP2DF**	0,840
	110	22	1,5	1	23	104	98	10000	17000	**7212 CTAP4DT**	1,543
	110	22	1,5	1	23	104	98	9000	15000	**7212 CTAP4DB**	1,543
	110	22	1,5	1	23	104	98	9000	15000	**7212 CTAP4DF**	1,543
	110	22	1,5	1	23	138	147	8500	14000	**7212 CTAP4TBT**	2,313
	110	22	1,5	1	23	104	98	9000	15000	**7212 CTAP2DB**	1,543
	110	22	1,5	1	31	98,8	95	9000	15000	**7212 ATAP4DT**	1,543
	110	22	1,5	1	31	98,8	95	8500	14000	**7212 ATAP4DB**	1,543
	110	22	1,5	1	31	98,8	95	8500	14000	**7212 ATAP4DF**	1,543
	110	22	1,5	1	31	98,8	95	9000	15000	**7212 ATBP4DT**	1,543
	110	22	1,5	1	31	98,8	95	8500	14000	**7212 ATBP4DB**	1,543
	110	22	1,5	1	31	98,8	95	8500	14000	**7212 ATBP4DF**	1,543
65	100	18	1,1	0,6	20	58,3	65	11000	18000	**7013 CTAP4DT**	0,920
	100	18	1,1	0,6	20	58,3	65	9500	16000	**7013 CTAP4DB**	0,920
	100	18	1,1	0,6	20	58,3	65	9500	16000	**7013 CTAP4DF**	0,920
	100	18	1,1	0,6	20	77,8	97,5	9000	15000	**7013 CTAP4TBT**	1,383
	100	18	1,1	0,6	20	95	130	8500	14000	**7013 CTAP4QBC**	1,843
	100	18	1,1	0,6	20	77,8	97,5	9000	15000	**7013 CTAP2TBT**	1,383
	100	18	1,1	0,6	28	55	62	9500	16000	**7013 AMBP4DT**	0,920
	100	18	1,1	0,6	28	55	62	8500	14000	**7013 ATAP4DB**	0,920

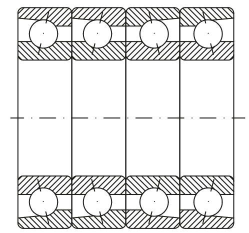
High precision angular contact ball bearings, single row, for paired and stack mounted



TT



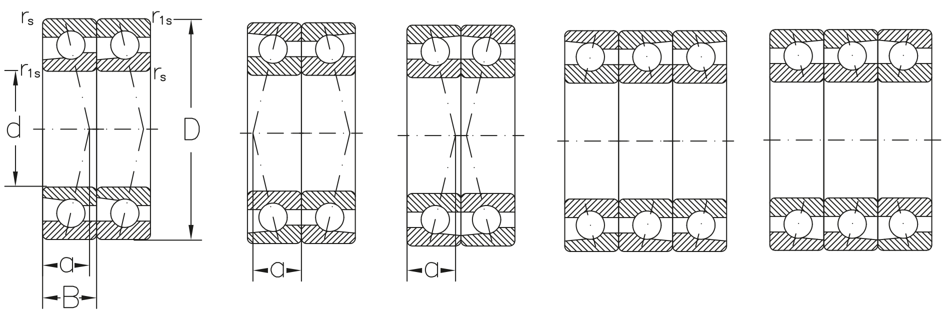
QFC



QBC

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
65	100	18	1,1	0,6	28	55	62	8500	14000	**7013 ATAP4DF**	0,920
	120	23	1,5	1	24	117	114	9500	20000	**7213 CTAP4DT**	1,943
	120	23	1,5	1	24	117	114	8500	14000	**7213 CTAP4DB**	1,943
	120	23	1,5	1	24	117	114	8500	14000	**7213 CTAP4DF**	1,943
	120	23	1,5	1	24	117	114	9500	16000	**7213 CTAP2DT**	1,943
	120	23	1,5	1	33	113	108	8500	14000	**7213 ATAP4DT**	1,943
	120	23	1,5	1	33	113	108	8000	13000	**7213 ATAP4DB**	1,943
	120	23	1,5	1	33	113	108	8000	13000	**7213 ATAP4DF**	1,943
	120	23	1,5	1	33	113	108	8500	14000	**7213 ATBP4DT**	1,943
	120	23	1,5	1	33	113	108	8000	13000	**7213 ATBP4DB**	1,943
	120	23	1,5	1	33	113	108	8000	13000	**7213 ATBP4DF**	1,943
70	110	20	1,1	0,6	22	73,4	81,6	9500	16000	**7014 CTAP4DT**	1,283
	110	20	1,1	0,6	22	73,4	81,6	8500	14000	**7014 CTAP4DB**	1,283
	110	20	1,1	0,6	22	73,4	81,6	8500	14000	**7014 CTAP4DF**	1,283
	110	20	1,1	0,6	31	93	102	8500	14000	**7014 CTAP4TBT**	1,923
	110	20	1,1	0,6	31	69,7	68	8500	14000	**7014 AMBP4DT**	1,283
	110	20	1,1	0,6	31	114	136	6700	11000	**7014 AMBP4QBC**	2,563
	110	20	1,1	0,6	31	69,7	68	8500	14000	**7014 ATAP4DT**	1,283
	110	20	1,1	0,6	31	69,7	68	8000	12000	**7014 ATAP4DB**	1,283
	110	20	1,1	0,6	31	69,7	68	8000	13000	**7014 ATAP4DF**	1,283
	110	20	1,1	0,6	31	93	102	7000	13000	**7014 ATAP2TBT**	1,923
	125	24	1,5	1	25	123	120	9000	15000	**7214 CTAP4DT**	2,103
	125	24	1,5	1	25	123	120	8500	14000	**7214 CTAP4DB**	2,103
	125	24	1,5	1	25	123	120	8500	14000	**7214 CTAP4DF**	2,103
	125	24	1,5	1	25	123	120	8500	14000	**7214 CTAP2DB**	2,103
	125	24	1,5	1	35	126	114	8500	14000	**7214 ATAP4DT**	2,103
	125	24	1,5	1	35	126	114	7000	12000	**7214 ATAP4DB**	2,103
	125	24	1,5	1	35	126	114	7000	12000	**7214 ATAP4DF**	2,103
	125	24	1,5	1	35	126	114	8500	14000	**7214 ATBP4DT**	2,103
	125	24	1,5	1	35	126	114	7000	12000	**7214 ATBP4DB**	2,103
	125	24	1,5	1	35	126	114	7000	12000	**7214 ATBP4DF**	2,103
75	115	20	1,1	0,6	23	75,4	87	9500	16000	**7015 CTAP4DT**	1,363
	115	20	1,1	0,6	23	75,4	87	8500	14000	**7015 CTAP4DB**	1,363
	115	20	1,1	0,6	23	75,4	87	8500	14000	**7015 CTAP4DF**	1,363
	115	20	1,1	0,6	32	71,3	82,4	7000	12000	**7015 AMAP4DB**	1,363
	115	20	1,1	0,6	23	100	131	6700	11000	**7015 AMAP4TBT**	2,043
	115	20	1,1	0,6	32	116	165	6700	11000	**7015 AMAP4QBC**	2,723
	115	20	1,1	0,6	32	71,3	82,4	8500	14000	**7015 ATAP4DT**	1,363
	115	20	1,1	0,6	32	71,3	82,4	7000	11000	**7015 ATAP4DB**	1,363
	115	20	1,1	0,6	32	71,3	82,4	7000	11000	**7015 ATAP4DF**	1,363

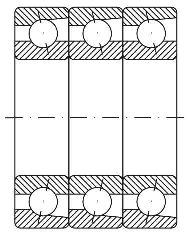
High precision angular contact ball bearings, single row, for paired and stack mounted



DT DB DF TBT TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
75	115	20	1,1	0,6	32	71,3	82,4	7000	12000	**7015 ATBP2DB**	1,363
	130	25	1,5	1	26	130	131	8500	14000	**7215 CTAP4DT**	2,303
	130	25	1,5	1	26	130	131	8000	13000	**7215 CTAP4DB**	2,303
	130	25	1,5	1	26	130	131	8000	13000	**7215 CTAP4DF**	2,303
	130	25	1,5	1	37	118	121	8000	13000	**7215 ATAP4DT**	2,303
	130	25	1,5	1	37	118	121	6700	11000	**7215 ATAP4DB**	2,303
	130	25	1,5	1	37	118	121	6700	11000	**7215 ATAP4DF**	2,303
	130	25	1,5	1	37	118	121	8000	13000	**7215 ATBP4DT**	2,303
	130	25	1,5	1	37	118	121	6700	11000	**7215 ATBP4DB**	2,303
	130	25	1,5	1	37	118	121	6700	11000	**7215 ATBP4DF**	2,303
80	125	22	1,1	0,6	25	95	110	8500	14000	**7016 CTAP4DT**	1,783
	125	22	1,1	0,6	25	95	110	8000	13000	**7016 CTAP4DB**	1,783
	125	22	1,1	0,6	25	95	110	8000	13000	**7016 CTAP4DF**	1,783
	125	22	1,1	0,6	35	91	126	8000	13000	**7016 AMAP4DT**	1,783
	125	22	1,1	0,6	35	91	126	6700	11000	**7016 AMAP4DB**	1,783
	125	22	1,1	0,6	25	155	221	6000	10000	**7016 AMAP4QBC**	3,563
	125	22	1,1	0,6	35	91	126	8000	13000	**7016 ATAP4DT**	1,783
	125	22	1,1	0,6	35	91	126	6700	11000	**7016 ATAP4DB**	1,783
	125	22	1,1	0,6	35	91	126	6700	11000	**7016 ATAP4DF**	1,783
	140	26	2	1	28	151	156	7000	12000	**7216 CTAP4DT**	2,803
	140	26	2	1	28	151	156	6000	10000	**7216 CTAP4DB**	2,803
	140	26	2	1	28	151	156	6000	10000	**7216 CTAP4DF**	2,803
	140	26	2	1	28	201	234	6000	10000	**7216 CTAP4TBT**	4,203
	140	26	2	1	28	151	156	7000	12000	**7216 CTAP2DT**	2,803
	140	26	2	1	28	151	156	6000	10000	**7216 CTAP2DB**	2,803
	140	26	2	1	28	151	156	6000	10000	**7216 CTAP2DF**	2,803
	140	26	2	1	28	246	312	5300	9000	**7216 CTAP2QBC**	5,603
	140	26	2	1	39	139	147	6700	11000	**7216 ATAP4DT**	2,803
	140	26	2	1	39	139	147	5600	9500	**7216 ATAP4DB**	2,803
	140	26	2	1	39	139	147	5600	9500	**7216 ATAP4DF**	2,803
	140	26	2	1	39	139	147	6700	11000	**7216 ATBP4DT**	2,803
	140	26	2	1	39	139	147	5600	9500	**7216 ATBP4DB**	2,803
	140	26	2	1	39	139	147	5600	9500	**7216 ATBP4DF**	2,803
85	130	22	1,1	0,6	26	97,5	117	8500	14000	**7017 CTAP4DT**	1,863
	130	22	1,1	0,6	26	97,5	117	7000	12000	**7017 CTAP4DB**	1,863
	130	22	1,1	0,6	26	97,5	117	7000	12000	**7017 CTAP4DF**	1,863
	130	22	1,1	0,6	36	92	112	7000	12000	**7017 ATAP4DT**	1,863
	130	22	1,1	0,6	36	92	112	6000	10000	**7017 ATAP4DB**	1,863
	130	22	1,1	0,6	36	92	112	6000	10000	**7017 ATAP4DF**	1,863
	150	28	2	1	30	168	180	7000	12000	**7217 CTAP4DT**	3,503

High precision angular contact ball bearings, single row, for paired and stack mounted



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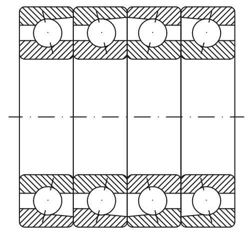
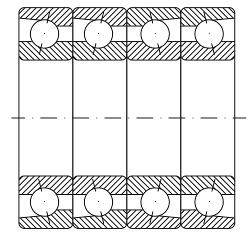


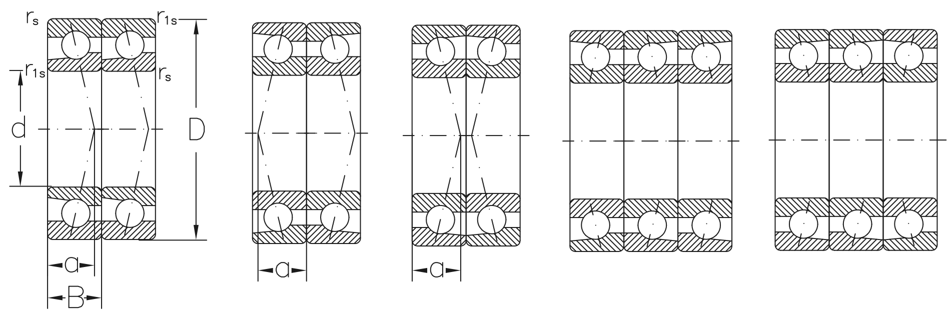
QFC



QBC

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
85	150	28	2	1	30	168	180	6000	10000	**7217 CTAP4DB**	3,503
	150	28	2	1	30	168	180	6000	10000	**7217 CTAP4DF**	3,503
	150	28	2	1	42	159	153	6000	10000	**7217 ATAP4DT**	3,503
	150	28	2	1	42	159	153	5300	9000	**7217 ATAP4DB**	3,503
	150	28	2	1	42	159	153	5300	9000	**7217 ATAP4DF**	3,503
	150	28	2	1	42	159	153	6000	10000	**7217 ATBP4DT**	3,503
	150	28	2	1	42	159	153	5300	9000	**7217 ATBP4DB**	3,503
	150	28	2	1	42	159	153	5300	9000	**7217 ATBP4DF**	3,503
90	140	24	1,5	0,6	28	116	138	7000	12000	**7018 CMBP4DT**	2,403
	140	24	1,5	0,6	28	116	138	7000	12000	**7018 CTAP4DT**	2,403
	140	24	1,5	0,6	28	116	138	6000	10000	**7018 CTAP4DB**	2,403
	140	24	1,5	0,6	28	116	138	6000	10000	**7018 CTAP4DF**	2,403
	140	24	1,5	0,6	28	155	207	5300	10000	**7018 CTAP2TBT**	3,603
	140	24	1,5	0,6	39	110	131	6000	10000	**7018 AMBP4DT**	2,403
	140	24	1,5	0,6	39	147	262	5000	8500	**7018 AMBP4TBT**	3,603
	140	24	1,5	0,6	39	180	262	4500	7500	**7018 AMBP4QT**	4,803
	140	24	1,5	0,6	39	110	131	6000	10000	**7018 ATAP4DT**	2,403
	140	24	1,5	0,6	39	110	131	5300	9000	**7018 ATAP4DB**	2,403
	140	24	1,5	0,6	39	110	131	5300	9000	**7018 ATAP4DF**	2,403
	160	30	2	1	32	199	210	6700	11000	**7218 CTAP4DT**	4,303
	160	30	2	1	32	199	210	5600	9500	**7218 CTAP4DB**	4,303
	160	30	2	1	32	199	210	5600	9500	**7218 CTAP4DF**	4,303
	160	30	2	1	44	189	200	5000	8500	**7218 AMAP4DT**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 AMAP4DB**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 AMAP4DF**	4,303
	160	30	2	1	44	189	200	5000	8500	**7218 ATAP4DT**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 ATAP4DB**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 ATAP4DF**	4,303
	160	30	2	1	44	189	200	5000	8500	**7218 ATBP4DT**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 ATBP4DB**	4,303
	160	30	2	1	44	189	200	4500	7500	**7218 ATBP4DF**	4,303
95	145	24	1,5	0,6	28	119	147	8000	13000	**7019 CTAP4DT**	2,503
	145	24	1,5	0,6	28	119	147	6700	11000	**7019 CTAP4DB**	2,503
	145	24	1,5	0,6	28	119	147	6700	11000	**7019 CTAP4DF**	2,503
	145	24	1,5	0,6	40	110	132	5300	9000	**7019 ATAP4DT**	2,503
	145	24	1,5	0,6	40	110	132	4800	8000	**7019 ATAP4DB**	2,503
	145	24	1,5	0,6	40	110	132	4800	8000	**7019 ATAP4DF**	2,503
	170	32	21,1	1,1	34	211	230	5300	9000	**7219 CTAP4DT**	5,303
	170	32	21,1	1,1	34	211	230	4800	8000	**7219 CTAP4DB**	5,303
	170	32	21,1	1,1	34	211	230	4800	8000	**7219 CTAP4DF**	5,303

High precision angular contact ball bearings, single row, for paired and stack mounted



DT DB DF TBT TFT

Dimensions						Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	r_{1s} min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm						kN		min^{-1}		-	Kg
95	170	32	21,1	1,1	34	211	230	4800	8000	**7219 CTAP4DB**	5,303
	170	32	21,1	1,1	47	204	220	4800	8000	**7219 ATAP4DT**	5,303
	170	32	21,1	1,1	47	204	220	4300	7000	**7219 ATAP4DB**	5,303
	170	32	21,1	1,1	47	204	220	4300	7000	**7219 ATAP4DF**	5,303
	170	32	21,1	1,1	47	126	220	4800	8000	**7219 ATBP4DT**	5,303
	170	32	21,1	1,1	47	126	220	4300	7000	**7219 ATBP4DB**	5,303
	170	32	21,1	1,1	47	126	220	4300	7000	**7219 ATBP4DF**	5,303
100	150	24	1,5	0,6	29	122	154	6700	11000	**7020 CTAP4DT**	2,603
	150	24	1,5	0,6	29	122	154	5600	9500	**7020 CTAP4DB**	2,603
	150	24	1,5	0,6	29	122	154	5600	9500	**7020 CTAP4DF**	2,603
	150	24	1,5	0,6	41	115	146	5000	8500	**7020 AMBP4DT**	2,603
	150	24	1,5	0,6	29	163	231	4300	7000	**7020 AMBP4TBT**	3,903
	150	24	1,5	0,6	41	188	292	4000	6700	**7020 AMBP4QBT**	5,203
	150	24	1,5	0,6	41	115	146	4500	7500	**7020 AMBP4DB**	2,603
	150	24	1,5	0,6	41	115	146	5000	8500	**7020 AMBP4DT**	2,603
	150	24	1,5	0,6	41	115	146	4500	7500	**7020 AMBP4DB**	2,603
	150	24	1,5	0,6	41	115	146	4500	7500	**7020 AMBP4DF**	2,603
	180	34	2,1	1,1	36	243	254	5000	8500	**7220 CTAP4DT**	6,303
	180	34	2,1	1,1	36	243	254	4500	7500	**7220 CTAP4DB**	6,303
	180	34	2,1	1,1	36	243	254	4500	7500	**7220 CTAP4DF**	6,303
	180	34	2,1	1,1	36	398	508	4000	6700	**7220 CTAP4QBC**	12,63
	180	34	2,1	1,1	50	230	243	4500	7500	**7220 AMAP4DT**	6,303
	180	34	2,1	1,1	50	230	243	4000	6700	**7220 AMAP4DB**	6,303
	180	34	2,1	1,1	50	230	243	4500	7500	**7220 ATAP4DT**	6,303
	180	34	2,1	1,1	50	230	243	4000	6700	**7220 ATAP4DB**	6,303
	180	34	2,1	1,1	50	230	243	4000	6700	**7220 ATAP4DF**	6,303
	180	34	2,1	1,1	50	230	243	4500	7500	**7220 ATBP4DT**	6,303
	180	34	2,1	1,1	50	230	243	4000	6700	**7220 ATBP4DB**	6,303
	180	34	2,1	1,1	50	230	243	4000	6700	**7220 ATBP4DF**	6,303
105	160	26	2	1	31	143	178	4500	7500	**7021 CTAP4DB**	3,323
110	170	28	2	1	47	169	208	3800	6300	**7022 ATAP4DB**	6,403
120	180	28	2	2	49	169	210	3600	6000	**7024 AMAP4DB**	2,293
130	200	33	2	1	39	313	298	3800	6300	**7026 CMAP4TBT**	9,573
	200	33	2	1	39	235	298	4000	6700	**7026 CTAP4DB**	6,383
150	225	35	2,1	1,1	61	258	346	2800	4500	**7030 AMAP4DB**	8,643


ROMANIA
B
URB
3211 M

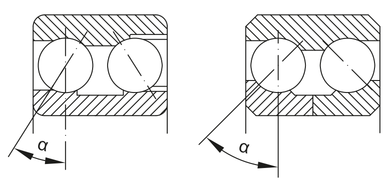
Angular contact ball bearings, double row

Double row angular contact ball bearings are, functionally, similar to two single row angular contact ball bearings in DB arrangement and they have to take axial loads acting in both directions and tilting moments.

Double row angular contact ball bearings are narrower than a pair of single row angular contact ball bearings.

Double row angular contact ball bearings can be manufactured in two versions:

- with non-separable inner ring, series 32 and 33, with a contact angle $\alpha = 32^0$;
- with separable inner ring, series 33D, with a contact angle $\alpha = 45^0$.



$\alpha = 32°$ $\alpha = 45°$

Double row angular contact ball bearings, series 32 and 33 have filling slots on one side. If these bearings have to take axial loads mainly in one direction, they are to be mounted so that axial loads acting upon the shaft should be directed to the filling slots.

Double row angular contact ball bearings series 33D are suitable to accomodate heavy axial loads in both directions.

Dimensions

Main bearing dimensions given in tables are in accordance with ISO/R15.

Misalignment

Angular misalignment of the outer ring, relative to the inner ring, is accommodated by force between the balls and raceway. This leads to a shortening of bearing life.

Tolerances

Double row angular contact ball bearings are generally manufactured to the normal tolerance class.

Bearing tolerances are given on page 28.

Axial clearance

Double row angular contact ball bearings series 32 and 33, with a contact angle $\alpha = 32^0$ are generally manufactured with normal axial clearance. They can also be manufactured with smaller or larger axial clearances.

Double row angular contact ball bearings series 33D, with a contact angle $\alpha = 45^0$ are generally mounted on the shaft with greater tightening than those of series 33. For this reason, the axial clearance is larger.

The values of axial clearance of the double row angular contact ball bearings are given in table 1.

Cages

Double row angular contact ball bearings series 32, 33 are fitted with machined brass cages.

Glass fibre reinforced polyamide 6.6 cages are also used with good results.

Large-sized bearings are fitted with pressed sheet cages.

Cage design and some technical data are given in table 2.

Equivalent dynamic radial load

For double row angular contact ball bearings series 32 and 33 with a contact angle α= 32⁰, the following equations are available:

$P_r = F_r + 0{,}73\ F_a$, kN, for $F_a/F_r \leq 0{,}86$
$P_r = 0{,}62\ F_r + 1{,}17\ F_a$, kN, for $F_a/F_r > 0{,}86$

For double row angular contact ball bearins series 33D with a contact angle α= 45⁰, the following equations are used:

$P_r = F_r + 0{,}47\ F_a$, kN, for $F_a/F_r \leq 1{,}33$
$P_r = 0{,}54\ F_r + 0{,}81\ F_a$, kN, for $F_a/F_r > 1{,}33$

For double row angular contact ball bearins with a contact angle α= 40⁰, the following equations are used:

$P_r = F_r + 0{,}55\ F_a$, kN, for $F_a/F_r \leq 1{,}14$
$P_r = 0{,}57\ F_r + 0{,}93\ F_a$, kN, for $F_a/F_r > 1{,}14$

Axial clearance of the doulbe row angular contact ball bearings

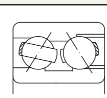
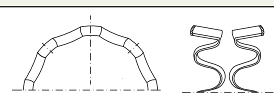
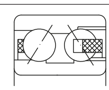
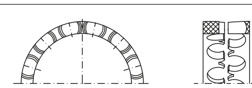
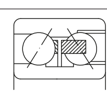
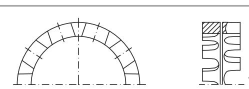
Table 1

Outer diameter d		**Series 32 and 33 C2**		**Normal**		**C3**		**Series 33D Normal**		**C3**	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm									
-	**10**	1	11	5	21	12	28	11	28	20	37
10	**18**	1	12	6	23	13	31	13	31	23	41
18	**24**	2	14	7	25	16	34	14	32	24	42
24	**30**	2	15	8	27	18	37	16	35	27	46
30	**40**	2	16	9	29	21	40	18	38	30	50
40	**50**	2	18	11	33	23	44	22	44	36	58
50	**65**	3	22	13	36	26	48	25	48	40	63
65	**80**	3	24	15	40	30	54	29	54	48	71
80	**100**	3	26	18	46	35	63	35	63	55	83
100	**110**	4	30	22	53	42	73	42	73	65	96

Radial clearance = 0,6 axial clearance

Cages design and some technical data

Table 2

Cage	**Design** bearing	cage	**Application**	**Max. value** $D_m\ n$ oil	grease
Pressed sheet cage			- General application - Bearings series 32, 33	450×10^3	350×10^3
Polyamide cage TN			- General application - Bearings series 32, 33	1000×10^3	800×10^3
Machined brass cage M			- General application - Bearings dimensions 3319-3322, 3305D-3318D	800×10^3	600×10^3

Equivalent static radial load

For double row angular contact ball bearings series 32 and 33 with a contact angle $\alpha = 32^0$:

$$P_{0r} = F_r + 0{,}63\ F_a,\ \text{kN}$$

For double row angular contact ball bearings series 33D with a contact angle $\alpha = 45^0$:

$$P_{0r} = F_r + 0{,}46\ F_a,\ \text{kN}$$

For double row angular contact ball bearings with a contact angle $\alpha = 40^0$:

$$P_{0r} = F_r + 0{,}52\ F_a,\ \text{kN}$$

Abutment dimensions

For a proper location of bearing rings on the shaft and housing shoulder respectively, shaft (housing) maximum radius $r_{u\ max}$ should be less than bearing minimum mounting chamfer $r_{s\ min}$.

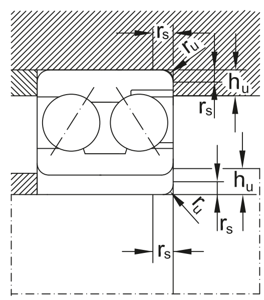
Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

The values of the connexion radii and support shoulder height are given in table 3.

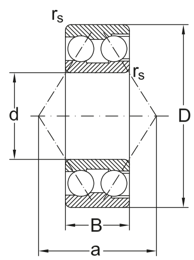
Abutment dimensions

Table 3

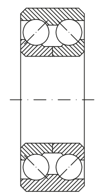
r_s min.	r_u max.	h_u min. Bearing series 32; 33; 33D
mm		
0,6	0,6	2,1
1	1	2,8
1,1	1,1	3,5
1,5	1,5	4,5
2	2	5,5
2,1	2,1	6
3	2,5	7



Angular contact ball bearings, double row



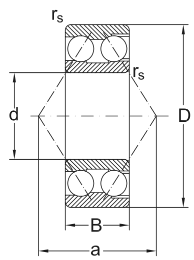
32;33



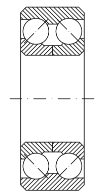
33D

Dimensions					Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm					kN		min^{-1}		-	Kg
10	30	14,3	0,6	19	7,8	3,9	16000	22000	**3200**	0,050
12	32	15,9	0,6	22	10,6	5,1	15000	20000	**3201**	0,060
15	35	15,9	0,6	23	11,8	6,1	13000	18000	**3202**	0,070
	42	19	1	27	16,3	8,7	10000	15000	**3302**	0,130
17	40	17,5	0,6	27	14,6	7,8	10000	15000	**3203**	0,100
	47	22,2	1	31	20,8	10,6	9500	14000	**3303**	0,190
20	47	20,6	1	31	19,6	10,8	9000	13000	**3204**	0,170
	52	22,2	1,1	34	23,2	12,9	8500	12000	**3304**	0,230
	52	22,2	1,1	46	24	11	8500	12000	**3304 D**	0,230
25	52	20,6	1	35	21,2	12,7	8000	11000	**3205**	0,190
	62	25,4	1,1	40	29,2	17,3	7500	10000	**3305**	0,370
	62	25,4	1,1	57	30	19	7500	10000	**3305 D**	0,380
30	62	23,8	1	41	28,1	18,3	7000	9500	**3206**	0,310
	72	30,2	1,1	47	38	24,5	6300	8500	**3306**	0,580
	72	30,2	1,1	67	41,5	30	6300	8500	**3306 D**	0,600
35	72	27	1,1	47	39	25	6000	8000	**3207**	0,480
	80	34,9	1,5	54	51	30	5600	7500	**3307**	0,780
	80	34,9	1,5	76	58	38	5600	7500	**3307 D**	0,780
40	80	30,2	1,1	52	48	31,5	5600	7500	**3208**	0,650
	90	36,5	1,5	58	62	39	5000	6700	**3308**	1,05
	90	36,5	1,5	84	70	45	5000	6700	**3308 D**	1,15
45	85	30,2	1,1	56	49	32,5	5000	6700	**3209**	0,700
	100	39,7	1,5	64	71	57	4500	6000	**3309**	1,41
	100	39,7	1,5	93	78	51	4500	6000	**3309 D**	1,61
50	90	30,2	1,1	59	51	36	4800	6300	**3210**	0,740
	110	44,4	2	73	85	75	4000	5300	**3310**	1,90
	110	44,4	2	102	90	72	4000	5300	**3310 D**	2,05
55	100	33,3	1,5	64	54	55	4300	5600	**3211**	1,05
	120	49,2	2	80	98	88	3600	4800	**3311**	2,48
	120	49,2	2	114	104	81,5	3600	4800	**3311 D**	2,68
60	110	36,5	1,5	71	69,5	72	3800	5000	**3212**	1,36
	130	54	2,1	86	114	112	3400	4500	**3312**	3,17
	130	54	2,1	123	116	104	3400	4500	**3312 D**	3,42
65	120	38,1	1,5	76	73,5	83	3600	4800	**3213**	1,76
	140	58,7	2,1	94	129	130	3200	4300	**3313**	4,01
	140	58,7	2,1	132	135	117	3200	4300	**3313 D**	4,31

Angular contact ball bearings, double row



32;33



33D

Dimensions					Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	a	dyn. C_r	stat. C_{0r}	grease	oil		
mm					kN		min^{-1}		-	Kg
70	125	39,7	1,5	81	81,5	91,5	3200	4300	**3214**	1,93
	150	63,5	2,1	101	143	146	2800	3800	**3314**	5,04
	150	63,5	2,1	142	159	130	2800	3800	**3314 D**	5,40
75	130	41,3	1,5	84	85	98	3200	4300	**3215**	2,08
	160	68,3	2,1	107	163	166	2600	3600	**3315**	6,16
	160	68,3	2,1	140	179	150	2600	3600	**3315 D**	6,66
80	140	44,4	2	91	95	110	2800	3800	**3216**	2,64
	170	68,3	2,1	112	176	186	2400	3400	**3316**	6,93
	170	68,3	2,1	149	192	170	2400	3400	**3316 D**	7,53
85	150	49,2	2	97	112	132	2600	3600	**3217**	3,39
	180	73	3	119	190	200	2200	3200	**3317**	8,30
	180	73	3	155	208	193	2200	3200	**3317 D**	9,00
90	160	52,4	2	104	125	146	2400	3400	**3218**	4,14
	190	73	3	125	216	240	2000	3000	**3318**	9,23
	190	73	3	166	228	216	2000	3000	**3318 D**	10,0
95	170	55,6	2,1	111	140	163	2200	3200	**3219**	5,00
	200	77,8	3	133	220	245	1900	2800	**3319**	11,4
100	180	60,3	2,1	118	160	196	2000	3000	**3220**	6,10
	215	82,6	3	139	240	280	1800	2600	**3320**	14,2
110	200	69,8	2,1	132	190	228	1900	2800	**3222**	8,79
	240	92,1	3	153	280	400	1800	2600	**3322**	19,0

Four Point Contact Ball Bearings

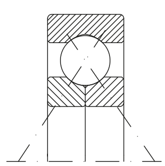
Standards, Boundary dimensions

Standard plans DIN 616
Single row angular contact ball bearings
Four point contact ball bearings
DIN 628

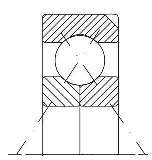
General

Four Point Contact Ball Bearings belong to the single row angular contact ball bearings family. But, unlike bearings of the series 7.., four point contact bearings are double - acting. This means they are able to support thrust loads in either direction including minor radial loads.

URB Four Point Contact Bearings of the **QJ design** have **split inner rings** to allow the bearing to accept the maximum number of large balls. Due to the split inner rings these bearings are separable. This brings some mounting advantages. Beacause the bearing outher ring with cage and ball set, and the inner ring halves may be mounted separately.



QJ ...



QJ ...N2

Design variants

Four Point contact ball bearings are frequently used to accomodate trust loads only.

To avoid unforeseen radial loading to the bearing they used to be mounted either reduced outside bearing ring diameters or to oversized housing seats.

To prevent the outer ring from rotating with the shaft, for point contact ball bearing outer rings are often produced with locating slots.

For this reason, **URB four point contact bearings** with outer diameters of more then ϕ160 mm are produced with two locating slots in their outer ring (suffix **N2**).

Special series of four point contact ball bearings are available on request represented by the series **QJ 10** and four point contact ball bearings with split outer ring (Series **Q**).

Misalignment

Four point contact ball bearings are less suitable to operate with misaligments.

When there are used in combination with a radial bearing as pure thrust bearings, however, they must not be exposed to any misalignment.

Tolerances

URB four point contact ball bearings are produced to normal class tolerance (**PN**) as standard.

Other tolerance classes, such as **P6** or **P5** are available upon request.

Cages

Unless otherwise specified, **URB** - four point contact ball bearings are fitted with machined solid brass cages (suffix **MPA**) as standard.

Also, other cage types and materials are produced to order; Machined steel solid cage (Suffix **F**) machined light metal alloy solid cage (Suffix **L**) moulded Polyamide cage (Suffix **TVP**).

Internal clearance

URB four point contact ball bearings are produced to axial clearance group **CN** (Normal) as standard.

URB also produce four point contact ball bearings with enlarged (axial clearance groups **C3** or **C4**) and/or with reduced axial clearance (Clearance group **C2**) on request.

Values for these clearance groups are listed in **table below.**

*Internal **axial** clearance groups of **URB Four Point Contact Ball Bearings** (Clearances are in **[µm]**)*

Bore diameter [mm]		>	-	18	40	60	80	100	140	180	220
		≤	18	40	60	80	100	140	180	220	260
Clearance group	C2	min	20	30	40	50	60	70	80	100	120
		max	60	70	90	100	120	140	160	180	200
Clearance group (NORMAL)	CN	min	50	60	80	90	100	120	140	160	180
		max	90	110	130	140	160	180	200	220	240
Clearance group	C3	min	80	100	120	130	140	160	180	200	220
		max	120	150	170	180	200	220	240	260	300
Clearance group	C4	min	115	135	155	165	185	205	225	250	275
		max	165	185	205	225	245	265	295	325	355

Special clearance

For applications not covered by the standard clearances groups or where bearings with standard clearances do not achieve optimum perform, **URB** four point contact ball bearings may also be supplied with special internal clearances.

Example:
A80.150 Special axial internal clearance. Axial clearance of; **80** to **150** microns (µm)

If required, the range of internal clearance values may be grouped to a specific part within a clearance group.

Example:
C2L axial clearance reduced to the **Lower part** of the **C2** clearance group.

Minimum load

Four point contact ball bearings are suitable to operate at high speeds. For optimum contacting behaviours, however, four point contact ball bearings should be mainly exposed to axial acting loads.

An effective function is given, when

$F_a \geq 1{,}27 * F_r$

If this ratio is not attained or achieved high sliding friction may occur in the bearing and thus generate high noise and excessive wear.

To function effectively, four point contact bearings should run under minimum bearing load of approximately **2 per cent** of the dynamic load rating (**C_r**).

Equivalent dinamic bearing load

In the case of four point contact ball bearings the following formula should be used:

when

$F_a/F_r \leq 0{,}95$ then $\mathbf{P = F_r + 0{,}66 * F_a}$

or, when

$F_a/F_r > 0{,}95$ then $\mathbf{P = 0{,}6 * F_r + 1{,}07 * F_a}$

Equivalent static bearing load

$P_0 = F_r + 0{,}58 * F_a$

Abutment and fillet dimensions

Four point contact ball bearings are often used to accommodate thrust loads, so they do require optimum support of the bearings rings by the machine components surrounding the bearing.

To gain adequate support the shaft and housing shouders required a certain minimum height.

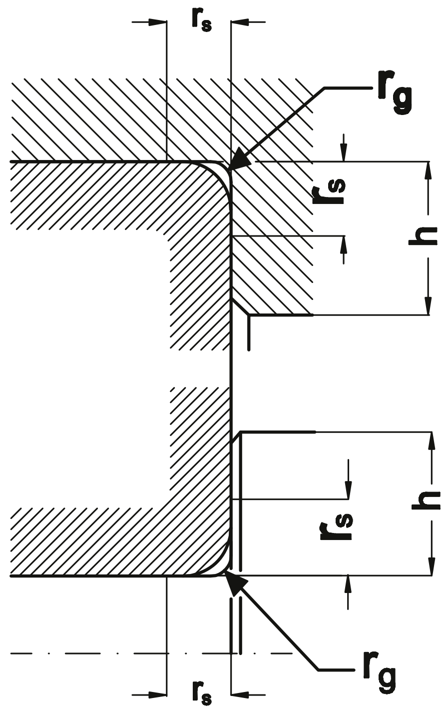
The bearing rings, however, must only contact adjacent parts with there side faces.

The radii of bearings corners must not touch the corner fillet radii of either the shaft or housing shoulders. Therefore, the largest fillet radius ($\mathbf{r_g}$ or $\mathbf{r_{g1}}$, respectively) must always be smaller than the minimum fillet dimensions of the bearing rings ($\mathbf{r_s}$). Recommandations for the dimensions of adjacent parts listed in **DIN 5418**, the values for the bearing fillet dimensions are stated in the bearing tables.

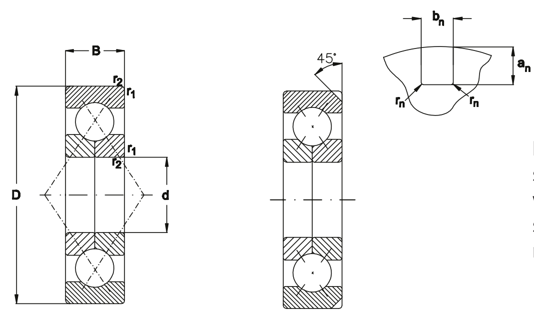
Abutment and fillet dimensions for Four Point contact Ball bearings

All dimensions are in [mm]

$r_{s\ min}$	$r_{g\ max}$	h_{min} Bearing Series QJ 2.. QJ 3..
1,1	1	3,5
1,5	1,5	4,5
2	2	5,5
2,1	2,1	6
3	2,5	7
4	3	8,5
5	4	10



Four Point Contact Ball Bearings



QJ ...   QJ ...N2

For D≥160 mm standard design with 2 location slots in outer ring (N2)

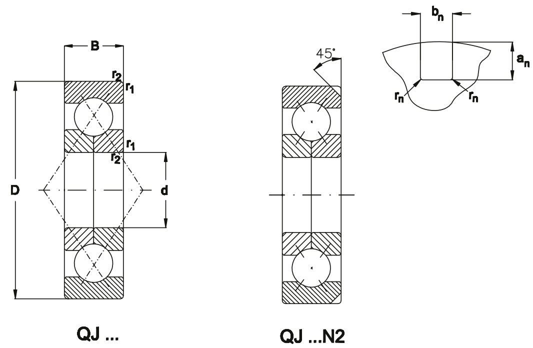
Dimensions								Basical radial load		Speed limit		Designation	Mass
								dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	a	a_n	b_n	r_n	C_r	C_{0r}				
mm								kN		min $^{-1}$			kg
20	52	15	1,1	26	-	-	-	30	19,6	10000	15000	**QJ304**	0,18
25	52	15	1	27	-	-	-	25,5	18,6	9500	14000	**QJ205**	0,17
	62	17	1	31	-	-	-	44	31,5	9500	13500	**QJ305**	0,25
30	62	16	1	32	-	-	-	36,5	27	8500	12000	**QJ206**	0,30
	72	19	1,1	36	-	-	-	58,5	43	7500	10000	**QJ306**	0,37
35	72	17	1,1	38	-	-	-	41,5	35,5	7500	10000	**QJ207**	0,46
	80	21	1,5	41	-	-	-	62	51	7000	9500	**QJ307**	0,50
40	80	18	1,1	42	-	-	-	54	45,5	6700	9000	**QJ208**	0,39
	90	23	1,5	46	-	-	-	86,5	68	6300	8500	**QJ308**	0,69
45	85	19	1,1	45	-	-	-	64	57	6300	8500	**QJ209**	0,48
	100	25	1,5	51	-	-	-	102	83	5600	7500	**QJ309**	0,95
50	90	20	1,1	49	-	-	-	58,5	56	5600	7500	**QJ210**	0,64
	110	27	2	56	-	-	-	110	91,5	5000	6700	**QJ310**	1,37
55	100	21	1,5	54	-	-	-	80	75	5300	7000	**QJ211**	0,68
	120	29	2	61	-	-	-	127	108	4500	6000	**QJ311**	1,74
60	110	22	1,5	60	-	-	-	91,5	93	4800	6300	**QJ212**	0,87
	130	31	2,1	67	-	-	-	146	127	4300	5600	**QJ312**	2,18
65	120	23	1,5	65	-	-	-	104	100	4300	5600	**QJ213**	1,24
	140	33	2,1	72	-	-	-	163	146	4000	5300	**QJ313**	2,69
70	125	24	1,5	68	-	-	-	118	132	4300	5600	**QJ214**	1,39
	150	35	2,1	77	-	-	-	183	166	3600	4800	**QJ314**	3,25
75	130	25	1,5	72	-	-	-	125	129	4000	5300	**QJ215**	1,77
	160	37	2,1	82	10,1	8,5	2	212	204	3400	4500	**QJ315 N2**	3,93
80	140	26	2	77	-	-	-	132	137	3600	4800	**QJ216**	1,8
	170	39	2,1	88	10,1	8,5	2	220	216	3200	4300	**QJ316 N2**	4,61

Four Point Contact Ball Bearings

Abutment and fillet dimensions see on page 198

Dimensions								Basical radial load		Speed limit		Designation	Mass
								dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	a	a_n	b_n	r_n	C_r	C_{0r}				
mm								kN		min^{-1}			kg
85	150	28	2	82	-	-	-	153	160	3400	4500	**QJ217**	2,25
	180	41	3	93	11,7	10,5	2	245	255	3000	4000	**QJ317 N2**	5,49
90	160	30	2	88	8,1	6,5	1	173	200	3200	4300	**QJ218 N2**	2,89
	190	43	3	98	11,7	10,5	2	255	265	2800	3800	**QJ318 N2**	6,34
95	170	32	2,1	93	8,1	6,5	1	196	228	3000	4000	**QJ219 N2**	3,37
	200	45	3	103	11,7	10,5	2	285	310	2600	3600	**QJ319 N2**	7,4
100	180	34	2,1	98	10,1	8,5	2	224	260	2800	3800	**QJ220 N2**	4,03
	215	47	3	110	11,7	10,5	2	325	365	2400	3400	**QJ320 N2**	8,98
105	190	36	2,1	103	10,1	8,5	2	232	260	2700	3700	**QJ221 N2**	6,11
110	200	38	2,1	109	10,1	8,5	2	250	305	2400	3600	**QJ222 N2**	5,67
	240	50	3	123	11,7	10,5	2	345	416	2000	3000	**QJ322 N2**	12,2
120	215	40	2,1	117	11,7	10,5	2	285	360	2200	3200	**QJ224 N2**	6,74
	260	55	3	133	11,7	10,5	2	380	480	1900	2800	**QJ324 N2**	15,6
130	230	40	3	127	11,7	10,5	2	290	390	1900	2800	**QJ226 N2**	7,67
	280	58	4	144	12,7	10,5	2	425	570	1800	2600	**QJ326 N2**	19,2
140	250	42	3	137	11,7	10,5	2	315	415	1800	2600	**QJ228 N2**	9,69
	300	62	4	154	12,7	10,5	2	475	655	1700	2400	**QJ328 N2**	23,2
150	270	45	3	147	11,7	10,5	2	345	480	1700	2400	**QJ230 N2**	12,2
	320	65	4	165	12,7	10,5	2	510	750	1600	2200	**QJ330 N2**	27,8
160	290	48	3	158	12,7	10,5	2	375	530	1600	2200	**QJ232 N2**	20
	340	68	4	175	12,7	10,5	2	585	865	1500	2100	**QJ332 N2**	32,5
170	310	52	4	168	12,7	10,5	2	425	630	1600	2200	**QJ234 N2**	18,9
	360	72	4	186	12,7	10,5	2	585	915	1400	1900	**QJ334 N2**	38,4
180	320	52	4	175	12,7	10,5	2	430	670	1500	2000	**QJ236 N2**	23,1
	380	75	4	196	12,7	10,5	2	680	1080	1300	1800	**QJ336 N2**	44,9

Four Point Contact Ball Bearings



For D≥160 mm standard design with 2 location slots in outer ring (N2)

Dimensions								Basical radial load		Speed limit		Designation	Mass
								dyn.	stat.	grease	oil		
d	D	B	r_1, r_2 min.	a	a_n	b_n	r_n	C_r	C_{0r}				
mm								kN		min $^{-1}$			kg
190	340	55	4	186	12,7	10,5	2	465	750	1400	1900	**QJ238 N2**	24
200	360	58	4	196	12,7	10,5	2	510	850	1300	1800	**QJ240 N2**	33,3
220	400	65	4	217	12,7	10,5	2	630	1120	1250	1700	**QJ244 N2**	49,3
240	440	72	4	238	15	12,5	2,5	680	1270	1100	1500	**QJ248 N2**	68,3

URB

Cylindrical roller bearings

Cylindrical roller bearings are manufactured in a various range of constructive types and sizes, particularly single row cylindrical roller bearings but also two or more row cylindrical roller bearings but also two or more row cylindrical roller bearings, with cages or roller by roller, as shown in the designs below.

In case of cylindrical roller bearings, the rollers are laterally guided by the fixed ribs of one ring.

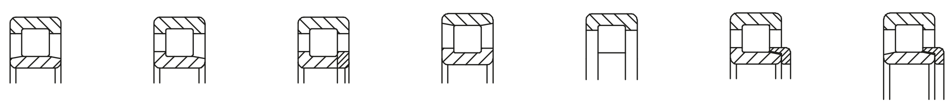
In case of bearings with cages, the ring with ribs and the rollers retained in the cage can be drawn out from the other ring, which means that these bearings are dismountable.

Therefore, bearings from joints can be much easier mounted and dismounted, especially were interference fits are needed for both rings due to the loading conditions.

Bearings are provided with unloaded rollers at both generatrix ends. Therefore, the linear contact between rollers and rings alters advantageously, i.e. peripheral stresses are avoided.

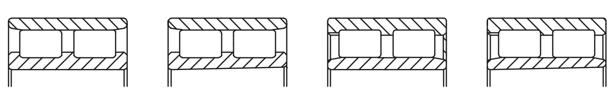
- single row
- double row
- without cage (full complement)

- single row



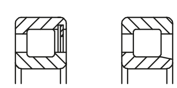
NU NJ NUP N RNU NJ+HJ NU+HJ

- double row



NN30 NN30K NNU49 NNU49K

- without cage (full complement)



NCF V NJ VH

Suffixes

AR - Grinding addition on the inner ring raceway

B - Cylindrical roller bearings with extended inner ring

C2 - Radial clearance smaller than normal, bearings with interchangable elements

C2NA - Radial clearance smaller than normal, bearings with non-interchangable elements

C3 - Radial clearance larger than normal, bearings with interchangable elements

C3NA - Radial clearance larger than normal, bearings with non-interchangable elements

D - Two-pieces inner ring

E - Cylindrical roller bearings, E - design (increased basic static and dynamic loads)

F - Machined steel or special cast iron cage

F2 - Constructive modification

K - Tapered bore bearing
M - Machined brass cage guided on the rolling elements
M6 - Machined brass cage with integral rivets
MA - Machined brass cage guided in the outer ring
MA6 - Machined brass cage with integral rivets guided on outer ring
MB - Machined brass cage guided in the inner ring
MPA - Machined brass cage (one-piece)
N - Circular groove in the outer ring for snap ring
NA - Radial clearance, non-interchangable elements
NR - Circular groove in the outer ring and snap ring
P - Two-pieces outer ring
P5 - Tolerance class more accurate than normal (P6)
P51 - Tolerance class P5 and radial clearance C1
P53 - Tolerance class P5 and radial clearance C3
P4 - Tolerance class more accurate than P5
P41 - Tolerance class P4 and radial clearance C1
R... - Non-standardized radial clearance (e.g. R45...85)
TN - Polyamide cage
V - Roller bearing without cage (full complement)
VH - Self-retaining roller bearing without cage
W20 - Lubrication holes in the outer ring
W518 - Lubrication holes in the outer and inner ring
W5 - Lubrication groove and holes in both rings
W513 - Lubrication groove and holes in the outer ring and lubrication holes in the inner ring W513 = W33 +W26
W7 - Locating holes
W8 - Lubrication groove on the outer ring side surfaces
W9 - Lubrication groove on the inner ring side surfaces
W20 - Lubrication holes in the outer ring
W33 - Lubrication groove and holes on the outer ring
W44 - Lubrication groove and holes on the inner ring
W339 - W9 + W33
ZS - NA radial clearance; changing the bearing elements, the clearance can be obtained from the interchangeable elements.

Single or more rows cylindrical roller bearings

Single or more rows cylindrical roller bearings are manufactured by URB in various constructive versions, depending on the position of the ribs on rings. The four basic designs (NU, NJ, N and NUP) are given in the bearing tables.

Bearings of NU design have two fixed ribs on the outer ring and one smooth inner ring. Bearings of N design have two fixed ribs on the inner ring and one smooth outer ring. These designs allow an axial displacement in certain limits, of the shaft in relation to the housing. Therefore, these rolling bearings are used in non-locating bearing units.

Bearings of NJ design have two fixed ribs on the outer ring and a fixed rib on the inner ring which can guide the shaft in a single direction (axially).

Bearings of NUP design have also two fixed ribs on the outer ring and, on the inner ring, a fixed rib and a support washer. This way they can be used as locating bearings, guiding the shaft axially in both directions.

For a shaft guiding in a single direction, it also can be used a bearing of NU design which is combined with a support washer. Thus, the constructive version NUJ is obtained.

Support washers on both sides of a bearing of NU design are not allowed as they lead to an axial blocking of the rollers.

Cylindrical roller bearings can carry heavy radial loads and can operate at high speeds.

Double or more rows cylindrical roller bearings have small sections, high load carrying capacity and stiffness.

These bearings provide high stiffness and maximum load carrying capacity and are particularly used for tool holders of the machine-tools and rolling mills.

Double row cylindrical roller bearings series NNU49 and NN30 are generally manufactured to tolerance classes P5 and SP, used for machine tools.

Large-sized bearings series NNU49 are also manufactured to the normal tolerance class.

Cylindrical roller bearings with snap ring groove

Single row cylindrical roller bearings are also manufactured with snap ring grooves on the outer rings. This design simplifies the bearing joint as the bearings are located into the housing by means of the snap rings. The snap ring groove and snap rings are in accordance with ISO 464, and tables 7 and 8 on page 89 and 91.

Cylindrical roller bearings without cage (full complement)

These bearings incorporate the maximum number of rollers and have a small section in relation to their width.

This provides a high load carrying capacity and allows space-saving designs to be achieved.

Cylindrical roller bearings without cage cannot be used at speeds as high as those with cages. These bearings are manufactured with single or more row rollers and suffix V is added to the bearing designation. The most utilized bearings are those of series NCF29 V, NCF30 V and NJ23VH and they are given in this catalogue on page 259.

Dimensions

The main dimensions of standardized bearings given in tables are in accordance with ISO 15.

Misalignment

The modfied contact between rollers and raceway allows not only peripheral stresses to be avoided but also, in case of single row roller bearings, permits an angular misalignment of the outer ring with respect to the inner ring, depending on the bearing series and load according to the table 1.

Permisible misalignment

Table 1

Bearings series	**Permisible misalignment** $P \leq 0{,}1\ C_r$	$P > 0{,}1\ C_r$
NU10, NU2, NU3, NU4, NU2E, NU3E	max. 3'	max. 7'
NU22, NU23, NU22E, NU23E	max. 2'	max. 4'
N, NJ, NUP design, all series	max. 2'	max. 4'

Tolerances and radial clearance

Single row cylindrical roller bearings are usually manufactured to normal tolerance class with normal radial clearance.

They can also be manufactured to more accurate tolerance classes and with larger (C3NA and C4NA) or smaller (C1NA and C2NA) radial clearances.

Radial clearance for single and double row cylindrical roller bearings and needle roller bearings

With interchangeable elements

With cylindrical bore[1)]

Table 2

Bore diameter d		**Clearance group symbol** **C2**		**Normal**		**C3**		**C4**		**C5**	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm									
	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	10	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
500	**560**	120	240	240	360	360	480	480	600	660	780
560	**630**	140	260	260	380	380	500	500	620	675	795
630	**710**	145	285	285	425	425	565	565	705	705	845
710	**800**	150	310	310	470	470	630	630	790	790	950
800	**900**	180	350	350	520	520	690	690	860	860	1030
900	**1000**	200	390	390	580	580	770	770	960	960	1150
1000	**1120**	220	430	430	640	640	850	850	1060	1060	1270
1120	**1250**	230	470	470	710	710	950	950	1190	1190	1430
1250	**1400**	270	530	530	790	790	1050	1050	1310	1310	1570
1400	**1600**	330	610	610	890	890	1170	1170	1450	1450	1730

1) Radial clearance for bearings with tapered bore is staggered with one group to the right, for example radial clearance C3 for cylindrical bore bearings match Normal radial clearance for tapered bore bearings.

Tolerances of cylindrical roller bearings are given on pages 28.

Radial clearances according to international standard ISO 5753 are given in tales 2 and 3 for cylindrical bore bearings both with interchangeable rings and with non-interchangeable rings (NA).

Cages

Small and medium-sized single row cylindrical roller bearings are generally fitted with pressed sheet cages.

Large-sized bearings are fitted with machined brass cages of normal design, i.e. cages of separable design guided on rolling elements M, on the outside surface MA or inner surface MB.

In case of heavy loads and high speeds, cages are made in one piece.

Glass fibre reinforced polyamide 6.6 cages, are succesfully used for small and medium-sized bearings, if the operating temperature doesn't exceed + 120^{0}C. These cages have low mass, low coefficient of friction and are noiseless while running.

Cage design and some technical data are given in table 4.

Radial clearance for single and double row cylindrical roller bearings and needle roller bearings

With non-interchangeable elements
With cylindrical bore[1)]

Table 3

Bore diameter		**Clearance group symbol**											
d		**C1NA**		**C2NA**		**NA**		**C3NA**		**C4NA**		**C5NA**	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm											
2,5	**6**	0	7	8	15	15	15	30	40	40	50		
6	**10**	0	7	10	20	20	30	35	45	45	55		
10	**14**	0	10	10	20	20	30	35	45	45	55		
14	**24**	5	15	10	20	20	30	35	45	45	55	65	75
24	**20**	5	15	10	25	25	35	40	50	50	60	70	80
30	**40**	5	15	12	25	25	40	45	55	55	70	80	95
40	**50**	5	18	15	30	30	45	50	65	65	80	95	110
50	**65**	5	20	15	35	35	50	55	75	75	90	110	130
65	**80**	10	25	20	40	40	60	70	90	90	110	130	150
80	**100**	10	30	25	45	45	70	80	105	105	125	155	180
100	**120**	10	30	25	50	50	80	95	120	120	145	180	205
120	**140**	10	35	30	60	60	90	105	135	135	160	200	230
140	**160**	10	35	35	65	65	100	115	150	150	180	225	260
160	**180**	10	40	35	75	75	110	125	165	165	200	250	285
180	**200**	15	45	40	80	80	120	140	180	180	220	275	315
200	**225**	15	50	45	90	90	135	155	200	200	240	305	350
225	**250**	15	50	50	100	100	150	170	215	215	265	330	380
250	**280**	20	55	55	110	110	165	185	240	240	295	370	420
280	**315**	20	60	60	120	120	180	205	265	265	325	410	470
315	**355**	20	65	65	135	135	200	225	295	295	360	455	520
355	**400**	25	75	75	150	150	225	255	330	330	405	510	585
400	**450**	25	85	85	170	170	255	285	370	370	455	565	650
450	**500**	25	95	95	190	190	285	315	410	410	505	625	720
500	**560**	25	100	105	210	210	315	350	455	455	560	720	815
560	**630**	30	110	115	230	230	345	390	505	505	620	800	910
630	**710**	30	130	130	260	260	390	435	565	565	695	900	1030
710	**800**	35	140	145	290	290	435	485	630	630	775	1000	1140
800	**900**	35	160	160	320	320	480	540	700	700	860	1130	1290
900	**1000**	35	180	180	360	360	540	600	780	780	960	1270	1440
1000	**1120**	50	200	200	400	400	600	660	860	860	1060	1380	1560
1120	**1250**	60	220	220	440	440	660	730	950	950	1170	1520	1720
1250	**1400**	60	240	240	480	480	720	810	1050	1050	1290	1680	1900
1400	**1600**	70	270	270	540	540	810	910	1190	1190	1460	1900	2150

1) Radial clearance for bearings with tapered bore is staggered with one group to the right, for example radial clearance C3NA for cylindrical bore bearings match radial clearance NA for tapered bore bearings.

Minimum load

Cylindrical roller bearings must be subjected to a given minimum load, so that a proper operation of these bearings can be guaranteed.

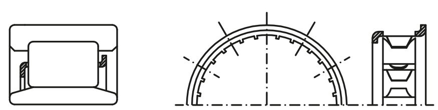
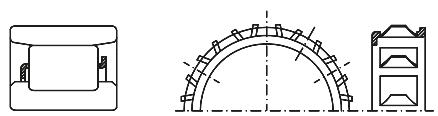
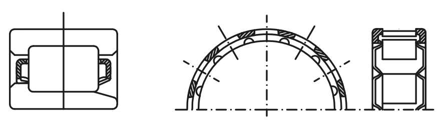
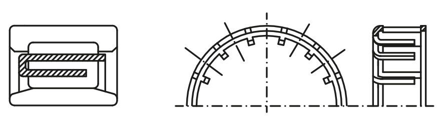
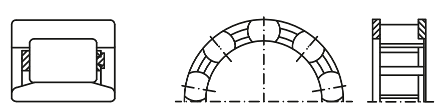
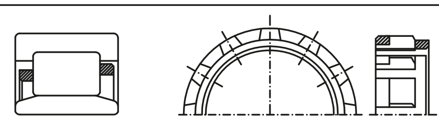
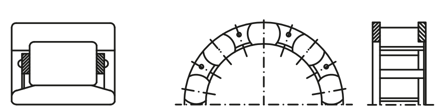
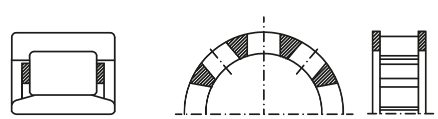
This is necessary especially as the bearings are operated at high speeds and the centrifugal forces produce additional friction in bearing due to the sliding between rollers and raceway.

The values of the minimum load can be enough accurately calculated using the equation:

$$F_{rm} = 0{,}02\ C_r,\ kN$$

Cage design and some technical data

Table 4

Cage	Design bearing / Cage	Application	Max. value $D_m n$ oil	grease
Pressed sheet cage with fins		- General application - Low inertia - Provides proper bearing lubrication - Moderate speeds - Bearings NU, NJ, NUP	$550x10^3$	$400x10^3$
Pressed sheet cage with fins		- General application - Low inertia - Provides proper bearing lubrication - Moderate speeds - Bearings N	$550x10^3$	$400x10^3$
Pressed sheet cage		- General application - Low inertia - Provides proper bearing lubrication - Moderate speeds - Bearings construction E tipe NU, NJ, NUP	$550x10^3$	$400x10^3$
Pressed sheet cage with fins		- General application - Low inertia - Provides proper bearing lubrication - Moderate speeds - Bearings NU, NJ, NUP	$550x10^3$	$400x10^3$
Two piece machined cage with integral rivets M6, MA6		- General application - Heavy loads - Moderate and high speeds	$1200x10^3$	$900x10^3$
Polyamide cage TN		- General application - Low frictional moment - High speeds - Low noise T < 120° C	$1400x10^3$	$1100x10^3$
Two piece machined riveted cage M, MA, MB		- General application - Heavy loads - Moderate and high speeds - Bearings with d > 100 mm	$1200x10^3$	$900x10^3$
One piece machined brass cage MPA		-General application - Heavy loads - Provides proper lubrication - High speeds	$1400x10^3$	$1100x10^3$

Equivalent dynamic radial load

For cylindrical roller bearings purely radially loaded which don't locate shafts axially, equivalent dynamic load is:

$P_r = F_r$, kN

If cylindrical roller bearings have ribs on the outer and inner rings and locate shafts axially in one or both directions, equivalent dynamic load can be calculated using the equations:

$P_r = F_r$, kN, when $F_a/F_r \leq e$
$P_r = 0{,}92\ F_r + Y\ F_a$, kN, when $F_a/F_r > e$

where:
e - calculation factor with values:
- 0,2 for series 10,2,3 and 4
- 0,3 for series 22,23

Y - factor for axial load
- 0,6 for series 10,2,3 and 4
- 0,4 for series 22,23

Cylindrical roller bearings axially loaded run satisfactorily only if they are simultaneously radially loaded. Ratio F_a/F_r should not exceed 0,5 for bearings of E design and 0,4 for the other bearings.

Equivalent static radial load

For cylindrical roller bearings purely radially loaded, equivalent static load is:

$P_{0r} = F_r$, kN

Dynamic axial load

Bearings with ribs on the outer ring can accommodate axial loads in addition to radial loads. The axial load carryng capacity of cylindrical roller bearings do not depend essentially on the steel fatigue strength, but on the resistance of the sliding surfaces at the roller end and rib contact and therefore on lubrication, operating temperature and bearing thermal conductivity.

Considering the above mentioned, axial load carrying capacity of a cylindrical roller bearing can be enough accurately calculated usign the following equation:

$$F_{a\,max} = \frac{k_1 C_{0r} 10^4}{n\,(d + D)} - k_2 F_r\ ,$$

where:

$F_{a\,max}$ - maximum permissible axial load, kN
C_{0r} - radial static load, kN
F_r - radial load component, kN
n - operating speed, r/min
d - bearing bore diameter, mm
D - bearing outside diameter, mm
k_1 - auxiliary factor, see table 5
k_2 - auxiliary factor, see table 5

The above equation is based on conditions which are considered typical for normal bearing operation:
- a difference of 60⁰C between the bearing operating temperature and the ambient temperature
- a specific heat loss from the bearing of 0,5 mW/mm^2 ⁰C
- a viscozity ratio k=2.

The viscosity ratio k is the ratio of the actual viscosity at the operating temperature to the requisite viscosity for a proper lubrication at that temperature. Further details can be found in subchapter "Adjusted rating life", life adjustment factor a_{23} - on page 22.

In case of grease lubrication, the base oil viscosity of the grease should be used. These effects can be reduced at low speeds by using oils with EP additives.

Factors k_1 and k_2

Table 5

Factor	Lubrication	
	oil	grease
Bearings construction E		
k_1	1,5	1
k_2	0,15	0,1
Other bearings		
k_1	0,5	0,3
k_2	0,05	0,03

The values of permissible axial load $F_{a\ max}$ obtained from the equation above mentioned are valid for a continuously acting constant axial load. If axial loads act only for short periods, the values may be multiplied by 2 or for shock loads by 3.

The constantly acting axial load $F_{a\,max}$ (N) should never exceed the numerical value of 1,2 D^2 (D = bearing outside diameter, mm) and occasional shock loads should never be greater than the numerical value of $3D^2$.

In case of heavy axial loads ($F_a > D^2$), the ribs of the outer and inner ring respectively are recommended to be supported by the bearing adjoint parts. Bearings of NUP and NJ+HJ designs which take axial loads in both directions are to be placed so that main axial loads should be taken by fixed ribs, if bearing design allows.

Heat treatment

Cylindrical roller bearings with outside diameter D > 240 mm of all series given in the catalogue are to be subject to a heat treatment of sress relieving which allows bearings to be operated up to a temperature of +150⁰C.

The hardness of rigs should not be less 59 HRC.

Small-sized bearings operate normally up to +120⁰C.

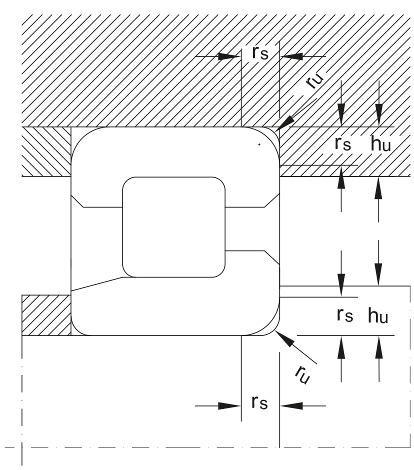
Abutment dimensions

For a proper location of bearing rings on the shaft and housing shoulder respectively, shaft (housing) maximum radius $r_{u\ max}$ should be less than bearing minimum mounting chamfer $r_{s\ min}$.

Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

The values of the connection radius and support shoulder height are given in table 6.

Abutment dimensions for single row cylindrical roller bearings are given in table 7. The values for double row cylindrical roller bearings are given in table 8.

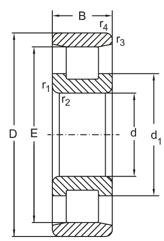


Abutment dimensions

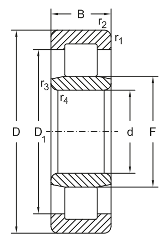
Table 6

r_s, r_{1s} min.	r_u max.	h_u min. Bearing series 10, 18, 19, 28, 29, 30, 48, 49, 60	2, 2E, 3, 3E, 22, 22E, 23, 23E	4
mm				
0,3	0,3	1	1,2	
0,6	0,6	1,6	2,1	
1	1	2,3	2,8	
1,1	1	3	3,5	4,5
1,5	1,5	3,5	4,5	5,5
2	2	4,4	5,5	6,5
2,1	2,1	5,1	6	7
3	2,5	6,2	7	8
4	3	7,3	8,5	10
5	4	9	10	12

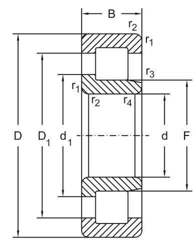
Single Row Cylindrical Roller Bearings



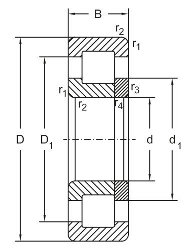
N



NU



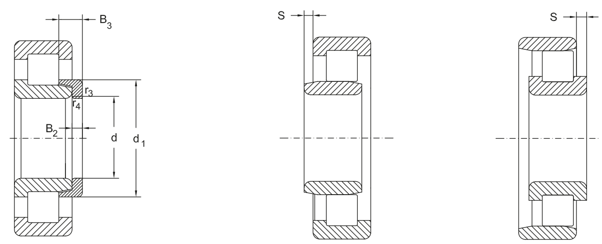
NJ



NUP

d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	Basical radial load dyn. C_r	stat. C_{0r}	Speed limit grease	oil	Designation
mm						kN		min $^{-1}$		
15	35	11	0,6	0,3	1	12,7	10,4	18000	22000	**NU202 E**
	35	11	0,6	0,3	-	12,7	10,4	18000	22000	**NJ202 E**
17	40	12	0,6	0,3	1,2	11,8	9,6	15000	18000	**N203**
	40	12	0,6	0,3	1,2	17,6	14,6	15000	18000	**NU203 E**
	40	12	0,6	0,3	-	17,6	14,6	15000	18000	**NJ203 E**
	40	12	0,6	0,3	-	17,6	14,6	15000	18000	**NUP203 E**
	40	16	0,6	0,3	1,0	24	22	15000	18000	**NU2203 E**
	40	16	0,6	0,3	-	24	22	15000	18000	**NJ2203 E**
	40	16	0,6	0,3	-	24	22	15000	18000	**NUP2203 E**
	47	14	1,1	0,6	1,2	16,2	13	13000	16000	**NU303 M**
	47	14	1,1	0,6	-	16,2	13	13000	16000	**NJ303 M**
	47	14	1,1	0,6	-	16,2	13	13000	16000	**NUP303 M**
20	47	14	1	0,6	1	15,4	12,7	13000	16000	**N204**
	47	14	1	0,6	1	27,5	24,5	13000	16000	**NU204 E**
	47	14	1	0,6	-	27,5	24,5	13000	16000	**NJ204 E**
	47	14	1	0,6	-	27,5	24,5	13000	16000	**NUP204 E**
	47	18	1	0,6	1,8	32,5	31	13000	16000	**NU2204 E**
	47	18	1	0,6	-	32,5	31	13000	16000	**NJ2204 E**
	47	18	1	0,6	-	32,5	31	13000	16000	**NUP2204 E**
	52	15	1	0,6	1,1	31,5	27	11000	14000	**NU304 E**
	52	15	1	0,6	-	31,5	27	11000	14000	**NJ304 E**

Single Row Cylindrical Roller Bearings

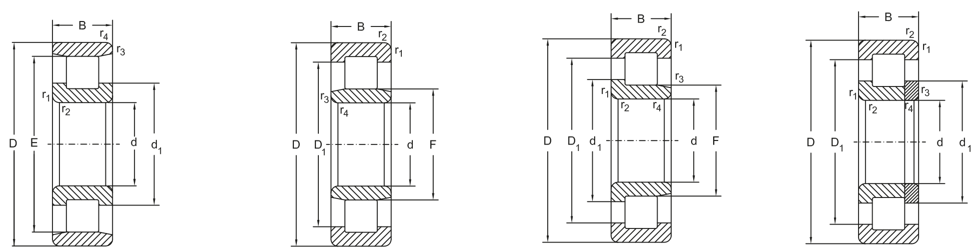


NJ+HJ

Abutment and fillet dimensions see on *page 210*

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
15	-	19,3	-	27,8	-	-	**-**	0,047	-
	-	19,3	21,8	27,8	2,5	5	**HJ202 E**	0,047	0,007
17	33,9	-	24,7	-	-	-	**-**	0,068	-
	-	22,1	-	32	-	-	**-**	0,068	-
	-	22,1	24,7	32	3	5,5	**HJ203 E**	0,068	0,009
	-	22,1	24,7	32	-	-	**-**	0,068	-
	-	22,1	-	32	-	-	**-**	0,091	-
	-	22,1	24,7	32	3	6	**HJ2203 E**	0,091	0,01
	-	22,1	24,7	32	-	-	**-**	0,091	-
	-	25,1	-	36,8	-	-	**-**	0,120	-
	-	25,1	27,6	36,8	4	6,5	**HJ303 E**	0,120	0,012
	-	25,1	27,6	36,8	-	-	**-**	0,120	-
20	40	-	29,9	-	-	-	**-**	0,132	-
	-	26,5	-	38,8	-	-	**-**	0,132	-
	-	26,5	29,9	38,8	3	5,5	**HJ204 E**	0,132	0,011
	-	26,5	29,9	38,8	-	-	**-**	0,132	-
	-	26,5	-	38,4	-	-	**-**	0,142	-
	-	26,5	29,9	38,4	3	6,5	**HJ2204**	0,142	0,012
	-	26,5	29,9	38,4	-	-	**-**	0,142	-
	-	27,5	-	41,8	-	-	**-**	0,151	-
	-	27,5	31,4	41,8	4	6,5	**HJ304 E**	0,151	0,017

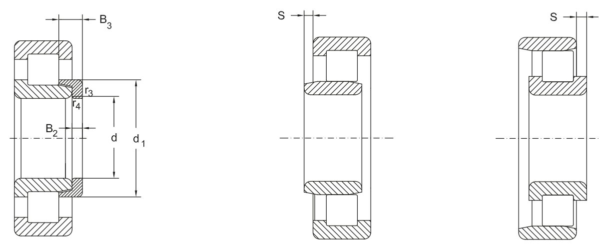
Single Row Cylindrical Roller Bearings



N NU NJ NUP

		Dimensions				Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
20	52	15	1,1	0,6	-	31,5	27	11000	14000	**NUP304 E**
	52	21	1,1	0,6	2	41,5	39	11000	14000	**NU2304 E**
	52	21	1,1	0,6	-	41,5	39	11000	14000	**NJ2304 E**
	52	21	1,1	0,6	-	41,5	39	11000	14000	**NUP2304 E**
25	52	15	1	0,6	1,3	17,7	15,7	12000	15000	**N205**
	52	15	1	0,6	1,3	29	27,5	12000	15000	**NU205 E**
	52	15	1	0,6	-	29	27,5	12000	15000	**NJ205 E**
	52	15	1	0,6	-	29	27,5	12000	15000	**NUP205 E**
	52	18	1	0,6	1,7	34,5	35	12000	15000	**NU2205 E**
	52	18	1	0,6	-	34,5	35	12000	15000	**NJ2205 E**
	52	18	1	0,6	-	34,5	35	12000	15000	**NUP2205 E**
	62	17	1,1	1,1	1,5	29,3	25,2	9500	12000	**N305**
	62	17	1,1	1,1	1,5	41,5	37,5	9500	12000	**NU305 E**
	62	17	1,1	1,1	-	41,5	37,5	9500	12000	**NJ305 E**
	62	17	1,1	1,1	-	41,5	37,5	9500	12000	**NUP305 E**
	62	24	1,1	1,1	1,9	57	56	9500	12000	**NU2305 E**
	62	24	1,1	1,1	-	57	56	9500	12000	**NJ2305 E**
	62	24	1,1	1,1	-	57	56	9500	12000	**NUP2305 E**
	80	21	1,5	1,5	2,2	50,6	44.4	8500	10000	**NU405 M**
	80	21	1,5	1,5	-	50,6	44,4	8500	10000	**NJ405 M**
30	62	16	1	0,6	1,4	39,7	37,9	9500	12000	**N206 EM6**

Single Row Cylindrical Roller Bearings

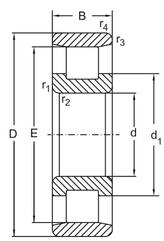


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
20	-	27,5	31,4	41,8	-	-	**-**	0,150	-
	-	27,5	-	41,8	-	-	**-**	0,210	-
	-	27,5	31,4	41,8	4	7,5	**HJ2304 E**	0,210	0,019
	-	27,5	31,4	41,8	-	-	**-**	0,210	-
25	45	-	35	-	-	-	**-**	0,130	-
	-	31,5	-	43,3	-	-	**-**	0,140	-
	-	31,5	34,9	43,3	3	6	**HJ205 E**	0,140	0,015
	-	31,5	34,9	43,3	-	-	**-**	0,140	-
	-	31,5	-	43,3	-	-	**-**	0,160	-
	-	31,5	34,9	43,3	3	6,5	**HJ2205 E**	0,160	0,015
	-	31,5	34,9	43,3	-	-	**-**	0,160	-
	53	-	39	-	-	-	**-**	0,245	-
	-	34	-	50,1	-	-	**-**	0,245	-
	-	34	38,3	50,1	4	7	**HJ305 E**	0,245	0,025
	-	34	38,3	50,1	-	-	**-**	0,245	-
	-	34	-	50,1	-	-	**-**	0,350	-
	-	34	38,3	50,1	4	8	**HJ2305 E**	0,350	0,027
	-	34	38,3	50,1	-	-	**-**	0,350	-
	-	38,8	-	58,4	-	-	**-**	0,625	-
	-	38,8	43,6	58,4	6	10,5	**HJ405**	0,625	0,057
30	55,5	-	41,4	-	-	-	**-**	0,210	-

Single Row Cylindrical Roller Bearings



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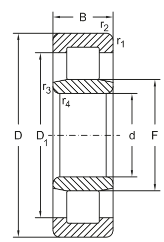

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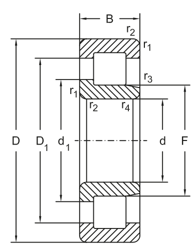

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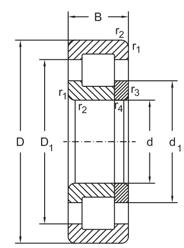
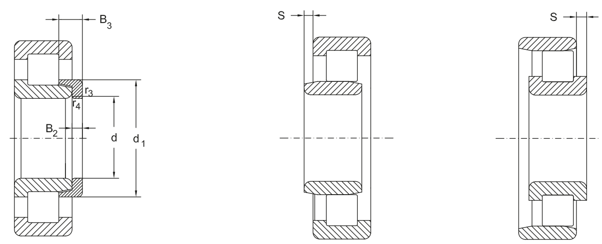


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
30	62	16	1	0,6	1,4	39,7	37,9	9500	12000	**NU206 E**
	62	16	1	0,6	-	39,7	37,9	9500	12000	**NJ206 E**
	62	16	1	0,6	-	39,7	37,9	9500	12000	**NUP206 E**
	62	20	1	0,6	1,6	49	50	9500	12000	**NU2206 E**
	62	20	1	0,6	-	49	50	9500	12000	**NJ2206 E**
	62	20	1	0,6	-	49	50	9500	12000	**NUP2206 E**
	72	19	1,1	1,1	1,9	38,6	35,2	8500	10000	**N306**
	72	19	1,1	1,1	1,9	51	48	8500	10000	**NU306 E**
	72	19	1,1	1,1	-	51	48	8500	10000	**NJ306 E**
	72	19	1,1	1,1	-	51	48	8500	10000	**NUP306 E**
	72	27	1,1	1,1	2,5	73,5	75	8500	10000	**NU2306 E**
	72	27	1,1	1,1	-	73,5	75	8500	10000	**NJ2306 E**
	72	27	1,1	1,1	-	73,5	75	8500	10000	**NUP2306 E**
	90	23	1,5	1,5	2,3	65	57,8	7000	8500	**N406 M**
	90	23	1,5	1,5	2,3	65	57,8	7000	8500	**NU406 M**
	90	23	1,5	1,5	-	65	57,8	7000	8500	**NJ406 M**
	90	23	1,5	1,5	-	65	57,8	7000	8500	**NUP406 M**
35	62	14	1	0,6	2,6	23,6	24,5	10000	13000	**NU1007 M**
	72	17	1,1	0,6	1,7	33,6	31,5	8500	10000	**N207**
	72	17	1,1	0,6	1,7	50	50	8500	10000	**NU207 E**
	72	17	1,1	0,6	-	50	50	8500	10000	**NJ207 E**
	72	17	1,1	0,6	-	50	50	8500	10000	**NUP207 E**
	72	23	1,1	0,6	2,9	65	70	8500	10000	**NU2207 E**

Single Row Cylindrical Roller Bearings

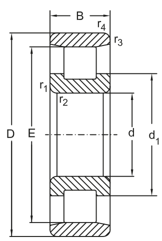


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
30	-	37,5	-	52	-	-	**-**	0,210	-
	-	37,5	41,4	52	4	7	**HJ206 E**	0,210	0,025
	-	37,5	41,4	52	-	-	**-**	0,210	-
	-	37,5	-	52	-	-	**-**	0,260	-
	-	37,5	41,4	52	4	7,5	**HJ2206 E**	0,260	0,025
	-	37,5	41,4	52	-	-	**-**	0,260	-
	62	-	46,4	-	-	-	**-**	0,360	-
	-	40,5	-	58,3	-	-	**-**	0,370	-
	-	40,5	45,1	58,3	5	8,5	**HJ306 E**	0,370	0,043
	-	40,5	45,1	58,3	-	-	**-**	0,370	-
	-	40,5	-	58,3	-	-	**-**	0,528	-
	-	40,5	45,1	58,3	5	9,5	**HJ2306 E**	0,528	0,045
	-	40,5	45,1	58,3	-	-	**-**	0,528	-
	73	-	50,5	-	-	-	**-**	0,870	-
	-	45	-	67,8	-	-	**-**	0,870	-
	-	45	50,5	67,8	7	11,5	**HJ406**	0,870	0,09
	-	45	50,5	67,8	-	-	**-**	0,870	-
35	-	42	44,5	51,9	4	7,75	**HJ1007**	0,180	0,02
	61,8	-	47,6	-	-	-	**-**	0,305	-
	-	44	-	60,1	-	-	**-**	0,305	-
	-	44	48	60,1	4	7	**HJ207 E**	0,305	0,033
	-	44	48	60,1	-	-	**-**	0,305	-
	-	44	-	60,1	-	-	**-**	0,395	-

Single Row Cylindrical Roller Bearings



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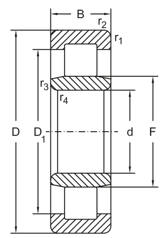

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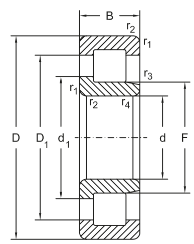

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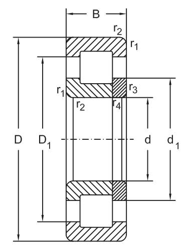
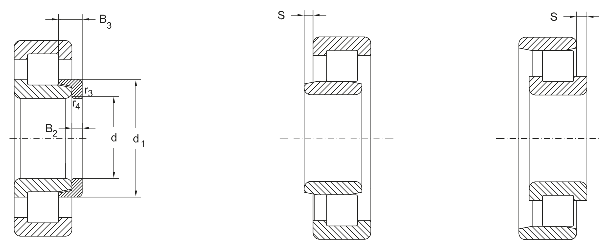


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
35	72	23	1	0,6	2,9	65	70	8500	10000	**NJ2207 E**
	72	23	1	0,6	-	65	70	8500	10000	**NUP2207 E**
	80	21	1,1	1,5	0,6	44,3	40,4	7500	9000	**N307**
	80	21	1,1	1,5	0,6	66,7	65,4	7500	9000	**NU307 E**
	80	21	1,1	1,5	-	66,7	65,4	7500	9000	**NJ307 E**
	80	21	1,1	1,5	-	66,7	65,4	7500	9000	**NUP307 E**
	80	31	1,1	1,5	3	91,5	98	7500	9000	**NU2307 E**
	80	31	1,1	1,5	-	91,5	98	7500	9000	**NJ2307 E**
	80	31	1,1	1,5	-	91,5	98	7500	9000	**NUP2307 E**
	100	25	1,5	1,5	2,6	75	69,5	6300	7500	**N407 M**
	100	25	1,5	1,5	2,6	75	69,5	6300	7500	**NU407 M**
	100	25	1,5	1,5	-	75	69,5	6300	7500	**NJ407 M**
	100	25	1,5	1,5	-	75	69,5	6300	7500	**NUP407 M**
40	68	15	1	0,6	2,7	26,1	27,3	9500	12000	**NJ1008 M**
	80	18	1,1	1,1	1,9	43,7	42,9	7500	9000	**N208**
	80	18	1,1	1,1	1,9	53	53	7500	9000	**NU208 E**
	80	18	1,1	1,1	-	53	53	7500	9000	**NJ208 E**
	80	18	1,1	1,1	-	53	53	7500	9000	**NUP208 E**
	80	23	1,1	1,1	2,3	71	75	7500	9000	**NU2208 E**
	80	23	1,1	1,1	-	71	75	7500	9000	**NJ2208 E**
	80	23	1,1	1,1	-	71	75	7500	9000	**NUP2208 E**
	90	23	1,5	1,5	2,5	56,1	45,3	6300	7500	**N308**
	90	23	1,5	1,5	2,5	81,5	78	6300	7500	**NU308 E**

Single Row Cylindrical Roller Bearings

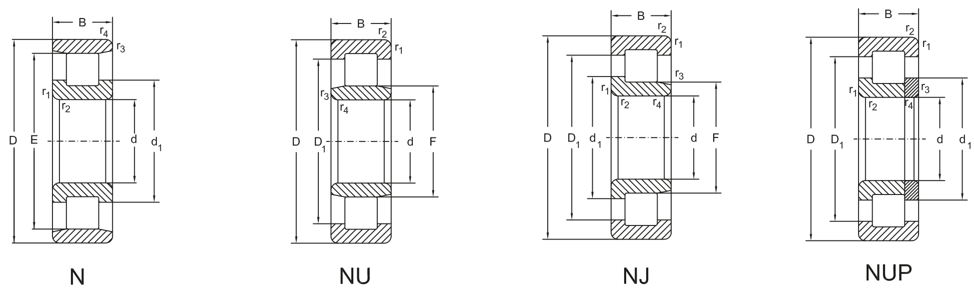


NJ+HJ

Abutment and fillet dimensions see on page 210

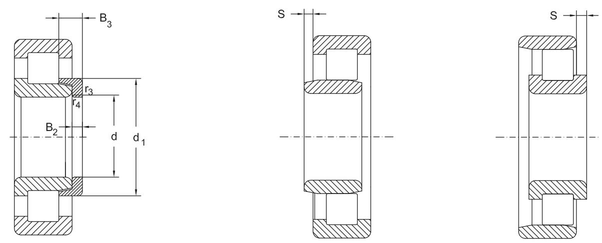
Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
35	-	44	48	60,1	4	8,5	**HJ2207 E**	0,395	0,035
	-	44	48	60,1	-	-	**-**	0,395	-
	68,2	-	51	-	-	-	**-**	0,47	-
	-	46,2	-	65,7	-	-	**-**	0,485	-
	-	46,2	51,2	65,7	6	9,5	**HJ307 E**	0,485	0,062
	-	46,2	51,2	65,7	-	-	**-**	0,485	-
	-	46,2	-	65,7	-	-	**-**	0,715	-
	-	46,2	51,2	65,7	6	11	**HJ2307 E**	0,715	0,065
	-	46,2	51,2	65,7	-	-	**-**	0,715	-
	83	-	59	-	-	-	**-**	1,05	-
	-	53	-	77,6	-	-	**-**	1,05	-
	-	53	59	77,6	8	13	**HJ407**	1,05	0,13
	-	53	59	77,6	-	-	**-**	1,05	-
40	-	47	50	57,6	4	8	**HJ1008**	0,23	0,03
	70	-	54,4	-	-	-	**-**	0,40	-
	-	49,5	-	67,3	-	-	**-**	0,38	-
	-	49,5	54,1	67,3	5	8,5	**HJ208 E**	0,38	0,05
	-	49,5	54,1	67,3	-	-	**-**	0,38	-
	-	49,5	-	67,3	-	-	**-**	0,49	-
	-	49,5	54,1	67,3	5	9	**HJ2208 E**	0,49	0,05
	-	49,5	54,1	67,3	-	-	**-**	0,49	-
	77,5	-	58,8	-	-	-	**-**	0,66	-
	-	52	-	74,9	-	-	**-**	0,65	-

Single Row Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	Basical radial load dyn. C_r	stat. C_{0r}	Speed limit grease	oil	Designation
mm						kN		min^{-1}		
40	90	23	1,5	1,5	-	81,5	78	6300	7500	**NJ308 E**
	90	23	1,5	1,5	-	81,5	78	6300	7500	**NUP308 E**
	90	33	1,5	1,5	3,5	112	120	6300	7500	**NU2308 E**
	90	33	1,5	1,5	-	112	120	6300	7500	**NJ2308 E**
	90	33	1,5	1,5	-	112	120	6300	7500	**NUP2308 E**
	110	27	2	2	2,6	93	86,5	5500	6800	**N408 M**
	110	27	2	2	2,6	93	86,5	5500	6800	**NU408 M**
	110	27	2	2	-	93	86,5	5500	6800	**NJ408 M**
	110	27	2	2	-	93	86,5	5500	6800	**NUP408 M**
45	75	16	1	0,6	2,5	32,5	35,5	8500	10000	**NU1009 M**
	85	19	1,1	1,1	1,9	61	63	7000	8500	**N209 E**
	85	19	1,1	1,1	1,9	61	63	7000	8500	**NU209 E**
	85	19	1,1	1,1	-	61	63	7000	8500	**NJ209 E**
	85	19	1,1	1,1	-	61	63	7000	8500	**NUP209 E**
	85	23	1,1	1,1	2,3	76	81,6	7000	8500	**NU2209 E**
	85	23	1,1	1,1	-	76	81,6	7000	8500	**NJ2209 E**
	85	23	1,1	1,1	-	76	81,6	7000	8500	**NUP2209 E**
	100	25	1,5	1,5	2,9	98	100	5600	6700	**N309 E**
	100	25	1,5	1,5	2,9	98	100	5600	6700	**NU309 E**
	100	25	1,5	1,5	-	98	100	5600	6700	**NJ309 E**
	100	25	1,5	1,5	-	98	100	5600	6700	**NUP309 E**
	100	36	1,5	1,5	3,5	137	153	5600	6700	**NU2309 E**
	100	36	1,5	1,5	-	137	153	5600	6700	**NJ2309 E**

Single Row Cylindrical Roller Bearings

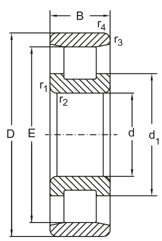


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
40	-	52	57,7	74,9	7	11	**HJ308 E**	0,66	0,088
	-	52	57,7	74,9	-	-	**-**	0,66	-
	-	52	-	74,9	-	-	**-**	0,95	-
	-	52	57,7	74,9	7	12,5	**HJ2308 E**	0,95	0,92
	-	52	57,7	74,9	-	-	**-**	0,95	-
	92	-	64,8	-	-	-	**-**	1,30	-
	-	58	-	85,8	-	-	**-**	1,30	-
	-	58	64,8	85,8	8	13	**HJ408**	1,30	0,15
	-	58	64,8	85,8	-	-	**-**	1,30	-
45	-	52,5	55,5	63,9	4	8,25	**HJ1009**	0,29	0,03
	76,5	-	59,1	-	-	-	**-**	0,5	-
	-	54,5	-	72,4	-	-	**-**	0,5	-
	-	54,5	59,1	72,4	5	8,5	**HJ209 E**	0,5	0,05
	-	54,5	59,1	72,4	-	-	**-**	0,5	-
	-	54,5	-	72,4	-	-	**-**	0,6	-
	-	54,5	59,1	72,4	5	9	**HJ2209 E**	0,6	0,057
	-	54,5	59,1	72,4	-	-	**-**	0,6	-
	88,5	-	64,6	-	-	-	**-**	1	-
	-	58,5	-	83,1	-	-	**-**	1	-
	-	58,5	64,6	83,1	7	11,5	**HJ309 E**	1	0,11
	-	58,5	64,6	83,1	-	-	**-**	1	-
	-	58,5	-	83,1	-	-	**-**	1,3	-
	-	58,5	64,6	83,1	7	13	**HJ2309 E**	1,3	0,12

Single Row Cylindrical Roller Bearings



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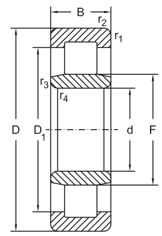

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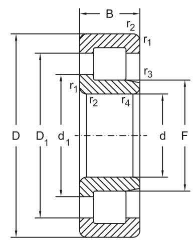

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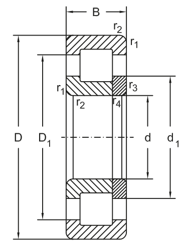
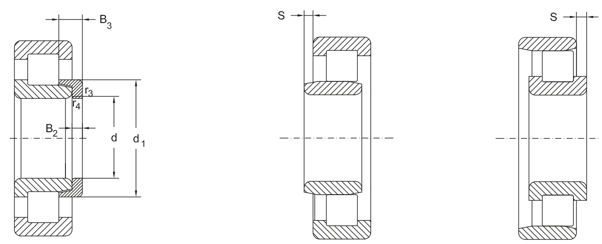


NUP

	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
45	100	36	1,5	1,5	-	137	153	5600	6700	**NUP2309 E**
	120	29	2	2	2,9	113	109	5000	6000	**N409 M**
	120	29	2	2	2,9	113	109	5000	6000	**NU409 M**
	120	29	2	2	-	113	109	5000	6000	**NJ409 M**
	120	29	2	2	-	113	109	5000	6000	**NUP409 M**
50	80	16	1	0,6	2,1	36	41,5	8000	9500	**NU1010 M**
	90	20	1,1	1,1	2,2	64	68	6700	8000	**N210 E**
	90	20	1,1	1,1	2,2	64	68	6700	8000	**NU210 E**
	90	20	1,1	1,1	-	64	68	6700	8000	**NJ210 E**
	90	20	1,1	1,1	-	64	68	6700	8000	**NUP210 E**
	90	23	1,1	1,1	2,2	78	88	6700	8000	**NU2210 E**
	90	23	1,1	1,1	-	78	88	6700	8000	**NJ2210 E**
	90	23	1,1	1,1	-	78	88	6700	8000	**NUP2210 E**
	110	27	2	2	3	110	114	5300	6300	**N310 E**
	110	27	2	2	3	110	114	5300	6300	**NU310 E**
	110	27	2	2	-	110	114	5300	6300	**NJ310 E**
	110	27	2	2	-	110	114	5300	6300	**NUP310 E**
	110	40	2	2	4,2	163	186	5300	6300	**NU2310 E**
	110	40	2	2	-	163	186	5300	6300	**NJ2310 E**
	110	40	2	2	-	163	186	5300	6300	**NUP2310 E**
	130	31	2,1	2,1	3	139	136	4500	5300	**N410 M**
	130	31	2,1	2,1	3	139	136	4500	5300	**NU410 M**
	130	31	2,1	2,1	-	139	136	4500	5300	**NJ410 M**

Single Row Cylindrical Roller Bearings

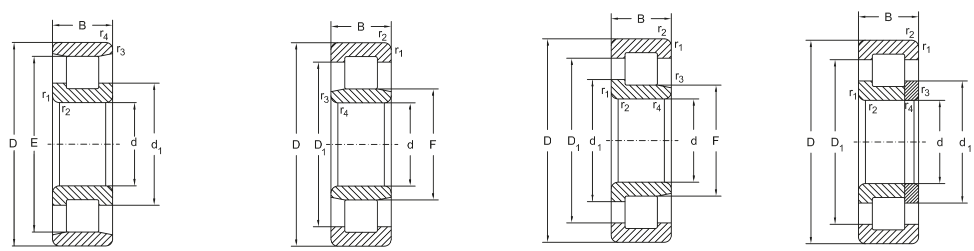


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
45	-	58,5	64,6	83,1	-	-	**-**	1,3	-
	100,5	-	71,8	-	-	-	**-**	1,7	-
	-	64,5	-	93,9	-	-	**-**	1,7	-
	-	64,5	71,8	93,9	8	13,5	**HJ409**	1,7	0,19
	-	64,5	71,8	93,9	-	-	**-**	1,7	-
50	-	57,5	60,5	68,9	4	8,25	**HJ1010**	0,32	0,04
	81,5	-	64,1	-	-	-	**-**	0,6	-
	-	59,5	-	77,4	-	-	**-**	0,6	-
	-	59,5	64,1	77,4	5	9	**HJ210 E**	0,6	0,06
	-	59,5	64,1	77,4	-	-	**-**	0,6	-
	-	59,5	-	77,4	-	-	**-**	0,65	-
	-	59,5	64,1	77,4	5	9	**HJ2210 E**	0,65	0,06
	-	59,5	64,1	77,4	-	-	**-**	0,65	-
	97	-	71,4	-	-	-	**-**	1,2	-
	-	65	-	91,4	-	-	**-**	1,2	-
	-	65	71,4	91,4	8	13	**HJ310 E**	1,2	0,15
	-	65	71,4	91,4	-	-	**-**	1,2	-
	-	65	-	91,4	-	-	**-**	1,9	-
	-	65	71,4	91,4	8	14,5	**HJ2310 E**	1,9	0,16
	-	65	71,4	91,4	-	-	**-**	1,9	-
	110,8	-	78,8	-	-	-	**-**	2,1	-
	-	70,8	-	103,6	-	-	**-**	2,1	-
	-	70,8	78,8	103,6	9	14,5	**HJ410**	2,1	0,24

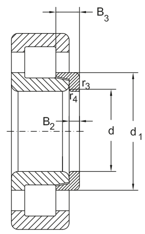
Single Row Cylindrical Roller Bearings



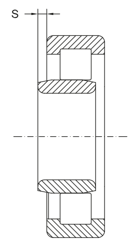
N NU NJ NUP

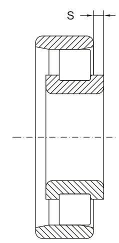
	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
50	130	31	2,1	2,1	-	139	136	4500	5300	**NUP410 M**
55	90	18	1,1	1	2,4	41,5	50	7800	9200	**NU1011 M**
	100	21	1,5	1,1	1,7	57,9	62,5	6300	7500	**N211**
	100	21	1,5	1,1	1,7	83	95	6300	7500	**NU211 E**
	100	21	1,5	1,1	-	83	95	6300	7500	**NJ211 E**
	100	21	1,5	1,1	-	83	95	6300	7500	**NUP211 E**
	100	25	1,5	1,1	2,2	98	118	6300	7500	**NU2211 E**
	100	25	1,5	1,1	-	98	118	6300	7500	**NJ2211 E**
	100	25	1,5	1,1	-	98	118	6300	7500	**NUP2211 E**
	120	29	2	2	3	109	109	5000	6000	**N311**
	120	29	2	2	3	134	140	5000	6000	**NU311 E**
	120	29	2	2	-	134	140	5000	6000	**NJ311 E**
	120	29	2	2	-	134	140	5000	6000	**NUP311 E**
	120	43	2	2	4,3	187,3	212	5000	6000	**NU2311 EM**
	120	43	2	2	-	187,3	212	5000	6000	**NJ2311 EM**
	120	43	2	2	-	187,3	212	5000	6000	**NUP2311 EM**
	140	33	2,1	2,1	3,3	140	137	4300	5000	**N411 M**
	140	33	2,1	2,1	3,3	140	137	4300	5000	**NU411 M**
	140	33	2,1	2,1	-	140	137	4300	5000	**NJ411 M**
	140	33	2,1	2,1	-	140	137	4300	5000	**NUP411 M**
60	95	18	1,1	1	3,3	44	55	6700	8000	**NU1012 M**
	110	22	1,5	1,5	1,6	95	104	5600	6700	**N212 EM**
	110	22	1,5	1,5	1,6	95	104	5600	6700	**NU212 E**

Single Row Cylindrical Roller Bearings



NJ+HJ

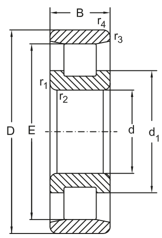




Abutment and fillet dimensions see on page 210

Dimensions							**Thrust collar**	**Mass**	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
50	-	70,8	78,8	103,6	-	-	**-**	2,2	-
55	-	64,5	67,5	76,7	5	10	**HJ1011**	0,47	0,05
	88,5	-	71,3	-	-	-	**-**	0,655	-
	-	66	-	85,6	-	-	**-**	0,75	-
	-	66	71	85,6	6	9,5	**HJ211 E**	0,75	0,09
	-	66	71	85,6	-	-	**-**	0,75	-
	-	66	-	85,6	-	-	**-**	0,9	-
	-	66	71	85,6	6	10	**HJ2211 E**	0,9	0,09
	-	66	71	85,6	-	-	**-**	0,9	-
	104,5	-	77,2	-	-	-	**-**	1,54	-
	-	70,5	-	100,3	-	-	**-**	1,6	-
	-	70,5	77,7	100,3	9	14	**HJ3122 E**	1,6	0,2
	-	70,5	77,7	100,3	-	-	**-**	1,6	-
	-	70,5	-	100,3	-	-	**-**	2,3	-
	-	70,5	77,7	100,3	9	15,5	**HJ2311 E**	2,3	0,2
	-	70,5	77,7	100,3	-	-	**-**	2,3	-
	117,2	-	85,2	-	-	-	**-**	2,5	-
	-	77,2	-	109,9	-	-	**-**	2,5	-
	-	77,2	85,2	109,9	10	16,5	**HJ411**	2,5	0,31
	-	77,2	85,2	109,9	-	-	**-**	2,5	-
60	-	69,5	72,5	81,7	5	10	**HJ1012**	0,49	0,06
	100	-	77,7	-	-	-	**-**	0,887	-
	-	72	-	95,1	-	-	**-**	1	-

Single Row Cylindrical Roller Bearings



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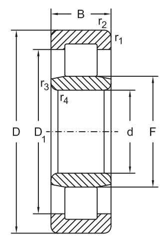

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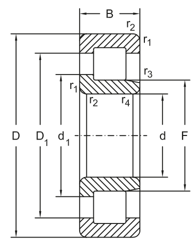

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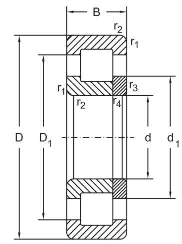
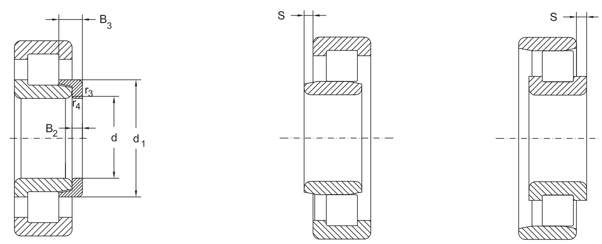


NUP

Dimensions						Basical radial load		Speed limit		Designation
			r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
d	D	B								
mm						kN		min $^{-1}$		
60	110	22	1,5	1,5	-	95	104	5600	6700	**NJ212 E**
	110	22	1,5	1,5	-	95	104	5600	6700	**NUP212 E**
	110	28	1,5	1,5	2,4	129	153	5300	6300	**NU2212 E**
	110	28	1,5	1,5	-	129	153	5300	6300	**NJ2212 E**
	110	28	1,5	1,5	-	129	153	5300	6300	**NUP2212 E**
	130	31	2,1	2,1	3	121	123	4500	5300	**N312**
	130	31	2,1	2,1	3	150	156	4300	5000	**NU312 E**
	130	31	2,1	2,1	-	150	156	4300	5000	**NJ312 E**
	130	31	2,1	2,1	-	150	156	4300	5000	**NUP312 E**
	130	46	2,1	2,1	4,2	224	260	4300	5000	**NU2312 E**
	130	46	2,1	2,1	-	224	260	4300	5000	**NJ2312 E**
	130	46	2,1	2,1	-	224	260	4300	5000	**NUP2312 E**
	150	35	2,1	2,1	3,4	179	184	4000	4800	**N412 M**
	150	35	2,1	2,1	3,4	179	184	4000	4800	**NU412 M**
	150	35	2,1	2,1	-	179	184	4000	4800	**NJ412 M**
	150	35	2,1	2,1	-	179	184	4000	4800	**NUP412 M**
65	100	18	1,1	1	3,3	45	58,5	6600	7800	**NU1013 M**
	120	23	1,5	1,5	1,4	80,5	89,7	5300	6300	**N213**
	120	23	1,5	1,5	1,4	108	120	5300	6300	**NU213 E**
	120	23	1,5	1,5	-	108	120	5300	6300	**NJ213 E**
	120	23	1,5	1,5	-	108	120	5300	6300	**NUP213 E**
	120	31	1,5	1,5	1,9	147	178	4800	5600	**NU2213 EM**
	120	31	1,5	1,5	-	147	178	4800	5600	**NJ2213 EM**

Single Row Cylindrical Roller Bearings

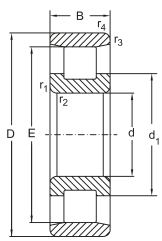


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
60	-	72	77,7	95,1	6	10	**HJ212 E**	1	0,11
	-	72	77,7	95,1	-	-	**-**	1	-
	-	72	-	95,1	-	-	**-**	1,2	-
	-	72	77,7	95,1	6	10	**HJ2212 E**	1,2	0,11
	-	72	77,7	95,1	-	-	**-**	1,2	-
	113	-	85	-	-	-	**-**	1,8	-
	-	77	-	108,5	-	-	**-**	1,9	-
	-	77	84,5	108,5	9	14,5	**HJ312 E**	1,9	0,24
	-	77	84,5	108,5	-	-	**-**	1,9	-
	-	77	-	108,5	-	-	**-**	2,9	-
	-	77	84,5	108,5	9	16	**HJ2312 E**	2,9	0,24
	-	77	84,5	108,5	-	-	**-**	2,9	-
	127	-	91,8	-	-	-	**-**	3,1	-
	-	83	-	118,8	-	-	**-**	3,1	-
	-	83	91,8	118,8	10	16,5	**HJ412**	3,1	0,35
	-	83	91,8	118,8	-	-	**-**	3,1	-
65	-	74,5	77,5	86,7	5	10	**HJ1013**	0,52	0,07
	105,6	-	85,4	-	-	-	**-**	1,06	-
	-	78,5	-	103,2	-	-	**-**	1,2	-
	-	78,5	84,6	103,2	6	10	**HJ213 E**	1,2	0,13
	-	78,5	84,6	103,2	-	-	**-**	1,2	-
	-	78,5	-	103,2	-	-	**-**	1,6	-
	-	78,5	84,6	103,2	6	10,5	**HJ2213 E**	1,6	0,13

Single Row Cylindrical Roller Bearings



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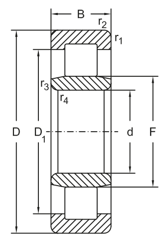

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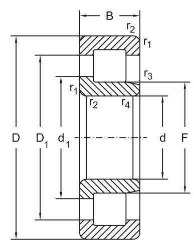

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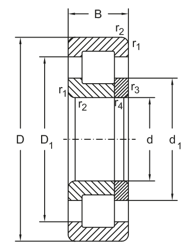
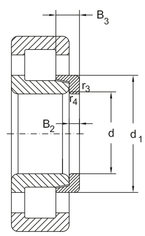


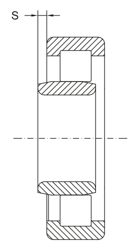
NUP

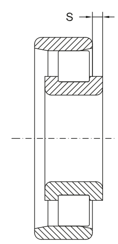
	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min^{-1}		
65	120	31	1,5	1,5	-	147	178	4800	5600	**NUP2213 EM**
	140	33	2,1	2,1	1,4	170	176,8	4300	5000	**N313 EM**
	140	33	2,1	2,1	1,4	180	190	4300	5000	**NU313 E**
	140	33	2,1	2,1	-	180	190	4300	5000	**NJ313 E**
	140	33	2,1	2,1	-	180	190	4300	5000	**NUP313 E**
	140	48	2,1	2,1	3,9	245	285	4000	4800	**NU2313 EM**
	140	48	2,1	2,1	-	245	285	4000	4800	**NJ2313 EM**
	140	48	2,1	2,1	-	245	285	4000	4800	**NUP2313 EM**
	160	37	2,1	2,1	3,5	195	203	3800	4500	**N413 M**
	160	37	2,1	2,1	3,5	195	203	3800	4500	**NU413 M**
	160	37	2,1	2,1	-	195	203	3800	4500	**NJ413 M**
	160	37	2,1	2,1	-	195	203	3800	4500	**NUP413 M**
70	110	20	1,1	1	3,3	65	81,5	6000	7000	**NU1014 M**
	125	24	1,5	1,5	1,1	119	136	5000	6000	**N214 EM**
	125	24	1,5	1,5	1,1	120	137	5000	6000	**NU214 E**
	125	24	1,5	1,5	-	120	137	5000	6000	**NJ214 E**
	125	24	1,5	1,5	-	120	137	5000	6000	**NUP214 E**
	125	31	1,5	1,5	1,6	156	196	4800	5600	**NU2214 E**
	125	31	1,5	1,5	-	156	196	4800	5600	**NJ2214 E**
	125	31	1,5	1,5	-	156	196	4800	5600	**NUP2214 E**
	150	35	2,1	2,1	1,6	149	156	4000	4800	**N314**
	150	35	2,1	2,1	1,6	205	222	4000	4800	**NU314 E**
	150	35	2,1	2,1	-	205	222	4000	4800	**NJ314 E**

Single Row Cylindrical Roller Bearings



NJ+HJ

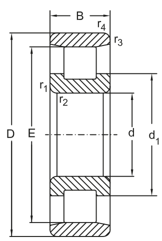




Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
65	-	78,5	84,6	103,2	-	-	**-**	1,6	-
	124,5	-	89	-	-	-	**-**	2,3	-
	-	82,5	-	117,4	-	-	**-**	2,3	-
	-	82,5	90,7	177,4	10	15,5	**HJ313 E**	2,3	0,29
	-	82,5	90,7	117,4	-	-	**-**	2,3	-
	-	82,5	-	117,4	-	-	**-**	3,7	-
	-	82,5	89	118	10	18	**HJ2313 E**	3,7	0,3
	-	82,5	89	118	-	-	**-**	3,7	-
	135,3	-	98,5	-	-	-	**-**	3,8	-
	-	89,3	-	126,9	-	-	**-**	3,8	-
	-	89,3	98,5	126,9	11	18	**HJ413**	3,8	0,43
	-	89,3	98,5	126,9	-	-	**-**	3,8	-
70	-	80	84	95,3	5	10	**HJ1014**	0,75	0,08
	113,5	-	88,8	-	-	-	**-**	1,3	-
	-	83,5	-	108,2	-	-	**-**	1,3	-
	-	83,5	89,6	108,2	7	11	**HJ214 E**	1,3	0,16
	-	83,5	89,6	108,2	-	-	**-**	1,3	-
	-	83,5	-	108,2	-	-	**-**	1,7	-
	-	83,5	89,6	108,2	7	11,5	**HJ2214 E**	1,7	0,15
	-	83,5	89,6	108,2	-	-	**-**	1,7	-
	130	-	98,9	-	-	-	**-**	2,68	-
	-	89	-	125,6	-	-	**-**	2,8	-
	-	89	97,5	125,6	10	15,5	**HJ314 E**	2,8	0,34

Single Row Cylindrical Roller Bearings



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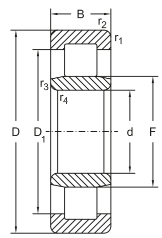

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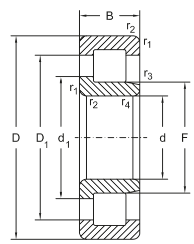
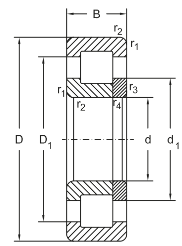


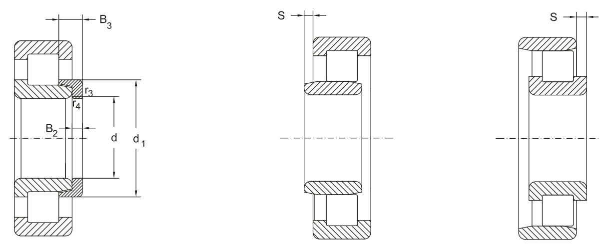
NJ



NUP

	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
70	150	35	2,1	2,1	-	205	222	4000	4800	**NUP314 E**
	150	51	2,1	2,1	4,6	275	325	3800	4500	**NU2314 E**
	150	51	2,1	2,1	-	275	325	3800	4500	**NJ2314 E**
	150	51	2,1	2,1	-	275	325	3800	4500	**NUP2314 E**
	180	42	3	3	4	240	253	3400	4000	**N414 M**
	180	42	3	3	4	240	253	3400	4000	**NU414 M**
	180	42	3	3	-	240	253	3400	4000	**NJ414 M**
	180	42	3	3	-	240	253	3400	4000	**NUP414 M**
75	115	20	1,1	1	2,5	65,5	85	5600	6600	**NU1015 M**
	130	25	1,5	1,5	1,2	132	156	4800	5600	**N215 E**
	130	25	1,5	1,5	1,2	132	156	4800	5600	**NU215 E**
	130	25	1,5	1,5	-	132	156	4800	5600	**NJ215 E**
	130	25	1,5	1,5	-	132	156	4800	5600	**NUP215 E**
	130	31	1,5	1,5	1,6	151	190	4000	4800	**NU2215 EM**
	130	31	1,5	1,5	-	151	190	4000	4800	**NJ2215 EM**
	130	31	1,5	1,5	-	151	190	4000	4800	**NUP2215 EM**
	160	37	2,1	2,1	1,8	242	263	4000	4800	**N315 E**
	160	37	2,1	2,1	1,8	240	265	4000	4800	**NU315 E**
	160	37	2,1	2,1	-	240	265	4000	4800	**NJ315 E**
	160	37	2,1	2,1	-	240	265	4000	4800	**NUP315 E**
	160	55	2,1	2,1	4,1	329	395	4000	4800	**NU2315 E**
	160	55	2,1	2,1	-	329	395	4000	4800	**NJ2315 E**
	160	55	2,1	2,1	-	329	395	4000	4800	**NUP2315 E**

Single Row Cylindrical Roller Bearings

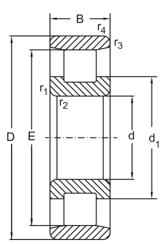


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
70	-	89	97,5	125,6	-	-	**-**	2,8	-
	-	89	-	125,6	-	-	**-**	4,0	-
	-	89	97,5	125,6	10	18,5	**HJ2314 E**	4,0	0,35
	-	89	97,5	125,6	-	-	**-**	4,0	-
	152	-	110,3	-	-	-	**-**	5,5	-
	-	100	-	142	-	-	**-**	5,5	-
	-	100	110,3	142	12	20	**HJ414**	5,5	0,61
	-	100	110,3	142	-	-	**-**	5,5	-
75	-	85	89	100,9	5	10	**HJ1015**	0,75	0,09
	118,5	-	94,5	-	-	-	**-**	1,25	-
	-	88,5	-	113,2	-	-	**-**	1,25	-
	-	88,5	94,5	113,2	7	11	**HJ215 E**	1,25	0,17
	-	88,5	94,5	113,2	-	-	**-**	1,25	-
	-	88,5	-	113,2	-	-	**-**	1,6	-
	-	88,5	94,5	113,2	7	11,5	**HJ2215 E**	1,6	0,17
	-	88,5	94,5	113,2	-	-	**-**	1,6	-
	143	-	104,3	-	-	-	**-**	3,93	-
	-	95	-	135	-	-	**-**	3,4	-
	-	95	104,3	135	11	16,5	**HJ315 E**	3,4	0,42
	-	95	104,3	135	-	-	**-**	3,4	-
	-	95	-	135	-	-	**-**	5,0	-
	-	95	104,3	135	11	19,5	**HJ2315 E**	5,0	0,43
	-	95	104,3	135	-	-	**-**	5,0	-

Single Row Cylindrical Roller Bearings



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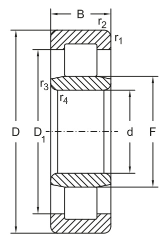

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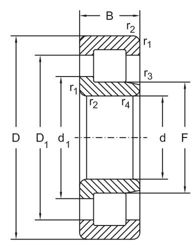
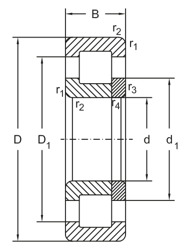


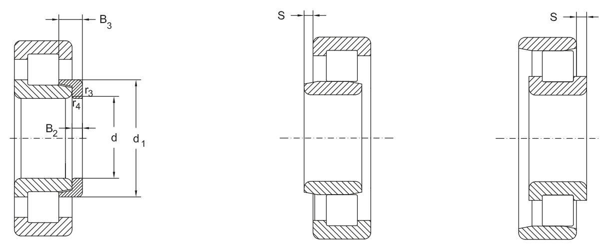
NJ



NUP

	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
75	190	45	3	3	4,5	277	294	4000	4800	**N415 M**
	190	45	3	3	4,5	277	294	4000	4800	**NU415 M**
	190	45	3	3	-	277	294	4000	4800	**NJ415 M**
	190	45	3	3	-	277	294	4000	4800	**NUP415 M**
80	125	22	1,1	1	3,8	76,5	98	5200	6200	**NU1016 M**
	140	26	2	2	1,2	140	170	4300	5000	**N216 E**
	140	26	2	2	1,2	140	170	4300	5000	**NU216 E**
	140	26	2	2	-	140	170	4300	5000	**NJ216 E**
	140	26	2	2	-	140	170	4300	5000	**NUP216 E**
	140	33	2	2	2,5	186	245	4300	5000	**NU2216 EM**
	140	33	2	2		186	245	4300	5000	**NJ2216 EM**
	140	33	2	2		186	245	4300	5000	**NUP2216 EM**
	170	39	2,1	2,1	2,8	205	228	3600	4300	**N316**
	170	39	2,1	2,1	2,8	255	275	3600	4300	**NU316 E**
	170	39	2,1	2,1	-	255	275	3600	4300	**NJ316 E**
	170	39	2,1	2,1	-	255	275	3600	4300	**NUP316 E**
	170	58	2,1	2,1	3,6	352	424	3600	4300	**NU2316 EM**
	170	58	2,1	2,1	-	352	424	3600	4300	**NJ2316 EM**
	170	58	2,1	2,1	-	352	424	3600	4300	**NUP2316 EM**
	200	48	3	3	4,6	316	339	3000	3600	**N416 M**
	200	48	3	3	4,6	316	339	3000	3600	**NU416 M**
	200	48	3	3	-	316	339	3000	3600	**NJ416 M**
	200	48	3	3	-	316	339	3000	3600	**NUP416 M**

Single Row Cylindrical Roller Bearings

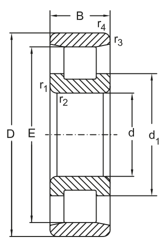


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
75	160,5	-	116	-	-	-	**-**	6,45	-
	-	104,5	-	149,8	-	-	**-**	6,45	-
	-	104,5	116	149,8	13	21,5	**HJ415**	6,45	0,71
	-	104,5	116	149,8	-	-	**-**	6,45	-
80	-	91,5	96	109,1	6	11,5	**HJ1016**	1,03	0,13
	127,3	-	101,7	-	-	-	**-**	1,54	-
	-	95,3	-	121,6	-	-	**-**	1,54	-
	-	95,3	101,7	121,6	8	12,5	**HJ216 E**	1,54	0,22
	-	95,3	101,7	121,6	-	-	**-**	1,54	-
	-	95,3	-	121,6	-	-	**-**	2,34	-
	-	95,3	101,7	121,6	8	12,5	**HJ2216 E**	2,4	0,22
	-	95,3	101,7	121,6	-	-	**-**	2,52	-
	147	-	112,6	-	-	-	**-**	4,25	-
	-	101	-	142,7	-	-	**-**	3,95	-
	-	101	110,6	142,7	11	17	**HJ316 E**	3,95	0,47
	-	101	110,6	142,7	-	-	**-**	3,95	-
	-	101	-	142,7	-	-	**-**	6,6	-
	-	101	110,6	142,7	11	20	**HJ2316 E**	6,7	0,5
	-	101	110,6	142,7	-	-	**-**	6,68	-
	170	-	122	-	-	-	**-**	8,3	-
	-	110	-	158,8	-	-	**-**	8,3	-
	-	110	122	158,8	13	22	**HJ416**	8,3	0,79
	-	110	122	158,8	-	-	**-**	8,3	-

Single Row Cylindrical Roller Bearings



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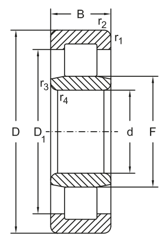

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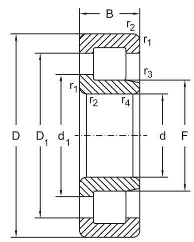

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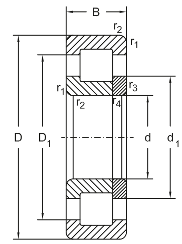
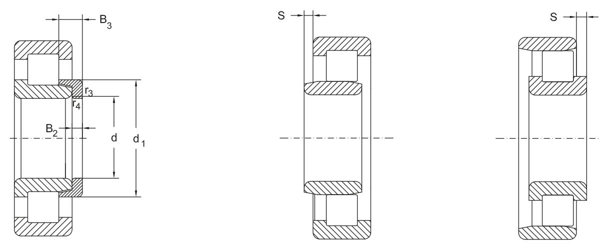


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
85	130	22	1,1	1	4	78	104	4800	5600	**NU1017 M**
	150	28	2	2	2	120	140	4300	5000	**N217**
	150	28	2	2	2	165	194	4300	5000	**NU217 E**
	150	28	2	2	-	165	194	4300	5000	**NJ217 E**
	150	28	2	2	-	165	194	4300	5000	**NUP217 E**
	150	36	2	2	2,4	216	275	3800	4500	**NU2217 E**
	150	36	2	2	-	216	275	3800	4500	**NJ2217 E**
	150	36	2	2	-	216	275	3800	4500	**NUP2217 E**
	180	41	3	3	3	271	300	3400	4000	**N317 EMB**
	180	41	3	3	3	288	325	3400	4000	**NU317 E**
	180	41	3	3	-	288	325	3400	4000	**NJ317 E**
	180	41	3	3	-	288	325	3400	4000	**NUP317 E**
	180	60	3	3	5	367	444	3400	4000	**NU2317 EM**
	180	60	3	3	-	367	444	3400	4000	**NJ2317 EM**
	180	60	3	3	-	367	444	3400	4000	**NUP2317 EM**
	210	52	4	4	5	357	384	2800	3400	**N417 M**
	210	52	4	4	5	357	384	2800	3400	**NU417 M**
	210	52	4	4	-	357	384	2800	3400	**NJ417 M**
	210	52	4	4	-	357	384	2800	3400	**NUP417 M**
90	140	24	1,5	1,1	4	93	125	4500	5300	**NU1018 M**
	160	30	2	2	1,4	156	185	3800	4500	**N218 M**
	160	30	2	2	1,4	183	216	3800	4500	**NU218 E**
	160	30	2	2	-	183	216	3800	4500	**NUP218 E**

Single Row Cylindrical Roller Bearings

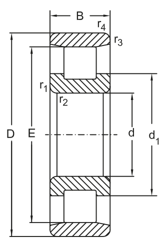


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
85	-	96,5	101	114,1	6	11,5	**HJ1017**	1,1	0,14
	133,8		108,8	-	-	-	**-**	1,9	-
	-	100,5	-	130,3	-	-	**-**	1,9	-
	-	100,5	107,6	130,3	8	12,5	**HJ217 E**	1,9	0,25
	-	100,5	107,6	130,3	-	-	**-**	1,9	-
	-	100,5	-	130,3	-	-	**-**	2,6	-
	-	100,5	107,6	130,3	8	13	**HJ2217 E**	2,6	0,25
	-	100,5	107,6	130,3	-	-	**-**	2,6	-
	160	-	118	-	-	-	**-**	5,04	-
	-	108	-	151,3	-	-	**-**	5,3	-
	-	108	118	151,3	12	18,5	**HJ317 E**	5,3	0,58
	-	108	118	151,3	-	-	**-**	5,3	-
	-	108	-	151,3	-	-	**-**	7,49	-
	-	108	118	151,3	12	22	**HJ2317 E**	7,61	0,6
	-	108	118	151,3	-	-	**-**	7,77	-
	177	-	126	-	-	-	**-**	9,8	-
	-	113	-	164,8	-	-	**-**	9,8	-
	-	113	126	164,8	14	24	**HJ417**	9,8	0,92
	-	113	126	164,8	-	-	**-**	9,8	-
90	-	103	108	122,1	6	12	**HJ1018**	1,4	0,17
	143	-	114,2	-	-	-		2,59	-
	-	107	-	138,5	-	-	**-**	2,4	-
	-	107	114,5	138,5	-	-	**-**	2,4	-

Single Row Cylindrical Roller Bearings



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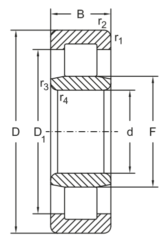

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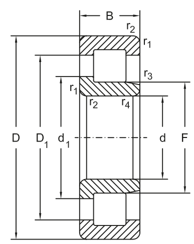

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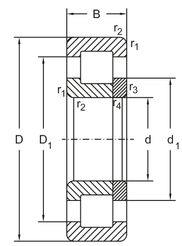
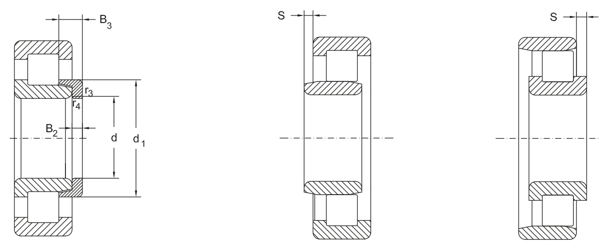


NUP

	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
90	160	30	2	2	-	183	216	3800	4500	**NJ218 E**
	160	40	2	2	3,5	240	315	3200	3800	**NU2218 E**
	160	40	2	2	-	240	315	3200	3800	**NJ2218 E**
	160	40	2	2	-	240	315	3200	3800	**NUP2218 E**
	190	43	3	3	3	315	345	3200	3800	**N318 EMB**
	190	43	3	3	3	315	345	3200	3800	**NU318 E**
	190	43	3	3	-	315	345	3200	3800	**NJ318 E**
	190	43	3	3	-	315	345	3200	3800	**NUP318 E**
	190	64	3	3	6	430	530	3000	3600	**NU2318 E**
	190	64	3	3	-	430	530	3000	3600	**NJ2318 E**
	190	64	3	3	-	430	530	3000	3600	**NUP2318 E**
	225	54	4	4	5	393	427	2800	3400	**N418 M**
	225	54	4	4	5	393	427	2800	3400	**NU418 M**
	225	54	4	4	-	393	427	2800	3400	**NJ418 M**
	225	54	4	4	-	393	427	2800	3400	**NUP418 M**
95	145	24	1,5	1,1	4,1	96,5	129	4400	5200	**NU1019 M**
	170	32	2,1	2,1	1,4	166	195	3800	4500	**N219**
	170	32	2,1	2,1	1,4	210	249	3800	4500	**NU219 EM**
	170	32	2,1	2,1	-	210	249	3800	4500	**NJ219 EM**
	170	32	2,1	2,1	-	210	249	3800	4500	**NUP219 EM**
	170	43	2,1	2,1	3,5	273	349	3200	3800	**NU2219 EM**
	170	43	2,1	2,1	-	273	349	3200	3800	**NJ2219 EM**
	170	43	2,1	2,1	-	273	349	3200	3800	**NUP2219 EM**

Single Row Cylindrical Roller Bearings

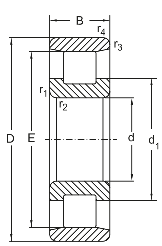


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
90	-	107	114,5	138,5	9	14	**HJ218 E**	2,7	0,33
	-	107	-	138,5	-	-	**-**	3,2	-
	-	107	114,5	138,5	9	15	**HJ2218 E**	3,2	0,32
	-	107	114,5	138,5	-	-	**-**	3,2	-
	169,5	-	124	-	-	-	**-**	5,93	-
	-	113,5	-	160,2	-	-	**-**	5,4	-
	-	113,5	124	160,2	12	18,5	**HJ318 E**	5,4	0,63
	-	113,5	124	160,2	-	-	**-**	5,4	-
	-	113,5	-	160,2	-	-	**-**	8,1	-
	-	113,5	124	160,2	12	22	**HJ2318 E**	8,1	0,68
	-	113,5	124	160,2	-	-	**-**	8,1	-
	191,5	-	137	-	-	-	**-**	11,5	-
	-	123,5	-	178,8	-	-	**-**	11,5	-
	-	123,5	137	178,8	14	24	**HJ418**	11,5	1,1
	-	123,5	137	178,8	-	-	**-**	11,5	-
95	-	108	113	127,1	6	12	**HJ1019**	1,45	0,18
	151,5	-	122	-	-	-	**-**	2,88	-
	-	112,5	-	147,4	-	-	**-**	3,24	-
	-	112,5	120,7	147,4	9	14	**HJ219 E**	3,25	0,35
	-	112,5	120,7	147,4	-	-	**-**	3,33	-
	-	112,5	-	147,4	-	-	**-**	4,29	-
	-	112,5	120,7	147,4	9	15,5	**HJ2219 E**	4,38	0,37
	-	112,5	120,7	147,4	-	-	**-**	4,42	-

Single Row Cylindrical Roller Bearings



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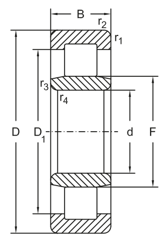

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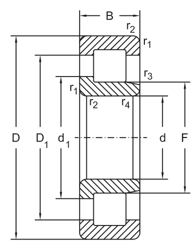

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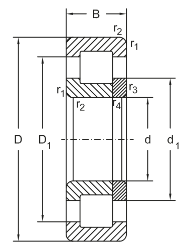
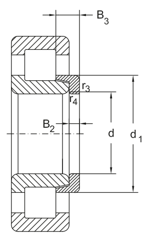


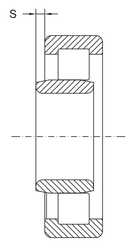
NUP

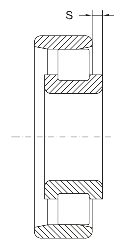
	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
95	200	45	3	3	3,5	242	170	3000	3600	**N319**
	200	45	3	3	3,5	311	351	3000	3600	**NU319 EM**
	200	45	3	3	-	311	351	3000	3600	**NJ319 EM**
	200	45	3	3	-	311	351	3000	3600	**NUP319 EM**
	200	67	3	3	7,2	388	488	2800	3400	**NU2319 M**
	200	67	3	3	-	388	488	2800	3400	**NJ2319 M**
	200	67	3	3	-	388	488	2800	3400	**NUP2319 M**
	240	55	4	4	5,2	415	465	2400	3000	**N419 M**
	240	55	4	4	5,2	415	465	2400	3000	**NU419 M**
	240	55	4	4	-	415	465	2400	3000	**NJ419 M**
	240	55	4	4	-	415	465	2400	3000	**NUP419 M**
100	150	24	1,5	1,1	4,3	98	134	4300	5000	**NU1020 M**
	180	34	2,1	2,1	1,4	250	305	3200	3800	**N220 E**
	180	34	2,1	2,1	1,4	250	305	3200	3800	**NU220 E**
	180	34	2,1	2,1	-	250	305	3200	3800	**NJ220 E**
	180	34	2,1	2,1	-	250	305	3200	3800	**NUP220 E**
	180	46	2,1	2,1	3	335	440	3000	3800	**NU2220 E**
	180	46	2,1	2,1	-	335	440	3000	3600	**NJ2220 E**
	180	46	2,1	2,1	-	335	440	3000	3600	**NUP2220 E**
	215	47	3	3	3,5	380	425	3000	3600	**N320 E**
	215	47	3	3	3,5	380	425	3000	3600	**NU320 E**
	215	47	3	3	-	380	425	3000	3600	**NJ320 E**
	215	47	3	3	-	380	425	3000	3600	**NUP320 E**

Single Row Cylindrical Roller Bearings



NJ+HJ

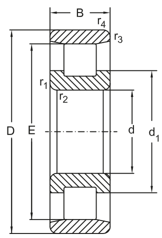




Abutment and fillet dimensions see on page 210

Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	Designation	Bearing	Thrust collar
								kg	
95	173,5	-	133	-	-	-	**-**	6,47	-
	-	121,5	-	168,2	-	-	**-**	7	-
	-	121,5	132,2	168,2	13	20,5	**HJ319 E**	7,2	0,8
	-	121,5	132,2	168,2	-	-	**-**	7,26	-
	-	121,5	-	168,2	-	-	**-**	10,5	-
	-	121,5	132,2	168,2	13	24,5	**HJ2319 E**	10,5	0,93
	-	121,5	132,2	168,2	-	-	**-**	10,9	-
	201,5	-	147	-	-	-	**-**	13,8	-
	-	133,5	-	188,8	-	-	**-**	13,8	-
	-	133,5	147	188,8	15	25,5	**HJ419**	13,8	1,3
	-	133,5	147	188,8	-	-	**-**	13,8	-
100	-	113	118	132,1	6	12	**HJ1020**	1,5	0,18
	163	-	127,3	-	-	-	**-**	3,44	-
	-	119	-	155,5	-	-	**-**	3,44	-
	-	119	127,3	155,5	10	15	**HJ220 E**	3,44	0,44
	-	119	127,3	155,5	-	-	**-**	3,44	-
	-	119	-	155,5	-	-	**-**	5,5	-
	-	119	127,3	155,5	10	16	**HJ2220 E**	5,5	0,45
	-	119	127,3	155,5	-	-	**-**	5,5	-
	191,5	-	139,6	-	-	-	**-**	7,7	-
	-	127,5	-	181	-	-	**-**	7,7	-
	-	127,5	139,6	181	13	20,5	**HJ320 E**	7,7	0,9
	-	127,5	139,6	181	-	-	**-**	7,7	-

Single Row Cylindrical Roller Bearings



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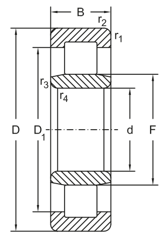

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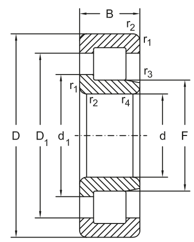

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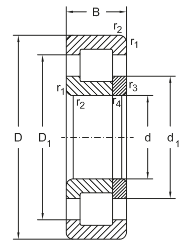
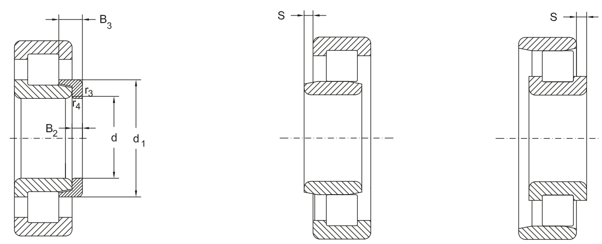


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min^{-1}		
100	215	73	3	3	6,1	570	720	2600	3200	**NU2320 E**
	215	73	3	3	-	570	720	2600	3200	**NJ2320 E**
	215	73	3	3	-	570	720	2600	3200	**NUP2320 E**
	250	58	4	4	5,7	440	490	2400	3000	**N420 M**
	250	58	4	4	5,7	440	490	2400	3000	**NU420 M**
	250	58	4	4	-	440	490	2400	3000	**NJ420 M**
	250	58	4	4	-	440	490	2400	3000	**NUP420 M**
105	160	26	2	1,1	4,5	112	153	3800	4500	**NU1021 M**
	190	36	2,1	2,1	1,4	260	320	3000	3600	**N221 E**
	190	36	2,1	2,1	1,4	260	320	3000	3600	**NU221 E**
	190	36	2,1	2,1	-	260	320	3000	3600	**NJ221 E**
	190	36	2,1	2,1	-	260	320	3000	3600	**NUP221 E**
	225	49	3	3	3,4	335	380	2600	3200	**N321 E**
	225	49	3	3	3,4	335	380	2600	3200	**NU321 E**
	225	49	3	3	-	335	380	2600	3200	**NJ321 E**
	225	49	3	3	-	335	380	2600	3200	**NUP321 E**
	260	60	4	4	5,7	490	540	2200	2800	**NU421 M**
	260	60	4	4	-	490	540	2200	2800	**NJ421 M**
	260	60	4	4	-	490	540	2200	2800	**NUP421 M**
110	170	28	2	1,1	4,5	140	190	3600	4500	**NU1022 M**
	200	38	2,1	2,1	1,4	290	365	3000	3600	**N222 E**
	200	38	2,1	2,1	1,4	290	365	3000	3600	**NU222 E**
	200	38	2,1	2,1	-	290	365	3000	3600	**NJ222 E**

Single Row Cylindrical Roller Bearings

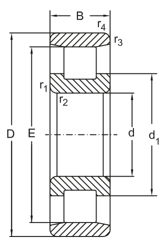


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
100	-	127,5	-	181	-	-	**-**	12	-
	-	127,5	139,6	181	13	23,5	**HJ2320 E**	12	0,95
	-	127,5	139,6	181	-	-	**-**	12	-
	211	-	153,5	-	-	-	**-**	15,8	-
	-	139	-	197	-	-	**-**	15,8	-
	-	139	153,5	197	16	27	**HJ420**	15,8	1,6
	-	139	153,5	197	-	-	**-**	15,8	-
105	-	119,5	124,5	140,3	7	13,5	**HJ1021**	1,9	0,24
	171,5	-	134,7	-	-	-	**-**	4,1	-
	-	125,5	-	163	-	-	**-**	4,1	-
	-	125,5	134,7	163	10	16	**HJ221 E**	4,1	0,52
	-	125,5	134,7	163	-	-	**-**	4,1	-
	195	-	147	-	-	-	**-**	9,1	-
	-	135	-	183,8	-	-	**-**	9,1	-
	-	135	147	183,8	13	20,5	**HJ321 E**	9,1	1
	-	135	147	183,8	-	-	**-**	9,1	-
	-	144,5	-	206	-	-	**-**	17,5	-
	-	144,5	159,5	206	16	27	**HJ421**	17,5	1,7
	-	144,5	159,5	206	-	-	**-**	17,5	-
110	-	125	131	149	7	13,5	**HJ1022**	2,4	0,27
	180,5	-	141,6	-	-	-	**-**	4,9	-
	-	132,5	-	172,4	-	-	**-**	4,9	-
	-	132,5	141,6	172,4	11	17	**HJ222 E**	4,9	0,62

Single Row Cylindrical Roller Bearings



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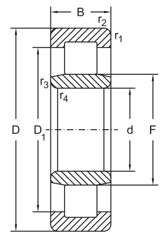

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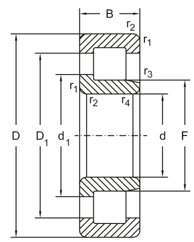

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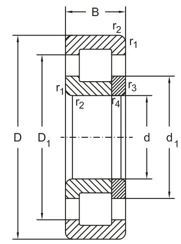
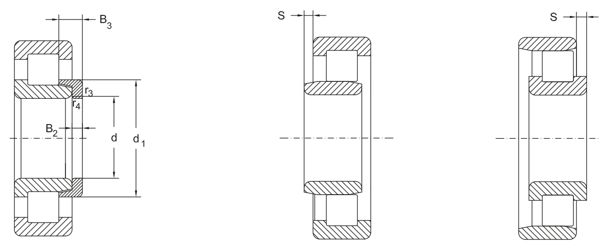


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
110	200	38	2,1	2,1	-	290	365	3000	3600	**NUP222 E**
	200	53	2,1	2,1	4	380	520	2800	3400	**NU2222 E**
	200	53	2,1	2,1	-	380	520	2800	3400	**NJ2222 E**
	200	53	2,1	2,1	-	380	520	2800	3400	**NUP2222 E**
	240	50	3	3	4	443	513	2400	3000	**N322 E**
	240	50	3	3	4	443	513	2400	3000	**NU322 E**
	240	50	3	3	-	443	513	2400	3000	**NJ322 E**
	240	50	3	3	-	443	513	2400	3000	**NUP322 E**
	240	80	3	3	7,2	630	800	2200	2800	**NU2322 E**
	240	80	3	3	-	630	800	2200	2800	**NJ2322 E**
	240	80	3	3	-	630	800	2200	2800	**NUP2322 E**
	280	65	4	4	6,2	583	672	2200	2800	**NU422 M**
	280	65	4	4	-	583	672	2200	2800	**NJ422 M**
	280	65	4	4	-	583	672	2200	2800	**NUP422 M**
120	180	28	2	1	3,2	150	208	3400	4000	**NU1024 M**
	215	40	2,1	2,1	3,5	335	415	2600	3200	**N224 E**
	215	40	2,1	2,1	3,5	335	415	2600	3200	**NU224 E**
	215	40	2,1	2,1	-	335	415	2600	3200	**NJ224 E**
	215	40	2,1	2,1	-	335	415	2600	3200	**NUP224 E**
	215	58	2,1	2,1	5	450	610	2600	3200	**NU2224 E**
	215	58	2,1	2,1	-	450	610	2600	3200	**NJ2224 E**
	215	58	2,1	2,1	-	450	610	2600	3200	**NUP2224 E**
	260	55	3	3	4,5	520	600	2200	2800	**N324 E**

Single Row Cylindrical Roller Bearings

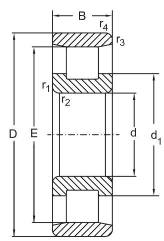


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
110	-	132,5	141,6	172,4	-	-	**-**	4,9	-
	-	132,5	-	172,4	-	-	**-**	6,7	-
	-	132,5	141,6	172,4	11	19,5	**HJ2222 E**	6,7	0,65
	-	132,5	141,6	172,4	-	-	**-**	6,7	-
	211	-	155,9	-	-	-	**-**	10,5	-
	-	143	-	199,9	-	-	**-**	10,5	-
	-	143	155,9	199,9	14	22	**HJ322 E**	10,5	1,2
	-	143	155,9	199,9	-	-	**-**	10,5	-
	-	143	-	199,9	-	-	**-**	17,0	-
	-	143	155,9	199,9	14	26,5	**HJ2322 E**	17,0	1,3
	-	143	155,9	199,9	-	-	**-**	17,0	-
	-	155	-	219,5	-	-	**-**	20,8	-
	-	155	171	219,5	17	29,5	**HJ422**	20,8	2,1
	-	155	171	219,5	-	-	**-**	20,8	-
120	-	135	141	158,8	7	13,5	**HJ1024**	2,6	0,3
	195,5	-	153,5	-	-	-	**-**	5,7	-
	-	143,5	-	186,9	-	-	**-**	5,7	-
	-	143,5	153,5	186,9	11	17	**HJ224 E**	5,7	0,72
	-	143,5	153,5	186,9	-	-	**-**	5,7	-
	-	143,5	-	186,9	-	-	**-**	8,3	-
	-	143,5	153,5	186,9	11	20	**HJ2224 E**	8,3	0,75
	-	143,5	153,5	186,9	-	-	**-**	8,3	-
	230	-	168,7	-	-	-	**-**	15,2	-

Single Row Cylindrical Roller Bearings



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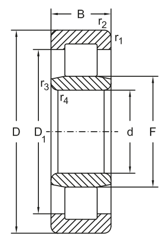

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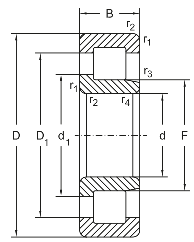

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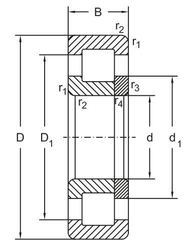
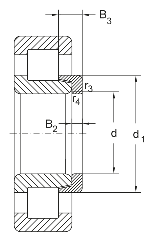


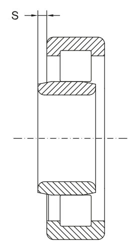
NUP

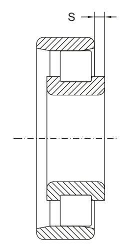
	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
120	260	55	3	3	4,5	520	600	2200	2800	**NU324 E**
	260	55	3	3	-	520	600	2200	2800	**NJ324 E**
	260	55	3	3	-	520	600	2200	2800	**NUP324 E**
	260	86	3	3	7,2	780	1020	2000	2600	**NU2324 EM**
	260	86	3	3	-	780	1020	2000	2600	**NJ2324 EM**
	260	86	3	3	-	780	1020	2000	2600	**NUP2324 EM**
	310	72	5	5	6,9	670	780	1800	2200	**NU424 M**
	310	72	5	5	-	670	780	1800	2200	**NJ424 M**
130	200	33	2	1	5,5	180	250	3000	3600	**NU1026 M**
	230	40	3	3	3,6	360	450	2400	3000	**N226 E**
	230	40	3	3	3,6	360	450	2400	3000	**NU226 E**
	230	40	3	3	-	360	450	2400	3000	**NJ226 E**
	230	40	3	3	-	360	450	2400	3000	**NUP226 E**
	230	64	3	3	6	530	735	2400	3000	**NU2226 E**
	230	64	3	3	-	530	735	2400	3000	**NJ2226 E**
	230	64	3	3	-	530	735	2400	3000	**NUP2226 E**
	280	58	4	4	4,5	570	670	2000	2600	**N326 E**
	280	58	4	4	4,5	570	670	2000	2600	**NU326 E**
	280	58	4	4	-	570	670	2000	2600	**NJ326 E**
	280	58	4	4	-	570	670	2000	2600	**NUP326 E**
	280	93	4	4	8,1	915	1220	1900	2400	**NU2326 EM**
	280	93	4	4	-	915	1220	1900	2400	**NJ2326 EM**
	280	93	4	4	-	915	1220	1900	2400	**NUP2326 EM**

Single Row Cylindrical Roller Bearings



NJ+HJ

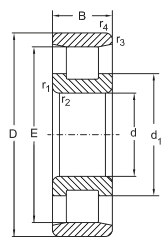




Abutment and fillet dimensions see on page 210

Dimensions						**Thrust collar**		**Mass**	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
120	-	154	-	217,3	-	-	**-**	13,4	-
	-	154	168,7	217,3	14	22,5	**HJ324 E**	13,4	1,4
	-	154	168,7	217,3	-	-	**-**	13,4	-
	-	154	-	217,3	-	-	**-**	23,5	-
	-	154	168,7	217,3	14	26	**HJ2324 E**	23,5	1,5
	-	154	168,7	217,3	-	-	**-**	23,5	-
	-	170	-	242,5	-	-	**-**	30,5	-
	-	170	188	242,5	17	30,5	**HJ424**	30,5	2,7
130	-	148	155	175	8	16	**HJ1026**	3,9	0,45
	209,5	-	164,2	-	-	-	**-**	6,5	-
	-	153,5	-	200,2	-	-	**-**	6,5	-
	-	153,5	164,2	200,2	11	17	**HJ226 E**	6,5	0,8
	-	153,5	164,2	200,2	-	-	**-**	6,5	-
	-	153,5	182,3	200,2	-	-	**-**	10,5	-
	-	153,5	-	200,2	11	21	**HJ2226 E**	10,5	0,85
	-	153,5	182,3	200,2	-	-	**-**	10,5	-
	247	-	182,3	-	-	-	**-**	16,5	-
	-	167	-	233,8	-	-	**-**	16,5	-
	-	167	182,3	233,8	14	23	**HJ326 E**	16,5	1,7
	-	167	182,3	233,8	-	-	**-**	16,5	-
	-	167	-	233,8	-	-	**-**	29,6	-
	-	167	182,3	233,8	14	28	**HJ2326 E**	29,6	1,8
	-	167	182,3	233,8	-	-	**-**	29,6	-

Single Row Cylindrical Roller Bearings



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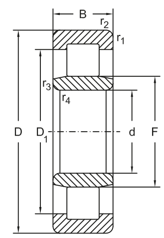

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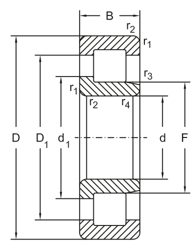

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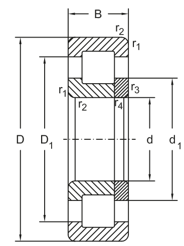
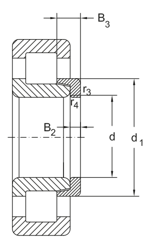


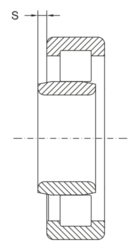
NUP

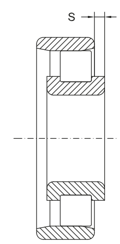
	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
130	340	78	6	5	6,5	790	960	1800	2200	**NU426 M**
	340	78	6	5	-	790	960	1800	2200	**NJ426 M**
140	210	33	2	1,1	3,8	183	265	2800	3400	**NU1028 M**
	250	42	3	3	3,7	390	510	2400	3000	**N228 EM**
	250	42	3	3	3,7	390	510	2400	3000	**NU228 EM**
	250	42	3	3	-	390	510	2400	3000	**NJ228 EM**
	250	42	3	3	-	390	510	2400	3000	**NUP228 EM**
	250	68	3	3	7	570	830	2200	2800	**NU2228 EM**
	250	68	3	3	-	570	830	2200	2800	**NJ2228 EM**
	250	68	3	3	-	570	830	2200	2800	**NUP2228 EM**
	300	62	4	4	5,2	670	800	1900	2400	**N328 E**
	300	62	4	4	5,2	670	800	1900	2400	**NU328 E**
	300	62	4	4	-	670	800	1900	2400	**NJ328 E**
	300	62	4	4	-	670	800	1900	2400	**NUP328 E**
	300	102	4	4	9,2	1130	1589	1800	2200	**NU2328 EM**
	300	102	4	4	-	1130	1589	1800	2200	**NJ2328 EM**
	300	102	4	4	-	1130	1589	1800	2200	**NUP2328 EM**
	360	82	6	5	7	850	1020	1600	1900	**NU428 M**
	360	82	6	5	-	850	1020	1600	1900	**NJ428 M**
150	225	35	2,1	1,5	4,2	208	310	2600	3200	**NU1030 M**
	270	45	3	3	4	440	585	2200	2800	**N230 EM**
	270	45	3	3	4	440	585	2200	2800	**NU230 EM**
	270	45	3	3	-	440	585	2200	2800	**NJ230 EM**

Single Row Cylindrical Roller Bearings



NJ+HJ

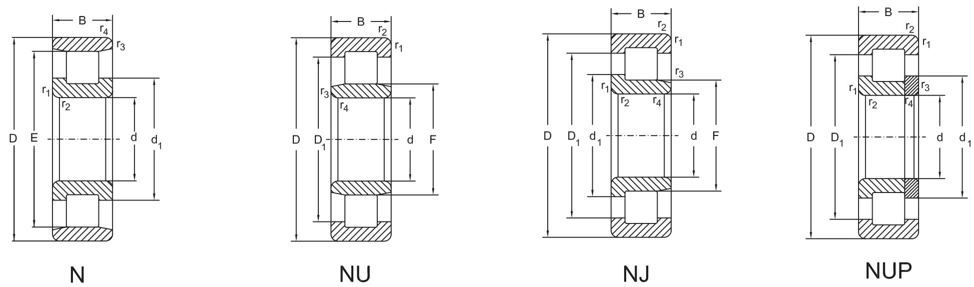




Abutment and fillet dimensions see on page 210

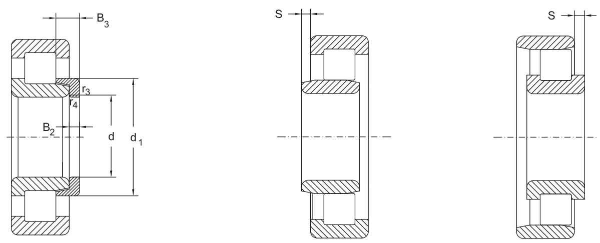
Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
130	-	185	-	265	-	-	**-**	42,6	-
	-	185	205	265	18	32	**HJ426**	42,6	3,4
140	-	158	165	185	8	16	**HJ1028**	4,1	0,48
	225	-	180	-	-	-	**-**	9,5	-
	-	169	-	215,3	-	-	**-**	9,5	-
	-	169	180	215,3	11	18	**HJ228 E**	9,5	1
	-	169	180	215,3	-	-	**-**	9,5	-
	-	169	-	215,3	-	-	**-**	15,5	-
	-	169	180	215,3	11	23	**HJ2228 E**	15,5	1,1
	-	169	180	215,3	-	-	**-**	15,5	-
	264	-	195,5	-	-	-	**-**	22,5	-
	-	180	-	250,3	-	-	**-**	22,5	-
	-	180	195,5	250,3	15	25	**HJ328 E**	22,5	2
	-	180	195,5	250,3	-	-	**-**	22,5	-
	-	180	-	250,3	-	-	**-**	37,2	-
	-	180	195,5	250,3	15	31	**HJ2328 E**	37,2	2,2
	-	180	195,5	250,3	-	-	**-**	37,2	-
	-	198	-	281	-	-	**-**	49,5	-
	-	198	219	281	18	33	**HJ428**	49,5	3,9
150	-	169,5	176,5	198,1	9	18	**HJ1030**	5	0,6
	242	-	193,7	-	-	-	**-**	11,8	-
	-	182	-	231,8	-	-	**-**	11,8	-
	-	182	193,7	231,8	12	19,5	**HJ230 E**	11,8	1,3

Single Row Cylindrical Roller Bearings



	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
150	270	45	3	3	-	440	585	2200	2800	**NUP230 EM**
	270	73	3	3	7,3	655	980	2000	2600	**NU2230 EM**
	270	73	3	3	-	655	980	2000	2600	**NJ2230 EM**
	270	73	3	3	-	655	980	2000	2600	**NUP2230 EM**
	320	65	4	4	5,5	800	1000	1800	2200	**N330 EM**
	320	65	4	4	5,5	800	1000	1800	2200	**NU330 EM**
	320	65	4	4	-	800	1000	1800	2200	**NJ330 EM**
	320	65	4	4	-	800	1000	1800	2200	**NUP330 EM**
	320	108	4	4	9,8	1160	1600	1700	2000	**NU2330 EM**
	320	108	4	4	-	1160	1600	1700	2000	**NJ2330 EM**
	320	108	4	4	-	1160	1600	1700	2000	**NUP2330 EM**
	380	85	6	5	7,5	898	1145	1500	1800	**NU430 M**
	380	85	6	5	-	898	1145	1500	1800	**NJ430 M**
160	240	38	2,1	1,5	4,3	245	355	2400	3000	**NU1032 M**
	290	48	3	3	4,1	500	670	2000	2600	**N232 EM**
	290	48	3	3	4,1	500	670	2000	2600	**NU232 EM**
	290	48	3	3	-	500	670	2000	2600	**NJ232 EM**
	290	48	3	3	-	500	670	2000	2600	**NUP232 EM**
	290	80	3	3	7,3	800	1180	1900	2400	**NU2232 EM**
	290	80	3	3	-	800	1180	1900	2400	**NJ2232 EM**
	290	80	3	3	-	800	1180	1900	2400	**NUP2232 EM**
	340	68	4	4	5,5	865	1060	1600	1900	**N332 EM**
	340	68	4	4	5,5	865	1060	1600	1900	**NU332 EM**

Single Row Cylindrical Roller Bearings

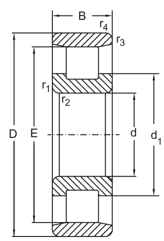


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
150	-	182	193,7	231,8	-	-	**-**	11,8	-
	-	182	-	231,8	-	-	**-**	19,5	-
	-	182	193,7	231,8	12	24,5	**HJ2230 E**	19,5	1,4
	-	182	193,7	231,8	-	-	**-**	19,5	-
	283	-	210,1	-	-	-	**-**	27,5	-
	-	193	-	268,4	-	-	**-**	27,5	-
	-	193	210,1	268,4	15	25	**HJ330 E**	27,5	2,4
	-	193	210,1	268,4	-	-	**-**	27,5	-
	-	193	-	268,4	-	-	**-**	44,8	-
	-	193	210,1	268,4	15	31,5	**HJ2330 E**	44,8	2,5
	-	193	210,1	268,4	-	-	**-**	44,8	-
	-	213	-	296	-	-	**-**	48	-
	-	213	234	296	20	36,5	**HJ430**	48	4,9
160	-	180	188	211,7	10	19	**HJ1032**	6,2	0,75
	259	-	207,4	-	-	-	**-**	14,6	-
	-	195	-	248,2	-	-	**-**	14,6	-
	-	195	207,4	248,2	12	20	**HJ232 E**	14,6	1,5
	-	195	207,4	248,2	-	-	**-**	14,6	-
	-	193	-	249,7	-	-	**-**	24,5	-
	-	193	206,1	249,7	12	24,5	**HJ2232 E**	24,5	1,6
	-	193	206,1	249,7	-	-	**-**	24,5	-
	300	-	222,2	-	-	-	**-**	32,3	-
	-	204	-	284,6	-	-	**-**	32,3	-

Single Row Cylindrical Roller Bearings



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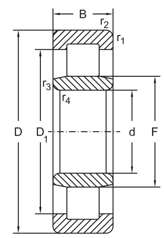

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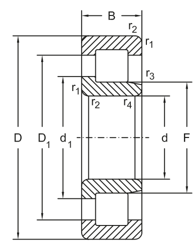

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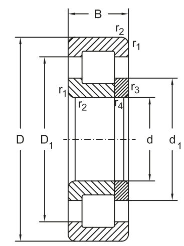
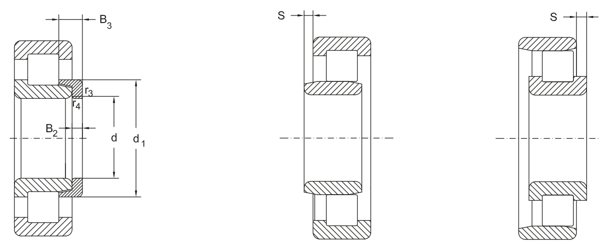


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
160	340	68	4	4	-	918	1148	1600	1900	**NJ332 EM**
	340	68	4	4	-	865	1060	1600	1900	**NUP332 EM**
	340	114	4	4	10	1320	1830	1600	1900	**NU2332 EM**
	340	114	4	4	-	1320	1830	1600	1900	**NJ2332 EM**
	340	114	4	4	-	1320	1830	1600	1900	**NUP2332 EM**
170	260	42	2,1	2,1	6,9	300	430	2200	2800	**NU1034 M**
	310	52	4	4	4,3	618	828	1800	2200	**NU234 EM6**
	310	52	4	4	-	618	828	1800	2200	**NJ234 EM6**
	310	52	4	4	-	618	828	1800	2200	**NUP234 EM6**
	310	86	4	4	7,2	950	1400	1700	2000	**NU2234 EM**
	310	86	4	4	-	950	1400	1700	2000	**NJ2234 EM**
	310	86	4	4	-	950	1400	1700	2000	**NUP2234 EM**
	360	72	4	4	7	800	1020	1600	1900	**N334 EM**
	360	72	4	4	7	928	1150	1600	1900	**NU334 EM**
	360	72	4	4	-	928	1150	1600	1900	**NJ334 EM**
	360	72	4	4	-	928	1150	1600	1900	**NUP334 EM**
	360	120	4	4	13	1220	1760	1500	1800	**NU2334 M**
	360	120	4	4	-	1220	1760	1500	1800	**NJ2334 M**
	360	120	4	4	-	1220	1760	1500	1800	**NUP2334 M**
180	280	46	2,1	2,1	7	360	520	2200	2800	**NU1036 M**
	320	52	4	4	4,5	610	830	1800	2200	**N236 EM**
	320	52	4	4	4,5	610	830	1800	2200	**NU236 EM**

Single Row Cylindrical Roller Bearings

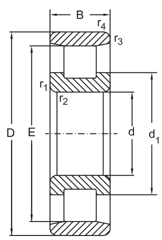


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
160	-	204	222,2	284,6	15	25	**HJ332 E**	32,1	2,7
	-	204	222,2	284,6	-	-	**-**	32,1	-
	-	204	-	284,6	-	-	**-**	53,5	-
	-	204	222,2	284,6	15	32	**HJ2332 E**	53,5	2,9
	-	204	222,2	284,6	-	-	**-**	53,5	-
170	-	193	200,9	227,7	11	21	**HJ1034**	8,4	1
	-	207	-	267,1	-	-	**-**	18,2	-
	-	207	220,8	267,1	12	20	**HJ234 E**	18,2	1,7
	-	207	220,8	267,1	-	-	**-**	18,2	-
	-	205	-	268,5	-	-	**-**	29,8	-
	-	205	219,6	268,5	12	24	**HJ2234 E**	29,8	1,8
	-	205	219,6	268,5	-	-	**-**	29,8	-
	310	-	238	-	-	-	**-**	38	-
	-	220	-	292,5	-	-	**-**	38	-
	-	220	238	292,5	16	29,5	**HJ334 E**	38	3,3
	-	220	238	292,5	-	-	**-**	38	-
	-	220	-	292,5	-	-	**-**	63,5	-
	-	220	238	292,5	16	38,5	**HJ2334**	63,5	3,7
	-	220	238	292,5	-	-	**-**	63,5	-
180	-	205	214,1	244,7	12	22,5	**HJ1036**	10,9	1,3
	289	-	230,2	-	-	-	**-**	18,9	-
	-	217	-	277,2	-	-	**-**	18,9	-

Single Row Cylindrical Roller Bearings



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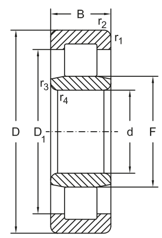

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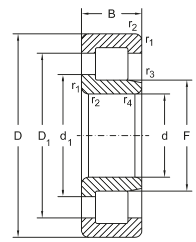

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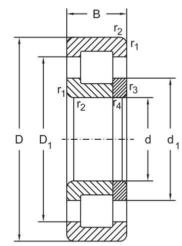
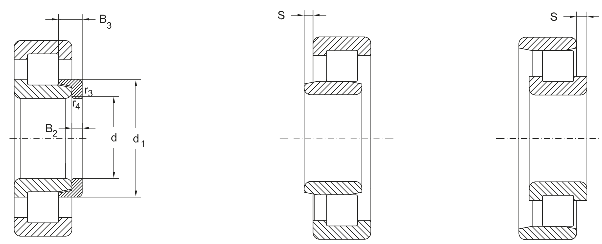


NUP

Dimensions						Basical radial load		Speed limit		Designation
			r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
d	D	B								
mm						kN		min $^{-1}$		
180	320	52	4	4	-	610	830	1800	2200	**NJ236 EM**
	320	52	4	4	-	610	830	1800	2200	**NUP236 EM**
	320	86	4	4	7,2	1000	1500	1700	2000	**NU2236 EM**
	320	86	4	4	-	1000	1500	1700	2000	**NJ2236 EM**
	320	86	4	4	-	1000	1500	1700	2000	**NUP2236 EM**
	380	75	4	4	6,9	900	1160	1500	1800	**N336 M**
	380	75	4	4	6,9	900	1160	1500	1800	**NU336 M**
	380	75	4	4	-	900	1160	1500	1800	**NJ336 M**
	380	75	4	4	-	900	1160	1500	1800	**NUP336 M**
	380	126	4	4	13	1370	2000	1400	1700	**NU2336 M**
	380	126	4	4	-	1370	2000	1400	1700	**NJ2336 M**
	380	126	4	4	-	1370	2000	1400	1700	**NUP2336 M**
190	290	46	2,1	2,1	5	365	550	2000	2600	**NU1038 M**
	340	55	4	4	4,7	680	930	1700	2000	**N238 EM**
	340	55	4	4	4,7	680	930	1700	2000	**NU238 EM**
	340	55	4	4	-	680	930	1700	2000	**NJ238 EM**
	340	55	4	4	-	680	930	1700	2000	**NUP238 EM**
	340	92	4	4	8	854	1338	1600	1900	**NU2238 EM**
	340	92	4	4	-	854	1338	1600	1900	**NJ2238 M**
	400	78	5	5	7,1	1236	1635	1400	1700	**NU338 EM**
	400	78	5	5	-	1236	1635	1400	1700	**NJ338 EM**
	400	132	5	5	13,5	1789	1635	1400	1700	**NU2338 EM6**
	400	132	5	5	-	1789	2628	1400	1700	**NJ2338 EM6**

Single Row Cylindrical Roller Bearings

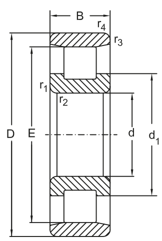


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
180	-	217	230,2	277,2	12	20	**HJ236 E**	19	1,8
	-	217	230,2	277,2	-	-	**-**	19	-
	-	215	-	278,6	-	-	**-**	31,2	-
	-	215	229,6	278,6	12	24	**HJ2236 E**	31,2	1,9
	-	215	229,6	278,6	-	-	**-**	31,2	-
	328	-	252	-	-	-	**-**	44	-
	-	232	-	308,5	-	-	**-**	44	-
	-	232	252	308,5	17	30,5	**HJ336**	44	3,9
	-	232	252	308,5	-	-	**-**	44	-
	-	232	-	308,5	-	-	**-**	74	-
	-	232	252	308,5	17	40	**HJ2336**	74	4,9
	-	232	252	308,5	-	-	**-**	74	-
190	-	215	225	254,5	12	22,5	**HJ1038**	11,4	1,4
	306	-	244,6	-	-	-	**-**	22,8	-
	-	230	-	293,6	-	-	**-**	22,8	-
	-	230	244,6	293,6	13	21,5	**HJ238 E**	22,8	2,2
	-	230	244,6	293,6	-	-	**-**	22,8	-
	-	231	-	285,2	-	-	**-**	36,7	-
	-	231	246	285,2	13	26,5	**HJ2238 E**	37,6	2,4
	-	245	-	334,5	-	-	**-**	50,5	-
	-	245	263,5	334,5	18	31	**HJ338**	50,5	4,5
	-	245	-	334,5	-	-	**-**	83,5	-
	-	245	263,5	334,5	18	36,5	**HJ2338 E**	83,5	5

Single Row Cylindrical Roller Bearings



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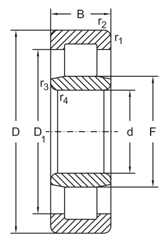

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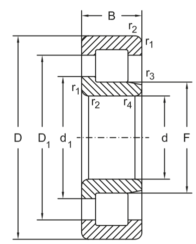

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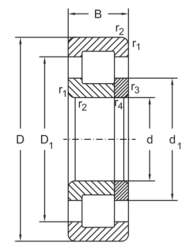
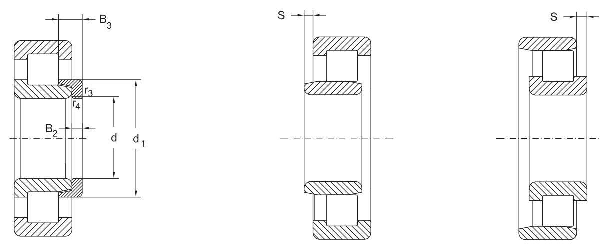


NUP

Dimensions						Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min $^{-1}$		
190	400	132	5	5	-	1789	2628	1400	1700	**NUP2338 EM6**
200	310	51	2,1	2,1	8,3	400	600	2000	2600	**NU1040 M**
	360	58	4	4	5	750	1040	1600	1900	**N240 EM**
	360	58	4	4	5	750	1040	1600	1900	**NU240 EM**
	360	58	4	4	-	750	1040	1600	1900	**NJ240 EM**
	360	58	4	4	-	750	1040	1600	1900	**NUP240 EM**
	360	98	4	4	8,1	1220	1860	1500	1800	**NU2240 EM**
	360	98	4	4	-	1220	1860	1500	1800	**NJ2240 EM**
	420	80	5	5	7,5	965	1250	1400	1700	**NU340 M**
	420	80	5	5	-	965	1250	1400	1700	**NJ340 M**
	420	138	5	5	15	1740	2685	1300	1600	**NU2340 M**
	420	138	5	5	-	1740	2685	1300	1600	**NJ2340 M**
220	340	56	3	3	6,2	650	1047	1700	2000	**NU1044 M**
	400	65	4	4	6	778	1113	1500	1800	**NU244 M**
	400	65	4	4	-	778	1113	1500	1800	**NJ244 M**
	400	65	4	4	-	778	1113	1500	1800	**NUP244 M**
	400	108	4	4	11,8	1370	2310	1400	1700	**NU2244 M**
	400	108	4	4	-	1160	1870	1400	1700	**NJ2244 M**
	460	88	5	5	8	1230	1650	1300	1600	**NU344 M**
	460	145	5	5	10	1760	2600	1200	1500	**NU2344 E**
240	360	56	3	3	8,5	695	1168	1600	1900	**NU1048 M**
	440	72	4	4	7	936	1339	1400	1700	**NU248 M**
	440	72	4	4	-	936	1339	1400	1700	**NJ248 M**

Single Row Cylindrical Roller Bearings

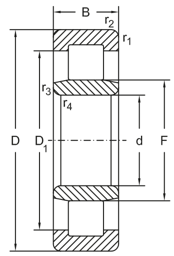


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
190	-	245	263,5	334,5	-	-	**-**	85,8	-
200	-	229	239,5	270,1	13	25,5	**HJ1040**	14,8	1,7
	323	-	258,2	-	-	-	**-**	26,9	-
	-	243	-	310,1	-	-	**-**	26,9	-
	-	243	258,2	310,1	14	23	**HJ240 E**	26,9	2,6
	-	243	258,2	310,1	-	-	**-**	26,9	-
	-	241	-	311,5	-	-	**-**	45,7	-
	-	241	256,9	311,5	14	28	**HJ2240 E**	45,7	3
	-	260	-	339,3	-	-	**-**	57,5	-
	-	260	280	339,3	18	33	**HJ340**	57,5	5,2
	-	260	-	339,3	-	-	**-**	99	-
	-	260	280	339,3	18	44,5	**HJ2340**	99	5,5
220	-	250	262	297,3	14	27	**HJ1044**	19,3	2,2
	-	270	-	334,3	-	-	**-**	38,1	-
	-	270	285,5	334,3	15	27,5	**HJ244**	38,1	3,6
	-	270	285,5	334,3	-	-	**-**	38,1	-
	-	270	-	334,3	-	-	**-**	63,5	-
	-	270	285,5	334,3	15	36,5	**HJ2244**	63,5	3,6
	-	284	-	373,3	-	-	**-**	75,5	-
	-	284	-	373,3	-	-	**-**	124	-
240	-	270	282	317,3	14	27	**HJ1048**	20,7	2,4
	-	295	-	367,3	-	-	**-**	51,5	-
	-	295	313	367,3	16	29,5	**HJ248**	51,5	4,65

Single Row Cylindrical Roller Bearings



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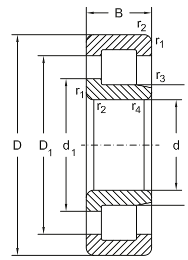
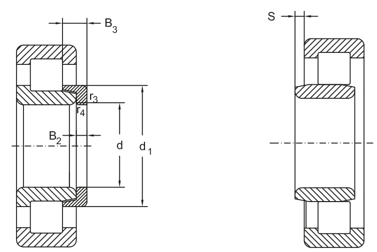


NJ

d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	Basical radial load dyn. C_r	stat. C_{0r}	Speed limit grease	oil	Designation
mm						kN		min $^{-1}$		
240	440	120	4	4	12,8	1430	2320	1300	1600	**NU2248 M**
	500	95	5	5	8.9	1400	1930	1200	1500	**NU348 M**
	500	155	5	5	17	2080	3150	1100	1400	**NU2348 M**
260	400	65	4	4	10,5	660	1039	1500	1800	**NU1052 M**
	480	80	5	5	5	1140	1630	1200	1500	**NU252 M**
	480	80	5	5	-	1140	1630	1200	1500	**NJ252 M**
	480	130	5	5	12,8	1760	2900	1100	1400	**NU2252 M**
	540	102	6	6	9,4	1600	2200	1100	1400	**NU352 M**
	540	165	6	6	18	2320	3550	1000	1300	**NU2352 M**
280	420	65	4	4	10,5	680	1100	1400	1700	**NU1056 M**
	500	80	5	5	7,5	1120	1660	1200	1500	**NU256 M**
	500	80	5	5	-	1120	1660	1200	1500	**NJ256 M**
	500	130	5	5	12,8	1760	2900	1100	1400	**NU2256 M**
	580	108	6	6	22	1800	2500	1000	1300	**NU356 M**
300	460	74	4	4	12	900	1430	1300	1600	**NU1060 M**
	540	85	5	5	7,2	1400	2040	1100	1400	**NU260 M**
	540	85	5	5	-	1400	2040	1100	1400	**NJ260 M**
	540	140	5	5	14	2080	3400	1000	1300	**NU2260 M**
	620	109	7,5	7,5	9,5	2080	3000	900	1100	**NU360 M**
320	480	74	4	4	11,5	915	1500	1200	1500	**NU1064 M**
	580	92	5	5	8,3	1600	2360	1000	1300	**NU264 M**
	580	92	5	5	-	1600	2360	1000	1300	**NJ264 M**

Single Row Cylindrical Roller Bearings

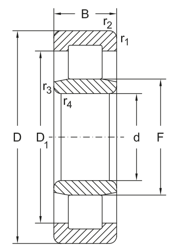


NJ+HJ

Abutment and fillet dimensions see on page 210

Dimensions							Thrust collar	Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
240	-	295	-	367,3	-	-	**-**	85,9	-
	-	310	-	405,3	-	-	**-**	96,2	-
	-	310	-	405,3	-	-	**-**	157	-
260	-	296	309,6	349,7	16	31,5	**HJ1052**	30,8	3,3
	-	320	-	399,3	-	-	**-**	68,3	-
	-	320	340	399,3	18	33	**HJ252**	68,3	6,2
	-	320	-	399,3	-	-	**-**	112	-
	-	336	-	437,3	-	-	**-**	120	-
	-	336	-	437,3	-	-		195	-
280	-	316	329,6	369,7	16	31,5	**HJ1056**	32,8	3,7
	-	340	-	419,3	-	-	**-**	71,8	-
	-	340	360	419,3	18	33	**HJ256**	71,8	6,5
	-	340	-	419,3	-	-	**-**	117	-
	-	362	-	469,3	-	-	**-**	147	-
300	-	340	356	403,6	19	36	**HJ1060**	46,3	5,4
	-	364	-	453,3	-	-	**-**	89,9	-
	-	364	387	453,3	20	34,5	**HJ260**	89,9	8,4
	-	364	-	453,3	-	-	**-**	148	-
	-	388	-	506,7	-	-	**-**	168	-
320	-	360	376	423,1	19	36	**HJ1064**	48,7	5,5
	-	390	-	485,3	-	-	**-**	113	-
	-	390	415	485,3	21	37	**HJ260**	113	10,2

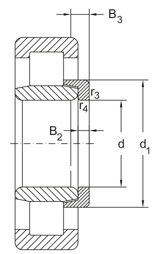
Single Row Cylindrical Roller Bearings



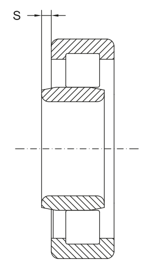
NU

	Dimensions					Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	s ≈	dyn. C_r	stat. C_{0r}	grease	oil	
mm						kN		min^{-1}		
340	520	82	5	5	12,5	1120	1830	1200	1400	**NU1068 M**
360	540	82	5	5	12,5	1145	1900	1200	1400	**NU1072 M**
380	560	82	5	5	12,5	1180	2000	1000	1300	**NU1076 M**
400	600	90	5	5	13,5	1370	2320	950	1200	**NU1080 M**
420	620	90	5	5	15	1400	2450	900	1100	**NU1084 M**
440	650	94	6	6	9,8	1560	2750	850	1000	**NU1088 M**
460	680	100	6	6	10,5	1660	3000	850	1000	**NU1092 M**
480	650	78	5	5	6,8	1140	2240	900	1100	**NU1996 M**
	700	100	5	5	15,9	1140	2240	900	1100	**NU1096 M**
500	670	78	5	5	6,8	1140	2240	850	1000	**NU19/500 M**
	720	100	6	6	10,5	1760	3200	800	950	**NU10/500 M**
560	750	85	5	5	7,5	1430	2900	750	900	**NU19/560 M**
	820	115	6	6	12,3	2700	5100	630	750	**NU10/560 M**
600	870	118	6	6	13,9	2750	5050	580	480	**NU10/600 M**
630	850	100	6	6	8,5	1830	3750	670	800	**NU19/630 M**
710	950	106	6	6	9,3	2080	4400	600	700	**NU19/710 M**

Single Row Cylindrical Roller Bearings



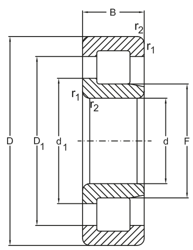
NU+HJ



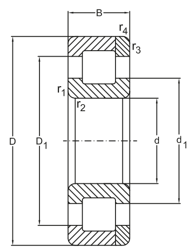
Abutment and fillet dimensions see on page 210

Dimensions						Thrust collar		Mass	
d	E	F	d_1 ≈	D_1 ≈	B_2	B_3	**Designation**	Bearing	Thrust collar
								kg	
340	-	385	403	456	21	39,5	**HJ1068**	65	7,1
360	-	405	423	476,4	21	39,5	**HJ1072**	68,2	7,6
380	-	425	-	496,7	-	-	**-**	71,2	-
400	-	450	-	529,5	-	-	**-**	92,5	-
420	-	470	-	549,5	-	-	**-**	96,2	-
440	-	493	-	575,7	-	-	**-**	110	-
460	-	516	-	601,5	-	-	**-**	129	-
480	-	525	-	587	-	-	**-**	77,5	-
	-	525	-	587	-	-	**-**	128	-
500	-	545	-	606,8	-	-	**-**	80,4	-
	-	556	-	641,7	-	-	**-**	139	-
560	-	610	-	679,8	-	-	**-**	110	-
	-	626	-	713	-	-	**-**	215	-
600	-	667	-	779	-	-	**-**	240	-
630	-	688	-	768,5	-	-	**-**	169	-
710	-	774	-	860,6	-	-	**-**	219	-

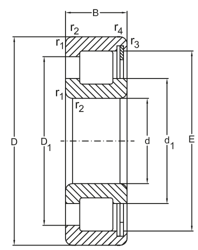
Single Row Full Complement Cylindrical Roller Bearings



NJ 23..VH



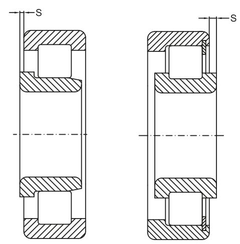
NC



NCF

d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	Designation
Dimensions					Basical radial load		Designation
mm					kN		
20	37	11	0,3	0,3	16	18,5	**NC2904 V**
	37	11	0,3	0,3	16	18,5	**NCF2904 V**
	42	16	0,6	0,3	33	39,7	**NC3004 V**
	42	16	0,6	0,3	33	39,7	**NCF3004 V**
25	42	11	0,3	0,3	18	22,5	**NC2905 V**
	42	11	0,3	0,3	18	22,5	**NCF2905 V**
	47	16	0,6	0,3	37,4	46,9	**NC3005 V**
	47	16	0,6	0,3	37,4	46,9	**NCF3005 V**
	62	24	1,1	-	68,2	82,8	**NJ2305 VH**
30	47	11	0,3	0,3	19,8	26	**NC2906 V**
	47	11	0,3	0,3	19,8	26	**NCF2906 V**
	55	19	1	0,4	49	63	**NC3006 V**
	55	19	1	0,4	49	63	**NCF3006 V**
	72	27	1	-	84	102	**NJ2306 VH**
35	55	13	0,6	0,3	31	40,5	**NC2907 V**
	55	13	0,6	0,3	31	40,5	**NCF2907 V**
	62	20	1	0,4	55	71,5	**NC3007 V**
	62	20	1	0,4	55	71,5	**NCF3007 V**
	80	31	1,5	-	108	124	**NJ2307 VH**
40	62	14	0,6	0,3	34	46,5	**NC2908 V**
	62	14	0,6	0,3	34	46,5	**NCF2908 V**
	68	21	1	0,4	66	87,4	**NC3008 V**

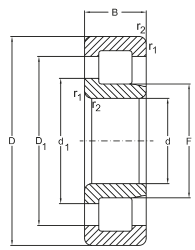
Single Row Full Complement Cylindrical Roller Bearings



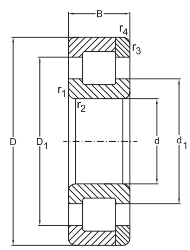
Abutment and fillet dimensions see on page 210

Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	26,3	30,3	-	4800	9000	0,06	**NC2904 V**
32,3	-	26,3	30,3	0,5	4800	9000	0,05	**NCF2904 V**
-	-	27,5	34,5	-	4500	8400	0,12	**NC3004 V**
37,5	-	27,5	34,5	0,5	4500	8400	0,11	**NCF3004 V**
-	-	31,4	35,4	-	4000	7500	0,07	**NC2905 V**
37,45	-	31,4	35,4	0,5	4000	7500	0,06	**NCF2905 V**
-	-	36,3	49	-	3600	7000	0,13	**NC3005 V**
42,7	-	36,3	49	0,5	3600	7000	0,12	**NCF3005 VH**
-	31,71	36,3	49	1,7	3000	5300	0,40	**NJ2305 V**
-	-	36,5	40,5	-	3600	6700	0,08	**NC2906 V**
42,5	-	36,5	40,5	0,5	3600	6700	0,07	**NCF2906 V**
-	-	38,4	46,8	-	3200	5600	0,22	**NC3006 V**
49,6	-	38,4	46,8	0,8	3200	5600	0,20	**NCF3006 V**
-	38,34	43,3	56,5	1,8	1900	4000	0,56	**NJ2306 VH**
-	-	42,4	47,4	-	3000	5600	0,14	**NC2907 V**
49,9	-	42,4	47,4	0,5	3000	5600	0,12	**NCF2907 V**
-	-	43,6	52,6	-	2800	5300	0,27	**NC3007 V**
55,52	-	43,6	52,6	1	2800	5300	0,25	**NCF3007 V**
-	44,74	50,3	65,8	2	1600	3400	0,73	**NJ2307 VH**
-	-	48,3	53,9	-	2600	5000	0,16	**NC2908 V**
56,6	-	48,3	53,9	0,5	2600	5000	0,15	**NCF2908 V**
-	-	49,1	58,7	-	2400	4500	0,32	**NC3008 V**

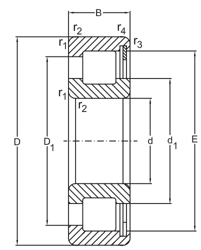
Single Row Full Complement Cylindrical Roller Bearings



NJ 23..VH



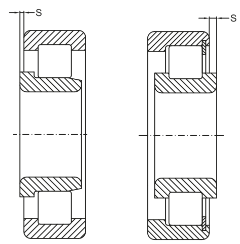
NC



NCF

	Dimensions				Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
40	68	21	1	0,4	65	86	**NCF3008 V**
	90	33	1,5	-	145	184	**NJ2308 VH**
45	68	14	0,6	0,3	37	52	**NC2909 V**
	68	14	0,6	0,3	37	52	**NCF2909 V**
	75	23	1	0,4	81	110	**NC3009 V**
	75	23	1	0,4	81	110	**NCF3009 V**
	100	36	1,5	-	170	220	**NJ2309 VH**
50	72	14	0,6	0,3	39	56	**NC2910 V**
	72	14	0,6	0,3	39	56	**NCF2910 V**
	80	23	1	0,4	86	120	**NC3010 V**
	80	23	1	0,4	86	120	**NCF3010 V**
	110	40	2	-	198	250	**NJ2310 VH**
55	80	16	1	0,6	42	60	**NC2911 V**
	80	16	1	0,6	42	60	**NCF2911 V**
	90	26	1,1	0,6	105	152	**NC3011 V**
	90	26	1,1	0,6	105	152	**NCF3011 V**
	120	43	2	-	230	260	**NJ2311 VH**
60	85	16	1	0,6	52	78	**NC2912 V**
	85	16	1	0,6	52	78	**NCF2912 V**
	95	26	1,1	0,6	110	160	**NC3012 V**
	95	26	1,1	0,6	110	160	**NCF3012 V**
	130	46	2,1	-	260	352	**NJ2312 VH**

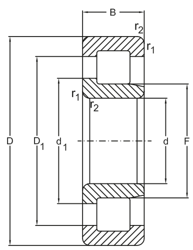
Single Row Full Complement Cylindrical Roller Bearings



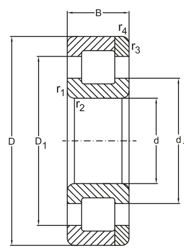
Abutment and fillet dimensions see on page 210

Dimensions					**Speed Ratings**		**Mass**	**Designation**
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng $_{grease}$	ng $_{oil}$	Bearing	
					[min $^{-1}$]		[kg]	
61,8	-	49	58,6	1	2400	4500	0,30	**NCF3008 V**
-	51,1	57,5	76	2,4	1400	3000	1,00	**NJ2308 VH**
-	-	53,6	59,2	-	2200	4500	0,20	**NC2909 V**
61,9	-	53,6	59,2	0,5	2200	4500	0,18	**NCF2909 V**
-	-	55	65	-	2000	4300	0,42	**NC3009 V**
68,5	-	55	65	1	2000	4300	0,40	**NCF3009 V**
-	56,13	62,5	81,8	2,4	1300	2800	1,35	**NJ2309 VH**
-	-	58,7	64,4	-	1900	4000	0,21	**NC2910 V**
67,1	-	58,7	64,4	0,5	1900	4000	0,18	**NCF2910 V**
-	-	58	68,8	-	1900	4000	0,45	**NC3010 V**
72,33	-	58	68,8	1	1900	4000	0,43	**NCF3010 V**
-	60,7	68,3	90,3	2,6	1600	3200	1,85	**NJ2310 VH**
-	-	64,2	70,2	-	1800	3800	0,30	**NC2911 V**
73,2	-	64,2	70,2	0,5	1800	3800	0,27	**NCF2911 V**
-	-	67,5	79,5	-	1600	3400	0,66	**NC3011 V**
83,7	-	67,5	79,5	1,2	1600	3400	0,63	**NCF3011 V**
-	67,1	75,5	98,6	2,6	1000	2200	2,30	**NJ2311 VH**
-	-	69,5	76,1	-	1600	3400	0,30	**NC2912 V**
79,3	-	69,5	76,1	0,5	1600	3400	0,28	**NCF2912 V**
-	-	70,9	82,9	-	1600	3200	0,71	**NC3012 V**
86,9	-	70,9	82,9	1,2	1600	3200	0,68	**NCF3012 V**
-	73,68	82,1	106	3	950	2000	2,83	**NJ2312 VH**

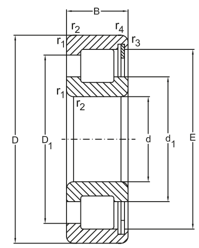
Single Row Full Complement Cylindrical Roller Bearings



NJ 23..VH



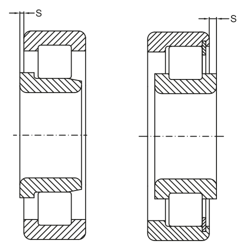
NC



NCF

d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	Designation
	Dimensions				Basical radial load		
mm					kN		
65	90	16	1	0,6	53,5	80	**NC2913 V**
	90	16	1	0,6	53,5	80	**NCF2913 V**
	100	26	1,1	0,6	117	175	**NC3013 V**
	100	26	1,1	0,6	117	175	**NCF3013 V**
	140	48	2,1	-	302	358	**NJ2313 VH**
70	100	19	1	0,6	77	118	**NC2914 V**
	100	19	1	0,6	77	118	**NCF2914 V**
	110	30	1,1	0,6	145	215	**NC3014 V**
	110	30	1,1	0,6	145	215	**NCF3014 V**
	150	51	2,1	-	335	455	**NJ2314 VH**
75	105	19	1	0,6	79,5	124	**NC2915 V**
	105	19	1	0,6	79,5	124	**NCF2915 V**
	115	30	1,1	0,6	154	224	**NC3015 V**
	115	30	1,1	0,6	154	224	**NCF3015 V**
	160	55	2,1	-	390	550	**NJ2315 VH**
80	110	19	1	0,6	81	128	**NC2916 V**
	110	19	1	0,6	81	128	**NCF2916 V**
	125	34	1,1	0,6	194	285	**NC3016 V**
	125	34	1,1	0,6	194	285	**NCF3016 V**
	170	58	2,1	-	455	550	**NJ2316 VH**
85	120	22	1,1	1	105	168	**NC2917 V**
	120	22	1,1	1	105	168	**NCF2917 V**
	130	34	1,1	0,6	195	295	**NC3017 V**

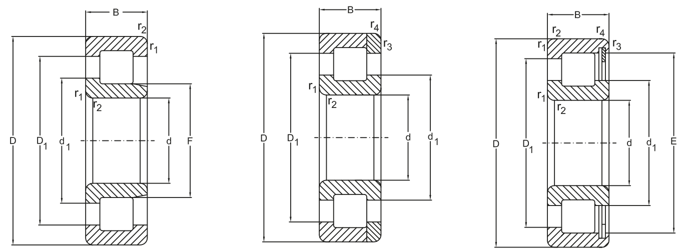
Single Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

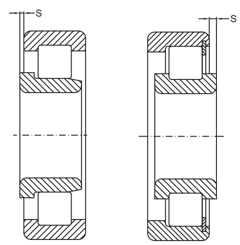
Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	73,7	80,3	-	1600	3400	0,33	**NC2913 V**
83,5	-	73,7	80,3	0,5	1600	3400	0,30	**NCF2913 V**
-	-	77,1	87,1	-	1400	3000	0,75	**NC3013 V**
93,1	-	77,1	87,1	1,2	1400	3000	0,72	**NCF3013 V**
-	80,71	89,4	117	3	900	1900	3,48	**NJ2313 VH**
-	-	80,5	88,5	-	1400	3000	0,52	**NC2914 V**
92,5	-	80,5	88,5	0,75	1400	3000	0,48	**NCF2914 V**
-	-	82,6	97,2	-	1300	2800	1,10	**NC3014 V**
102,1	-	82,6	97,2	1,5	1300	2800	1,05	**NCF3014 V**
-	84,22	93,8	121	3	850	1800	4,40	**NJ2314 VH**
-	-	85,6	93,6	-	1300	2800	0,55	**NC2915 V**
97,6	-	85,6	93,6	0,75	1300	2800	0,50	**NCF2915 V**
-	-	87	102	-	1200	2600	1,15	**NC3015 V**
106,5	-	87	102	1,5	1200	2600	1,10	**NCF3015 V**
-	91,25	100,8	132,5	3	750	1600	5,18	**NJ2315 VH**
-	-	90,7	98,7	-	1200	2600	0,57	**NC2916 V**
102,7	-	90,7	98,7	0,75	1200	2600	0,53	**NCF2916 V**
-	-	94,8	112	-	1100	2400	1,56	**NC3016 V**
117,2	-	94,8	112	1,8	1100	2400	1,50	**NCF3016 V**
-	98,3	109	141	4	700	1500	6,40	**NJ2316 VH**
-	-	99,1	109	-	1100	2400	0,79	**NC2917 V**
112,5	-	99,1	109	0,75	1100	2400	0,78	**NCF2917 V**
-	-	99,2	116	-	1100	2400	1,60	**NC3017 V**

Single Row Full Complement Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	Designation
mm					kN		
85	130	34	1,1	0,6	195	295	**NCF3017 V**
	180	60	3	-	482	695	**NJ2317 VH**
90	125	22	1,1	1	105	172	**NC2918 V**
	125	22	1,1	1	105	172	**NCF2918 V**
	140	37	1,5	1	227	348	**NC3018 V**
	140	37	1,5	1	227	348	**NCF3018 V**
	190	64	3	-	520	790	**NJ2318 VH**
95	130	22	1,1	1	108	180	**NC2919 V**
	130	22	1,1	1	108	180	**NCF2919 V**
	145	37	1,5	1	230	360	**NC3019 V**
	145	37	1,5	1	230	360	**NCF3019 V**
100	140	24	1,1	1	132	220	**NC2920 V**
	140	24	1,1	1	132	220	**NCF2920 V**
	150	37	1,5	1	242	375	**NC3020 V**
	150	37	1,5	1	242	375	**NCF3020 V**
	215	73	3	-	704	1030	**NJ2320 VH**
110	150	24	1,1	1	140	243	**NC2922 V**
	150	24	1,1	1	140	243	**NCF2922 V**
	170	45	2	1	325	510	**NC3022 V**
	170	45	2	1	325	510	**NCF3022 V**
	240	80	3	-	830	1060	**NJ2322 VH**
120	165	27	1,1	1	172	287	**NC2924 V**
	165	27	1,1	1	172	287	**NCF2924 V**

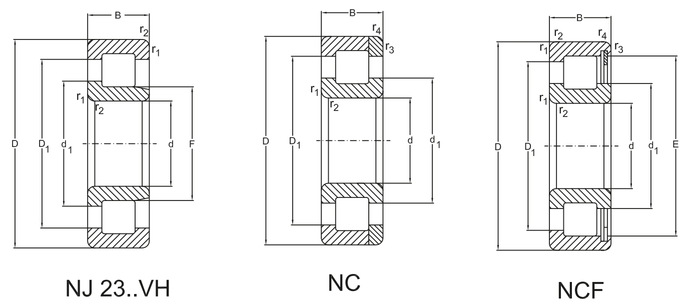
Single Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

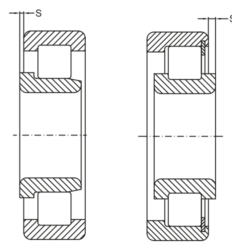
Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
121,6	-	99,2	116	1,8	1100	2200	1,55	**NCF3017 V**
-	107,02	117,4	151,5	4	900	1800	7,3	**NJ2317 VH**
-	-	102	111	-	1100	2400	0,9	**NC2918 V**
115,6	-	102	111	0,75	1100	2400	0,82	**NCF2918 V**
-	-	106,2	125	-	1000	2200	2,12	**NC3018 V**
130,3	-	106,2	125	2	1000	2200	2,05	**NCF3018 V**
-	108,8	121	156	4	670	1400	8,75	**NJ2318 VH**
-	-	107	117	-	1000	2200	0,94	**NC2919 V**
120,4	-	107	117	0,75	1000	2200	0,86	**NCF2919 V**
-	-	111	129	2	950	2000	2,28	**NC3019 V**
135,1	-	111	129	4,5	950	2000	2,15	**NCF3019 V**
-	-	114	124	-	1000	2200	1,25	**NC2920 V**
129	-	114	124	0,75	1000	2200	1,15	**NCF2920 V**
-	-	116	134	-	950	2000	2,29	**NC3020 V**
139,9	-	116	134	2	950	2000	2,20	**NCF3020 V**
-	122,8	136	176	4,5	600	1200	13,00	**NJ2320 VH**
-	-	126	137	-	900	1900	1,35	**NC2922 V**
141,3	-	126	137	0,75	900	1900	1,25	**NCF2922 V**
-	-	129	150	-	900	1800	3,79	**NC3022 V**
157	-	129	150	3	900	1800	3,65	**NCF3022 V**
-	134,3	151	198	5	700	1400	17,80	**NJ2322 VH**
-	-	136	149	-	850	1800	1,88	**NC2924 V**
154,3	-	136	149	0,75	850	1800	1,70	**NCF2924 V**

Single Row Full Complement Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	Designation
	Dimensions				Basical radial load		
mm					kN		
120	180	46	2	1	340	550	**NC3024 V**
	180	46	2	1	340	550	**NCF3024 V**
	260	86	3	-	920	1300	**NJ2324 VH**
130	180	30	1,5	1,1	205	350	**NC2926 V**
	180	30	1,5	1,1	205	350	**NCF2926 V**
	200	52	2	1	415	620	**NC3026 V**
	200	52	2	1	415	620	**NCF3026 V**
	280	93	4	-	1080	1660	**NJ2326 VH**
140	190	30	1,5	1,1	220	375	**NC2928 V**
	190	30	1,5	1,1	220	375	**NCF2928 V**
	210	53	2	1	440	680	**NC3028 V**
	210	53	2	1	440	680	**NCF3028 V**
	300	102	4	-	1250	1910	**NJ2328 VH**
150	190	20	1	1,1	108	185	**NC1830 V**
	190	20	1	1,1	108	185	**NCF1830 V**
	210	36	2	1,1	286	497	**NC2930 V**
	210	36	2	1,1	286	497	**NCF2930 V**
	225	56	2,1	1,1	530	880	**NC3030 V**
	225	56	2,1	1,1	530	880	**NCF3030 V**
	320	108	4	-	1450	2240	**NJ2330 VH**
160	200	20	1,1	1,1	112	199	**NC1832 V**
	200	20	1,1	1,1	112	199	**NCF1832 V**
	220	36	2	1,1	297	524	**NC2932 V**

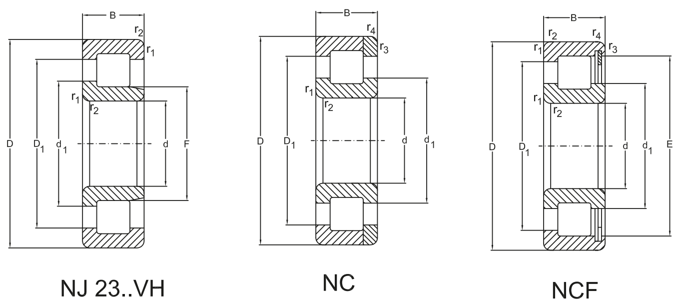
Single Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

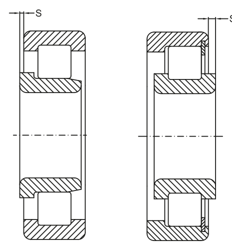
Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	139	160,5	-	800	1700	4,10	**NC3024 V**
167,9	-	139	160,5	3,5	800	1700	3,95	**NCF3024 V**
-	147,7	164	211	5,5	530	1000	22,30	**NJ2324 VH**
-	-	147	161	-	750	1600	2,50	**NC2926 V**
167,1	-	147	161	0,75	750	1600	2,30	**NCF2926 V**
-	-	148,6	175	-	700	1500	6,00	**NC3026 V**
186,5	-	148,6	175	3,5	700	1500	5,80	**NCF3026 V**
-	157,95	174,1	229,6	6	500	950	28	**NJ2326 VH**
-	-	159	173	-	700	1500	2,59	**NC2928 V**
180	-	159	173	0,75	700	1500	2,40	**NCF2928 V**
-	-	162,7	189,1	-	670	1400	6,21	**NC3028 V**
198,2	-	162,7	189,1	3,5	670	1400	6,10	**NCF3028 V**
-	168,5	184,7	245,3	6,5	450	850	35,5	**NJ2328 VH**
-	-	163	176	1,5	700	1500	1,54	**NC1830 V**
159,5	-	163	176	1,5	700	1500	1,30	**NCF1830 V**
-	-	171	188	-	670	1400	4	**NC2930 V**
195,5	-	171	188	0,8	670	1400	3,85	**NCF2930 V**
-	-	174	203	-	630	1300	7,72	**NC3030 V**
211,7	-	174	203	3,5	630	1300	7,50	**NCF3030 V**
-	182,5	203	261	6,5	430	800	42,5	**NJ2330 VH**
-	-	173	185	1,5	670	1400	1,60	**NC1832 V**
169	-	173	185	1,5	670	1400	1,45	**NCF1832 V**
-	-	181	198	-	630	1300	4	**NC2932 V**

Single Row Full Complement Cylindrical Roller Bearings



		Dimensions			Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
160	220	36	2	1,1	297	524	**NCF2932 V**
	240	60	2,1	1,1	580	970	**NC3032 V**
	240	60	2,1	1,1	580	970	**NCF3032 V**
	340	114	4	-	1630	2550	**NJ2332 VH**
170	215	22	1,1	1,1	142	245	**NC1834 V**
	215	22	1,1	1,1	142	245	**NCF1834 V**
	230	36	2	1,1	308	552	**NC2934 V**
	230	36	2	1,1	308	552	**NCF2934 V**
	260	67	2,1	1,1	728	1230	**NC3034 V**
	260	67	2,1	1,1	728	1230	**NCF3034 V**
	360	120	3	-	1760	2400	**NJ2334 VH**
180	225	22	1,1	1,1	147	275	**NC1836 V**
	225	22	1,1	1,1	147	275	**NCF1836 V**
	250	42	2	1,1	391	690	**NC2936 V**
	250	42	2	1,1	391	690	**NCF2936 V**
	280	74	2,1	2,1	820	1400	**NC3036 V**
	280	74	2,1	2,1	820	1400	**NCF3036 V**
	300	126	3	-	1900	2700	**NJ2336 VH**
190	240	24	1,5	1,5	172	320	**NC1838 V**
	240	24	1,5	1,5	172	320	**NCF1838 V**
	260	42	2	1,1	440	782	**NC2938 V**
	260	42	2	1,1	440	782	**NCF2938 V**
	290	75	2,1	2,1	850	1450	**NC3038 V**

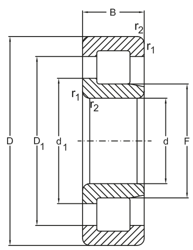
Single Row Full Complement Cylindrical Roller Bearings



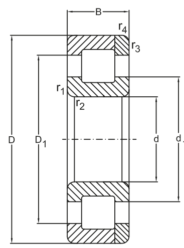
Abutment and fillet dimensions see on page 210

Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng $_{grease}$	ng $_{oil}$	Bearing	
					[min $^{-1}$]		[kg]	
205,7	-	181	198	0,8	630	1300	4,05	**NCF2932 V**
-	-	184,8	214,8	-	600	1100	9,26	**NC3032 V**
225,1	-	184,8	214,8	4	600	1100	9,10	**NCF3032 V**
-	196,55	216,7	286	7	400	750	48,80	**NJ2332 VH**
-	-	185	200	1,5	630	1300	2	**NC1834 V**
204,5	-	185	200	1,5	630	1300	1,85	**NCF1834 V**
-	-	192	208	-	600	1200	4,50	**NC2934 V**
216	-	192	208	0,8	600	1200	4,25	**NCF2934 V**
-	-	198	232	-	560	1000	13,70	**NC3034 V**
243,2	-	198	232	4	560	1000	12,50	**NCF3034 V**
-	203,56	224,5	296,4	7	450	800	59,20	**NJ2334 VH**
-	-	196	211	1,5	600	1200	2,20	**NC1836 V**
215,2	-	196	211	1,5	600	1200	1,95	**NCF1836 V**
-	-	203	223	-	560	1100	6,40	**NC2936 V**
232	-	203	223	1	560	1100	6,25	**NCF2936 V**
-	-	212	249	-	560	1100	17,10	**NC3036 V**
260,5	-	212	249	5	560	1100	16,50	**NCF3036 V**
-	221,74	242,6	314,6	9	400	700	69,60	**NJ2336 VH**
-	-	208	224	1,8	560	1100	2,70	**NC1838 V**
229	-	208	224	1,8	560	1100	2,45	**NCF1838 V**
-	-	212	236	-	560	1100	6,80	**NC2938 V**
244	-	212	236	1	560	1100	6,55	**NCF2938 V**
-	-	222	258	-	530	1000	17,9	**NC3038 V**

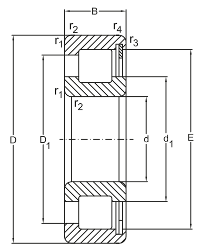
Single Row Full Complement Cylindrical Roller Bearings



NJ 23..VH



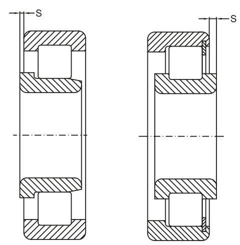
NC



NCF

		Dimensions			Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
190	290	75	2,1	2,1	800	1290	**NCF3038 V**
	400	132	4	-	2080	2900	**NJ2338 VH**
200	250	24	1,5	1,5	176	335	**NC1840 V**
	250	24	1,5	1,5	176	335	**NCF1840 V**
	280	48	2,1	1,5	528	938	**NC2940 V**
	280	48	2,1	1,5	528	938	**NCF2940 V**
	310	82	2,1	2,1	990	1750	**NC3040 V**
	310	82	2,1	2,1	990	1750	**NCF3040 V**
	420	138	5	-	2290	3680	**NJ2340 VH**
220	270	24	1,5	1,5	183	350	**NC1844 V**
	270	24	1,5	1,5	183	350	**NCF1844 V**
	300	48	2,1	1,5	550	1030	**NC2944 V**
	300	48	2,1	1,5	550	1030	**NCF2944 V**
	340	90	3	3	1190	2100	**NC3044 V**
	340	90	3	3	1190	2100	**NCF3044 V**
240	300	28	2	2	260	510	**NC1848 V**
	300	28	2	2	260	510	**NCF1848 V**
	320	48	2,1	1,5	583	1120	**NC2948 V**
	320	48	2,1	1,5	583	1120	**NCF2948 V**
	360	92	3	3	1250	2240	**NC3048 V**
	360	92	3	3	1250	2240	**NCF3048 V**
260	320	28	2	2	270	550	**NC1852 V**
	320	28	2	2	270	550	**NCF1852 V**

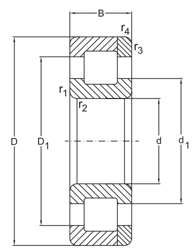
Single Row Full Complement Cylindrical Roller Bearings



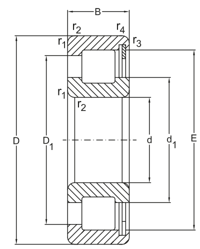
Abutment and fillet dimensions see on page 210

Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng $_{grease}$	ng $_{oil}$	Bearing	
					[min $^{-1}$]		[kg]	
270	-	222	258	6	530	1000	17,00	**NCF3038 V**
-	224,6	247,6	327	7	400	700	80,00	**NJ2338 VH**
-	-	216	233	1,8	560	1100	3	**NC1840 V**
237,5	-	216	233	1,8	560	1100	2,60	**NCF1840 V**
-	-	227	253	-	530	1000	9,50	**NC2940 V**
262	-	227	253	3	530	1000	9,15	**NCF2940 V**
-	-	227	276	-	450	800	23,00	**NC3040 V**
287,75	-	227	276	6,5	450	800	22,50	**NCF3040 V**
-	238,65	263,2	347,5	9	320	600	91,60	**NJ2340 VH**
-	-	237	253	1,8	530	1000	3,35	**NC1844 V**
258	-	237	253	1,8	530	1000	2,85	**NCF1844 V**
-	-	248	274	-	480	900	10,90	**NC2944 V**
283	-	248	274	2,5	480	900	9,90	**NCF2944 V**
-	-	254,7	297,9	-	430	850	30,50	**NC3044 V**
312,7	-	254,7	297,9	7	430	850	29,50	**NCF3044 V**
-	-	261	281	1,8	480	900	5,30	**NC1848 V**
287	-	261	281	1,8	480	900	4,40	**NCF1848 V**
-	-	261	296	-	450	850	12,00	**NC2948 V**
303	-	261	296	2,5	450	850	11,00	**NCF2948 V**
-	-	278	322	-	430	800	33,00	**NC3048 V**
335,6	-	278	322	7	430	800	32,00	**NCF3048 V**
-	-	281	301	1,8	430	800	5,55	**NC1852 V**
307,2	-	281	301	1,8	430	800	4,75	**NCF1852 V**

Single Row Full Complement Cylindrical Roller Bearings



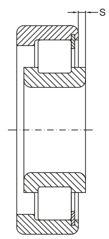
NC



NCF

	Dimensions				Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
260	360	60	2,1	1,5	737	1410	**NC2952 V**
	360	60	2,1	1,5	737	1410	**NCF2952 V**
	400	104	4	4	1600	2920	**NC3052 V**
	400	104	4	4	1600	2920	**NCF3052 V**
280	350	33	2	2	330	650	**NC1856 V**
	350	33	2	2	330	650	**NCF1856 V**
	380	60	2,1	1,5	897	1710	**NC2956 V**
	380	60	2,1	1,5	897	1710	**NCF2956 V**
	420	106	4	4	1650	3100	**NC3056 V**
	420	106	4	4	1650	3100	**NCF3056 V**
300	380	38	2,1	2,1	418	850	**NC1860 V**
	380	38	2,1	2,1	418	850	**NCF1860 V**
	420	72	3	3	1120	2170	**NC2960 V**
	420	72	3	3	1120	2170	**NCF2960 V**
320	400	38	2,1	2,1	440	852	**NC1864 V**
	400	38	2,1	2,1	440	852	**NCF1864 V**
	440	72	3	3	1140	2300	**NC2964 V**
	440	72	3	3	1140	2300	**NCF2964 V**
340	420	38	2,1	2,1	446	900	**NC1868 V**
	420	38	2,1	2,1	446	900	**NCF1868 V**
	460	72	3	3	1190	2430	**NC2968 V**
	460	72	3	3	1190	2430	**NCF2968**

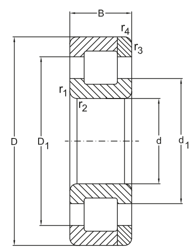
Single Row Full Complement Cylindrical Roller Bearings

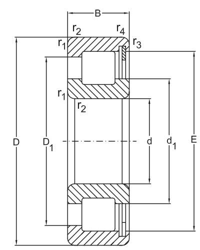


Abutment and fillet dimensions see on page 210

Dimensions					**Speed Ratings**		**Mass**	**Designation**
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	294	321	-	400	750	19,30	**NC2952 V**
333,7	-	294	321	5	400	750	18,50	**NCF2952 V**
-	-	304,1	358,1	-	380	700	47,50	**NC3052 V**
373,5	-	304,1	358,1	8	380	700	46,50	**NCF3052 V**
-	-	305	327	2,5	400	750	8,00	**NC1856 V**
334	-	305	327	2,5	400	750	7,10	**NCF1856 V**
-	-	305	346	-	380	700	21,10	**NC2956 V**
362,7	-	319	346	4	380	700	20,00	**NCF2956 V**
-	-	324	375	-	320	560	52,5	**NC3056 V**
391	-	324	375	9	320	560	50	**NCF3056 V**
-	-	329	355	3	360	670	11,50	**NC1860 V**
363	-	329	355	3	360	670	10,00	**NCF1860 V**
-	-	342	375	-	340	630	32,30	**NC2960 V**
390,5	-	342	375	5	340	630	31,50	**NCF2960 V**
-	-	349	375	3	340	630	11,30	**NC1864 V**
383	-	349	375	3	340	630	10,50	**NCF1864 V**
-	-	363	395	-	320	600	34,00	**NC2964 V**
411	-	363	395	5	320	600	33,00	**NCF2964 V**
-	-	369	395	3	320	600	12,80	**NC1868 V**
403	-	369	395	3	320	600	11,00	**NCF1868 V**
-	-	383	415	-	300	560	36,00	**NC2968 V**
431	-	383	415	3	300	560	35,00	**NCF2968**

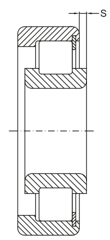
Single Row Full Complement Cylindrical Roller Bearings





Dimensions					Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
360	440	38	2,1	2,1	452	950	**NC1872 V**
	440	38	2,1	2,1	452	950	**NCF1872 V**
	480	72	3	3	1230	2580	**NC2972 V**
	480	72	3	3	1230	2580	**NCF2972 V**
380	480	46	2,1	2,1	627	1230	**NC1876 V**
	480	46	2,1	2,1	627	1230	**NCF1876 V**
	520	82	4	4	1570	3000	**NC2976 V**
	520	82	4	4	1570	3000	**NCF2976 V**
400	500	46	2,1	2,1	627	1280	**NC1880 V**
	500	46	2,1	2,1	627	1280	**NCF1880 V**
	540	82	4	4	1650	3420	**NC2980 V**
	540	82	4	4	1650	3420	**NCF2980 V**
420	520	46	2,1	2,1	660	1340	**NC1884 V**
	520	46	2,1	2,1	660	1340	**NCF1884 V**
	520	60	2,1	2,1	945,6	2329	**NCF2884 V**
	560	82	4	4	1650	3500	**NC2984 V**
	560	82	4	4	1650	3500	**NCF2984 V**
440	540	46	2,1	2,1	670	1405	**NC1888 V**
	540	46	2,1	2,1	670	1405	**NCF1888 V**
	600	95	4	4	2010	4270	**NC2988 V**
	600	95	4	4	2010	4270	**NCF2988 V**
460	580	56	3	3	913	1850	**NC1892 V**
	580	56	3	3	913	1850	**NCF1892 V**

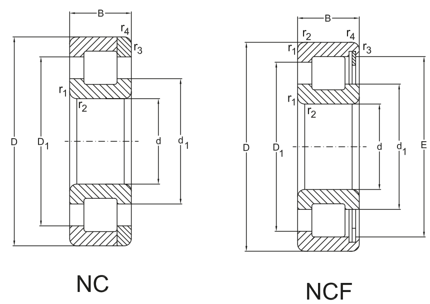
Single Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

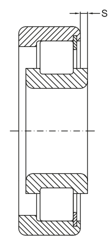
Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	389	415	3	300	560	12,40	**NC1872 V**
423,3	-	389	415	3	300	560	12,00	**NCF1872 V**
-	-	403	436	-	280	530	36,80	**NC2972 V**
451,5	-	403	436	5	280	530	36,50	**NCF2972 V**
-	-	416	448	3,5	280	530	19,90	**NC1876 V**
458	-	416	448	3,5	280	530	19,50	**NCF1876 V**
-	-	427	473	-	260	500	53,50	**NC2976 V**
488	-	427	473	5	260	500	52,50	**NCF2976 V**
-	-	433	465	3,5	260	500	21,20	**NC1880 V**
475	-	433	465	3,5	260	500	20,50	**NCF1880 V**
-	-	450	496	-	240	480	55	**NC2980 V**
511	-	450	496	5	240	480	54,50	**NCF2980 V**
-	-	457	489	3,5	240	480	21,60	**NC1884 V**
499	-	447	488	3,5	240	480	21,00	**NCF1884 V**
499	-	457,4	488,6	3	240	480	28,50	**NCF2884 V**
-	-	463	509	-	220	450	57,70	**NC2984 V**
524	-	463	509	5	220	450	57,00	**NCF2984 V**
-	-	474	506	3,5	220	450	22,60	**NC1888 V**
516	-	474	506	3,5	220	450	22,00	**NCF1888 V**
-	-	502	545	-	200	430	81,10	**NC2988 V**
565,5	-	502	545	6	200	430	80,50	**NCF2988 V**
-	-	501	541	5	200	430	34,80	**NC1892 V**
533	-	501	541	5	200	430	34,00	**NCF1892 V**

Single Row Full Complement Cylindrical Roller Bearings



Dimensions					Basical radial load		Designation
d	D	B	r_1, r_2 min.	r_3, r_4 min.	dyn. C_r	stat. C_{0r}	
mm					kN		
460	620	95	4	4	2050	4420	**NC2992 V**
	620	95	4	4	2050	4420	**NCF2992 V**
480	600	56	3	3	935	1920	**NCF1896 V**
	650	100	5	5	2290	4950	**NCF2996 V**
500	620	56	3	3	952	2120	**NCF18/500 V**
	670	100	5	5	2380	5240	**NCF29/500 V**
530	650	56	3	3	990	2110	**NCF18/530 V**
560	680	56	3	3	1020	2230	**NCF18/560 V**
600	730	60	3	3	1050	2350	**NCF18/600 V**
630	780	69	4	4	1250	2800	**NCF18/630 V**
670	820	69	4	4	1300	3000	**NCF18/670 V**
710	870	74	4	4	1540	3550	**NCF18/710 V**
750	920	78	5	5	1760	4030	**NCF18/750 V**

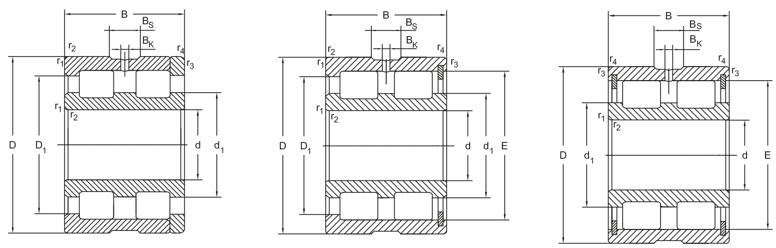
Single Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

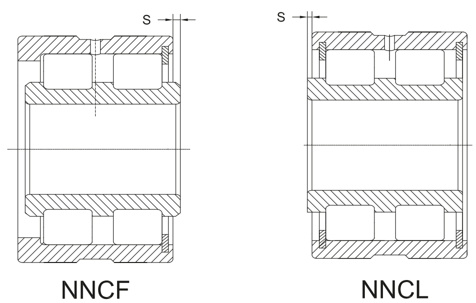
Dimensions					Speed Ratings		Mass	Designation
E ≈	F ≈	d_1 ≈	D_1 ≈	s ≈	ng_{grease}	ng_{oil}	Bearing	
					[min $^{-1}$]		[kg]	
-	-	516	558	-	190	400	83,90	**NC2992 V**
579	-	516	558	6	190	400	83,50	**NCF2992 V**
573,5	-	522	561	5	190	400	35,50	**NCF1896 V**
606	-	538	584	-	180	380	98,00	**NCF2996 V**
594	-	542	582	5	180	380	36,50	**NCF18/500 V**
634,5	-	567	612	7	170	360	100,00	**NCF29/500 V**
624,5	-	573	612	5	170	360	38,50	**NCF18/530 V**
655	-	603	643	5	160	340	40,50	**NCF18/560 V**
696	-	644	684	7	150	320	51,50	**NCF18/600 V**
739	-	681	725	8	140	300	72,50	**NCF18/630 V**
783	-	725	769	8	130	280	76,50	**NCF18/670 V**
831	-	767	815	8	120	260	92,50	**NCF18/710 V**
880	-	811	863	8	110	240	110,00	**NCF18/750 V**

Double Row Full Complement Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	Basical radial load dyn. C_r	stat. C_{0r}	Speed Ratings ng grease	ng oil	Designation
mm				kN		[min $^{-1}$]		
25	47	30	0,6	55	76,4	3800	7000	**NNCF5005 V**
30	55	34	1	73,7	105	3200	6000	**NNCF5006 V**
35	62	36	1	88	131	2800	5300	**NNCF5007 V**
40	68	38	1	105	159	2400	4800	**NNCF5008 V**
45	75	40	1	128	195	2000	4300	**NNCF5009 V**
50	80	40	1	132	206	1900	4000	**NNCF5010 V**
55	90	46	1,1	176	294	1600	3400	**NNCF5011 V**
60	85	25	1	76,5	134	1700	3400	**NNC4912 V**
	85	25	1	76,5	134	1700	3400	**NNCF4912 V**
	85	25	1	76,5	134	1700	3400	**NNCL4912 V**
	95	46	1,1	183	305	1600	3400	**NNCF5012 V**
65	100	46	1,1	194	331	1400	3000	**NNCF5013 V**
70	100	30	1	103	188	1400	3000	**NNC4914 V**
	100	30	1	103	188	1400	3000	**NNCF4914 V**
	100	30	1	103	188	1400	3000	**NNCL4914 V**
	110	54	1,1	220	361	1300	2800	**NNCF5014 V**
80	110	30	1	110	210	1200	2600	**NNC4916 V**
	110	30	1	110	210	1200	2600	**NNCF4916 V**

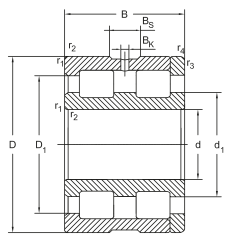
Double Row Full Complement Cylindrical Roller Bearings



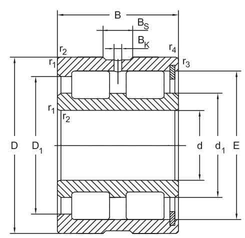
Abutment and fillet dimensions see on page 210

Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
25	42,7	33,1	40,3	4,5	3	1	0,23
30	49,8	38,6	47	4,5	3	1	0,35
35	55,7	43,7	52,7	4,5	3	1	0,46
40	61,9	49,1	58,7	4,5	3	1	0,56
45	69,8	55,4	66,2	4,5	3	1	0,70
50	72,9	58,5	69,3	4,5	3	1	0,75
55	83,7	67,6	79,7	4,5	3,5	1	1,15
60	-	69,5	76,5	4,5	3,5	-	0,48
	78,9	69,5	76,5	4,5	3,5	1	0,46
	78,9	69,5	76,5	4,5	3,5	1	0,46
	86,9	70,9	82,9	4,5	3,5	1	1,25
65	93,3	77,3	89,3	4,5	3,5	1	1,30
70	-	82	89	4,5	3,5	-	0,8
	92,3	82	89	4,5	3,5	1	0,79
	92,3	82	89	4,5	3,5	1	0,79
	101	81,8	96,2	5	3,5	1,1	1,85
80	-	90,5	98	5	3,5	-	0,9
	101,2	90,5	98	5	3,5	1	0,88

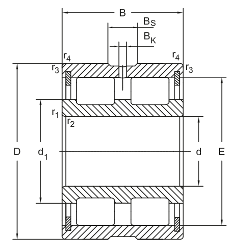
Double Row Full Complement Cylindrical Roller Bearings



NNC



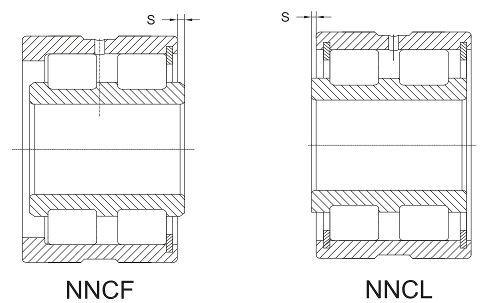
NNCF



NNCL

Dimensions				Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng_{grease}	ng_{oil}	
mm				kN		[min $^{-1}$]		
80	110	30	1	110	210	1200	2600	**NNCL4916 V**
	125	60	1,1	286	469	1100	2400	**NNCF5016 V**
90	125	35	1,1	146	292	1100	2300	**NNC4918 V**
	125	35	1,1	146	292	1100	2300	**NNCF4918 V**
	125	35	1,1	146	292	1100	2300	**NNCL4918 V**
	140	67	1,5	369	635	1000	2200	**NNCF5018 V**
100	140	40	1,1	190	390	950	2000	**NNC4920 V**
	140	40	1,1	190	390	950	2000	**NNCF4920 V**
	140	40	1,1	190	390	950	2000	**NNCL4920 V**
	150	67	1,5	391	690	950	2000	**NNCF5020 V**
110	150	40	1,1	197	420	900	1900	**NNC4922 V**
	150	40	1,1	197	420	900	1900	**NNCF4922 V**
	150	40	1,1	197	420	900	1900	**NNCL4922 V**
	170	80	2	528	957	850	1800	**NNCF5022 V**
120	165	45	1,1	220	465	800	1700	**NNC4924 V**
	165	45	1,1	220	465	800	1700	**NNCF4924 V**
	165	45	1,1	220	465	800	1700	**NNCL4924 V**
	180	80	2	561	1050	800	1700	**NNCF5024 V**
130	180	50	1,5	255	540	750	1600	**NNC4926 V**

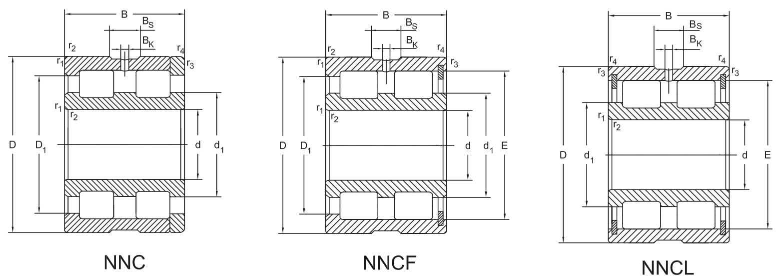
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

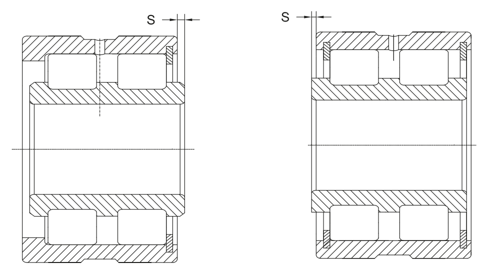
			Dimensions				Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
80	101,2	90,5	98	5	3,5	1	0,88
	117,2	94,8	112	5	3,5	2,5	2,60
90	-	103,5	111,5	5	3,5	-	1,4
	115,5	103,5	111,5	5	3,5	1,5	1,37
	115,5	103,5	111,5	5	3,5	1,5	1,37
	130,3	106	125	5	3,5	2,5	3,75
100	-	116,5	125,5	5	3,5	-	2,1
	130	116,5	125,5	5	3,5	2	2,0
	130	116,5	125,5	5	3,5	2	2,0
	140	116	134	6	3,5	2,5	4,05
110	-	125	134	6	3,5	-	2,3
	138,6	125	134	6	3,5	2	2,2
	138,6	125	134	6	3,5	2	2,2
	157	128	150	6	3,5	2,5	6,60
120	-	139	149	6	3,5	-	3,2
	154	139	149	6	3,5	3	3,0
	154	139	149	6	3,5	3	3,0
	168	139	161	6	3,5	2,5	7,10
130	-	149,5	160,5	6	3,5	-	4,2

Double Row Full Complement Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng grease	ng oil	Designation
Dimensions				Basical radial load		Speed Ratings		Designation
mm				kN		[min $^{-1}$]		
130	180	50	1,5	255	540	750	1600	**NNCF4926 V**
	180	50	1,5	255	540	750	1600	**NNCL4926 V**
	200	95	2	704	1380	700	1500	**NNCF5026 V**
140	190	50	1,5	265	576	700	1500	**NNC4928 V**
	190	50	1,5	265	576	700	1500	**NNCF4928 V**
	190	50	1,5	265	576	700	1500	**NNCL4928 V**
	210	95	2	737	1500	670	1400	**NNCF5028 V**
150	190	40	1,1	230	560	720	1500	**NNC4830 V**
	190	40	1,1	230	560	720	1500	**NNCF4830 V**
	190	40	1,1	230	560	720	1500	**NNCL4830 V**
	210	60	2	383	843	680	1400	**NNC4930 V**
	210	60	2	383	843	680	1400	**NNCF4930 V**
	210	60	2	383	843	680	1400	**NNCL4930 V**
	225	100	2,1	842	1680	630	1300	**NNCF5030 V**
160	200	40	1,1	238	600	680	1400	**NNC4832 V**
	200	40	1,1	238	600	680	1400	**NNCF4832 V**
	200	40	1,1	238	600	680	1400	**NNCL4832 V**
	220	60	2	399	906	650	1300	**NNC4932 V**
	220	60	2	399	906	650	1300	**NNCF4932 V**
	220	60	2	399	906	650	1300	**NNCL4932 V**

Double Row Full Complement Cylindrical Roller Bearings

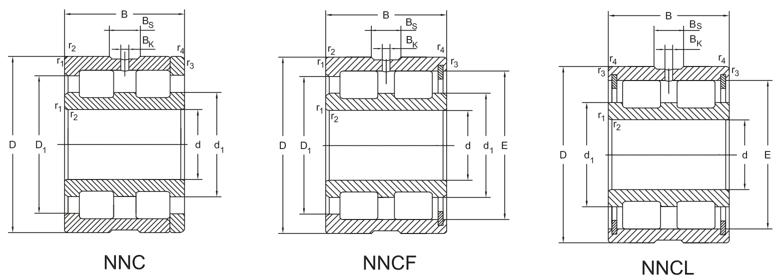


NNCF NNCL

Abutment and fillet dimensions see on page 210

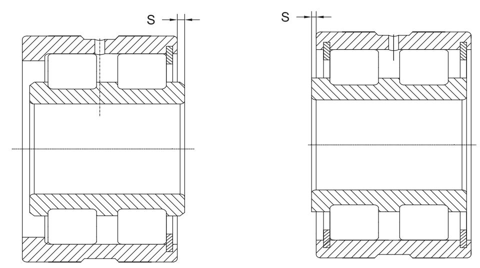
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
130	166	149,5	160,5	6	3,5	4	4,0
	166	149,5	160,5	6	3,5	4	4,0
	183,5	153	176	6	3,5	2,5	11,0
140	-	160	171	6	3,5	-	4,4
	176,4	160	171	6	3,5	4	4,2
	176,4	160	171	6	3,5	4	4,2
	195,5	165	188	7	4	3	11,5
150	-	165	174	7	4	-	3
	178,7	165	174	7	4	2	2,8
	178,7	165	-	7	4	2	2,8
	-	172,5	185,5	7	4	-	7
	192	172,5	185,5	7	4	4	6,8
	192	172,5	185,5	7	4	4	6,8
	209	175	201	7	4	3	14
160	-	176,5	185,5	7	4	-	3,2
	190,1	176,5	185,5	7	4	2	3,0
	190,1	176,5	-	7	4	2	3,0
	-	184,5	197,5	7	4	-	7,2
	203,9	184,5	197,5	7	4	4	7,1
	203,9	184,5	197,5	7	4	4	7,1

Double Row Full Complement Cylindrical Roller Bearings



	Dimensions			Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng_{grease}	ng_{oil}	
mm				kN		[min $^{-1}$]		
160	240	109	2,1	1010	1950	600	1200	**NNCF5032 V**
170	215	45	1,1	258	631	640	1300	**NNC4834 V**
	215	45	1,1	258	631	640	1300	**NNCF4834 V**
	215	45	1,1	258	631	640	1300	**NNCL4834 V**
	230	60	2	408	950	600	1200	**NNC4934 V**
	230	60	2	408	950	600	1200	**NNCF4934 V**
	230	60	2	408	950	600	1200	**NNCL4934 V**
	260	122	2,1	1140	2170	560	1100	**NNCF5034 V**
180	225	45	1,1	266	664	610	1200	**NNC4836 V**
	225	45	1,1	266	664	610	1200	**NNCF4836 V**
	225	45	1,1	266	664	610	1200	**NNCL4836 V**
	250	69	2	547	1220	570	1100	**NNC4936 V**
	250	69	2	547	1220	570	1100	**NNCF4936 V**
	250	69	2	547	1220	570	1100	**NNCL4936 V**
	280	136	2,1	1320	2580	560	1100	**NNCF5036 V**
190	240	50	1,5	305	760	560	1150	**NNC4838 V**
	240	50	1,5	305	760	560	1150	**NNCF4838 V**
	240	50	1,5	305	760	560	1150	**NNCL4838 V**
	260	69	2	562	1290	550	1100	**NNC4938 V**
	260	69	2	562	1290	550	1100	**NNCF4938 V**

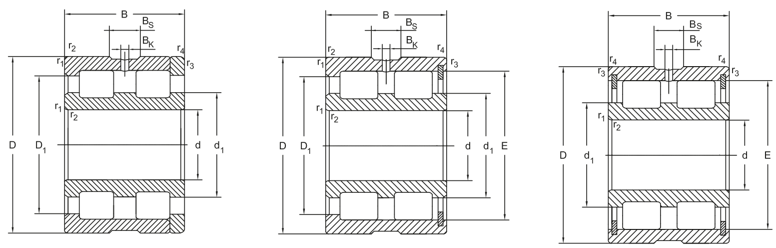
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

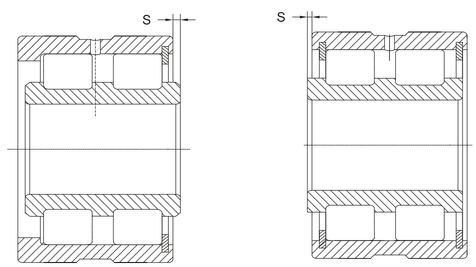
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
160	225	185	215	7	4	3	17
170	-	187,5	196,5	7	4	-	4,2
	201,7	187,5	196,5	7	4	3	4,0
	201,7	187,5	-	7	4	3	4,0
	-	192,5	205,5	7	4	-	7,6
	212,2	192,5	205,5	7	4	4	7,5
	212,2	192,5	205,5	7	4	4	7,5
	243	198	232	7	4	5	23,0
180	-	196	207	7	4	-	4,5
	211,3	196	207	7	4	3	4,2
	211,3	196	-	7	4	3	4,2
	-	207	223	7	4	-	11
	231,1	207	223	7	4	4	10,8
	231,1	207	223	7	4	4	10,8
	260,5	212	249	8	4	6	30,5
190	-	209	220	7	4	-	5,8
	225,4	209	220	7	4	4	5,5
	225,4	209	-	7	4	4	5,5
	-	217,5	233	7	4	-	11,5
	241,3	217,5	233	7	4	4	11,3

Double Row Full Complement Cylindrical Roller Bearings



	Dimensions			Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng grease	ng oil	
mm				kN		[min $^{-1}$]		
190	260	69	2	562	1290	550	1100	**NNCL4938 V**
	290	136	2,1	1380	2690	530	1000	**NNCF5038 V**
200	250	50	1,5	315	799	550	1100	**NNC4840 V**
	250	50	1,5	315	799	550	1100	**NNCF4840 V**
	250	50	1,5	315	799	550	1100	**NNCL4840 V**
	280	80	2,1	661	1495	530	1000	**NNC4940 V**
	280	80	2,1	661	1495	530	1000	**NNCF4940 V**
	280	80	2,1	661	1495	530	1000	**NNCL4940 V**
	310	150	2,1	1570	3130	500	950	**NNCF5040 V**
220	270	50	1,5	330	878	500	1000	**NNC4844 V**
	270	50	1,5	330	878	500	1000	**NNCF4844 V**
	270	50	1,5	330	878	500	1000	**NNCL4844 V**
	300	80	2,1	690	1610	500	950	**NNC4944 V**
	300	80	2,1	690	1610	500	950	**NNCF4944 V**
	300	80	2,1	690	1610	500	950	**NNCL4944 V**
	340	160	3	1870	3680	450	850	**NNCF5044 V**
240	300	60	2	497	1292	480	900	**NNC4848 V**
	300	60	2	497	1292	480	900	**NNCF4848 V**
	300	60	2	497	1292	480	900	**NNCL4848 V**
	320	80	2,1	725	1762	450	850	**NNC4948 V**

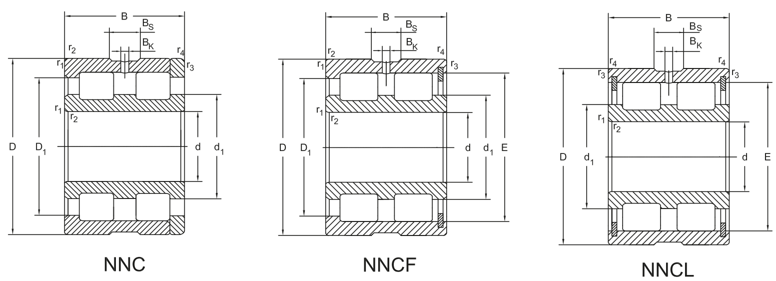
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

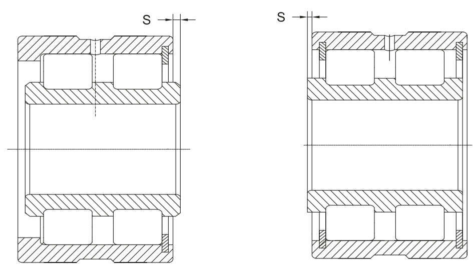
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
190	241,3	217,5	233	7	4	4	11,3
	270	222	258	8	4	6	31,5
200	-	219,5	230	7	4	-	6
	235,9	219,5	230	7	4	4	5,8
	235,9	219,5	-	7	4	4	5,8
	-	233	251	8	4	-	16
	260	233	251	8	4	5	15,9
	260	233	251	8	4	5	15,9
	288	236	276	8	4	7	41,0
220	-	240,5	251,5	7	4	-	6,5
	256,9	240,5	251,5	7	4	4	6,3
	256,9	240,5	-	7	4	4	6,3
	-	250	268	8	4	-	17,5
	277,2	250	268	8	4	5	17,2
	277,2	250	268	8	4	5	17,2
	315,5	255	300	8	4	7	52,5
240	-	261,5	275,5	8	4	-	10,3
	282,4	261,5	275,5	8	4	4	10,0
	282,4	261,5	-	8	4	4	10,0
	-	273	291	8	4	-	18,7

Double Row Full Complement Cylindrical Roller Bearings



Dimensions				Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng $_{grease}$	ng $_{oil}$	
mm				kN		[min $^{-1}$]		
240	320	80	2,1	725	1762	450	850	**NNCF4948 V**
	320	80	2,1	725	1762	450	850	**NNCL4948 V**
	360	160	3	1980	4050	450	800	**NNCF5048 V**
260	320	60	2	521	1406	430	820	**NNC4852 V**
	320	60	2	521	1406	430	820	**NNCF4852 V**
	320	60	2	521	1406	430	820	**NNCL4852 V**
	360	100	2,1	1070	2520	400	750	**NNC4952 V**
	360	100	2,1	1070	2520	400	750	**NNCF4952 V**
	360	100	2,1	1070	2520	400	750	**NNCL4952 V**
	400	190	4	2640	5340	380	700	**NNCF5052 V**
280	350	69	2	680	1853	400	750	**NNC4856 V**
	350	69	2	680	1853	400	750	**NNCF4856 V**
	350	69	2	680	1853	400	750	**NNCL4856 V**
	380	100	2,1	1120	2710	380	700	**NNC4956 V**
	380	100	2,1	1120	2710	380	700	**NNCF4956 V**
	380	100	2,1	1120	2710	380	700	**NNCL4956 V**
	420	190	4	2700	5610	360	670	**NNCF5056 V**
300	380	80	2,1	801	2146	380	700	**NNC4860 V**
	380	80	2,1	801	2146	380	700	**NNCF4860 V**
	380	80	2,1	801	2146	380	700	**NNCL4860 V**

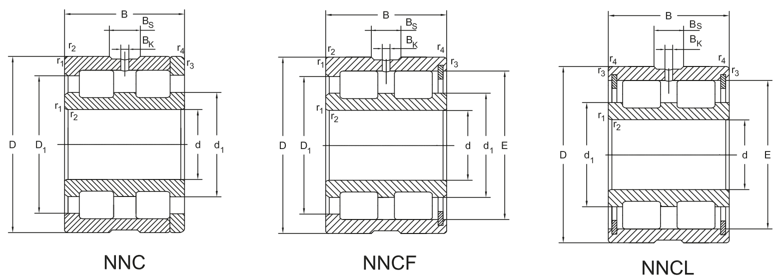
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

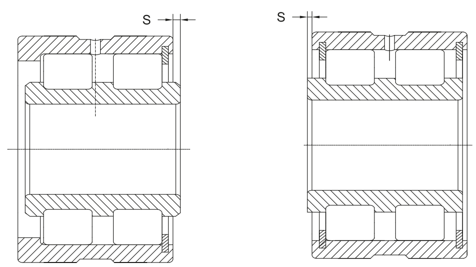
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
240	300,1	273	291	8	4	5	18,5
	300,1	273	291	8	4	5	18,5
	335,6	278	322	9,4	5	7	56,0
260	-	283,5	297,5	8	4	-	11,1
	304,7	283,5	297,5	8	4	4	10,8
	304,7	283,5	-	8	4	4	10,8
	-	297	320	9,4	5	-	33,1
	331,5	297	320	9,4	5	6	32,2
	331,5	297	320	9,4	5	6	32,2
	373,5	304	357	9,4	5	7	85,5
280	-	309	325	8	4	-	16,1
	332,9	309	325	8	4	4	15,8
	332,9	309	-	8	4	4	15,8
	-	319	342	9,4	5	-	34,5
	353,5	319	342	9,4	5	6	34,2
	353,5	319	342	9,4	5	6	34,2
	389	320	372	9,4	5	7	90,5
300	-	330,5	348,5	9,4	5	-	22,9
	357,4	330,5	348,5	9,4	5	6	22,5
	357,4	330,5	-	9,4	5	6	22,5

Double Row Full Complement Cylindrical Roller Bearings



	Dimensions			Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng grease	ng oil	
mm				kN		[min $^{-1}$]		
300	420	118	3	1560	3630	340	650	**NNC4960 V**
	420	118	3	1560	3630	340	650	**NNCF4960 V**
	420	118	3	1560	3630	340	650	**NNCL4960 V**
	460	218	4	3410	7180	320	600	**NNCF5060 V**
320	400	80	2,1	832	2300	340	640	**NNC4864 V**
	400	80	2,1	832	2300	340	640	**NNCF4864 V**
	400	80	2,1	832	2300	340	640	**NNCL4864 V**
	440	118	3	1600	3835	320	600	**NNC4964 V**
	440	118	3	1600	3835	320	600	**NNCF4964 V**
	440	118	3	1600	3835	320	600	**NNCL4964 V**
	480	218	4	3470	7450	300	560	**NNCF5064 V**
340	420	80	2,1	850	2415	320	600	**NNC4868 V**
	420	80	2,1	850	2415	320	600	**NNCF4868 V**
	420	80	2,1	850	2415	320	600	**NNCL4868 V**
	460	118	3	1640	4035	300	560	**NNC4968 V**
	460	118	3	1640	4035	300	560	**NNCF4968 V**
	460	118	3	1640	4035	300	560	**NNCL4968 V**
	520	243	5	4180	9200	280	530	**NNCF5068 V**
360	440	80	2,1	880	2570	300	560	**NNC4872 V**
	440	80	2,1	880	2570	300	560	**NNCF4872 V**

Double Row Full Complement Cylindrical Roller Bearings

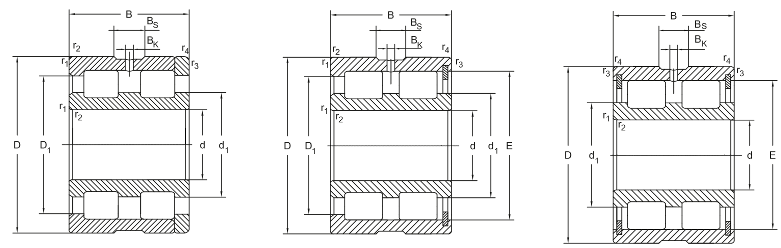


NNCF NNCL

Abutment and fillet dimensions see on page 210

Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
300	-	346,5	375,5	9,4	5	-	53
	390,2	346,5	375,5	9,4	5	6	52,8
	390,2	346,5	375,5	9,4	5	6	52,8
	432	355	413	9,4	5	9	130
320	-	353,5	371,5	9,4	5	-	24
	380,3	353,5	371,5	9,4	5	6	23,8
	380,3	353,5	-	9,4	5	6	23,8
	-	353,5	399	9,4	5	-	56
	409	353,5	399	9,4	5	6	55,2
	409	353,5	399	9,4	5	6	55,2
	447,5	370	429	9,4	5	9	135
340	-	370,5	388,5	9,4	5	-	25,5
	397,4	370,5	388,5	9,4	5	6	25,2
	397,4	370,5	-	9,4	5	6	25,2
	-	383,5	412,5	9,4	5	-	60,5
	427,1	383,5	412,5	9,4	5	6	58,8
	427,1	383,5	412,5	9,4	5	6	58,8
	486	399	465	9,4	5	11	185
360	-	393	411	9,4	5	-	27
	420,2	393	411	9,4	5	6	26,5

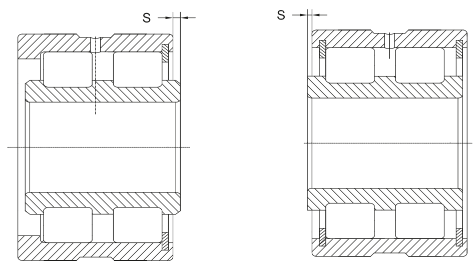
Double Row Full Complement Cylindrical Roller Bearings



NNC NNCF NNCL

	Dimensions			Basical radial load		Speed Ratings		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng $_{grease}$	ng $_{oil}$	
mm				kN		[min $^{-1}$]		
360	440	80	2,1	880	2570	300	560	**NNCL4872 V**
	480	118	2,5	1690	4240	300	550	**NNC4972 V**
	480	118	2,5	1690	4240	300	550	**NNCF4972 V**
	540	243	5	4290	9570	260	500	**NNCF5072 V**
380	480	100	2,1	1293	3618	280	530	**NNC4876 V**
	480	100	2,1	1293	3618	280	530	**NNCF4876 V**
	480	100	2,1	1293	3618	280	530	**NNCL4876 V**
	520	140	4	2124	5460	260	500	**NNC4976 V**
	520	140	4	2124	5460	260	500	**NNCF4976 V**
	520	140	4	2124	5460	260	500	**NNCL4976 V**
	560	243	5	4400	9940	240	480	**NNCF5076 V**
400	500	100	2,1	1311	3748	270	500	**NNC4880 V**
	500	100	2,1	1311	3748	270	500	**NNCF4880 V**
	500	100	2,1	1311	3748	270	500	**NNCL4880 V**
	540	140	4	2185	5730	240	480	**NNC4980 V**
	540	140	4	2185	5730	240	480	**NNCF4980 V**
	540	140	4	2185	5730	240	480	**NNCL4980 V**
	600	272	5	5500	12300	220	450	**NNCF5080 V**
420	520	100	2,1	1353	3942	250	470	**NNC4884 V**

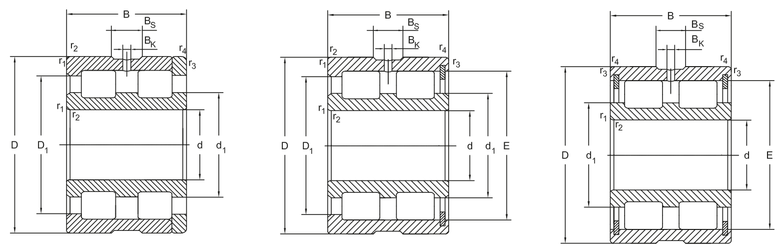
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

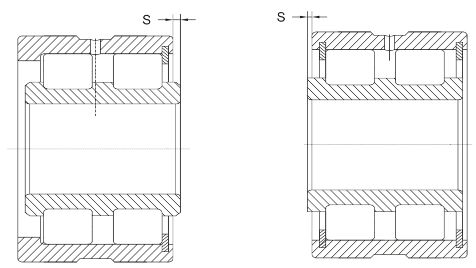
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
360	420,2	393	-	9,4	5	6	26,5
	-	399	436,5	9,4	5	-	61
	446	399	436,5	9,4	5	6	60,5
	504	417	483	9,4	5	11	195
380	-	421,5	444,5	9,4	5	-	45
	456,0	421,5	444,5	9,4	5	6	44,6
	456,0	421,5	-	9,4	5	6	44,6
	-	433,5	465,5	9,4	5	-	93
	481,5	433,5	465,5	9,4	5	7	92,4
	481,5	433,5	465,5	9,4	5	7	92,4
	532	435	511	9,4	5	11	200
400	-	436	459	9,4	5	-	47
	470,3	436	459	9,4	5	6	46,8
	470,3	436	-	9,4	5	6	46,8
	-	454	486	9,4	5	-	97,5
	502	454	486	9,4	5	7	96,5
	502	454	486	9,4	5	7	96,5
	560	464	536	9,4	5	11	270
420	-	458	481	9,4	5	-	49,2

Double Row Full Complement Cylindrical Roller Bearings



d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	ng grease	ng oil	Designation
Dimensions				**Basical radial load**		**Speed Ratings**		**Designation**
mm				kN		[min $^{-1}$]		
420	520	100	2,1	1353	3942	250	470	**NNCF4884 V**
	520	100	2,1	1353	3942	250	470	**NNCL4884 V**
	560	140	4	2235	6000	220	450	**NNC4984 V**
	560	140	4	2235	6000	220	450	**NNCF4984 V**
	560	140	4	2235	6000	220	450	**NNCL4984 V**
	620	272	5	5610	12800	200	430	**NNCF5084 V**
440	540	100	2,1	1387	4136	240	450	**NNC4888 V**
	540	100	2,1	1387	4136	240	450	**NNCF4888 V**
	540	100	2,1	1387	4136	240	450	**NNCL4888 V**
	600	160	4	2990	7570	200	430	**NNC4988 V**
	600	160	4	2990	7570	200	430	**NNCF4988 V**
	600	160	4	2990	7570	200	430	**NNCL4988 V**
	650	280	6	6160	14100	190	400	**NNCF5088 V**
460	580	118	3	1560	4614	230	420	**NNC4892 V**
	580	118	3	1560	4614	230	420	**NNCF4892 V**
	580	118	3	1560	4614	230	420	**NNCL4892 V**
	620	160	4	3020	7770	190	400	**NNC4992 V**
	620	160	4	3020	7770	190	400	**NNCF4992 V**
	620	160	4	3020	7770	190	400	**NNCL4992 V**
	680	130	6	6440	14700	180	380	**NNCF5092 V**

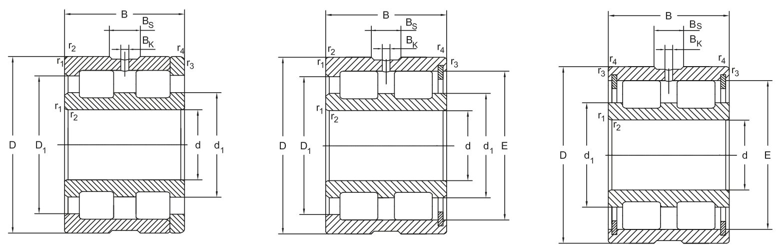
Double Row Full Complement Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 210

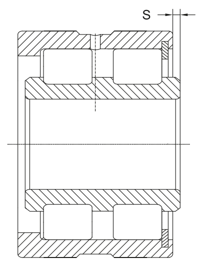
Dimensions							Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
420	492,5	458	481	9,4	5	6	48,8
	492,5	458	-	9,4	5	6	48,8
	-	470,5	512	9,4	5	-	100
	522,5	470,5	512	9,4	5	7	99,0
	522,5	470,5	512	9,4	5	7	99,0
	579	483	555	9,4	5	11	280
440	-	480	503	9,4	5	-	51,5
	541,6	480	503	9,4	5	6	50,9
	514,6	480	-	9,4	5	6	50,9
	-	503,5	543,5	9,4	5	-	140
	563,5	503,5	543,5	9,4	5	7	138
	563,5	503,5	543,5	9,4	5	7	138
	608	507	583	9,4	5	11	320
460	-	506	531	9,4	5	-	77,5
	543,3	506	531	9,4	5	7	76,9
	543,3	506	-	9,4	5	7	76,9
	-	512	564	9,4	5	-	145
	577	512	564	9,4	5	7	141
	577	512	564	9,4	5	7	141
	638	527	609	9,4	5	14	365

Double Row Full Complement Cylindrical Roller Bearings

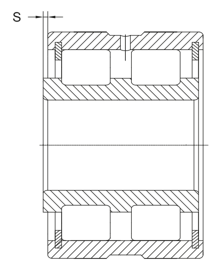


d	D	B	r_1, r_2 min.	Basical radial load dyn. C_r	stat. C_{0r}	Speed Ratings ng_{grease}	ng_{oil}	Designation
mm				kN		[min $^{-1}$]		
480	600	118	3	1597	4838	210	400	**NNC4896 V**
	600	118	3	1597	4838	210	400	**NNCF4896 V**
	600	118	3	1597	4838	210	400	**NNCL4896 V**
	650	170	5	3270	8420	180	360	**NNC4996 V**
	650	170	5	3270	8420	180	360	**NNCF4996 V**
	650	170	5	3270	8420	180	360	**NNCL4996 V**
	700	300	6	6710	15300	170	360	**NNCF5096 V**
500	620	118	3	1625	4987	200	380	**NNC48/500 V**
	620	118	3	1625	4987	200	380	**NNCF48/500 V**
	620	118	3	1625	4987	200	380	**NNCL48/500 V**
	670	170	5	3350	8850	170	360	**NNC49/500 V**
	670	170	5	3350	8850	170	360	**NNCF49/500 V**
	670	170	5	3350	8850	170	360	**NNCL49/500 V**
	720	300	6	6820	15900	170	360	**NNCF50/500 V**
530	650	118	3	5285	5285	180	340	**NNC48/530 V**
	650	118	3	2285	5285	180	340	**NNCF48/530 V**
	650	118	3	5285	5285	180	340	**NNCL48/530 V**
	710	180	4	10100	10100	160	340	**NNC49/530 V**
	710	180	4	10100	10100	160	340	**NNCF49/530 V**
	710	180	4	10100	10100	160	340	**NNCL49/530 V**

Double Row Full Complement Cylindrical Roller Bearings



NNCF

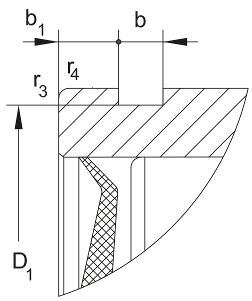


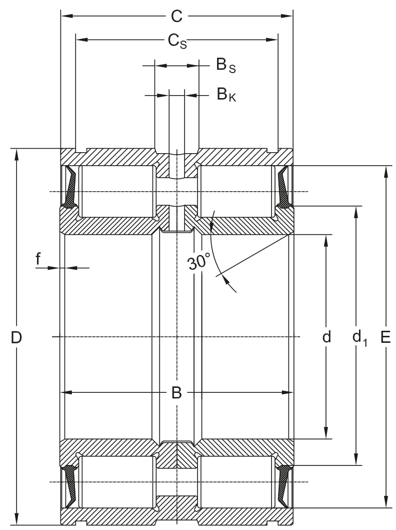
NNCL

Abutment and fillet dimensions see on page 210

		Dimensions					Mass
d	E	d_1 ≈	D_1 ≈	B_s ≈	B_k	s ≈	Bearing
							[kg]
480	-	530	555	9,4	5	-	80
	567,3	530	555	9,4	5	7	89,8
	567,3	530	-	9,4	5	7	89,8
	-	537	592	9,4	5	-	170
	605,5	537	592	9,4	5	8	166
	605,5	537	592	9,4	5	8	166
	657	548	630	9,4	5	14	380
500	-	547	571	9,4	5	-	82,5
	583,5	547	571	9,4	5	7	83,0
	583,5	547	-	9,4	5	7	83,0
	-	568,5	610,5	9,4	5	-	179
	631,5	568,5	610,5	9,4	5	8	175
	631,5	568,5	610,5	9,4	5	8	175
	678	569	651	9,4	5	14	390
530	-	577,5	602,5	9,4	5	-	87,5
	615	577,5	602,5	9,4	5	6	87,2
	615	577,5	-	9,4	5	6	87,2
	-	588	648	9,4	5	-	208
	663	588	648	9,4	5	8	205
	663	588	648	9,4	5	8	205

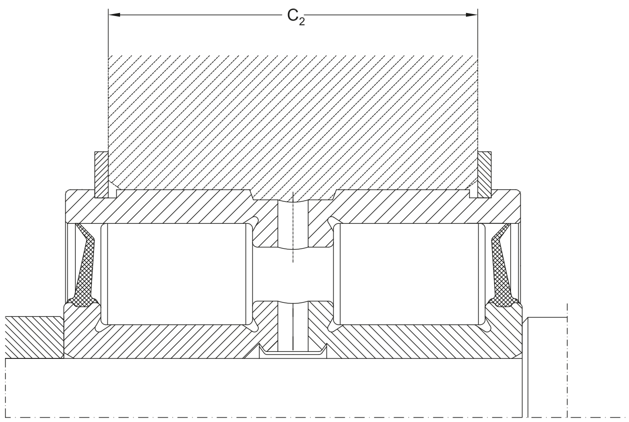
Sealed Double Row Full Complement Cylindrical Roller Bearings





	Dimensions					Basical radial load		Speed Ratings	Designation
d	D	B	C	C_s	r_3, r_4 min.	dyn. C_r	stat. C_{0r}		
mm						kN		[min $^{-1}$]	
25	47	30	29	24,7	0,3	44,5	65,3	3000	**NNF5005 2LSV**
30	55	34	33	28,2	0,3	48,5	70	2600	**NNF5006 2LSV**
35	62	36	35	30,2	0,3	66	95,8	2200	**NNF5007 2LSV**
40	68	38	37	32,2	0,6	79	121	2000	**NNF5008 2LSV**
45	75	40	39	34,2	0,6	95,1	150	1800	**NNF5009 2LSV**
50	80	40	39	34,2	0,6	101	162	1700	**NNF5010 2LSV**
55	90	46	45	40,2	0,6	119	195	1500	**NNF5011 2LSV**
60	95	46	45	40,2	0,6	123	210	1400	**NNF5012 2LSV**
65	100	46	45	40,2	0,6	128	224	1300	**NNF5013 2LSV**
70	110	54	53	48,2	0,6	190	337	1200	**NNF5014 2LSV**
80	125	60	59	54,2	0,6	233	420	1000	**NNF5016 2LSV**
90	140	67	66	59,2	0,6	297	552	900	**NNF5018 2LSV**
100	150	67	66	59,2	0,6	314	580	850	**NNF5020 2LSV**
110	170	80	79	70,2	0,6	380	699	750	**NNF5022 2LSV**

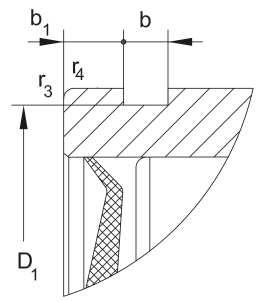
Sealed Double Row Full Complement Cylindrical Roller Bearings

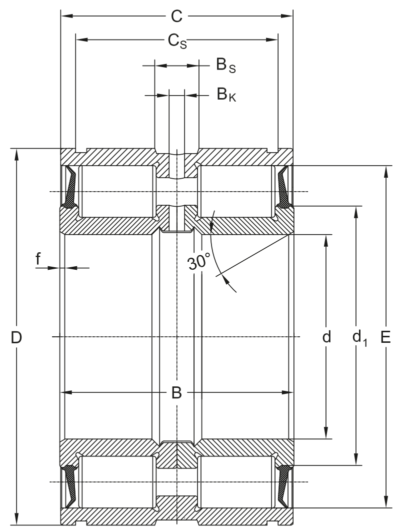


Abutment and fillet dimensions see on page 210

Dimensions											Mass
d	d_1 ≈	D_1 ≈	E	b	b_1	B_s ≈	B_k	f	C_2 ± 0,1	Adequate snap ring according to **DIN 471**	Bearing
											[kg]
25	33	44,8	40,4	1,8	2,15	4,5	3	0,5	21	47x1,75	0,23
30	39	52,8	47,9	2,1	2,4	4,5	3	0,5	24	55x2	0,35
35	45	59,8	54,5	2,1	2,4	4,5	3	0,5	26	62x2	0,45
40	50,5	65,8	61	2,7	2,4	4,5	3	0,8	27	68x2,5	0,53
45	56,4	72,8	67,7	2,7	2,4	4,5	3	0,8	29	75x2,5	0,68
50	61,2	77,8	72,5	2,7	2,4	4,5	3	0,8	29	80x2,5	0,73
55	68	87,4	80	3,2	2,4	4,5	3,5	1	34	90x3	1,10
60	73	92,5	85	3,2	2,4	4,5	3,5	1	34	95x3	1,20
65	78	97,4	90	3,2	2,4	4,5	3,5	1	34	100x3	1,30
70	85	107,1	100	4,2	2,4	5	3,5	1	40	110x4	1,85
80	97	122,1	113,5	4,2	2,4	5	3,5	1,5	46	125x4	2,70
90	109	137	127,5	4,2	3,4	5	3,5	1,5	51	140x4	3,80
100	118	147	138	4,2	3,4	6	3,5	1,5	51	150x4	4,05
110	132	167	154,5	4,2	4,4	6	3,5	1,8	62	170x4	6,45

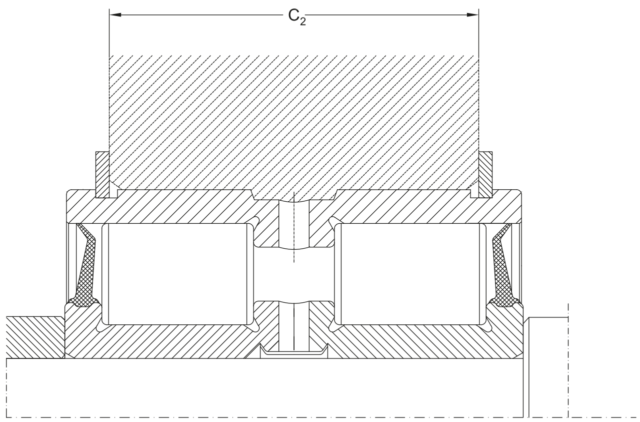
Sealed Double Row Full Complement Cylindrical Roller Bearings





Dimensions						Basical radial load		Speed Ratings	Designation
d	D	B	C	C_s	r_3, r_4 min.	dyn. C_r	stat. C_{0r}		
mm						kN		[min $^{-1}$]	
120	180	80	79	71,2	0,6	402	745	700	**NNF5024 2LSV**
130	200	95	94	83,2	0,6	572	1050	630	**NNF5026 2LSV**
140	210	95	94	83,2	0,6	594	1140	600	**NNF5028 2LSV**
150	225	100	99	87,2	0,6	693	1310	560	**NNF5030 2LSV**
160	240	109	108	95,2	0,6	721	1410	500	**NNF5032 2LSV**
170	260	122	121	107,2	0,6	935	1800	480	**NNF5034 2LSV**
180	280	136	135	118,2	0,6	1080	2130	450	**NNF5036 2LSV**
190	290	136	135	118,2	0,6	1100	2210	430	**NNF5038 2LSV**
200	310	150	149	128,2	0,6	1340	2870	400	**NNF5040 2LSV**
220	340	160	159	138,2	1	1510	3130	360	**NNF5044 2LSV**
240	360	160	159	138,2	1	1570	3310	340	**NNF5048 2LSV**

Sealed Double Row Full Complement Cylindrical Roller Bearings

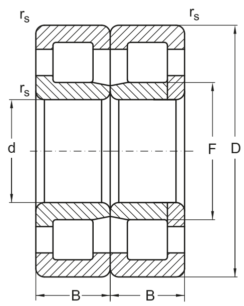


Abutment and fillet dimensions see on page 210

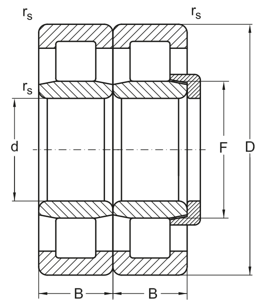
Dimensions											Mass
d	d_1 ≈	D_1 ≈	E	b	b_1	B_s ≈	B_k	f	C_2 ± 0,1	Adequate snap ring according to **DIN 471**	Bearing
											[kg]
120	141	176	164	4,2	3,9	6	3,5	1,8	63	180x4	6,90
130	155	196	183,5	4,2	5,4	7	4	1,8	75	200x4	10,5
140	167	206	195,5	5,2	5,4	7	4	1,8	73	210x5	11
150	177	221	209,2	5,2	5,9	7	4	2	77	225x5	13,5
160	191	236	222,6	5,2	6,4	7	4	2	85	240x5	16,5
170	203	254	239	5,2	6,9	7	4	2	97	260x5	22,5
180	220	274	259	5,2	8,4	8	4	2	108	280x5	30
190	228	284	267,3	5,2	8,4	8	4	2	108	290x5	31,5
200	245	304	284	6,3	10,4	8	4	2	116	310x6	42
220	264	334	308,5	6,3	10,4	8	6	2	126	340x6	53,5
240	283	354	327,5	6,3	10,4	9,4	6	2	126	360x6	57,5

Cylindrical roller bearings, double row and three row

Non-standardized



NJ+NJP
WJ+WJP



WJ+WUJ

Dimensions					Basical radial load		Speed limit	Mass	Designation
					dyn.	stat.			
d	D	B	r_s	F	C_r	C_{0r}	Grease		
mm					kN				
85	170	60	3	105	578	862	2800	14,5	**NJ+NJP85/170 MAP63**
110	215	73	3	135,5	773	1188	2600	25,0	**WJ+WJP110/215 M**
	215	73	3	135,5	773	1188	2600	26,0	**WJ+WUJ110/215 M**
120	240	80	3	150	946	1484	2400	34,7	**WJ+WJP120/240 M**
	240	80	3	150	946	1484	2400	34,7	**WJ+WUJ120/240 M**
130	240	80	3	157	951	1620	2200	35,6	**WJ+WJP130/240 M**
	250	80	3	160	1028	1660	2200	37,5	**WJ+WJP130/250 F**
	250	80	3	160	1028	1660	2200	37,7	**WJ+WJP130/250 M**
	250	80	3	158	1028	1660	2200	37,8	**WJ+WJP130/250 MPA**
	260	86	3	164	1212	1932	2000	44,4	**WJ+WJP130/260 M**
140	300	102	4	180	1554	2460	1800	71,6	**WJ+WJP140/300 M**
	300	102	4	180	1554	2460	1800	71,6	**WJ+WUJ140/300 M**
160	320	102	4	200	1630	2676	1500	81,6	**WJ+WJP160/320 FC4**

Cylindrical roller bearings, single row

Non-standardized

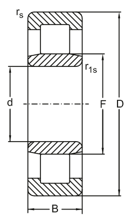


fig. 1

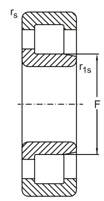


fig. 2

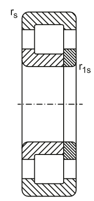


fig. 3

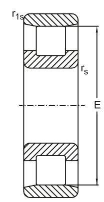


fig. 4

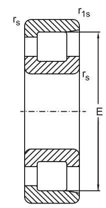


fig. 5

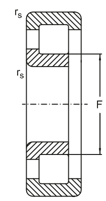


fig. 6

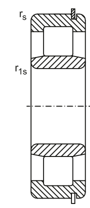


fig. 7

Dimensions						**Fig.**	**Basical radial load**		**Speed limit**		**Mass**	**Designation**
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
mm							kN					
20	47	14	1	0,6	40	5	15,2	12,5	15000	18000	0,110	**NF204**
	52	15	1,1	0,6	44,5	5	21,1	17,1	12000	15000	0,152	**NF304 M**
25	62	17	1,1	1,1	34	2	41,2	37	10000	13000	0,243	**NJ305 EC3VB133**
30	67	16	0,6	1	38,5	3	23,4	21,5	10000	12500	0,296	**NUP5806**
	67	16	0,6	1	38,5	3	23,4	21,5	10000	12500	0,296	**NUP5806 NA**
	72	19	1,1	1,1	62	4	38,7	35,2	8500	10000	0,346	**N306 F2**
32	72	19	1,5	1,1	62	4	38,3	34,8	8000	9500	0,346	**N30/32**
	72	19	1,5	1,5	61,8	5	55,5	56,8	8000	9500	0,370	**NF5306 NV**
35	80	21	1,5	1,1	68,2	5	47,3	44,1	7700	8700	0,485	**NF307**
40	80	18	1,1	1,1	70	5	43,7	42,9	8000	9500	0,380	**NF208**
	90	23	1,5	1,5	77,5	5	56,2	53,8	7000	8500	0,660	**NF308**
45	85	19	1,1	1,1	75	5	46	46,9	7500	9000	0,445	**NF209 M**
	100	25	1,5	1,5	86,5	5	72	70	6000	7000	0,895	**NF309**
	100	25	1,5	1,5	58,5	6	72	70	6000	7000	0,870	**NUPJ309**
	100	25	1,5	1,5	58,5	6	96,9	97,7	6000	7000	0,895	**NUPJ309 E**
	100	25	1,5	1,5	58,5	13	96,9	97,7	6000	7000	0,895	**NUPJ309 ENMAZS**
	100	36	2	1,5	86,5	5	103	110	6000	7000	1,29	**NF2309 M**
50	90	20	1,1	1,1	80,4	5	48,2	51	6700	8000	0,490	**NF210**
	90	20	1,1	1,1	80,4	5	48,2	51	6700	8000	0,490	**NF210 M**
	90	20	1,1	1,1	59,5	6	63,7	68,3	6700	8000	0,490	**NUPJ210 EMA**
	90	23	0,5	0,5	57,8	3	91,1	98,4	2500	3200	0,632	**NUP2210**
	110	44,5	2	2	62	3	124	163	5300	6300	2,28	**NUP5410 MA**
	110	27	2	2	95	5	86,9	86,2	8500	6500	1,14	**NF310**
55	100	21	1,5	1,1	88,5	5	57,9	62,5	6300	7500	0,665	**NF211**
	100	21	1,5	1,1	88,5	5	57,9	62,5	6300	7500	0,665	**NF211 M**
	110	22	2,5	2,5	72	2	93,4	102	5000	6000	0,922	**NJ5111 E**
	120	29	2	2	70,5	6	109	109	5000	6000	1,47	**NUPJ311**
	120	29	2	2	70,5	6	138	150	4500	5600	1,52	**NUPJ311 E**
	120	29	2	2	70,5	13	138	150	4500	5600	1,47	**NUPJ311 ENMA**
	120	29	2	2	104,5	5	109	109	5000	6000	1,47	**NF311**
	120	29	2	2	104,5	5	109	109	5000	6000	1,65	**NF311 M**
57.15	114,30	28	1,5	1,5	99,6	5	84,5	88,7	5000	6000	1,45	**NF5211 MB**

Cylindrical roller bearings, single row

Non-standardized

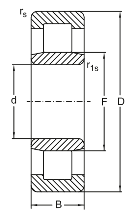


fig. 1

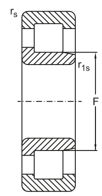


fig. 2

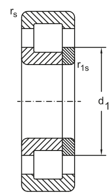


fig. 3

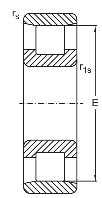


fig. 4

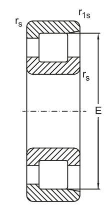


fig. 5

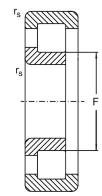


fig. 6

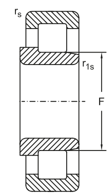


fig. 7

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
mm							kN					
60	110	22	1,5	1,5	100	2	93,4	101	5600	6700	0,825	**NJ212 E/X**
65	120	23	1,5	1,5	105,6	5	80,5	89,7	5300	6300	1,05	**NF213**
70	125	24	1,5	1,5	83,5	3	118	136	5000	6000	1,17	**NUP2214 EW7**
	150	35	2,1	2,1	89	13	203	220	4000	4800	2,80	**NUPJ314 EN**
	150	35	2,1	2,1	89	13	203	220	4000	4800	2,80	**NUPJ314 ENMA**
	150	35	2,1	2,1	89	13	203	220	4000	4800	2,80	**NUPJ314 ENMAZS**
	150	35	2,1	2,1	89	6	203	220	4000	4800	2,73	**NUPJ314 EMA**
	240	80	3	3	143	7	664	863	3200	4000	22,94	**CR0136.14**
75	130	25	1,5	1,5	116,5	5	92,5	106	4800	5600	1,28	**NF215**
80	140	26	2	2	125,3	5	106	122	4300	5000	1,54	**NF216**
	140	26	2	2	125,3	8	106	122	4300	5000	1,54	**NP216**
	140	26	2	2	127,3	8	139	166	4300	5000	1,54	**NP216 EM**
	140	26	2	2	127,3	6	139	166	4300	5000	1,51	**NUPJ216 E**
90	160	30	2	2	143	5	149	174	3800	4500	2,36	**NF218**
	190	43	3	3	165	5	237	261	3200	3800	5,42	**NF318**
	190	43	2,1	2,1	115	6	237	261	3200	3800	5,38	**NUPJ318 M**

Cylindrical roller bearings, single row

Non-standardized

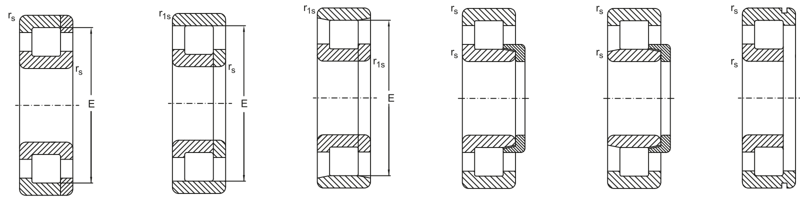


fig. 8 fig. 9 fig. 10 fig. 11 fig. 12 fig. 13

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
d	D	B	r_s	r_{1s} min	E, F		dyn. C_r	stat. C_{0r}	Grease	Oil		
mm							kN					
95,25	133,35	19,05	1,5	1,1	123	4	60,9	83,7	3600	4300	0,85	**N5319 MBP5**
99,5	180	46	2,1	2,1	120	2	270	360	3000	3600	5,32	**NJ2220 MF2**
100	215	47	3	3	185,5	9	309	354	3000	3600	8,525	**NP320 M**
	215	73	3	3	127,5	1	570	717	2600	3200	12,0	**NU2320 EMW33**
	215	73	3	3	129,5	1	457	584	2600	3200	12,0	**NU2320 MAW33**
	215	73	3	3	129,5	1	457	584	2600	3200	12,0	**NU2320 MW33**
	215	73	3	3	129,5	1	457	584	2600	3200	12,0	**NU2320 W33**
	215	73	3	3	127,5	12	568	714	2600	3200	12,0	**NUJ2320 EM**
	215	47	3	3	185,5	10	308	352	2800	2400	8,67	**NT5220 MNA**
	215	47	4	4	127	11	384	432	3100	3900	10,530	**MR320-129**
112	170	38	2	1	127	1	181	264	3000	3600	3,15	**NU5120**
130	165	22	1	1	155,55	6	78,1	146	3300	4100	1,21	**N5126 MB**
	165	22	2	1	155,5	6	78,1	146	3300	4100	1,2	**2002826 LM**
	200	33	2	1	148	1	163	221	3000	3600	3,91	**NU1026 M**

Cylindrical roller bearings, single row

Non-standardized

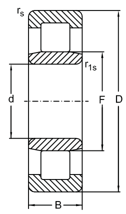


fig. 1

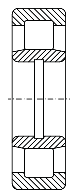


fig. 2

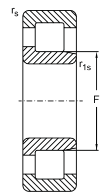


fig. 3

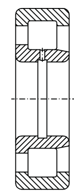


fig. 4

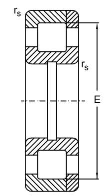


fig. 5

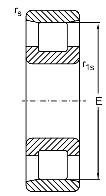


fig. 6

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
m	m						N	k				
150	225	45	2,1	1,5	168,5	1	338	527	2200	2600	6,49	**NU2030 EMC3ZS**
160	240	25	1,5	1,5	216	6	169	259	2200	2600	4,31	**NG160 M**
165,1	279,4	39,687	2	1,5	188,1	3	424	516	2200	2800	10,9	**65RIT292**
180	280	31	1,5	1,5	250,1	6	258	401	1800	2200	7,71	**NG180M**
	320	52	4	4	282	8	516	717	1800	2200	18,8	**NF236 M**
190	290	60	2,1	2,1	214	1	616	561	1700	2000	14,8	**NU2038 EMC3ZS**
220	340	56	3	3	250	3	650	1047	1300	1600	19,3	**NJ1044 B/M/R204**
	400	65	4	4	270	16	778	1113	1400	1700	41,6	**NUJ244 M**
240	319,975	48	2	1,5	300	6	405	736	1500	1800	10,7	**N5248 MBP5NA**
	320	48	2	2	261	1	361	684	1500	1800	11,2	**NU2948 MAP63**
285,75	387,35	69,85	2,5	2,5	368	6	748	1533	1500	1700	24,7	**491457 M**
300	380	48	1,5	2,1	321	2	479	988	1400	1600	14,3	**NJ2860 EMA**
305	460	65	5	5	422	7	884	1418	1400	1700	38,775	**N10/305 NA**
381	508	63,5	4	4	406,5	3	951	1688	900	1100	37,0	**NJ5176 MW33**

Cylindrical roller bearings, single row

Non-standardized

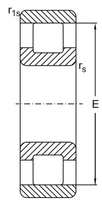


fig. 7

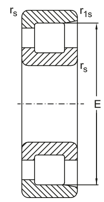


fig. 8

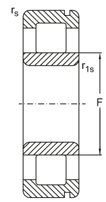


fig. 9

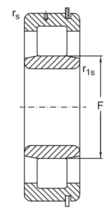


fig. 10

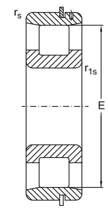


fig. 11

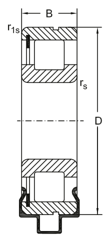


fig. 12

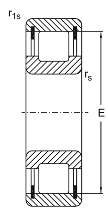


fig. 13

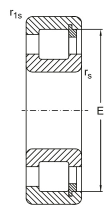


fig. 14

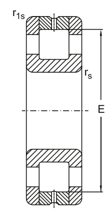


fig. 15

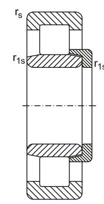
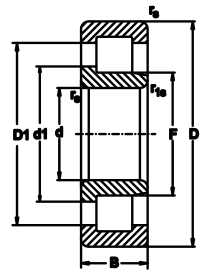


fig. 16

Dimensions						**Fig.**	**Basical radial load**		**Speed limit**		**Mass**	**Designation**
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
mm							kN					
25	62	17	1,1	1,1	53	13	39,3	37,5	3800	4500	0,277	**N2R305 V**
	67	15	0,6	0,6	31,5	10	29,3	27,7	10400	13000	0,317	**NU5305 ENR**
	67	15	1	0,6	53,5	11	23,4	21,5	10400	13000	0,267	**N5805 NR**
	67	15	1	0,6	53,5	11	23,4	21,5	10400	13000	0,267	**N5805 NRC3NA**
30	62	24	1	1	54	13	44,2	47	8000	10000	0,320	**N2R5706**
	67	16	1	0,6	53,5	11	23,4	21,5	10000	12500	0,274	**N5806 NRP6**
	67	15	1	0,6	53,5	11	23,4	21,5	10000	12500	0,270	**N5806 NRP6F2**
	67	16	1	0,6	53,5	11	23,4	21,5	10000	12500	0,274	**N5806 NRP6NA**
	80	21	1	1	67,8	13	73,9	84,5	3000	3600	0,578	**N2R5206 V**
	62	19	1	1	54,5	13	51,4	57,7	3700	4700	0,266	**N2R5906 V**
32	72	19	2	1,5	61,8	12	55,5	56,8	8000	9500	0,370	**NF5306 NV**
34,991	72	20,638	1,6	4	62,471	14	67,6	77,6	7000	8500	0,40	**482307 V**
35	72	23	0,6	1,6	64,7	13	68,7	75,7	7000	8500	0,32	**N2R2207 V**
	72	27	1	1	62,5	13	63,7	72,5	7000	8500	0,524	**N2R5207**
	80	23	1,5	0,6	49,5	9	58	61	6300	8000	0,613	**NUC5107 NM**
40	80	18	1,4	1	71,5	13	61	62,6	2800	3400	0,403	**N2R5108 V**
	90	23	1	1	78	13	71,8	70,3	5600	7000	0,743	**N2R308**
	90	23	1,6	1,6	77,663	13	72	71,4	5600	7000	0,72	**482208**
45	85	19	1	1	74,2	13	59,7	66,1	2600	3000	0,484	**N2R209 V**
	85	23	1,1	1,1	74,2	13	80	96,5	2400	2800	0,60	**N2R2209 V**
	100	25	1,6	1,6	88,25	13	110	111	2200	2600	0,94	**N2R309 V**
50	80	15	1	1	72,5	13	41,5	51,2	2800	3500	0,267	**N2R5510 V**
55	140	57	2	2	117,2	15	175	392	1400	2000	4,80	**N2P5611 MBW33**
65	140	33	3	1,5	121,3	13	152	163	3000	4300	2,43	**N2R5613 VC4**
	140	33	3	1,5	121,3	14	197	231	1400	2000	2,59	**NFR5113 VC4**
70	150	35	2,1	2,1	129,3	13	173	188	3400	4000	2,95	**N2R314**

Cylindrical roller bearings, single row

Non-standardized



NJ.....V,VH

Dimensions					Basical radial load		Speed limit		Designation
					dyn.	stat.			
d	D	B	r_s	r_{1s} min	C_r	C_{0r}	Grease	Oil	
mm					kN				
100	180	60,3	2,1	2,1	414	631	1200	1500	**NJ5220 VC3**
	180	60,3	2,1	2,1	414	631	1200	1500	**NJ5220 VH**
	215	73	3		655	830	800	1600	**NJ2320 VH**
	125	13	1	0,6	33,6	55,3	4400	5500	**NJ1820 VH**
110	240	80	3		830	1060	700	1400	**NJ2322 VH**
120	260	86	3		950	1220	630	1200	**NJ2324 VH**
130	230	64	3	3	591	853	600	1200	**NJ130X230X64 V**
	280	93	4		1100	1430	560	1000	**NJ2326 VH**
140	300	102	4		1250	1630	530	950	**NJ2328 VH**
150	320	108	4		1500	2000	500	900	**NJ2330 VH**
160	340	114	4		1630	2200	450	800	**NJ2332 VH**
170	360	120	4		1760	2400	450	800	**NJ2334 VH**
180	380	126	4		1900	2700	400	700	**NJ2336 VH**
190	400	132	5		2080	2900	400	700	**NJ2338 VH**
200	420	138	5		2320	3250	380	670	**NJ2340 VH**

Dimensions				Mass
d	F	D_1	d_1	
mm		kN		
100	120,6	150	129	6,684
	120,6	150	129	6,684
	119,3	173,7	131,5	13,0
	106,5			0,382
110	133,35	194,2	147	17,8
120	147,4	214	162,5	22,3
130	152	196,8	163,2	11,11
	157,95	229,9	174,1	27,9
140	168,46	245,3	184,7	34,9
150	182.5	265,7	201,2	41,6
160	196,55	286	216,7	48,8
170	203,56	296,4	224,5	59,2
180	221,74	314,6	242,6	69,6
190	224,6	327	247,6	80,0
200	238,65	347,5	263,2	91,6

Cylindrical roller bearings, single row

Non-standardized

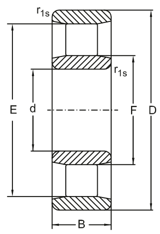


fig. 1

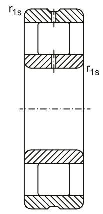


fig. 2

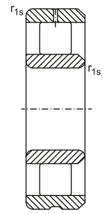


fig. 3

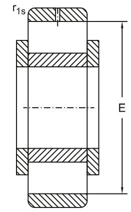


fig. 4

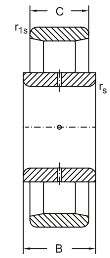


fig. 5

Dimensions								**Fig.**	**Basical radial load**		**Speed limit**		**Mass**	**Designation**
									dyn.	stat.				
d	D	B	C	r_s	r_{1s} min	E	F		C_r	C_{0r}	Grease	Oil		
mm									kN					
50,8	110	45,3	44,5	2	1,5	95,5	65,5	5	164	195	4300	5600	2,23	**NUNB5210 MW44**
58	96	51,6	43,6	1,5	1,5	86	68	4	160	146	4300	6000	1,30	**NUN5212**
	96	51,6	43,6		0,3		68	4	159	264	6400	8000	1,378	**NUN5212 FC3**
	96	51,6	43,6	1,3	1,3	86	68	5	160	146	4300	6000	1,38	**NUNB5212 FC3**
65	120	52,4		1,5	0,6	104,8	79,7	1	203	298	3600	4800	2,60	**NUN5613**
70	125	60,3		1,5	0,6	109,6	84,1	1	229	353	3400	4500	3,10	**NUN5114**
80	140	46		2	0,6	122,3	93,7	1	208	297	3000	4000	2,98	**NUN5216**
	140	66,6		2	2	123,8	95,2	1	329	541	3000	4000	4,44	**NUN5716 F2**
85	150	49,2		2	2	133,4	101,6	1	272	359	2800	3800	3,82	**NUN3217 W20**
95	170	55,6		3	2,1	151,1	113,5	1	363	536	2600	3400	5,16	**NUN2R3219 F2**
	170	55,6		3	2,1	151,1	113,5	1	363	536	2600	3400	5,67	**NUN3219 W20F2**
101,6	139	76,2		2	1,5	139,6	114,2	1	358	685	2800	3800	4,74	**NUN5320 W33F2**
152,4	209,55	53,975		1,25	2,5	165	165	3	345	626	2600	3300	5,700	**B6460**
180	310	149					215	1	1512	2670	2000	2500	51,95	**NUN5136 M**
285,75	387,35	69,85			2,5		318	2	743	1534	1400	1800	23,933	**49137**
345	406	28			1,5		362	1	215	486	1300	1600	7,215	**NUN5169 M**

Cylindrical roller bearings, single row
Combined roller thrust ball bearings

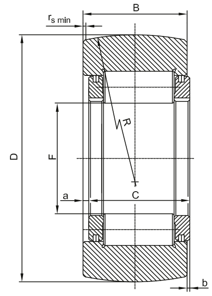


fig. 1

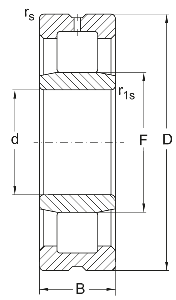


fig. 2

Dimensions							Fig.	Basical radial load		Mass	Designation
								dyn.	stat.		
d	D	D_1	B	r_s	r_{1s} min	E, F		C_r	C_{0r}		
mm								kN			
20	52		21	1,1	0,3	25,77	2	49,7	45,3	0,21	**ZRL2443**
190	170		60	1	6	80,03	1	219,2	292,4	7,8	**482916 VHS0**

URB

Cylindrical roller bearings, single row

Non-standardized

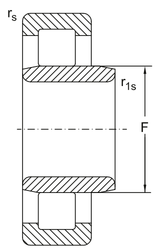


fig. 7

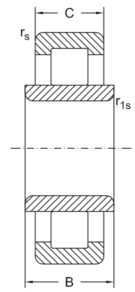


fig. 8

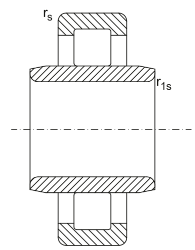


fig. 9

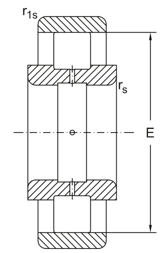


fig. 10

Dimensions							**Fig.**	**Basical radial load**		**Speed limit**		**Mass**	**Designation**
								dyn.	stat.				
d	D	B	C	r_s	r_{1s} min	E,F		C_r	C_{0r}	Grease	Oil		
mm								kN					
20	47	18	14	1	0,6	26,5	8	25,7	22,6	15000	18000	0,112	**NUB204 E**
25	52	18	15	1	0,6	31,5	8	29,3	27,7	12000	15000	0,140	**NUB205 E**
	62	24	17	1,1	1,1	34	8	41,2	37	10000	13000	0,243	**NUB305 E**
30	62	20	16	1	0,6	37,5	8	39,7	37,9	10000	13000	0,24	**NUB206 E**
40	80	23	18	1,1	1,1	49,5	8	53,1	52,1	8000	9500	0,47	**NUB208 E**
	80	23	18	1,1	1,1	49,5	8	53,1	52,1	8000	9500	0,47	**NUB208 EK**
45	85	23	19	1,1	1,1	54,5	8	61,7	64,6	7500	9000	0,46	**NUB209 E**
50	90	23	20	1,1	1,1	59,5	8	63,7	68,3	6700	8000	0,52	**NUB210 E**
	90	40	20	2	1,5	60,4	8	47,8	50,4	6000	7000	0,641	**NUB5110 NA**
50,8	110	45,3	44,5	2	2	65,5	10	164	195	5600	6700	2,11	**NB5210 S3W44**
60	110	28	22	1,5	1,5	72	8	94	102,3	5600	6700	0,93	**NUB212 E**
65	120	31	23	1,5	1,5	78,5	8	108	119	5300	6300	1,18	**NUB213 E**
	120	48	23	1,5	1,5	79,6	8	105	115	4800	5600	1,39	**NUB5313 NA**
	140	49	33	2,1	2,1	83,5	8	134	137	4000	4800	2,52	**NUB5213 NA**
	140	66	33	2	2	83,5	9	135	139	4800	6000	2,82	**NUB5413 NA**
75	130	31	25	1,5	1,5	88,5	8	130	156	4800	5600	1,39	**NUB215 E**
	160	55	37	2,1	2,1	95	8	239	261	3800	4600	3,7	**NUB315 E**
85	150	54	28	2	2	101,8	8	121	141	4300	5000	1,89	**NUB217**
	150	36	28	2	2	100,5	8	164	194	4300	5000	1,89	**NUB217 E**
170	310	76	52	4	4	208	8	499	677	1300	1800	21,4	**NUB234 MAC3F2**
	310	116	86	4	4	208	8	784	1141	1700	2000	31,9	**NUB2234 MC3**

Split cylindrical roller bearings, single row

Non-standardized

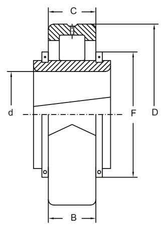


fig. 1

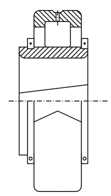


fig. 2

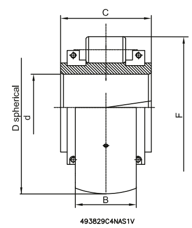


fig. 3

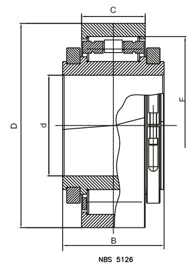


fig. 4

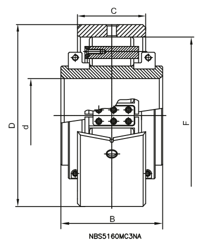


fig. 5

Dimensions					Fig.	Basical radial load		Speed limit	Mass	Designation
						dyn.	stat.			
d	D	B	C	F		C_r	C_{0r}	Grease		
mm						kN				
127	254	114,3	63,5	193	1	570	745	850	22,3	**NUBS5125 MA**
130	222,25	98,5	54	180	4	367	503	2400	12,3	**NBS5126 M**
145	250	80	117,5	225	3	665	1402		18,9	**493829 VC4NAS1**
220	393,757	156	90,5	324,2	2	1156	1680	530	73,6	**NUBS5144 MA**
300	438	143	74,5	388	5	850	1549	1200	58,7	**NBS5160 MC3NA**

URB

Double Row Cylindrical Roller Bearings

Standards, Boundary dimensions

Standard plans DIN 616
Double row cylindrical roller bearings, DIN 5412 / part 4

General

Double Row Cylindrical Roller Bearings of series NN30.. and NNU 49 are separable radial bearings.

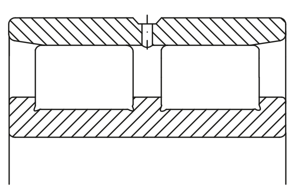
They are frequently used as non - locating bearings arrangements of working spindles for machine tools. Therefore, these bearings are often used in high precision telerance class, frequently in combination with reduced internal clearance. These bearings also feature high radial load capacity and are satisfactory for high speed applications, providing a very stiff and rigid bearing arrangement. They are also commonly used with tapered bores, namely suffix K, (i.e. taper 1:12).

Design variants of Double Row Cylindrical Roller Bearings

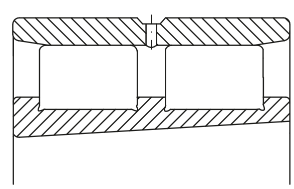
Double Row Cylindrical Roller Bearings of series NN 30.. and NNU 49.. are produced and available either with or without tapered bores, as standard (see also Abb, 1).

Bearings of series NN 30.. comprise of a plain outer ring and an inner ring with three integral shoulders to guide the two separate rows of rollers around the raceway. These bearings series are produced with lubrication facilities in their outer ring, such as a circumferential lubrication groove and holes as standard, namelu suffix W33.

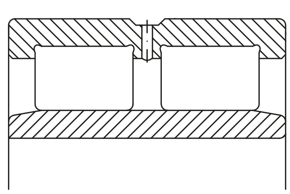
Unlike the NN30.. series the double row cylindrical roller bearings of the NNU 49.. series feature opposite internal design characteristics, (i.e. outer ring with 3 integral shoulders around the raceway and a plain inner ring). These bearing series also feature lubrication facilities in their outer ring as standard, also namely, suffix W33.



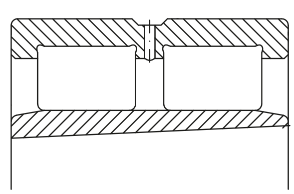
NN30..W33



NN30..K..W33



NNU49..W33



NNU49..K..W33

Cylindrical roller bearings of series BB30.. and NNU49.. allow for compensation of length changes within the bearings itself. In this way they are ideal non-locating bearings.

Both bearing rings may be mounted with heavy interference fit to shaft and housing.

Misalignment

Double Row Cylindrical Roller bearings are not able to accomodate misalignments.

Tolerances

Double Row Cilindrical Roller Bearings of series NN 30.. and NNU 49.. are frequently used as spindle bearings.

Consequently, they are also available with closer tolerance classes, such as P4 or SP, as standard.

On request these bearings are also be produced to other tolerance classes.

Detailed tolerance values, for URB double row cylindrical roller bearings and URB double row cylindrical roller bearings in spindle bearing design, tolerance class SP, are listed in the table shown in the chapter "Bearing tolerances" page 33.

Cages

URB Double Row Cylindrical Roller Bearings of the series NN 30.. and NNU 49.. are produced with roller riding solid brass cages as standard.

Internal clearance

URB Double Row Cylindrical Roller Bearings are produced with normal internal clearance (clearance group CN, historically designated C0) as standard. Other internal radial clearances are produced upon order request.

NOTE:

URB Double Row Cylindrical Roller Bearings of series NN 30.. and NNU 49.. produced to high precision design are frequently used with reduced internal radial clearance (clearance group C1).

As these bearings are produced to very closed tolerances, under no circumstances should components be mixed or exchanged with other bearing parts.

The value of internal clearance groups of URB Cylindrical Roller Bearings are listed in the tables on page 206.

These Values conform, as far as they are standardised, and conform to DIN 620/part 4 and ISO 5753-1991, respectively.

Minimum load

The minimum load applied to fast rotating double row cylindrical roller bearings should be higher than 4 % of its dynamic load rating C_r.

Equivalent Dynamic bearing load

Since double Row Cylindrical Roller Bearings of series NN 30.. and NNU 49.. are non - locating bearings, they are not able to accomodate any thrust loads.

$$P = F_r$$

Equivalent static bearing load

For Single and Double row cylindrical roller bearings:

$$P_0 = F_r$$

Mounting

When handling High Precision double row cylindrical roller bearings particular attention must be paid to the relevant instructions of fitting and mounting of these bearings.

When double row cylindrical roller bearings, with tapered inner bores, are mounted the effect on the running clearance can be adjusted to obtain a specific clearance or preload.

As these bearing types are separable under no circumstances should either components or assembled bearings be mixed or exchanged with other bearing parts.

Abutment and fillet dimensions for Double row cylindrical roller bearings

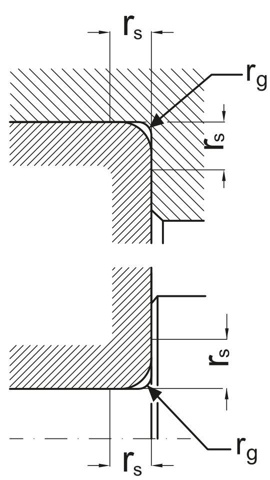
The bearing rings must only contact adjacent parts with their side faces. The bearing corners must not touch the corner fillet radii or either the shaft or housing corners.

Therefore, the largest fillet radius (**r_g**) must be smaller than the minimum fillet dimension of the bearings rings (**r_s**) as listed in the bearing tables, also see next page.

Recommendations for the dimensions of adjacent parts are listed in **DIN 5418**.

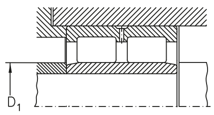
Abutment and fillet dimensions for Double Row Cylindrical Roller Bearings

Dimensions are in [mm]

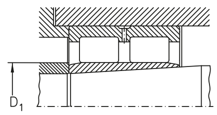


Abutment and fillet dimension for Double row Cylindrical Roller Bearings

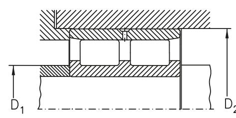
All dimensions are in [mm]



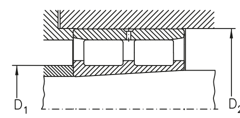
NNU49..W33



NNU49..K..W33



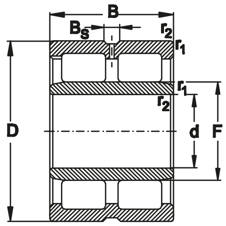
NN30..W33



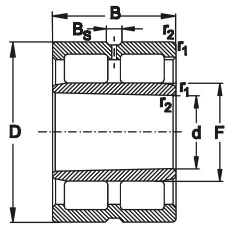
NN30..K..W33

Shaft diameter	for Bearings series					
	NNU 49, NNU 49 K		NN 30, NN 30 K			
	Type	D_1	Type	D_1	D_2	
d		max		min	min	max
mm						
30	**-**	-	**NN3006**	35	49	50
35	**-**	-	**NN3007**	40	56	57
40	**-**	-	**NN3008**	45	62	63
45	**-**	-	**NN3009**	50	69	70
50	**-**	-	**NN3010**	55	74	75
55	**-**	-	**NN3011**	61	82	84
60	**-**	-	**NN3012**	66	87	89
65	**-**	-	**NN3013**	71	92	94
70	**-**	-	**NN3014**	76	102	104
75	**-**	-	**NN3015**	81	107	109
80	**-**	-	**NN3016**	86	115	119
85	**-**	-	**NN3017**	91	120	124
90	**-**	-	**NN3018**	98	129	133
95	**-**	-	**NN3019**	103	134	137
100	**NNU4920**	112	**NN3020**	108	139	142
105	**NNU4921**	117	**NN3021**	114	148	151
110	**NNU4922**	122	**NN3022**	119	157	161
120	**NNU4924**	133	**NN3024**	129	167	171
130	**NNU4926**	145	**NN3026**	139	184	191
140	**NNU4928**	155	**NN3028**	149	194	201
150	**NNU4930**	167	**NN3030**	160	208	215
160	**NNU4932**	177	**NN3032**	170	222	230
170	**NNU4934**	187	**NN3034**	180	239	250
180	**NNU4936**	200	**NN3036**	190	258	270
190	**NNU4938**	210	**NN3038**	200	268	280
200	**NNU4940**	223	**NN3040**	210	285	300
220	**NNU4944**	243	**NN3044**	232	313	328
240	**NNU4948**	263	**NN3048**	252	334	348
260	**NNU4952**	289	**NN3052**	275	368	385
280	**NNU4956**	309	**NN3056**	295	388	405
300	**NNU4960**	335	**NN3060**	315	422	445
320	**NNU4964**	335	**NN3064**	335	442	465

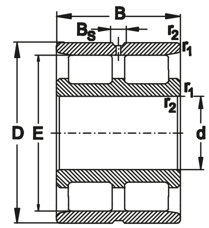
Double Row Cylindrical Roller Bearings



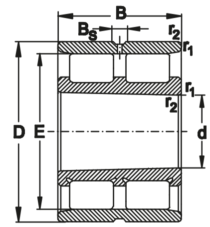
NNU49...W33



NNU49..K..W33



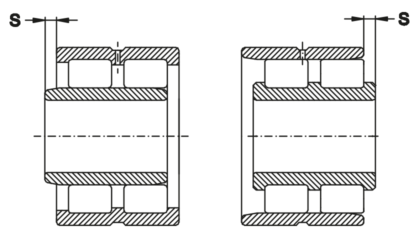
NN30...W33



NN30..K..W33

Dimensions				Basical radial load		Speed limit		Designation
				dyn.	stat.	grease	oil	
d	D	B	r_1, r_2 min.	C_r	C_{0r}			
mm				kN		min $^{-1}$		
30	55	19	1	29	34	16000	19000	**NN3006 MW33**
	55	19	1	29	34	16000	19000	**NN3006 KMW33**
35	62	20	1	39,3	50	14000	17000	**NN3007 MW33**
	62	20	1	39,3	50	14000	17000	**NN3007 KMW33**
40	68	21	1	45	58,5	12000	15000	**NN3008 MW33**
	68	21	1	45	58,5	12000	15000	**NN3008 KMW33**
45	75	23	1	54	72	11000	14000	**NN3009 MW33**
	75	23	1	54	72	11000	14000	**NN3009 KMW33**
50	80	23	1	57	80	10000	13000	**NN3010 MW33**
	80	23	1	57	80	10000	13000	**NN3010 KMW33**
55	90	26	1,1	72	100	9000	11000	**NN3011 MW33**
	90	26	1,1	72	100	9000	11000	**NN3011 KMW33**
60	95	26	1,1	75	110	8500	10000	**NN3012 MW33**
	95	26	1,1	75	110	8500	10000	**NN3012 KMW33**
65	100	26	1,1	76,5	118	8000	9500	**NN3013 MW33**
	100	26	1,1	76,5	118	8000	9500	**NN3013 KMW33**
70	110	30	1,1	98	151	7000	8500	**NN3014 MW33**
	110	30	1,1	98	151	7000	8500	**NN3014 KMW33**
75	115	30	1,1	100	156	6700	8000	**NN3015 MW33**

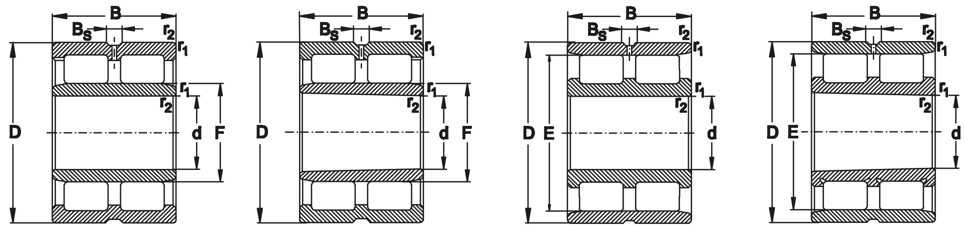
Double Row Cylindrical Roller Bearings



Abutment and fillet dimensions
see on page 319

Bearing dimensions					Mass
d	E	F	B_s	s	
mm					[kg]
30	48,5	-	4,8	1,4	0,12
	48,5	-	4,8	1,4	0,12
35	55	-	4,8	1,4	0,26
	55	-	4,8	1,4	0,26
40	61	-	4,8	1,4	0,32
	61	-	4,8	1,4	0,32
45	67,5	-	4,8	1,7	0,41
	67,5	-	4,8	1,7	0,41
50	72,5	-	4,8	1,7	0,43
	72,5	-	4,8	1,7	0,43
55	81	-	4,8	1,9	0,65
	81	-	4,8	1,9	0,65
60	86,1	-	4,8	1,9	0,67
	86,1	-	4,8	1,9	0,67
65	91	-	4,8	1,9	0,74
	91	-	4,8	1,9	0,74
70	100	-	6,5	2,3	1,1
	100	-	6,5	2,3	1,1
75	105	-	6,5	2,3	1,1

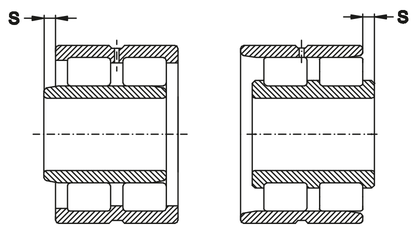
Double Row Cylindrical Roller Bearings



NNU49...W33 NNU49..K..W33 NN30...W33 NN30..K..W33

Dimensions				Basical radial load		Speed limit		Designation
d	D	B	r_1, r_2 min.	dyn. C_r	stat. C_{0r}	grease	oil	
mm				kN		min $^{-1}$		
75	115	30	1,1	100	156	6700	8000	**NN3015 KMW33**
80	125	34	1,1	120	186	6300	7500	**NN3016 MW33**
	125	34	1,1	120	186	6300	7500	**NN3016 KMW33**
85	130	34	1,1	125	200	6000	7000	**NN3017 MW33**
	130	34	1,1	125	200	6000	7000	**NN3017 KMW33**
90	140	37	1,5	141	224	5600	6700	**NN3018 MW33**
	140	37	1,5	141	224	5600	6700	**NN3018 KMW33**
95	145	37	1,5	146	236	5300	6300	**NN3019 MW33**
	145	37	1,5	146	236	5300	6300	**NN3019 KMW33**
100	140	40	1,1	129	255	5300	6300	**NNU4920 MW33**
	140	40	1,1	129	255	5300	6300	**NNU4920 KMW33**
	150	37	1,5	152	264	5300	6300	**NN3020 MW33**
	150	37	1,5	152	264	5300	6300	**NN3020 KMW33**
105	145	40	1,1	129	260	5300	6300	**NNU4921 MW33**
	145	40	1,1	129	260	5300	6300	**NNU4921 KMW33**
	160	41	2	192	310	4800	5600	**NN3021 MW33**
	160	41	2	192	310	4800	5600	**NN3021 KMW33**
110	150	40	1,1	132	270	5000	6000	**NNU4922 MW33**
	150	40	1,1	132	270	5000	6000	**NNU4922 KMW33**

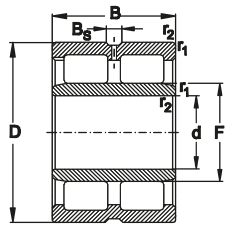
Double Row Cylindrical Roller Bearings



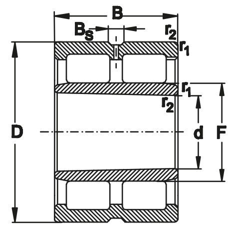
Abutment and fillet dimensions see on page 319

Bearing dimensions					Mass
d	E	F	B_s	s	
mm					[kg]
75	105	-	6,5	2,3	1,1
80	113	-	6,5	2,5	1,6
	113	-	6,5	2,5	1,6
85	118	-	6,5	2,5	1,6
	118	-	6,5	2,5	1,6
90	127	-	6,5	2,5	2,1
	127	-	6,5	2,5	2,1
95	132	-	6,5	2,5	2,3
	132	-	6,5	2,5	2,3
100	-	113	6,5	2	1,9
	-	113	6,5	2	1,9
	137	-	6,5	2,5	2,2
	137	-	6,5	2,5	2,2
105	-	118	6,5	1,5	2
	-	118	6,5	1,5	2
	146	-	6,5	2,6	3
	146	-	6,5	2,6	3
110	-	123	6,5	1,5	2,1
	-	123	6,5	1,5	2,1

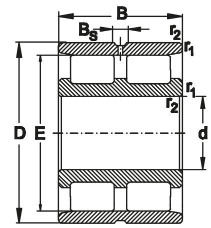
Double Row Cylindrical Roller Bearings



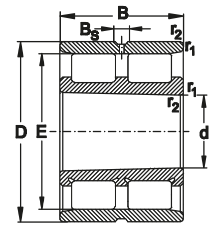
NNU49...W33



NNU49..K..W33



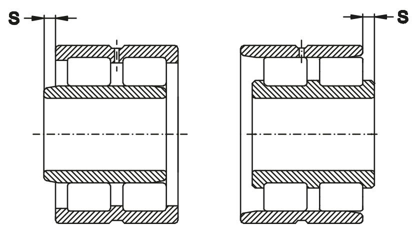
NN30...W33



NN30..K..W33

Dimensions				**Basical radial load**		**Speed limit**		**Designation**
				dyn.	stat.	grease	oil	
d	D	B	r_1, r_2 min.	C_r	C_{0r}			
mm				kN		min $^{-1}$		
110	170	45	2	226	365	4500	5300	**NN3022 MW33**
	170	45	2	226	365	4500	5300	**NN3022 KMW33**
120	165	45	1,1	176	340	4500	5300	**NNU4924 MW33**
	165	45	1,1	176	340	4500	5300	**NNU4924 KMW33**
	180	46	2	235	405	4300	5000	**NN3024 MW33**
	180	46	2	235	405	4300	5000	**NN3024 KMW33**
130	180	50	1,5	193	390	4000	4800	**NNU4926 MW33**
	180	50	1,5	193	390	4000	4800	**NNU4926 KMW33**
	200	52	2	294	510	3800	4500	**NN3026 MW33**
	200	52	2	294	510	3800	4500	**NN3026 KMW33**
140	190	50	1,5	190	400	3800	4500	**NNU4928 MW33**
	190	50	1,5	190	400	3800	4500	**NNU4928 KMW33**
	210	53	2	305	520	3600	4300	**NN3028 MW33**
	210	53	2	305	520	3600	4300	**NN3028 KMW33**
150	210	60	2	326	655	3600	4300	**NNU4930 MW33**
	210	60	2	326	655	3600	4300	**NNU4930 KMW33**
	225	56	2	339	600	3400	4000	**NN3030 MW33**
	225	56	2	339	600	3400	4000	**NN3030 KMW33**
160	220	60	2	335	680	3400	4000	**NNU4932 MW33**
	220	60	2	335	680	3400	4000	**NNU4932 KMW33**

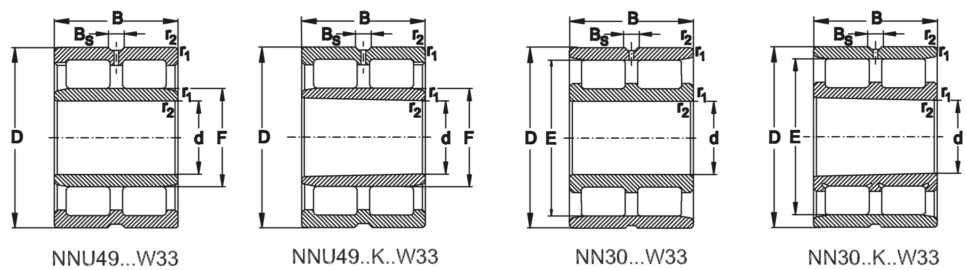
Double Row Cylindrical Roller Bearings



Abutment and fillet dimensions see on page 319

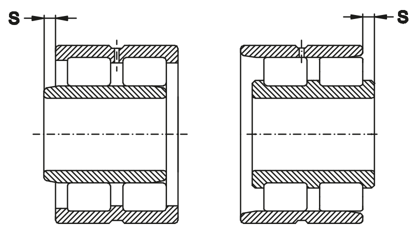
		Bearing dimensions			Mass
d	E	F	B_s	s	
mm					[kg]
110	155	-	6,5	2,8	3,8
	155	-	6,5	2,8	3,8
120	-	134,5	6,5	1,5	2,76
	-	134,5	6,5	1,5	2,76
	165	-	6,5	3,1	4,1
	165	-	6,5	3,1	4,1
130	-	146	6,5	2	3,79
	-	146	6,5	2	3,79
	182	-	9,5	3,35	6,1
	182	-	9,5	3,35	6,1
140	-	156	6,5	2	4,11
	-	156	6,5	2	4,11
	192	-	9,5	3,35	6,5
	192	-	9,5	3,35	6,5
150	-	168,5	6,5	2,3	6,2
	-	168,5	6,5	2,3	6,2
	206	-	9,5	3,7	7,9
	206	-	9,5	3,7	7,9
160	-	178,5	6,5	2,3	6,55
	-	178,5	6,5	2,3	6,55

Double Row Cylindrical Roller Bearings



Dimensions				Basical radial load		Speed limit		Designation
				dyn.	stat.	grease	oil	
d	D	B	r_1, r_2 min.	C_r	C_{0r}			
mm				kN		min $^{-1}$		
160	240	60	2,1	388	670	3200	3800	**NN3032 MW33**
	240	60	2,1	388	670	3200	3800	**NN3032 KMW33**
170	230	60	2	340	720	3200	3800	**NNU4934 MW33**
	230	60	2	340	720	3200	3800	**NNU4934 KMW33**
	260	67	2,1	458	810	3000	3600	**NN3034 MW33**
	260	67	2,1	458	810	3000	3600	**NN3034 KMW33**
180	250	69	2	405	877	3000	3600	**NNU4936 MW33**
	250	69	2	405	877	3000	3600	**NNU4936 KMW33**
	280	74	2,1	576	1080	2800	3400	**NN3036 MW33**
	280	74	2,1	576	1080	2800	3400	**NN3036 KMW33**
190	260	69	2	412	910	2800	3400	**NNU4938 MW33**
	260	69	2	412	910	2800	3400	**NNU4938 KMW33**
	290	75	2,1	614	1088	2600	3200	**NN3038 MW33**
	290	75	2,1	614	1088	2600	3200	**NN3038 KMW33**
200	280	80	2,1	490	1040	2600	3200	**NNU4940 MW33**
	280	80	2,1	490	1040	2600	3200	**NNU4940 KMW33**
	310	82	2,1	715	1271	2400	3000	**NN3040 MW33**
	310	82	2,1	715	1271	2400	3000	**NN3040 KMW33**
220	300	80	2,1	535	1321	2400	3000	**NNU4944 MW33**
	300	80	2,1	535	1321	2400	3000	**NNU4944 KMW33**

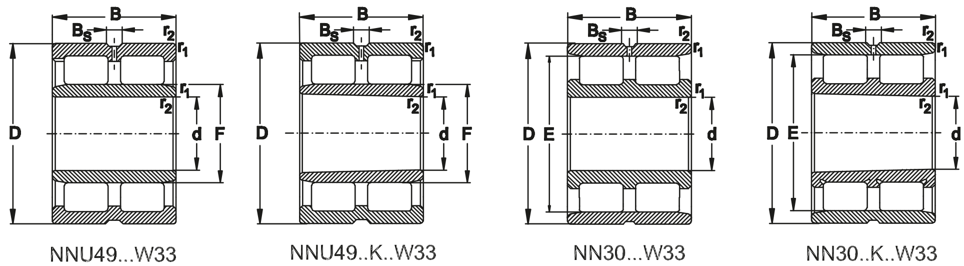
Double Row Cylindrical Roller Bearings



Abutment and fillet dimensions
see on page 319

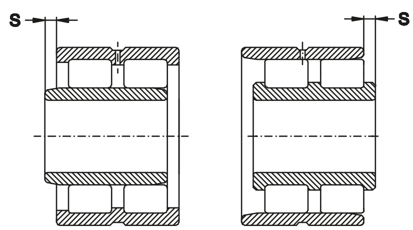
	Bearing dimensions				Mass
d	E	F	B_s	s	
mm					[kg]
160	219	-	9,5	4,2	9,6
	219	-	9,5	4,2	9,6
170	-	188,5	6,5	2,3	6,85
	-	188,5	6,5	2,3	6,85
	236	-	9,5	4,5	13
	236	-	9,5	4,5	13
180	-	202	9,5	2,6	10,2
	-	202	9,5	2,6	10,2
	255	-	12,2	4,8	17
	255	-	12,2	4,8	17
190	-	212	9,5	2,6	10,6
	-	212	9,5	2,6	10,6
	265	-	12,2	4,8	18
	265	-	12,2	4,8	18
200	-	225	12,2	3,4	14,9
	-	225	12,2	3,4	14,9
	282	-	12,2	5,3	23
	282	-	12,2	5,3	23
220	-	245	12,2	3,4	16,2
	-	245	12,2	3,4	16,2

Double Row Cylindrical Roller Bearings



Dimensions				Basical radial load		Speed limit		Designation
				dyn.	stat.	grease	oil	
d	D	B	r_1, r_2 min.	C_r	C_{0r}			
mm				kN		min $^{-1}$		
220	340	90	3	890	1591	2200	2800	**NN3044 MW33**
	340	90	3	890	1591	2200	2800	**NN3044 KMW33**
240	320	80	2,1	556	1300	2200	2800	**NNU4948 MW33**
	320	80	2,1	556	1300	2200	2800	**NNU4948 KMW33**
	360	92	3	850	1560	2000	2600	**NN3048 MW33**
	360	92	3	850	1560	2000	2600	**NN3048 KMW33**
260	360	100	2,1	750	1700	2000	2600	**NNU4952 MW33**
	360	100	2,1	750	1700	2000	2600	**NNU4952 KMW33**
	400	104	4	1060	2000	1900	2400	**NN3052 MW33**
	400	104	4	1060	2000	1900	2400	**NN3052 KMW33**
280	380	100	2,1	765	1800	1900	2400	**NNU4956 MW33**
	380	100	2,1	765	1800	1900	2400	**NNU4956 KMW33**
	420	106	4	1080	2080	1800	2200	**NN3056 MW33**
	420	106	4	1080	2080	1800	2200	**NN3056 KMW33**
300	420	118	3	1188	2943	1700	2000	**NNU4960 MW33**
	420	118	3	1188	2943	1700	2000	**NNU4960 KMW33**
	460	118	4	1270	2400	1600	1900	**NN3060 MW33**
	460	118	4	1270	2400	1600	1900	**NN3060 KMW33**
320	440	118	3	1060	2550	1600	1900	**NNU4964 KMW33**
	480	121	4	1320	2600	1600	1900	**NN3064 MW33**

Double Row Cylindrical Roller Bearings



Abutment and fillet dimensions
see on page 319

		Bearing dimensions			Mass
d	E	F	B_s	s	
mm					[kg]
220	310	-	15	4,5	33
	310	-	15	4,5	33
240	-	265	12	3,4	17,4
	-	265	12	3,4	17,4
	330	-	15	6	36
	330	-	15	6	36
260	-	292	15	4	30,2
	-	292	15	4	30,2
	364	-	15	6,5	48
	364	-	15	6,5	48
280	-	312	15	4	32,2
	-	312	15	4	32,2
	384	-	15	6,75	52
	384	-	15	6,75	52
300	-	339	17,7	5	50
	-	339	17,7	5	50
	418	-	17,7	7,45	72
	418	-	17,7	7,45	72
320	-	359	17,7	5	52,7
	438	-	17,7	7,95	77

Cylindrical Roller Bearings, double row

Non-standardized

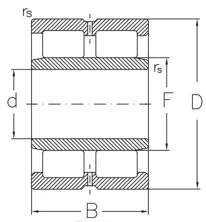


Fig. 1

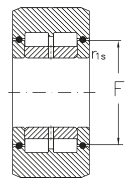


Fig. 2

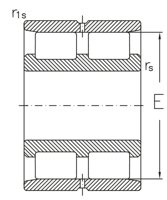


Fig. 3

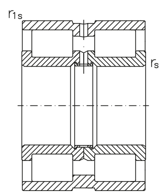


Fig. 4

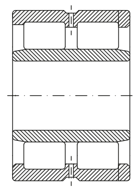


Fig. 5

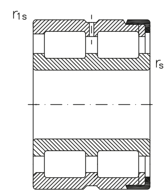


Fig. 6

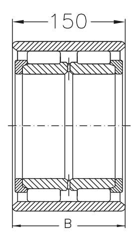


Fig. 7

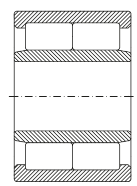


Fig. 8

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
mm							kN					
30	62	24	1	0,6	38	8	47,5	48,8	2400	3000	0,364	**2NNU5106 M**
40	68	37	0,8	0,6	61	4	79	116	3200	4000	0,525	**NNF5008 VS3**
	68	38	0,8	0,6	61	4	79	116	3200	4000	0,535	**NNF5008 VS3A1**
52	110	125		1	72	13	218	303	1900	2300	3,99	**480911**
90	125	35	1,1		115,5	6	148	301	1600	2000	1,343	**NNC4918 VW33**
120	190	80	1,1	1,1	137	1	417	701	2400	3000	8,30	**NNU5124 M**
130	180	50	1,5	1,5	165,4	5	252	526	900	1300	3,90	**NNP4926 VW33**
	180	50	1,5	1,5	165,4	5	252	526	900	1300	3,90	**NNP4926 VW1**
135	220	145	2	2	192	7	611	1360	2200	2600	21,2	**2NUNJ5127 MC3**
	220	150		1	194	7	650	1363	2700	3400	23,014	**LII-68853**
150	300	120		4	182	2	984	1645	800	1000	45,285	**NNU5130 VW44C3**
169,5	280	105	4	4	197	8	800	2000	1700	2000	27,3	**2NNU5134 MNAC5**
	280	105	3		197	1	955	1680	2200	2700	27,327	**NNU5134 MNA**
	280	105	3		197	1	955	1680	2200	2700	27,327	**NNU5134 MNAC5**
170	230	60	2	1,5	215	3	423	944	1800	2200	7,51	**NN5234 C3**
177,8	258,175	196,469	4	5	198,5	1	1258	2650	1700	2000	35,5	**NNU5136 MC190W5**
180	280	135	0,6	3,5	260,22	13	1350	2543	300		30,1	**NNF5036 V**
220	300	80	2,1	2,1	276,5	4	665	1592	450	800	17	**NNC4944 VW33**
260	320	60	2	2	304,7	6	500	1402	400	700	10,7	**NNC4852 VW33**

Cylindrical roller bearings, double row and three row

Non-standardized

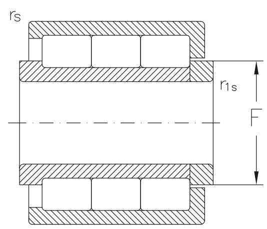


Fig. 9

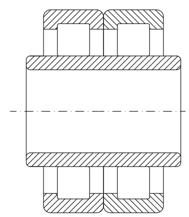


Fig. 10

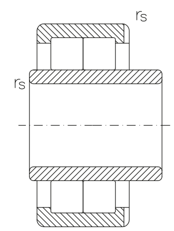


Fig. 11

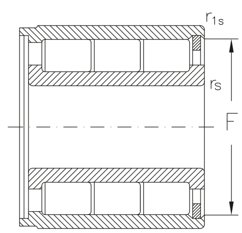


Fig. 12

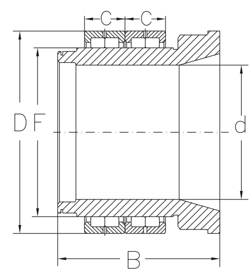


Fig. 13

Dimensions							Fig.	Basical radial load		Speed limit		Mass	Designation
d	D	B	C	r_s	r_{1s} min	E,F		dyn. C_r	stat. C_{0r}	Grease	Oil		
mm								kN					
65,019	110	140		1,5	1	86,9	13	208	474	5700	7200	4,121	**CR0113.13 V**
105	190	80	75	1,5	1,5	124	9	367	1020	850	1200	10,9	**3NNUPB5121 VC4**
120	215	130	98	2,1	2,1	143,5	10	584	905	1000	2600	16,6	**2NUB5224 MAP54S1**
130	182	81,5		2	2	170,4	12	495	1083	1200	1500	6,020	**3NN5226 VP5**
205	310	110	66	2,1	2,1	240	11	500	1610	560	800	26,2	**NNUB5141 VC3**
260	400	247	145	5	5	296	11	1675	3300	950	1300	83,5	**NNUB5252 MC3W8**

Cylindrical roller bearings, three row and four row

Non-standardized

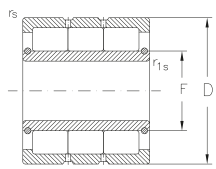


Fig. 1

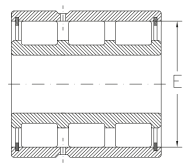


Fig. 2

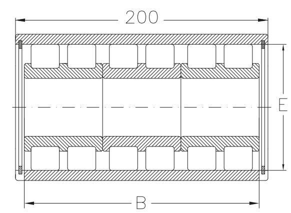


Fig. 3

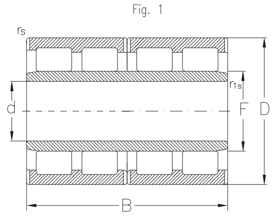


Fig. 4

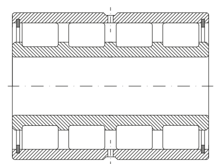


Fig. 5

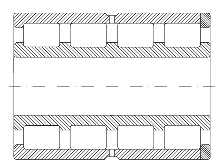


Fig. 6

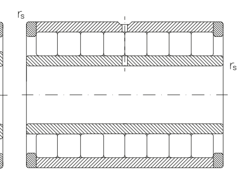


Fig. 7

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
d	D	B	r_s	r_{1s} min	E, F		dyn. C_r	stat. C_{0r}	Grease	Oil		
mm							kN					
80	125	80	1,1		94,5	7	353	833	1700	2100	4,094	**NNU6016 VC3**
90	125	68	1,5	1,5	115	5	856	596	1500	1900	2,66	**4NN5118 VW33**
140	215	100	3	3	160,1	1	751	1576	2200	2600	13,7	**3NNU5128 V**
160	230	168	1,5	1,5	179	4	300	539	2400	3000	23,570	**4NNU5232 PMC3**
	230	168	1,5	1,5	179	4	300	539	2400	3000	23,6	**4NNU5232 PMW8**
	240	130	2	2	180	4	739	1473	1900	2200	22,0	**4NNU5132 PFC3W8**
170	230	180	2	2	215	3	995	2832	750	900	22	**3NN5234 VC3**
180	260	168	2,1	2,1	202	4	1105	2563	1700	2000	29,5	**4NNU5136 PFC3W8**
	260	168	2,1	2,1	202	4	1105	2563	1700	2000	29,75	**4NNU5136 PMC3W8**
190	260	101	2	2	240,5	2	771	1924	750	900	16,2	**3NN5138 VW33C3**
	270	200	2,1	2,1	212	4	1330	3296	1600	2000	36,3	**4NNU5138 PMW8**
200	280	152	2,1	2,1	259,2	5	1190	3015	700	850	32,5	**4NN5240 VW33C3**
	280	152	2,1	2,1	259,2	6	1190	3015	700	850	32,5	**4NNP5240 VW33C3**
	290	192	2,1	2,1	226	4	1205	2761	1500	1800	44,0	**4NNU5140 PFC3W8**
230	330	206	2,1	2,1	260	4	1625	4014	1300	1600	63,0	**4NNU5146 PFC3W8**
	330	206	2,1	2,1	260	4	1625	4014	1300	1600	63,0	**4NNU5146 PMC4**
260	370	220	3	3	292	4	2018	5241	300	500	77,8	**4NNU5152 M**

Cylindrical roller bearings without inner ring

Non-standardized

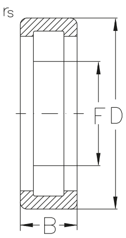


Fig. 1

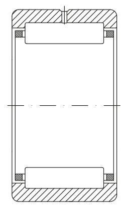


Fig. 2

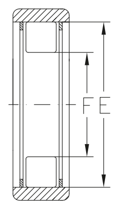


Fig. 3

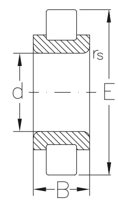


Fig. 4

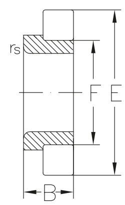


Fig. 5

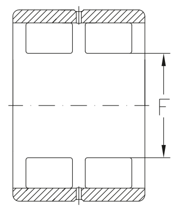


Fig. 6

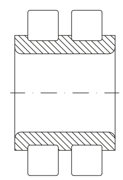
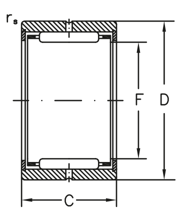


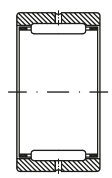
Fig. 7

Dimensions						Fig.	Basical radial load		Speed limit		Mass	Designation
							dyn.	stat.				
d	D	B	r_s	r_{1s} min	E, F		C_r	C_{0r}	Grease	Oil		
mm							kN					
19,05	31,8	25,4	0,3			2	28	34	11000	18000	0,079	**RNA193225 A**
	52	15	0,7		25	3	28,6	23,9	7000	14000	0,212	**RNU2R304 F2**
22		22,5	1	0,3	38,75	7	34	35	3000	6000	0,107	**RNN5204 V**
25	37	30	0,3			2	36	51	9500	16000	0,098	**RNA6904**
	41,275	31,8	0,6		28	1	48	92	2300	5600	0,165	**RNU5105 V**
28,58	41,28	31,75	0,3			2	44	67	8000	1300	0,134	**RNA294132**
30		26	0,6		60	4	77,4	84,1	5000	10000	0,361	**RN5506 M**
40		35,5	2,5	0,5	62	7	101	136	1700	3400	0,334	**RNN5408 V**
50		40	2,5	1	75,25	7	134	204	2900	3600	0,620	**RNN5110 V**
	100	21	1		66,92	1	70,4	82,6	3500	7000	0,554	**RNU5311**
	100	33,33	1,5		66,95	1	99,2	129	3500	7000	0,912	**RNU5411 M**
	100	33,33	1		66,95	3	99,2	129	3500	7000	0,818	**RNU2R5411**
60		28,53	2	0,3	127	5	177	182	2400	4800	1,86	**RNUPJ5112 M**
	102	61	1,5		60	1	234	356	2300	2900	2,189	**RNU5212 V**
	120	38,1	1		80,48	3	140	187	2600	5300	1,32	**RNU2R5513**
	120	38,1	1		80,48	1	140	187	2600	5300	1,53	**RNU5513 MA**
	140	44,45	2		95,36	1	136	259	2400	4500	2,25	**RNU5116 M**
	170	55,56	2		113,6	1	327	453	1900	3800	4,51	**RNU5119 M**
	215	76,2	2		145,23	1	569	878	1500	3000	9,66	**RNU5124 M**
	317,55	220	1		228,6	6	1655	4043	1000	2000	56,0	**R2NUN4246 MW7**

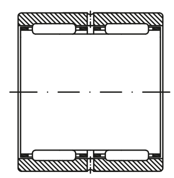
Needle roller bearings without inner ring



RNA
Fw<12mm



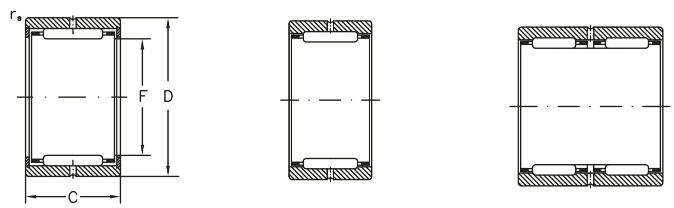
RNA



RNA69

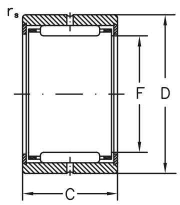
Dimensions				Basic radial load		Speed limit		Designation	Mass
F_w	D	C	r_s min.	dyn. C_r	stat. C_{0r}	grease	oil		
mm				kN		min^{-1}		-	Kg
8	15	12	0,3	3,7	3,95	19000	32000	**RNA081512**	0,008
	15	16	0,3	4,95	5,65	19000	32000	**RNA081516**	0,012
9	16	12	0,3	4,3	4,8	18000	30000	**RNA091612**	0,010
	16	16	0,3	5,6	6,9	18000	30000	**RNA091616**	0,013
10	17	12	0,3	4,5	5,35	17000	28000	**RNA101712**	0,011
	17	16	0,3	5,8	6,5	17000	28000	**RNA101716**	0,014
12	18	15	0,3	5,6	7,75	16000	26000	**RNA121815 TN**	0,012
	19	12	0,3	4,65	5,8	16000	26000	**RNA121912**	0,013
	19	16	0,3	6,15	8,1	16000	26000	**RNA121916**	0,017
	22	12	0,3	5,3	6,65	16000	26000	**RNA122212**	0,021

Needle roller bearings without inner ring

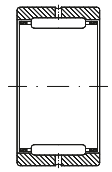


Dimensions				Basic radial load		Speed limit		Designation	Mass
F_w	D	C	r_s min.	dyn. C_r	stat. C_{0r}	grease	oil		
mm				kN		min^{-1}		-	Kg
14	22	13	0,3	8,25	9,1	15000	24000	**RNA4900**	0,017
	22	16	0,3	9,8	11,3	15000	24000	**RNA142216**	0,021
	22	20	0,3	11,8	15,4	15000	24000	**RNA142220**	0,028
16	24	13	0,3	9,1	10,6	15000	24000	**RNA4901**	0,018
	24	22	0,3	14,8	20,2	15000	24000	**RNA6901**	0,032
18	28	15	0,3	9,5	11,9	14000	22000	**RNA182815**	0,036
20	28	13	0,3	10,4	13,2	13000	20000	**RNA4902**	0,022
	28	23	0,3	16,8	24,5	13000	20000	**RNA6902**	0,040
22	30	13	0,3	10,7	13,9	11000	18000	**RNA4903**	0,023
	30	23	0,3	18,2	27,8	11000	18000	**RNA6903**	0,043
25	37	17	0,3	20	24,4	9500	16000	**RNA4904**	0,053
	37	30	0,3	33	47,6	9500	16000	**RNA6904**	0,101
30	40	20	0,3	21	33	8000	13000	**RNA304020**	0,065
	42	17	0,3	22,2	28,3	8000	13000	**RNA4905**	0,068
	42	30	0,3	40,1	60,1	8000	13000	**RNA6905**	0,155
35	45	20	0,3	24,2	38,5	7000	11000	**RNA354520**	0,074
	47	17	0,3	23,7	32,1	7000	11000	**RNA4906**	0,140
	47	30	0,3	43,1	49,3	7000	11000	**RNA6906**	0,131
38	48	20	0,3	24,3	41,4	7000	11000	**RNA384820**	0,080
42	55	20	0,6	29,8	45,5	6300	9500	**RNA4907**	0,109
	55	36	0,6	52,7	95	6300	9500	**RNA6907**	0,214
45	55	30	0,3	40,2	86,9	6000	9000	**RNA455530**	0,137
48	62	22	0,6	38,7	60,9	5600	8500	**RNA4908**	0,147
	62	40	0,6	63,8	116	5600	8500	**RNA6908**	0,266
50	62	22	1	35,5	60,3	5300	8000	**RNA506222**	0,153
	62	25	0,6	36,3	76	5300	8000	**RNA506225**	0,157
	62	35	0,6	49,4	114	5300	8000	**RNA506235**	0,209
52	68	22	0,6	46,4	73,9	5000	7500	**RNA4909**	0,197
	68	40	0,6	64,5	123	5000	7500	**RNA6909**	0,283
55	68	25	0,6	38,5	82,2	5000	7500	**RNA556825 TN**	0,181
58	72	22	0,6	45	73,5	4800	7000	**RNA4910**	0,167
	72	40	0,6	67,3	136	4800	7000	**RNA6910**	0,335
60	72	25	0,6	40,2	87	4500	6700	**RNA607225 TN**	0,160
	72	35	0,6	55,7	130	4500	6700	**RNA607235**	0,224

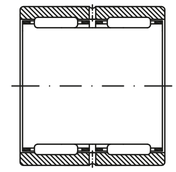
Needle roller bearings without inner ring



RNA
Fw<12mm



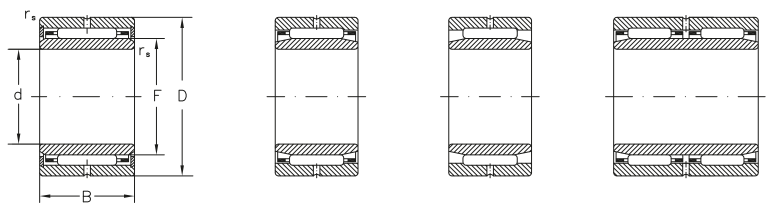
RNA



RNA69

Dimensions				Basic radial load		Speed limit		Designation	Mass
F_w	D	C	r_s min.	dyn. C_r	stat. C_{0r}	grease	oil		
mm				kN		min^{-1}		-	Kg
63	80	25	0,6	59,3	101	4500	6700	**RNA4911**	0,278
	80	45	0,6	83,8	173	4500	6700	**RNA6911**	0,477
68	85	25	1	62	109	4000	6000	**RNA4912**	0,296
	85	45	1	89,1	175	4000	6000	**RNA6912**	0,493
72	90	25	1	58,3	110	3800	5600	**RNA4913**	0,318
	90	45	1	91,3	193	3800	5600	**RNA6913**	0,545
80	95	25	1	53,4	115	3400	5000	**RNA809525**	0,312
	100	30	1	76,5	148	3400	5000	**RNA4914 TN**	0,485
	100	54	1	125	254	3400	5000	**RNA6914**	0,545
85	105	30	1	80,6	158	3200	4800	**RNA4915**	0,504
	105	54	1	127	270	3200	4800	**RNA6915**	0,965
90	110	30	1	84,9	169	3000	4500	**RNA4916**	0,520
	110	54	1	144	316	3000	4500	**RNA6916**	0,973
95	115	26	1	74,3	137	2800	4300	**RNA95/26**	0,523
100	120	35	1,1	98,8	222	2600	4000	**RNA4917**	0,672
	120	63	1,1	143	378	2600	4000	**RNA6917**	1,24
105	125	35	1,1	110	222	2400	3800	**RNA4918**	0,712
	125	63	1,1	144	400	2400	3800	**RNA6918**	1,36
110	130	30	1,1	99,6	210	2200	3600	**RNA110/30**	0,629
	130	35	1,1	105	244	2200	3600	**RNA4919**	0,729
	130	63	1,1	149	411	2200	3600	**RNA6919**	1,48
115	140	40	1,1	124	267	2200	3600	**RNA4920**	1,17
120	140	30	1	102	222	2000	3400	**RNA4822**	0,729
125	150	40	1,1	127	283	2000	3400	**RNA4922**	1,25
130	150	30	1	86,8	228	1800	3000	**RNA4824**	0,730
135	165	45	1,1	170	385	1800	3000	**RNA4924**	1,93
145	165	35	1,1	122	316	1700	2800	**RNA4826**	1,02
150	180	50	1,5	188	421	1700	2800	**RNA4926**	2,25
155	175	35	1,1	128	323	1600	2600	**RNA4828**	1,21
	180	32	1,5	116	258	1600	2600	**RNA155/32**	1,22
160	190	50	1,5	190	484	1600	2600	**RNA4928**	2,50
165	190	40	1,1	150	386	1500	2400	**RNA4830**	1,68

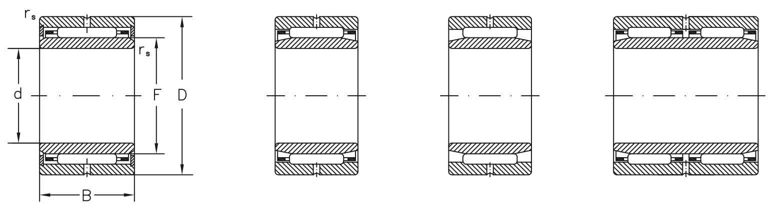
Needle roller bearings



NA d<9 mm | NA | NAV | NA69

Dimensions					Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	F_w	dyn. C_r	stat. C_{0r}	grease	oil		
mm					kN		min^{-1}		-	Kg
5	15	12	0,3	8	3,7	3,95	19000	32000	**NA051512**	0,013
	15	16	0,3	8	4,95	5,65	19000	32000	**NA051516**	0,016
6	16	12	0,3	9	4.3	4.8	18000	30000	**NA061612**	0,014
	16	16	0,3	9	5.6	6.9	18000	30000	**NA061616**	0,018
7	17	12	0,3	10	4.5	5.35	17000	28000	**NA071712**	0,015
	17	16	0,3	10	5.8	6.5	17000	28000	**NA071716**	0,020
9	19	12	0,3	12	4.65	5.8	16000	26000	**NA091912**	0,018
	19	16	0,3	12	6.15	8.1	16000	26000	**NA091916**	0,023
10	22	13	0,3	14	8.25	9.1	15000	24000	**NA4900**	0,024
	22	16	0,3	14	9.8	11.3	15000	24000	**NA102216**	0,031
	22	20	0,3	14	11.8	15.4	15000	24000	**NA102220**	0,038
12	24	13	0,3	16	9.1	10.6	15000	24000	**NA4901**	0,027
	24	22	0,3	16	14.8	20.2	15000	24000	**NA6901**	0,048
15	28	13	0,3	20	10.4	13.2	13000	20000	**NA4902**	0,035
	28	23	0,3	20	16.8	24.5	13000	20000	**NA6902**	0,065
17	30	13	0,3	22	10.7	13.9	11000	18000	**NA4903**	0,039
	30	23	0,3	22	18.2	27.8	11000	18000	**NA6903**	0,074
20	37	17	0,3	25	20.6	24.4	9500	16000	**NA4904**	0,077
	37	30	0,3	25	33	47.6	9500	16000	**NA6904**	0,143
25	42	17	0,3	30	22.2	28.3	8000	13000	**NA4905**	0,096
	42	17	0,3	30	30	42.8	3000	6000	**NA4905 V**	0,100
	42	30	0,3	30	40.1	60.1	8000	13000	**NA6905**	0,170
30	45	20	0,3	35	24.2	38.5	7000	11000	**NA304520**	0,117
	47	17	0,3	35	23.7	32.1	7000	11000	**NA4906**	0,107
	47	30	0,3	35	43.1	69.3	7000	11000	**NA6906**	0,202
35	55	20	0.6	42	29.8	45.5	6300	9500	**NA4907**	0,174
	55	36	0.6	42	52.7	95	6300	9500	**NA6907**	0,330
40	55	30	0.3	45	40.2	86.9	6000	9000	**NA405530**	0,221
	62	22	0.6	48	38.7	60.9	5600	8500	**NA4908**	0,239
	62	22	0.6	48	55	97.1	2000	4000	**NA4908 V**	0,266
	62	40	0.6	48	63.8	116	5600	8500	**NA6908**	0,450
	65	22	1	50	40.7	66.9	5600	8500	**NA406522**	0,290
45	62	25	0.6	50	36.3	76	5300	8000	**NA456225**	0,235
	62	35	0.6	50	49.4	114	5300	8000	**NA456235**	0,330
	62	22	0.6	52	46.4	73.9	5000	7500	**NA4909**	0,285
	68	40	0.6	52	64.5	123	5000	7500	**NA6909**	0,515
50	68	25	0.6	55	38.5	82.2	5000	7500	**NA506825 TN**	0,268
	72	22	0.6	58	45	73.5	4800	7000	**NA4910**	0,280
	72	40	0.6	58	67.3	136	4800	7000	**NA6910**	0,545

Needle roller bearings



NA d<9 mm | NA | NAV | NA69

Dimensions					Basic radial load		Speed limit		Designation	Mass
d	D	B	r_s min.	F_w	dyn. C_r	stat. C_{0r}	grease	oil		
mm					kN		min^{-1}		-	Kg
55	72	25	0,6	60	40,2	87	4500	6700	**NA557225 TN**	0,283
	72	35	0,6	60	55,7	130	4500	6700	**NA557235**	0,380
	80	25	1	63	59,3	101	4500	6700	**NA4911**	0,423
	80	25	1	63	80,3	151	1500	3000	**NA4911 V**	0,448
	80	45	1	63	83,3	173	4500	6700	**NA6911**	0,795
60	85	25	1	68	62	109	4000	6000	**NA4912**	0,454
	85	25	1	68	83,4	163	1400	2800	**NA4912 V**	0,480
	85	45	1	68	89,1	175	4000	6000	**NA6912**	0,836
65	90	25	1	72	58,3	110	3800	5600	**NA4913**	0,472
	90	45	1	72	91,3	193	3800	5600	**NA6913**	0,881
70	95	25	1	80	53,4	115	3400	5000	**NA709525**	0,538
	100	30	1	80	76,5	148	3400	5000	**NA4914 TN**	0,725
	100	30	1	80	103	231	1200	2700	**NA4914 V**	0,774
	100	54	1	80	125	254	3400	5000	**NA6914**	1,39
75	105	30	1	85	80,6	80,6	3200	4800	**NA4915**	0,796
	105	54	1	85	127	127	3200	4800	**NA6915**	1,51
80	110	30	1	90	84,9	84,9	3000	4500	**NA4916**	0,870
	110	54	1	90	144	144	3000	4500	**NA6916**	1,48
85	115	26	1	95	74,3	74,3	2800	4300	**NA85/26**	0,830
	120	35	1,1	100	98,8	98,8	2600	4000	**NA4917**	1,28
	120	63	1,1	100	143	143	2600	4000	**NA6917**	2,33
	130	45	1,1	104	121	121	900	1800	**NA4617 V**	2,57
90	125	35	1,1	105	110	110	2400	3800	**NA4918**	1,34
	125	63	1,1	105	144	144	2400	3800	**NA6918**	2,47
95	130	35	1,1	110	105	105	2200	3600	**NA4919**	1,39
	130	63	1,1	110	149	149	2200	3600	**NA6919**	2,63
100	130	30	1,1	110	99,6	99,6	2200	3600	**NA100/30**	1,00
	140	40	1,1	115	174	124	2200	3600	**NA4920**	1,93
110	140	30	1	120	102	102	2000	3400	**NA4822**	1,15
	150	40	1,1	125	127	127	2000	3400	**NA4922**	2,09
120	150	30	1	130	86,8	86,8	1800	3000	**NA4824**	1,23
	165	45	1,1	135	170	170	1800	3000	**NA4924**	2,95
130	165	35	1,1	145	122	122	1700	2800	**NA4826**	1,90
	180	50	1,5	150	188	188	1700	2800	**NA4926**	3,98
140	175	35	1,1	155	128	128	1600	2600	**NA4828**	1,99
	180	32	1,5	155	116	116	1600	2600	**NA140/32**	2,05
	190	50	1,5	160	190	190	1600	2600	**NA4928**	4,32
150	190	40	1,1	165	150	150	1500	2400	**NA4830**	2,85


URB
30315

Tapered roller bearings

Tapered roller bearings have the rolling elements under the form of frustra of cones. They roll on tapered surfaces which, if extended, converge towards a single point on the bearing axis.

The rollers are guided tangentially by the cage and axially by the big rib of the outer ring, on which they have point contact. As between roller and raceways there is linear contact, tapered roller bearings can take heavy radial loads. They can also take heavy axial or combined loads, depending on the contact angle caused by the tapered rolling elements. The contact angle is the angle of the outer raceway generatrix.

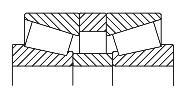
Tapered roller bearings can be manufactured in the versions: single, double and four row rollers.

Basic types and constructive versions:

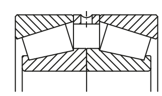
- single row

R

- paired

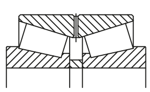


DB

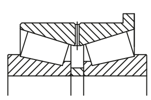


DF

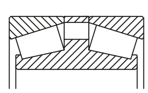
- double row



DB



DBR



DF

Suffixes

A	- increased basic load
A...	- axial clearance of bearing set
B	- enlarged contact angle
DB	- set of two bearings mounted in back-to-back arrangement (O)
DF	- set of two bearings mounted in face-to-face arrangement (X)
DF	- bearings with double row of rollers in face-to-face arrangement (X)
F	- machined cage of hardened steel or special cast iron
F2	- constructive modifications
J	- pressed cage of not hardened steel sheet
K	- tapered bore 1:12
M	- machined brass cage
P6X	- tolerance class with smaller values than normal
P5	- tolerance class with smaller values than P6X
P4	- tolerance class with smaller values than P5
P2	- tolerance class with smaller values than P4
R	- rib on the outer ring
S0	- operating temperature up to $+150^0$C
S1	- operating temperature up to $+200^0$C
T...	- bearing set width
TN	- polyamide cage
X	- modified main dimensions according to ISO

Single row tapered roller bearings

Single row tapered roller bearings are of separable design, i.e. the outer ring and the inner ring with rollers and cage assembly can be be separately mounted. These two assemblies are interchangeable.

Tapered roller bearings can be manufactured both in standardized constructive versions with dimensions series 320, 302, 322, 303, 323, 313 and with non-standardized dimensions, mm or inch.

Tapered roller bearings can carry only single direction axial loads. Under pure radial loads, an axial force occurs which is supossed to distance the bearing ring in axial direction. Therefore, tapered roller bearings are generally pair mounted on both ends of the shaft, in "X" or "O" arrangements, so that the shaft will be axially located in both directions (table 4). Thus, the optimum clearance in these two bearings can be adjusted.

Single row tapered roller bearings can also be manufactured with rib on the outer ring. This design is to be used when the housing cannot be manufactured with shoulder, but only with a passed through bore. In this case, axial location can be provided by the bearing ring.

Paired single row tapered roller bearing

If tapered roller bearings are pair mounted in "X" or "O" arrangements, the load carryng capacity inreases and loads can be taken in both directions in the same bearing.

These bearing sets have guaranteed clearance after mounting since the distance rings are mounted between the bearing rings.

For certain application, paired bearings can be delivered with small clearance or lightly preloaded.

Double row tapered roller bearings

Double row tapered roller bearings are used where load carrying capacity should be greater, loads should be taken in both directions and axial space is smaller than in case of a set of two single row tapered roller bearings.

Double row tapered roller bearings can have the rollers in face-to-face arrangement, i.e. double outer ring and two inner rings.

The first design provides greater stiffness, can take tilting moments and shaft expansions can be compensated.

The bearings of the second design can be manufactured with tapered bore so that they can be frequently mounted / dismounted.

Double row tapered roller bearings can have or not distance rings with lubrication holes, mounted between the simple rings.

In case of bearings with distance rings, the bearing clearance or preload are pre-adjusted; in case of those without distance rings, bearing clearance and preload can and should be adjusted while mounting.

Double row tapered roller bearings with rollers in back-to-back arrangement can also be manufactured in the following two versions:

- with rib on the outer ring; the housing has no shoulder and the bearing is axially located by the rib;

with two seals; this design is used in motor vehicles construction. The bearings are delivered filled with grease and relubrication is not needed.

Dimensions

Tapered roller bearings are manufactured with the following dimension:

- metric dimension (mm), according to ISO 355;
- inch dimensions

Misalignment

As between rollers and raceway there is a linear contact, tapeed roller bearings have low capacity to compensate for errors, of alignment between shaft and housing.

Permissible values of misalignment between shaft and housing are given in table 1, depending on bearing size and load magnitude.

Permisible misalignment

Table 1

Bearings series	Load magnitude	Permisible misalignment
329, 320, 302, 322, 303, 313	$F_r/C_{0r} < 0,1$ $F_r/C_{0r} > 0,1$	2' 4'
323, 34	$F_r/C_{0r} < 0,1$ $F_r/C_{0r} > 0,1$	1'30'' 3'
35, 36 seturi DB, DF	$F_r/C_{0r} < 0,1$ $F_r/C_{0r} > 0,1$	1' 2'

Tolerances

Tapered roller bearings are generally manufactured to the normal tolerance class ISO and AFBMA, respectively (for bearings with inch dimensions).

For certain applications (e.g. bearings for machine-tools), they can be also manufactured to tolerance classes P5 and P6X or 3 AFBMA.

At request, they can be manufactured to tolerance class P4.

Single row tapered roller bearings have thr outer rings interchangeable with the inner ring - rollers - cage assembly (if they have the same mark) and also with bearings produced by other companies, according to ISO and AFBMA respectively.

The parts of the two and four row tapered roller bearings are non-interchangeable.

The tolerances for bearings overall dimensions are given in tables on the page 34 for tapered roller bearings, both with metric and inch dimensions. Tolerances for mounting chamfer are given in tables on page 43.

Radial and axial clearance

In case of tapered roller bearings, clearance should be in radial direction, but it is measured and adjusted in axial direction. As tapered roller bearings are dismountable, their clearance is not guaranteed by design and it is adjusted while mounting. Thus, optimum clearance can be obtained for that application.

In case of double and four row tapered roller bearings with distance rings between bearing rings, the clearance is guaranteed and its values are given in table 2. The bearing parts are numbered for each bearing so that the prescribed clearance on each row should be observed while mounting.

In case of bearings without distance rings, clearance is adjusted as for single row tapered roller bearings: for DB design - by the inner rings and for DF design by the outer rings. The above specifications are also available for bearings matched in sets.

The values of the axial clearance can be calculated using the equation:

$$\text{axial clearance} = \frac{\text{radial clearance}}{2 \text{ tg } \alpha}$$

where α is the contact angle.

In case of certain applications where clearance between shaft and housing should be avoided, tapered roller bearings can also be pre-tightened. This can be adjusted while mounting or is pre-adjusted by distance rings, in case of two or four row tapered roller bearings.

Contact angle of tapered roller beaings is the angle of the outer ring raceway generatrix. In case of standardized single row tapered roller bearings, this angle can be found in the standard of dimension ISO 355.

Bearing series 329, 302, 322, 303 and 323 have a contact angle 10° and 17° and those of series 313 have a contact angle of 28° 48' 39'', so that they can take heavier axial loads.

Non-standardized single row tapered roller bearings and also all double and four-row tapered roller bearings have the contact angle between 90° and 30°.

Radial clearance of double tapered roller bearings

Table 2

Bore diameter d		**Radial clearance symbol**											
		C1		**C2**		**Normal**		**C3**		**C4**		**C5**	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm											
50	**65**	0	15	15	30	30	50	50	70	70	90	90	120
65	**80**	0	20	20	40	40	60	60	80	80	110	110	150
80	**100**	0	20	20	45	45	70	70	100	100	130	130	170
100	**120**	0	25	25	50	50	80	80	110	110	150	150	200
120	**140**	0	30	30	60	60	90	90	120	120	170	170	230
140	**160**	0	30	30	65	65	100	100	140	140	190	190	260
160	**180**	0	35	35	70	70	110	110	150	150	210	210	280
180	**200**	0	40	40	80	80	120	120	170	170	230	230	310
200	**225**	0	40	40	90	90	140	140	190	190	260	260	340
225	**250**	0	50	50	100	100	150	150	210	210	290	390	380
250	**280**	0	50	50	110	110	170	170	230	230	320	320	420
280	**315**	0	60	60	120	120	180	180	250	250	350	350	460
315	**355**	0	70	70	140	140	210	210	280	280	390	390	510
355	**400**	0	70	70	150	150	230	230	310	310	440	440	580
400	**450**	0	80	80	170	170	260	260	350	350	490	490	650
450	**500**	0	90	90	190	190	290	290	390	390	540	540	720
500	**560**	0	100	100	210	210	320	320	430	430	590	590	790
560	**630**	0	110	110	230	230	350	350	480	480	660	660	880
630	**710**	0	130	130	260	260	400	400	540	540	740	740	910
710	**800**	0	140	140	290	290	450	450	610	610	830	830	1100
800	**900**	0	160	160	330	330	500	500	670	670	920	920	1240

Cages

Small and medium-sized tapered roller bearings are generally fitted with pressed sheet cages. Large sized bearings are generally fitted with machined steel or brass caces, with welded pins. In some cases, median or large sized bearings can also be fitted with machined steel or brass cages. In all cases, the cage is guided on rollers.

For small and medium sized bearings, glass fibre reinforced polyamide 6.6 cages can be successfully used if the operating temperature doesn't exceed +120°C. They have low mass, are noiseless in operation an have low coefficient of friction.

Design and some technical data are given in table 3.

Equivalent dynamic radial load

Equivalent dynamic radial load can be calculated using the following equations:

- for single row tapered roller bearings:

$P_r = F_r$, kN, when $F_a/F_r \leq e$
$P_r = 0{,}4\, F_r + YF_a$, kN, when $F_a/F_r > e$

For single row tapered roller bearings, the F_a values can be calculated using the equations in table 4. These equations are available when bearings are mounted so that axial clearance is in fact zero without preloading. F_{rA} and F_{rB} should always be considered as being positive, even if they act in the opposite direction to that in the figure.

In case of paired bearings and of double or four row tapered roller bearings, F_a and F_r are the loads acting upon the paired bearings or single bearings.

The values of e, Y, Y_1 and Y_2 are given in bearing tables.

Equivalent static radial load

Equivalent static radial load can be calculated using the equations:

- for single row tapered roller bearings:

$P_{0r} = F_r$, kN, when $F_a/F_r \leq 1/2\, Y_0$
$P_{0r} = 0{,}5\, F_r + Y_0\, Fa$, kN, when $F_a/F_r > 1/2\, Y_0$

- for paired double or four row tapered roller bearings:

$P_{0r} = F_r + Y_0\, Fa$, kN

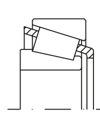
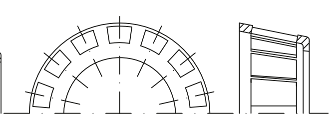
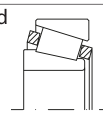
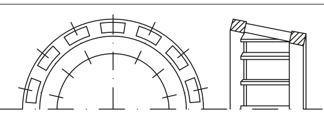
F_a is calculated as in case of equivalent dynamic radial load. The values of Y_0 are given in bearing tables.

Abutment dimensions

The mounting dimensions of tapered roller bearings are given in the bearings tables, for single row tapered roller bearings. These dimensions are also available for bearings with ribs and for standardized paired bearings. These dimensions are also available for bearings with ribs and for standardized paired bearings. For the other types of tapered roller bearings, the mounting dimensions should be adapted depending on the cross section size and mounting chamfer.

Cage design and some technical data

Table 3

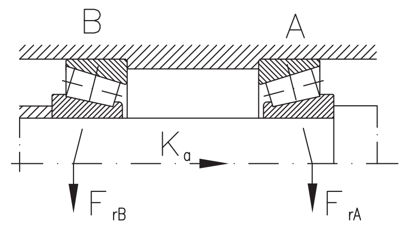
Cage	**Design** bearing	Cage	**Application**	**Max. value D_m n** oil	grease
Pressed sheet cage			- General application - Small and medium sized bearings d ≤ 250 mm	350×10^3	245×10^3
Machined brass cage M			- General application - Median and large sized bearings d > 150 mm	450×10^3	315×10^3

Calculating relations for axial loadings F_a

Table 4

	Loading versions	Axial load

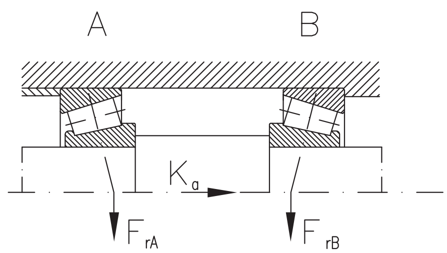
Back to back
DB



1a) $\frac{F_{rA}}{Y_A} \ge \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = \frac{0,5F_{rA}}{Y_A}$

$K_a \ge 0 \quad F_{aB} = F_{aA} + K_a$

Face to face
DF



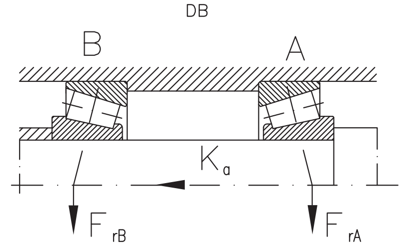
1b) $\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = \frac{0,5F_{rA}}{Y_A}$

$K_a \ge 0,5\left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right) \quad F_{aB} = F_{aA} + K_a$

1c) $\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = F_{aB} - K_A$

$K_a < 0,5\left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right) \quad F_{aB} = \frac{0,5\,F_{rB}}{Y_B}$

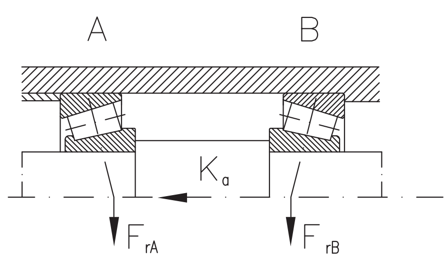
Back to back
DB



2a) $\frac{F_{rA}}{Y_A} \le \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = F_{aB} + K_A$

$K_a \ge 0 \quad F_{aB} = \frac{0,5\,F_{rB}}{Y_B}$

Face to face
DF



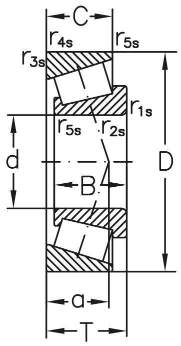
2b) $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = F_{aB} + K_A$

$K_a \ge 0,5\left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right) \quad F_{aB} = \frac{0,5\,F_{rB}}{Y_B}$

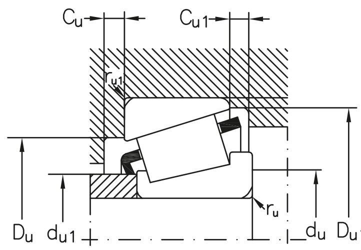
2c) $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $\quad F_{aA} = \frac{0,5F_{rA}}{Y_A}$

$K_a < 0,5\left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right) \quad F_{aB} = F_{aA} - K_a$

Tapered roller bearings, single row

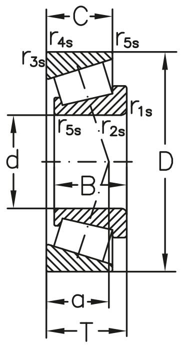


Dimensions									Designation	ISO series	Basic radial load. Factors				
d	D	B	C	T	$r_{1s,2s}$ min.	$r_{3s,4s}$ min.	r_5 min.	a			dyn. Cr	e	Y	stat C_{0r}	Y_0
mm									-		kN	-		kN	-
15	42	13	11	14,25	1	1	0,3	9	**30302 A**	2FB	21,5	0,28	2,1	19,8	1,1
17	40	12	11	13,25	1	1	0,3	10	**30203 A**	2DB	18,3	0,35	1,7	190,9	
	47	14	12	15,25	1	1	0,3	10	**30303 A**	2FB	26	0,28	2,1	24,5	1,1
	47	19	16	20,25	1	1	0,3	12	**32303 A**	2FD	34	0,28	2,1	35,5	1,1
20	42	15	12	15	0,6	0,6	0,3	10	**32004 XA**	3CC	26	0,37	1,6	28,5	0,9
	47	14	12	15,25	1	1	0,3	11	**30204 A**	2DB	25,8	0,35	1,7	26,4	0,9
	52	15	13	16,25	1,5	1,5	0,6	11	**30304 A**	2FB	32	0,3	2	321,1	
	52	21	18	22,25	1,5	1,5	0,6	14	**32304 A**	2FD	42,5	0,3	2	471,1	
25	47	15	11,5	15	0,6	0,6	0,3	11	**32005 XA**	4CC	26	0,43	1,4	33,5	0,8
	52	15	13	16,25	1	1	0,3	12	**30205 A**	3CC	30,1	0,37	1,6	32,9	0,9
	52	18	15	19,25	1	1	0,3	16	**32205 A**	2CD	31	0,33	1,8	371	
	62	17	15	18,25	1,5	1,5	0,6	13	**30305 A**	2FB	43	0,3	2	431,1	
	62	17	13	18,25	1,5	1,5	0,6	20	**31305 A**	7FB	39	0,83	0,7	410,4	
	62	24	20	25,25	1,5	1,5	0,6	15	**32305 A**	2FD	58,3	0,3	2	60,3	1,1
30	55	17	13	17	1	1	0,3	13	**32006 XA**	4CC	34	0,43	1,4	45,5	0,8
	62	16	14	17,25	1	1	0,3	14	**30206 A**	3DB	40,5	0,37	1,6	45,1	0,9
	62	20	17	21,25	1	1	0,3	15	**32206 A**	3DC	49	0,37	1,6	610,9	
	72	19	16	20,75	1,5	1,5	0,6	15	**30306 A**	2FB	52,9	0,37	1,9	51,8	1,1
	72	19	14	20,75	1,5	1,5	0,6	22	**31306 A**	7FB	46,5	0,31	0,7	49,5	0,4
	72	27	23	28,75	1,5	1,5	0,6	18	**32306 A**	2FD	75,8	0,83	1,9	82,7	1,1
35	62	18	14	18	1	1	0,3	15	**32007 XA**	4CC	35,9	0,31	1,3	52,4	0,7
	72	17	15	18,25	1,5	1,5	0,6	15	**30207 A**	3DB	50,5	0,46	1,6	54,7	0,9
	72	23	19	24,25	1,5	1,5	0,6	17	**32207 A**	3DC	66,2	0,37	1,6	77,5	0,9
	80	21	18	22,75	2	1,5	0,6	16	**30307 A**	2FB	71,2	0,37	1,9	72,5	1,1
	80	21	15	22,75	2	1,5	0,6	25	**31307 A**	7FB	58,1	0,31	0,7	640,4	
	80	31	25	32,75	2	1,5	0,6	20	**32307 A**	2FE	95,3	0,83	1,9	106	1,1
40	68	19	14,5	19	1	1	0,3	15	**32008 XA**	3CD	48,8	0,31	1,6	65,6	0,9
	80	18	16	19,75	1,5	1,5	0,6	16	**30208 A**	3DB	57,9	0,37	1,6	62,4	0,9
	80	23	19	24,75	1,5	1,5	0,6	19	**32208 A**	3DC	66,2	0,37	1,6	79,5	0,9
	90	23	20	25,25	2	1,5	0,6	19	**30308 A**	2FB	83,9	0,37	1,7	91,3	0,9
	90	23	17	25,25	2	1,5	0,6	28	**31308 A**	7FB	74,6	0,83	0,7	60,8	0,4
	90	33	27	35,25	2	1,5	0,6	23	**32308 A**	2FD	105	0,35	1,7	122	0,9
45	75	20	15,5	20	1	1	0,3	16	**32009 XA**	3CC	57	0,4	1,5	82,2	0,8
	85	19	16	20,75	1,5	1,5	0,6	18	**30209 A**	3DB	60,1	0,4	1,5	67,1	0,8
	85	23	19	24,75	1,5	1,5	0,6	20	**32209 A**	3DC	76,5	0,4	1,5	91,6	0,8
	100	25	22	27,25	2	1,5	0,6	21	**30309 A**	2FB	106	0,35	1,7	118	0,9
	100	25	18	27,25	2	1,5	0,6	31	**31309 A**	7FB	88,9	0,83	0,7	97,1	0,4
	100	36	30	38,25	2	1,5	0,6	25	**32309 A**	2FD	133	0,35	1,7	159	0,9
50	80	20	15,5	20	1	1	0,3	18	**32010 XA**	3CC	58,5	0,43	1,4	88,5	0,8

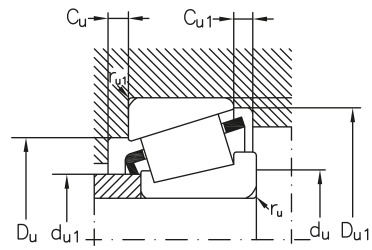


Speed limit		Mass	Mounting dimensions								
grease	oil		d_{u1} max.	d_u min.	D_u min.	max.	D_{u1} min.	C_u min.	C_{u1} min.	r_u max.	r_{u1} max.
min^{-1}		Kg									
9000	13000	0,090	22	21	36	36	38	2	3	1	1
9000	13000	0,074	23	23	34	34	37	2	2	1	1
8500	12000	0,130	25	23	40	41	42	2	3	1	1
8000	11000	0,170	24	23	39	41	43	3	4	1	1
8500	12000	0,097	25	25	36	37	39	3	3	0,6	0,6
8000	11000	0,120	27	26	40	41	43	2	3	1	1
8000	11000	0,170	28	27	44	45	47	2	3	1,5	1,5
7500	10000	0,221	27	27	43	45	47	3	4	1,5	1,5
8000	11000	0,113	30	30	40	42	44	3	3,5	0,6	0,6
7500	10000	0,150	31	31	44	46	48	2	3	1	1
7500	10000	0,182	31	31	44	46	48	3	4	1	1
6700	9000	0,250	34	32	54	55	57	2	3	1,5	1,5
5600	7500	0,255	34	32	47	55	59	3	5	1,5	1,5
6000	8000	0,360	33	32	53	55	57	3	5	1,5	1,5
6700	9000	0,017	35	36	48	49	52	3	4	1	1
6300	8500	0,220	35	36	53	56	57	2	3	1	1
6300	8500	0,280	37	36	52	56	59	3	4	1	1
5600	7500	0,380	37	37	62	65	66	3	4,5	1,5	1,5
5000	6700	0,390	40	37	55	65	68	3	6,5	1,5	1,5
5300	7000	0,550	40	37	59	65	66	4	5,5	1,5	1,5
6000	8000	0,220	39	41	54	56	59	4	4	1	1
5300	7000	0,320	40	42	62	65	67	3	3	1,5	1,5
5300	7000	0,420	44	42	61	65	67	3	5,5	1,5	1,5
5000	6700	0,520	43	44	70	71	74	3	4,5	2	1,5
4500	6000	0,520	45	44	62	71	76	4	7,5	2	1,5
4800	6300	0,730	44	44	66	71	74	4	7,5	2	1,5
5300	7000	0,270	44	46	60	62	65	4	4,5	1	1
4800	6300	0,420	46	47	69	73	74	3	3,5	1,5	1,5
4800	6300	0,510	49	47	68	73	75	3	5,5	1,5	1,5
4500	6000	0,700	48	49	77	81	82	3	5	2	1,5
4000	5300	0,685	52	49	71	81	86	4	8	2	1,5
4000	5300	0,993	51	49	73	81	82	4	8	2	1,5
4800	6300	0,330	50	51	67	69	72	4	4,5	1	1
4500	6000	0,470	51	52	74	78	80	3	4,5	1,5	1,5
4500	6000	0,560	54	52	73	78	80	3	5,5	1,5	1,5
4000	5300	0,920	53	54	86	91	92	3	5	2	1,5
3400	4500	0,915	59	54	79	91	95	4	9	2	1,5
3600	4800	1,25	56	54	82	91	93	4	8	2	1,5
4500	6000	0,360	56	56	72	74	77	4	4,5	1	1

Tapered roller bearings, single row

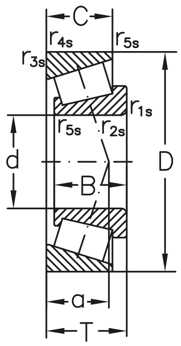


Dimensions									Designation	ISO series	Basic radial load. Factors				
d	D	B	C	T	$r_{1s,2s}$ min.	$r_{3s,4s}$ min.	r_5 min.	a			dyn. Cr	e	Y	stat C_{0r}	Y_0
mm									-		kN	-		kN	-
50	90	20	17	21,75	1,5	1,5	0,6	19	**30210 A**	3DB	69,7	0,43	1,4	81,3	0,8
	90	23	19	24,75	1,5	1,5	0,6	21	**32210 A**	3DC	79,1	0,43	1,4	95,8	0,8
	110	27	23	29,25	2,5	2	0,6	23	**30310 A**	2FB	120	0,35	1,7	133	0,9
	110	27	19	29,25	2,5	2	0,6	34	**31310 A**	7FB	102	0,83	0,7	112	0,4
	110	40	33	42,25	2,5	2	0,6	27	**32310 A**	2FD	160	0,35	1,7	194	0,9
55	90	23	17,5	23	1,5	1,5	0,6	20	**32011 XA**	3CC	77	0,4	1,5	117	0,8
	100	21	18	22,75	2	1,5	0,6	20	**30211 A**	3DB	83	0,4	1,5	95,2	0,8
	100	25	21	26,75	2	1,5	0,6	22	**32211 A**	3DC	96,2	0,4	1,5	115	0,8
	120	29	25	31,5	2,5	2	0,6	24	**30311 A**	2FB	146	0,35	1,7	166	0,9
	120	29	21	31,5	2,5	2	0,6	37	**31311 A**	7FB	118	0,83	0,7	133	0,4
	120	43	35	45,5	2,5	2	0,6	29	**32311 A**	2FD	191	0,35	1,7	235	0,9
60	95	23	17,5	23	1,5	1,5	0,6	21	**32012 XA**	4CC	78,5	0,43	1,4	119	0,8
	110	22	19	23,75	2	1,5	0,6	22	**30212 A**	3EB	91,6	0,4	1,5	105	0,8
	110	28	24	29,75	2	1,5	0,6	24	**32212 A**	3EC	122	0,4	1,5	152	0,8
	130	31	26	33,5	3	2,5	1	26	**30312 A**	2FB	164	0,35	1,7	187	0,9
	130	31	22	33,5	3	2,5	1	39	**31312 A**	7FB	140	0,83	0,7	158	0,4
	130	46	37	48,5	3	2,5	1	31	**32312 A**	2FD	229	0,35	1,7	288	0,9
65	100	23	17,5	23	1,5	1,5	0,6	22	**32013 XA**	4CC	80,6	0,46	1,3	123	0,7
	120	23	20	24,75	2	1,5	0,6	23	**30213 A**	3EB	111	0,4	1,5	129	0,8
	120	31	27	32,75	2	1,5	0,6	27	**32213 A**	3EC	149	0,4	1,5	189	0,8
	140	33	28	36	3	2,5	1	28	**30313 A**	2GB	191	0,35	1,7	220	0,9
	140	33	23	36	3	2,5	1	42	**31313 A**	7GB	164	0,83	0,7	189	0,4
	140	48	39	51	3	2,5	1	33	**32313 A**	2GO	256	0,35	1,7	322	0,9
70	110	25	19	25	1,5	1,5	0,6	23	**32014 XA**	4CC	95,6	0,43	1,4	143	0,8
	125	24	21	26,25	2	1,5	0,6	25	**30214 A**	3EB	119	0,43	1,4	143	0,8
	125	31	27	33,25	2	1,5	0,6	28	**32214 A**	3EC	157	0,43	1,4	204	0,8
	150	35	30	38	3	2,5	1	29	**30314 A**	2GB	224	0,35	1,7	264	0,9
	150	35	25	38	3	2,5	1	45	**31314 A**	7GB	185	0,83	0,7	215	0,4
	150	51	42	54	3	2,5	1	36	**32314 A**	2GD	297	0,35	1,7	381	0,9
75	115	25	19	25	1,5	1,5	0,6	25	**32015 XA**	4CC	97,3	0,46	1,3	149	0,7
	130	25	22	27,25	2	1,5	0,6	27	**30215 A**	4DB	134	0,43	1,4	166	0,8
	130	31	27	33,25	2	1,5	0,6	29	**32215 A**	4DC	157	0,43	1,4	205	0,8
	160	37	31	40	3	2,5	1	31	**30315 A**	2GB	246	0,35	1,7	289	0,9
	160	37	26	40	3	2,5	1	48	**31315 A**	7GB	213	0,83	0,7	251	0,4
	160	55	45	58	3	2,5	1	38	**32315 A**	2GD	350	0,35	1,7	460	0,9
80	125	29	22	29	1,5	1,5	0,6	27	**32016 XA**	3CC	130	0,43	1,4	198	0,8
	140	26	22	28,25	2,5	2	0,6	28	**30216 A**	3EB	145	0,43	1,4	177	0,8
	140	33	28	35,25	2,5	2	0,6	30	**32216 A**	3EC	180	0,43	1,4	232	0,8
	170	39	33	42,5	3	2,5	1	33	**30316 A**	2GB	277	0,35	1,7	329	0,9
	170	39	27	42,5	3	2,5	1	52	**31316 A**	7GB	222	0,83	0,7	275	0,4

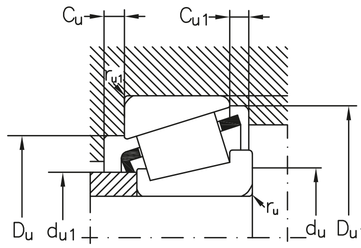


Speed limit		Mass	Mounting dimensions								
grease	oil		d_{u1} max.	d_u min.	D_u min.	max.	D_{u1} min.	C_u min.	C_{u1} min.	r_u max.	r_{u1} max.
min^{-1}		Kg									
4300	5600	0,530	58	57	79	83	85	3	4,5	1,5	1,5
4300	5600	0,600	58	57	78	83	85	3	5,5	1,5	1,5
3600	4800	1,19	65	60	95	100	102	4	6	2,5	2
3200	4300	1,16	62	60	87	100	104	4	10	2,5	2
3200	4300	1,83	62	60	90	100	102	5	9	2,5	2
4000	5300	0,540	63	62	81	83	86	4	5,5	1,5	1,5
3800	5000	0,690	64	64	88	91	94	4	4,5	1,5	1,5
3800	5000	0,820	63	64	87	91	95	4	5,5	1,5	1,5
3200	4300	1,53	71	65	104	110	111	4	6,5	2	2
2800	3800	1,49	68	65	94	110	113	4	10,5	2	2
3000	4000	2,21	68	65	99	110	111	5	10,5	2	2
3800	5000	0,580	67	67	85	88	91	4	5,5	1,5	1,5
3400	4500	0,860	70	69	96	101	103	4	4,5	2	1,5
3400	4500	1,10	69	69	95	101	104	4	5,5	2	1,5
3000	4000	1,90	77	72	112	118	120	5	7,5	3	2,5
2600	3600	1,83	73	72	103	118	123	5	11,5	3	2,5
2600	3600	2,80	74	72	107	118	120	6	11,5	3	2,5
3400	4500	0,620	72	72	90	93	97	4	5,5	1,5	1,5
3000	4000	1,10	77	74	106	111	113	4	4,5	2	1,5
3000	4000	1,48	76	74	104	111	115	4	5,5	2	1,5
2600	3600	2,30	83	77	122	128	130	5	8	3	2,5
2200	3200	2,25	79	77	111	128	132	5	13	3	2,5
2400	3400	3,49	80	77	117	128	130	6	12	3	2,5
3200	4300	0,830	78	77	98	103	105	5	6	1,5	1,5
3000	4000	1,22	81	79	110	116	118	4	5	2	1,5
2800	3800	1,56	80	79	108	116	119	4	6	2	1,5
2400	3400	3,00	89	82	130	138	140	5	8	3	2,5
2000	3000	2,82	84	82	118	138	141	5	13	3	2,5
2200	3200	4,10	86	82	125	138	140	6	12	3	2,5
3000	4000	0,880	83	82	103	108	110	5	6	1,5	1,5
2800	3800	1,33	86	84	115	121	124	4	5	2	1,5
2600	3600	2,62	85	84	115	121	124	4	6	2	1,5
2600	3600	3,40	95	87	139	148	149	5	9	3	2,5
1900	2800	3,50	91	87	127	148	151	6	14	3	2,5
2000	3000	5,00	91	87	133	148	149	7	13	3	2,5
2600	3600	1,24	89	87	112	117	120	6	7	1,5	1,5
2400	3400	1,59	91	90	124	130	132	4	6	2,5	2
2400	3400	2,00	90	90	122	130	134	5	7	2,5	2
2000	3000	4,00	102	92	148	158	159	5	9,5	3	2,5
1900	2800	4,07	97	92	134	158	159	6	15,5	3	2,5

Tapered roller bearings, single row

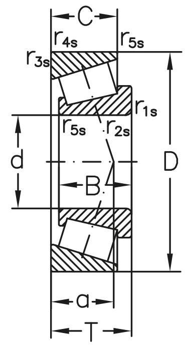


Dimensions									Designation	ISO series	Basic radial load.		Factors		
d	D	B	C	T	$r_{1s,2s}$ min.	$r_{3s,4s}$ min.	r_5 min.	a			dyn. Cr	e	Y	stat C_{0r}	Y_0
mm									-		kN	-		kN	-
80	170	58	48	61,5	3	2,5	1	41	**32316 A**	2GD	383	0,35	1,7	503	0,9
85	130	29	22	29	1,5	1,5	0,6	28	**32017 XA**	4CC	136	0,44	1,4	213	0,8
	150	28	24	30,5	2,5	2	0,6	30	**30217 A**	3EB	167	0,43	1,4	206	0,8
	150	36	30	38,5	2,5	2	0,6	33	**32217 A**	3EC	213	0,43	1,4	283	0,8
	180	41	34	44,5	4	3	1	35	**30317 A**	2GB	298	0,35	1,7	354	0,9
	180	41	28	44,5	4	3	1	55	**31317 A**	7GB	245	0,83	0,7	298	0,4
	180	60	49	63,5	4	3	1	42	**32317 A**	2GD	400	0,35	1,7	555	0,9
90	140	32	24	32	2	1,5	0,6	30	**32018 XA**	3CC	159	0,43	1,4	246	0,8
	160	30	26	32,5	2,5	2	0,6	31	**30218 A**	3FB	190	0,43	1,4	238	0,8
	160	40	34	42,5	2,5	2	0,6	36	**32218 A**	3FC	251	0,43	1,4	340	0,8
	190	43	36	46,5	4	3	1	36	**30318 A**	2GB	328	0,35	1,7	394	0,9
	190	43	30	46,5	4	3	1	57	**31318 A**	7GB	270	0,83	0,7	330	0,4
	190	64	53	67,5	4	3	1	44	**32318 A**	2GD	461	0,35	1,7	612	0,9
95	145	32	24	32	2	1,5	0,6	31	**32019 XA**	4CC	163	0,44	1,4	257	0,8
	170	32	27	34,5	3	2,5	1	33	**30219 A**	2FB	210	0,43	1,4	264	0,8
	170	43	37	45,5	3	2,5	1	39	**32219 A**	3FC	281	0,43	1,4	390	0,8
	200	45	38	49,5	4	3	1	39	**30319 A**	2GB	350	0,35	1,7	449	0,9
	200	45	32	49,5	4	3	1	60	**31319 A**	7GB	300	0,83	0,7	365	0,4
	200	67	55	71,5	4	3	1	47	**32319 A**	2GD	500	0,35	1,7	670	0,9
100	150	32	24	32	2	1,5	0,6	32	**32020 XA**	4CC	171	0,46	1,3	277	0,7
	180	34	29	37	3	2,5	1	35	**30220 A**	3FB	238	0,43	1,4	303	0,8
	180	46	39	49	3	2,5	1	41	**32220 A**	3FC	320	0,43	1,4	444	0,8
	215	47	39	51,5	4	2	1	40	**30320 A**	2GB	404	0,35	1,7	492	0,9
	215	73	60	77,5	4	3	1	53	**32320 A**	2GD	578	0,35	1,7	780	0,9
105	160	35	26	35	2,5	2	0,6	34	**32021 XA**	4DC	204	0,44	1,4	334	0,8
	190	36	30	39	3	2,5	1	37	**30221 A**	3FB	270	0,43	1,4	350	0,8
	190	50	43	53	3	2,5	1	44	**32221 A**	3FC	358	0,43	1,4	510	0,8
	225	77	63	81,5	4	3	1	53	**32321 A**	2GD	405	0,35	1,7	815	0,9
110	170	38	29	38	2,5	2	0,6	36	**32022 XA**	4DC	235	0,43	1,4	382	0,8
	200	38	32	41	3	2,5	1	39	**30222 A**	3FB	304	0,43	1,4	396	0,8
	200	53	46	56	3	2,5	1	46	**32222 A**	3FC	406	0,43	1,4	580	0,8
	240	50	42	54,5	4	3	1	43	**30322 A**	2GB	479	0,35	1,7	588	0,9
	240	80	65	84,5	4	3	1	55	**32322 A**	2GD	699	0,35	1,7	956	0,9
120	180	38	29	38	2,5	2	0,6	39	**32024 XA**	4DC	238	0,46	1,3	397	0,7
	215	40	34	43,5	3	2,5	1	43	**30224 A**	4FB	340	0,43	1,4	459	0,8
	215	58	50	61,5	3	2,5	1	51	**32224 A**	4FD	446	0,43	1,4	653	0,8
	260	55	46	59,5	4	3	1	47	**30324 A**	2GB	568	0,35	1,7	712	0,9
	260	86	69	90,5	4	3	1	60	**32324 A**	2GD	799	0,35	1,7	1104	0,9
130	200	45	34	45	2,5	2	0,6	42	**32026 XA**	4EC	315	0,43	1,4	526	0,8
	230	40	34	43,75	4	3	1	45	**30226 A**	4FB	367	0,43	1,4	485	0,8
	230	64	54	67,75	4	3	1	56	**32226 A**	4FD	551	0,43	1,4	836	0,8

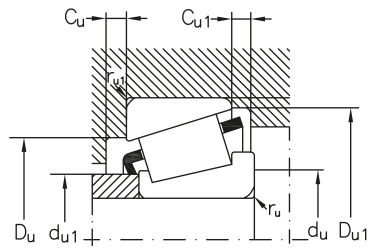


Speed limit		Mass	Mounting dimensions								
grease	oil										
			d_{u1} max.	d_u min.	D_u min.	max.	D_{u1} min.	C_u min.	C_{u1} min.	r_u max.	r_{u1} max.
min^{-1}		Kg									
1900	2800	5,90	98	92	142	158	159	7	13,5	3	2,5
2400	3400	1,30	94	92	117	122	125	6	7	1,5	1,5
2200	3200	2,00	97	95	132	140	141	5	6.5	2,5	2
2200	3200	2,50	96	95	130	140	142	5	8,5	2,5	2
1900	2800	4,70	107	99	156	166	167	6	10,5	4	3
1800	2600	5,08	103	99	143	166	169	6	16,5	4	3
1800	2600	6,85	103	99	150	166	167	8	14,5	4	3
2200	3200	1,70	100	99	125	131	134	6	8	2	1,5
2200	3000	2,49	103	100	140	150	150	5	6,5	2,5	2
2000	3000	3,30	102	100	138	150	152	5	8,5	2,5	2
1700	2400	5,50	113	104	165	176	176	6	10,5	4	3
1700	2400	5,92	109	104	151	176	179	6	16,5	4	3
1700	2400	8,21	108	104	157	176	177	8	14,5	4	3
2200	3200	1,80	105	104	130	136	140	6	8	2	1,5
1900	2800	2,96	110	107	149	158	159	5	7,5	3	2,5
1900	2800	4,00	108	107	145	158	161	5	8,5	3	2,5
1800	2600	6,70	118	109	172	186	184	6	11,5	4	3
1700	2400	6,95	114	109	157	186	187	6	17,5	4	3
1700	2400	11,0	115	109	166	186	186	8	16,5	4	3
2000	3000	1,85	109	109	134	141	144	6	8	2	1,5
1900	2800	3,54	116	112	157	168	168	5	8	3	2,5
1800	2600	4,76	114	112	154	168	171	5	10	3	2,5
1700	2400	7,90	127	114	184	201	197	6	12,5	4	3
1600	2200	14,0	123	114	177	201	200	8	17,5	4	3
1900	2800	2,42	116	115	143	150	154	6	9	2,5	2
1800	2600	4,26	122	117	165	178	177	6	9	3	2,5
1800	2600	5,90	120	117	161	178	180	5	10	3	2,5
1500	2000	14,5	128	119	185	211	209	9	18,5	4	3
1800	2600	3,06	122	120	152	160	163	7	9	2,5	2
1700	2400	5,00	129	122	174	188	187	6	9	3	2,5
1700	2400	6,90	126	122	170	188	190	6	10	3	2,5
1600	2200	12,5	141	124	206	226	220	8	12,5	4	3
1400	1900	16,4	137	124	198	226	222	9	19,5	4	3
1700	2400	3,25	131	130	161	170	173	7	9	2,5	2
1600	2200	6,01	140	132	187	203	201	6	9,5	3	2,5
1600	2200	8,59	136	132	181	203	204	7	11,5	3	2,5
1500	2000	13,6	152	134	221	246	237	10	13,5	4	3
1300	1800	24,5	148	134	213	246	239	9	21,5	4	3
1600	2200	4,93	144	140	178	190	192	8	11	2,5	2
1500	2000	7,60	152	144	203	216	217	7	9,5	4	3
1500	2000	10,7	146	144	193	216	219	7	13,5	4	3

Tapered roller bearings, single row

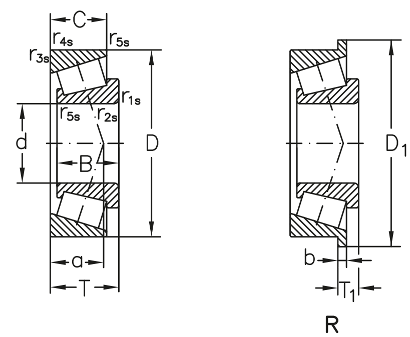


Dimensions									Designation	ISO series	Basic radial load. Factors				
d	D	B	C	T	$r_{1s,2s}$ min.	$r_{3s,4s}$ min.	r_5 min.	a			dyn. Cr	e	Y	stat C_{0r}	Y_0
mm									-		kN	-		kN	-
130	280	58	49	63,75	5	4	1,5	51	**30326 A**	2GB	640	0,35	1,7	820	0,9
	280	66	44	72	5	4	1,5	87	**31326 XA**	7GB	597	0,83	0,7	761	0,4
	280	93	78	98,75	5	4	1,5	66	**32326 A**	-	947	0,35	1,7	1333	0,9
140	210	45	34	45	2,5	2	0,6	46	**32028 XA**	4DC	312	0,46	1,3	529	0,7
	250	42	36	45,75	4	3	1	47	**30228 A**	4FB	396	0,43	1,4	527	0,8
	250	68	58	71,75	4	3	1	60	**32228 A**	4FD	602	0,43	1,4	907	0,8
	300	70	47	77	5	4	1,5	90	**31328 XA**	7GB	714	0,83	0,7	935	0,4
150	225	48	36	48	3	2,5	1	49	**32030 XA**	4EC	355	0,46	1,3	620	0,7
	270	45	38	49	4	3	1	50	**30230 A**	4GB	457	0,43	1,4	618	0,8
	270	73	60	77	4	3	1	64	**32230 A**	4GD	705	0,43	1,4	1080	0,8
160	240	51	38	51	3	2,5	1	52	**32032 XA**	4EC	402	0,46	1,3	696	0,7
	290	48	40	52	4	3	1	54	**30232 A**	4GB	520	0,43	1,4	710	0,8
	290	80	67	84	4	3	1	70	**32232 A**	4GD	840	0,43	1,4	1400	0,8
170	230	38	30	38	2,5	2	0,6	42	**32934 A**	3DC	280	0,37	1,6	572	0,9
	260	57	43	57	3	2,5	1	56	**32034 XA**	4EC	480	0,44	1,4	865	0,8
	310	52	43	57	5	4	1,5	58	**30234 A**	4GB	610	0,43	1,4	844	0,8
	310	86	71	91	5	4	1,5	75	**32234 A**	4GD	889	0,43	1,4	1377	0,8
180	250	45	34	45	2,5	2	0,6	53	**32936 A**	4DC	350	0,48	1,3	727	0,7
	280	64	48	64	3	2,5	1	59	**32036 XA**	3FD	599	0,43	1,4	1037	0,8
	320	52	43	57	5	4	1,5	61	**30236 A**	4GB	584	0,46	1,3	825	0,7
	320	86	71	91	5	4	1,5	78	**32236 A**	4GD	974	0,46	1,3	1571	0,7
190	260	45	34	45	2,5	2	0,6	55	**32938 A**	4DC	358	0,48	1,3	772	0,7
	290	64	48	64	3	2,5	1	62	**32038 XA**	4FD	609	0,44	1,4	1077	0,8
	340	92	75	97	5	4	1,5	81	**32238 A**	4GD	1080	0,43	1,4	1860	08
200	280	51	39	51	3	2,5	1	53	**32940 A**	3EC	474	0,4	1,5	950	0,8
	310	70	53	70	3	2,5	1	66	**32040 XA**	4FD	716	0,43	1,4	1356	0,8
	310	70	53	70	3	2,5	1	66	**T32040 X**	4FD	716	0,43	1,4	1356	0,8
	310	70	53	70	3	2,5	1	66	**T32040 XP5**	4FD	716	0,43	1,4	1356	0,8
	360	98	82	104	5	4	1,5	83	**32240 A**	3GD	1220	0,4	1,5	2020	0,8
220	300	51	39	51	3	2,5	1	58	**32944 M**	3EC	407	0,43	1,4	827	0,8
	340	76	57	76	4	3	1	72	**32044 XA**	4FD	850	0,43	1,4	1537	0,8

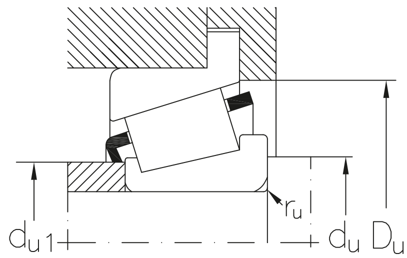


Speed limit grease	oil	Mass	Mounting dimensions d_{u1} max.	d_u min.	D_u min.	max.	D_{u1} min.	C_u min.	C_{u1} min.	r_u max.	r_{u1} max.
min^{-1}		Kg									
1300	1800	19,5	164	148	239	262	255	8	14,5	5	4
1200	1700	18,6	157	148	218	262	261	9	28	5	4
1100	1600	27,6	160	148	230	262	260	10	20,5	5	4
1600	2200	5,23	153	150	187	200	202	8	11	2,5	2
1400	1900	8,50	163	154	219	236	234	9	9,5	4	3
1400	1900	13,9	159	154	210	236	238	8	13,5	4	3
1200	1700	23,9	169	158	235	282	280	9	30	5	4
1500	2000	6,35	164	162	200	213	216	8	12	3	2,5
1300	1800	10,7	175	164	234	256	250	9	11	4	3
1200	1700	17,9	171	164	226	256	254	8	17	4	3
1300	1800	7,75	175	172	213	228	231	8	13	3	2,5
1100	1600	13,6	189	174	252	276	269	9	12	4	3
1100	1600	25,5	183	174	242	276	274	10	17	4	3
1400	1900	4,50	183	180	213	220	222	7	8	2,5	2
1200	1700	10,5	187	182	230	248	249	10	14	3	2,5
1000	1500	19,0	203	188	269	292	288	8	14	5	4
1000	1500	29,3	196	188	259	292	294	10	20	5	4
1200	1700	6,65	193	190	225	240	241	8	11	2,5	2
1100	1600	14,5	199	192	247	268	267	10	16	3	2,5
1000	1500	20,0	211	198	278	302	297	9	14	5	4
950	1400	27,4	204	198	267	302	303	10	20	5	4
1100	1600	7,00	204	200	235	249	251	8	11	2,5	2
1000	1500	15,0	209	202	257	278	279	10	16	3	2,5
900	1300	39,5	216	207	286	322	323	10	22	5	4
1000	1500	9,50	216	212	257	268	271	9	12	3	2,5
950	1400	19,5	221	212	273	298	297	11	17	3	2,5
950	1400	19,5	221	212	273	298	297	11	17	3	2,5
950	1400	19,5	221	212	273	298	297	11	17	3	2,5
900	1300	33,0	226	217	302	342	340	11	22	5	4
950	1400	11,2	234	232	275	288	290	9	12	3	2,5
900	1300	25,5	243	234	300	326	326	12	19	4	3

Tapered roller bearings with flanged outer ring

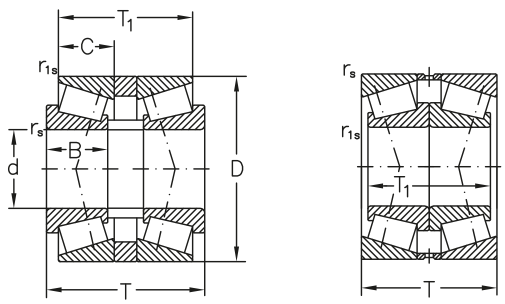


Dimensions										Designation	ISO series
d	D	B	C	T	r_{1s}, r_{2s} min.	r_{3s}, r_{4s} min.	D_1	b	a		
mm										-	
20	47	14	12	6,25	1	1	51	3	11	**30204 AR**	2DB
25	52	15	13	6,25	1	1	57	3,5	12	**30205 AR**	3CC
30	62	16	14	6,75	1	1	67	3,5	14	**30206 AR**	3DB
	62	20	17	8,25	1	1	67	4	15	**32206 AR**	3DC
	72	19	16	8,75	1,5	1,5	77	4	15	**30306 AR**	2FB
	72	27	23	11,75	1,5	1,5	77	6	18	**32306 AR**	2FD
35	72	17	15	7,25	1,5	1,5	77	4	15	**30207 AR**	3DB
	72	23	19	10,25	1,5	1,5	77	4,5	17	**32207 AR**	3DC
	80	21	18	8,25	2	1,5	85	4,5	16	**30307 AR**	2FB
	80	31	25	13,75	2	1,5	85	6	20	**32307 AR**	2FE
40	80	18	16	7,75	1,5	1,5	85	4	16	**30208 AR**	3DB
	80	23	19	10,25	1,5	1,5	85	4,5	19	**32208 AR**	3DC
	90	23	20	9,75	2	1,5	95	4,5	19	**30308 AR**	2FB
	90	33	27	14,25	2	1,5	95	6	23	**32308 AR**	2FD
45	85	19	16	8,75	1,5	1,5	90	4	18	**30209 AR**	3DB
	85	23	19	10,25	1,5	1,5	90	4,5	20	**32209 AR**	3DC
	100	25	22	10,25	2	1,5	106	5	21	**30309 AR**	2FB
	100	36	30	15,25	2	1,5	106	7	25	**32309 AR**	2FD
50	90	20	17	8,75	1,5	1,5	95	4	19	**30210 AR**	3DB
	90	23	19	10,25	1,5	1,5	95	4,5	21	**32210 AR**	3DC
	110	27	23	11,25	2,5	2	116	5	23	**30310 AR**	2FB
	110	40	33	17,25	2,5	2	116	8	27	**32310 AR**	2FD
55	100	21	18	9,25	2	1,5	106	4,5	20	**30211 AR**	3DB
	100	25	21	10,75	2	1,5	106	5	22	**32211 AR**	3DC
	120	43	35	18,5	2,5	2	127	8	29	**32311 AR**	2FD
60	110	22	19	9,25	2	1,5	116	4,5	22	**30212 AR**	2EB
	110	28	24	10,75	2	1,5	116	5	24	**32212 AR**	2EC
	130	46	37	19,5	3	2,5	137	8	31	**32312 AR**	2FD
65	120	23	20	9,25	2	1,5	127	4,5	23	**30213 AR**	3EB
	120	31	27	11,75	2	1,5	127	6	27	**32213 AR**	3EC
70	125	24	21	10,25	2	1,5	132	5	25	**30214 AR**	3EB
	125	31	27	12,25	2	1,5	132	6	28	**32214 AR**	3EC



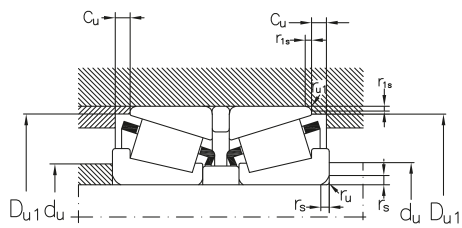
Basic radial load. Factors					Speed limit		Mass	Mounting dimensions			
dyn. Cr	e	Y	stat C_{0r}	Y_0	grease	oil		d_{u1} max.	d_u min.	D_u min.	r_u max.
kN	-		kN	-	min^{-1}		Kg				
26	0,35	1,7	29	0,9	8000	11000	0,127	27	26	43	1
29,5	0,37	1,6	36	0,9	7500	10000	0,161	31	31	48	1
38	0,37	1,6	48	0,9	6300	8500	0,233	37	36	57	1
47,5	0,37	1,6	65	0,9	6300	8500	0,290	37	36	59	1
53	0,31	1,9	65	1,1	5600	7500	0,398	39	37	66	1,5
72,3	0,31	1,9	97	1,1	5600	7000	0,577	40	37	66	1,5
49,4	0,37	1,6	58	0,9	5300	7000	0,338	44	42	67	1,5
61,6	0,37	1,6	80	0,9	5300	7000	0,422	43	42	67	1,5
68,2	0,31	1,9	83	1,1	5000	6700	0,543	45	44	74	2
88,2	0,31	1,9	120	1,1	4800	6300	0,760	44	44	74	2
58,5	0,37	1,6	70	0,9	4800	6300	0,440	49	47	74	1,5
71	0,37	1,6	95	0,9	4800	6300	0,533	48	47	75	1,5
81	0,35	1,7	105	0,9	4500	6000	0,725	52	49	82	2
110	0,35	1,7	156	0,9	4000	5300	1,027	50	49	82	2
63	0,4	1,5	83	0,8	4500	6000	0,491	54	52	80	1,5
75	0,4	1,5	103	0,8	4500	6000	0,584	53	52	80	1,5
101	0,35	1,7	130	0,9	4000	5300	0,958	59	54	92	2
132	0,35	1,7	188	0,9	3600	4800	1,30	56	54	93	2
70,5	0,43	1,4	95	0,8	4300	5600	0,552	58	57	85	1,5
76,5	0,43	1,4	106	0,8	4300	5600	0,625	58	57	85	1,5
120	0,35	1,7	156	0,9	3600	4800	1,23	65	60	102	2,5
165	0,35	1,7	239	0,9	3200	4300	1,89	62	60	102	2,5
84,5	0,4	1,5	112	0,8	3800	5000	0,724	64	64	94	1,5
99	0,4	1,5	138	0,8	3800	5000	0,858	63	64	95	1,5
187	0,35	1,7	276	0,9	3000	4000	2,29	68	65	111	2
91,5	0,4	1,5	122	0,8	3400	4500	0,897	70	69	103	2
120	0,4	1,5	170	0,8	3400	4500	1,14	69	69	104	2
216	0,35	1,7	318	0,9	2600	3600	1,92	74	72	120	3
110	0,4	1,5	147	0,8	3000	4000	1,14	77	74	113	2
142	0,4	1,5	206	0,8	3000	4000	1,54	76	74	115	2
120	0,43	1,4	163	0,8	3000	4000	1,27	81	79	118	2
150	0,43	1,4	220	0,8	2800	3800	1,62	80	79	119	2

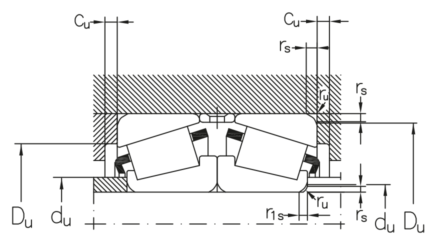
Tapered roller bearings, single row, paired mounted



DB DF

Dimensions								Designation	Speed limit		Mass
d	D	B	C	T	T_1	r_s min.	r_{1s} min.		grease	oil	
mm								-	min^{-1}		Kg
45	85	21	19	57,5	46	1,5	0,6	**32209 AP2F2DBT57,5**	3600	4800	1,28
	85	23	19	55	43,5	1,5	0,6	**32209 AP4DBT55**	3600	4800	1,26
55	100	22,52	21	69,5	57,66	2	0,6	**32211 AP2F2DBT69,5**	3000	4000	2,06
	100	25	21	69,5	58	2	0,6	**32211 AUPDBT69,5**	3000	4000	1,15
70	110	25	19	58	46	1,5	0,5	**32014 XADBT58**	2600	3400	1,87
80	125	29	22	70	56	1,5	0,6	**32016 XADBT70**	2000	2800	3,08
90	140	32	24	75	59	2	0,6	**32018 XADBT75**	1800	2600	3,95
100	180	46	39	140	120	3	0,8	**32220 AS1DBT140**	1400	2000	12,6
110	200	52,5	46	112	105	0,6	2,5	**32222 ADFT112**	1400	1900	7,77
	240	50	42	109	100	1	3	**30322 ADFT1109**	1300	1800	12,6
120	215	58	50	123	116	0,6	2	**32224 ADFT123**	1300	1800	18,7
	260	55	46	119	110	1	3	**30324 ADFT119**	1200	1600	29,8
	260	86	69	181	172	1	3	**32324 ADFT181**	1000	1400	46,2
130	200	45	34	90	90	0,6	2	**32026 XAP5S0DFT90**	1300	1800	10,6
	230	64	54	135,5	128	1	3	**32226 ADFT135,5**	1200	1600	23,1
	280	66	45	144	132	2	4	**31326 ADFT144**	950	1400	40,5
140	250	68	58	163,5	136	3	1	**32228 ADBT164**	1100	1500	30,9
170	310	86	71	202	162	5	1,5	**32234 AMDBT202**	800	1200	64,1
	310	86	71	202	162	5	1,5	**32234 AMP5DBT202**	800	1200	64,1

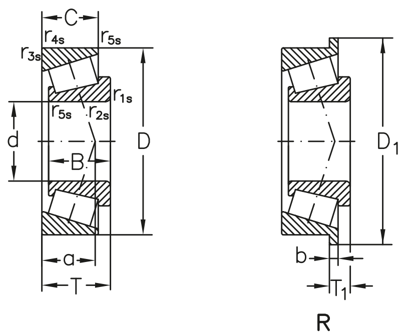




Basic radial load. Factors						Mounting dimensions					
dyn. Cr	e	Y_1	Y_2	stat C_{0r}	Y_0	d_u min./max.	D_u min.	max.	C_u min.	r_u max.	r_{u1} max.
kN	-			kN	-						
125	0,4	1,7	2,5	185	1,6	52	80		5,5	1,5	0,6
125	0,4	1,7	2,5	185	1,6	52	80		5,5	1,5	0,6
155	0,4	1,7	2,5	230	1,6	64	95		5,5	1,5	0,6
155	0,4	1,7	2,5	230	1,6	64	95		5,5	1,5	0,6
155	0,43	1,6	2,3	285	1,6	77	105		6	1,5	0,6
210	0,43	1,6	2,3	395	1,6	87	120		7	1,5	0,6
260	0,43	1,6	2,3	490	1,6	99	134		8	2	0,6
520	0,43	1,6	2,3	890	1,6	112	171		10	3	1
660	0,43	1,6	2,3	1160	1,6	126	170	188	6	2,5	1
780	0,35	1,9	2,8	1180	1,8	141	206	226	8	3	1
720	0,43	1,6	2,3	1310	1,6	136	181	203	7	2,5	1
920	0,35	1,9	2,8	1420	1,8	152	221	246	10	3	1
1290	0,35	1,9	2,8	2210	1,8	148	213	246	9	3	1
510	0,43	1,6	2,3	1050	1,6	144	178	190	8	2	0,6
890	0,43	1,6	2,3	1670	1,6	146	193	216	7	3	1
970	0,83	0,8	1,2	1520	0,8	157	218	262	9	4	1,5
980	0,43	1,6	2,3	1810	1,6	154	238		13,5	4	1
1440	0,43	1,6	2,3	2750	1,6	188	294		20	5	1,5
1440	0,43	1,6	2,3	2750	1,6	188	294		20	5	1,5

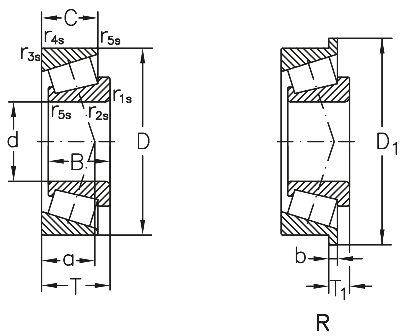
Tapered roller bearings, single row

inch dimensions



Dimensions										Designation
d	D	B	C	T	r_{1s}, r_{2s} min.	r_{3s}, r_{4s} min.	D_1	b	a	
mm										-
11,112	34,988	10,988	8,73	10,998	1,3	1,3			9	**A4044/A4138**
12,7	34,988	10,988	8,73	10,998	1,3	1,3			9	**A4050/4138**
14,989	34,988	10,988	8,73	10,998	0,8	1,3			9	**A4059/4138**
17,462	39,878	14,605	10,668	13,843	1,3	1,3			9	**LM11749/LM11710**
19,05	45,237	16,637	12,065	15,494	1,3	1,3			10	**LM11949/LM11910**
	49,225	19,05	14,288	18,034	1,3	1,3			11	**09067/09195**
21,43	50,005	18,288	13,97	17,526	1,3	1,3			11	**M12649/M12610**
21,986	45,237	16,637	12,065	15,494	1,3	1,3			10	**LM12749/LM12710**
	45,974	16,637	12,065	15,494	1,3	1,3			10	**LM12749/LM12711**
25	51,994	14,26	12,7	15,011	1,5	1,3			12	**07097/07204**
25,4	50,005	14,26	9,525	13,495	1	1			11	**07100/07196**
	50,292	14,732	10,668	14,224	1,3	1,3			11	**L44643/L44610**
26,988	50,292	14,732	10,668	14,224	3,5	1,3			11	**L44649/L44610**
29	50,292	14,732	10,668	14,224	3,5	1,3			11	**L45449/L45410**
31,75	59,131	16,764	11,811	15,875	*	1,3			13	**LM67048/LM67010**
	62	19,05	14,288	18,161	3.5	1,3			13	**15123/15245**
34,925	65,088	18,288	13,97	18,034	*	1,3			14	**LM485448/LM48510**
	72,233	25,4	19,842	25,4	2,3	2,3			21	**HM88649/HM88610**
	76,2	28,575	23,02	29,37	3,5	3,3			23	**HM89446/HM894410**
34,988	59,131	16,764	11,938	15,875	*	1,3			13	**L68149/L68110**
	59,974	16,764	11,938	15,875	*	1,3			13	**L68149/L68111**
38	63	17	13,5	17	*	1,3			14	**JL69349/JL69310**
38,1	65,088	18,288	13,97	18,04	2,3	1,3			13	**LM29749/LM29710**
	79,375	29,771	23,812	29,37	3,5	3,3			20	**3490/3420**

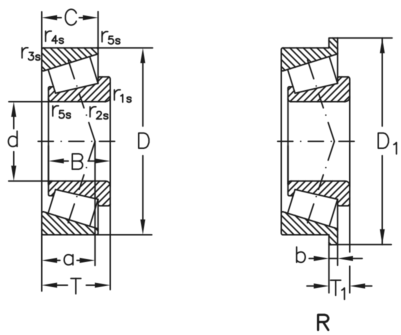
* Special mounting chamfer.



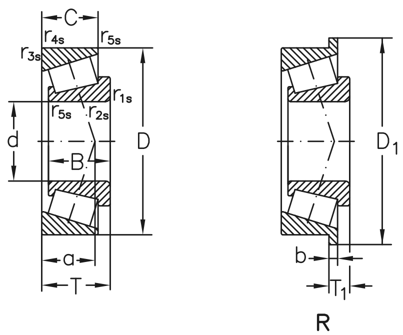
Basic radial load. Factors					Speed limit		Mass
dyn. Cr	e	Y	stat C_{0r}	Y_0	grease	oil	
kN	-		kN	-	min^{-1}		Kg
12,0	0,45	1,3	11,85	0,7	11000	15000	0,055
12,0	0,45	1,3	11,85	0,7	10000	15000	0,058
12,0	0,45	1,3	11,85	0,7	10000	14000	0,063
19,8	0,29	2,1	21,1	1,2	8500	12000	0,081
25,5	0,30	2,0	25,104	1,1	7500	11000	0,123
31,1	0,27	2,3	33,1	1,2	7000	10000	0,160
34,1	0,28	2,2	38	1,2	7000	10000	0,160
25,2	0,31	2,0	27,7	1,1	7500	10000	0,122
25,2	0,31	2,0	27,7	1,1	7000	10000	0,123
23,7	0,4	1,5	27,5	0,8	6300	9000	0,140
23,7	0,4	1,5	27,5	0,8	6300	9500	0,115
23,4	0,37	1,6	25,913	0,9	6300	9000	0,125
23,4	0,37	1,6	25,913	0,9	6300	9000	0,115
24,1	0,37	1,6	32,2	0,9	6300	9000	0,115
31,1	0,41	1,5	35,912	0,8	5300	7500	0,180
43,9	0,35	1,7	49,708	0,9	5300	7500	0,228
42,9	0,38	1,6	50,696	0,9	4800	7000	0,248
66,5	0,55	1,1	86,61	0,6	4500	6700	0,487
72,5	0,55	1,1	97,9	0,6	4500	6300	0,570
30,1	0,42	1,4	38,841	0,8	5300	7500	0,170
30,1	0,42	1,4	38,841	0,8	5300	7500	0,180
32,9	0,42	1,4	43,8	0,8	4800	7000	0,221
38,4	0,33	1,8	48,72	1,0	4800	6700	0,227
79,3	0,36	1,6	103	0,9	4300	6000	0,550

Tapered roller bearings, single row

inch dimensions

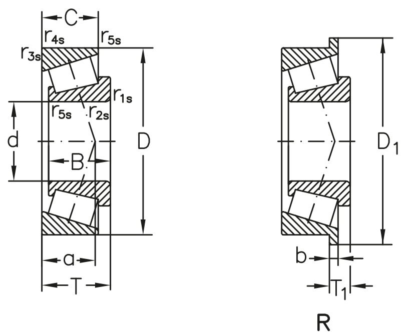


Dimensions										Designation
d	D	B	C	T	r_{1s}, r_{2s} min.	r_{3s}, r_{4s} min.	D_1	b	a	
mm										-
39,688	73,025	22,098	21,336	25,654	0,8	2,3			18	**M201047/M201011**
41,275	73,431	19,812	14,732	19,559	3,5	0,8			16	**LM501349/LM501310**
44,45	73,025	18,258	15,083	18,258	1,5	1,5			14	**L102849/L102810**
	82,931	25,4	19,05	23,813	3,6	0,8			18	**25580/25520**
	95,25	28,575	22,225	27,783	0,8	0,8			20	**460/453 A**
45,242	73,431	19,812	15,748	19,558	3,5	0,8			15	**LM102949/LM102910**
45,618	82,931	25,4	19,05	23,812	3,5	0,8			18	**25590/25520**
	82,931	25,4	22,225	26,988	3,5	2,3			19	**25590/25523**
46,038	85	25,608	20,638	25,4	0,8	1,3			19	**2984A/2924**
47,625	93,264	30,302	23,812	30,162	3,5	0,8			21	**3779/3730**
50	90	22,225	15,875	8,887	2	0,8	94,661	4,762	16	**365/362 R**
50,8	82,55	22,225	16,51	21,59	3,5	1,3			16	**LM104949/LM104911**
	92,075	25,4	19,845	24,608	3,5	0,8			20	**28580/28521**
	92,25	28,575	22,225	27,783	3,5	0,8			20	**33889/33822**
	97,63	24,608	19,446	9,124	3,5	0,8	101,549	3,962	21	**28678/28622 R**
	107,95	29,317	22,225	27,783	3,5	0,8			21	**33885/33822**
53,975	123,825	32,791	25,4	17,462	3,5	3,3	130,073	6,35	37	**72212/72487 R**
57,15	104,775	29,317	24,605	30,162	2,3	3,3			23	**462A/453 X**
	110	29,317	27	27,795	3,5	2			24	**462/454**
	112,712	30,162	23,812	30,162	8	3,3			23	**39581/39520**
60,325	127	36,512	26,988	36,512	3,5	3,3			32	**HM813841/HM813810**
63,485	95	15,5	12	17	1	1			28	**L910349/L910310**
63,5	92,075	12,7	9,525	13,495	1,5	1,5			16	**LL510749/LL510710**
	112,712	30,048	23,812	11,112	3,5	3,3	117,373	4,762	25	**3982/3920 R**
	112,712	30,048	23,812	30,162	3,5	3,3			25	**3982/3920**
	112,712	30,048	23,812	30,162	3,5	0,8			25	**3982/3928**
	112,712	30,048	23,812	30,162	3,5	3,3			23	**39585/39520**
	120	29,007	23,444	29,007	3,5	3,3			26	**483/472 A**
	122,238	38,43	29,77	38,305	3,5	2			27	**X3962/X3963**
66,675	110	25,4	19,05	25,4	3,5	1,3			24	**29590/29521**
	112,712	30,048	23,812	30,162	3,5	3,3			25	**3984/3920**
	122,238	38,354	29,718	38,1	3,5	3,3			27	**HM212049/HM212011**

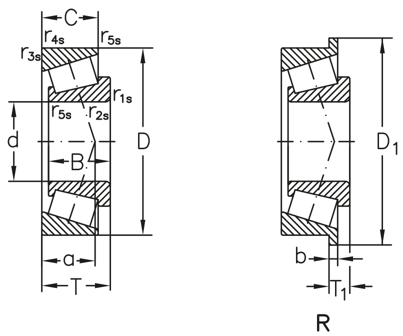


Basic radial load. Factors					Speed limit		Mass
dyn. Cr	e	Y	stat C_{0r}	Y_0	grease	oil	
kN	-		kN	-	min^{-1}		Kg
57,5	0,33	1,8	72,0	1,0	4300	6300	0,460
48,6	0,40	1,5	64,3	0,8	4300	6000	0,320
47,0	0,32	1,9	68,9	1,0	4300	6000	0,300
75,7	0,33	1,8	95,1	1,0	3800	5600	0,554
96,8	0,33	1,8	127,0	1,0	3600	5000	0,970
97,8	0,34	1,8	134	1,0	3000	4500	1,10
48,5	0,31	2,0	66,4	1,1	4000	6000	0,300
70	0,33	1,8	95,2	1,0	3800	5300	0,550
70	0,33	1,8	95,2	1,0	3800	5300	0,580
68,3	0,35	1,7	97	1,0	3800	5300	0,600
98,0	0,34	1,8	128	1,0	3400	5000	0,905
74,3	0,32	1,9	87,26	1,0	3400	5000	0,554
65,2	0,31	2,0	86,2	1,1	3600	5300	0,411
71	0,38	1,6	103	0,9	3400	4800	0,690
102	0,33	1,8	135	1,0	3400	4800	0,860
101	0,40	1,5	147	0,8	3400	4800	0,850
143	0,74	0,8	162	0,4	2800	4000	2,10
97,8	0,34	1,8	134	1,0	3000	4500	1,10
109	0,34	1,8	139	1,0	3000	4300	1,22
130	0,34	1,8	196	1,0	2800	4000	1,03
161	0,50	1,2	226	0,7	2600	3800	2,16
42,3	0,78	0,8	56,8	0,4	3000	4500	0,400
31,2	0,40	1,5	46,0	0,8	3200	4500	0,250
116	0,40	1,5	174	0,8	2800	4000	1,26
116	0,40	1,5	174	0,8	2800	4000	1,24
116	0,40	1,5	174	0,8	2800	4000	1,24
130	0,34	1,8	196	1,0	2800	4000	1,22
133	0,38	1,6	167	0,9	2600	3800	1,44
189	0,34	1,8	248	1,0	2600	3800	2,03
92,0	0,44	1,4	138	0,7	2800	4000	0,900
113	0,40	1,5	172	0,8	2800	4000	1,20
189	0,34	1,8	248	1,0	2600	3800	1,92

Tapered roller bearings, single row
inch dimensions



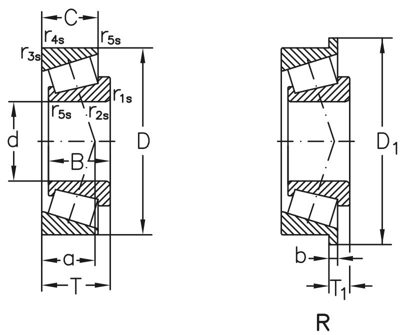
Dimensions										Designation
d	D	B	C	T	r_{1s}, r_{2s} min.	r_{3s}, r_{4s} min.	D_1	b	a	
mm										-
71,438	127	36,17	28,575	36,512	3,5	3,3			28	**567A/563**
	136,525	46,038	36,512	46,038	3,5	3,3			38	**H715345/H715311**
73,025	127	36,17	28,575	36,512	3,5	3,3			28	**567/563**
	146,05	41,275	31,75	41,275	3,5	3,3			34	**657/653**
76,2	139,992	36,098	28,575	36,512	3,5	3,3			31	**575/572**
	161,925	55,1	42,862	53,975	3,5	3,3			40	**6576/6535**
77,788	120	23,012	16	23	3,5	2,3			24	**34306/34472 X**
82,55	139,992	36,098	28,575	36,512	3,5	3,3			31	**580/572**
	146,05	41,275	31,75	41,275	3,5	3,3			34	**663/653**
	161,925	48,26	38,1	47,625	3,5	3,3			35	**757/752**
85,725	133,35	29,769	25,4	33,338	3,3	3,3			31	**497/492 W**
	146,05	41,275	31,75	41,275	6,4	3,3			34	**665A/653**
88,9	152,4	39,688	30,163	39,688	6,4	3,3			34	**HM518445/HM518410**
	190,5	57,531	46,038	57,15	8	3,3			41	**HM221434/HM221410**
89,974	146,975	40	32,5	40	7	3,5			31	**HM218248/HM218210**
92	140	30	22	30	3,5	1,5			32	**LM718947/XC18140 D**
92,075	152,4	36,322	30,162	39,688	6,4	3,3			35	**598A/592 A**
	171,45	48,26	38,1	47,625	3,5	3,3			37	**77362/77675**
95,25	148,43	28,971	21,433	28,575	3	3			33	**42375/42584**
	152,4	36,322	30,162	15,875	3,5	3,3	158,648	6,35	35	**594/592 R**
96,838	149,225	28,971	24,608	12,7	3,5	3,3	154,681	5,558	34	**42381/42587 R**
100,012	157,162	36,116	26,195	36,512	3,5	3,3			36	**52393/52618**
101,6	180,975	48,006	38,1	17,462	3,5	3,3	188,798	7,938	40	**780/772 R**
	212,725	66,675	53,975	66,675	7	3,3			48	**HH224335/HH224310**



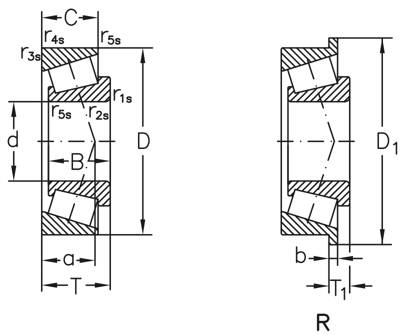
Basic radial load. Factors					Speed limit		Mass
dyn. Cr	e	Y	stat C_{0r}	Y_0	grease	oil	
kN	-		kN	-	min^{-1}		Kg
161	0,36	1,7	226	0,9	2400	3600	1,64
219	0,48	1,2	296	0,7	2400	3400	2,91
161	0,36	1,7	226	0,9	2400	3400	2,68
213	0,41	1,5	307	0,8	2200	3200	3,31
184	0,40	1,5	239	0,8	2200	3200	2,35
327	0,40	1,5	448	0,8	2000	3000	5,37
84,91	0,45	1,3	117	0,7	2400	3600	0,836
168	0,40	1,5	247	0,8	2200	3200	2,13
201	0,41	1,5	286	0,8	2200	3000	3,73
272	0,34	1,8	358	1,0	2000	2800	4,70
135	0,45	1,3	203	0,7	2200	3200	1,34
213	0,41	1,5	307	0,8	2200	3000	2,60
235	0,40	1,5	338	0,8	2000	3000	2,80
395	0,34	1,8	526	1,0	1800	2600	8,85
220	0,33	1,8	386	1,0	2000	3000	2,59
140	0,48	1,3	213	0,7	2200	3000	1,52
174	0,44	1,4	268	0,7	2000	2800	2,59
305	0,37	1,6	416	0,9	1900	2600	4,79
136	0,49	1,2	416	0,7	2000	2800	1,72
204	0,44	1,4	313	0,7	2000	2800	2,64
136	0,49	1,2	210	0,7	2000	2800	1,74
142	0,47	1,3	195	0,7	1900	2800	2,47
321	0,39	1,6	462	0,9	1700	2400	5,50
557	0,33	1,8	783	1,0	1600	2200	11,1

Tapered roller bearings, single row

inch dimensions

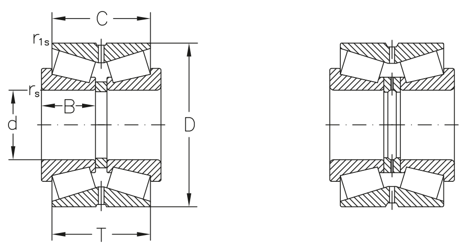


Dimensions										**Designation**
d	D	B	C	T	r_{1s}, r_{2s} min.	r_{3s}, r_{4s} min.	D_1	b	a	
mm										-
120,65	174,625	36,512	27,783	35,72	3,5	1,5				**M224749/M224710**
	206,375	47,625	34,925	47,625	3,5	3,5				**795/792**
127	215,9	47,625	34,925	47,625	3,5	3,3				**74500/74850**
130	234,95	63,5	49,213	63,5	6	3,3				**95512/95925**
133,35	215,9	47,625	34,925	20,638	3,5	3,3	223,733	7,938		**74525/74850 R**
136,525	215,9	47,625	34,925	20,638	3,5	3,3	223,733	7,938		**74525/74850 R**
139,7	215,9	47,625	34,925	20,638	3,5	3,3	223,733	7,938		**74550/74850 R**
	215,9	47,625	34,925	47,625	3,5	3,3				**74550/74850**
	215,9	47,625	34,925	47,625	3,5	3,3				**74550/74850**
158,75	225,425	39,688	33,338	13,495	3,5	3,3	230,881	5,558		**46780/46720 R**
	225,425	39,688	33,338	41,275	3,5	3,3				**46780/46720**
180	250	45	37	47	3	3				**JM736149/JM36110**
196,85	254	27,783	21,433	28,575	1,5	1,5				**L540049/L540010**
203,2	261,142	27,783	21,433	28,575	1,5	1,5				**LL641149/LL641110**
209,55	282,575	46,038	36,512	46,038	3,5	3,3				**67989/67920**
	317,5	63,5	46,038	63,5	4,3	3,3				**93825/93125**
234,95	327,025	52,388	36,512	52,388	6,4	3,3				**8575/8520**
241,3	327,025	52,388	36,512	25,4	6,4	3,3	336,448	9,525		**8578/8520 R**



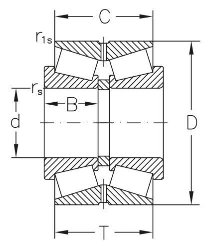
Basic radial load. Factors					Speed limit		Mass
dyn. Cr	e	Y	stat C_{0r}	Y_0	grease	oil	
kN	-		kN	-	min^{-1}		Kg
220	0,33	1,8	375	1,0	1700	2400	2,70
308	0,49	1,2	523	0,7	1400	2000	6,97
507	0,36	1,6	784	0,9	1300	1900	11,3
313	0,49	1,2	528	0,7	1400	2000	6,78
313	0,49	1,2	528	0,7	1400	2000	6,53
310	0,49	1,2	531	0,7	1400	2000	6,17
310	0,49	1,2	531	0,7	1400	2000	6,08
310	0,49	1,2	531	0,7	1400	2000	6,08
305	0,38	1,6	541	0,9	1300	1800	5,40
305	0,38	1,6	541	0,9	1300	1800	5,35
334	0,48	1,3	703	0,7	1100	1600	7,85
170	0,39	1,5	334	0,9	1100	1600	3,32
174	0,41	1,5	353	0,8	1100	1500	3,56
331	0,51	1,2	661	0,6	1000	1400	8,84
651	0,52	1,2	1098	0,6	950	1300	18,5
468	0,41	1,5	934	0,8	850	1200	12,3
468	0,41	1,5	934	0,8	850	1200	11,9

Tapered roller bearings, double row

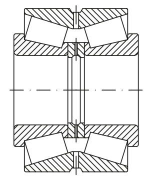


d<220 d>220

Dimensions							Designation
d	D	B	C	T	r_1 min.	r_{1s} min.	
mm							-
160	240	48	94	115	3	1	**35032**
180	280	60	108	134	3	1	**35036**
200	310	66	123	152	3	1	**35040**
220	340	72	130	165	4	1	**35044**



d<220



d>220

Basic radial load. Factors						**Speed limit**		**Mass**
dyn. Cr	e	Y_1	Y_2	stat C_{0r}	Y_0	grease	oil	
kN	-			kN	-	min^{-1}		Kg
662	0,37	1,8	2,7	1288	1,8	950	1400	17,0
1154	0,29	2,3	3,5	2352	2,3	850	1200	29,9
1268	0,37	1,0	2,7	2526	1,8	800	1100	39,3
1469	0,34	2,0	2,9	3032	1,9	750	1000	50,1

Tapered roller bearings, double row
Inch dimensions

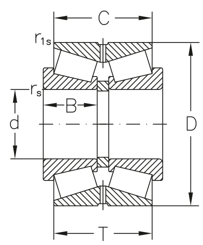


Fig. 1

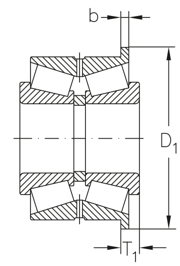


Fig. 2

Dimensions							Designation
d	D	B	C	T	r_1 min.	r_{1s} min.	
mm							-
69,85	114,287	25,4	46,038	58,738	1,5	0,8	**29675/29622 DC**
	120	29,007	53,975	65,09	3,5	0,8	**482/472 D**
73,025	114,287	25,4	46,038	58,738	3,5	0,8	**29685/29622 D**
82,55	136,525	29,769	53,975	69,85	3,5	0,8	**495/493 D**
85,725	136,525	29,769	53,975	69,85	3,5	0,8	**497/493 DC**
92,075	149,225	28,971	52,387	66,672	3,5	0,8	**42362/42587 D**
107,95	158,75	21,4	39,688	53,978	3,5	0,8	**37425/37626 D**
	159,987	34,925	58,738	74,89	3,6	0,8	**LM4522546/LM522510 DC**
114,3	190,5	49,2	80,962	106,362	3,5	1,5	**71450/7175 D**
115	190,5	50	82,6	108	3,5	1	**181115/181190 XG**
127	196,85	46	85,725	101,6	3,5	0,8	**67388/67322 D**
136,525	190,5	39,7	73,025	85,725	3,5	0,8	**48393/48320 D**
	215,9	51	92	110	2,5	1	**200136X/200215 XH**[1)]
152,4	222,25	46,8	76,2	100,01	3,5	0,8	**M231649/M23160 D**
	222,25	46,8	76,2	100,01	3,5	0,8	**M231649/M23160 D**
203,2	282,575	46,038	82,55	101,6	3,5	0,8	**67983/67920 DC**

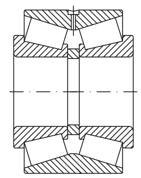


Fig. 3

Basic radial load. Factors						**Speed limit**		**Mass**	**Fig.**
dyn. Cr	e	Y_1	Y_2	stat C_{0r}	Y_0	grease	oil		
kN	-			kN	-	min^{-1}		Kg	
180	0,49	1,4	2,1	295	1,4	2400	3000	2,05	3
255	0,38	1,8	2,6	415	1,7	2200	2800	2,45	1
180	0,49	1,4	2,1	295	1,4	2400	2800	1,91	1
255	0,44	1,5	2,3	450	1,5	2000	2400	3,84	1
255	0,44	1,5	2,3	450	1,5	1900	2400	3,72	3
275	0,49	1,4	2,1	510	1,4	1800	2200	4,37	1
170	0,61	1,1	1,7	335	1,1	1600	2000	3,26	1
280	0,40	1,7	2,5	630	1,6	1600	2000	4,97	3
530	0,42	1,6	2,4	980	1,6	1400	1800	10,8	1
435	0,26	2,6	3,8	750	2,5	1400	1800	10,1	1
540	0,34	2,0	2,9	1130	1,9	1300	1700	10,6	1
395	0,33	2,1	3,1	940	2,0	1300	1700	6,88	1
540	0,25	2,7	4,1	960	2,7	1200	1500	12,2	2
540	0,33	2,0	3,0	1190	2,0	1200	1400	11,7	1
540	0,33	2,0	3,0	1190	2,0	1200	1400	11,7	1
600	0,51	1,3	2,0	1410	1,3	900	1100	17,8	1

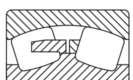
Spherical roller bearings

Spherical roller bearings operate in arduous conditions. The spherical rollers can be symmetrical or unsymmetrical and are self-aligning in the outer ring sphered raceway. Thus, the possible coaxiality deviations of the supporting bearings as well as shaft bending can be compensated.

Spherical roller bearings are manufactured in the following constructive versions, depending on the bearing size and series.

MB design

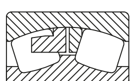
These bearings have a central fixed rib and machined cages guided on the inner ring rib.



a.

MA design

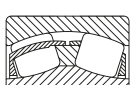
These bearings have a central fixed rib and machined cages guided on the outer ring rib.



b.

C design

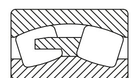
These bearings have a central guide rib floating on the inner ring, symmetrical rollers with larger dimensions so that the load carrying capacity increases. Special pressed sheet cage. Bearings of this design are of small and medium sizes.



c.

CA design

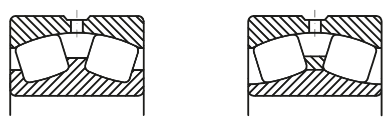
These bearings have side shoulders and an one-piece machined brass cage. They also have symmetrical rollers with larger dimensions so that the load carrying capacity increases. This design is available for medium and large-sized bearings



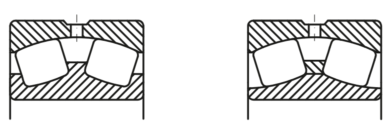
d.

Other constructive versions are shown below:

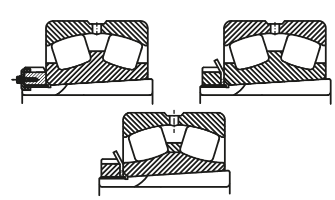
Cylindrical bore, lubrication groove and holes in the outer ring



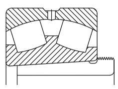
Tapered bore, lubrication groove and holes in the outer ring
(taper 1:12, 1:30)

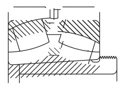


With adapter sleeves



With withdrawal sleeves





Suffixes

- **C** - modified inner design, increased basic load, symmetrical rollers, pressed sheet cage
- **CA** - modified inner design, increased basic load, one-piece machined brass cage
- **F2, F3** - constructive modifications
- **K** - tapered bore bearings, taper 1:12
- **K30** - tapered bore bearings, taper 1:30
- **MA** - machined brass cage guided on the outer ring
- **MB** - machined brass cage guided on the inner ring
- **P** - two-piece outer ring
- **W33** - lubrication groove and holes in the outer ring

Tolerances

Spherical roller bearings with both cylindrical and tapered bore, are manufactured in normal tolerance class (see chapter Bearing tolerance, page 28).

Radial Clearance

Spherical roller bearings are generally manufactured with normal radial clearance. At request, they can be manufactured with clearances larger than normal (C3, C4 etc.) or smaller than normal (C2).

The limit values of the radial clearance measured on unloaded bearings are in accordance with SR ISO 5753 and are given in tables 1 and 2.

Dimensions

The main dimensions of spherical roller bearings are in accordance with ISO 15 and national standard SR 3918 respectively.

The dimensions of the adapter sleeves are in accordance with national standard SR ISO 2982-1.

Radial clearance of spherical roller bearings with cylindrical bore

Table 1

Bore diameter		**Radial clearance**									
		C2		**Normal**		**C3**		**C4**		**C5**	
d 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

Radial clearance of spherical roller bearings with tapered bore

Table 2

Bore diameter d over	up to	Radial clearance C2 min	C2 max	Normal min	Normal max	C3 min	C3 max	C4 min	C4 max	C5 min	C5 max
18	**24**	15	25	25	35	35	45	45	60	60	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

The dimensions of the safety washers are in accordance with national standard SR ISO 2982-2.

The dimensions of the bearings nuts are in accordance with national standard SR ISO 2982-2.

The dimensions of the withdrawal sleeves are in accordance with national standard SR ISO 2982-1 and pages 793-800

Misalignment

Spherical roller bearings allow angular misalignment between the outer ring and inner ring without any influence on the bearing rating life. Under normal loads and operating conditions and when the inner ring rotates, the values of the permissible misalignment depending on the bearing series are given in table 3.

Cages

Small and medium size spherical roller bearing are fitted with pressed sheet or machined brass cages (Y). Bearings of normal design are fitted with machined brass or steel cages guided on the rollers (M), inner ring (MB) or outer ring raceway (MA).

Glass fibre reinforced polyamide 6.6 cages are successfully used for small and medium size bearings if the operating temperature doesn't exceed +120°C.

Large-size bearings are fitted with machined brass cages, CA design.

Designs and some technical data are given in table 4.

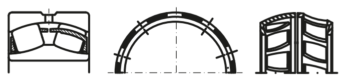
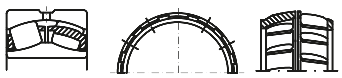
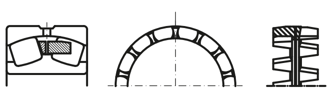
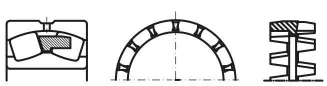
Permissible angular misalignment

Table 3

Bearing series	Permissible angular misalignment degrees
213	1
222	1.5
223	2
230	1.5
231	1.5
232	2.5
239	1.5
240	2
241	2.5

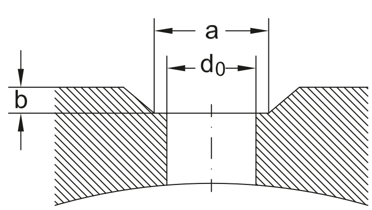
Cage design and some technical data

Table 4

Cage	Design: bearing	Design: cage		Application	Max. value $D_m n$: oil	Max. value $D_m n$: grease
Pressed sheet cage				- General application - C design - Moderate speeds - Bearings with d≤200mm	300×10^3	225×10^3
Polyamide cage TN				- General application - Moderate and high speeds	400×10^3	300×10^3
Machined brass M or steel F cage				- General application - Bearings with d>40 mm	350×10^3	265×10^3
Machined brass cage, CA design				- General application - Bearings with d>200mm	350×10^3	265×10^3

Lubrication grooves and holes

Spherical roller bearings are provided with a lubrication groove and holes in the outer ring, excepting those of series 213. Designation suffix W33 is used to identify this feature on bearings. The dimensions of the groove, bore diameter and their number depending on the dimension series are given in table 5.



Axial load for bearings mounted on adapter sleeves

If the spherical roller bearings are mounted on a smooth shaft using an adapter sleeve, without side support, the axial load carrying capacity depends on the friction between shaft and sleeve.

Considering that the mounting is correctly done, the permissible axial load can be accurately enough determined using the following equation

$F_{a\,max} = 3\,B\,d$, kn

where:

$F_{a\,max}$ - maximum permissible axial load, kN;
B - bearing width, mm;
d - bearing bore diameter, mm.

Equivalent dynamic radial load

$P_r=F_r+Y_1F_a$, kN, for $F_a/F_r \leq e$
$P_r=67\,F_r+Y_2F_a$, kN, for $F_a/F_r > e$

The values of the factors depending on the bearing type can be found in bearing tables.

Dimensions of lubrication grooves and holes

of Table 5

Series 23900				Series 23000				Series 24000			
Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b
mm	mm			mm	mm			mm	mm		
250... 360	4,5	7,2	1,5	**170... 210**	4,5	7,2	1,5	**... 180**	4,5	7,2	1,5
380... 420	4,5	7,2	2	**225... 260**	6	9,6	2	**200... 225**	6	9,6	2
440... 480	6	9,6	3	**280... 310**	7,5	12,1	2,5	**240... 260**	7,5	12,1	2,5
520... 540	7,5	12,1	3	**310... 460**	9	14,5	3	**280... 480**	9	14,5	3
560... 650	9	14,5	3	**480... 980**	12	19,7	3	**520... 560**	9	14,5	3
670... 1000	12	19,7	3,5					**600... 980**	12	19,7	3,5

Series 23100				Series 24100				Series 22200			
Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b
mm	mm			mm	mm			mm	mm		
165... 200	4,5	7,2	1,5	**180... 210**	3	4,9	1	**72... 100**	3	4,2	0,8
210... 250	6	9,6	2	**... 225**	4,5	7,2	1,5	**110... 160**	3	4,9	1
... 270	7,5	12,1	2,5	**250... 270**	4,5	9,6	2	**170... 200**	4,5	7,2	1,5
280... 400	9	14,5	3	**280... 400**	6	9,6	2	**215... 250**	6	9,6	2
440... 980	12	19,7	3	**420... 500**	7,5	12,1	2,5	**270... 290**	7,5	12,1	2,5
				540... 620	9	14,5	3	**310... 400**	9	14,5	3
				650... 980	12	19,7	3,5	**440... 580**	12	19,7	3,5

Series 23200				Series 22300				Series 21300			
Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b	Outer diameter range	Dimensions d0	a	b
mm	mm			mm	mm			mm	mm		
... 160	3	4,9	1	**90... 120**	3	4,9	1	**... 80**	3	4,2	0,8
180... 200	4,5	7,2	1,5	**130... 180**	4,5	7,2	1,5	**90... 180**	3	4,9	1
215... 250	6	9,6	2	**190... 215**	6	9,6	2	**190... 215**	4,5	7,2	1,5
270... 320	7,5	12,1	2,5	**240... 260**	7,5	12,1	2,5				
340... 400	9	14,5	3	**280... 360**	9	14,5	3				
400... 980	12	19,7	3,5	**380... 580**	12	19,7	3,5				

Number of lubrication holes - all series

Bore diameter range, mm	50... 240	260... 440	460... 950
Number of lubrication holes	3	4	6

Equivalent static radial load

$P_{0r}=F_r+Y_0F_a$, kN

The value of the factor Y_0 depending on the bearing type can be found in bearing tables.

Abutment dimensions

For a proper location of bearing rings on the shaft and housing shoulder respectively, shaft (housing) maximum connection radius $r_{u\ max}$ should be less than bearing minimum mounting chamfer $r_{s\ min}$.

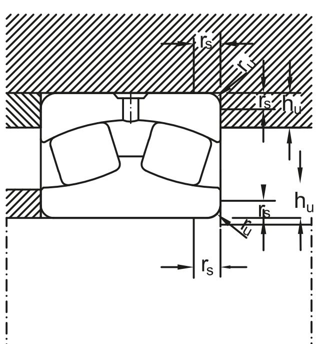
Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

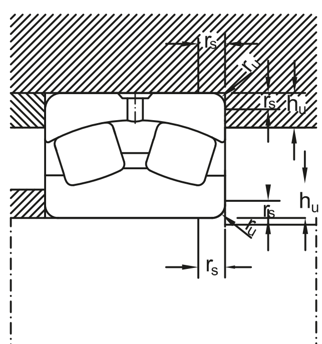
The values of the connection radii and support shoulder height are given in table 6. The mounting dimensions for bearings with withdrawal sleeves are given in table 7.

Dimensions of lubrication grooves and holes

of Table 6

$r_{s\ min}$	$r_{u\ max}$	$h_{u\ min}$ Bearing series 230, 239, 240	231, 213, 241, 223, 222, 233, 232
mm			
1	1	2,3	2,8
1,1	1	3	3,5
1,5	1,5	3,5	4,5
2	2	4,4	5,5
2,1	2,1	5,1	6
3	2,5	6,2	7
4	3	7,3	8,5
5	4	9	10
6	5	11,5	13
7,5	6	14	16
9,5	8	17	20





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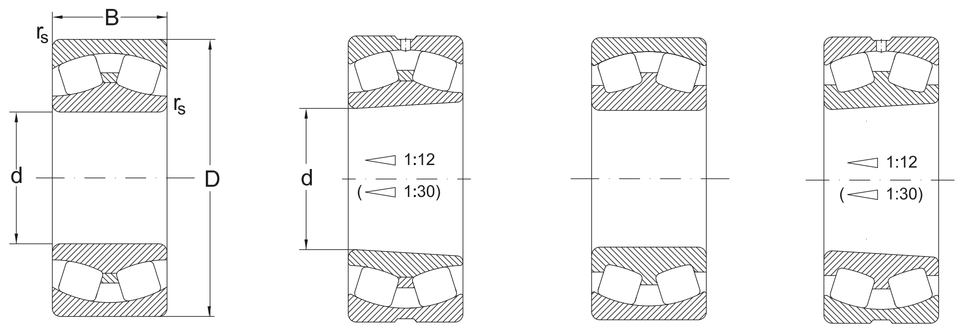

C CK/K30W33 MB MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
35	80	21	1,5	66	0,28	2,4	3,6	65
	80	21	1,5	66	0,28	2,4	3,6	65
40	80	23	1,1	88	0,31	2,2	3,2	98
	80	23	1,1	88	0,31	2,2	3,2	98
	80	23	1,1	88	0,31	2,2	3,2	98
	80	23	1,1	78	0,31	2,2	3,2	87
	80	23	1,1	78	0,31	2,2	3,2	87
	80	23	1,1	78	0,31	2,2	3,2	87
	80	23	1,1	78	0,31	2,2	3,2	87
	80	23	1,1	78	0,31	2,2	3,2	87
	90	23	1,5	99	0,26	2,6	3,9	120
	90	23	1,5	99	0,26	2,6	3,9	120
	90	23	1,5	83	0,26	2,6	3,8	101
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	140	0,4	2,6	2,5	145
	90	33	1,5	140	0,4	2,5	2,5	145
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	140	0,4	1,6	2,5	145
	90	33	1,5	125	0,4	1,7	2,5	135
	90	33	1,5	125	0,4	1,7	2,5	135
	90	33	1,5	125	0,4	1,7	2,5	135
	90	33	1,5	125	0,4	1,7	2,5	135
	90	33	1,5	125	0,4	1,7	2,5	135
45	85	23	1,1	93	0,26	2,6	3,8	105
	85	23	1,1	93	0,26	2,6	3,4	105
	85	23	1,1	93	0,26	2,6	3,4	105

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
35	2,4	5000	6400	**21307 MBKW33**	0,56
	2,4	5000	6400	**21307 MBW33**	0,56
40	2,1	4800	6300	**22208 C**	0,54
	2,1	4800	6300	**22208 CK**	0,54
	2,1	4800	6300	**22208 CKW33**	0,52
	2,1	4400	5800	**22208 MAC4F80W33**	0,654
	2,1	4400	5800	**22208 MB**	0,57
	2,1	4400	5800	**22208 MBK**	0,57
	2,1	4400	5800	**22208 MBKW33**	0,56
	2,1	4400	5800	**22208 MBW33**	0,56
	2,6	4500	6000	**21308 C**	0,710
	2,6	4500	6000	**21308 CK**	0,700
	2,5	4900	6500	**21308 CKW33**	0,700
	1,6	4300	5600	**22308 C**	0,97
	1,6	4300	5600	**22308 CK**	0,95
	1,6	4300	5600	**22308 CKW33**	0,93
	1,6	4300	5600	**22308 CW33**	0,96
	1,6	4300	5600	**22308 CY**	0,98
	1,6	4300	5600	**22308 CYK**	0,95
	1,6	4300	5600	**22308 CYKW33**	0,94
	1,6	4300	5600	**22308 CYW33**	0,972
	1,6	3800	5000	**22309 MAKC4F80W33**	1,42
	1,6	3800	5000	**22308 MBK**	1
	1,6	3800	5000	**22308 MBKW33**	0,99
	1,6	3800	5000	**22308 MB**	1,02
	1,6	3800	5000	**22308 MBW33**	1,05
45	2,5	4500	6000	**22209 C**	0,64
	2,5	4500	6000	**22209 CK**	0,62
	2,5	4500	6000	**22209 CKW33**	0,62

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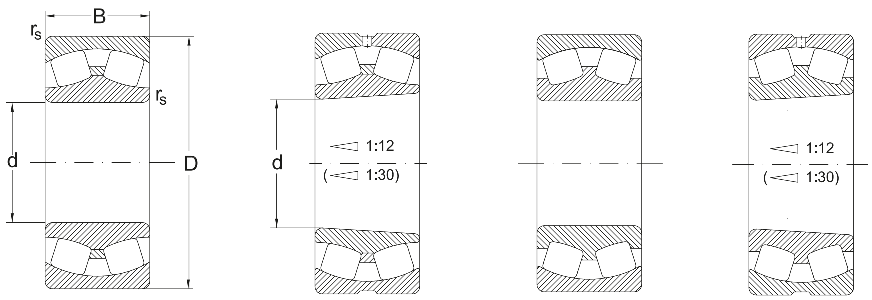

C CK/K30W33 MB MBK/K30W33

d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
Dimensions				Basical radial load				
mm				kN				kN
45	85	23	1,1	93	0,26	2,6	2,4	105
	85	23	1,1	77	0,28	2,4	3,5	87,5
	85	23	1,1	77	0,28	2,4	3,5	87,5
	85	23	1,1	77	0,28	2,4	3,5	87,5
	85	23	1,1	77	0,28	2,4	3,5	87,5
	100	25	1,5	120	0,26	2,6	3,9	135
	100	25	1,5	120	0,26	2,6	3,9	135
	100	25	1,5	120	0,26	2,6	3,9	135
	100	25	1,5	105	0,28	2,4	3,6	107
	100	36	1,5	165	0,35	1,9	2,9	190
	100	36	1,5	165	0,35	1,9	2,9	190
	100	36	1,5	165	0,4	1,9	2,9	190
	100	36	1,5	165	0,4	1,9	2,9	190
	100	36	1,5	150	0,4	1,7	2,5	175
	100	36	1,5	150	0,4	1,7	2,5	175
	100	36	1,5	150	0,4	1,7	2,5	175
	100	36	1,5	150	0,4	1,7	2,5	175
50	90	23	1,1	100	0,24	2,9	4,2	120
	90	23	1,1	100	0,24	2,9	4,2	120
	90	23	1,1	100	0,24	2,9	4,2	120
	90	23	1,1	100	0,24	2,9	4,2	120
	90	23	1,1	78	0,26	2,6	3,8	91,3
	90	23	1,1	78	0,26	2,6	3,8	91,3
	90	23	1,1	78	0,26	2,6	3,8	91,3
	90	23	1,1	78	0,26	2,6	3,8	91,3
	110	27	2	120	0,24	2,8	4,1	130
	110	27	2	120	0,24	2,8	4,1	130
	110	27	2	120	0,24	2,8	4,1	130
	110	40	2	190	0,38	1,8	2,7	220

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
45	2,5	4500	6000	**22209 CW33**	0,71
	2,3	4100	5500	**22209 MBK**	0,72
	2,3	4100	5500	**22209 MBKW33**	0,72
	2,3	4100	5500	**22209 MB**	0,72
	2,3	4100	5500	**22209 MBW33**	0,77
	2,6	4000	5300	**21309 C**	0,71
	2,6	4000	5300	**21309 CK**	0,54
	2,6	4000	5300	**21309 CKW33**	0,74
	2,3	3600	4800	**21309 MB**	0,77
	1,9	3800	5000	**22309 C**	1,38
	1,9	3800	5000	**22309 CK**	1,35
	1,9	3800	5000	**22309 CKW33**	1,38
	1,9	3800	5000	**22309 CW33**	1,38
	1,6	3400	4500	**22309 MBK**	1,36
	1,6	3400	4500	**22309 MBKW33**	1,36
	1,6	3400	4500	**22309 MB**	1,37
	1,6	3400	4500	**22309 MBW33**	1,36
50	2,7	4000	5300	**22210 C**	0,7
	2,7	4000	5300	**22210 CK**	0,69
	2,7	4000	5300	**22210 CKW33**	0,69
	2,7	4000	5300	**22210 CW33**	0,7
	2,5	3600	4800	**22210 MBK**	0,77
	2,5	3600	4800	**22210 MBKW33**	0,76
	2,5	3600	4800	**22210 MB**	0,77
	2,5	3600	4800	**22210 MBW33**	0,76
	2,7	3600	4800	**21310 C**	1,25
	2,7	3600	4800	**21310 CK**	1,20
	2,7	3600	4800	**21310 CKW33**	1,20
	1,7	3400	4500	**22310 C**	1,81

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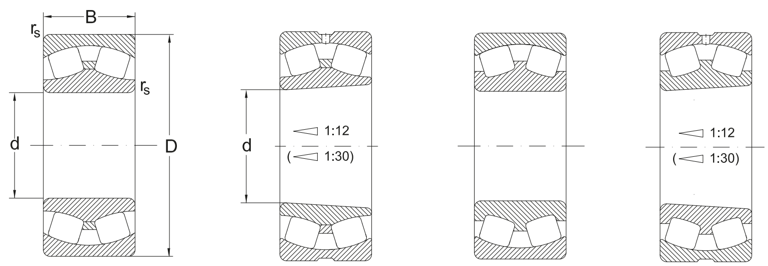

C CK/K30W33 MB MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
50	110	40	2	190	0,38	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	220
	110	40	2	190	0,4	1,8	2,7	202
	110	40	2	177	0,4	1,7	2,5	202
	110	40	2	177	0,4	1,7	2,5	202
	110	40	2	177	0,4	1,7	2,5	202
	110	40	2	177	0,4	1,7	2,5	202
	110	40	2	177	0,4	1,7	2,5	202
55	100	25	1,5	120	0,27	2,7	4,1	140
	100	25	1,5	120	0,27	2,7	4,1	140
	100	25	1,5	120	0,27	2,7	4,1	140
	100	25	1,5	120	0,27	2,7	4,1	140
	100	25	1,5	94	0,26	2,6	3,9	107
	100	25	1,5	94	0,26	2,6	3,9	107
	100	25	1,5	94	0,26	2,6	3,9	107
	100	25	1,5	94	0,26	2,6	3,9	107
	120	29	2	135	0,24	2,8	4,1	155
	120	29	2	135	0,24	2,8	4,1	155
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265

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d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
50	1,7	3400	4500	**22310 CK**	1,77
	1,7	3400	4500	**22310 CKW33**	1,76
	1,7	3400	4500	**22310 CW33**	1,81
	1,7	3400	4500	**22310 CY**	1,82
	1,7	3400	4500	**22310 CYK**	1,81
	1,7	3400	4500	**22310 CYKW33**	1,77
	1,7	3400	4500	**22310 CYW33**	1,81
	1,6	3000	4000	**22310 MBK**	1,85
	1,6	3000	4000	**22310 MBKW33**	1,83
	1,6	3000	4000	**22310 MAC4F80W33**	1,83
	1,6	3000	4000	**22310 MB**	1,85
	1,6	3000	4000	**22310 MBW33**	1,84
55	2,7	3800	5000	**22211 C**	0,91
	2,7	3800	5000	**22211 CK**	0,9
	2,7	3800	5000	**22211 CKW33**	0,8
	2,7	3800	5000	**22211 CW33**	0,89
	2,5	3600	4600	**22211 MBK**	0,89
	2,5	3600	4600	**22211 MBKW33**	0,88
	2,5	3600	4600	**22211 MB**	0,91
	2,5	3600	4600	**22211 MBW33**	0,89
	2,7	3200	4300	**21311 C**	1,65
	2,7	3200	4300	**21311 CK**	1,60
	1,6	3000	4000	**22311 C**	2,32
	1,6	3000	4000	**22311 CK**	2,27
	1,6	3000	4000	**22311 CKW33**	2,25
	1,6	3000	4000	**22311 CW33**	2,32
	1,6	3000	4000	**22311 CY**	2,34
	1,6	3000	4000	**22311 CYK**	2,28

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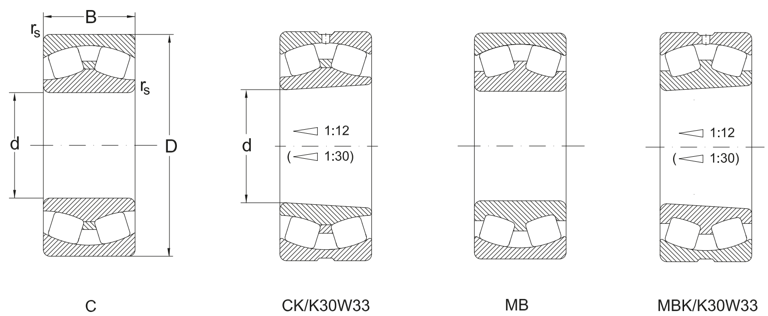

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
55	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	230	0,4	1,7	2,5	265
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
	120	43	2	220	0,4	1,7	2,5	255
60	110	28	1,5	145	0,27	2,7	4	175
	110	28	1,5	145	0,27	2,7	4	175
	110	28	1,5	145	0,27	2,7	4	175
	110	28	1,5	117,8	0,27	2,6	3,8	140,3
	110	28	1,5	117,8	0,27	2,6	3,8	140,3
	110	28	1,5	117,8	0,27	2,6	3,8	140,3
	110	28	1,5	117,8	0,27	2,6	3,8	140,3
	130	31	2,1	150	0,24	2,9	4,3	180
	130	31	2,1	150	0,24	2,9	4,3	180
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	270	0,4	1,7	2,5	320
	130	46	2,1	260	0,4	1,7	2,5	310
	130	46	2,1	260	0,4	1,7	2,5	310

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
55	1,6	3000	4000	**22311 CYKW33**	2,26
	1,6	3000	4000	**22311 CYW33**	2,32
	1,6	2800	3600	**22311 MBK**	2,1
	1,6	2800	3600	**22311 MAKW33**	2,44
	1,6	2800	3600	**22311 MA**	2,49
	1,6	2800	3600	**22311 MAC4F80W33**	2,42
	1,6	2800	3600	**22311 MAC4W502**	2,44
	1,6	2800	3600	**22311 MAW502**	2,44
	1,6	2800	3600	**22311 MB**	2,43
	1,6	2800	3600	**22311 MBW33**	2,42
60	2,7	3400	4500	**22212 C**	1,32
	2,7	3400	4500	**22212 CK**	1,29
	2,7	3400	4500	**22212 CKW33**	1,25
	2,5	3200	4100	**22212 MBK**	1,19
	2,5	3200	4100	**22212 MBKW33**	1,17
	2,5	3200	4100	**22212 MB**	1,17
	2,5	3200	4100	**22212 MBW33**	1,2
	2,8	3000	4000	**21312 C**	1,95
	2,8	3000	4000	**21312 CK**	1,90
	1,7	2800	3800	**22312 C**	2,91
	1,7	2800	3800	**22312 CK**	2,84
	1,7	2800	3800	**22312 CKW33**	2,8
	1,7	2800	3800	**22312 CW33**	2,87
	1,7	2800	3800	**22312 CY**	2,93
	1,7	2800	3800	**22312 CYK**	2,86
	1,7	2800	3800	**22312 CYKW33**	2,82
	1,7	2800	3800	**22312 CYW33**	2,89
	1,7	2600	3400	**22312 MBK**	3,04
	1,7	2600	3400	**22312 MBKW33**	3

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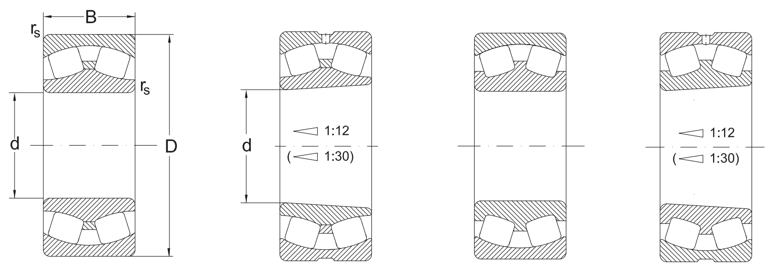

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
60	130	46	2,1	260	0,4	1,7	2,5	310
	130	46	2,1	260	0,4	1,7	2,5	310
	130	46	2,1	260	0,4	1,7	2,5	310
	130	31	2,1	151	0,24	2,9	4,3	152
65	120	31	1,5	180	0,28	2,4	3,6	220
	120	31	1,5	180	0,28	2,4	3,6	220
	120	31	1,5	180	0,28	2,4	3,6	220
	120	31	1,5	180	0,28	2,4	3,6	220
	120	31	1,5	165	0,28	2,4	3,6	200
	120	31	1,5	165	0,28	2,4	3,6	200
	120	31	1,5	165	0,28	2,4	3,6	200
	120	31	1,5	165	0,28	2,4	3,6	200
	140	33	2,1	220	0,24	2,8	4,2	290
	140	33	2,1	220	0,24	2,8	4,2	290
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	305	0,39	1,7	2,6	360
	140	48	2,1	280	0,39	1,7	2,6	360
	140	48	2,1	280	0,39	1,7	2,6	330
	140	48	2,1	280				330
	140	48	2,1	280	0,39	1,7	2,6	330
	140	48	2,1	280	0,39	1,7	2,6	330
	140	48	2,1	280	0,39	1,7	2,6	330
	140	48	2,1	280	0,39	1,7	2,6	330
	140	48	1,5	280	0,38	1,8	2,6	330

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
60	1,7	2600	3400	**22312 MAC4F80W33**	3,07
	1,7	2600	3400	**22312 MB**	3,04
	1,7	2600	3400	**22312 MBW33**	3
	2,8	2800	3800	**21312 MBK**	2,13
65	2,4	3000	4000	**22213 C**	1,73
	2,4	3000	4000	**22213 CK**	1,51
	2,4	3000	4000	**22213 CKW33**	1,65
	2,4	3000	4000	**22213 CW33**	1,68
	2,4	2800	3600	**22213 MBK**	1,59
	2,4	2800	3600	**22213 MBKW33**	1,57
	2,4	2800	3600	**22213 MB**	1,62
	2,4	2800	3600	**22213 MBW33**	1,6
	2,8	2800	3800	**21313 C**	2,45
	2,8	2800	3800	**21313 CK**	2,40
	1,7	2800	3600	**22313 C**	3,57
	1,7	2800	3600	**22313 CK**	3,44
	1,7	2800	3600	**22313 CKW33**	3,49
	1,7	2800	3600	**22313 CW33**	3,51
	1,7	2800	3600	**22313 CY**	3,54
	1,7	2800	3600	**22313 CYK**	3,44
	1,7	2800	3600	**22313 CYKW33**	3,43
	1,7	2800	3600	**22313 CYW33**	3,53
	1,7	2400	3200	**22313 MBK**	3,71
	1,7	2400	3200	**22313 MBKW33**	3,71
	1,7	2400	3200	**22313 MA**	3,56
	1,7	2400	3200	**22313 MAC4F80W33**	3,77
	1,7	2400	3200	**22313 MAC4W502**	3,51
	1,7	2400	3200	**22313 MAW502**	3,51
	1,7	2400	3200	**22313 MB**	3,51

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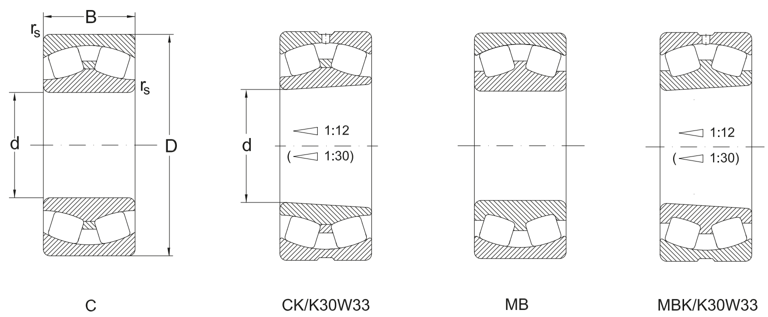

d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
		Dimensions		**Basical radial load**				
mm				kN				kN
65	140	48	1,5	280	0,39	1,7	2,6	330
70	125	31	1,5	180	0,26	2,6	3,9	225
	125	31	1,5	180	0,26	2,6	3,9	225
	125	31	1,5	180	0,26	2,6	3,9	225
	125	31	1,5	180	0,26	2,6	3,9	225
	125	31	1,5	145	0,24	2,8	4,2	177
	150	35	2,1	190	0,26	2,6	4	197
	150	35	2,1	190	0,26	2,6	4	197
	150	35	2,1	190	0,26	2,6	4	197
	150	51	2,1	375	0,38	1,9	2,9	455
	150	51	2,1	375	0,38	1,9	2,9	455
	150	51	2,1	375	0,38	1,9	2,9	455
	150	51	2,1	375	0,38	1,9	2,9	455
	150	51	2,1	340	0,37	1,8	2,7	420
	150	51	2,1	340	0,37	1,8	2,7	420
	150	51	2,1	340	0,37	1,8	2,7	420
	150	51	2,1	340	0,37	1,8	2,7	420
	150	51	2,1	340	0,37	1,8	2,7	420
	150	51	2,1	340	0,37	1,8	2,7	420
75	130	31	1,5	190	0,23	2,9	4,4	250
	130	31	1,5	190	0,23	2,9	4,4	250
	130	31	1,5	190	0,24	2,9	4,4	250
	130	31	1,5	190	0,24	2,9	4,4	250
	130	31	1,5	175	0,24	2,8	4,1	230
	130	31	1,5	175	0,24	2,8	4,1	230
	130	31	1,5	175	0,24	2,8	4,1	230
	130	31	1,5	175	0,24	2,8	4,1	230
	160	55	2,1	380	0,34	2,9		131
	160	55	2,1	280	0,23	2,9		360
	160	37	2,1	280	0,23	2,9		360

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Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
65	1,7	2400	3200	**22313 MBW33**	3,7
70	2,6	2800	3800	**22214 C**	1,82
	2,6	2800	3800	**22214 CK**	1,82
	2,6	2800	3800	**22214 CKW33**	1,8
	2,6	2800	3800	**22214 CW33**	1,82
	2,8	2600	3400	**22214 MBW33**	1,94
	2,6	2600	3400	**21314 MBKW33**	3,12
	2,6	2600	3400	**21314 MB**	3,2
	2,6	2600	3400	**21314 MBW33**	3,16
	1,9	2400	3200	**22314 C**	4,32
	1,9	2400	3200	**22314 CK**	4,32
	1,9	2400	3200	**22314 CKW33**	4,21
	1,9	2400	3200	**22314 CW33**	4,3
	1,7	2200	2800	**22314 MBK**	4,43
	1,7	2200	2800	**22314 MBKW33**	4,42
	1,7	2200	2800	**22314 MAC4F80W33**	4,58
	1,8	2200	2800	**22314 MB**	4,31
	1,7	2200	2800	**22314 MBW33**	4,61
	1,7	2200	2800	**22314 MBW7**	1,90
75	2,9	2800	3800	**22215 C**	1,91
	2,9	2800	3800	**22215 CK**	1,88
	2,9	2800	3800	**22215 CW33**	1,86
	2,9	2800	3800	**22215 CKW33**	1,86
	2,7	2600	3400	**22215 MBK**	1,75
	2,7	2600	3400	**22215 MBKW33**	1,73
	2,7	2600	3400	**22215 MB**	1,79
	2,7	2600	3400	**22215 MBW33**	1,77
	2,9	2400	3000	**22315 MBKW33**	1,73
	2,9	2400	3200	**21315 CW33**	3,50
	2,9	2400	3200	**21315 CKW33**	5,28

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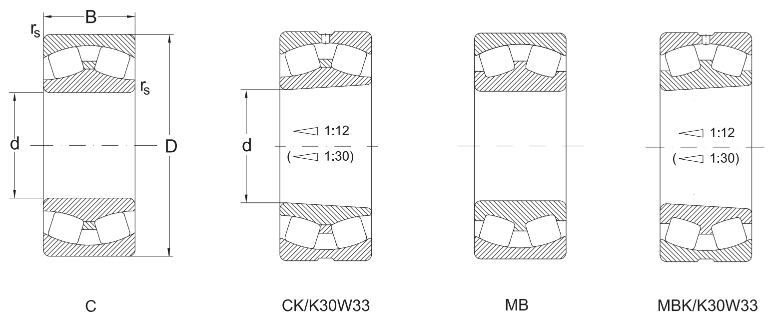

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
75	160	55	2,1	415	0,38	1,8	2,6	520
	160	55	2,1	415	0,38	1,8	2,6	520
	160	55	2,1	415	0,38	1,8	2,6	520
	160	55	2,1	415	0,38	1,8	2,6	520
	160	55	2,1	380	0,34	1,9	2,9	475
	160	55	2,1	380	0,34	1,9	2,9	475
	160	55	2,1	380	0,34	1,9	2,9	475
	160	55	2,1	380	0,34	1,9	2,9	475
	160	55	2,1	380	0,34	1,9	2,9	475
80	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	210	0,25	2,6	4	275
	140	33	2	195	0,24	2,8	4,1	250
	140	33	2	195	0,24	2,8	4,1	250
	140	33	2	195	0,24	2,8	4,1	250
	140	33	2	195	0,24	2,8	4,1	250
	170	39	2,1	310	0,23	2,9	4,2	400
	170	39	2,1	310	0,23	2,9	4,2	400
	170	58	2,1	450	0,35	1,9	2,9	550
	170	58	2,1	450	0,35	1,9	2,9	550
	170	58	2,1	450	0,35	1,9	2,9	550
	170	58	2,1	450	0,35	1,9	2,9	550
	170	58	2,1	410	0,25	2,6	4	500
	170	58	2,1	410	0,25	2,6	4	500

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Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
75	1,7	2200	3000	**22315 C**	5,28
	1,7	2200	3000	**22315 CW33**	5,26
	1,7	2200	3000	**22315 CK**	5,16
	1,7	2200	3000	**22315 CKW33**	5,14
	1,9	1900	2600	**22315 MBK**	5,14
	1,9	1900	2600	**22315 MBKW33**	5,12
	1,9	1900	2600	**22315 MAC4F80W33**	5,57
	1,9	1900	2600	**22315 MB**	5,26
	1,9	1900	2600	**22315 MBW33**	5,24
80	2,6	2600	3400	**22216 C**	2,12
	2,6	2600	3400	**22216 CW33**	2,1
	2,6	2600	3400	**22216 CK**	2,07
	2,6	2600	3400	**22216 CKW33**	2,05
	2,6	2600	3400	**22216 CY**	2,13
	2,6	2600	3400	**22216 CYK**	2,13
	2,6	2600	3400	**22216 CYKW33**	2,06
	2,6	2600	3400	**22216 CYW33**	2,11
	2,7	2400	3200	**22216 MBK**	2,09
	2,7	2400	3200	**22216 MBKW33**	2,07
	2,7	2400	3200	**22216 MB**	2,07
	2,7	2200	3000	**22216 MBW33**	2,1
	2,8	2200	3000	**21316 CW33**	4,26
	2,8	2200	3000	**21316 CKW33**	4,20
	1,8	2000	2600	**22316 C**	6,29
	1,8	2000	2600	**22316 CK**	6,14
	1,8	2000	2600	**22316 CKW33**	6,12
	1,8	2000	2600	**22316 CW33**	6,27
	2,6	1800	2400	**22316 MAC4F80W33**	6,95
	2,6	1800	2400	**22316 MBK**	6,11

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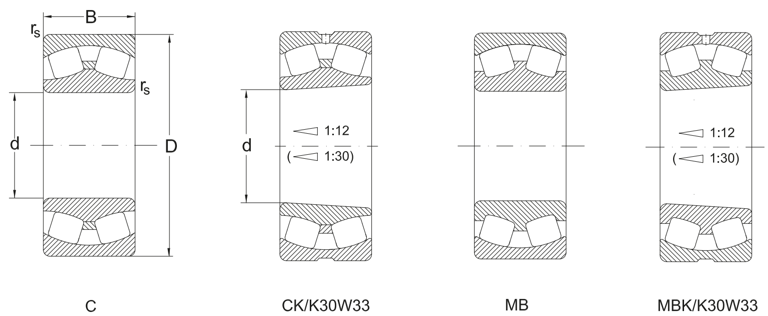

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
80	170	58	2,1	410	0,25	2,6	4	500
	170	58	2,1	410	0,25	2,6	4	500
	170	58	2,1	410	0,25	2,6	4	500
85	150	36	2	250	0,26	2,6	3,9	325
	150	36	2	250	0,26	2,6	3,9	325
	150	36	2	250	0,26	2,6	3,9	325
	150	36	2	250	0,26	2,6	3,9	325
	150	36	2	230	0,25	2,7	4	295
	150	36	2	230	0,25	2,7	4	295
	150	36	2	230	0,25	2,7	4	295
	150	36	2	230	0,25	2,7	4	295
	150	36	2	230	0,25	2,7	4	295
	180	41	3	233,4	0,22	3	4,5	244
	180	41	3	350	0,22	3	4,5	450
	180	41	3	350	0,22	3	4,5	450
	180	60	3	500	0,33	2	3	620
	180	60	3	500	0,33	2	3	620
	180	60	3	500	0,33	2	3	620
	180	60	3	407	0,22	3	4,5	507
	180	60	3	460	0,37	1,8	2,7	570
	180	60	3	460	0,37	1,8	2,7	570
	180	60	3	460	0,37	1,8	2,7	570
	180	60	3	460	0,37	1,8	2,7	570
	180	60	3	460	0,37	1,8	2,7	570
	180	60	3	407	0,22	3	4,5	507
	180	60	3	460	0,37	1,8	2,7	570

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
80	2,6	1800	2400	**22316 MB**	6,25
	2,6	1800	2400	**22316 MBW33**	6,23
	2,6	1800	2400	**22316 MBKW33**	6,09
85	2,6	2400	3200	**22217 C**	2,57
	2,6	2400	3200	**22217 CK**	2,52
	2,6	2400	3200	**22217 CW33**	2,56
	2,6	2400	3200	**22217 CKW33**	2,50
	2,6	2200	2800	**22217 MB**	2,76
	2,6	2200	2800	**22217 MBK**	2,7
	2,6	2200	2800	**22217 MBKW33**	2,69
	2,6	2200	2800	**22217 MBW7**	2,76
	2,6	2200	2800	**22217 MBW33**	2,75
	2,9	2100	2600	**21317 MBKW33**	5,78
	2,9	2200	2800	**21317 C**	5,10
	2,9	2200	2800	**21317 CK**	5,00
	2	1800	2400	**22317 C**	7,68
	2	1800	2400	**22317 CK**	7,52
	2	1800	2400	**22317 CKW33**	7,47
	2,9	2200	2800	**22317 CA**	7,64
	1,8	1800	2400	**22317 MBW33**	7,27
	1,8	1700	2200	**22317 MBK**	7,07
	1,8	1700	2200	**22317 MAC4F80W33**	7,88
	1,8	1700	2200	**22317 MB**	7,23
	1,8	1700	2200	**22317 MBW20**	7,23
	1,9	2200	2800	**22317 CA**	7,64
	1,8	1700	2200	**22317 MBKW33**	7,01

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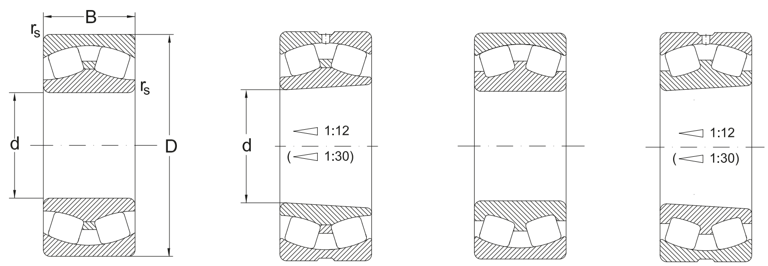

C CK/K30W33 MB MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
90	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	305	0,27	2,5	3,8	410
	160	40	2	280	0,26	2,6	3,8	375
	160	40	2	280	0,26	2,6	3,8	375
	160	40	2	280	0,26	2,6	3,8	375
	160	40	2	280	0,26	2,6	3,8	375
	160	52,4	2	340	0,34	2	3	485
	160	52,4	2	340	0,34	2	3	485
	160	52,4	2	340	0,34	2	3	485
	160	52,4	2	340	0,34	2	3	485
	190	43	3	385	0,22	3	4,5	510
	190	43	3	385	0,22	3	4,5	510
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	570	0,36	1,9	2,8	730
	190	64	3	530	0,37	1,8	2,7	670
	190	64	3	530	0,37	1,8	2,7	670
	190	64	3	530	0,37	1,8	2,7	670

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
90	2,5	2200	3000	**22218 C**	3,40
	2,5	2200	3000	**22218 CW33**	3,38
	2,5	2200	3000	**22218 CK**	3,33
	2,5	2200	3000	**22218 CKW33**	3,31
	2,5	2200	3000	**22218 CY**	3,41
	2,5	2200	3000	**22218 CYK**	3,34
	2,5	2200	3000	**22218 CYKW33**	3,33
	2,5	2200	3000	**22218 CYW33**	3,39
	2,5	2200	2800	**22218 MBK**	3,47
	2,5	2200	2800	**22218 MBKW33**	3,46
	2,5	2200	2800	**22218 MBW33**	3,46
	2,5	2200	2800	**22218 MB**	3,57
	2	1500	2000	**23218 MBKW33**	4,23
	2	1500	2000	**23218 MB**	4,37
	2	1500	2000	**23218 MBK**	4,25
	2	1500	2000	**23218 MBW33**	4,35
	2,9	2200	2800	**21318 C**	5,80
	2,9	2200	2800	**21318 CK**	5,70
	1,8	1800	2400	**22318 C**	8,52
	1,8	1800	2400	**22318 CK**	8,68
	1,8	1800	2400	**22318 CW33**	8,60
	1,8	1800	2400	**22318 CKW33**	8,50
	1,8	1800	2400	**22318 CY**	8,73
	1,8	1800	2400	**22318 CYK**	8,55
	1,8	1800	2400	**22318 CYKW33**	8,53
	1,8	1800	2400	**22318 CYW33**	8,71
	1,8	1700	2200	**22318 MBK**	8,5
	1,8	1700	2200	**22318 MBKW33**	8,49
	1,8	1700	2200	**22318 MA**	9,21

Spherical Roller Bearings
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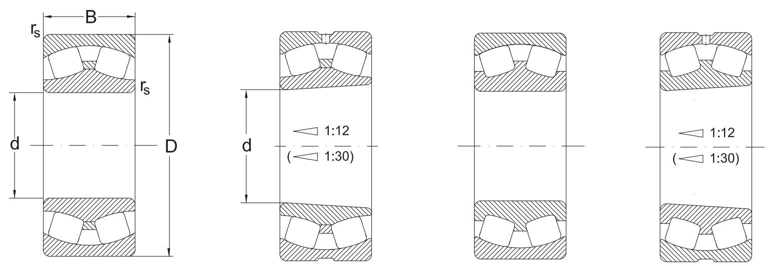

C   CK/K30W33   MB   MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
90	190	64	3	530	0,37	1,8	2,7	670
	190	64	3	530	0,37	1,8	2,7	670
	190	64	3	530	0,37	1,8	2,7	670
95	170	43	2,1	340	0,24	2,8	4,2	450
	170	43	2,1	340	0,24	2,8	4,2	450
	170	43	2,1	340	0,24	2,8	4,2	450
	170	43	2,1	340	0,24	2,8	4,2	450
	170	43	2,1	340	0,24	2,8	4,2	450
	170	43	2,1	310	0,26	2,6	3,8	415
	170	43	2,1	310	0,26	2,6	3,8	415
	170	43	2,1	310	0,26	2,6	3,8	415
	170	43	2,1	310	0,26	2,6	3,8	415
	170	43	2,1	310	0,26	2,6	3,8	415
	200	45	3	420	0,22	3	4,5	580
	200	45	3	385	0,22	3,1	4,6	530
	200	45	3	385	0,22	3,1	4,6	530
	200	67	3	620	0,35	1,9	2,9	800
	200	67	3	620	0,35	1,9	2,9	800
	200	67	3	620	0,35	1,9	2,9	800
	200	67	3	620	0,35	1,9	2,9	800
	200	67	3	620	0,35	1,9	2,9	800
	200	67	3	570	0,35	1,9	2,7	740
	200	67	3	570	0,38	1,8	2,7	740
	200	67	3	570	0,38	1,8	2,7	740
	200	67	3	570	0,38	1,8	2,7	740
	200	67	3	570	0,38	1,8	2,7	740
	200	67	3	570	0,38	1,8	2,7	740
100	165	52	2	390	0,28	2,4	3,5	590

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 378

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
90	1,8	1700	2200	**22318 MAC4F80W33**	9,2
	1,8	1700	2200	**22318 MB**	8,69
	1,8	1700	2200	**22318 MBW33**	8,68
95	2,8	2200	2800	**22219 C**	4,26
	2,8	2200	2800	**22219 CK**	4,17
	2,8	2200	2800	**22219 CKW33**	4,15
	2,8	2200	2800	**22219 CW25**	4,24
	2,8	2200	2800	**22219 CW33**	4,24
	2,5	2000	2600	**22219 MBK**	4,3
	2,5	2000	2600	**22219 MBKW33**	4,28
	2,5	2000	2600	**22219 MB**	4,32
	2,5	2000	2600	**22219 MBW25**	4,32
	2,5	2600	2600	**22319 MBW33**	4,28
	3	2600	2600	**21319 CA**	7,43
	3	2400	2400	**21319 MB**	7,38
	3	2400	2400	**21319 MBK**	7,28
	1,8	2200	2200	**22319 C**	8,83
	1,8	2200	2200	**22319 CK**	8,61
	1,8	2200	2200	**22319 CKW33**	8,5
	1,8	2200	2200	**22319 CW25**	8,71
	1,8	2200	2200	**22319 CW33**	8,72
	1,7	2000	2000	**22319 MBK**	9,88
	1,7	2000	2000	**22319 MAC4F80W33**	10,7
	1,7	2000	2000	**22319 MB**	10,1
	1,7	2000	2000	**22319 MBW25**	9,97
	1,7	2000	2000	**22319 MBW33**	9,97
	1,7	2000	2000	**22319 MBKW33**	9,97
100	2,3	2200	3000	**23120 CW33**	5

Spherical Roller Bearings
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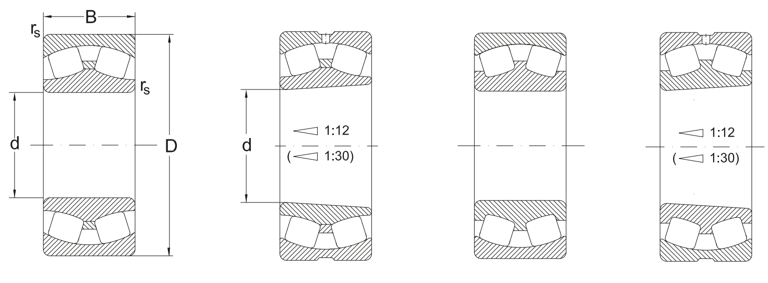

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
100	165	52	2	355	0,31	2,2	3,2	540
	165	52	2	355	0,31	2,2	3,2	540
	165	52	2	355	0,31	2,2	3,2	540
	165	52	2	355	0,31	2,2	3,2	540
	180	46	2,1	375	0,24	2,8	4,2	500
	180	46	2,1	375	0,24	2,8	4,2	500
	180	46	2,1	375	0,24	2,8	4,2	500
	180	46	2,1	375	0,24	2,8	4,2	500
	180	46	2,1	340	0,27	2,5	3,7	455
	180	46	2,1	340	0,27	2,5	3,7	455
	180	46	2,1	340	0,27	2,5	3,7	455
	180	46	2,1	340	0,27	2,5	3,7	455
	180	60,3	2,1	495	0,33	2	3	720
	180	60,3	2,1	495	0,33	2	3	720
	180	60,3	2,1	495	0,33	2	3	720
	180	60,3	2,1	495	0,33	2	3	720
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	180	60,3	2,1	455	0,33	2	3	660
	215	47	3	460	0,22	3,1	4,7	640
	215	47	3	371	0,24	2,8	4,2	410
	215	47	3	425	0,22	3,1	4,7	580
	215	73	3	730	0,35	1,9	2,9	960
	215	73	3	730	0,35	1,9	2,9	960
	215	73	3	730	0,35	1,9	2,9	960

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
100	2,1	2000	2600	**23120 MBKW33**	4,53
	2,1	2000	2600	**23120 MB**	4,7
	2,1	2000	2600	**23120 MBK**	4,57
	2,1	2000	2600	**23120 MBW33**	4,66
	2,8	2200	2800	**22220 C**	5,24
	2,8	2200	2800	**22220 CK**	5,13
	2,8	2200	2800	**22220 CKW33**	5,09
	2,8	2200	2800	**22220 CW33**	5,24
	2,4	2000	2600	**22220 MBK**	5,24
	2,4	2000	2600	**22220 MB**	5,35
	2,4	2000	2600	**22220 MBW33**	5,31
	2,4	2000	2600	**22220 MBKW33**	5,2
	2	1700	2200	**23220 C**	7,34
	2	1700	2200	**23220 CK**	7,19
	2	1700	2200	**23220 CKW33**	7,13
	2	1700	2200	**23220 CW33**	7,28
	2	1500	2000	**23220 MA**	7,04
	2	1500	2000	**23220 MAK**	6,85
	2	1500	2000	**23220 MAW33**	7,03
	2	1500	2000	**23220 MAKW33**	6,84
	2	1500	2000	**23220 MBK**	6,80
	2	1500	2000	**23220 MB**	6,99
	2	1500	2000	**23220 MBW33**	6,98
	3,1	1800	2400	**21320 CA**	9,07
	2,8	1700	2200	**21320 MB**	8,96
	3,1	1700	2200	**21320 MBK**	8,84
	1,9	1500	2000	**22320 C**	12,95
	1,9	1500	2000	**22320 CK**	12,67
	1,9	1500	2000	**22320 CW33**	12,83

Spherical Roller Bearings
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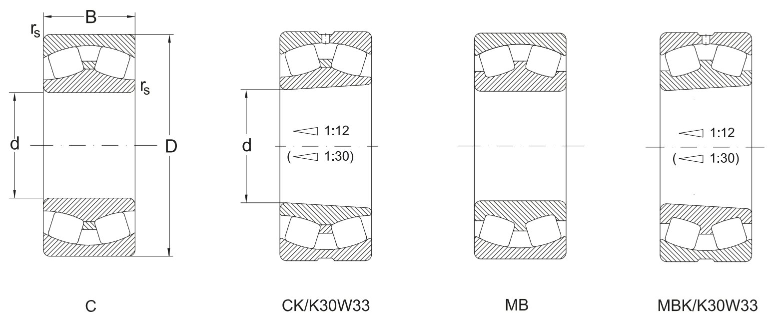

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm		min-1	min-1	kN				kN
100	215	73	3	730	0,35	1,9	2,9	960
	215	73	3	730	0,35	1,9	2,9	960
	215	73	3	670	0,37	1,8	2,9	880
	215	73	3	670	0,37	1,8	2,9	880
	215	73	3	670	0,37	1,8	2,9	880
	215	73	3	670	0,37	1,8	2,9	880
	215	73	3	670	0,37	1,8	2,7	880
	215	73	3	670	0,37	1,8	2,7	880
110	170	45	2	295	0,24	2,8	4,2	485
	170	45	2	295	0,24	2,8	4,2	485
	170	45	2	295	0,24	2,8	4,2	485
	170	45	2	295	0,24	2,8	4,2	485
	180	56	2	450	0,3	2,3	3,4	700
	180	56	2	410	0,3	2,3	3,3	640
	180	56	2	410	0,3	2,3	3,3	640
	180	56	2	410	0,3	2,3	3,3	640
	180	56	2	410	0,3	2,3	3,3	640
	180	69	2	466	0,39	1,7	2,6	771
	180	69	2	466	0,39	1,7	2,6	771
	180	69	2	466	0,39	1,7	2,6	771
	180	69	2	466	0,39	1,7	2,6	771
	200	53	2,1	515	0,25	2,7	4	650
	200	53	2,1	515	0,25	2,7	4	650
	200	53	2,1	515	0,25	2,7	4	650
	200	53	2,1	515	0,25	2,7	4	650
	200	53	2,1	455	0,28	2,4	3,5	585
	200	53	2,1	455	0,28	2,4	3,5	585
	200	53	2,1	455	0,28	2,4	3,5	585
	200	53	2,1	455	0,28	2,4	3,5	585

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
100	1,9	1500	2000	**22320 CKW33**	12,55
	1,9	1500	2000	**22320 CYW33**	12,83
	1,7	1400	1800	**22320 MBK**	13,21
	1,7	1400	1800	**22320 MBKW33**	13,09
	1,7	1400	1800	**22320 MA**	13,89
	1,7	1400	1800	**22320 MAC4F80W33**	13,78
	1,7	1400	1800	**22320 MB**	13,49
	1,7	1400	1800	**22320 MBW33**	13,37
110	2,7	2000	2600	**23022 MBK**	3,58
	2,7	2000	2600	**23022 MBKW33**	3,56
	2,7	2000	2600	**23022 MB**	3,8
	2,7	2000	2600	**23022 MBW33**	3,56
	2,2	2000	2600	**23122 C**	6,26
	2,2	1800	2400	**23122 MBK**	5,18
	2,2	1800	2400	**23122 MB**	5,29
	2,2	1800	2400	**23122 MBW33**	5,19
	2,2	1800	2400	**23122 MBKW33**	5,07
	1,7	1200	1600	**24122 CA**	6,82
	1,7	1200	1600	**24122 CAW33**	6,9
	1,7	1200	1600	**24122 CAK30**	6,9
	1,7	1200	1600	**24122 CAK30W33**	6,80
	2,5	1800	2400	**22222 C**	7,45
	2,5	1800	2400	**22222 CK**	7,45
	2,5	1800	2400	**22222 CKW33**	7,45
	2,5	1800	2400	**22222 CW33**	7,45
	2,3	1700	2200	**22222 MBK**	7,58
	2,3	1700	2200	**22222 MB**	7,10
	2,3	1700	2200	**22222 MBW33**	7
	2,3	1700	2200	**22222 MBKW33**	7,1

Spherical Roller Bearings
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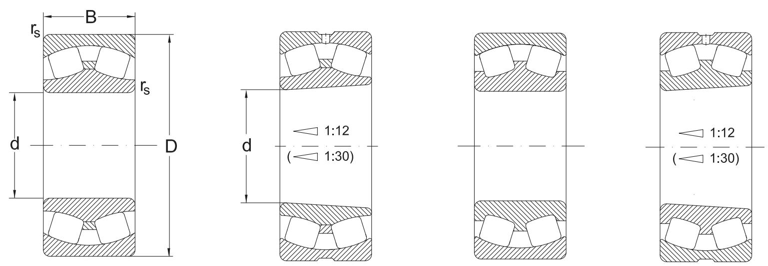

C   CK/K30W33   MB   MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
110	200	69,8	2,1	620	0,33	2	3	920
	200	69,8	2,1	570	0,37	1,8	2,7	840
	200	69,8	2,1	570	0,37	1,8	2,7	840
	200	69,8	2,1	570	0,37	1,8	2,7	840
	200	69,8	2,1	570	0,37	1,8	2,7	840
	200	69,8	2,1	570	0,37	1,8	2,7	840
	240	50	3	510	0,21	3,2	4,8	690
	240	50	3	510	0,21	3,2	4,8	690
	240	80	3	870	0,34	1,2	2,3	1160
	240	80	3	870	0,34	1,2	2,3	1160
	240	80	3	870	0,34	1,2	2,3	1160
	240	80	3	870	0,34	1,2	2,3	1160
	240	80	3	870	0,34	2	3	1160
	240	80	3	870	0,34	2	3	1160
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
	240	80	3	800	0,37	1,8	2,7	1060
120	180	46	2	365	0,22	3	4,6	610
	180	46	2	365	0,22	3	4,6	610
	180	46	2	365	0,22	3	4,6	610
	180	46	2	365	0,22	3	4,6	610
	180	46	2	335	0,24	2,8	4,2	560
	180	46	2	335	0,24	2,8	4,2	560
	180	46	2	335	0,24	2,8	4,2	560
	180	46	2	335	0,24	2,8	4,2	560

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
110	2	1400	1800	**23222 C**	10,75
	1,8	1200	1600	**23222 MBK**	9,40
	1,8	1200	1600	**23222 MB**	9,70
	1,8	1200	1600	**23222 MBW20**	9,40
	1,8	1200	1600	**23222 MBW33**	9,70
	1,8	1200	1600	**23222 MBKW33**	9,50
	3,2	1500	2000	**21322 MB**	12,0
	3,2	1500	2000	**21322 MBK**	11,7
	1,2	1400	1900	**22322 C**	18,0
	1,2	1400	1900	**22322 CW33**	18,0
	1,2	1400	1900	**22322 CK**	17,5
	1,2	1400	1900	**22322 CKW33**	17,5
	2	1400	1900	**22322 CY**	17,5
	2	1400	1900	**22322 CYK**	17,5
	1,8	1300	1700	**22322 MBK**	18,7
	1,8	1300	1700	**22322 MBKW33**	18,7
	1,8	1300	1700	**22322 MB**	17,7
	1,8	1300	1700	**22322 MBW33**	18,7
	1,8	1300	1700	**22322 MA**	18,4
	1,8	1300	1700	**22322 MAC4F80W33**	18,7
	1,8	1300	1700	**22322 MAW33**	18,7
120	2,8	2000	2600	**23024 C**	4,31
	2,8	2000	2600	**23024 CK**	4,11
	2,8	2000	2600	**23024 CKW33**	4,09
	2,8	2000	2600	**23024 CW33**	4,22
	2,8	1800	2400	**23024 MBK**	4,19
	2,8	1800	2400	**23024 MB**	4,19
	2,8	1800	2400	**23024 MBW33**	4,14
	2,8	1800	2400	**23024 MBKW33**	3,87

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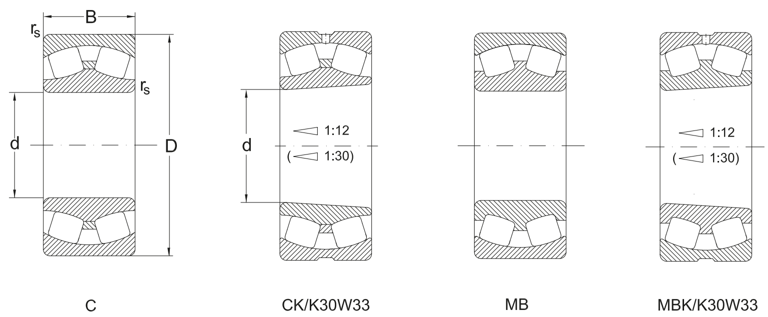

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
120	180	60	2	450	0,32	2,1	3,1	800
	180	60	2	450	0,32	2,1	3,1	800
	180	60	2	410	0,32	2,1	3,1	740
	180	60	2	410	0,32	2,1	3,1	740
	180	60	2	410	0,32	2,1	3,1	740
	200	62	2	495	0,31	2,2	3,3	770
	200	62	2	495	0,31	2,2	3,3	770
	200	62	2	495	0,31	2,2	3,3	770
	200	62	2	495	0,31	2,2	3,3	770
	200	80	2	630	0,4	1,7	2,5	1050
	200	80	2	630	0,4	1,7	2,5	1050
	200	80	2	630	0,4	1,7	2,5	1050
	215	58	2,1	590	0,27	2,6	3,8	800
	215	58	2,1	590	0,27	2,6	3,8	800
	215	58	2,1	590	0,27	2,6	3,8	800
	215	58	2,1	590	0,27	2,6	3,8	800
	215	58	2,1	540	0,29	2,3	3,5	740
	215	58	2,1	540	0,29	2,3	3,5	740
	215	58	2,1	540	0,29	2,3	3,5	740
	215	58	2,1	540	0,29	2,3	3,5	740
	215	76	2,1	730	0,35	1,9	2,9	1120
	215	76	2,1	670	0,37	1,8	2,7	1020
	215	76	2,1	670	0,37	1,8	2,7	1020
	215	76	2,1	670	0,37	1,8	2,7	1020
	215	76	2,1	670	0,37	1,8	2,7	1020
	260	86	3	1010	0,35	1,9	2,9	1340
	260	86	3	1010	0,35	1,9	2,9	1340
	260	86	3	1010	0,35	1,9	2,9	1340
	260	86	3	1010	0,35	1,9	2,9	1340

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
120	2	1500	2000	**24024 CAW33**	5,40
	2	1500	2000	**24024 CAK30W33**	5,30
	2	1400	1800	**24024 MBK30W33**	5,1
	2	1400	1800	**24024 MB**	5,12
	2	1400	1800	**24024 MBW33**	5,1
	2,2	1700	2200	**23124 MBK**	7,9
	2,2	1700	2200	**23124 MB**	8,19
	2,2	1700	2200	**23124 MBW33**	8,13
	2,2	1700	2200	**23124 MBKW33**	7,84
	1,6	1000	1300	**24124 MB**	10,22
	1,6	1000	1300	**24124 MBW33**	10,2
	1,6	1000	1300	**24124 MBK30W33**	10,04
	2,5	1700	2200	**22224 C**	8,9
	2,5	1700	2200	**22224 CK**	8,70
	2,5	1700	2200	**22224 CW33**	8,8
	2,5	1700	2200	**22224 CKW33**	8,60
	2,3	1500	2000	**22224 MBK**	9,53
	2,3	1500	2000	**22224 MBKW33**	9,09
	2,3	1500	2000	**22224 MB**	9,04
	2,3	1500	2000	**22224 MBW33**	9,73
	1,8	1300	1700	**23224 C**	13,1
	1,8	1100	1500	**23224 MBK**	11,84
	1,8	1100	1500	**23224 MB**	12,8
	1,8	1100	1500	**23224 MBW33**	11,73
	1,8	1100	1500	**23224 MBKW33**	11,73
	1,8	1300	1700	**22324 C**	23,76
	1,8	1300	1700	**22324 CK**	23,29
	1,8	1300	1700	**22324 CKW33**	23,05
	1,8	1300	1700	**22324 CW33**	23,52

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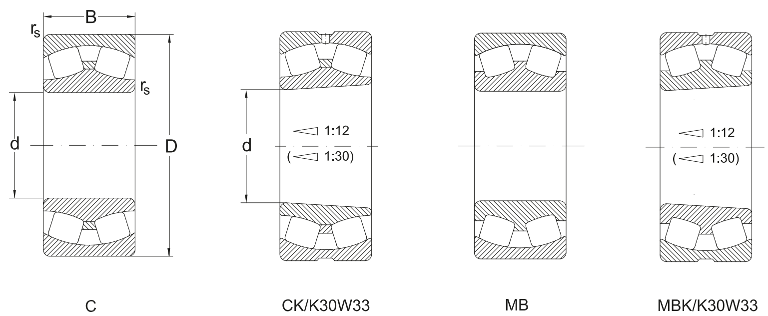

Dimensions				Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
120	260	86	3	930	0,36	1,8	2,7	1230
	260	86	3	930	0,36	1,8	2,7	1230
	260	86	3	930	0,36	1,8	2,7	1230
	260	86	3	930	0,36	1,8	2,7	1230
	260	86	3	930	0,36	1,8	2,7	1230
	260	86	3	930	0,36	1,8	2,7	1230
130	200	52	2	450	0,23	2,9	4,4	730
	200	52	2	450	0,23	2,9	4,4	730
	200	52	2	450	0,23	2,9	4,4	730
	200	52	2	450	0,23	2,9	4,4	730
	200	52	2	410	0,23	2,9	4,4	670
	200	52	2	410	0,23	2,9	4,4	670
	200	52	2	410	0,23	2,9	4,4	670
	200	52	2	410	0,23	2,9	4,4	670
	200	69	2	530	0,34	2	3	900
	200	69	2	530	0,34	2	3	900
	200	69	2	530	0,34	2	3	900
	210	64	2	590	0,28	2,4	3,6	940
	210	64	2	540	0,3	2,3	3,3	860
	210	64	2	540	0,3	2,3	3,3	860
	210	64	2	540	0,3	2,3	3,3	860
	210	64	2	540	0,3	2,3	3,3	860
	210	80	2	650	0,37	1,8	2,7	1100
	210	80	2	650	0,37	1,8	2,7	1100
	210	80	2	650	0,37	1,8	2,7	1100
	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	660	0,29	2,3	3,5	960

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Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
120	1,8	1100	1500	**22324 MAKC4F80W33**	23,93
	1,8	1100	1500	**22324 MBK**	22,93
	1,8	1100	1500	**22324 MAC4F80W33**	23,93
	1,8	1100	1500	**22324 MB**	23,39
	1,8	1100	1500	**22324 MBW33**	23,18
	1,8	1100	1500	**22324 MBKW33**	22,71
130	2,8	1800	2400	**23026 C**	4,59
	2,8	1800	2400	**23026 CK**	5,99
	2,8	1800	2400	**23026 CKW33**	5,94
	2,8	1800	2400	**23026 CW33**	6,09
	2,8	1700	2200	**23026 MBK**	5,61
	2,8	1700	2200	**23026 MB**	5,78
	2,8	1700	2200	**23026 MBW33**	5,73
	2,8	1700	2200	**23026 MBKW33**	5,56
	1,9	1200	1600	**24026 MB**	7,98
	1,9	1200	1600	**24026 MBW33**	7,79
	1,9	1200	1600	**24026 MBK30W33**	7,78
	2,5	1700	2200	**23126 C**	9,70
	2,2	1500	2000	**23126 MBK**	8,36
	2,2	1500	2000	**23126 MB**	8,66
	2,2	1500	2000	**23126 MBW33**	8,62
	2,2	1500	2000	**23126 MBKW33**	8,32
	1,8	900	1200	**24126 MB**	11,09
	1,8	900	1200	**24126 MBW33**	11,06
	1,8	900	1200	**24126 MBK30W33**	11,09
	2,3	1700	2200	**22226 C**	11,14
	2,3	1700	2200	**22226 CW33**	10,01
	2,3	1700	2200	**22226 CK**	10,87
	2,3	1700	2200	**22226 CKW33**	10,7

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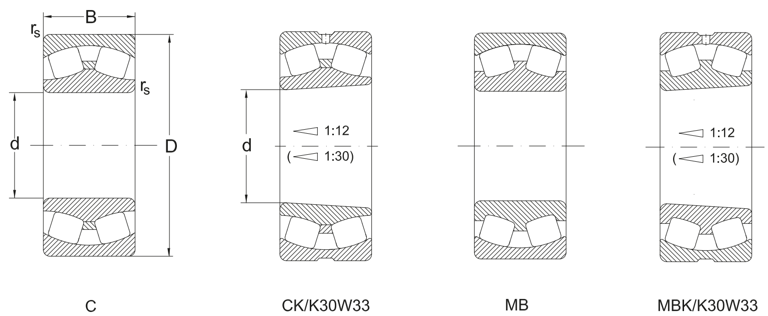

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
130	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	660	0,29	2,3	3,5	960
	230	64	3	600	0,29	2,3	3,4	880
	230	64	3	600	0,29	2,3	3,4	880
	230	64	3	600	0,29	2,3	3,4	880
	230	64	3	600	0,29	2,3	3,4	880
	230	80	3	830	0,33	2	3	1270
	230	80	3	760	0,35	1,9	2,8	1170
	230	80	3	760	0,35	1,9	2,8	1170
	230	80	3	760	0,35	1,9	2,8	1170
	230	80	3	760	0,35	1,9	2,8	1170
	280	93	4	1170	0,35	1,9	2,9	1580
	280	93	4	1170	0,35	1,9	2,9	1580
	280	93	4	1170	0,35	1,9	2,9	1580
	280	93	4	1170	0,35	1,9	2,9	1580
	280	93	4	1170	0,35	1,9	2,9	1580
	280	93	4	1080	0,37	1,8	2,7	1450
	280	93	4	1080	0,37	1,8	2,7	1450
	280	93	4	1080	0,37	1,8	2,7	1450
	280	93	4	1080	0,37	1,8	2,7	1450
	280	93	4	1080	0,37	1,8	2,7	1450
140	210	53	2	475	0,22	3	4,6	820
	210	53	2	475	0,22	3	4,6	820
	210	53	2	475	0,22	3	4,6	820
	210	53	2	475	0,22	3	4,6	820
	210	53	2	435	0,22	3	4,6	750
	210	53	2	435	0,22	3	4,6	750
	210	53	2	435	0,22	3	4,6	750

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
130	2,3	1700	2200	**22226 CY**	11,19
	2,3	1700	2200	**22226 CYK**	10,92
	2,3	1700	2200	**22226 CYW33**	11,06
	2,2	1500	2000	**22226 MBK**	11,32
	2,2	1500	2000	**22226 MBKW33**	11,2
	2,2	1500	2000	**22226 MBW33**	11,47
	2,2	1500	2000	**22226 MBK**	11,32
	2	1300	1700	**23226 C**	15,86
	1,9	1100	1500	**23226 MBK**	14,52
	1,9	1100	1500	**23226 MB**	14,97
	1,9	1100	1500	**23226 MBW33**	14,95
	1,9	1100	1500	**23226 MBKW33**	14,5
	1,8	1200	1600	**22326 C**	34,2
	1,8	1200	1600	**22326 CK**	28,65
	1,8	1200	1600	**22326 CKW33**	28,33
	1,8	1200	1600	**22326 CW33**	28,82
	1,8	1200	1600	**22326 CYW502**	28,97
	1,8	1100	1400	**22326 MBK**	28,77
	1,8	1100	1400	**22326 MAC4F80W33**	29,48
	1,8	1100	1400	**22326 MB**	28,59
	1,8	1100	1400	**22326 MBW33**	28,25
	1,8	1100	1400	**22326 MBKW33**	27,65
140	2,8	1700	2200	**23028 C**	7,20
	2,8	1700	2200	**23028 CK**	7,03
	2,8	1700	2200	**23028 CKW33**	6,96
	2,8	1700	2200	**23028 CW33**	7,13
	2,8	1500	2000	**23028 MBK**	6,07
	2,8	1500	2000	**23028 MB**	6,18
	2,8	1500	2000	**23028 MBW33**	6,08

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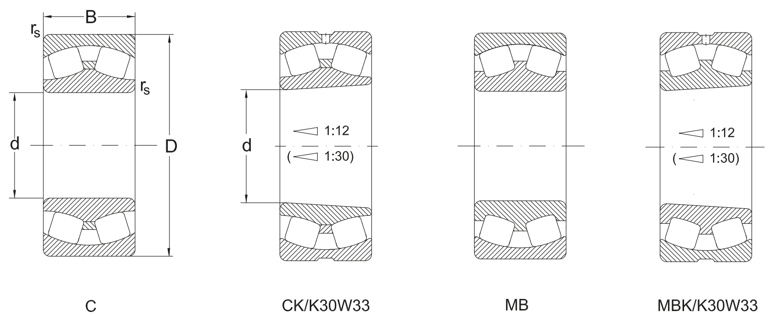

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
140	210	53	2	435	0,22	3	4,6	750
	210	69	2	550	0,32	2,1	3,1	990
	210	69	2	550	0,32	2,1	3,1	990
	225	68	2,1	660	0,28	2,4	3,6	1080
	225	68	2,1	600	0,3	2,3	3,3	990
	225	68	2,1	600	0,3	2,3	3,3	990
	225	68	2,1	600	0,3	2,3	3,3	990
	225	68	2,1	600	0,3	2,3	3,3	990
	225	85	2,1	740	0,37	1,8	2,7	1280
	225	85	2,1	740	0,37	1,8	2,7	1280
	225	85	2,1	740	0,37	1,8	2,7	1280
	250	68	3	730	0,26	2,6	3,9	1080
	250	68	3	730	0,26	2,6	3,9	1080
	250	68	3	730	0,26	2,6	3,9	1080
	250	68	3	730	0,26	2,6	3,9	1080
	250	68	3	670	0,29	2,3	3,5	990
	250	68	3	670	0,29	2,3	3,5	990
	250	68	3	670	0,29	2,3	3,5	990
	250	68	3	670	0,29	2,3	3,5	990
	250	68	3	670	0,29	2,3	3,5	990
	250	88	3	960	0,33	2	3	1500
	250	88	3	880	0,37	1,8	2,7	1380
	250	88	3	880	0,37	1,8	2,7	1380
	250	88	3	880	0,37	1,8	2,7	1380
	250	88	3	880	0,37	1,8	2,7	1380
	300	102	4	1360	0,35	1,9	2,9	1870
	300	102	4	1360	0,35	1,9	2,9	1870
	300	102	4	1360	0,35	1,9	2,9	1870

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
140	2,8	1500	2000	**23028 MBKW33**	5,98
	2,1	1100	1500	**24028 MBW33**	9,07
	2,1	1100	1500	**24028 MBK30W33**	8,66
	2,5	1500	2000	**23128 C**	11,8
	2,2	1400	1800	**23128 MBK**	10,38
	2,2	1400	1800	**23128 MB**	10,72
	2,2	1400	1800	**23128 MBW33**	10,69
	2,2	1400	1800	**23128 MBKW33**	10,36
	1,8	850	1100	**24128 MB**	13,27
	1,8	850	1100	**24128 MBW33**	13,2
	1,8	850	1100	**24128 MBK30W33**	13,19
	2,5	1400	1900	**22228 C**	14,4
	2,5	1400	1900	**22228 CK**	14,09
	2,5	1400	1900	**22228 CKW33**	13,97
	2,5	1400	1900	**22228 CW33**	14,27
	2,3	1300	1700	**22228 MBK**	14,2
	2,3	1300	1700	**22228 MBKW33**	13,97
	2,3	1300	1700	**22228 MB**	14,5
	2,3	1300	1700	**22228 MBW33**	14,27
	2,3	1300	1700	**22228 MBKW33**	13,97
	2	1100	1400	**23228 C**	20,86
	1,8	1000	1300	**23228 MBK**	18,72
	1,8	1000	1300	**23228 MB**	19,32
	1,8	1000	1300	**23228 MBW33**	19,19
	1,8	1000	1300	**23228 MBKW33**	18,59
	1,8	1100	1400	**22328 C**	45,7
	1,8	1100	1400	**22328 CK**	36,34
	1,8	1100	1400	**22328 CKW33**	36,13

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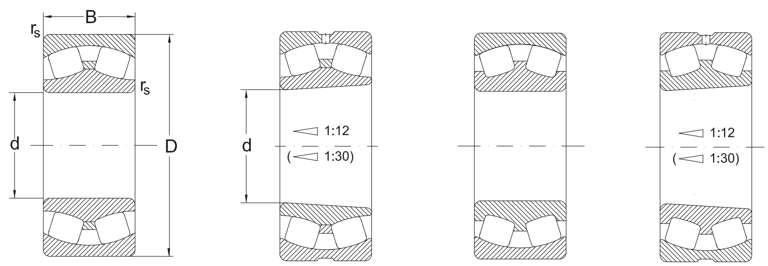

C CK/K30W33 MB MBK/K30W33

Dimensions				Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
140	300	102	4	1360	0,35	1,19	2,9	1870
	300	102	4	1240	0,38	1,7	2,6	1720
	300	102	4	1240	0,38	1,7	2,6	1720
	300	102	4	1240	0,38	1,7	2,6	1720
	300	102	4	1240	0,38	1,7	2,6	1720
	300	102	4	1240	0,38	1,7	2,6	1720
	300	118	4	1200	0,43	1,6	2,3	1700
150	225	56	2,1	520	0,22	3	4,6	900
	225	56	2,1	520	0,22	3	4,6	900
	225	56	2,1	520	0,22	3	4,6	900
	225	56	2,1	520	0,22	3	4,6	900
	225	56	2,1	480	0,22	3	4,6	830
	225	56	2,1	480	0,22	3	4,6	830
	225	56	2,1	480	0,22	3	4,6	830
	225	56	2,1	480	0,22	3	4,6	830
	225	75	2,1	620	0,33	2,1	3,1	1140
	225	75	2,1	620	0,33	2,1	3,1	1140
	225	75	2,1	620	0,33	2,1	3,1	1140
	225	75	2,1	620	0,33	2,1	3,1	1140
	250	100	2,1	1080	0,37	1,8	2,7	1840
	250	100	2,1	1080	0,4	1,7	2,5	1840
	250	100	2,1	1080	0,4	1,7	2,5	1840
	250	100	2,1	1080	0,4	1,7	2,5	1840
	250	100	2,1	1080	0,4	1,7	2,5	1840
	250	100	2,1	818	0,4	2,1	2,5	1357
	250	80	2,1	800	0,32	2,1	3,2	1320
	250	80	2,1	800	0,32	2,1	3,2	1320
	250	80	2,1	800	0,32	2,1	3,2	1320

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
140	1,8	1100	1400	**22328 CW33**	36,79
	1,7	1000	1300	**22328 MBK**	34,57
	1,7	1000	1300	**22328 MAC4F80W33**	37,5
	1,7	1000	1300	**22328 MB**	35,37
	1,7	1000	1300	**22328 MBW33**	35,17
	1,7	1000	1300	**22328 MBKW33**	34,37
	1,5	1100	1500	**23328 MAC4F80W33**	42,23
150	2,8	1500	2000	**23030 C**	8,57
	2,8	1500	2000	**23030 CK**	8,4
	2,8	1500	2000	**23030 CKW33**	8,32
	2,8	1500	2000	**23030 CW33**	8,51
	2,8	1400	1800	**23030 MBK**	8,05
	2,8	1400	1800	**23030 MB**	8,15
	2,8	1400	1800	**23030 MBW33**	8,11
	2,8	1400	1800	**23030 MBKW33**	8,05
	2	1100	1400	**24030 MBK30**	10,1
	2	1100	1400	**24030 MB**	10,25
	2	1100	1400	**24030 MBW33**	10,14
	2	1100	1400	**24030 MBK30W33**	9,97
	1,8	850	1100	**24130 C**	19,4
	1,6	850	1100	**24130 CA**	19,66
	1,6	850	1100	**24130 CAK30**	18,9
	1,6	850	1100	**24130 CAW33**	19,5
	1,6	850	1100	**24130 CAK30W33**	18,76
	1,6	750	1000	**24130 MBW33**	19,97
	2,1	1300	1700	**23130 MBK**	16
	2,1	1300	1700	**23130 MB**	16,37
	2,1	1300	1700	**23130 MBW33**	16,3

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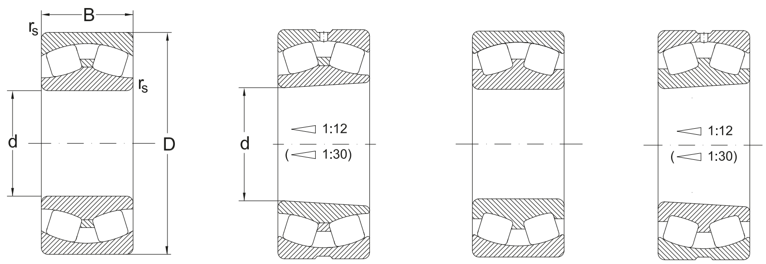

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
150	250	80	2,1	800	0,32	2,1	3,2	1320
	270	73	3	880	0,26	2,6	3,9	1300
	270	73	3	880	0,26	2,6	3,9	1300
	270	73	3	880	0,26	2,6	3,9	1300
	270	73	3	880	0,26	2,6	3,9	1300
	270	73	3	810	0,29	2,3	3,5	1190
	270	73	3	810	0,29	2,3	3,5	1190
	270	73	3	810	0,29	2,3	3,5	1190
	270	73	3	810	0,29	2,3	3,5	1190
	270	96	3	1030	0,38	1,8	2,7	1610
	270	96	3	1030	0,38	1,8	2,7	1610
	270	96	3	1030	0,38	1,8	2,7	1610
	270	96	3	1030	0,38	1,8	2,7	1610
	320	108	4	1520	0,35	1,9	2,9	2110
	320	108	4	1520	0,35	1,9	2,9	2110
	320	108	4	1520	0,35	1,9	2,9	2110
	320	108	4	1520	0,35	1,9	2,9	2110
	320	108	4	1400	0,38	1,7	2,6	1940
	320	108	4	1400	0,38	1,7	2,6	1940
	320	108	4	1400	0,38	1,7	2,6	1940
	320	108	4	1400	0,38	1,7	2,6	1940
	320	108	4	1400	0,38	1,7	2,6	1940
	320	108	4	1400	0,38	1,7	2,6	1940
160	240	60	2,1	610	0,22	3	4,6	1060
	240	60	2,1	610	0,22	3	4,6	1060
	240	60	2,1	610	0,22	3	4,6	1060
	240	60	2,1	610	0,22	3	4,6	1060
	240	60	2,1	560	0,22	3	4,6	970

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
150	2,1	1300	1700	**23130 MBKW33**	16,0
	2,5	1400	1800	**22230 C**	18,81
	2,5	1400	1800	**22230 CK**	18,43
	2,5	1400	1800	**22230 CKW33**	18,2
	2,5	1400	1800	**22230 CW33**	18,59
	2,3	1200	1600	**22230 MBK**	19,3
	2,3	1200	1600	**22230 MB**	17,79
	2,3	1200	1600	**22230 MBW33**	18,0
	2,3	1200	1600	**22230 MBKW33**	17,95
	1,7	1000	1300	**23230 MBK**	24,13
	1,7	1000	1300	**23230 MB**	24,58
	1,7	1000	1300	**23230 MBW33**	24,39
	1,7	1000	1300	**23230 MBKW33**	24,0
	1,8	1100	1400	**22330 C**	44,62
	1,8	1100	1400	**22330 CK**	43,87
	1,8	1100	1400	**22330 CKW33**	43,47
	1,8	1100	1400	**22330 CW33**	44,6
	1,7	1000	1300	**22330 MAKC4F80W33**	44,3
	1,7	1000	1300	**22330 MBK**	41,35
	1,7	1000	1300	**22330 MAC4F80W33**	44,4
	1,7	1000	1300	**22330 MB**	42,25
	1,7	1000	1300	**22330 MBW33**	41,85
	1,7	1000	1300	**22330 MBKW33**	40,95
160	2,8	1400	1900	**23032 C**	9,97
	2,8	1400	1900	**23032 CK**	9,71
	2,8	1400	1900	**23032 CKW33**	9,56
	2,8	1400	1900	**23032 CW33**	9,79
	2,8	1300	1700	**23032 MBK**	10,45

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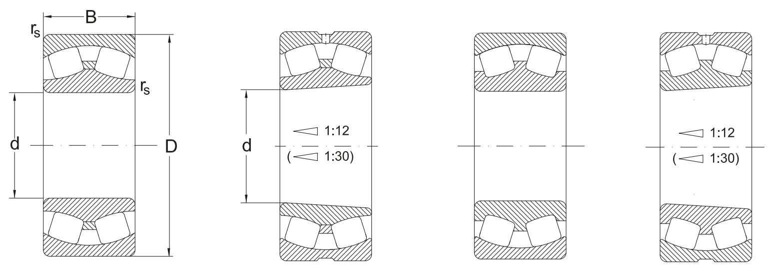

C CK/K30W33 MB MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
160	240	60	2,1	560	0,22	3	4,6	970
	240	60	2,1	560	0,22	3	4,6	970
	240	60	2,1	560	0,22	3	4,6	970
	240	60	2,1	720	0,32	2,1	3,1	1320
	240	80	2,1	720	0,32	2,1	3,1	1320
	240	80	2,1	720	0,32	2,1	3,1	1320
	270	109	2,1	1250	0,39	1,7	2,5	2110
	270	109	2,1	1250	0,39	1,7	2,5	2110
	270	109	2,1	1250	0,39	1,7	2,5	1776
	270	109	2,1	1250	0,39	1,7	2,5	2110
	270	109	2,1	1250	0,39	1,7	2,5	2110
	270	109	2,1	1250	0,39	1,7	2,5	2110
	270	109	2,1	940	0,41	1,6	2,4	1558
	270	86	2,1	1010	0,3	2,3	3,4	1640
	270	86	2,1	930	0,32	2,1	3,2	1510
	270	86	2,1	930	0,32	2,1	3,2	1510
	270	86	2,1	930	0,32	2,1	3,2	1510
	270	86	2,1	930	0,32	2,1	3,2	1510
	290	104	3	1180	0,38	1,8	2,7	1830
	290	104	3	1180	0,38	1,8	2,7	1830
	290	104	3	1180	0,38	1,8	2,7	1830
	290	104	3	1180	0,38	1,8	2,7	1830
	290	80	3	1040	0,26	2,6	3,9	1550
	290	80	3	1040	0,26	2,6	3,9	1550
	290	80	3	1040	0,26	2,6	3,9	1550
	290	80	3	1040	0,26	2,6	3,9	1550
	290	80	3	950	0,29	2,3	3,4	1420
	290	80	3	950	0,29	2,3	3,4	1420

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
160	2,8	1300	1700	**23032 MB**	10,61
	2,8	1300	1700	**23032 MBW33**	10,49
	2,8	1300	1700	**23032 MBKW33**	10,33
	2	1000	1300	**24032 MB**	14,79
	2	1000	1300	**24032 MBW33**	14,61
	2	1000	1300	**24032 MBK30W33**	14,42
	1,6	850	1100	**24132 C**	25,04
	1,6	850	1100	**24132 CW33**	24,96
	1,6	850	1100	**24132 CK30**	24,8
	1,6	850	1100	**24132 CK30W33**	24,76
	1,6	850	1100	**24132 CYK30W33**	24,85
	1,6	850	1100	**24132 CYW33**	25,05
	1,6	750	1100	**24132 MBW33**	25,38
	2,2	1400	1800	**23132 C**	22,9
	2,1	1200	1600	**23132 MBK**	20,9
	2,1	1200	1600	**23132 MB**	20,95
	2,1	1200	1600	**23132 MBW33**	20,81
	2,1	1200	1600	**23132 MBKW33**	20,1
	1,7	900	1200	**23232 MBK**	31,56
	1,7	900	1200	**23232 MB**	31,7
	1,7	900	1200	**23232 MBW33**	31,7
	1,7	900	1200	**23232 MBKW33**	31,1
	2,5	1300	1700	**23232 C**	24,9
	2,5	1300	1700	**22232 CK**	23,31
	2,5	1300	1700	**22232 CKW33**	24,6
	2,5	1300	1700	**22232 CW33**	23,6
	2,3	1100	1500	**22232 MBK**	22,27
	2,3	1100	1500	**22232 MB**	23,3

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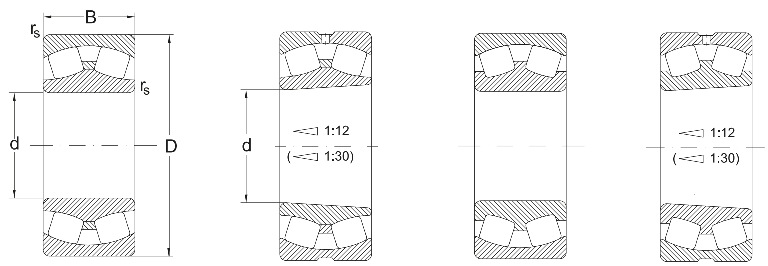

C | CK/K30W33 | MB | MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
160	290	80	3	950	0,29	2,3	3,4	1420
	290	80	3	950	0,29	2,3	3,4	1420
	340	114	4	1660	0,35	1,9	2,9	2350
	340	114	4	1660	0,35	1,9	2,9	2350
	340	114	4	1660	0,35	1,9	2,9	2350
	340	114	4	1660	0,35	1,9	2,9	2350
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	114	4	1520	0,37	1,8	2,7	2160
	340	136	4	1540	0,44	1,5	2,3	2200
170	260	67	2,1	750	0,23	2,9	4,4	1270
	260	67	2,1	750	0,23	2,9	4,4	1270
	260	67	2,1	750	0,23	2,9	4,4	1270
	260	67	2,1	750	0,23	2,9	4,4	1270
	260	67	2,1	680	0,23	2,9	4,4	1170
	260	67	2,1	680	0,23	2,9	4,4	1170
	260	67	2,1	680	0,23	2,9	4,4	1170
	260	67	2,1	680	0,23	2,9	4,4	1170
	260	90	2,1	880	0,34	2	3	1610
	260	90	2,1	880	0,34	2	3	1610
	260	90	2,1	880	0,34	2	3	1610
	260	90	2,1	880	0,34	2	3	1610
	280	109	2,1	1280	0,37	1,8	2,7	2230

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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
160	2,3	1100	1500	**22232 MBW33**	22,53
	2,3	1100	1500	**22232 MBKW33**	22,03
	1,8	1000	1300	**22332 C**	52,6
	1,8	1000	1300	**22332 CK**	52,16
	1,8	1000	1300	**22332 CKW33**	51,74
	1,8	1000	1300	**22332 CW33**	52,7
	1,8	900	1200	**22332 MBK**	49,16
	1,8	900	1200	**22332 MAC4F80W33**	50,08
	1,8	900	1200	**22332 MAC4W502**	50,08
	1,8	900	1200	**22332 MAW33**	50,08
	1,8	900	1200	**22332 MAW502**	50,0
	1,8	900	1200	**22332 MB**	50,26
	1,8	900	1200	**22332 MBW33**	49,84
	1,8	900	1200	**22332 MBKW33**	48,74
	1,5	1000	1400	**23332 MAC4F80W33**	61,85
170	2,8	1400	1800	**23034 C**	14,23
	2,8	1400	1800	**23034 CK**	13,95
	2,8	1400	1800	**23034 CKW33**	13,78
	2,8	1400	1800	**23034 CW33**	14,2
	2,8	1200	1600	**23034 MBK**	14,3
	2,8	1200	1600	**23034 MB**	14,32
	2,8	1200	1600	**23034 MBW33**	14,18
	2,8	1200	1600	**23034 MBKW33**	14,08
	2	1000	1300	**24034 MBK30**	17,3
	2	1000	1300	**24034 MB**	17,57
	2	1000	1300	**24034 MBW33**	17,5
	2	1000	1300	**24034 MBK30W33**	17,2
	1,8	750	1000	**24134 C**	27,3

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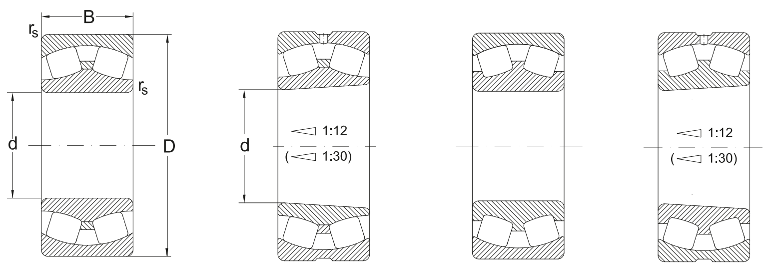

C CK/K30W33 MB MBK/K30W33

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
170	280	109	2,1	1280	0,39	1,7	2,6	2230
	280	109	2,1	1280	0,39	1,7	2,6	2230
	280	109	2,1	1280	0,39	1,7	2,6	2230
	280	109	2,1	1280	0,39	1,7	2,6	2230
	280	109	2,1	1029	0,37	1,8	2,7	1672
	280	109	2,1	1029	0,37	1,8	2,7	1672
	280	88	2,1	1280	0,37	1,8	2,7	2230
	280	88	2,1	990	0,31	2,2	3,2	1650
	280	88	2,1	990	0,31	2,2	3,2	1650
	280	88	2,1	990	0,31	2,2	3,2	1650
	280	88	2,1	990	0,31	2,2	3,2	1650
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1460	0,35	1,9	2,9	2320
	310	110	4	1340	0,36	1,9	2,8	2120
	310	110	4	1340	0,36	1,9	2,8	2120
	310	86	4	1170	0,27	2,5	3,7	1750
	310	86	4	1170	0,27	2,5	3,7	1750
	310	86	4	1170	0,27	2,5	3,7	1750
	310	86	4	1170	0,27	2,5	3,7	1750
	310	86	4	1080	0,3	2,3	3,4	1610
	310	86	4	1080	0,3	2,3	3,4	1610
	310	86	4	1080	0,3	2,3	3,4	1610

Spherical Roller Bearings
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Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
170	1,7	750	1000	**24134 CA**	27,46
	1,7	750	1000	**24134 CAW33**	27,41
	1,7	750	1000	**24134 CAK30**	27,41
	1,7	750	1000	**24134 CAK30W33**	27,3
	1,8	650	800	**24134 MBK30W33**	27,94
	1,8	650	800	**24134 MBW33**	28,4
	1,8	1300	1700	**23134 C**	27,3
	2,1	1100	1500	**23134 MBK**	21,4
	2,1	1100	1500	**23134 MB**	21,46
	2,1	1100	1500	**23134 MBW33**	21,41
	2,1	1100	1500	**23134 MBKW33**	21,31
	1,8	900	1200	**23234 C**	35,82
	1,8	900	1200	**23234 CA**	37,47
	1,8	900	1200	**23234 CAK**	36,38
	1,8	900	1200	**23234 CAKW33**	36,41
	1,8	900	1200	**23234 CAW33**	37,17
	1,8	900	1200	**23234 CK**	34,75
	1,8	900	1200	**23234 CKW33**	34,55
	1,8	900	1200	**23234 CW33**	35,67
	1,8	850	1100	**23234 MBW33**	37,8
	1,8	850	1100	**23234 MBKW33**	35,68
	2,5	1200	1600	**22234 C**	31,7
	2,5	1200	1600	**22234 CK**	31,7
	2,5	1200	1600	**22234 CKW33**	31,28
	2,5	1200	1600	**22234 CW33**	31,29
	2,2	1300	1100	**22234 MBK**	27,89
	2,2	1100	1400	**22234 MB**	28,5
	2,2	1100	1400	**22234 MBW33**	28,2

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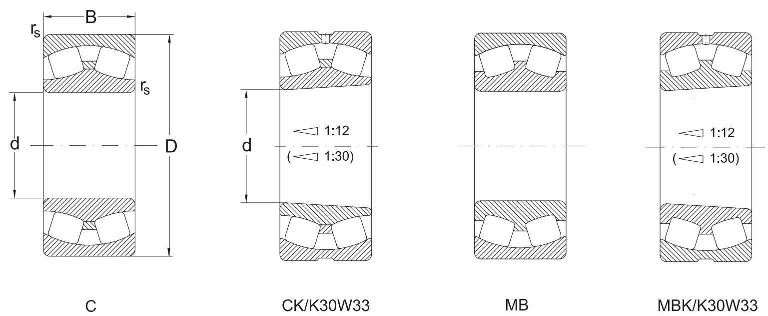

	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
170	310	86	4	1080	0,3	2,3	3,4	1610
	360	120	4	1850	0,33	2	3	2590
	360	120	4	1850	0,33	2	3	2590
	360	12	4	1850	0,33	2	3	2590
	360	120	4	1850	0,33	2	3	2590
	360	120	4	1690	0,37	1,8	2,7	2380
	360	120	4	1690	0,37	1,8	2,7	2380
	360	120	4	1690	0,37	1,8	2,7	2380
	360	120	4	1690	0,37	1,8	2,7	2380
	360	120	4	1690	0,37	1,8	2,7	2380
180	250	52	2	454	0,2	3,5	5,2	830
	280	100	2,1	1030	0,36	1,9	2,8	1900
	280	100	2,1	1030	0,36	1,9	2,8	1900
	280	100	2,1	1030	0,36	1,9	2,8	1900
	280	74	2,1	870	0,24	2,8	4,2	1500
	280	74	2,1	870	0,24	2,8	4,2	1500
	280	74	2,1	870	0,24	2,8	4,2	1500
	280	74	2,1	870	0,24	2,8	4,2	1500
	280	74	2,1	800	0,24	2,8	4,2	1380
	280	74	2,1	800	0,24	2,8	4,2	1380
	280	74	2,1	800	0,24	2,8	4,2	1380
	280	74	2,1	800	0,24	2,8	4,2	1380
	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1460	0,4	1,7	2,5	2590

Spherical Roller Bearings
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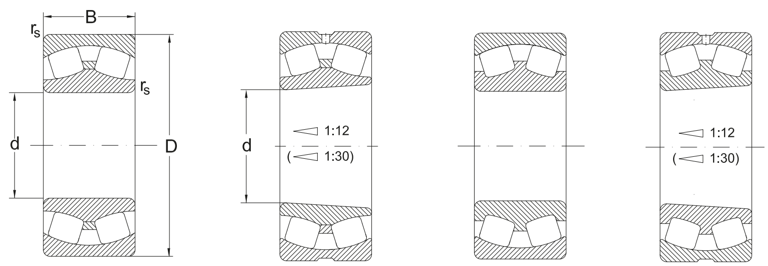
Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
170	2,2	1100	1400	**22234 MBKW33**	27,51
	2	900	1200	**22334 C**	65,3
	2	900	1200	**22334 CK**	63,99
	2	900	1200	**22334 CKW33**	63,59
	2	900	1200	**22334 CW33**	64,88
	1,8	850	1100	**22334 MBK**	57,53
	1,8	850	1100	**22334 MAC4F80W33**	60,01
	1,8	850	1100	**22334 MB**	58,83
	1,8	850	1100	**22334 MBW33**	58,41
	1,8	850	1100	**22334 MBKW33**	60,2
180	3,4	1300	1700	**23936 MBW33**	7,79
	1,9	900	1200	**24036 MB**	22,9
	1,9	900	1200	**24036 MBW33**	22,79
	1,9	900	1200	**24036 MBK30W33**	22,42
	2,8	1300	1700	**23036 C**	18,76
	2,8	1300	1700	**23036 CK**	18,36
	2,8	1300	1700	**23036 CKW33**	18,13
	2,8	1300	1700	**23036 CW33**	18,53
	2,8	1100	1500	**23036 MBK**	17,5
	2,8	1100	1500	**23036 MB**	17,26
	2,8	1100	1500	**23036 MBW33**	17,03
	2,8	1100	1500	**23036 MBKW33**	17,0
	1,6	700	950	**24136 C**	33,52
	1,6	700	950	**24136 CAK30W33**	33,0
	1,6	700	950	**24136 CAW33**	33,0
	1,6	700	950	**24136 CW33**	33,42
	1,6	700	950	**24136 CK30**	33,32
	1,6	700	950	**24136 CK30W33**	33,2

Spherical Roller Bearings
SR 3918



C CK/K30W33 MB MBK/K30W33

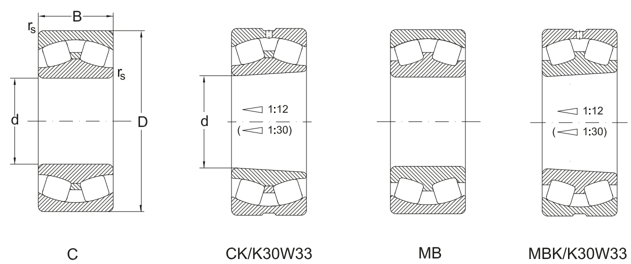
		Dimensions		Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
180	300	118	3	1460	0,4	1,7	2,5	2590
	300	118	3	1193	0,4	1,7	2,5	1962
	300	96	3	1260	0,3	2,3	3,4	2110
	300	96	3	1260	0,3	2,3	3,4	2110
	300	96	3	1260	0,3	2,3	3,4	2110
	300	96	3	1160	0,32	2,1	3,1	1940
	300	96	3	1160	0,32	2,1	3,1	1940
	300	96	3	1160	0,32	2,1	3,1	1940
	300	96	3	1160	0,32	2,1	3,1	1940
	300	118	3	1193	0,4	1,7	2,5	1962
	320	86	4	791	0,25	2,7	4	1395
	320	112	4	1420	0,36	1,9	2,8	2330
	320	112	4	1420	0,36	1,9	2,8	2330
	320	112	4	1420	0,36	1,9	2,8	2330
	320	86	4	1210	0,26	2,6	3,9	1870
	320	86	4	1210	0,26	2,6	3,9	1870
	320	86	4	1210	0,26	2,6	3,9	1870
	320	86	4	1210	0,26	2,6	3,9	1870
	320	86	4	1110	0,29	2,3	3,5	1720
	320	86	4	1110	0,29	2,3	3,5	1720
	320	86	4	1110	0,29	2,3	3,5	1720
	320	86	4	1110	0,29	2,3	3,5	1720
	380	126	4	1900	0,37	1,8	2,7	2700
	380	126	4	1900	0,37	1,8	2,7	2700
	380	126	4	1900	0,37	1,8	2,7	2700
	380	126	4	1900	0,37	1,8	2,7	2700
	380	126	4	1900	0,37	1,8	2,7	2700

Spherical Roller Bearings
SR 3918

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min -1	min -1		Kg
180	1,6	700	950	**24136 CYW33**	33,0
	1,6	600	750	**24136 MBW33**	33,84
	2,2	1200	1600	**23136 C**	30,6
	2,2	1200	1600	**23136 CKW33**	29,38
	2,2	1200	1600	**23136 CW33**	30,25
	2,1	1100	1400	**23136 MBK**	28,34
	2,1	1100	1400	**23136 MB**	28,4
	2,1	1100	1400	**23136 MBW33**	28,09
	2,1	1100	1400	**23136 MBKW33**	28,0
	1,6	600	750	**24136 MBK30W33**	33,32
	2,7	1200	1600	**22236 CKC3W33**	32,11
	1,8	750	1000	**23236 MBK**	38,5
	1,8	750	1000	**23236 MBW33**	39,81
	1,8	750	1000	**23236 MBKW33**	40,1
	2,5	1100	1500	**22236 C**	33,13
	2,5	1100	1500	**22236 CK**	32,58
	2,5	1100	1500	**22236 CKW33**	32,11
	2,5	1100	1500	**22236 CW33**	32,66
	2,3	1100	1400	**22236 MBK**	28,99
	2,3	1100	1400	**22236 MB**	29,69
	2,3	1100	1400	**22236 MBW33**	29,54
	2,3	1100	1400	**22236 MBKW33**	28,84
	1,8	850	1100	**22336 MBK**	67,18
	1,8	850	1100	**22336 MAC4F80W33**	71,8
	1,8	850	1100	**22336 MB**	68,68
	1,8	850	1100	**22336 MBW33**	71,8
	1,8	850	1100	**22336 MBKW33**	71,8

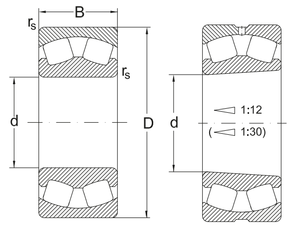
Spherical Roller Bearings



Dimensions **Basical radial load**

d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
190	260	52	2	465	0.18	3.7	5.5	900
	260	52	2	465	0.18	3.7	5.5	900
	290	75	2.1	915	0.23	3	4.4	1530
	290	75	2.1	915	0.23	3	4.4	1530
	290	75	2.1	930	0.26	2.6	3.9	1470
	290	100	2.1	1080	0.34	2	3	1980
	290	100	2.1	1080	0.34	2	3	1980
	320	104	3	1320	0.33	2	3	2290
	320	104	3	1320	0.33	2	3	2290
	320	128	3	1330	0.37	1.8	2.7	2320
	320	128	3	1330	0.37	1.8	2.7	2320
	320	128	3	1540	0.41	1.7	2.5	2750
	320	128	3	1540	0.41	1.7	2.5	2750
	340	92	4	1200	0.26	2.6	3.9	1830
	340	92	4	1200	0.26	2.6	3.9	1830
	340	92	4	1220	0.29	2.3	3.4	1870
	340	120	4	1750	0.35	1.9	2.9	2880
	340	120	4	1750	0.35	1.9	2.9	2880
	340	120	4	1610	0.36	1.9	2.8	2640
	400	132	5	1860	0.37	1.8	2.7	2500
	400	132	5	1860	0.37	1.8	2.7	2500
200	280	60	2.1	525	0.2	3.4	5.1	1020
	280	60	2.1	525	0.2	3.4	5.1	1020
	310	82	2.1	1060	0.23	2.9	4.3	1760
	310	82	2.1	1060	0.23	2.9	4.3	1760
	310	82	2.1	760	0,25	2.7	4	1350
	310	109	2.1	1140	0.35	1.9	2.9	2280

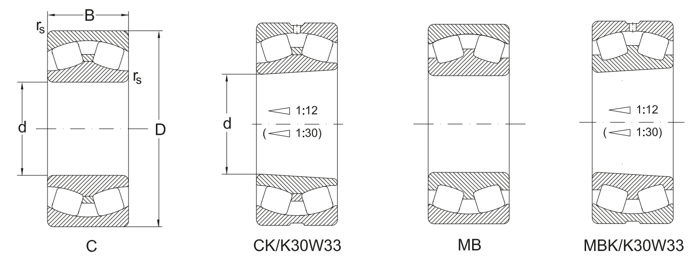
Spherical Roller Bearings



Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
190	3.6	1100	1500	**23938 M**	8.46
	3.6	1100	1500	**23938 MBK**	8.46
	2.9	1300	1700	**23038 C**	16.08
	2.9	1300	1700	**23038 CK**	16.08
	2.6	1100	1400	**23038 MBW33**	18.21
	2	850	1100	**24038 MB**	24.5
	2	850	1100	**24038 MBK30**	24.5
	2	1100	1400	**23138 MB**	35.6
	2	1100	1400	**23138 MBK**	35.6
	1.8	670	900	**24138 CAW33**	41.4
	1.8	670	900	**24138 CAK30W33**	41.4
	1.6	600	800	**24138 MBW33**	42.5
	1.6	600	800	**24138 MBK30W33**	41.9
	2.5	1100	1400	**22238 C**	37.2
	2.5	1100	1400	**22238 CK**	37.2
	2.3	1000	1300	**22238 MBW33**	36.53
	1.8	850	1100	**23238 C**	52.4
	1.8	850	1100	**23238 CK**	52.4
	1.8	750	1000	**23238 MBW33**	47.83
	1.8	750	1000	**22238 M**	81.2
	1.8	750	1000	**22238 MBK**	81.2
200	3.3	1100	1400	**23940 MB**	11.5
	3.3	1100	1400	**23940 MBK**	11.5
	2.8	1300	1700	**23040 C**	21.5
	2.8	1300	1700	**23040 CK**	21.5
	2.6	1000	1300	**23040 MBW33**	21.82
	1.9	850	1100	**24040 MB**	30.5

Spherical Roller Bearings



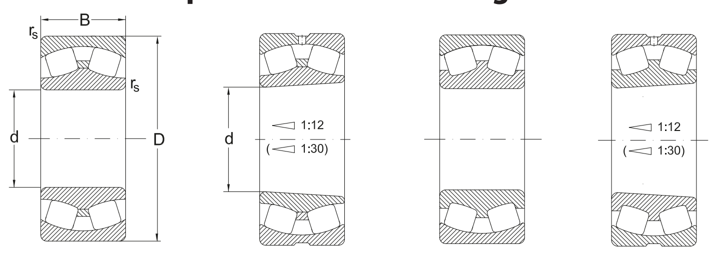
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
	Dimensions			Basical radial load				
mm				kN				kN
200	310	109	2.1	1140	0.35	1.9	2.9	2280
	340	112	3	1370	0.35	1.9	2.9	2460
	340	112	3	1370	0.35	1.9	2.9	2460
	340	140	3	1700	0.35	2	2.9	3000
	340	140	3	1700	0.35	2	2.9	3000
	340	140	3	1400	0.4	1.7	2.5	2385
	360	98	4	1250	0.29	2.3	3.9	2020
	360	98	4	1250	0.29	2.3	3.9	2020
	360	98	4	1140	0.26	2.6	3.9	1716
	360	128	4	1620	0.35	1.9	2.9	2590
	360	128	4	1620	0.35	1.9	2.9	2590
	360	128	4	1620	0.35	1.9	2.9	2590
	420	138	5	1910	0.36	1.8	2.8	2750
	420	138	5	1910	0.36	1.8	2.8	2750
220	300	60	2.1	625	0.18	3.8	5.6	1344
	300	60	2.1	625	0.18	3.8	5.6	1344
	340	90	3	1100	0.26	2.6	3.8	2000
	340	90	3	1100	0.26	2.6	3.8	2000
	340	118	3	1400	0.34	2	2.9	2700
	340	118	3	1400	0.34	2	2.9	2700
	340	140	4	1900	0.41	1.6	2.4	3450
	340	140	4	1900	0.41	1.6	2.4	3450
	370	120	4	1515	0.3	2.3	3.4	2509
	370	120	4	1515	0.3	2.3	3.4	2509
	400	108	4	1545	0.29	2.3	3.4	2300
	400	108	4	1545	0.29	2.3	3.4	2300
	400	108	4	1485	0.29	2.3	3.4	2483
	400	144	4	2065	0.35	1.9	2.9	3380
	400	144	4	1850	0.35	1.9	2.9	2899

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min^{-1}	min^{-1}		kg
200	1.9	850	1100	**24040 MBK**	30.5
	1.9	1100	1400	**23140 MB**	43.5
	1.9	1100	1400	**23140 MBK**	43.5
	1.9	800	1000	**24140 C**	52.5
	1.9	800	1000	**24140 CK30**	52.5
	1.6	560	750	**24140 MBW33**	52.07
	2.3	1100	1400	**22240 C**	44.4
	2.3	1100	1400	**22240 CK**	44.4
	2.5	900	1200	**22240 MBW33**	43.96
	1.8	750	1000	**23240 C**	58.4
	1.8	750	1000	**23240 CK**	58.4
	1.8	750	1000	**23240 MBW33**	57.7
	1.8	670	900	**22340 M**	91.8
	1.8	670	900	**22340 MBK**	91.8
220	3.7	1100	1500	**23944 MB**	13
	3.7	1100	1500	**23944 MBK**	13
	2.5	900	1200	**23044 MB**	31
	2.5	900	1200	**23044 MBK**	31
	1.9	750	1000	**24044 MB**	39.5
	1.9	750	1000	**24044 MBK30**	39.5
	1.6	700	900	**24144 MB**	65.5
	1.6	700	900	**24144 MBK30**	65.5
	2.2	1000	1300	**23144 MBK**	52
	2.2	1000	1300	**23144 MB**	52
	2.3	900	1200	**22244 C**	61.4
	2.3	900	1200	**22244 CK**	61.4
	2.3	850	1100	**22244 MBW33**	62.76
	1.8	670	900	**23244 C**	79.5
	1.8	600	800	**23244 MBW33**	80.62

Spherical Roller Bearings



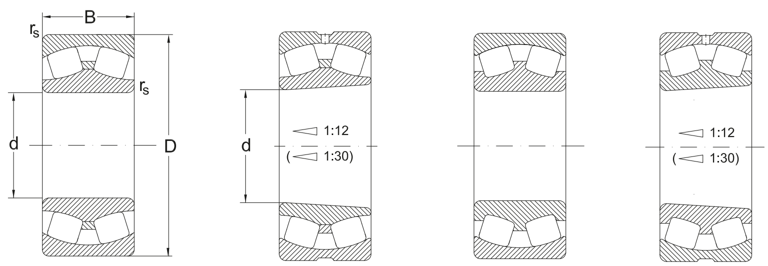
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
	Dimensions			**Basical radial load**				
mm				kN				kN
220	400	144	4	2065	0.35	1.9	2.9	3380
	460	145	5	2380	0.36	1.8	2.8	3407
	460	145	5	2380	0.36	1.8	2.8	3407
	460	145	5	2263	0.36	1.8	2.8	3272
240	320	60	2.1	600	0.17	4.1	6	1170
	320	60	2.1	600	0.17	4.1	6	1170
	360	92	3	1160	0.25	2.7	4.1	2200
	360	92	3	1160	0.25	2.7	4.1	2200
	360	118	3	1460	0.32	2.1	3.1	2841
	360	118	3	1460	0.32	2.1	3.1	2841
	400	160	4	1780	0.41	1.7	2.5	3109
	400	160	4	1780	0.41	1.7	2.5	3109
	400	128	4	1705	0.3	2.3	3.4	2863
	400	128	4	1705	0.3	2.3	3.4	2863
	440	120	4	1845	0.29	2.3	3.4	2763
	440	120	4	1845	0.29	2.3	3.4	2763
	440	120	4	1815	0.29	2.3	3.4	2701
	440	160	4	2530	0.35	1.9	2.9	4600
	440	160	4	2530	0.35	1.9	2.9	4600
	440	160	4	2370	0.35	1.9	2.9	3837
	500	155	5	2650	0.31	2.2	3.3	4000
	500	155	5	2650	0.31	2.2	3.3	4000
260	360	75	2.1	845	0.19	3.5	5.3	1604
	360	75	2.1	845	0.19	3.5	5.3	1604
	400	104	4	1500	0.26	2.6	3.9	2800
	400	104	4	1500	0.26	2.6	3.9	2800

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		kg
220	1.8	670	900	**23244 CK**	79.5
	1.8	700	950	**22344 C**	120
	1.8	750	950	**22344 MBW33**	119.85
	1.8	700	950	**22344 CK**	120
240	4	1000	1300	**23948 MBK**	14
	4	1000	1300	**23948 MB**	14
	2.7	800	1000	**23048 MBK**	33.9
	2.7	800	1000	**23048 MB**	33.9
	2.1	750	1000	**24048 MBK30**	42.5
	2.1	750	1000	**24048 MB**	42.5
	1.6	530	700	**24148 MB**	79.5
	1.6	530	700	**24148 MBK30**	79.5
	2.2	900	1200	**23148 MBK**	66
	2.2	900	1200	**23148 MB**	66
	2.3	850	1100	**22248 C**	83.2
	2.3	850	1100	**22248 CK**	83.2
	2.3	750	1000	**22248 MBW33**	84.48
	1.8	630	850	**23248 C**	109
	1.8	630	850	**23248 CK**	109
	1.8	560	750	**23248 MBW33**	103.66
	2.2	560	750	**22348 M**	151
	2.2	560	750	**22348 MBK**	151
260	3.5	850	1100	**23952 MBK**	24
	3.5	850	1100	**23952 MB**	24
	2.6	750	950	**23052 MBK**	49
	2.6	750	950	**23052 MB**	49

Spherical Roller Bearings



C CK/K30W33 MB MBK/K30W33

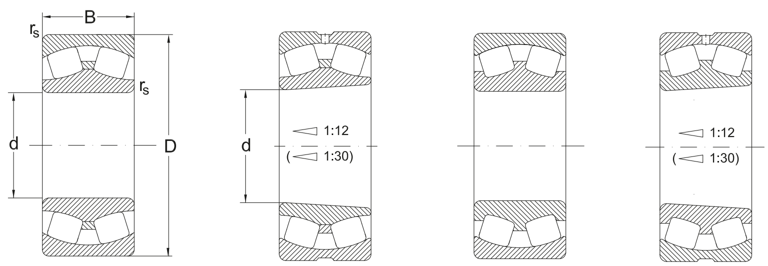
	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
260	400	140	4	1775	0.35	1.9	2.9	3494
	400	140	4	1775	0.35	1.9	2.9	3494
	440	180	4	2500	0.42	1.6	2.4	5100
	440	180	4	2500	0.42	1.6	2.4	5100
	440	144	4	2153	0.31	2.2	3.3	3673
	440	144	4	2153	0.31	2.2	3.3	3673
	480	174	5	2681	0.36	1.9	2.8	4431
	480	130	5	2190	0.29	2.3	3.4	3300
	480	130	5	2190	0.29	2.3	3.4	3300
	540	165	6	3125	0.36	1.8	2.8	4560
	540	165	6	3125	0.36	1.8	2.8	4560
280	380	75	2.1	950	0.18	3.8	5.6	2000
	380	75	2.1	950	0.18	3.8	5.6	2000
	420	106	4	1560	0.25	2.7	4.1	3000
	420	106	4	1560	0.25	2.7	4.1	3000
	420	140	4	2000	0.33	2	3	4000
	420	140	4	2000	0.33	2	3	4000
	460	146	5	2295	0.3	2.3	3.4	4050
	460	146	5	2295	0.3	2.3	3.4	4050
	460	180	5	2635	0.39	1.7	2.5	4848
	460	180	5	2635	0.39	1.7	2.5	4848
	500	130	5	2330	0.29	2.3	3.4	3600
	500	130	5	2330	0.29	2.3	3.4	3600
	500	176	5	2806	0.35	1.9	2.9	4645
	500	176	5	2806	0.35	1.9	2.9	4645

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min^{-1}	min^{-1}		Kg
260	1.9	600	800	**24052 MBK30**	66
	1.9	600	800	**24052 MB**	66
	1.6	480	630	**24152 MB**	110
	1.6	480	630	**24152 MBK30**	110
	2.2	850	1100	**23152 MBK**	92.5
	2.2	850	1100	**23152 MB**	92.5
	1.8	600	750	**23252 MBW33**	140.33
	2.3	750	1000	**22252 MB**	107
	2.3	750	1000	**22252 MBK**	107
	1.8	600	800	**22352 C**	187
	1.8	600	800	**22352 CK**	187
280	3.7	900	1200	**23956 MBK**	26
	3.7	900	1200	**23956 MB**	26
	2.7	700	900	**23056 MBK**	52.5
	2.7	700	900	**23056 MB**	52.5
	2	560	750	**24056 MBK30**	68.5
	2	560	750	**24056 MB**	68.5
	2.2	750	1000	**23156 MBK**	98.5
	2.2	750	1000	**23156 MB**	98.5
	1.7	400	530	**24156 MB**	118
	1.7	400	530	**24156 MBK30**	118
	2.3	700	950	**22256 MB**	113
	2.3	700	950	**22256 MBK**	113
	1.8	480	630	**23256 MB**	153
	1.8	480	630	**23256 MBK**	153

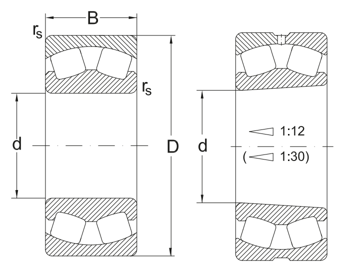
Spherical Roller Bearings



C CK/K30W33 MB MBK/K30W33

d	D	B	r_s min.	Basical radial load dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
280	580	175	6	3530	0.36	1.8	2.8	5208
	580	175	6	3530	0.36	1.8	2.8	5208
300	420	90	3	1175	0.2	3.4	5.1	2261
	420	90	3	1175	0.2	3.4	5.1	2261
	460	118	4	1960	0.25	2.7	4	3650
	460	118	4	1960	0.25	2.7	4	3650
	460	160	4	2385	0.35	2	2.9	4702
	460	160	4	2385	0.35	2	2.9	4702
	500	160	5	2385	0.3	2.3	3.4	4485
	500	160	5	2385	0.3	2.3	3.4	4485
	500	200	5	3213	0.4	1.7	2.5	6011
	500	200	5	3213	0.4	1.7	2.5	6011
	540	140	5	2655	0.29	2.3	3.4	4230
	540	140	5	2655	0.29	2.3	3.4	4230
320	440	90	3	1215	0.19	3.6	5.4	2409
	440	90	3	1215	0.19	3.6	5.4	2409
	480	121	4	2040	0.25	2.7	4.1	4000
	480	121	4	2040	0.25	2.7	4.1	4000
	480	160	4	2500	0.33	2.1	3.1	5240
	480	160	4	2500	0.33	2.1	3.1	5240
	540	176	5	3115	0.34	2	3	6000
	540	176	5	3115	0.34	2	3	6000
	540	218	5	3750	0.41	1.7	2.5	7300

Spherical Roller Bearings

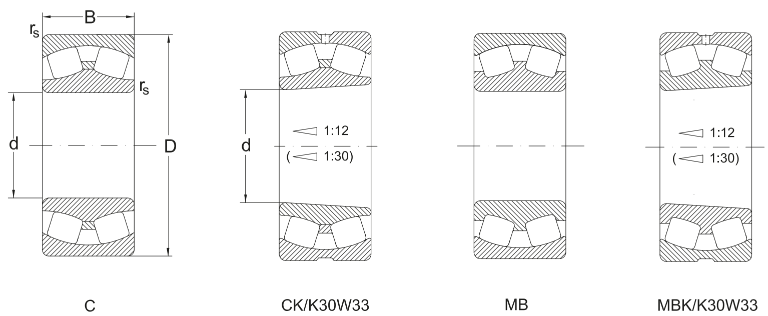


CA CAK/K30W33

Abutment and fillet dimensions see on page 377

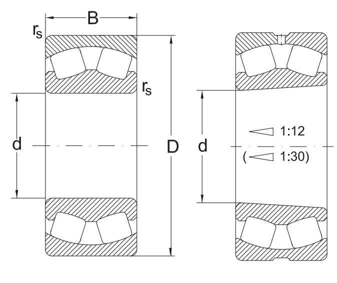
d	Y_0	Speed limit grease	oil	Designation	Mass
mm		min -1	min -1		Kg
280	1.8	560	750	**22356 C**	235
	1.8	560	750	**22356 CK**	235
300	3.3	750	1000	**23960 MBK**	40
	3.3	750	1000	**23960 MB**	40
	2.6	630	800	**23060 MBK**	73.6
	2.6	630	800	**23060 MB**	73.6
	1.9	560	759	**24060 MBK30**	97
	1.9	560	759	**24060 MB**	97
	2.2	700	950	**23160 MBK**	129
	2.2	700	950	**23160 MB**	129
	1.6	430	560	**24160 MB**	159
	1.6	430	560	**24160 MBK30**	159
	2.3	670	900	**22260 CAKW33**	142
	2.3	670	900	**22260 CAW33**	142
320	3.5	670	900	**23964 MBK**	42
	3.5	670	900	**23964 MB**	42
	2.7	600	750	**23064 MBK**	79.5
	2.7	600	750	**23064 MB**	79.5
	2	530	700	**24064 MBK30**	106
	2	530	700	**24064 MB**	106
	1.9	530	670	**23164 MB**	165
	1.9	530	670	**23164 MBK**	165
	1.6	400	530	**24164 MB**	215

Spherical Roller Bearings



	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
320	540	218	5	3750	0.41	1.7	2.5	7300
	580	150	5	2997	0.29	2.5	3.7	4740
	580	150	5	2997	0.29	2.5	3.7	4740
	580	208	5	4130	0.35	1.9	2.9	7026
	580	208	5	4130	0.35	1.9	2.9	7026
340	440	90	3	1306	0.189	3.8	5.7	2691
	440	90	3	1306	0.189	3.8	5.7	2691
	520	133	5	2360	0.25	2.7	4	4500
	520	133	5	2360	0.25	2.7	4	4500
	520	180	5	2912	0.34	2	2.9	5961
	520	180	5	2912	0.34	2	2.9	5961
	580	190	5	3605	0.31	2.2	3.2	6409
	580	190	5	3605	0.31	2.2	3.2	6409
	580	243	5	4400	0.43	1.6	2.3	8500
	580	243	5	4400	0.43	1.6	2.3	8500
360	480	90	3	1030	0.17	4.1	6	3200
	480	90	3	1030	0.17	4.1	6	3200
	540	134	5	2450	0.25	2.7	4.1	4800
	540	134	5	2450	0.25	2.7	4.1	4800
	540	180	5	3150	0.33	2.1	3.1	6530
	540	180	5	3150	0.33	2.1	3.1	6530
	600	192	5	3740	0.33	2.3	3.4	7010
	600	192	5	3740	0.33	2.3	3.4	7010

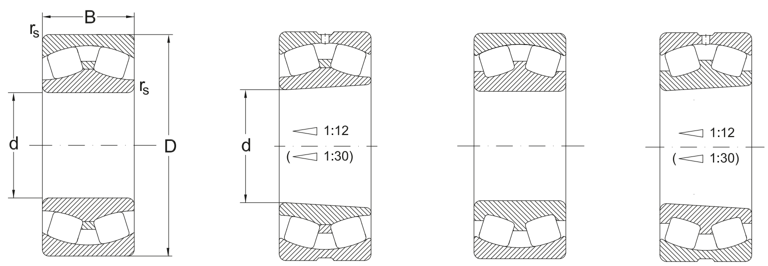
Spherical Roller Bearings



Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
320	1.6	400	530	**24164 MBK30**	215
	2.5	630	580	**22264 CAKW33**	180
	2.5	630	580	**22264 CAW33**	180
	1.8	430	560	**23264 MB**	247
	1.8	430	560	**23264 MBK**	247
340	3.8	630	850	**23968 MBK**	45
	3.8	630	850	**23698 MB**	45
	2.6	560	700	**23068 MBK**	105
	2.6	560	700	**23068 MB**	105
	1.9	480	600	**24068 CAW33**	143
	1.9	480	600	**24068 CAK30W33**	143
	2.2	630	850	**23168 MBK**	212
	2.2	630	850	**23168 MB**	212
	1.5	450	560	**24168 MB**	266
	1.5	450	560	**24168 MBK30**	266
360	4	560	700	**23972 MBK**	47
	4	560	700	**23972 MB**	47
	2.7	530	670	**23072 MBK**	111
	2.7	530	670	**23072 MB**	111
	2	480	630	**24072 MBK30**	145
	2	480	630	**24072 MB**	145
	2.2	600	800	**23172 MBK**	220
	2.2	600	800	**23172 MB**	220

Spherical Roller Bearings



C CK/K30W33 MB MBK/K30W33

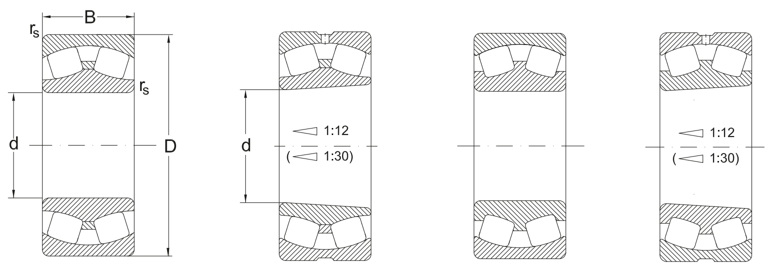
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
	Dimensions			**Basical radial load**				
mm				kN				kN
360	600	243	5	4500	0.41	1.6	2.4	9000
	600	243	5	4500	0.41	1.6	2.4	9000
	650	232	6	4880	0.35	1.9	2.9	8490
	650	232	6	4880	0.35	1.9	2.9	8490
380	520	106	4	1785	0.19	3.6	5.3	4000
	520	106	4	1785	0.19	3.6	5.3	4000
	560	135	5	2550	0.25	2.8	4.2	5300
	560	135	5	2550	0.25	2.8	4.2	5300
	560	180	5	3150	0.31	2.2	3.2	6710
	560	180	5	3150	0.31	2.2	3.2	6710
	620	194	5	3740	0.3	2.3	3.4	7540
	620	194	5	3740	0.3	2.3	3.4	7540
	620	243	5	4650	0.39	1.7	2.5	9500
	620	243	5	4650	0.39	1.7	2.5	9500
	680	240	6	5050	0.35	1.9	2.9	9660
	680	240	6	5050	0.35	1.9	2.9	9660
400	540	106	4	1850	0.18	3.7	5.5	3990
	540	106	4	1850	0.18	3.7	5.5	3990
	600	148	5	3050	0.24	2.8	4.1	6200
	600	148	5	3050	0.24	2.8	4.1	6200
	600	200	5	3610	0.33	2.1	3.1	7545
	600	200	5	3610	0.33	2.1	3.1	7545
	650	200	6	4100	0.28	2.4	3.6	7730

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
360	1.6	430	530	**24172 MB**	278
	1.6	430	530	**24172 MBK30**	278
	1.8	430	560	**23272 MB**	344
	1.8	430	560	**23272 MBK**	344
380	3.5	630	850	**23976 MBK**	70
	3.5	630	850	**23976 MB**	70
	2.8	500	630	**23076 MBK**	117
	2.8	500	630	**23076 MB**	117
	2.1	450	600	**24076 MBK30**	152
	2.1	450	600	**24076 MB**	152
	2.2	560	750	**23176 MBK**	240
	2.2	560	750	**23176 MB**	240
	1.7	400	500	**24176 MB**	290
	1.7	400	500	**24176 MBK30**	290
	1.8	400	530	**23276 MB**	375
	1.8	400	530	**23276 MBK**	375
400	3.6	600	800	**23980 MB**	72
	3.6	600	800	**23980 MBK**	72
	2.7	450	560	**23080 MBK**	152
	2.7	450	560	**23080 MB**	152
	2	430	460	**24080 MB**	205
	2	430	460	**24080 MBK30**	205
	2.5	530	700	**23180 MBK**	265

Spherical Roller Bearings



C CK/K30W33 MB MBK/K30W33

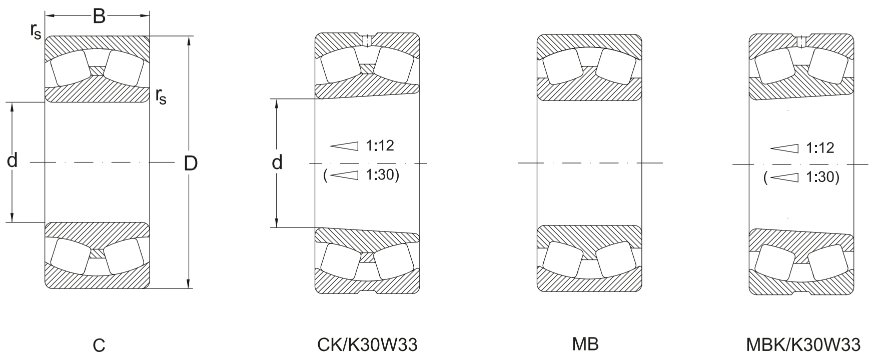
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
	Dimensions			**Basical radial load**				
mm				kN				kN
400	650	200	6	4100	0.28	2.4	3.6	7730
	650	250	6	5100	0.39	1.7	2.6	10400
	650	250	6	5100	0.39	1.7	2.6	10400
	720	256	6	5950	0.35	1.9	2.9	10807
	720	256	6	5950	0.35	1.9	2.9	10807
420	560	106	4	1960	0.18	3.8	5.7	4130
	560	106	4	1960	0.18	3.8	5.7	4130
	620	150	5	3150	0.24	2.8	4.2	6550
	620	150	5	3150	0.24	2.8	4.2	6550
	620	200	5	4000	0.32	2.1	3.2	8800
	620	200	5	4000	0.32	2.1	3.2	8800
	700	224	6	4600	0.33	2	3	9000
	700	224	6	4600	0.33	2	3	9000
	700	224	6	6200	0.33	2	3	12700
	700	224	6	6200	0.33	2	3	12700
	760	272	7.5	6575	0.35	1.9	2.9	11717
	760	272	7.5	6575	0.35	1.9	2.9	11717
440	600	118	4	2100	0.18	3.7	5.5	4690
	600	118	4	2100	0.18	3.7	5.5	4690
	650	157	6	3400	0.24	2.8	4.2	7100
	650	157	6	3400	0.24	2.8	4.2	7100
	650	212	6	4300	0.32	2.1	3.2	9650
	650	212	6	4300	0.32	2.1	3.2	9650

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min^{-1}	min^{-1}		Kg
400	2.5	530	700	**23180 MB**	265
	1.7	380	480	**24180 MB**	326
	1.7	380	480	**24180 MBK30**	326
	1.8	380	500	**23280 MB**	450
	1.8	380	500	**23280 MBK**	450
420	3.8	600	800	**23984 MBK**	75
	3.8	600	800	**23984 MB**	75
	2.8	450	560	**23084 MBK**	160
	2.8	450	560	**23084 MB**	160
	2.1	380	480	**24084 MBK30**	214
	2.1	380	480	**24084 MB**	214
	2	500	670	**23184 C**	363
	2	500	670	**23184 CK**	363
	2	400	500	**24184 MB**	443
	2	400	500	**24184 MBK30**	443
	1.8	360	480	**23284 MB**	540
	1.8	360	480	**23284 MBK**	540
440	3.6	560	750	**23988 MBK**	102
	3.6	560	750	**23988 MB**	102
	2.8	430	530	**23088 MBK**	184
	2.8	430	530	**23088 MB**	184
	2.1	360	450	**24088 MBK30**	249
	2.1	360	450	**24088 MB**	249

Spherical Roller Bearings



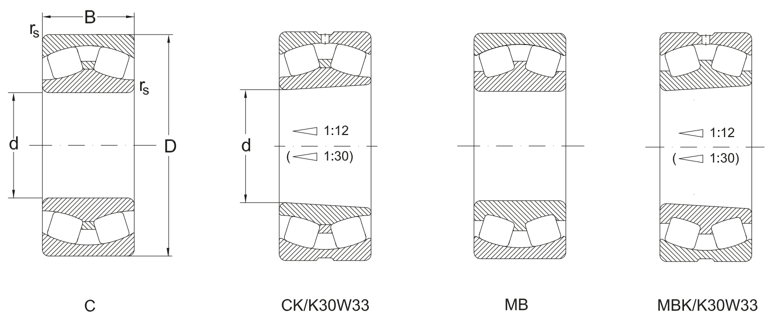
Dimensions				Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
440	720	226	6	5250	0.3	2.3	3.4	10000
	720	226	6	5250	0.3	2.3	3.4	10000
	720	280	6	6400	0.38	1.8	2.6	13200
	720	280	6	6400	0.38	1.8	2.6	13200
	790	280	7.5	7100	0.35	1.9	2.9	13400
	790	280	7.5	7100	0.35	1.9	2.9	13400
460	620	118	4	2305	0.18	3.8	5.7	5036
	620	118	4	2305	0.18	3.8	5.7	5036
	680	163	6	3650	0.24	2.8	4.2	7650
	680	163	6	3650	0.24	2.8	4.2	7650
	680	218	6	4370	0.31	2.2	3.2	9570
	680	218	6	4370	0.31	2.2	3.2	9570
	760	240	7.5	5760	0.3	2.3	3.4	11025
	760	240	7.5	5760	0.3	2.3	3.4	11025
	760	300	7.5	7500	0.39	1.7	2.6	15600
	760	300	7.5	7500	0.39	1.7	2.6	15600
	830	296	7.5	7560	0.35	1.9	2.9	13970
	830	296	7.5	7560	0.35	1.9	2.9	13970
480	650	128	5	2525	0.18	3.8	5.6	5500
	650	128	5	2525	0.18	3.8	5.6	5500
	700	165	6	3800	0.23	2.9	4.3	8150
	700	165	6	3800	0.23	2.9	4.3	8150
	700	218	6	4900	0.3	2.3	3.3	11200

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
440	2.2	500	670	**23188 C**	360
	2.2	500	670	**23188 CK**	360
	1.7	340	430	**24188 MB**	454
	1.7	340	430	**24188 MBK30**	454
	1.8	360	480	**23288 MB**	595
	1.8	360	480	**23288 MBK**	595
460	3.8	530	700	**23992 MBK**	105
	3.8	530	700	**23992 MB**	105
	2.8	400	500	**23092 MBK**	210
	2.8	400	500	**23092 MB**	210
	2.1	380	500	**24092 MBK30**	280
	2.1	380	500	**24092 MB**	280
	2.2	480	630	**23192 C**	441
	2.2	480	630	**23192 CK**	441
	1.7	320	400	**24192 MB**	578
	1.7	320	400	**24192 MBK30**	578
	1.9	340	450	**23292 MB**	695
	1.9	340	450	**23292 MBK**	695
480	3.7	450	600	**23996 MB**	128
	3.7	450	600	**23996 MBK**	128
	2.8	380	480	**23096 MBK**	220
	2.8	380	480	**23096 MB**	220
	2.2	340	430	**24096 MBK30**	288

Spherical Roller Bearings



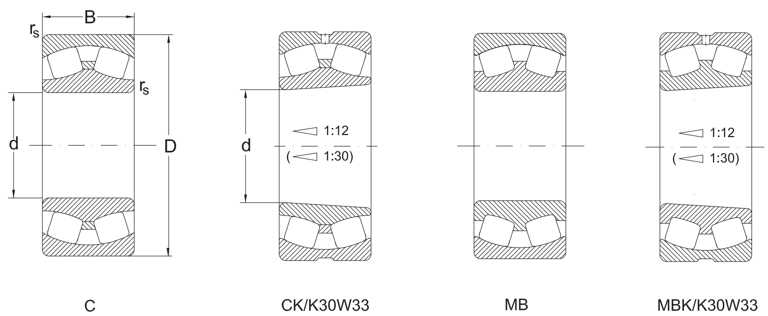
	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
480	700	218	6	4900	0.3	2.3	3.3	11200
	790	248	7.5	5800	0.3	2.3	3.4	11800
	790	248	7.5	5800	0.3	2.3	3.4	11800
	790	308	7.5	8000	0.39	1.8	2.6	16600
	790	308	7.5	8000	0.39	1.8	2.6	16600
	870	310	7.5	8800	0.37	1.8	2.7	17000
	870	310	7.5	8800	0.37	1.8	2.7	17000
500	670	128	5	2500	0.17	3.9	5.8	6090
	670	128	5	2500	0.17	3.9	5.8	6090
	720	167	6	3900	0.22	3	4.5	8500
	720	167	6	3900	0.22	3	4.5	8500
	720	218	6	4900	0.29	2.3	3.5	11200
	720	218	6	4900	0.29	2.3	3.5	11200
	830	264	7.5	6550	0.3	2.3	3.4	13200
	830	264	7.5	6550	0.3	2.3	3.4	13200
	830	325	7.5	8650	0.39	1.7	2.6	18300
	830	325	7.5	8650	0.39	1.7	2.6	18300
	920	336	7.5	9650	0.38	1.8	2.7	18300
	920	336	7.5	9650	0.38	1.8	2.7	18300
530	710	136	5	2980	0.18	3.8	5.7	6755
	710	136	5	2980	0.18	3.8	5.7	6755
	780	185	6	4400	0.22	3	4.5	9500
	780	185	6	4400	0.22	3	4.5	9500

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

d	Y_0	Speed limit grease	Speed limit oil	Designation	Mass
mm		min $^{-1}$	min $^{-1}$		Kg
480	2.2	340	430	**24096 MB**	288
	2.2	450	600	**23196 C**	485
	2.2	450	600	**23196 CK**	485
	1.7	320	400	**24196 MB**	639
	1.7	320	400	**24196 MBK30**	639
	1.8	340	430	**23296 MB**	835
	1.8	340	430	**23296 MBK**	835
500	3.8	480	630	**239/500 MBK**	130
	3.8	480	630	**239/500 MB**	130
	2.9	380	480	**230/500 MBK**	229
	2.9	380	480	**230/500 MB**	229
	2.3	320	400	**240/500 MBK30**	297
	2.3	320	400	**240/500 MB**	297
	2.2	430	560	**231/500 MBK**	580
	2.2	430	560	**231/500 MB**	580
	1.7	300	380	**241/500 MB**	753
	1.7	300	380	**241/500 MBK30**	753
	1.7	320	400	**232/500 MB**	1010
	1.7	320	400	**232/500 MBK**	1010
530	3.8	450	600	**239/530 MB**	150
	3.8	450	600	**239/530 MBK**	150
	3	340	430	**230/530 MB**	310
	3	340	430	**230/530 MBK**	310

Spherical Roller Bearings



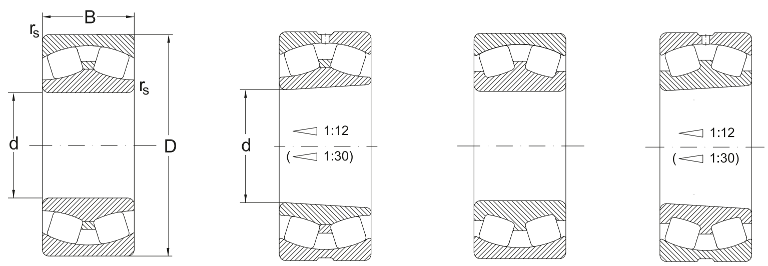
	Dimensions			Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
530	780	250	6	5640	0.31	2.2	3.2	12800
	780	250	6	5640	0.31	2.2	3.2	12800
	870	335	7.5	9500	0.38	1.8	2.6	20000
	870	335	7.5	9500	0.38	1.8	2.6	20000
	870	272	7.5	7625	0.3	2.3	3.4	15000
	870	272	7.5	7625	0.3	2.3	3.4	15000
560	750	140	5	3100	0.17	4	5.9	7650
	750	140	5	3100	0.17	4	5.9	7650
	820	195	6	5100	0.23	2.9	4.4	11000
	820	195	6	5100	0.23	2.9	4.4	11000
	820	258	6	6400	0.31	2.2	3.3	14600
	820	258	6	6400	0.31	2.2	3.3	14600
	920	280	7.5	8294	0.3	2.3	3.4	16295
	920	280	7.5	8294	0.3	2.3	3.4	16295
	920	355	7.5	10600	0.38	1.8	2.6	22400
	920	355	7.5	10600	0.38	1.8	2.6	22400
600	800	150	5	3450	0.17	4	5.9	8650
	800	150	5	3450	0.17	4	5.9	8650
	870	200	6	5700	0.22	3.1	4.6	12500
	870	200	6	5700	0.22	3.1	4.6	12500
	870	272	6	7100	0.31	2.2	3.3	16600
	870	272	6	7100	0.31	2.2	3.3	16600
	980	300	7.5	9000	0.31	1.8	2.7	19300

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
530	2.1	340	450	**240/530 MB**	410
	2.1	340	450	**240/530 MBK30**	410
	1.7	280	360	**241/530 MB**	838
	1.7	280	360	**241/530 MBK30**	838
	2.2	400	530	**231/530 MBK**	645
	2.2	400	530	**231/530 MB**	645
560	3.9	340	430	**239/560 MBK**	183
	3.9	340	430	**239/560 MB**	183
	2.9	320	400	**230/560 MBK**	358
	2.9	320	400	**230/560 MB**	358
	2.2	280	360	**240/560 MBK30**	469
	2.2	280	360	**240/560 MB**	469
	2.2	380	500	**231/560 MBK**	740
	2.2	380	500	**231/560 MB**	740
	1.7	260	340	**241/560 MB**	979
	1.7	260	340	**241/560 MBK30**	979
600	3.9	320	400	**239/600 MBK**	221
	3.9	320	400	**239/600 MB**	221
	3	300	380	**230/600 MBK**	406
	3	300	380	**230/600 MB**	406
	2.2	260	340	**240/600 MBK30**	550
	2.2	260	340	**240/600 MB**	550
	2.2	280	360	**231/600 MB**	933

Spherical Roller Bearings



C   CK/K30W33   MB   MBK/K30W33

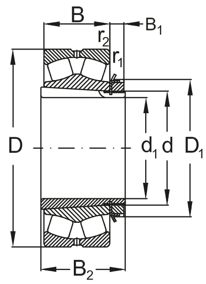
		Dimensions		Basical radial load				
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}
mm				kN				kN
600	980	300	7.5	9000	0.31	1.8	2.7	19300
	980	375	7.5	11600	0.38	1.8	2.7	26000
	980	375	7.5	11600	0.38	1.8	2.7	26000
630	850	165	6	4290	0.18	3.8	5.7	9910
	850	165	6	4290	0.18	3.8	5.7	9910
	920	212	7.5	6300	0.31	2.2	3.3	14000
	920	212	7.5	6300	0.31	2.2	3.3	14000
	920	290	7.5	8000	0.31	2.2	3.3	19000
	920	290	7.5	8000	0.31	2.2	3.3	19000
670	900	170	6	4300	0.17	4	5.9	10600
	900	170	6	4300	0.17	4	5.9	10600
	980	230	7.5	7200	0.22	3	4.5	16000
	980	230	7.5	7200	0.22	3	4.5	16000
	980	308	7.5	9000	0.31	2.2	3.3	21600
	980	308	7.5	9000	0.31	2.2	3.3	21600
710	950	180	6	4800	0.18	3.8	5.7	12000
	950	180	6	4800	0.18	3.8	5.7	12000
750	1000	185	6	5200	0.17	4	5.9	12900
	1000	185	6	5200	0.17	4	5.9	12900

Spherical Roller Bearings

Abutment and fillet dimensions see on page 377

		Speed limit		Designation	Mass
d	Y_0	grease	oil		
mm		min $^{-1}$	min $^{-1}$		Kg
600	2.2	280	360	**231/600 MBK**	933
	1.8	240	320	**241/600 MB**	1180
	1.8	240	320	**241/600 MBK30**	1180
630	3.7	380	500	**239/630 MBK**	280
	3.7	380	500	**239/630 MB**	280
	2.2	260	340	**230/630 MBK**	661
	2.2	260	340	**230/630 MB**	661
	2.2	260	340	**240/630 MBK30**	661
	2.2	260	340	**240/630 MB**	661
670	3.9	280	360	**239/670 MBK**	326
	3.9	280	360	**239/670 MB**	326
	2.9	260	340	**230/670 MBK**	602
	2.9	260	340	**230/670 MB**	602
	2.2	240	320	**240/670 MBK30**	802
	2.2	240	320	**240/670 MB**	802
710	3.8	260	340	**239/710 MBK**	386
	3.8	260	340	**239/710 MB**	386
750	3.9	260	340	**239/750 MBK**	437
	3.9	260	340	**239/750 MB**	437

Spherical Roller Bearings with Adapter Sleeve



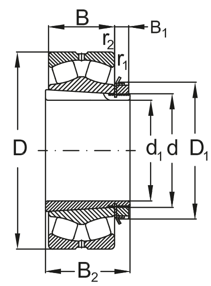
Shaft		Dimensions			Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Adapter Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
20	25	52	18	1	**22205 CK**	**H305**	43	46	7500	10000
25	30	62	20	1	**22206 CK**	**H306**	59	62	6300	8500
30	35	72	23	1,1	**22207 CK**	**H307**	81	88	5300	7000
	35	80	21	1,5	**22307 CK**	**H307**	71	73,5	5300	6700
35	40	80	23	1,1	**22208 CK**	**H308**	88	98	4800	6300
	40	90	23	1,5	**21308 CK**	**H308**	99	120	4500	6000
	40	90	33	1,5	**22308 CK**	**H2308**	140	145	4300	5600
40	45	85	23	1,1	**22209 CK**	**H309**	93	105	4500	6000
	45	100	25	1,5	**21309 CK**	**H309**	120	135	4000	5300
	45	100	36	1,5	**22309 CK**	**H2309**	165	190	3800	5000
45	50	90	23	1,1	**22210 CK**	**H310**	100	120	4000	5300
	50	110	27	2	**21310 CK**	**H310**	120	130	3600	4800
	50	110	40	2	**22310 CK**	**H2310**	190	220	3400	4500
50	55	100	25	1,5	**22211 CK**	**H311**	120	140	3800	5000
	55	120	29	2	**21311 CK**	**H311**	135	155	3200	4300
	55	120	43	2	**22311 CK**	**H2311**	230	265	3000	4000
55	60	110	28	1,5	**22212 CK**	**H312**	145	175	3400	4500
	60	130	31	2,1	**21312 CK**	**H312**	150	180	3000	4000

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
20	9	29	38	0,35	1,9	2,9	1,8	0,18	0,071
25	9	31	45	0,36	1,9	2,8	1,9	0,38	0,095
30	10	35	52	0,36	1,9	2,8	1,9	0,41	0,14
	10	35	52	0,26	2,6	3,8	2,5	0,50	0,14
35	11	36	58	0,31	2,2	3,2	2,1	0,49	0,17
	11	36	58	0,26	2,6	3,9	2,6	0,70	0,17
	11	46	58	0,40	1,6	2,5	2	1,10	0,22
40	12	39	65	0,30	2,3	3,4	2,2	0,54	0,23
	12	39	65	0,26	2,6	3,9	2,6	0,95	0,23
	12	50	65	0,40	1,7	2,5	1,6	1,36	0,27
45	13	42	70	0,26	2,6	3,4	2,5	0,61	0,27
	13	42	70	0,24	2,8	4,1	2,7	1,25	0,27
	13	55	70	0,40	1,7	2,5	1,6	1,82	0,34
50	14	45	75	0,27	2,5	3,9	2,5	0,80	0,32
	14	45	75	0,24	2,8	4,1	2,7	1,65	0,32
	14	59	75	0,40	1,7	2,5	1,6	2,31	0,39
55	14	47	80	0,27	2,5	3,8	2,4	1,06	0,36
	14	47	80	0,24	2,9	4,3	2,8	1,95	0,36

Spherical Roller Bearings with Adapter Sleeve



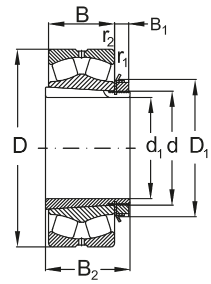
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
55	60	130	46	2,1	**22312 CK**	**H2312**	270	320	2800	3800
60	65	120	31	1,5	**22213 CK**	**H313**	180	220	3000	4000
	65	140	33	2,1	**21313 CK**	**H313**	196	228	2800	3800
	65	140	48	2,1	**22313 CK**	**H2313**	305	360	2800	3600
	70	125	31	1,5	**22214 CK**	**H314**	180	225	2800	3800
	70	150	35	2,1	**21314 CK**	**H314**	250	310	2600	3400
	70	150	51	2,1	**22314 CK**	**H2314**	325	375	2400	3200
65	75	130	31	1,5	**22215 CK**	**H315**	190	250	2800	3800
	75	160	37	2,1	**21315 CK**	**H315**	280	360	2400	3200
	75	160	55	2,1	**22315 CK**	**H2315**	375	440	2200	3000
70	80	140	33	2	**22216 CK**	**H316**	210	275	2600	3400
	80	170	39	2,1	**21316 CK**	**H316**	275	340	2200	3000
	80	170	58	2,1	**22316 CK**	**H2316**	410	500	1800	2400
75	85	150	36	2	**22217 CK**	**H317**	250	325	2400	3200
	85	180	41	3	**21317 CK**	**H317**	350	450	2200	2800
	85	180	60	3	**22317 CK**	**H2317**	500	620	1800	2400
80	90	160	40	2	**22218 CK**	**H318**	305	410	2200	3000
	90	160	52	2	**23218 CK**	**H2318**	340	485	1500	2000
	90	190	43	3	**21318 CK**	**H318**	335	415	2200	2800

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
55	14	62	80	0,4	1,7	2,5	1,7	2,93	0,45
60	15	50	85	0,28	2,4	3,7	2,4	1,4	0,42
	15	50	85	0,24	2,8	4,2	2,8	2,45	0,42
	15	65	85	0,39	1,7	2,6	1,7	3,54	0,52
	15	52	92	0,26	2,6	3,6	2,6	1,52	0,67
	15	52	92	0,23	2,9	4,4	2,9	3,10	0,67
	15	68	92	0,38	1,8	2,6	1,7	4,19	0,88
65	16	55	98	0,24	2,8	3,9	2,7	1,61	0,78
	16	55	98	0,23	2,9	4,4	2,9	3,55	0,78
	16	73	98	0,38	1,9	2,6	1,7	5,21	1,10
70	18	59	105	0,25	2,6	4,1	2,6	1,97	0,95
	18	59	105	0,23	2,9	4,4	2,9	4,25	0,95
	18	78	105	0,35	1,9	0,9	1,8	6,20	1,20
75	19	63	110	0,216	2,6	4	0,6	2,47	1,10
	19	63	110	0,22	3	4,5	2,9	5,10	1,10
	19	82	110	0,33	2	3	2	7,10	1,35
80	19	65	120	0,27	2,5	3,9	2,5	3,18	1,30
	19	86	120	0,34	2	3	2	4,6	1,60
	19	65	120	0,22	3	4,5	2,9	5,8	1,30

Spherical Roller Bearings with Adapter Sleeve



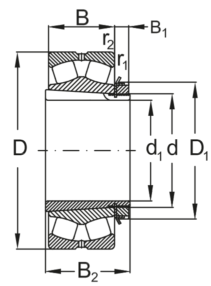
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Adapter Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
80	90	190	64	3	**22318 CK**	**H2318**	510	620	1800	2400
85	95	170	43	2,1	**22219 CK**	**H319**	340	450	2200	2800
	95	200	45	3	**21319 CK**	**H319**	360	450	2000	2600
	95	200	67	3	**22319 CK**	**H2319**	580	700	1700	2200
90	100	165	52	2	**23120 MBK**	**H3120**	355	540	2000	3000
	100	180	46	2,1	**22220 CK**	**H320**	375	500	2200	2800
	100	180	60,3	2,1	**23220 CK**	**H2320**	495	720	1700	2200
	100	215	73	3	**22320 CK**	**H2320**	730	960	1500	2000
100	110	170	45	2	**23022 CK**	**H322**	335	510	2200	3000
	110	180	56	2	**23122 MBK**	**H3122**	410	640	1800	2400
	110	200	53	2,1	**22222 CK**	**H322**	455	585	2000	2800
	110	200	69,8	2,1	**23222 CK**	**H2322**	620	850	1400	1800
	110	240	80	3	**22322 MBK**	**H2322**	800	1060	1400	1900
110	120	180	46	2	**23024 CK**	**H3024**	360	570	2200	3000
	120	200	62	2	**23124 MBK**	**H3124**	495	770	1700	2200
	120	215	58	2,1	**22224 CK**	**H 3124**	560	800	1700	2200
	120	215	76	2,1	**23224 CK**	**H 2324**	730	1120	1300	1700
	120	260	86	3	**22324 MBK**	**H 2324**	900	1400	1300	1700
115	130	200	52	2	**23026 CK**	**H 3026**	455	720	1900	2600

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
80	19	86	120	0,36	1,9	2,8	1,8	8,44	1,60
85	20	68	125	0,24	2,8	3,8	2,8	3,86	1,40
	20	68	125	0,22	3	4,5	3	7,43	1,40
	20	90	125	0,35	1,9	2,9	1,8	9,77	1,80
90	21	76	130	0,31	2,2	3,2	2,1	4,50	1,80
	21	71	130	0,24	2,8	4,2	2,8	4,69	1,60
	21	97	130	0,33	2	3	2	7,34	2,00
	21	97	130	0,33	2	3	2	12,60	2,00
100	21	77	145	0,23	2,9	4,3	2,8	3,54	2,05
	21	81	145	0,30	2,3	3,3	2,2	5,50	2,10
	21	77	145	0,25	2,7	4,2	2,5	6,70	2,05
	21	105	145	0,33	2	3	2	10,80	2,75
	21	105	145	0,37	1,8	2,7	1,8	17,50	2,75
110	22	72	145	0,22	3	4,5	3	3,86	1,80
	22	88	155	0,31	2,2	3,3	2,2	7,60	2,50
	22	88	155	0,29	2,3	4	2,3	8,44	2,50
	22	112	155	0,35	1,9	2,9	1,8	13,10	3,00
	22	112	155	0,36	1,8	2,7	1,8	21,90	3,00
115	23	80	155	0,23	2,9	4,4	2,9	5,61	2,80

Spherical Roller Bearings with Adapter Sleeve



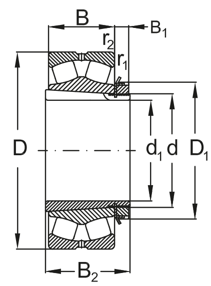
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
115	130	210	64	2	**23126 MBK**	**H3126**	540	860	1500	2000
	130	230	64	3	**22226 CK**	**H3126**	660	960	1700	2200
	130	230	80	3	**23226 CK**	**H2326**	830	1270	1300	1700
	130	280	93	4	**22326 MBK**	**H2326**	1040	1340	1200	1600
125	140	210	53	2	**23028 CK**	**H3028**	480	780	1900	2600
	140	225	68	2,1	**23128 MBK**	**H3128**	600	990	1400	1800
	140	250	68	3	**22228 CK**	**H3128**	730	1080	1400	1900
	140	250	88	3	**23228 CK**	**H2328**	915	1370	1250	1400
	140	300	102	4	**22328 MBK**	**H2328**	1220	1600	1100	1400
135	150	225	56	2,1	**23030 CK**	**H3030**	530	865	1800	2400
	150	250	80	2,1	**23130 MBK**	**H3130**	800	1320	1300	1700
	150	270	73	3	**22230 CK**	**H3130**	880	1300	1400	1800
	150	270	96	3	**23230 CK**	**H2330**	1030	1610	1000	1300
	150	320	108	4	**22330 MBK**	**H2330**	1370	1830	1100	1500
140	160	240	60	2,1	**23032 CK**	**H3032**	600	1000	1600	2000
	160	270	86	2,1	**23132 MBK**	**H3132**	930	1510	1200	1600
	160	290	80	3	**22232 CK**	**H3132**	965	1370	1300	1700
	160	290	104	3	**23232 CK**	**H2332**	1180	1830	1200	1600
	160	340	114	4	**22332 MBK**	**H2332**	1430	1900	1000	1300

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \le e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
115	23	92	165	0,3	2,3	3,3	2,2	8,50	3,45
	23	92	165	0,29	2,3	3,5	2,3	10,50	3,45
	23	121	165	0,33	2	3	2	15,80	4,45
	23	121	165	0,37	1,8	2,7	1,8	27,10	4,45
125	24	82	165	0,22	3,1	4,6	3	6,04	3,05
	24	97	180	0,30	2,3	3,3	2,2	10,50	4,10
	24	97	180	0,26	2,6	3,5	2,5	13,40	4,10
	24	131	180	0,33	2	3	2	20,80	5,40
	24	131	180	0,38	1,7	2,6	1,7	34,10	5,40
135	26	87	180	0,22	3,1	4,6	3	7,33	3,75
	26	111	195	0,32	2,1	3,2	2,1	16,30	5,25
	26	111	195	0,26	2,6	3,9	2,5	16,90	5,25
	26	139	195	0,38	1,8	2,7	1,7	24,50	6,40
	26	139	195	0,38	1,7	2,6	1,7	40,90	6,40
140	28	93	190	0,22	3,1	4,6	3	8,90	5,10
	28	119	210	0,32	2,1	3,2	2,1	20,50	7,25
	28	119	210	0,26	2,6	3,9	2,5	21,70	7,25
	28	147	210	0,38	1,8	2,7	1,7	31,70	8,80
	28	147	210	0,37	1,8	2,7	1,8	51,10	8,80

Spherical Roller Bearings with Adapter Sleeve



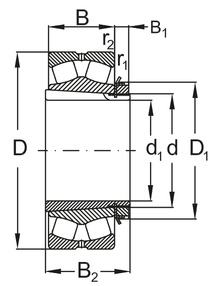
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
150	170	260	67	2,1	**23034 CK**	**H3034**	735	1200	1500	1900
	170	280	88	2,1	**23134 MBK**	**H3134**	990	1650	1100	1500
	170	310	86	4	**22234 CK**	**H3134**	1170	1750	1200	1600
	170	310	110	4	**23234 CK**	**H2334**	1370	2120	900	1200
	170	360	120	4	**22334 MBK**	**H2334**	1600	2120	900	1200
160	180	280	74	2,1	**23036 CK**	**H3036**	865	1430	1400	1800
	180	300	96	3	**23136 CK**	**H3136**	1160	1940	1100	1400
	180	320	86	4	**22236 CK**	**H3136**	1210	1870	1100	1500
	180	320	112	4	**23236 CK**	**H2336**	1420	2330	1000	1400
	180	380	126	4	**22336 MBK**	**H2336**	1760	2360	850	1100
170	190	290	75	2,1	**23038 CK**	**H3038**	915	1530	1300	1700
	190	320	104	3	**23138 MBK**	**H3138**	1320	2290	1100	1400
	190	340	92	4	**22238 CK**	**H3138**	1200	1830	1100	1400
	190	340	120	4	**23238 CK**	**H2338**	1750	2880	850	1100
	190	400	132	5	**22338 MBK**	**H2338**	1860	2500	750	1000
180	200	310	82	2,1	**23040 CK**	**H3040**	1060	1760	1300	1700
	200	340	112	3	**23140 MBK**	**H3140**	1370	2460	1100	1400
	200	360	98	4	**22240 CK**	**H3140**	1250	2020	1100	1400
	200	360	128	4	**23240 CK**	**H2340**	1620	2590	750	1000
	200	420	138	5	**22340 MBK**	**H2340**	1910	2750	670	900

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	**Dimensions**				**Calculation factor**			**Mass**	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
150	29	101	200	0,23	3	4,4	2,9	12,10	5,80
	29	122	220	0,31	2,2	3,2	2,1	22	8,10
	29	122	220	0,27	2,5	3,9	2,5	26,20	8,10
	29	154	220	0,35	1,9	2,9	1,8	35,70	9,90
	29	154	220	0,37	1,8	2,7	1,8	59,70	9,90
160	30	109	210	0,23	2,9	4,3	2,8	15,80	6,70
	30	131	230	0,32	2,1	3,1	2,1	28,40	9,15
	30	131	230	0,26	2,6	3,7	2,5	27,50	9,15
	30	161	230	0,36	1,9	2,8	1,8	40,80	11,0
	30	161	230	0,37	1,8	2,7	1,8	69,40	11,0
170	31	112	220	0,23	3	4,4	2,9	16,08	7,25
	31	141	240	0,33	2	3	2	35,60	10,5
	31	141	240	0,26	2,6	3,9	2,5	37,20	10,5
	31	169	240	0,35	1,9	2,9	1,8	52,40	12,0
	31	169	240	0,37	1,8	2,7	1,8	81,20	12,0
180	32	120	240	0,23	2,9	4,3	2,8	21,50	8,90
	32	150	250	0,35	1,9	2,9	1,9	43,50	12,0
	32	150	250	0,29	2,3	3,9	2,3	44,40	12,0
	32	176	250	0,35	1,9	2,9	1,8	58,40	13,5
	32	176	250	0,36	1,8	2,8	1,8	91,80	13,5

Spherical Roller Bearings with Adapter Sleeve



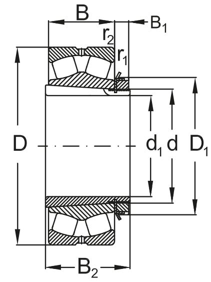
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
200	220	340	90	3	**23044 MBK**	**OH3044 H**	1100	2000	900	1200
	220	370	120	4	**23144 MBK**	**OH3144 H**	1515	2509	1000	1300
	220	400	108	4	**22244 CK**	**OH3144 H**	1545	2300	900	1200
	220	400	144	4	**23244 CK**	**OH2344 H**	2065	3380	670	900
	220	460	145	5	**22344 CK**	**OH2344 H**	2380	3407	700	950
220	240	360	92	3	**23048 MBK**	**OH3048 H**	1160	2200	800	1000
	240	400	128	4	**23148 MBK**	**OH3148 H**	1705	2863	900	1200
	240	440	120	4	**22248 CK**	**OH3148 H**	1845	2763	850	1100
	240	440	160	4	**23248 CK**	**OH2348 H**	2530	4600	630	850
	240	500	155	5	**22348 MBK**	**OH2348 H**	2650	4000	560	750
240	260	400	104	4	**23052 MBK**	**OH3052 H**	1500	2800	750	950
	260	440	144	4	**23152 MBK**	**OH3152**	2153	3673	700	850
	260	480	130	5	**22252 MBK**	**OH3152 H**	2190	3300	750	1000
	260	540	165	6	**22352 CK**	**OH2352 H**	3125	4560	600	800
260	280	420	106	4	**23056 MBK**	**OH3056 H**	1560	3000	700	900
	280	460	146	5	**23156 MBK**	**OH3156 H**	2295	4050	750	1000
	280	500	130	5	**22256 MBK**	**OH3156 H**	2330	3600	700	950
	280	500	176	5	**23256 MBK**	**OH2356 H**	2806	4645	480	630
	280	580	175	6	**22356 CK**	**OH2356 H**	3530	5208	560	750

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
200	30	126	260	0,26	2,6	3,8	2,5	31	9,90
	35	161	280	0,3	2,3	3,4	2,2	52	15,0
	35	161	280	0,29	2,3	3,4	2,3	61,40	15,0
	35	186	280	0,35	1,9	2,9	1,8	79,50	17,0
	35	186	280	0,36	1,8	2,8	1,8	120	17,0
220	34	133	290	0,25	2,7	4,1	2,7	33,90	12,0
	37	172	300	0,3	2,3	3,4	2,2	66	16,0
	37	172	300	0,29	2,3	3,4	2,3	83,20	16,0
	37	199	300	0,35	1,9	2,9	1,8	109	19,0
	37	199	300	0,31	2,2	3,3	2,2	151	19,0
240	34	145	310	0,26	2,6	3,9	2,6	49	13,5
	38	190	330	0,31	2,2	3,3	2,2	92,50	21,0
	38	190	330	0,29	2,3	3,4	2,3	107	21,0
	38	211	330	0,36	1,8	2,8	1,8	187	21,0
260	38	152	330	0,25	2,7	4,1	2,7	52,50	16,0
	39	195	350	0,3	2,3	3,4	2,2	98,50	23,0
	39	195	350	0,29	2,3	3,4	2,3	113	23,0
	39	224	350	0,35	1,9	2,9	1,8	153	27,0
	39	224	350	0,36	1,8	2,8	1,8	235	27,0

Spherical Roller Bearings with Adapter Sleeve



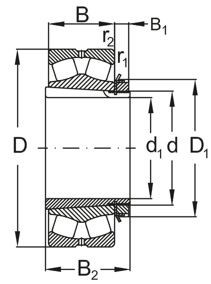
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Adapter Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
280	300	460	118	4	**23060 MBK**	**OH3060 H**	1960	3650	630	800
	300	500	160	5	**23160 MBK**	**OH3160 H**	2635	4485	700	950
	300	540	140	5	**22260 CAK**	**OH3160 H**	2670	4176	670	900
300	320	480	121	4	**23064 MBK**	**OH3064 H**	2040	4000	600	750
	320	540	176	5	**23164 MBK**	**OH3164 H**	3115	6000	530	670
	320	580	150	5	**22264 CAK**	**OH3164 H**	3150	5100	630	580
	320	580	208	5	**23264 MBK**	**OH3264 H**	4130	7026	430	560
320	340	520	133	5	**23068 MBK**	**OH3068 H**	2360	4500	560	700
	340	580	190	5	**23168 MBK**	**OH3168 H**	3605	6409	630	850
340	360	540	134	5	**23072 MBK**	**OH3072 H**	2450	4800	530	670
	360	600	192	5	**23172 MBK**	**OH3172 H**	3740	7010	600	800
	360	650	232	6	**23272 MBK**	**OH3272 H**	4880	8490	430	560
360	380	560	135	5	**23076 MBK**	**OH3076 H**	2550	5300	500	630
	380	620	194	5	**23176 MBK**	**OH3176 H**	3740	7540	560	750
	380	680	240	6	**23276 MBK**	**OH3276 H**	5050	9660	400	530
380	400	600	148	5	**23080 MBK**	**OH3080 H**	3050	6200	450	560
	400	650	200	6	**23180 MBK**	**OH3180 H**	4100	7730	530	700
	400	720	256	6	**23280 MBK**	**OH3280 H**	5950	10807	380	500
400	420	620	150	5	**23084 MBK**	**OH3084 H**	3150	6550	450	560

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
280	42	168	360	0,25	2,7	4	2,6	73,60	20,5
	40	208	380	0,3	2,3	3,4	2,2	129	29,0
	40	208	380	0,29	2,3	3,4	2,3	142	29,0
300	42	171	380	0,25	2,7	4,1	2,7	79,50	22,0
	42	226	400	0,34	2	3	1,9	172	32,0
	42	226	400	0,29	2,5	3,7	2,5	180	32,0
	42	258	400	0,35	1,9	2,9	1,8	247	35,0
320	45	187	400	0,25	2,7	4	2,6	105	27,0
	55	254	440	0,31	2,2	3,2	2,2	212	50,0
340	45	188	420	0,25	2,7	4,1	2,7	111	29,0
	58	259	460	0,33	2,3	3,4	2,2	220	56,0
	58	299	460	0,35	1,9	2,9	1,8	344	60,5
360	48	193	450	0,25	2,8	4,2	2,8	117	35,5
	60	264	490	0,3	2,3	3,4	2,2	240	61,5
	60	310	490	0,35	1,9	2,9	1,8	375	69,5
380	52	210	470	0,24	2,8	4,1	2,7	152	40,0
	62	272	520	0,28	2,4	3,6	2,5	265	73,0
	62	328	520	0,35	1,9	2,9	1,8	450	87,0
400	52	212	490	0,24	2,8	4,2	2,8	160	47,0

Spherical Roller Bearings with Adapter Sleeve



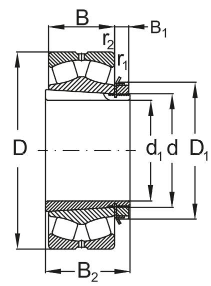
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
400	420	700	224	6	**23184 CK**	**OH3184 H**	4600	9000	500	670
	420	760	272	7,5	**23284 MBK**	**OH3284 H**	6575	11717	360	480
410	440	650	157	6	**23088 MBK**	**OH3088 H**	3400	7100	430	530
	440	720	226	6	**23188 CK**	**OH3188 H**	5250	10000	500	670
	440	790	280	7,5	**23288 MBK**	**OH3288 H**	7100	13400	360	480
430	460	680	163	6	**23092 MBK**	**OH3092 H**	3650	7650	400	500
	460	760	240	7,5	**23192 CK**	**OH3192 H**	5760	11025	480	630
	460	830	296	7,5	**23292 MBK**	**OH3292 H**	7560	13970	340	450
450	480	700	165	6	**23096 MBK**	**OH3096 H**	3800	8150	380	480
	480	790	248	7,5	**23196 CK**	**OH3196 H**	5800	11800	450	600
	480	870	310	7,5	**23296 MBK**	**OH3296 H**	8800	17000	340	430
470	500	670	128	5	**239/500 MBK**	**H39/500**	2500	6090	480	630
	500	720	167	6	**230/500 MBK**	**OH30/500 H**	3900	8500	380	480
	500	830	264	7,5	**231/500 MBK**	**OH31/500 H**	6550	13200	430	560
	500	920	336	7,5	**232/500 MBK**	**OH32/500 H**	9650	18300	320	400
500	530	710	136	5	**239/530 MBK**	**H39/530**	2980	6755	450	600
	530	780	185	6	**230/530 MBK**	**OH30/530 H**	4400	9500	340	430
530	560	750	140	5	**239/560 MBK**	**OH39/560 H**	3100	7650	340	430
	560	820	195	6	**230/560 MBK**	**OH30/560 H**	5100	11000	320	400

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	**Dimensions**				**Calculation factor**			**Mass**	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
400	70	304	540	0,33	2	3	2	363	80,0
	70	352	540	0,35	1,9	2,9	1,8	540	96,0
410	60	228	520	0,24	2,8	4,2	2,8	184	65,0
	70	307	560	0,3	2,3	3,4	2,2	380	95,0
	70	361	560	0,35	1,9	2,9	1,8	595	117
430	60	234	540	0,24	2,8	4,2	2,8	210	71,0
	75	326	580	0,3	2,3	3,4	2,2	441	119
	75	382	580	0,35	1,9	2,9	1,9	715	134
450	60	237	560	0,23	2,9	4,3	2,8	220	75,0
	75	335	620	0,3	2,3	3,4	2,2	485	135
	75	397	620	0,37	1,8	2,7	1,8	835	153
470	68	208	580	0,17	3,9	5,8	3,8	130	74,3
	68	247	580	0,22	3	4,5	2,9	229	82,0
	80	356	630	0,3	2,3	3,4	2,2	580	145
	80	428	630	0,38	1,8	2,7	1,7	1010	170
500	68	216	630	0,18	3,8	5,7	3,8	150	87,9
	68	265	630	0,22	3	4,5	3	310	105
530	75	227	650	0,17	4	5,9	3,9	183	95
	75	282	650	0,23	2,9	4,4	2,9	358	112

Spherical Roller Bearings with Adapter Sleeve



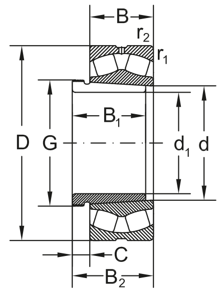
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Adapter	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
560	600	800	150	5	**239/600 MBK**	**OH39/600 H**	3450	8650	320	400
	600	870	200	6	**230/600 MBK**	**OH30/600 H**	5700	12500	300	380
600	630	850	165	6	**239/630 MBK**	**OH39/630 H**	4290	9910	380	500
	630	920	212	7,5	**230/630 MBK**	**OH30/630 H**	6300	14000	260	340
630	670	900	170	6	**239/670 MBK**	**OH39/670 H**	4300	10600	280	360
	670	980	230	7,5	**230/670 MBK**	**OH30/670 H**	7200	16000	260	340
670	710	950	180	6	**239/710 MBK**	**OH39/710 H**	4800	12000	260	340
710	750	1000	185	6	**239/750 MBK**	**OH39/750 H**	5200	12900	260	340

Spherical Roller Bearings with Adapter Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions				Calculation factor			Mass	
Φd_1	B_1	B_2	D_1	e	$F_a/F_r \leqslant e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Adapter Sleeve
mm									[kg]
560	75	239	700	0,17	4	5,9	3,9	221	127
	75	289	700	0,22	3,1	4,6	3	406	147
600	75	254	730	0,18	3,8	5,7	3,7	280	124
	75	301	730	0,22	3	4,5	2,9	520	138
630	80	264	780	0,17	4	5,9	3,9	326	162
	80	324	780	0,22	3	4,5	2,9	602	190
670	90	286	830	0,18	3,8	5,7	3,8	386	183
710	90	291	870	0,17	4	5,9	3,9	437	211

Spherical Roller Bearings with Withdrawal Sleeve



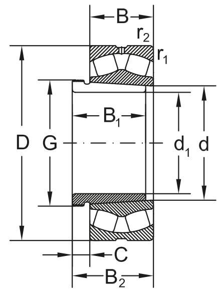
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
35	40	80	23	1,1	**22208 CK**	**AH308**	88	98	6000	7500
	40	90	23	1,5	**21308 CK**	**AH308**	91,5	100	4500	5600
	40	90	23	1,5	**22308 CK**	**AH2308**	129	143	4300	5300
40	45	85	23	1,1	**22209 CK**	**AH309**	93	105	5600	7000
	45	100	25	1,5	**21309 CK**	**AH309**	108	120	4000	5300
	45	100	36	1,5	**22309 CK**	**AH2309**	156	176	3800	4800
45	50	90	23	1,1	**22210 CK**	**AHX310**	98	114	4000	5300
	50	110	27	2	**21310 CK**	**AHX310**	120	130	3600	4800
	50	110	40	2	**22310 CK**	**AHX2310**	190	216	3400	4300
50	55	100	25	1,5	**22211 CK**	**AHX311**	120	140	3800	5000
	55	120	29	2	**21311 CK**	**AHX311**	135	155	3200	4300
	55	120	43	2	**22311 CK**	**AHX2311**	224	255	3000	4000
55	60	110	28	1,5	**22212 CK**	**AHX312**	145	175	3400	4500
	60	130	31	2,1	**21312 CK**	**AHX312**	150	180	3000	4000
	60	130	46	2,1	**22312 CK**	**AHX2312**	260	300	2800	3600
60	65	120	31	1,5	**22213 CK**	**AH313**	170	204	3000	4000
	65	140	33	2,1	**21313 CK**	**AH313**	196	228	2800	3800
	65	140	48	2,1	**22313 CK**	**AH2313**	290	355	2600	3400

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
						$F_a/F_r \le e$	$F_a/F_r > e$			Withdrawal
Φd_1	B_1	B_2	C	G	e	Y_1	Y_2	Y_0	Bearing	Sleeve
mm										[kg]
35	29	32	6	M 45x1,5	0,28	2,4	3,6	2,3	0,58	0,09
	29	32	6	M 45x1,5	0,26	2,6	3,9	2,6	0,80	0,09
	40	43	7	M 45x1,5	0,36	1,9	2,8	1,8	1,10	0,13
40	31	34	6	M 50x1,5	0,26	2,6	3,9	2,6	0,65	0,12
	31	34	6	M 50x1,5	0,26	2,6	3,9	2,6	1,06	0,12
	44	47	7	M 50x1,5	0,36	1,9	2,8	1,9	1,4	0,13
45	35	38	7	M 55x2	0,24	2,8	4,2	2,8	0,72	0,13
	35	38	7	M 55x2	0,24	2,8	4,1	2,7	1,35	0,13
	50	53	9	M 55x2	0,36	1,9	2,8	1,8	1,96	0,19
50	37	40	7	M 60x2	0,23	2,9	4,4	2,9	0,96	0,16
	37	40	7	M 60x2	0,24	2,8	4,1	2,7	1,71	0,16
	54	57	10	M 60x2	0,36	1,9	2,8	1,8	2,47	0,26
55	40	43	8	M 65x2	0,24	2,8	4,2	2,8	1,25	0,19
	40	43	8	M 65x2	0,24	2,9	4,3	2,8	2,12	0,19
	58	61	11	M 65x2	0,35	1,9	2,8	1,9	3,09	0,30
60	42	45	8	M 75x2	0,24	2,8	4,2	2,8	1,6	0,25
	42	45	8	M 75x2	0,24	2,8	4,2	2,8	2,67	0,25
	61	64	12	M 75x2	0,34	2	3	2	3,8	0,25

Spherical Roller Bearings with Withdrawal Sleeve



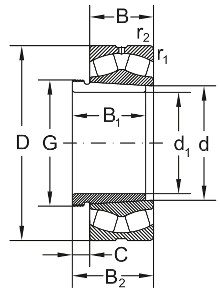
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
65	70	125	31	1,5	**22214 CK**	**AH314**	179	225	3600	4500
	70	150	35	2,1	**21314 CK**	**AH314**	207	360	2600	3400
	70	150	51	2,1	**22314 CK**	**AHX2314**	325	375	2200	3000
70	75	130	31	1,5	**22215 CK**	**AH315**	183	236	2800	3800
	75	160	37	2,1	**21315 CK**	**AH315**	250	305	2400	3200
	75	160	55	2,1	**22315 CK**	**AHX2315**	375	440	2200	3000
75	80	140	33	2	**22216 CK**	**AH316**	208	260	2600	3400
	80	170	39	2,1	**21316 CK**	**AH316**	275	340	2200	3000
	80	170	58	2,1	**22316 CK**	**AHX2316**	410	500	1800	2400
80	85	150	36	2	**22217 CK**	**AHX317**	250	325	2400	3200
	85	180	41	3	**21317 CK**	**AHX317**	305	375	2200	2800
	85	180	60	3	**22317 CK**	**AHX2317**	455	540	1800	2400
85	90	160	40	2	**22218 CK**	**AHX318**	285	360	2200	3000
	90	160	52,4	2	**23218 CK**	**AHX2318**	340	485	2200	3000
	90	190	43	3	**21318 CK**	**AHX318**	335	415	2200	2800
	90	190	64	3	**22318 CK**	**AH2318**	510	620	1800	2400
90	95	170	43	2,1	**22219 CK**	**AHX319**	315	400	2200	2800
	95	200	45	3	**21319 CK**	**AHX319**	360	450	2000	2600

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
						$F_a/F_r \leq e$	$F_a/F_r > e$			Withdrawal
Φd_1	B_1	B_2	C	G	e	Y_1	Y_2	Y_0	Bearing	Sleeve
mm										[kg]
65	43	47	8	M 80x2	0,23	2,9	4,4	2,9	1,8	0,28
	43	47	8	M 80x2	0,23	2,9	4,4	2,9	3,23	0,28
	64	68	12	M 80x2	0,34	2	3	2	4,53	0,46
70	45	49	8	M 85x2	0,22	3,1	4,6	3	1,92	0,31
	45	49	8	M 85x2	0,23	2,9	4,4	2,9	3,86	0,31
	68	72	12	M 85x2	0,34	2	3	1,9	5,52	0,53
75	48	52	8	M 90x2	0,22	3,1	4,7	3,1	2,34	0,37
	48	52	8	M 90x2	0,23	2,9	4,4	2,9	4,6	0,37
	71	75	12	M 90x2	0,34	2	3	1,9	6,53	0,60
80	52	56	9	M 95x2	0,22	3	4,5	3	2,9	0,43
	52	56	9	M 95x2	0,22	3	4,5	2,9	5,33	0,43
	74	78	13	M 95x2	0,33	2	3	2	7,48	0,65
85	53	57	9	M 100x2	0,23	2,9	4,3	2,8	3,64	0,46
	63	67	10	M 100x2	0,31	2,2	3,3	2,2	4,85	0,57
	53	57	9	M 100x2	0,22	3	4,5	2,9	6,2	0,46
	79	83	14	M 100x2	0,33	2	3	2	8,83	0,76
90	57	61	10	M 105x2	0,24	2,9	4,3	2,8	4,39	0,54
	57	61	10	M 105x2	0,22	3	4,5	3	7,16	0,54

Spherical Roller Bearings with Withdrawal Sleeve



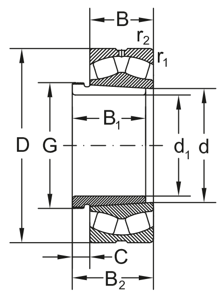
Shaft Φd_1	Dimensions d	D	B	r_1, r_2 min.	Designation Bearing	Withdrawal Sleeve	Basical radial load dyn. C_r	stat. C_{0r}	Speed limit grease	oil
mm							kN		min $^{-1}$	min $^{-1}$
90	95	200	67	3	**22319 CK**	**AHX2319**	580	700	1700	2200
95	100	165	52	2	**23120 MBK**	**AHX3120**	355	540	2000	3000
	100	180	46	2,1	**22220 CK**	**AHX320**	360	465	2200	2800
	100	180	60,3	2,1	**23220 CK**	**AHX2320**	465	655	1700	2200
	100	215	73	3	**22320 CK**	**AHX2320**	655	815	1500	2000
105	110	180	56	2	**23122 MBK**	**AHX3122**	410	640	1800	2400
	110	180	69	2	**24122 CK30**	**AH24122**	520	880	1200	1600
	110	200	53	2,1	**22222 CK**	**AHX3122**	455	585	2000	2800
	110	200	69,8	2,1	**23222 CK**	**AHX3222**	620	850	1400	1800
	110	240	80	3	**22322 MBK**	**AHX2322**	800	1060	1400	1900
115	120	180	46	2	**23024 CK**	**AHX3024**	360	570	2200	3000
	120	180	60	2	**24024 CK30**	**AH24024**	455	800	1500	2000
	120	200	62	2	**23124 MBK**	**AHX3124**	495	770	1700	2200
	120	200	80	2	**24124 CK30**	**AH24124**	630	1050	1000	1300
	120	215	58	2,1	**22224 CK**	**AHX3124**	540	720	1700	2200
	120	215	76	2,1	**23224 CK**	**AHX3224**	680	1000	1300	1700
	120	260	86	3	**22324 MBK**	**AHX2324**	900	1400	1300	1700
125	130	200	52	2	**23026 CK**	**AHX3026**	455	720	1900	2600
	130	200	69	2	**24026 CK30**	**AH24026**	530	900	1200	1600

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
90	85	89	16	M 105x2	0,33	2	3	2	10,2	0,90
95	64	68	11	M 110x2	0,28	2,4	3,5	2,3	4,87	0,66
	59	63	10	M 110x2	024	2,8	4,2	2,8	5,27	0,58
	73	77	11	M 110x2	0,31	2,2	3,3	2,1	7,06	0,76
	90	94	16	M 110x2	0,34	2	3	2	13	1,00
105	68	72	11	M 120x2	0,28	2,4	3,6	2,3	6,07	0,76
	82	91	13	M 115x2	0,35	1,9	2,9	1,9	7,65	0,73
	68	72	11	M 120x2	0,25	2,7	4	2,7	7,46	0,76
	82	86	11	M 120x2	0,33	2,1	3,1	2	10,1	0,88
	98	102	16	M 125x2	0,33	2,1	3,1	2	18,4	1,35
115	60	64	13	M 130x2	0,22	3	4,5	3	4,61	0,75
	73	82	13	M 125x2	0,29	2,3	3,4	2,3	5,85	0,65
	75	79	12	M 130x2	0,28	2,4	3,6	2,3	8,33	0,94
	93	102	13	M 130x2	0,37	1,8	2,7	1,8	11	1,00
	75	79	12	M 125x2	0,25	2,7	4	2,7	9,39	0,94
	90	94	13	M 135x2	0,33	2	3	2	12,5	1,11
	105	109	17	M 135x2	0,33	2,1	3,1	2	22,6	1,65
125	67	71	14	M 140x2	0,23	2,9	4,4	2,9	6,54	0,93
	83	93	14	M 135x2	0,31	2,2	3,3	2,2	8,56	0,84

Spherical Roller Bearings with Withdrawal Sleeve



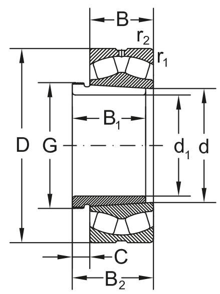
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Withdrawal	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
125	130	210	64	2	**23126 MBK**	**AHX3126**	540	860	1500	2000
	130	210	80	2	**24126 CK30**	**AH24126**	650	1100	900	1200
	130	230	64	3	**22226 CK**	**AHX3126**	630	880	1700	2200
	130	230	80	3	**23226 CK**	**AHX3226**	765	1140	1300	1700
	130	280	93	4	**22326 MBK**	**AHX2326**	1040	1340	1200	1600
135	140	210	53	2	**23028 CK**	**AHX3028**	480	780	1900	2600
	140	210	69	2	**24028 CK30**	**AH24028**	550	990	1100	1500
	140	225	68	2,1	**23128 MBK**	**AHX3128**	600	990	1400	1800
	140	225	85	2,1	**24128 CK30**	**AH24128**	740	1380	1100	1500
	140	250	68	3	**22228 CK**	**AHX3128**	730	1080	1400	1900
	140	250	88	3	**23228 CK**	**AHX3228**	915	1370	1100	1400
	140	300	102	4	**22328 MBK**	**AHX2328**	1220	1600	1100	1400
145	150	225	56	2,1	**23030 CK**	**AHX3030**	530	865	1800	2400
	150	225	75	2,1	**24030 CK30**	**AH24030**	620	1140	1300	1700
	150	250	80	2,1	**23130 MBK**	**AHX3130**	800	1320	1300	1700
	150	250	100	2,1	**24130 CK30**	**AH24130**	915	1560	1100	1500
	150	270	73	3	**22230 CK**	**AHX3130**	850	1200	1400	1800
	150	270	96	3	**23230 CK**	**AHX3230**	1030	1610	1000	1300
	150	320	108	4	**22330 MBK**	**AHX2330**	1370	1830	1100	1500

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
						$F_a/F_r \le e$	$F_a/F_r > e$			Withdrawal
Φd_1	B_1	B_2	C	G	e	Y_1	Y_2	Y_0	Bearing	Sleeve
mm										[kg]
125	78	82	12	M 140X2	0,28	2,4	3,6	2,4	9,19	1,10
	94	104	14	M 140X2	0,34	2	2,9	1,9	11,7	1,11
	78	82	12	M 140X2	0,26	2,6	3,9	2,6	11,6	1,10
	98	102	15	M 145X2	0,33	2,1	3,1	2	15	1,55
	115	119	19	M 145X2	0,33	2,1	3,1	2	28	2,00
135	68	73	14	M 150X2	0,22	3,1	4,6	3	7,05	1,00
	83	93	14	M 145X2	0,29	2,3	3,5	2,3	9,06	0,95
	83	88	14	M 150X2	0,27	2,5	3,7	2,4	11,1	1,30
	99	109	14	M 150X2	0,34	2	2,9	1,9	14,1	1,30
	83	88	14	M 150X2	0,25	2,7	4	2,6	14,7	1,30
	104	109	15	M 155X3	0,33	2	3	2	19,5	1,85
	125	130	20	M 155X2	0,34	2	3	2	35,1	2,35
145	72	77	15	M 160X3	0,22	3,1	4,6	3	8,48	1,15
	90	101	15	M 155X3	0,29	2,3	3,5	2,3	11,2	1,05
	96	101	15	M 165X3	0,29	2,3	3,5	2,3	16,8	1,80
	115	126	15	M 160X3	0,4	1,7	2,5	1,6	21,5	1,55
	96	101	15	M 165X3	0,25	2,7	3,4	2,6	18,7	1,80
	114	119	17	M 165X3	0,33	2	3	2	25	2,20
	135	140	24	M 165X3	0,33	2	3	2	42,1	2,80

Spherical Roller Bearings with Withdrawal Sleeve



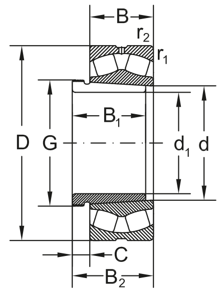
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
150	160	240	60	2,1	**23032 CK**	**AH3032**	600	1000	1600	2000
	160	240	80	2,1	**24032 CK30**	**AH24032**	720	1320	1000	1300
	160	270	86	2,1	**23132 MBK**	**AH3132**	930	1510	1200	1600
	160	270	109	2,1	**24132 CK30**	**AH24132**	1060	1800	1000	1400
	160	290	80	3	**22232 CK**	**AH3132**	965	1370	1300	1700
	160	290	104	3	**23232 CK**	**AH3232**	1180	1830	1200	1600
	160	340	114	4	**22332 MBK**	**AH2332**	1430	1900	1000	1300
160	170	260	67	2,1	**23034 CK**	**AH3034**	735	1200	1500	1900
	170	260	90	2,1	**24034 MBK30**	**AH24034**	850	1560	1000	1300
	170	280	88	2,1	**23134 MBK**	**AH3134**	990	1650	1100	1500
	170	280	109	2,1	**24134 CK30**	**AH24134**	1060	1830	750	1000
	170	310	86	4	**22234 CK**	**AH334**	1100	1530	1200	1600
	170	310	110	4	**23234 CK**	**AH2334**	1370	2120	1100	1500
	170	360	120	4	**22334 MBK**	**AH2334**	1600	2120	900	1200
170	180	280	74	2,1	**23036 CK**	**AH3036**	865	1430	1400	1800
	180	280	100	2,1	**24036 MBK30**	**AH24036**	1000	1830	900	1200
	180	300	96	3	**23136 CK**	**AH3136**	1160	1930	1100	1400
	180	300	118	3	**24136 CK30**	**AH24136**	1250	2200	700	950
	180	320	86	4	**22236 CK**	**AH2236**	1010	1560	1100	1500

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
150	77	82	16	M 170X3	0,22	3,1	4,6	3	11	2,05
	95	106	15	M 170X3	0,29	2,3	3,4	2,3	14,6	2,30
	103	108	16	M 180X3	0,29	2,3	3,5	2,3	22	2,87
	124	135	15	M 170X3	0,41	1,7	2,5	1,6	28,4	3,05
	103	108	16	M 180X3	0,26	2,6	3,9	2,6	24,6	2,87
	124	130	20	M 180X3	0,34	2	3	2	33,9	4,00
	140	146	24	M 180X3	0,37	1,8	2,7	1,8	55,8	4,72
160	85	90	17	M 180X3	0,23	3	4,4	2,9	14,5	2,40
	106	117	16	M 180X3	0,34	2	3	2	20,6	2,70
	104	109	16	M 190X3	0,28	2,4	3,5	2,3	23,6	3,04
	125	136	16	M 180X3	0,39	1,7	2,6	1,7	29,6	3,25
	104	109	16	M 190X3	0,26	2,6	3,9	2,5	29,2	3,04
	134	140	24	M 190X3	0,33	2	3	2	39,7	4,80
	146	152	24	M 190X3	0,37	1,8	2,7	1,8	65	5,25
170	92	98	17	M 190X3	0,23	2,9	4,3	2,8	18,6	2,80
	116	127	16	M 190X3	0,36	1,9	2,8	1,9	26,5	3,20
	116	122	19	M 200X3	0,29	2,3	3,5	2,3	29,7	3,76
	134	145	16	M 190X3	0,4	1,7	2,5	1,6	37,5	3,68
	105	110	17	M 200X3	0,26	2,6	3,9	2,5	37,5	5,25

Spherical Roller Bearings with Withdrawal Sleeve



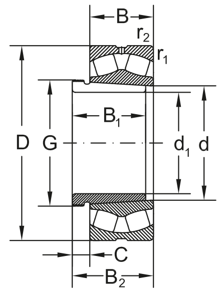
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min^{-1}	min^{-1}
170	180	320	112	4	**23236 CK**	**AH3236**	1420	2320	1100	1500
	180	380	126	4	**22336 MBK**	**AH2336**	1760	2360	850	1100
180	190	290	75	2,1	**23038 CK**	**AH3038**	915	1530	1300	1700
	190	290	100	2,1	**24038 MBK30**	**AH24038**	1040	1960	850	1100
	190	320	104	3	**23138 MBK**	**AH3138**	1320	2200	1100	1400
	190	320	128	3	**24138 CK30**	**AH24138**	1400	2500	670	900
	190	340	92	4	**22238 CK**	**AH2238**	1200	1830	1100	1400
	190	340	120	4	**23238 CK**	**AH3238**	1750	2880	850	1100
	190	400	132	5	**22338 MBK**	**AH2338**	1860	2500	750	1000
190	200	310	82	2,1	**23040 CK**	**AH3040**	1060	1760	1300	1700
	200	310	109	2,1	**24040 K30**	**AH24040**	1140	2280	850	1100
	200	340	112	3	**23140 MBK**	**AH3140**	1320	2280	900	1400
	200	340	140	3	**24140 CK30**	**AH24140**	1700	3000	800	1000
	200	360	98	4	**22240 CK**	**AH2240**	1250	1930	1100	1400
	200	360	128	4	**23240 CK**	**AH3240**	1620	2590	750	1000
	200	420	138	5	**22340 MBK**	**AH2340**	1910	2750	670	900
200	220	340	90	3	**23044 MBK**	**AH3044**	1100	2000	900	1200
	220	340	118	3	**24044 K30**	**AH24044**	1370	2600	750	950
	220	370	150	4	**24144 K30**	**AH24144**	1800	3300	700	900

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
170	140	146	25	M 200x3	0,33	2,1	3,1	2	42,6	5,32
	154	160	26	M 200x3	0,37	1,8	2,7	1,8	75,2	5,83
180	96	102	18	Tr 205x4	0,23	3	4,4	2,9	20,1	3,32
	118	131	18	M 200x3	0,34	2	3	2	28	3,55
	125	131	20	Tr 210x4	0,3	2,3	3,4	2,2	37,5	4,90
	146	159	18	M 200x3	0,41	1,7	2,5	1,6	46,2	4,28
	112	117	18	Tr 210x4	0,26	2,6	3,9	2,5	35,5	4,25
	145	152	25	Tr 210x4	0,36	1,9	2,8	1,8	53,9	5,90
	160	167	26	Tr 210x4	0,37	1,8	2,7	1,8	87,8	6,63
190	102	108	19	Tr 215x4	0,23	2,9	4,3	2,8	25,3	3,85
	127	140	18	Tr 210x4	0,35	1,9	2,9	1,9	35,2	4,00
	134	140	21	Tr 220x4	0,35	2	2,9	1,9	48,2	5,49
	158	171	18	Tr 210x4	0,42	1,6	2,4	1,6	57,6	5,05
	118	223	19	Tr 220x4	0,26	2,6	3,9	2,5	42,5	4,70
	153	160	24	Tr 220x4	0,37	1,8	2,7	1,8	64,3	6,60
	170	177	30	Tr 220x4	0,36	1,9	2,8	1,8	99,3	7,60
200	111	117	20	Tr 235x4	0,26	2,6	3,8	2,5	38,4	7,40
	138	152	20	Tr 230x4	0,34	2	2,9	1,9	49	8,20
	170	164	20	Tr 230x4	0,41	1,6	2,4	1,6	75,5	10,00

Spherical Roller Bearings with Withdrawal Sleeve



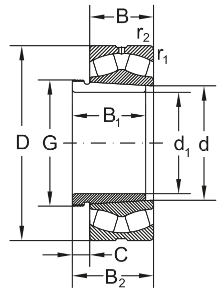
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Withdrawal	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
200	220	370	120	4	**23144 MBK**	**AH3144**	1515	2509	800	1000
	220	400	108	4	**22244 CK**	**AH3144**	1520	2300	900	1200
	220	400	144	4	**23244 CK**	**AH2344**	2040	3380	670	900
	220	460	145	5	**22344 CK**	**AH2344**	2320	3350	700	900
220	240	360	92	3	**23048 MBK**	**AH3048**	1160	2200	800	1000
	240	360	118	3	**24048 K30**	**AH24048**	1460	2841	700	900
	240	400	160	4	**24148 K30**	**AH24148**	1780	3109	530	700
	240	400	128	4	**23148 MBK**	**AH3148**	1705	2863	750	950
	240	440	120	4	**22248 CK**	**AH3148**	1845	2763	850	1100
	240	440	160	4	**23248 CK**	**AH2348**	2450	4250	630	850
	240	500	155	5	**22348 MBK**	**AH2348**	2650	3900	560	750
240	260	400	104	4	**23052 MBK**	**AH3052**	1500	2800	750	950
	260	400	140	4	**24052 K30**	**AH24052**	1775	3494	600	800
	260	440	180	4	**24152 K30**	**AH24152**	2500	5000	480	630
	260	440	144	4	**23152 MBK**	**AH3152**	2153	3673	670	850
	260	480	130	5	**22252 MBK**	**AH2252**	2190	3300	750	1000
	260	540	165	6	**22352 CK**	**AH2352**	3000	4400	600	750
260	280	420	106	4	**23056 MBK**	**AH3056**	1560	3000	700	900
	280	420	140	4	**24056 K30**	**AH24056**	2000	4000	560	750

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
200	145	151	23	Tr 240x4	0,33	2	3	2	64,8	10,4
	145	151	23	Tr 240x4	0,27	2,5	3,7	2,5	59	9,30
	181	189	30	Tr 240x4	0,37	1,8	2,7	1,8	95	13,5
	181	189	30	Tr 240x4	0,35	2	2,9	1,9	133	13,5
220	116	123	21	Tr 260x4	0,25	2,7	4,1	2,7	42,7	8,75
	138	153	20	Tr 250x4	0,32	2,1	3,1	2,1	52,6	9
	180	195	20	Tr 260x4	0,41	1,7	2,5	1,6	93,1	12,5
	154	161	25	Tr 260x4	0,33	2,1	3,1	2	78,4	12,00
	154	161	25	Tr 260x4	0,27	2,5	3,7	2,5	82,5	12,00
	189	197	30	Tr 260x4	0,37	1,8	2,7	1,8	125	15,5
	189	197	30	Tr 260x4	0,35	2	2,9	1,9	169	15,5
240	128	135	23	Tr 280x4	0,26	2,6	3,9	2,6	59,7	10,7
	162	178	22	Tr 270x4	0,35	1,9	2,9	1,9	77,8	11,8
	202	218	22	Tr 280x4	0,42	1,6	2,4	1,6	129	15,4
	172	179	26	Tr 290x4	0,33	2	3	2	109	16,00
	155	179	26	Tr 290x4	0,27	2,5	3,7	2,5	105	12,5
	205	213	30	Tr 290x4	0,34	2	3	2	205	19,6
260	131	139	24	Tr 300x4	0,25	2,7	4,1	2,7	64,5	12
	162	179	22	Tr 290x4	0,33	2	3	2	83,1	12,8

Spherical Roller Bearings with Withdrawal Sleeve



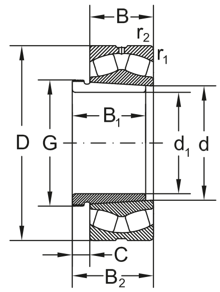
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min $^{-1}$	min $^{-1}$
260	280	460	146	5	**23156 MBK**	**AH3156**	2295	4050	630	800
	280	460	180	5	**24156 K30**	**AH24156**	2635	4848	400	530
	280	500	176	5	**23256 MBK**	**AH2356**	2806	4645	480	630
	280	580	175	6	**22356 CK**	**AH2356**	3530	5208	530	670
280	300	460	118	4	**23060 MBK**	**AH3060**	1960	3650	630	800
	300	460	160	4	**24060 K30**	**AH24060**	2385	4702	560	700
	300	500	160	5	**23160 MBK**	**AH3160**	2635	4485	600	750
	300	500	200	5	**24160 K30**	**AH24160**	3213	6011	430	560
300	320	480	121	4	**23064 MBK**	**AH3064**	2040	4000	600	750
	320	480	160	4	**24064 K30**	**AH24064**	2500	5240	530	670
	320	540	176	5	**23164 MBK**	**AH3164**	3115	6000	530	670
	320	540	218	5	**24164 K30**	**AH24164**	3750	7300	400	530
	320	580	208	5	**23264 MBK**	**AH3264**	3900	6950	430	560
320	340	520	133	5	**23068 MBK**	**AH3068**	2360	4500	560	700
	340	520	180	5	**24068 K30**	**AH24068**	3100	6550	480	600
	340	580	190	5	**23168 MBK**	**AH3168**	3605	6409	500	630
	340	580	243	5	**24168 K30**	**AH24168**	4400	8500	450	560
340	360	540	134	5	**23072 MBK**	**AH3072**	2450	4800	530	670
	360	540	180	5	**24072 K30**	**AH24072**	3110	6530	480	630

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
260	175	183	28	Tr 310x5	0,32	2,1	3,2	2,1	117	17,5
	202	219	22	Tr 300x4	0,39	1,7	2,5	1,7	134	16,3
	212	220	30	Tr 310x5	0,33	1,9	2,8	1,8	174	21,6
	212	220	30	Tr 310x5	0,33	2	3	2	254	21,6
280	145	153	26	Tr 320x5	0,25	2,7	4	2,6	88	14,4
	184	202	24	Tr 310x5	0,35	2	2,9	1,9	116	15,5
	192	200	30	Tr 330x5	0,33	2,1	3,1	2	151	20,8
	224	242	24	Tr 320x5	0,4	1,7	2,5	1,6	179	19,5
300	149	157	27	Tr 345x5	0,25	2,7	4,1	2,7	96	16
	184	202	24	Tr 330x5	0,33	2,1	3,1	2	123	16,6
	209	217	31	Tr 350x5	0,34	2	2,9	1,9	196	24,5
	242	260	24	Tr 340x5	0,41	1,7	2,5	1,6	225	21,4
	246	254	36	Tr 350x5	0,37	1,8	2,7	1,8	278	30,6
320	162	171	28	Tr 365x5	0,25	2,7	4	2,6	125	19,5
	206	225	26	Tr 360x5	0,34	2	2,9	1,9	165	21,7
	225	234	33	Tr 370x5	0,34	2	2,9	1,9	245	29
	269	288	26	Tr 360x5	0,43	1,6	2,3	1,5	293	27,1
340	167	176	30	Tr 385x5	0,25	2,7	4,1	2,7	132	21
	206	226	26	Tr 380x5	0,31	2,7	3,3	2,2	140	20,0

Spherical Roller Bearings with Withdrawal Sleeve



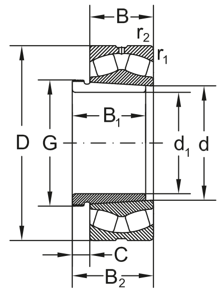
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Withdrawal	dyn.	stat.	grease	oil
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
340	360	600	192	5	**23172 MBK**	**AH3172**	3740	7010	480	600
	360	600	243	5	**24172 K30**	**AH24172**	4500	9000	430	530
	360	650	232	6	**23272 MBK**	**AH3272**	4880	8490	430	560
360	380	560	135	5	**23076 MBK**	**AH3076**	2550	5300	500	630
	380	560	180	5	**24076 K30**	**AH24076**	3150	6710	450	600
	380	620	194	5	**23176 MBK**	**AH3176**	3740	7540	450	560
	380	620	243	5	**24176 K30**	**AH24176**	4650	9500	400	500
	380	680	240	6	**23276 MBK**	**AH3276**	5050	9660	400	530
380	400	600	148	5	**23080 MBK**	**AH3080**	3050	6200	450	560
	400	600	200	5	**24080 CAK30**	**AH24080**	3610	7545	430	460
	400	650	200	6	**23180 MBK**	**AH3180**	4100	7730	430	530
	400	650	250	6	**24180 K30**	**AH24180**	5100	10400	380	480
	400	720	256	6	**23280 MBK**	**AH3280**	5700	10800	380	500
400	420	620	150	5	**23084 MBK**	**AH3084**	3150	6550	450	560
	420	620	200	5	**24084 K30**	**AH24084**	3740	8800	380	480
	420	700	224	6	**23184 CK**	**AH3184**	4600	9000	400	500
	420	700	280	6	**24184 K30**	**AH24184**	6100	12500	360	450
	420	760	272	7,5	**23284 MBK**	**AH3284**	6550	11717	360	480

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
						$F_a/F_r \le e$	$F_a/F_r > e$			Withdrawal
Φd_1	B_1	B_2	C	G	e	Y_1	Y_2	Y_0	Bearing	Sleeve
mm										[kg]
340	229	238	35	Tr 400x5	0,33	2,1	3,1	2	261	33
	269	289	26	Tr 380x5	0,41	1,6	2,4	1,6	308	29,6
	274	283	40	Tr 400x5	0,38	1,8	2,7	1,7	389	41,5
360	170	180	31	Tr 410x5	0,24	2,8	4,2	2,8	140	23,5
	208	228	28	Tr 400x5	0,3	2,3	3,4	2,2	145	23,5
	232	242	36	Tr 420x5	0,32	2,1	3,2	2,1	278	36,0
	271	291	28	Tr 400x5	0,39	1,7	2,5	1,7	321	31,0
	284	294	42	Tr 420x5	0,37	1,8	2,7	1,8	436	45,5
380	183	193	33	Tr 430x5	0,24	2,8	4,1	2,7	179	27,0
	228	248	28	Tr 420x5	0,3	2,3	3,4	2,2	200	27,0
	240	250	38	Tr 440x5	0,31	2,2	3,2	2,1	310	39,0
	278	298	28	Tr 420x5	0,39	1,7	2,6	1,7	360	35,0
	302	312	44	Tr 440x5	0,38	1,8	2,7	1,7	517	51,5
400	186	196	34	Tr 450x5	0,24	2,8	4,2	2,8	189	29,0
	230	252	30	Tr 440x5	0,3	2,3	3,4	2,2	205	29,0
	266	276	40	Tr 460x5	0,33	2	3	2	409	46,0
	310	332	30	Tr 440x5	0,4	1,7	2,5	1,6	483	40,3
	321	331	46	Tr 460x5	0,38	1,8	2,6	1,7	612	58,9

Spherical Roller Bearings with Withdrawal Sleeve



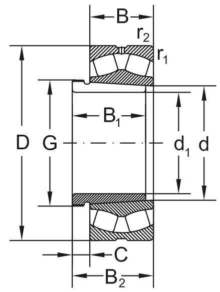
Shaft	Dimensions				Designation		Basical radial load		Speed limit	
						Withdrawal	dyn.	stat.	grease	oil
$Φd_1$	d	D	B	r_1, r_2 min.	Bearing	Sleeve	C_r	C_{0r}		
mm							kN		min^{-1}	min^{-1}
420	440	650	157	6	**23088 MBK**	**AHX3088**	3400	7100	430	530
	440	650	212	6	**24088 K30**	**AHX24088**	4080	8800	360	450
	440	720	226	6	**23188 CK**	**AHX3188**	5000	10000	400	500
	440	720	280	6	**24188 K30**	**AHX24188**	6400	13200	340	430
	440	790	280	7,5	**23288 MBK**	**AHX3288**	7100	13400	360	450
440	460	680	163	6	**23092 MBK**	**AHX3092**	3650	7650	400	500
	460	760	240	7,5	**23192 CK**	**AHX3192**	5760	11025	360	450
	460	760	300	7,5	**24192 K30**	**AH24192**	7250	14600	280	380
	460	830	296	7,5	**23292 MBK**	**AHX3292**	7560	13970	340	430
460	480	700	165	6	**23096 MBK**	**AHX3096**	3800	8150	380	480
	480	790	248	7,5	**23196 CK**	**AHX3196**	5800	11800	360	450
	480	790	308	7,5	**24196 K30**	**AH24196**	7250	15000	280	360
	480	870	310	7,5	**23296 MBK**	**AHX3296**	8800	17000	340	430
480	500	670	128	5	**239/500 MBK**	**AH39/500**	2500	6090	380	480
	500	720	167	6	**230/500 MBK**	**AHX30/500**	3900	8500	380	480
	500	830	264	7,5	**231/500 MBK**	**AHX31/500**	6550	13200	340	430
	500	830	325	7,5	**241/500 K30**	**AH241/500**	8630	17000	268	340
	500	920	336	7,5	**232/500 MBK**	**AHX32/500**	9650	18300	320	400
500	530	710	136	5	**239/530 MBK**	**AH39/530**	2850	6755	360	450

Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
Φd_1	B_1	B_2	C	G	e	$F_a/F_r \leq e$ Y_1	$F_a/F_r > e$ Y_2	Y_0	Bearing	Withdrawal Sleeve
mm										[kg]
420	194	205	35	Tr 470x5	0,24	2,8	4,2	2,8	216	32
	242	264	30	Tr 460x5	0,3	2,3	3,4	2,2	240	32
	270	281	42	Tr 480x5	0,32	2,1	3,1	2,1	429	49,8
	310	332	30	Tr 460x5	0,38	1,8	2,6	1,7	496	42,5
	330	341	48	Tr 480x5	0,37	1,8	2,7	1,8	671	63,8
440	202	213	37	Tr 490x5	0,24	2,8	4,2	2,8	245	35,2
	285	296	43	Tr 510x6	0,32	2,1	3,2	2,1	510	57,9
	332	355	32	Tr 480x6	0,37	1,8	2,7	1,8	550	50
	349	360	50	Tr 510x6	0,37	1,8	2,7	1,8	795	74,5
460	205	217	38	Tr 520x6	0,23	2,9	4,3	2,8	259	39,2
	295	307	45	Tr 530x6	0,32	2,1	3,2	2,1	567	63,1
	340	363	32	Tr 500x6	0,37	1,8	2,7	1,8	595	51,5
	364	376	52	Tr 530x6	0,37	1,8	2,7	1,8	914	82,1
480	162	172	32	Tr 520x6	0,17	3,9	5,8	3,8	161	28
	209	221	40	Tr 540x6	0,22	3	4,5	2,9	272	42,5
	313	325	47	Tr 550x6	0,32	2,1	3,1	2,1	670	70,9
	360	383	35	Tr 530x6	0,37	1,8	2,7	1,8	735	57,0
	393	405	54	Tr 550x6	0,38	1,8	2,7	1,7	1105	94,6
500	175	185	37	Tr 550x6	0,18	3,9	5,7	3,8	202	43,4

Spherical Roller Bearings with Withdrawal Sleeve



Shaft	Dimensions				Designation		Basical radial load		Speed limit	
Φd_1	d	D	B	r_1, r_2 min.	Bearing	Withdrawal Sleeve	dyn. C_r	stat. C_{0r}	grease	oil
mm							kN		min $^{-1}$	min $^{-1}$
500	530	780	185	6	**230/530 MBK**	**AH30/530**	4400	9500	340	430
	530	870	335	7,5	**241/530 K30**	**AH241/530**	8650	18400	240	320
530	560	750	140	5	**239/560 MBK**	**AH39/560**	3100	7350	340	430
	560	820	195	6	**230/560 MBK**	**AH30/560**	5100	11000	320	400
	560	920	355	7,5	**241/560 K30**	**AH241/560**	10500	21600	120	160
560	600	800	150	5	**239/600 MBK**	**AH39/600**	3450	8650	320	400
	600	870	200	6	**230/600 MBK**	**AH30/600**	5700	12500	300	380
	600	980	375	7,5	**241/600 K30**	**AH241/600**	10700	22800	220	280
600	630	580	165	6	**239/630 MBK**	**AH39/630**	4050	9800	300	380
	630	920	212	7,5	**230/630 MBK**	**AH30/630**	6300	14000	260	340
630	670	900	170	6	**239/670 MBK**	**AH39/670**	4300	10600	280	360
	670	980	230	7,5	**230/670 MBK**	**AH30/670**	7200	16000	260	340
670	710	950	180	6	**239/710 MBK**	**AH39/710**	4800	12000	260	340
710	750	1000	185	6	**239/750 MBK**	**AH39/750**	5200	12900	260	340

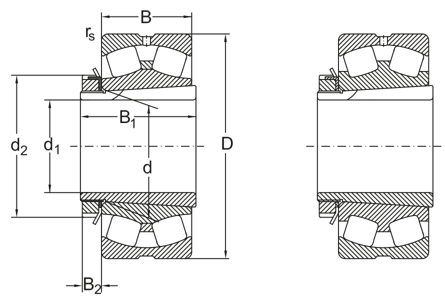
Spherical Roller Bearings with Withdrawal Sleeve

Abutment and fillet dimensions for spherical roller bearings see on page 377

Shaft	Dimensions					Calculation factor			Mass	
						$F_a/F_r \leq e$	$F_a/F_r > e$			Withdrawal
Φd_1	B_1	B_2	C	G	e	Y_1	Y_2	Y_0	Bearing	Sleeve
mm										[kg]
500	230	242	45	Tr 560x6	0,22	3	4,5	3	372	61,9
	370	394	35	Tr 550x6	0,37	1,8	2,7	1,8	820	86
530	180	190	37	Tr 580x6	0,17	4	5,9	3,9	230	47,4
	240	252	45	Tr 590x6	0,23	2,9	4,4	2,9	427	68,6
	393	417	38	Tr 580x6	0,35	1,9	2,9	1,8	970	97
560	192	202	38	Tr 625x6	0,17	4	5,9	3,9	277	56,1
	245	259	45	Tr 630x6	0,22	3,1	4,6	3	481	75,4
	413	439	38	Tr 630x6	0,35	1,9	2,9	1,8	1180	120
600	210	232	40	Tr 655x6	0,18	3,8	5,7	3,7	344	62,8
	258	272	46	Tr 670x6	0,22	3	4,5	2,9	576	87,7
630	216	228	41	Tr 695x6	0,17	4	5,9	3,9	412	85,5
	280	294	50	Tr 710x7	0,22	3	4,5	2,9	726	124
670	228	240	43	Tr 740x7	0,18	3,8	5,7	3,8	488	102
710	234	246	44	Tr 780x7	0,17	4	5,9	3,9	548	111

Spherical Roller Bearings with withdrawal sleeve

SR 3918



d_1	d	D	B	r_s min.	d_2	B_1	B_2	Designation Bearing	Withdrawal sleeve
mm									
35	40	80	23	1,1	58	36	10	**22208 CK**	**H308**
	40	90	23	1,5	58	36	10	**21308 CK**	**H308**
	40	90	33	1,5	58	46	10	**22308 CK**	**H2308**
40	45	85	23	1,1	65	39	11	**22209 CK**	**H309**
	45	100	25	1,5	65	39	11	**21309 CK**	**H309**
	45	100	36	1,5	65	50	11	**22309 CK**	**H2309**
45	50	90	23	1,1	70	42	12	**22210 CK**	**H310**
	50	110	27	2	70	42	12	**21310 CK**	**H310**
	50	110	40	2	70	55	12	**22310 CK**	**H2310**
50	55	100	25	1,5	75	45	12	**22211 CK**	**H311**
	55	120	29	2	75	45	12	**21311 CK**	**H311**
	55	120	43	2	75	59	12	**22311 CK**	**H2311**
55	60	110	28	1,5	80	47	13	**22212 CK**	**H312**
	60	130	31	2,1	80	47	13	**21312 CK**	**H312**
	60	130	46	2,1	80	62	13	**22312 CK**	**H2312**
60	65	120	31	1,5	85	50	14	**22213 CK**	**H313**
	65	140	33	2,1	85	50	14	**21313 CK**	**H313**
	65	140	48	2,1	85	65	14	**22313 CK**	**H2313**
	70	125	31	2,1	92	52	14	**22214 CK**	**H314**
	70	150	51	2,1	92	68	14	**22314 CK**	**H2314**
65	75	130	31	1,5	98	55	15	**22215 CKW33**	**H315**
	75	160	37	2,1	98	55	15	**21315 CKW33**	**H315**
	75	160	55	2,1	98	73	15	**22315 CKW33**	**H2315**
70	80	140	33	2	105	59	17	**22216 CKW33**	**H316**
	80	170	39	2,1	105	59	17	**21316 CKW33**	**H316**
	80	170	58	2,1	105	78	17	**22316 MBKW33**	**H2316**
75	85	150	36	2	110	63	18	**22217 CKW33**	**H317**
	85	180	41	3	110	63	18	**21317 CK**	**H317**
	85	180	60	3	110	82	18	**22317 MBKW33**	**H2317**
80	90	160	40	2	120	65	18	**22218 CKW33**	**H318**
	90	160	52,4	2	120	86	18	**23218 MBK**	**H2318**
	90	190	43	3	120	56	18	**21318 CK**	**H318**

Spherical Roller Bearings
with withdrawal sleeve

Basic radial load. Factors						Speed limit		Mass
dyn.				stat.				
C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil	
kN	-		-	kN	-	min^{-1}	min^{-1}	kg
88	0,31	2,2	3,2	98	2,1	4800	6300	0,699
99	0,26	2,6	3,9	120	2,6	4500	6000	0,889
140	0,4	1,6	2,5	145	1,6	4300	5600	1,22
93	0,3	2,3	3,4	105	2,2	4500	6000	0,798
120	0,26	2,6	3,9	135	2,6	4000	5300	1,19
165	0,4	1,7	2,5	190	1,6	3800	5000	1,58
100	0,26	2,6	3,9	120	2,5	4000	5300	0,903
120	0,24	2,8	4,1	130	2,7	3600	4800	1,50
190	0,4	1,7	2,5	220	1,6	3400	4500	2,16
120	0,27	2,5	3,8	140	2,5	3800	5000	1,15
135	0,24	2,8	4,1	155	2,7	3200	4300	1,95
230	0,4	1,7	2,5	265	1,6	3000	4000	2,72
145	1,27	2,5	3,7	175	2,4	3400	4500	1,49
150	0,24	2,9	4,3	180	2,8	3000	4000	2,29
270	0,4	1,7	2,5	320	1,7	2800	3800	3,33
180	0,28	2,4	3,6	220	2,4	3000	4000	1,86
220	0,24	2,8	4,2	290	2,8	2800	3800	2,86
305	0,39	1,7	2,6	360	1,7	2800	3600	4,01
180	0,26	2,6	3,9	225	2,6	2800	3800	2,22
375	0,38	1,8	2,6	455	1,7	2400	3200	5,20
190	0,24	2,8	4,1	250	2,7	2800	3800	2,43
280	0,23	2,9	4,4	360	2,9	2400	3200	4,33
415	0,38	1,8	2,6	520	1,7	2200	3000	6,20
210	0,25	2,6	4	275	2,6	2600	3400	3,08
310	0,23	2,9	4,4	400	2,9	2200	3000	5,23
410	0,25	2,6	4	500	2,6	1800	2400	7,38
250	0,26	2,6	3,9	325	2,6	2400	3200	3,68
350	0,22	3	4,5	450	2,9	2200	2800	6,18
460	0,37	1,8	2,7	570	1,8	1700	2200	8,65
305	0,27	2,5	3,8	410	2,5	2200	3000	4,57
340	0,34	2	3	485	2	1500	2000	6,19
385	0,22	3	4,5	510	2,9	2200	2800	7,07

Spherical Roller Bearings
with withdrawal sleeve

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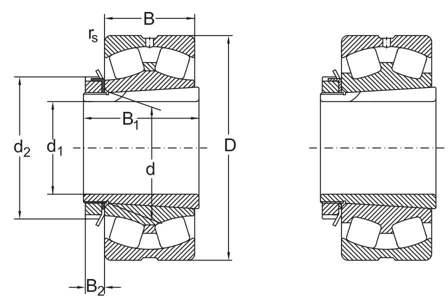


CK+H MBK+H

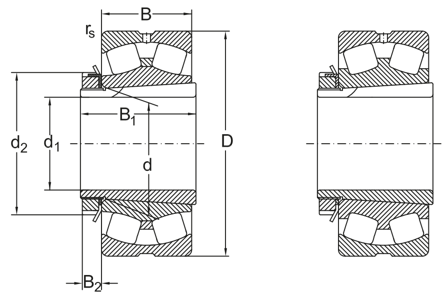
Dimensions								Designation	Withdrawal sleeve
d_1	d	D	B	r_s min.	d_2	B_1	B_2	Bearing	
mm									
80	90	190	64	3	120	86	18	**22318 CKW33**	**H2318**
85	95	170	43	2,1	125	68	19	**22219 MBKW33**	**H319**
	95	200	45	3	125	68	19	**21319 MBK**	**H319**
	95	200	67	3	125	90	19	**22319 MBKW33**	**H2319**
90	100	180	46	2,1	130	71	20	**22220 MBKW33**	**H320**
	100	180	60,3	2,1	130	97	20	**23220 MAKW33**	**H2320**
	100	215	47	3	130	71	20	**21320 MBK**	**H320**
	100	215	73	3	130	97	20	**22320 CKW33**	**H2320**
100	110	180	56	2	145	81	21	**23122 MBKW33**	**H3122**
	110	200	53	2,1	145	77	21	**22222 MBKW33**	**H322**
	110	200	69,8	2,1	145	105	21	**23222 MBKW33**	**H2322**
	110	240	50	3	145	77	21	**21322 MBK**	**H322**
	110	240	80	3	145	105	21	**22322 CKW33**	**H2322**
110	120	180	46	2	145	72	22	**23024 MBK33**	**H3024**
	120	200	62	2	155	88	22	**23124 MBKW33**	**H3124**
	120	215	58	2,1	155	88	22	**22224 CKW33**	**H3124**
	120	215	76	2,1	155	112	22	**23224 MBKW33**	**H2324**
	120	260	86	3	155	112	22	**22324 MBKW33**	**H2324**
115	130	200	52	2	155	80	23	**23026 MBKW33**	**H3026**
	130	210	64	2	165	92	23	**23126 MBKW33**	**H3126**
	130	230	64	3	165	92	23	**22226 CKW33**	**H3126**
	130	230	80	3	165	121	23	**23226 MBKW33**	**H2326**
	130	280	93	4	165	121	23	**22326 MBKW33**	**H2326**
125	140	210	53	2	165	82	24	**23028 MBKW33**	**H3028**
	140	225	68	2,1	180	97	24	**23128 MBKW33**	**H3128**
	140	250	68	3	180	97	24	**22228 MBKW33**	**H3128**
	140	250	88	3	180	131	24	**23228 MBKW33**	**H2328**
	140	300	102	4	180	131	24	**22328 MBKW33**	**H2328**
135	150	225	56	2,1	180	87	26	**23030 MBKW33**	**H3030**
	150	250	80	2,1	195	111	26	**23130 MBKW33**	**H3130**
	150	270	73	3	195	111	26	**22230 MBKW33**	**H3130**
	150	270	96	3	195	139	26	**23230 MBKW33**	**H2330**

Spherical Roller Bearings with withdrawal sleeve

Basic radial load. Factors						Speed limit		Mass
dyn.				stat.				
C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil	
kN	-		-	kN	-	min^{-1}	min^{-1}	kg
570	0,36	1,9	2,8	730	1,8	1800	2400	10,2
310	0,26	2,6	3,8	415	2,5	2000	2600	5,56
385	0,22	3,1	4,6	530	3	1800	2400	8,56
570	0,38	1,8	2,7	740	1,7	1500	2000	11,9
340	0,27	2,5	3,7	455	2,4	2000	2600	6,49
455	0,33	2	3	660	2	1500	2000	8,65
425	0,22	3,1	4,7	580	3,1	1700	2200	9,99
730	0,37	1,8	2,7	960	1,7	1500	2000	15,2
410	0,3	2,3	3,3	640	2,2	1800	2400	7,75
540	0,28	2,4	3,5	700	2,3	1700	2200	9,18
570	0,33	2	3	840	2	1200	1600	12,2
510	0,21	3,2	4,8	690	3,2	1500	2000	13,9
870	0,37	1,8	2,7	1160	1,8	1400	1900	20,2
335	0,24	2,8	4,2	560	2,8	1800	2400	6,03
495	0,31	2,2	3,3	770	2,2	1700	2200	10,2
560	0,29	2,3	3,5	800	2,3	1700	2200	11,2
670	0,37	1,8	2,7	1020	1,8	1100	1500	15,0
930	0,36	1,8	2,7	1230	1,8	1100	1500	25,0
410	0,23	2,9	4,4	670	2,8	1700	2200	8,85
540	0,3	2,3	3,3	860	2,2	1500	2000	12,0
660	0,29	2,3	3,5	960	2,3	1700	2200	17,5
760	0,33	2	3	1170	2	1100	1500	18,4
1080	0,37	1,8	2,7	1450	1,8	1100	1400	32,9
435	0,22	3	4,6	750	2,8	1500	2000	9,16
600	0,3	2,3	3,3	990	2,2	1400	1800	14,5
670	0,29	2,3	3,5	990	2,3	1300	1700	18,1
880	0,37	1,8	2,7	1380	1,8	1000	1300	23,8
1240	0,38	1,7	2,6	1720	1,7	1000	1300	39,7
480	0,22	3	4,6	830	2,8	1400	1800	11,7
800	0,32	2,1	3,2	1320	2,1	1300	1700	21,5
810	0,29	2,3	3,5	1190	2,3	1200	1600	23,2
1030	0,38	1,8	2,7	1610	1,7	1000	1300	30,6

Spherical Roller Bearings with withdrawal sleeve

SR 3918



CK+H MBK+H

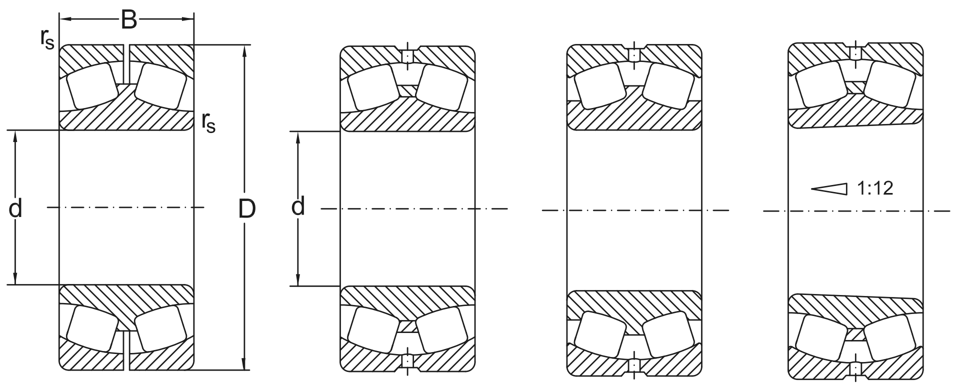
Dimensions								Designation	Withdrawal sleeve
d_1	d	D	B	r_s min.	d_2	B_1	B_2	Bearing	
mm									
135	150	320	108	4	195	139	26	**22330 MBKW33**	**H2330**
140	160	240	60	2,1	190	93	28	**23032 MBKW33**	**H3032**
	160	270	86	2,1	210	119	28	**23132 MBKW33**	**H3132**
	160	290	104	3	210	147	28	**23232 MBKW33**	**H2332**
	160	290	80	3	210	119	28	**22232 MBKW33**	**H3132**
	160	340	114	4	210	147	28	**22332 MBKW33**	**H2332**
150	170	260	67	2,1	200	101	29	**23034 MBKW33**	**H3034**
	170	280	88	2,1	220	122	29	**23134 MBKW33**	**H3134**
	170	310	110	4	220	154	29	**23234 MBKW33**	**H2334**
	170	310	86	4	220	122	29	**22234 MBKW33**	**H3134**
	170	360	120	4	220	154	29	**22334 MBKW33**	**H2334**
160	180	280	74	2,1	210	109	30	**23036 MBKW33**	**H3036**
	180	300	96	3	230	131	30	**23136 MBKW33**	**H3138**
	180	320	112	4	230	161	30	**23236 MBKW33**	**H2336**
	180	320	86	4	230	131	30	**22236 MBKW33**	**H3136**
	180	380	126	4	230	161	30	**22336 MBKW33**	**H2336**
170	190	290	75	2,1	220	112	31	**23038 MBKW33**	**H3038**
	190	320	104	3	240	141	31	**23138 MBKW33**	**H3138**
	190	340	120	4	240	169	31	**23238 MBKW33**	**H2338**
	190	340	92	4	240	141	31	**22238 MBKW33**	**H3138**
	190	400	132	5	240	169	31	**22338 MBKW33**	**H2338**
180	200	310	82	2,1	240	120	32	**23040 CAKW33**	**H3040**
	200	340	112	3	250	150	32	**23140 CAKW33**	**H3140**
	200	360	128	4	250	176	32	**23240 MBKW33**	**H2340**
	200	360	98	4	250	150	32	**22240 CAKW33**	**H3140**
	200	420	138	5	250	176	32	**22340 CKW33**	**H2340**
200	220	340	90	3	260	126	30	**23044 MBKW33**	**H3044**
	220	340	90	3	260	126	30	**23044 MBKW33**	**H3044**
	220	370	120	4	280	161	35	**23144 MBKW33**	**H3144**
	220	400	108	4	280	161	35	**22244 MBKW33**	**H3144**
	220	400	144	4	280	186	35	**23244 MBKW33**	**H2344**

Spherical Roller Bearings with withdrawal sleeve

Basic radial load. Factors						Speed limit		Mass
dyn.				stat.				
C_r	e	Y_1	Y_2	C_{0r}	Y_0	grease	oil	
kN	-		-	kN	-	min^{-1}	min^{-1}	kg
1400	0,38	1,7	2,6	1940	1,7	1000	1300	49,7
560	0,22	3	4,6	970	2,8	1300	1700	14,7
930	0,32	2,1	3,2	1510	2,1	1200	1600	27,8
1180	0,38	1,8	2,7	1830	1,7	900	1200	40,2
950	0,29	2,3	3,4	1420	2,3	1100	1500	30,6
1520	0,37	1,8	2,7	2160	1,8	900	1200	59,1
680	0,23	2,9	4,4	1170	2,8	1200	1600	19,3
990	0,31	2,2	3,2	1650	2,1	1100	1500	30,4
1340	0,36	1,9	2,8	2120	1,8	850	1100	47,4
1080	0,3	2,3	3,4	1610	2,2	1100	1400	36,8
1690	0,37	1,8	2,7	2380	1,8	850	1100	70,4
800	0,24	2,8	4,2	1380	2,8	1100	1500	23,8
1160	0,32	2,1	3,1	1940	2,1	1100	1400	37,5
1420	0,36	1,9	2,8	2330	1,8	750	1000	51,4
1110	0,29	2,3	3,5	1720	2,3	1100	1400	38,9
1900	0,37	1,8	2,7	2700	1,8	850	1100	79,5
830	0,26	2,6	3,9	1470	2,6	1100	1400	25,5
1320	0,33	2	3	2290	2	1100	1400	45,8
1610	0,36	1,9	2,8	2640	1,8	750	1000	60,7
1220	0,29	2,3	3,4	1870	2,3	1000	1300	48,0
2060	0,37	1,8	2,7	2920	1,8	750	1000	95,6
880	0,24	2,8	4,2	1560	2,8	1100	1500	32,69
1370	0,35	1,9	2,9	2460	1,9	1100	1400	55,6
1620	0,35	1,9	2,9	2590	1,8	750	1000	72,4
1250	0,29	2,3	3,4	2020	2,3	1100	1400	57,1
1910	0,36	1,8	2,8	2750	1,8	670	900	108,9
1155	0,24	2,8	4,2	2053	2,8	1100	1400	40,8
1025	0,24	2,8	4,2	1730	2,8	1000	1300	41,8
1455	0,3	2,3	3,4	2380	2,2	900	1200	69,2
1485	0,29	2,3	3,4	2483	2,3	850	1100	77,7
1850	0,35	1,9	2,9	2899	1,8	600	800	99,2

Spherical Roller Bearings

Non-standardized



PMB CW33 MBW33 CKW33

Dimensions				Basical radial load						Speed limit		Designation	Mass
d	D	B	r_s min.	dyn. C_r	e	Y_1	Y_2	stat. C_{0r}	Y_0	grease	oil		
mm				kN						min^{-1}	min^{-1}		
100	162	62	3	312				479		1400	1700	**25120 MB**	5,44
130	220	73	2	500	0,31	2,2	3,3	995	2,2	1100	1400	**25326 C**	11,4
	240	80	3	572	0,33	2	3	1104	2	1100	1400	**25126 MBK**	15,3
131,796	220	73	2	470	0,31	2,2	3,3	1020	2,2	1100	1400	**25226 C**	11,2
	220	73	2	470	0,31	2,2	3,3	1020	2,2	1100	1400	**25226 CW33**	11,2
	220	73	2	470				1020		1100	1400	**25226 CY**	11,2
140	240	80	3	482	0,26	2,6	3,9	1030	2,5	950	1300	**28228 PMB**	19,9
	260	86	3	663	0,26	2,6	3,9	1288	2,5	950	1300	**25128 MBK**	19,9
144,475	250	80	2	625	0,33	2	3	1310	2	900	1200	**25129 C**	16,5
169	310	110	3	1228				1970		1200	1400	**25134 C**	36,3

Spherical Roller Bearings
Non-standardized

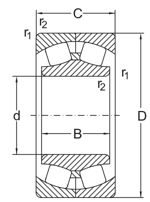


Fig. 4

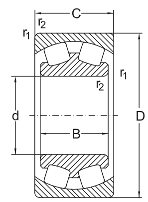


Fig. 5

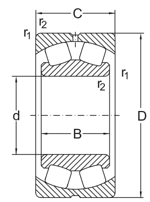


Fig. 6

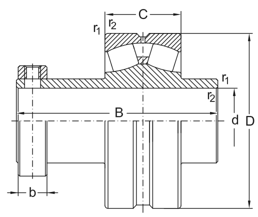


Fig. 7

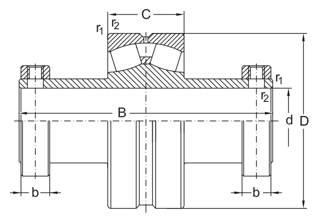


Fig. 8

Dimensions								Basical radial load		Designation	Mass
d	D	B	B_1	r_s min.	r_{1s} min.	b	**Fig.**	dyn. C_a	stat. C_{0a}		
mm				kN							
38,1	80	23	69,85	1,1		15,88	7	88	98	SB1000 1-1/2	0,93
42,877	85	23	73	1		15,9	7	131,5	188	SB1000 1-11/16	1,16
49,21	90	23	73	1,1		15,88	7	100	120	SB1000 1-15/16	1,23
61,93	120	31	85,75	1,5		22,3	7	158	195	SB1000 2-7/16	2,95
74,61	130	31	92,075	1,5		22,2	7	190	250	SB1000 2-15/16	3,22
87,31	160	40	102,4	2		22,23	7	305	410	SB1000 3-7/16	5,74
100,035	180	46	116	2,1		25,4	7	536	905	SB1000 3-15/16	8,31
112,71	200	53	155,58	2,1		25,4	8	590	770	SB1000 4-7/16 VSB	11,8
125,41	230	64	168,28	3		25,4	8	660	1700	SB1000 4-15/16 VSB	18
100	165	65	52	2			5	309	459	26120 MB	5,08
100	180	82	69	2,1			4	436	627	26220 CP	9,36
110	180	82	69	2			6	449	741	26122 CAW33	7,53

Thrust Ball Bearings

Standards, Boundary dimensions

Standard plans	DIN 616
Thrust ball bearings single direction	DIN 711
Thrust ball bearings double direction	DIN 715
Seating washers	DIN 711

General

Thrust Ball Bearings are separable axial bearings that are produced in both single and double direction acting design.
To assist in simple effective mounting or dismounting the bearing washers, seatings, and cage and ball assemblies, may be individually mounted in their arrangement location.

Thrust ball bearings may accomodate comparatively high axial loads but they must not be exposed to any radial forces.

Due to their specific kinematic behavior, thrust ball bearings are only suitable for low to medium operating speeds.

Futhermore, they require minimum axial loads for their optimum function.

Since thrust ball bearings do not compensate any misalignment, they are also frequently used in conjunction with sphered housing washers and seating washers.

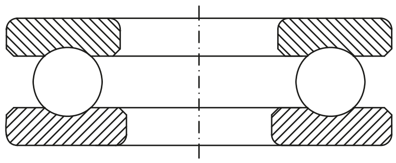
Design variants (see drawing on next page)

Thrust ball bearings are produced in both, single direction and double direction design. The most important design variants are shown on the next page.

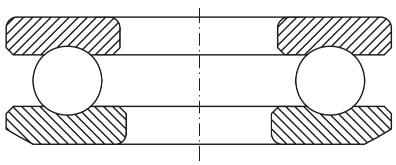
Single direction thrust ball bearings consist of a **shaft washer**, a **housing washer** and a **ball and cage thrust assembly**, (see figure a, b and c).
These bearings are able to accomodate axial loads in one direction only.
Single direction thrust ball bearings of series **511, 512, 513** and **514** have plain housing washers, (see figure a).
For applications where some misalignment may occur, single direction thrust ball bearings of the series **532, 533** and **534** are also available with sphered housing washers, figure b.
These bearings may be applied either direct to sphered shaped bearings seats or, they may be used together with **seating washers** of series **U2, U3** or **U4** (see figure c).

Unlike single direction thrust ball bearing types, **double direction thrust ball bearings** are suitable to guide the shaft in both directions (see figure d, e and f).
These bearings consist of two washers, **two ball and cage thrust assemblies** with one common **shaft washer** located centrally in between.
Double direction thrust ball bearings are also available in both designs, with **flat housing washers** (series **522, 523** and **524**, see figure d) and with **sphered housing washers** (series **542, 543** and **544**, see figure e).

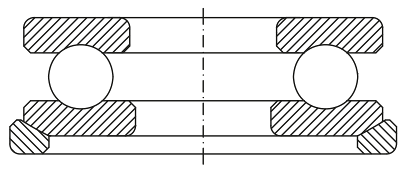
For compensation of possible aligning errors the double direction thrust ball bearings may be used in conjunction with Seating Washers (series U2, U3 and U4, see figure f).



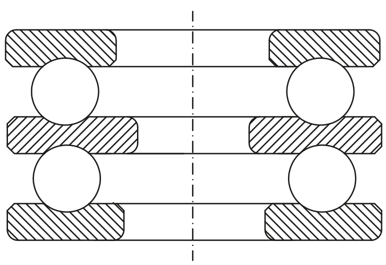
a



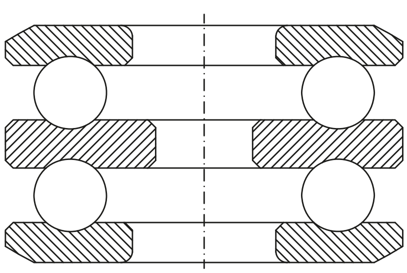
b



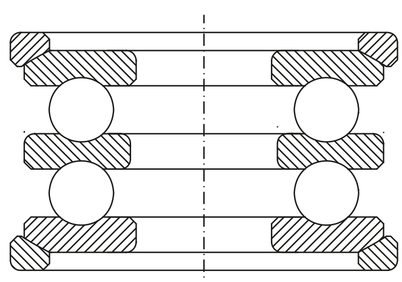
c



d



e



f

Misalignment

All thrust ball bearing types with flat housing washers do not allow any misalignment.

The contacting surfaces of both shaft and housing seats must be parallel. Misalignments can only be accomodated by using Thrust Ball bearings with **sphered housing washers.**

Cages

URB thrust ball bearings are normally fitted with pressed steel cages as standard.

For larger thrust ball bearings solid brass cages, (suffix **M**), or solid steel cages, sufix **F**), are fitted as standard.

Tolerances

URB thrust ball bearings are produced to normal class tolerance class (**PN**) as standard.

For applications of higher dimensional and geometrical accuracy these bearings are produced to precision tolerance class (e.g. **P6**) on order request.

For detailed values of the tolerance classes see chapter **Bearing tolerances** (see page 41).

Minimum load:

Thrust ball bearings require a certain minimum axial load to esnsure a satisfactory operating function.

To prevent excessive sliding friction, the minimum axial load applied should be greater than **4%** of the axial bearing dynamic load rating **Ca**.

Where such a minimum axial load is not possible, the load must be increased by effective measures, (i.e. preloading the bearing) using pressure washers or springs.

Equivalent dynamic bearing load

Thrust ball bearings are pure axial bearings, their are not able to accomodate any radial loads, therefore:

$$P=F_a$$

Equivalent static bearing load

For thrust ball bearings:

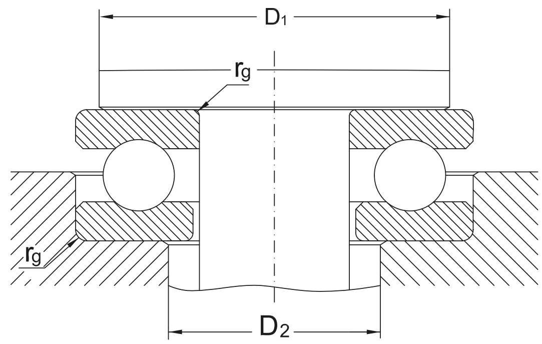
$$P_0=F_a$$

Abutment and Fillet dimensions for thrust ball bearings

The bearing washer must contact adjacent parts with their face sides only. The radii of bearing corners must not touch the shoulder fillet radii of the shaft or housing shoulders.

Therefore, the larest fillet radius **(r_g)** must be smaller than the minimum fillet dimension of the bearing rings **(r_s)** as listed in the bearing tables.

Abutment and Fillet dimensions for Thrust Ball bearings of series 511, 512, 513 and 514 [mm]

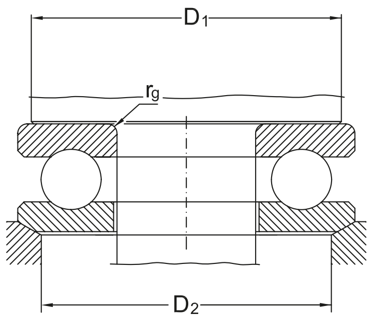


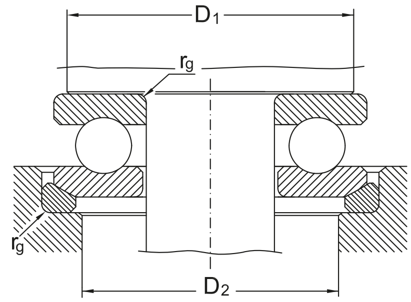
Shaft	Bore reference number	Bearing Series											
		511			512			513			514		
Φd_1		D_1 min	D_2 min	r_g max	D_1 min	D_2 min	r_g max	D_1 min	D_2 min	r_g max	D_1 min	D_2 min	r_g max
mm													
10	**00**	18	16	0,3	20	16	0,6	-	-	-	-	-	-
12	**01**	20	18	0,3	22	18	0,6	-	-	-	-	-	-
15	**02**	23	20	0,3	25	22	0,6	-	-	-	-	-	-
17	**03**	25	22	0,3	28	24	0,6	-	-	-	-	-	-
20	**04**	29	26	0,3	32	28	0,6	-	-	-	-	-	-
25	**05**	35	32	0,6	38	34	0,6	41	36	1	46	39	1
30	**06**	40	37	0,6	43	39	0,6	48	42	1	54	46	1
35	**07**	45	42	0,6	51	46	1	55	48	1	62	53	1
40	**08**	52	48	0,6	57	51	1	63	55	1	70	60	1
45	**09**	57	53	0,6	62	56	1	69	61	1	78	67	1
50	**10**	62	58	0,6	67	61	1	77	68	1	86	74	1,5
55	**11**	69	64	0,6	76	69	1	85	75	1	94	81	1,5
60	**12**	75	70	1	81	74	1	90	80	1	102	88	1,5
65	**13**	80	75	1	86	79	1	95	85	1	110	95	2
70	**14**	85	80	1	91	84	1	103	92	1	118	102	2
75	**15**	90	85	1	96	89	1	111	99	1,5	126	109	2
80	**16**	95	90	1	101	94	1	116	104	1,5	134	116	2,1
85	**17**	100	95	1	109	101	1	124	111	1,5	142	123	2,1
90	**18**	108	102	1	117	108	1	129	116	1,5	150	130	2,1
100	**20**	121	114	1	130	120	1	142	128	1,5	166	144	2,5
110	**22**	131	124	1	140	130	1	158	142	2	182	158	2,5
120	**24**	141	134	1	150	140	1	174	156	2,1	198	172	3
130	**26**	154	146	1	166	154	1	187	168	2,1	214	186	3
140	**28**	164	156	1	176	164	1	200	180	2,1	224	196	3
150	**30**	174	166	1	189	176	1	210	190	2,1	240	210	3

Abutment and Fillet dimensions for Thrust Ball bearings of series 511, 512 and 513 [mm]

Shaft	Bore reference number	Bearing Series								
		511			512			513		
Φd_1		D_1 min	D_2 min	r_g max	D_1 min	D_2 min	r_g max	D_1 min	D_2 min	r_g max
mm										
160	**32**	184	176	1	199	186	1,5	226	204	2,5
170	**34**	197	188	1	212	198	1,5	236	214	2,5
180	**36**	207	198	1	222	208	1,5	252	228	2,5
190	**38**	220	210	1	238	222	2	268	242	3
200	**40**	230	220	1	248	232	2	284	256	3
220	**44**	250	240	1	268	252	2	-	-	-
240	**48**	276	264	1,5	300	280	2,1	-	-	-
260	**52**	296	284	1,5	320	300	2,1	-	-	-
280	**56**	322	308	1,5	340	320	2,1	-	-	-
300	**60**	348	332	2	372	348	2,5	-	-	-
320	**64**	368	352	2	392	368	2,5	-	-	-
340	**68**	388	372	2	412	388	2,5	-	-	-
360	**72**	408	392	2	444	416	3	-	-	-
380	**76**	428	412	2	-	-	-	-	-	-
400	**80**	448	432	2	-	-	-	-	-	
420	**84**	468	452	2	-	-	-	-	-	-
440	**88**	500	480	2,1	-	-	-	-	-	-
460	**92**	520	500	2,1	-	-	-	-	-	-
480	**96**	540	520	2,1	-	-	-	-	-	-
500	**/500**	560	540	2,1	-	-	-	-	-	-
530	**/530**	596	574	2,5	-	-	-	-	-	-
560	**/560**	626	604	2,5	-	-	-	-	-	-

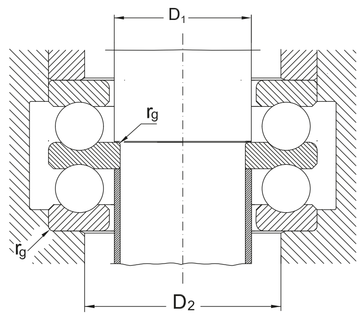
Abutment and Fillet dimensions for Thrust Ball bearings of series 532, 533, and 534 [mm]





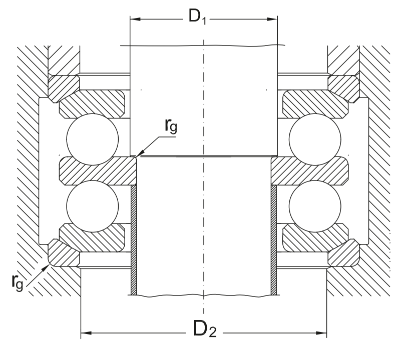
Shaft Φd_1	Bore reference number	Bearing Series 532 D_1 min	532 D_2 min	532 r_g max	533 D_1 min	533 D_2 min	533 r_g max	534 D_1 min	534 D_2 min	534 r_g max
mm										
10	**00**	20	18	0,6	-	-	-	-	-	-
12	**01**	22	20	0,6	-	-	-	-	-	-
15	**02**	25	24	0,6	-	-	-	-	-	-
17	**03**	28	26	0,6	-	-	-	-	-	-
20	**04**	32	30	0,6	-	-	-	-	-	-
25	**05**	38	36	0,6	41	38	1	46	42	1
30	**06**	43	42	0,6	48	45	1	54	50	1
35	**07**	51	48	1	55	52	1	62	58	1
40	**08**	57	55	1	63	60	1	70	65	1
45	**09**	62	60	1	69	65	1	78	72	1
50	**10**	67	62	1	77	72	1	86	80	1,5
55	**11**	76	72	1	85	80	1	94	88	1,5
60	**12**	81	78	1	90	85	1	102	95	1,5
65	**13**	86	82	1	95	90	1	110	100	2
70	**14**	91	88	1	103	98	1	118	110	2
75	**15**	96	92	1	111	105	1,5	126	115	2
80	**16**	101	98	1	116	110	1,5	134	125	2,1
85	**17**	109	105	1	124	115	1,5	142	130	2,1
90	**18**	117	110	1	129	120	1,5	150	140	2,1
100	**20**	130	125	1	142	135	1,5	166	155	2,5
110	**22**	140	135	1	158	150	2	182	170	2,5
120	**24**	150	145	1	174	165	2	195	185	3
130	**26**	166	160	1,5	187	177	2,1	214	200	3
140	**28**	176	170	1,5	200	190	2,1	-	-	-
150	**30**	189	180	1,5	210	200	2,1	-	-	-
160	**32**	199	190	1,5	-	-	-	-	-	-
170	**34**	212	200	1,5	-	-	-	-	-	-
180	**36**	222	210	1,5	-	-	-	-	-	-
190	**38**	238	230	1,5	-	-	-	-	-	-

Abutment and Fillet dimensions for Thrust Ball bearings of series 522, 523 and 524 [mm]



Shaft Φd_1	Bore reference number	Bearing Series 522 D_1 min	522 D_2 min	522 r_g max	522 r_{g1} max	523 D_1 min	523 D_2 min	523 r_g max	523 r_{g1} max	524 Shaft	524 D_1 min	524 D_2 min	524 r_g max	524 r_{g1} max
mm														
10	**02**	15	22	0,6	0,3	-	-	-	-	**-**	-	-	-	-
15	**04**	20	28	0,6	0,3	-	-	-	-	**-**	-	-	-	-
20	**05**	25	34	0,6	0,3	25	36	1	0,3	**15**	25	39	1	0,6
25	**06**	30	39	0,6	0,3	30	42	1	0,3	**20**	30	46	1	0,6
30	**07**	35	46	1	0,3	35	48	1	0,3	**25**	35	53	1	0,6
30	**08**	40	51	1	0,6	40	55	1	0,6	**30**	40	60	1	0,6
35	**09**	45	56	1	0,6	45	61	1	0,6	**35**	45	67	1	0,6
40	**10**	50	61	1	0,6	50	68	1	0,6	**40**	50	74	1,5	0,6
45	**11**	55	69	1	0,6	55	75	1	0,6	**45**	55	81	1,5	0,6
50	**12**	60	74	1	0,6	60	80	1	0,6	**50**	60	88	1,5	0,6
55	**13**	65	79	1	0,6	65	85	1	0,6	**50**	65	95	2	1
55	**14**	70	84	1	1	70	92	1	1	**55**	70	102	2	1
60	**15**	75	89	1	1	75	99	1,5	1	**60**	75	109	2	1
65	**16**	80	94	1	1	80	104	1,5	1	**65**	80	116	2,1	1
70	**17**	85	101	1	1	85	111	1,5	1	**65**	85	123	2,1	1
75	**18**	90	108	1	1	90	116	1,5	1	**70**	90	130	2,1	1
85	**20**	100	120	1	1	100	128	1,5	1	**80**	100	144	2,5	1
95	**22**	110	130	1	1	110	142	2	1	**-**	-	-	-	-
100	**24**	120	140	1	1	120	156	2,1	1	**-**	-	-	-	-
110	**26**	130	154	1,5	1	130	168	2,1	1	**-**	-	-	-	-
120	**28**	140	164	1,5	1	140	180	2,1	1	**-**	-	-	-	-
130	**30**	150	176	1,5	1	150	190	2,1	1	**-**	-	-	-	-
140	**32**	160	186	1,5	1	-	-	-	-	**-**	-	-	-	-
150	**34**	170	198	1,5	1	-	-	-	-	**-**	-	-	-	-

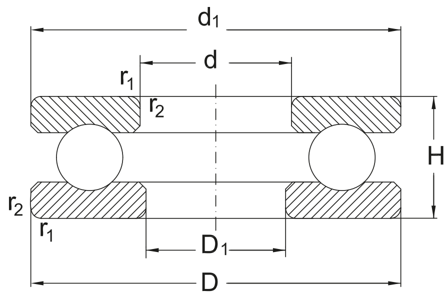
Abutment and Fillet dimensions for Thrust Ball bearings of series 542, 543 and 544 [mm]



Shaft Φd_1	Bore reference number	Bearing Series 542 D_1 min	542 D_2 min	542 r_g max	542 r_{g1} max	543 D_1 min	543 D_2 min	543 r_g max	543 r_{g1} max	544 Shaft	544 D_1 min	544 D_2 min	544 r_g max	544 r_{g1} max
mm														
10	**02**	15	24	0,6	0,3	-	-	-	-	**-**	-	-	-	-
15	**04**	20	30	0,6	0,3	-	-	-	-	**-**	-	-	-	-
20	**05**	25	36	0,6	0,3	25	38	1	0,3	**15**	25	42	1	0,6
25	**06**	30	42	0,6	0,3	30	45	1	0,3	**20**	30	50	1	0,6
30	**07**	35	48	1	0,3	35	52	1	0,3	**25**	35	58	1	0,6
30	**08**	40	55	1	0,6	40	60	1	0,6	**30**	40	65	1	0,6
35	**09**	45	60	1	0,6	45	65	1	0,6	**35**	45	72	1	0,6
40	**10**	50	62	1	0,6	50	72	1	0,6	**40**	50	80	1,5	0,6
45	**11**	55	72	1	0,6	55	80	1	0,6	**45**	55	88	1,5	0,6
50	**12**	60	78	1	0,6	60	85	1	0,6	**50**	60	95	1,5	0,6
55	**13**	65	82	1	0,6	65	90	1	0,6	**50**	65	100	2	1
55	**14**	70	88	1	1	70	98	1	1	**55**	70	110	2	1
60	**15**	75	92	1	1	75	105	1,5	1	**60**	75	115	2	1
65	**16**	80	98	1	1	80	110	1,5	1	**65**	80	125	2,1	1
70	**17**	85	105	1	1	85	115	1,5	1	**65**	85	130	2,1	1
75	**18**	90	110	1	1	90	120	1,5	1	**70**	90	140	2,1	1
85	**20**	100	125	1	1	100	135	1,5	1	**80**	100	155	2,5	1
95	**22**	110	135	1	1	110	150	2	1	**-**	-	-	-	-
100	**24**	120	145	1	1	120	165	2,1	1	**-**	-	-	-	-
110	**26**	130	160	1,5	1	-	-	-	-	**-**	-	-	-	-

URB

Thrust Ball bearings, single direction



511/ 512/ 513/ 514

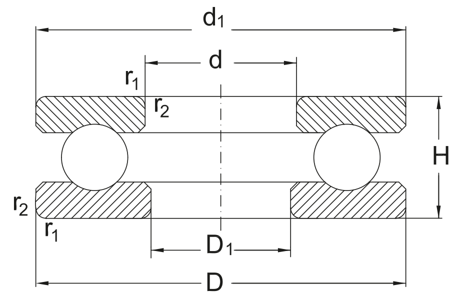
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
10	24	9	0,3	**51100**	10	14	7000	9500
	26	11	0,6	**51200**	12,7	17,1	6000	8000
12	26	9	0,3	**51101**	10,4	15,4	6700	9000
	28	11	0,6	**51201**	13,2	19	6000	8000
15	28	9	0,3	**51102**	10,5	16,8	6300	8500
	32	11	0,6	**51202**	16,6	25	5000	6700
17	30	9	0,3	**51103**	10,8	18,2	6300	8500
	35	12	0,6	**51203**	17,3	27,5	5000	6700
20	35	10	0,3	**51104**	14,9	26,6	5300	7000
	40	14	0,6	**51204**	22,4	37,7	4300	5600
25	42	11	0,6	**51105**	15,6	30,4	4800	6300
	47	15	0,6	**51205**	28	50,5	3800	5000
	52	18	1	**51305**	35,4	61,5	3150	4200
	60	24	1	**51405**	56	90	2600	3600
30	47	11	0,6	**51106**	18,6	39,9	4300	5600
	52	16	0,6	**51206**	28,1	54,3	3600	4800
	60	21	1	**51306**	42,2	78,7	2900	3900
	70	28	1	**51406**	72	125	2200	3200
35	52	12	0,6	**51107**	19,1	44,4	4000	5300

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft		Dimensions	Mass
d	d_1	D_1	Bearing
mm			[kg]
10	24	11	0,02
	26	12	0,03
12	26	13	0,02
	28	14	0,03
15	28	16	0,02
	32	17	0,05
17	30	18	0,03
	35	19	0,05
20	35	21	0,04
	40	22	0,08
25	42	26	0,06
	47	27	0,12
	52	27	0,17
	60	27	0,36
30	47	32	0,07
	52	32	0,13
	60	32	0,26
	70	32	0,58
35	52	37	0,09

Thrust Ball bearings, single direction



511/ 512/ 513/ 514

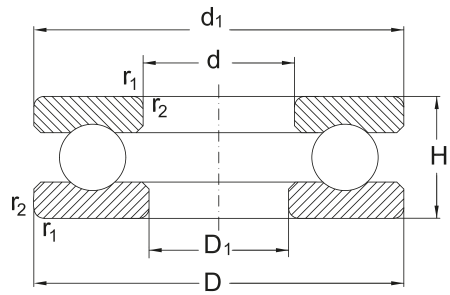
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
35	62	18	1	**51207**	38,8	78,2	3000	4000
	68	24	1	**51307**	55,4	105	2600	3600
	80	32	1,1	**51407**	86,5	156	2000	3000
40	60	13	0,6	**51108**	26,8	62,9	3400	4500
	68	19	1	**51208**	46,9	98,3	2800	3800
	78	26	1	**51308**	68,4	135	2200	3200
	90	36	1,1	**51408**	112	204	1700	2400
45	65	14	0,6	**51109**	27,2	69,2	3400	4500
	73	20	1	**51209**	49,3	112	2600	3600
	85	28	1	**51309**	78,9	164	2000	3000
	100	39	1,1	**51409**	140	262	1600	2200
50	70	14	0,6	**51110**	28,1	75,5	3200	4300
	78	22	1	**51210**	56,3	129	2400	3400
	95	31	1,1	**51310**	95,3	202	1900	2800
	110	43	1,5	**51410**	156	310	1500	2000
55	78	16	0,6	**51111**	31,1	81,5	2800	3800
	90	25	1	**51211**	68,8	159	2200	3200
	105	35	1,1	**51311**	118	246	1700	2400
	120	48	1,5	**51411**	180	360	1300	1800

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft		Dimensions	Mass
d	d_1	D_1	Bearing
mm			[kg]
35	62	37	0,22
	68	37	0,38
	80	37	0,96
40	60	42	0,13
	68	42	0,28
	78	42	0,53
	90	42	1,17
45	65	47	0,15
	73	47	0,30
	85	47	0,61
	100	47	1,60
50	70	52	0,17
	78	52	0,37
	95	52	0,94
	110	52	2,18
55	78	57	0,25
	90	57	0,59
	105	57	1,30
	120	57	2,91

Thrust Ball bearings, single direction



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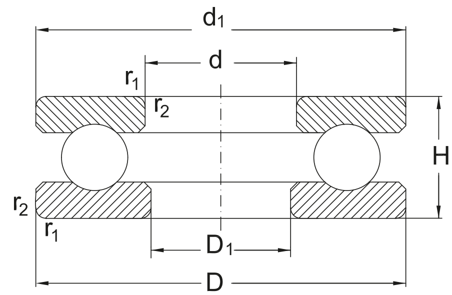
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
60	85	17	1	**51112**	37,9	98,6	2600	3600
	95	26	1	**51212**	70,4	169	2000	3000
	110	35	1,1	**51312**	123	267	1600	2200
	130	51	1,5	**51412 FP**	200	400	1200	1700
65	90	18	1	**51113**	39,2	108	2400	3400
	100	27	1	**51213**	78,5	191	2000	3000
	115	36	1,1	**51313**	127	287	1600	2200
	140	56	2	**51413 FP**	216	450	1100	1600
70	95	18	1	**51114**	39,3	113	2400	3400
	105	27	1	**51214**	72,8	189	1900	2800
	125	40	1,1	**51314**	153	341	1400	1900
	150	60	2	**51414 FP**	236	500	1100	1600
75	100	19	1	**51115**	47,2	140	2200	3200
	110	27	1	**51215**	73,7	199	1900	2800
	135	44	1,5	**51315**	184	426	1300	1800
	160	65	2	**51415 FP**	250	560	1000	1500
80	105	19	1	**51116**	48,5	145	2200	3200
	115	28	1	**51216**	76,1	209	1800	2600
	140	44	1,5	**51316**	181	426	1300	1800
	170	68	2,1	**51416 FP**	270	620	950	1400

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft		Dimensions	Mass
d	d_1	D_1	Bearing
mm			[kg]
60	85	62	0,33
	95	62	0,65
	110	62	1,37
	130	62	3,70
65	90	67	0,36
	100	67	0,74
	115	67	1,49
	140	68	4,67
70	95	72	0,39
	105	72	0,78
	125	72	1,91
	150	73	5,72
75	100	77	0,52
	110	77	0,83
	135	77	2,61
	160	78	7,06
80	105	82	0,56
	115	82	0,91
	140	82	2,71
	170	83	8,23

Thrust Ball bearings, single direction



511/ 512/ 513/ 514

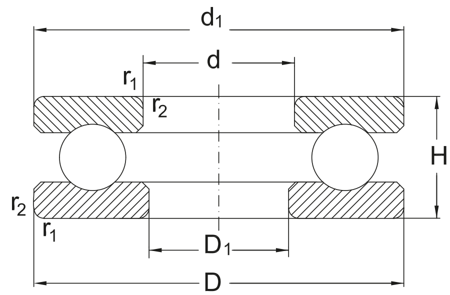
Shaft d	Dimension D	H	r_1, r_2 min.	Designation	Basical axial load dyn. C_a	stat. C_{0a}	Speed limit grease	oil
mm					kN		min $^{-1}$	
85	110	19	1	**51117**	48	151	2200	3200
	125	31	1	**51217**	98	264	1600	2200
	150	49	1,5	**51317**	290	716	1200	1700
	180	72	2,1	**51417 FP**	290	680	900	1300
90	120	22	1	**51118**	62,3	190	1900	2800
	135	35	1,1	**51218**	127	338	1500	2000
	155	50	1,5	**51318**	196	465	1200	1700
	190	77	2,1	**51418 FP**	305	750	850	1200
100	135	25	1	**51120**	85	270	1600	2200
	150	38	1,1	**51220**	149	402	1400	1900
	170	55	1,5	**51320**	247	628	1100	1600
	210	85	3	**51420 FP**	365	965	750	1000
110	145	25	1	**51122**	86,5	290	1600	2200
	160	38	1,1	**51222**	156	447	1300	1800
	190	63	2	**51322**	319	869	950	1400
	230	95	3	**51422 FP**	415	1140	700	950
120	155	25	1	**51124**	90	310	1500	2000
	170	39	1,1	**51224**	170	509	1200	1700
	210	70	2,1	**51324**	325	915	850	1200
	250	102	4	**51424 FP**	425	1220	670	900

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft	Dimensions		Mass
d	d_1	D_1	Bearing
mm			[kg]
85	110	87	0,60
	125	88	1,22
	150	88	3,53
	177	88	9,79
90	120	92	0,88
	135	93	1,68
	155	93	3,57
	187	93	11,60
100	135	102	1,30
	150	103	2,22
	170	103	4,95
	205	103	15,40
110	145	112	1,45
	160	113	2,41
	187	113	7,70
	225	113	20,80
120	155	122	1,59
	170	123	2,67
	205	123	10,70
	245	123	26,50

Thrust Ball bearings, single direction



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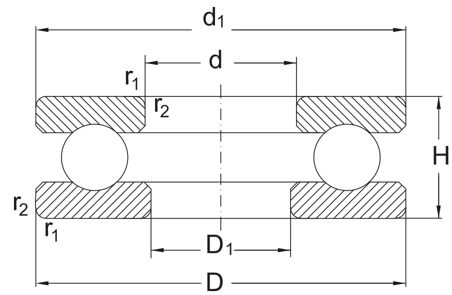
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
130	170	30	1	**51126**	117	392	1300	1800
	190	45	1,5	**51226**	183	540	1100	1600
	225	75	2,1	**51326 MP**	360	1060	800	1100
	270	110	4	**51426 FP**	520	1600	600	800
140	180	31	1	**51128**	112	400	1300	1800
	200	46	1,5	**51228**	190	570	1000	1500
	240	80	2,1	**51328 MP**	400	1220	750	1000
150	190	31	1	**51130 FP**	110	400	1200	1700
	215	50	1,5	**51230 MP**	236	735	950	1400
	250	80	2,1	**51330 MP**	405	1290	700	950
	300	120	4	**51430 FP**	560	1800	560	750
160	200	31	1	**51132 FP**	112	430	1200	1700
	225	51	1,5	**51232 MP**	245	780	950	1400
	270	87	3	**51332 M**	479	1582	670	900
170	215	34	1,1	**51134 FP**	132	500	1100	1600
	240	55	1,5	**51234 MP**	285	930	850	1200
	280	87	3	**51334 M**	496	1704	670	900
180	225	34	1,1	**51136 FP**	134	530	1000	1500
	250	56	1,5	**51236 MP**	290	1000	850	1200
	300	95	3	**51336 M**	546	1956	600	800

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft	Dimensions		Mass
d	d_1	D_1	Bearing
mm			[kg]
130	170	132	2,37
	187	133	3,99
	220	134	13,00
	265	134	32,80
140	178	142	2,59
	197	143	4,33
	235	144	15,70
150	188	152	2,26
	212	153	6,09
	245	154	16,40
	295	154	43,10
160	198	162	2,39
	222	163	6,56
	265	164	21,30
170	213	172	3,08
	237	173	8,12
	275	174	22,50
180	222	183	3,17
	245	183	8,70
	295	184	28,3

Thrust Ball bearings, single direction



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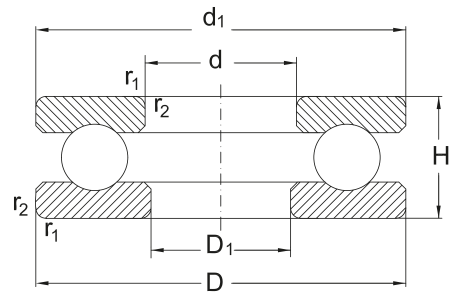
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
190	240	37	1,1	**51138 FP**	170	655	950	1400
	270	62	2	**51238 MP**	335	1160	750	1000
	320	105	4	**51338 M**	600	2200	560	750
200	250	37	1,1	**51140 FP**	170	655	950	1400
	280	62	2	**51240 MP**	340	1220	750	1000
	340	110	4	**51340 M**	656	2414	530	700
220	270	37	1,1	**51144 FP**	176	735	850	1200
	300	63	2	**51244 MP**	355	1340	700	950
240	300	45	1,5	**51148 FP**	232	965	750	1000
	340	78	2,1	**51248 MP**	465	1860	600	800
260	320	45	1,5	**51152 FP**	236	1020	750	1000
	360	79	2,1	**51252 MP**	475	2000	560	750
280	350	53	1,5	**51156 FP**	315	1340	670	900
	380	80	2,1	**51256 MP**	490	2160	560	750
300	380	62	2	**51160 FP**	365	1600	600	800
	420	95	3	**51260 MP**	610	2750	480	630
320	400	63	2	**51164 FP**	375	1700	560	750
	440	95	3	**51264 MP**	620	2900	480	630
340	420	64	2	**51168 FP**	380	1800	560	750
	460	96	3	**51268 M**	640	3150	450	600

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft	Dimensions		Mass
d	d_1	D_1	Bearing
mm			[kg]
190	237	193	4,08
	265	194	11,70
	315	195	35,70
200	245	203	4,26
	275	204	12,00
	335	205	44,30
220	265	223	4,64
	295	224	13,20
240	297	243	7,69
	335	244	23,00
260	317	263	8,25
	355	264	25,20
280	347	283	12,50
	375	284	26,70
300	376	304	17,70
	415	304	42,30
320	396	324	19,10
	435	325	44,20
340	416	344	20,50
	455	345	47,00

Thrust Ball bearings, single direction



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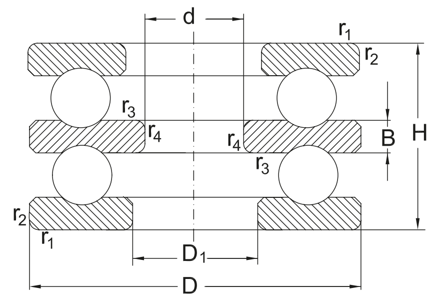
Shaft	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min $^{-1}$	
360	440	65	2	**51172 MP**	405	2000	530	700
	500	110	4	**51272 M**	765	3900	400	530
380	460	65	2	**51176 MP**	430	2240	500	670
400	480	65	2	**51180 MP**	440	2320	500	670
420	500	65	2	**51184 MP**	440	2450	480	630
460	560	80	2,1	**51192 MP**	530	3100	430	560
500	600	80	2,1	**511/500 MP**	550	3350	400	530
530	640	85	3	**511/530 MP**	620	3900	360	480
560	670	85	3	**511/560 MP**	630	4150	300	380

Thrust Ball bearings, single direction

Abutment and fillet dimensions see on page 503

Shaft		Dimensions	Mass
d	d_1	D_1	Bearing
mm			[kg]
360	436	364	21,50
	495	365	69,50
380	456	384	22,40
400	476	404	23,50
420	495	424	24,40
460	555	464	42,00
500	595	505	44,90
530	635	535	54,80
560	665	565	58,00

Thrust Ball bearings, double direction



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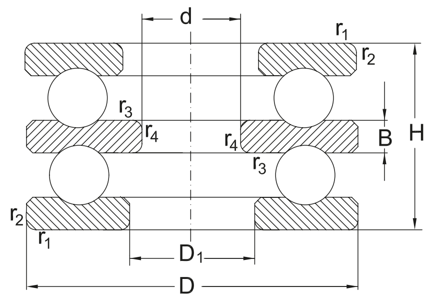
Shaft	Dimension				Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	r_3, r_4 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
10	32	22	0,6	0,3	**52202**	16,6	25	5000	6700
15	40	26	0,6	0,3	**52204**	22,4	37,7	4300	5600
	60	45	1	0,6	**52205**	56	90	2600	3600
20	47	28	0,6	0,3	**52205**	28	50,4	3800	5000
	52	34	1	0,3	**52305**	35,7	61,4	3200	4300
	70	52	1	0,6	**52406**	72	125	2200	3200
25	52	29	0,6	0,3	**52206**	28,1	54,3	3600	4800
	60	38	1	0,3	**52306**	42,8	78,7	3000	4000
	80	59	1,1	0,6	**52407**	86,5	156	2000	3000
30	62	34	1	0,3	**52207**	40,7	83,8	3000	4000
	68	36	1	0,6	**52208**	46,9	98,3	2800	3800
	68	44	1	0,3	**52307**	55,5	105	2600	3600
	78	49	1	0,6	**52308**	69,3	135	2200	3200
	90	65	1,1	0,6	**52408**	112	204	1700	2400
35	73	37	1	0,6	**52209**	47,7	105	2600	3600
	85	52	1	0,6	**52309**	80,8	163	2000	3000
	100	72	1,1	0,6	**52409**	129	245	1600	2200
40	78	39	1	0,6	**52210**	50	111	2400	3400
	95	58	1,1	0,6	**52310**	91,6	186	1900	2800
	110	78	1,5	0,6	**52410**	156	310	1500	200

Thrust Ball bearings, double direction

Abutment and fillet dimensions see on page 506

Shaft	Dimensions		Mass
d	D_1	B	Bearing
mm			[kg]
10	17	5	0,08
15	22	6	0,15
	27	11	0,59
20	27	7	0,22
	27	8	0,32
	32	12	0,92
25	32	7	0,25
	32	9	0,47
	37	14	1,35
30	37	8	0,41
	42	9	055
	37	10	0,68
	42	12	1,01
	42	15	1,92
35	47	9	0,60
	47	12	1,25
	47	17	2,55
40	52	9	0,71
	52	14	1,77
	52	18	3,43

Thrust Ball bearings, double direction



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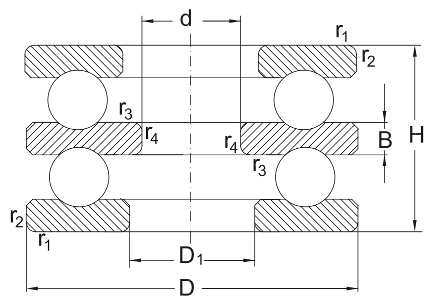
Shaft	Dimension				Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	r_3, r_4 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
45	90	45	1	0,6	**52211**	69,4	159	2200	3200
	105	64	1,1	0,6	**52311**	119	246	1700	2400
	120	87	1,5	0,6	**52411**	180	360	1300	1800
50	95	46	1	0,6	**52212**	73,6	179	2000	3000
	110	64	1,1	0,6	**52312**	124	267	1600	2200
	130	93	1,5	0,6	**52412**	200	400	1200	1700
	140	101	2	1	**52413**	216	450	1100	1600
55	100	47	1	0,6	**52213**	74,8	189	2000	3000
	105	47	1	1	**52214**	73,6	189	1900	2800
	115	65	1,1	0,6	**52313**	106	220	1600	2200
	125	72	1,1	1	**52314**	148	339	1400	1900
	150	107	2	1	**52414**	236	500	1100	1600
60	110	47	1	1	**52215**	77,4	209	1900	2800
	135	79	1,5	1	**52315**	171	396	1300	1800
	160	115	2	1	**52415**	250	560	1000	1500
65	115	48	1	1	**52216**	78,5	218	1800	2600
	140	79	1,5	1	**52316**	176	424	1300	1800
	170	120	2	1	**52416**	270	620	950	1400
	180	128	2,1	1,1	**52417**	290	680	900	1300
70	125	55	1	1	**52217**	92,3	251	1600	2200

Thrust Ball bearings, double direction

Abutment and fillet dimensions see on page 506

Shaft	Dimensions		Mass
d	D_1	B	Bearing
mm			[kg]
45	57	10	1,10
	57	15	2,38
	57	20	4,52
50	62	10	1,21
	62	15	2,53
	62	21	5,72
	68	23	7,18
55	67	10	1,34
	72	10	1,47
	67	15	2,73
	72	16	3,66
	73	24	8,76
60	77	10	1,57
	77	18	4,80
	78	26	10,80
65	82	10	1,72
	82	18	4,94
	83	27	12,70
	88	29	15,10
70	88	12	2,39

Thrust Ball bearings, double direction



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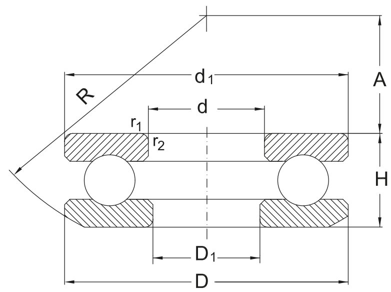
Shaft	Dimension				Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	r_3, r_4 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
70	150	87	1,5	1	**52317**	190	425	1200	1700
	190	135	2,1	1,1	**52418**	305	750	850	1200
75	135	62	1,1	1	**52218**	120	326	1500	200
	155	88	1,5	1	**52318**	196	465	1200	1700
80	210	150	3	1,1	**52420**	365	965	750	1000
85	150	67	1,1	1	**52220**	147	410	1400	1900
	170	97	1,5	1	**52320**	236	596	1100	1600
95	160	67	1,1	1	**52222**	148	431	1300	1800
	190	110	2	1	**52322 MP**	275	720	950	1400
100	170	68	1,1	1,1	**52224**	154	472	1200	1700
	210	123	2,1	1,1	**52324 MP**	325	915	850	1200
110	190	80	1,5	1,1	**52226**	203	622	1100	1600
	225	130	2,1	1,1	**52326 MP**	360	1060	800	1100
120	200	81	1,5	1,1	**52228**	190	570	1000	1500
	240	140	2,1	1,1	**52328 MP**	400	1220	750	1000
130	215	89	1,5	1,1	**52230 MP**	236	735	950	1400
140	225	90	1,5	1,1	**52232 MP**	245	780	950	1400
150	240	97	1,5	1,1	**52234 MP**	285	930	850	1200

Thrust Ball bearings, double direction

Abutment and fillet dimensions see on page 506

Shaft		Dimensions	Mass
d	D_1	B	Bearing
mm			[kg]
70	88	19	6,35
	88	30	17,80
75	93	14	3,22
	93	19	6,80
80	103	33	23,80
85	103	15	4,21
	103	21	8,94
95	113	15	4,63
	113	24	13,90
100	123	15	5,23
	123	27	19,40
110	133	18	7,99
	134	30	23,40
120	143	18	8,66
	144	31	28,20
130	153	20	11,40
140	163	20	12,10
150	173	21	14,90

Thrust Ball bearings, single direction, with Sphered Housing Washer



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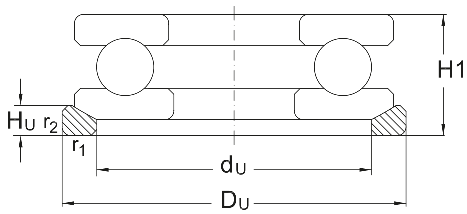
	Dimension			Designation		Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
10	26	11,6	0,6	**53200**	**U200**	12,7	17	6000	8000
12	28	11,4	0,6	**53201**	**U201**	13,2	19	6000	8000
15	32	13,3	0,6	**53202**	**U202**	16,6	25	5000	6700
17	35	13,2	0,6	**53203**	**U203**	17,3	27,5	5000	6700
20	40	14,7	0,6	**53204**	**U204**	22,4	37,5	4300	5600
25	47	16,7	0,6	**53205**	**U205**	28	50	3800	5000
	52	19,8	1	**53305**	**U305**	34,5	55	3200	4300
	60	26,4	1	**53405**	**U405**	56	90	2600	3600
30	52	17,8	0,6	**53206**	**U206**	29,2	58,2	3600	4800
	60	22,6	1	**53306**	**U306**	38	65,5	3000	4000
	70	30,1	1	**53406**	**U406**	72	125	2200	3200
35	62	19,9	1	**53207**	**U207**	35,5	67	3000	4000
	68	25,6	1	**53307**	**U307**	50	88	2600	3600
	80	34	1,1	**53407**	**U407**	86,5	156	2000	3000
40	68	20,3	1	**53208**	**U208**	46,5	98	2800	3800
	78	28,5	1	**53308**	**U308**	68	135	2200	3200
	90	38,2	1,1	**53408**	**U408**	112	204	1700	2400

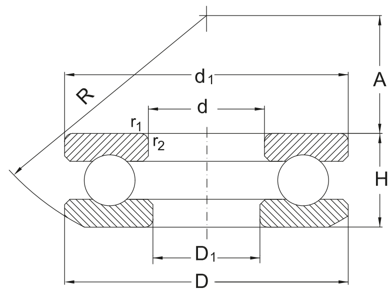
Thrust Ball bearings, single direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 505

Dimensions									Mass	
d	D_1	d_1	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
10	12	26	22	8,5	18	28	3,5	13	0,03	0,01
12	14	28	25	11,5	20	30	3,5	13	0,03	0,012
15	17	32	28	12	24	35	4	15	0,05	0,014
17	19	35	32	16	26	38	4	15	0,06	0,015
20	22	40	36	18	30	42	5	17	0,08	0,02
25	27	47	40	19	36	50	5,5	19	0,12	0,032
	27	52	45	21	38	55	6	22	0,18	0,044
	27	60	50	19	42	62	8	29	0,41	0,072
30	32	52	45	22	42	55	5,5	20	0,16	0,038
	32	60	50	22	45	62	7	25	0,27	0,056
	32	70	56	20	50	75	9	33	0,63	0,13
35	37	62	50	24	48	65	7	22	0,22	0,057
	37	68	56	24	52	72	7,5	28	0,38	0,084
	37	80	64	23	58	85	10	37	0,92	0,17
40	42	68	56	28,5	55	72	7	23	0,27	0,07
	42	78	64	28	60	82	8,5	31	0,55	0,12
	42	90	72	26	65	95	12	42	1,30	0,25

Thrust Ball bearings, single direction, with Sphered Housing Washer



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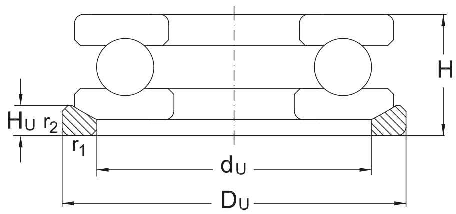
d	D	H	r_1, r_2 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
Dimension				**Designation**		**Basical axial load**		**Speed limit**	
mm						kN		min $^{-1}$	
45	73	21,3	1	**53209**	**U209**	39	80	2600	3600
	85	30,1	1	**53309**	**U309**	75	140	2000	3000
	100	42,4	1,1	**53409**	**U409**	129	245	1600	2200
50	78	23,5	1	**53210**	**U210**	50	106	2400	3400
	95	34,3	1,1	**53310**	**U310**	88	173	1900	2800
	110	45,6	1,5	**53410**	**U410**	156	310	1500	2000
55	90	27,3	1	**53211**	**U211**	61	134	2200	3200
	105	39,3	1,1	**53311**	**U311**	102	208	1700	2400
	120	50,5	1,5	**53411**	**U411**	180	360	1300	1800
60	95	28	1	**53212**	**U212**	62	140	2000	3000
	110	38,3	1,1	**53312**	**U312**	102	208	1600	2200
	130	54	1,5	**53412 FP**	**U412**	200	400	1200	1700
65	100	28,7	1	**53213**	**U213**	64	150	2000	3000
	115	39,4	1,1	**53313**	**U313**	106	220	1600	2200
	140	60,2	2	**53413 FP**	**U413**	216	450	1100	1600
70	105	28,8	1	**53214**	**U214**	71	179	1900	2800
	125	44,2	1,1	**53314**	**U314**	137	300	1400	1900
	150	63,6	2	**53414 FP**	**U414**	236	500	1100	1600

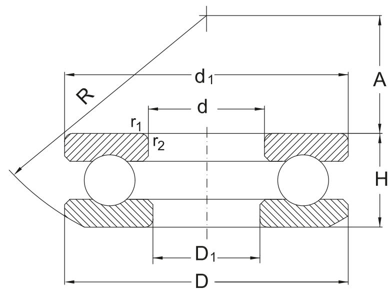
Thrust Ball bearings, single direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 505

Dimensions									Mass	
d	D_1	d_1	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
45	47	73	56	26	60	78	7,5	24	0,30	0,087
	47	85	64	25	65	90	10	33	0,66	0,17
	47	100	80	29	72	105	12,5	46	1,77	0,32
50	52	78	64	32,5	62	82	7,5	26	0,37	0,098
	52	95	72	28	72	100	11	37	0,97	0,23
	52	110	90	35	80	115	14	50	2,33	0,41
55	57	90	72	35	72	95	9	30	0,60	0,152
	57	105	80	30	80	110	11,5	42	1,38	0,28
	57	120	90	28	88	125	15,5	55	3,08	0,53
60	62	95	72	32,5	78	100	9	31	0,66	0,16
	62	110	90	41	85	115	11,5	42	1,41	0,31
	62	130	100	34	95	135	16	58	3,94	0,71
65	67	100	80	40	82	105	9	32	0,73	0,18
	67	115	90	38,5	90	120	12,5	43	1,53	0,34
	68	140	112	40	100	145	17,5	65	5,05	0,81
70	72	105	80	38	88	110	9	32	0,78	0,185
	72	125	100	43	98	130	13	48	2,10	0,41
	73	150	112	34	110	155	19,5	69	6,09	0,99

Thrust Ball bearings, single direction, with Sphered Housing Washer



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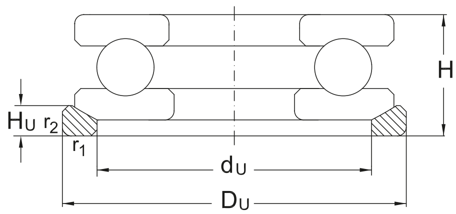
	Dimension			Designation		Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
75	110	28,3	1	**53215**	**U215**	67	170	1900	2800
	135	48,1	1,5	**53315**	**U315**	163	360	1300	1800
	160	69	2	**53415 FP**	**U415**	250	560	1000	1500
80	115	29,5	1	**53216**	**U216**	75	190	1800	2600
	140	47,6	1,5	**53316**	**U316**	160	360	1300	1800
	170	72,2	2,1	**53416 FP**	**U416**	270	620	950	1400
85	125	33,1	1	**53217**	**U217**	98	250	1600	2200
	150	53,1	1,5	**53317**	**U317**	190	425	1200	1700
	180	77	2,1	**53417 FP**	**U417**	290	680	900	1300
90	135	38,5	1,1	**53218**	**U218**	120	300	1500	2000
	155	54,6	1,5	**53318**	**U318**	196	465	1200	1700
	190	81,2	2,1	**53418 FP**	**U418**	305	750	850	1300
100	150	40,9	1,1	**53220**	**U220**	122	320	1400	1900
	170	59,2	1,5	**53320**	**U320**	232	560	1100	1600
	210	90	3	**53420 FP**	**U420**	565	965	750	1000
110	160	40,2	1,1	**53222**	**U222**	129	360	1300	1800
	190	67,2	2	**53322**	**U322**	275	720	950	1400
	230	99,7	3	**53422 FP**	**U422**	415	1140	700	950

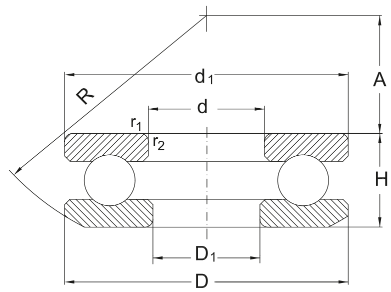
Thrust Ball bearings, single direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 505

Dimensions									Mass	
d	D_1	d_1	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
75	77	110	90	49	92	115	9,5	32	0,81	0,21
	77	135	100	37	105	140	15	52	2,67	0,55
	78	160	125	42	115	165	21	75	7,54	1,23
80	82	115	90	46	98	120	10	33	0,90	0,22
	82	140	112	50	110	145	15	52	2,77	0,57
	83	170	125	36	125	175	22	78	8,93	1,38
85	88	125	100	52	105	130	11	37	1,22	0,29
	88	150	112	43	115	155	17,5	58	3,53	0,81
	88	177	140	47	130	185	23	83	10,60	1,64
90	93	135	100	45	110	140	13,5	42	1,70	0,42
	93	155	112	40	120	160	18	59	3,83	0,84
	93	187	140	40	140	195	25,5	88	12,30	1,9
100	103	150	112	52	125	155	14	45	2,22	0,5
	103	170	125	46	135	175	18	64	4,98	0,95
	103	205	160	50	155	220	27	98	16,40	2,9
110	113	160	125	65	135	165	14	45	2,37	0,56
	113	187	140	51	150	195	20,5	72	7,83	1,28
	113	225	180	59	170	240	29	109	22,00	3,7

Thrust Ball bearings, single direction, with Sphered Housing Washer



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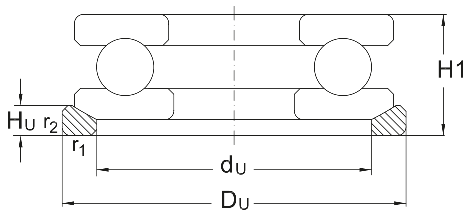
	Dimension			Designation		Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
mm						kN		min $^{-1}$	
120	170	40,8	1,1	**53224**	**U224**	140	400	1200	1700
	210	74,1	2,1	**53324 MP**	**U324**	325	915	850	1200
	250	107,3	4	**53424 FP**	**U424**	425	1220	670	900
130	190	47,9	1,5	**53226**	**U226**	183	540	1100	1600
	225	80,3	2,1	**53326 MP**	**U326**	360	1060	800	1100
	270	115,2	4	**53426 FP**	**U426**	520	1600	600	800
140	200	48,6	1,5	**53228**	**U228**	190	570	1000	1500
	240	84,9	2,1	**53328 MP**	**U328**	400	1220	750	1000
150	215	53,3	1,5	**53230 MP**	**U230**	236	735	950	1400
	250	83,7	2,1	**53330 MP**	**U330**	405	1290	700	950
160	225	54,7	1,5	**53232 MP**	**U232**	245	780	950	1400
170	240	58,7	1,5	**53234 MP**	**U234**	285	930	850	1200
180	250	58,2	1,5	**53236 MP**	**U236**	290	1000	700	1100
190	270	65,7	2	**53238 MP**	**U238**	335	1160	600	1000

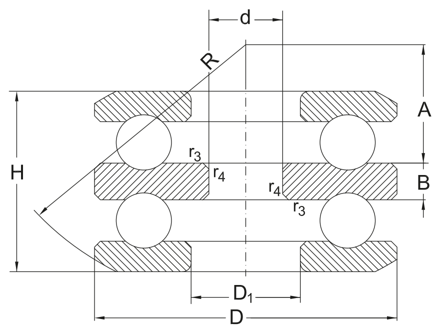
Thrust Ball bearings, single direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 505

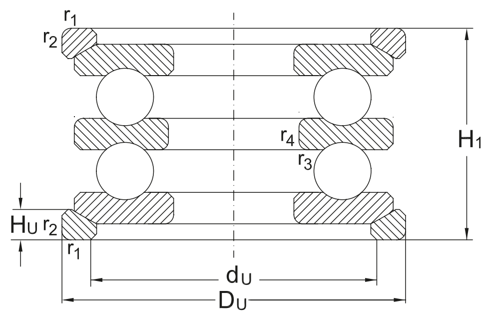
Dimensions									Mass	
d	D_1	d_1	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
120	123	170	125	61	145	175	15	46	2,57	0,65
	123	205	160	63	165	220	22	80	10,60	2
	123	245	200	70	185	260	32	118	28,10	4,7
130	133	187	140	67	160	195	17	53	3,93	0,9
	134	220	160	53	177	235	26	86	12,90	2,5
	134	265	200	58	200	280	38	128	34,60	6,4
140	143	197	160	87	170	210	17	55	4,27	1,22
	144	235	180	68	190	250	26	92	15,60	2,9
150	153	212	160	79	180	225	20,5	60	5,81	1,69
	154	245	200	89,5	200	260	26	92	16,10	3,1
160	163	222	160	74	190	235	21	61	6,44	1,81
170	173	237	180	91	200	250	21,5	65	7,91	2,14
180	183	245	200	112	210	260	21,5	66	8,19	1,06
190	195	265	200	98	230	280	23	73	11,50	2,6

Thrust Ball bearings, double direction, with Sphered Housing Washer



Shaft	Dimension				Designation		Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	r_3, r_4 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
mm							kN		min $^{-1}$	
10	32	24,6	0,6	0,3	**54202**	**U202**	16,6	25	5000	6700
15	40	27,4	0,6	0,3	**54204**	**U204**	22,4	37,5	4300	5600
	60	49,7	1	0,6	**54405**	**U405**	56	90	2600	3600
20	47	31,4	0,6	0,3	**54205**	**U205**	28	50	3800	5000
	52	37,6	1	0,3	**54305**	**U305**	34,5	55	3200	4300
	70	56,2	1	0,6	**54406**	**U406**	72	125	2200	3200
25	52	32,6	0,6	0,3	**54206**	**U206**	25,5	47,5	3600	4800
	60	41,3	1	0,3	**54306**	**U306**	38	65,5	3000	4000
	80	63,1	1,1	0,6	**54407**	**U407**	86,5	156	2000	3000
30	62	37,8	1	0,3	**54207**	**U207**	35,5	67	3000	4000
	68	38,6	1	0,6	**54208**	**U208**	46,5	98	2800	3800
	68	47,2	1	0,3	**54307**	**U307**	50	88	2600	3600
	78	54,1	1	0,6	**54308**	**U308**	61	112	2200	3200
	90	69,5	1,1	0,6	**54408**	**U408**	112	204	1700	2400
35	73	39,6	1	0,6	**54209**	**U209**	39	80	2600	3600
	85	56,3	1	0,6	**54309**	**U309**	75	140	2000	3000
	100	78,9	1,1	0,6	**54409**	**U409**	129	245	1600	2200
40	78	42	1	0,6	**54210**	**U210**	50	106	2400	3400

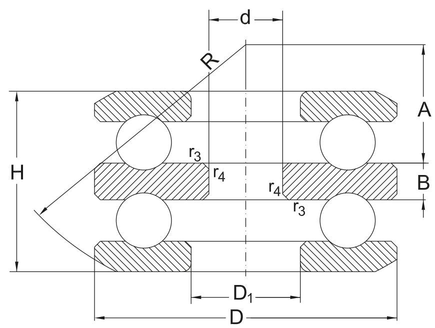
Thrust Ball bearings, double direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 507

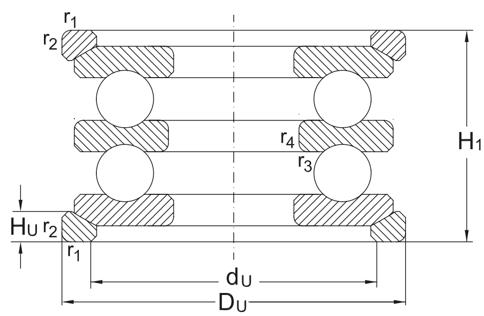
Dimensions									Mass	
d	D_1	B	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
10	17	5	28	10,5	24	35	4	28	0,09	0,01
15	22	6	36	16	30	42	5	32	0,15	0,02
	27	11	50	15	42	62	8	55	0,50	0,07
20	27	7	40	16,5	36	50	5,5	36	0,23	0,03
	27	8	45	18	38	55	6	42	0,32	0,04
	32	12	56	16	50	75	9	62	0,73	0,13
25	32	7	45	20	42	55	5,5	37	0,27	0,04
	32	9	50	19,5	45	62	7	46	0,47	0,06
	37	14	64	18,5	58	85	10	69	1,08	0,17
30	37	8	50	21	48	65	7	42	0,42	0,06
	42	9	56	25	55	72	7	44	0,56	0,07
	37	10	56	21	52	72	7,5	52	0,68	0,08
	42	12	64	23,5	60	82	8,5	59	1,06	0,12
	42	15	72	22	65	95	12	77	1,51	0,25
35	47	9	56	23	60	78	7,5	45	0,60	0,09
	47	12	64	21	65	90	10	62	1,24	0,17
	47	17	80	23,5	72	105	12,5	86	2,08	0,32
40	52	9	64	30,5	62	82	7,5	47	0,70	0,10

Thrust Ball bearings, double direction, with Sphered Housing Washer



Shaft	Dimension				Designation		Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.	r_3, r_4 min.	Bearing	Seating Washer	dyn. C_a	stat. C_{0a}	grease	oil
mm							kN		min $^{-1}$	
40	95	64,7	1,1	0,6	**54310**	**U310**	88	173	1900	2800
	110	83,2	1,5	0,6	**54410**	**U410**	156	310	1500	2000
45	90	49,6	1	0,6	**54211**	**U211**	61	134	2200	3200
	105	72,6	1,1	0,6	**54311**	**U311**	102	208	1700	2400
	120	92	1,5	0,6	**54411**	**U411**	180	360	1300	1800
50	95	50	1	0,6	**54212**	**U212**	62	140	2000	3000
	110	70,7	1,1	0,6	**54312**	**U312**	102	208	1600	2200
	130	99	1,5	0,6	**54412**	**U412**	200	400	1200	1700
	140	109,4	2	1	**54413**	**U413**	216	450	1100	1600
55	100	50,4	1	0,6	**54213**	**U213**	64	150	2000	3000
	105	50,6	1	1	**54214**	**U214**	65,5	160	1900	2800
	115	71,9	1,1	0,6	**54313**	**U313**	106	220	1600	2200
	125	80,3	1,1	1	**54314**	**U314**	137	300	1400	1900
	150	114,1	2	1	**54414**	**U414**	236	500	1100	1600
60	110	49,6	1	1	**54215**	**U215**	67	170	1900	2800
	135	87,2	1,5	1	**54315**	**U315**	163	360	1300	1800
	160	123	2	1	**54415**	**U415**	250	560	1000	1500
65	115	51	1	1	**54216**	**U216**	75	190	1800	2600

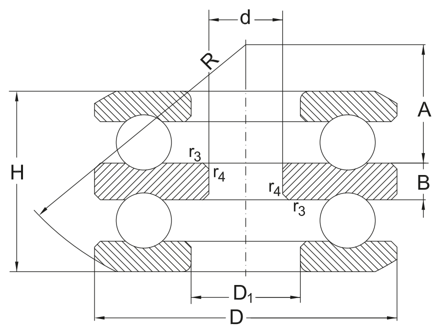
Thrust Ball bearings, double direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 507

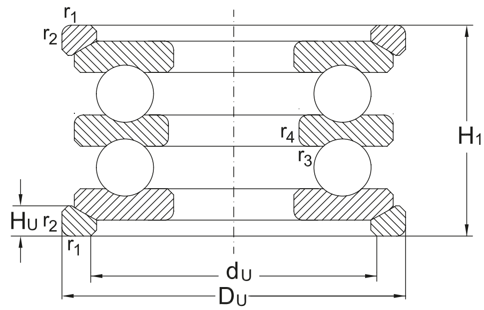
Dimensions									Mass	
d	D_1	B	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
40	52	14	72	23	72	100	11	70	1,83	0,23
	52	18	90	30	80	115	14	92	2,68	0,41
45	57	10	72	32,5	72	95	9	55	1,13	0,15
	57	15	80	25,5	80	110	11,5	78	2,54	0,28
	57	20	90	22,5	88	125	15,5	101	3,49	0,53
50	62	10	72	30,5	78	100	9	56	1,22	0,16
	62	15	90	36,5	85	115	11,5	78	2,62	0,31
	62	21	100	28	95	135	16	107	4,41	0,71
	68	23	112	34	100	145	17,5	119	5,67	0,81
55	67	10	80	38,5	82	105	9	57	1,33	0,18
	72	10	80	36,5	88	110	9	57	1,47	0,19
	67	15	90	34,5	90	120	12,5	79	2,82	0,34
	72	16	100	39	98	130	13	88	3,87	0,41
	73	24	112	28,5	110	155	19,5	125	6,77	0,99
60	77	10	90	47,5	92	115	9,5	57	1,54	0,21
	77	18	100	32,5	105	140	15	95	4,92	0,55
	78	26	125	36,5	115	165	21	135	8,33	1,23
65	82	10	90	45	98	120	10	58	1,70	0,22

Thrust Ball bearings, double direction, with Sphered Housing Washer



Shaft d	D	H	r_1, r_2 min.	r_3, r_4 min.	Designation Bearing	Seating Washer	Basical axial load dyn. C_a	stat. C_{0a}	Speed limit grease	oil
mm							kN		min $^{-1}$	
65	140	86,1	1,5	1	**54316**	**U316**	160	360	1300	1800
	170	128,5	2,1	1	**54416**	**U416**	270	620	950	1400
	180	138	2,1	1,1	**54417**	**U417**	290	680	900	1300
70	125	59,2	1	1	**54217**	**U217**	98	250	1600	2200
	150	95,2	1,5	1	**54317**	**U317**	190	425	1200	1700
	190	143,5	2,1	1,1	**54418**	**U418**	305	750	850	1200
75	135	69	1,1	1	**54218**	**U218**	120	300	1500	2000
	155	97,1	1,5	1	**54318**	**U318**	196	465	1200	1700
80	210	159,9	3	1,1	**54420**	**U420**	365	965	750	1000
85	150	72,8	1,1	1	**54220**	**U220**	122	320	1400	1900
	170	105,4	1,5	1	**54320**	**U320**	132	560	1100	1600
95	160	71,4	1,1	1	**54222**	**U222**	129	360	1300	1800
	190	118,4	2	1	**54322 MP**	**U322**	275	720	950	1400
100	170	71,6	1,1	1,1	**54224**	**U224**	140	400	1200	1700
	210	131,2	2,1	1,1	**54324 MP**	**U324**	325	915	850	1200
110	190	85,8	1,5	1,1	**54226**	**U226**	183	540	1100	1600

Thrust Ball bearings, double direction, with Sphered Housing Washer



Abutment and fillet dimensions see on page 507

Dimensions									Mass	
d	D_1	B	R	A	d_U	D_U	H_U	H_1	Bearing	Seating Washer
mm									[kg]	
65	82	18	112	45,5	110	145	15	95	5,05	0,57
	83	27	125	30,5	125	175	22	140	9,76	1,38
	88	29	140	40,5	130	185	23	150	8,64	1,64
70	88	12	100	49,5	105	130	11	67	2,39	0,29
	88	19	112	39	115	155	17,5	105	6,36	0,81
	93	30	140	34,5	140	195	25,2	157	13,60	1,90
75	93	14	100	42	110	140	13,5	76	3,27	0,42
	93	19	112	36,5	120	160	18	106	6,86	0,84
80	103	33	160	43,5	155	220	27	176	18,20	2,90
85	103	15	112	49	125	155	14	81	4,23	0,50
	103	21	125	42	135	175	18	115	8,99	0,95
95	113	15	125	62	135	165	14	81	4,57	0,56
	113	24	140	55	150	195	20,5	128	12,10	1,28
100	123	15	125	58,5	145	175	15	82	5,05	0,65
	123	27	160	58	165	220	22	143	19,10	2,00
110	133	18	140	63	160	195	17	96	7,78	0,90

Cylindrical Roller Thrust Bearings

Cylindrical Roller Thrust Bearings

Standards, Boundary dimensions	
Standard plans	DIN 616
Cylindrical roller thrust bearings	DIN 722

General

Cylindrical Roller Thrust Bearings series **811** and **812** are single direction acting separable axial bearings.

Cylindrical roller thrust bearings are insensitive to shock loading and feature much higher load carrying capacity compared to thrust ball bearings. They accomodate very heigh axial loads but no radial forces. They provide a very rigid bearing assembly for high thrust loading with less space requirement.

Cylindrical roller thrust bearings are of simple design, they consist of a **shaft washer (WS)**, a **housing washer (GS)**, and a **cylindrical roller and cage thrust assembly (K)**, see Abb. 1.

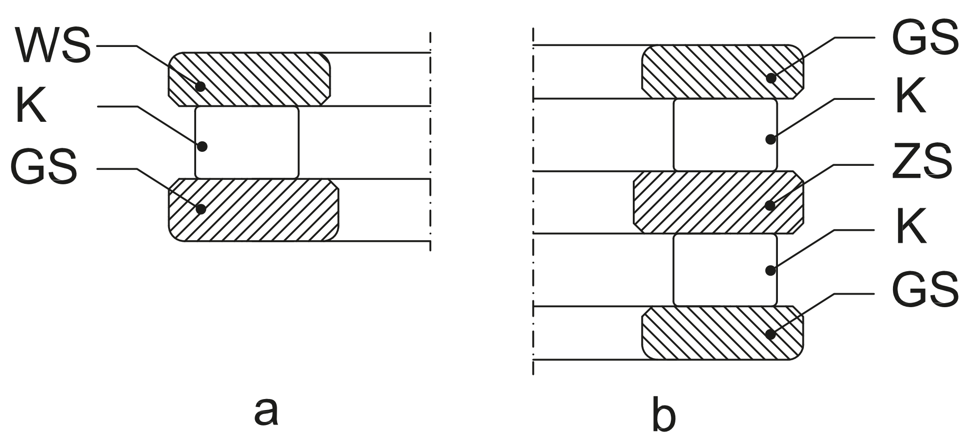
With all cylindrical roller thrust bearings, increased sliding friction can occur at the end of the cylindrical rollers.

In order to minimise this negative effect, **URB cylindricall roler thrust bearings with wider sectional widths** are produced using several short rollers in each cage pockets instead of using individual longer rollers.

Due to their specific kinematic behaviour, cylindrical roller thrust bearings are only suitable for low speed applications only. Furthermore, they require minimal axial loads for their optimum function.

Design variants

URB cylindrical roller thrust bearings are produced in single direction design only as standard (see Abb. 1a)



Double direction acting cylindrical roller thrust bearings are built using a combination of the components from single direction acting cylindrical roller thrust bearings together with **intermediate washers ZS**, (see Abb. 1 b).

Such intermediate washers are part of URB supplementary product range and are available on request.

For application designs with space restrictions the cylindrical roller and cage thrust assemblies may be used without washers providing the contact faces of adjacent machine parts are machined as bearing raceways, (e.g. hardened and ground, etc).

The components of cylindrical roller thrust bearing are frequently used either separately or in conjunction with othercomponents in several applications (e.g. to build needle roller thrust assemblies) therefore, they are available as loose parts.

Misalignment

All cylindrical roller thrust bearing type do not allow any misalignment.

The contacting surfaces of both shaft and housing seats must be parallel.

Cages

Small URB cylindrical roller thrust bearings are fitted with shaft - centred polyamide cages as standard. Polyamide cages are suitable for operating temperatures up to **+120ºC.**

Large cylindrical roller thrust bearings are produced with either solid brass cages (suffix **MP**), or with solid steel cages, (suffix **FP**).

Tolerances

URB cylindrical roller thrust bearings are produced to normal class tolerance (**PN**) as standard.

For applications of higher accuracy these bearings are produced to precision tolerance class (e.g. **P6**) on order request.

For detailed values of the tolerance classes see chapter "**Bearing tolerances**" (see page 41).

Minimum load:

All cylindrical roller thrust bearing require a certain minimum axial load to ensure a satisfactory operating function.

To prevent excessive sliding friction, the minimum axial load applied should be greater than **5%** of the axial bearing dynamic load rating $\mathbf{C_a}$.

Where such a minmum axial load is not possible the load must be increased by effective measures, (i.e. preloading the bearing) using pressure washers or springs.

Equivalent dynamic bearing load

Cylindrical roller thrust bearings are pure axial bearings, they are not able to accomodate any radial loads, therefore:

$$\mathbf{P = F_a}$$

Equivalent static bearing load

For cylindrical roller thrust bearings:

$$\mathbf{P_0 = F_a}$$

Design of adjacent machine parts

When **cylindrical roller and cage thrust assemblies** are used without washers adjacent machines parts must be designed and machined as bearing raceways (e.g. hardened and ground etc).

The maximum permissible axial runout of the adjacent surfaces acting as raceway must also meet the requirements of the respective washers.

For detailed information see chapter "**Design of bearing location**", on page 46.

The bore diameters of **URB cylindrical roller and cage thrust assemblies** have tolerances according to ISO Tolerance field (**E11**), whilst the tolerance of their outer diameters lies in the tolerance field (**a13**).

Cylindrical roller and cage thrust assemblies require an effective guidance when operating at higher speeds.

To avoid excessive wear, at higher speeds, the guiding surface must be ground.

Bearing seats for cylindrical roller thrust bearings

For the design of cylindrical roller thrust bearing seats the following of tolerance fields have proven to be satisfactory in practice:

	Tolerance field	
Centred at	**Shaft**	**Housing**
Cylindrical roller and cage thrust assembly	h8	H9
Shaft washer	h6	-
Housing washer	-	H7

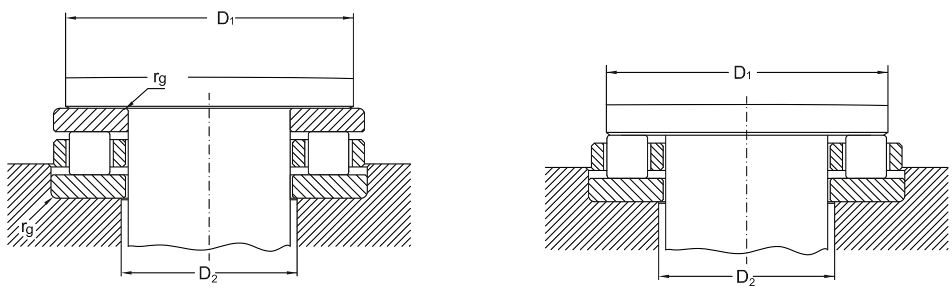
Abutment and Fillet dimensions for cylindrical roller thrust bearings

In case of cylindrical roller thrust bearings, an effective support of the bearing washers over the total width of their raceways by adjacent machine parts is necessary.

The bearing washer must contact adjacent parts with their side face only. The fillet radii of bearing corners must not touch the shoulder fillet radii of the shaft or housing shoulders.

Therefore, the largest fillet radius ($\mathbf{r_g}$) must be smaller than the minimum fillet dimension of the bearing rings ($\mathbf{r_s}$) as listed in the following tables.

Abutment and Fillet dimensions for cylindrical roller thrust bearings, series 811 and 812 [mm]

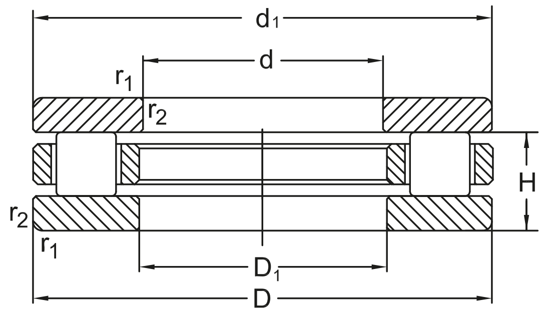


Shaft Φd	Bore reference number	Bearing Series 811 D1 min	811 D2 min	811 rg max	Bearing Series 812 D1 min	812 D2 min	812 rg max
mm							
15	**02**	25	18	0,3	-	-	-
17	**03**	27	20	0,3	-	-	-
20	**04**	32	23	0,3	-	-	-
25	**05**	39	28	0,6	-	-	-
30	**06**	44	33	0,6	49	33	0,6
35	**07**	49	38	0,6	56	41	1
40	**08**	56	44	0,6	63	45	1
45	**09**	61	49	0,6	68	50	1
50	**10**	66	54	0,6	73	55	1
55	**11**	73	60	0,6	84	61	1
60	**12**	80	65	1	89	66	1
65	**13**	85	70	1	94	71	1
70	**14**	90	75	1	99	76	1
75	**15**	95	80	1	104	81	1
80	**16**	100	85	1	109	86	1
85	**17**	105	90	1	117	93	1
90	**18**	114	96	1	127	98	1
100	**20**	129	106	1	140	110	1
110	**22**	139	116	1	150	120	1
120	**24**	149	126	1	160	130	1
130	**26**	162	138	1	179	141	1,5
140	**28**	172	148	1	189	151	1,5
150	**30**	182	158	1	204	161	1,5

Abutment and Fillet dimensions for cylindrical roller thrust bearings, series 811 and 812 [mm]

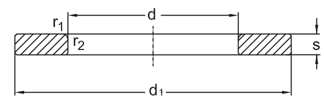
Shaft Φd	Bore reference number	Bearing Series 811 D_1 min	811 D_2 min	811 r_g max	812 D_1 min	812 D_2 min	812 r_g max
mm							
160	**32**	192	168	1	214	171	1,5
170	**34**	207	178	1	227	183	1,5
180	**36**	217	188	1	237	193	1,5
190	**38**	230	200	1	256	204	2
200	**40**	240	210	1	266	214	2
220	**44**	260	230	1	286	234	2
240	**48**	288	252	1,5	322	258	2,1
260	**52**	308	272	1,5	342	278	2,1
280	**56**	337	293	1,5	362	298	2,1
300	**60**	365	315	2	398	322	2,5
320	**64**	385	335	2	418	342	2,5
340	**68**	405	355	2	438	362	2,5
360	**72**	425	375	2	475	385	3
380	**76**	445	395	2	495	405	3
400	**80**	465	415	2	515	425	3
420	**84**	485	435	2	552	448	4
440	**88**	522	458	2,1	572	468	4
460	**92**	542	478	2,1	592	488	4
480	**96**	562	498	2,1	621	509	4
500	**/500**	582	518	2,1	641	529	4
530	**/530**	619	551	2,5	680	560	4
560	**/560**	649	581	2,5	715	595	4
600	**/600**	689	621	2,5	764	636	4

Cylindrical Roller Thrust Bearings



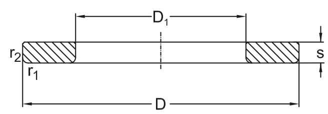
d	D	H	r_1, r_2 min.	Designation	Basical axial load dyn. C_a	stat. C_{0a}	Speed limit grease	oil
mm					kN		min $^{-1}$	min $^{-1}$
30	47	11	0,6	**81106**	28	83	2600	6700
	52	16	0,6	**81206**	50	132	2400	6300
35	52	12	0,6	**81107**	30	93	2200	6000
	62	18	1	**81207**	54	156	1900	5300
40	60	13	0,6	**81108**	42,5	137	1900	5300
	68	19	1	**81208**	76,5	220	1700	4800
45	65	14	0,6	**81109**	45	150	1700	4800
	73	20	1	**81209**	83	255	1600	4500
50	70	14	0,6	**81110**	42,5	143	1500	4300
	78	22	1	**81210**	88	285	1400	4000
55	78	16	0,6	**81111**	52	193	1400	4000
	90	25	1	**81211**	122	390	1200	3600
60	85	17	1	**81112**	73,5	265	1200	3600
	95	26	1	**81212**	114	335	1100	3400
65	90	18	1	**81113**	76,5	285	1100	3400
	100	27	1	**81213**	118	390	950	3000
70	95	18	1	**81114**	71	265	1000	3200
	105	27	1	**81214**	122	440	950	3000
75	100	19	1	**81115**	75	285	950	3000
	110	27	1	**81215**	125	440	900	2800
80	105	19	1	**81116**	76,5	300	900	2800
	115	28	1	**81216**	129	455	850	2600

Cylindrical Roller Thrust Bearings

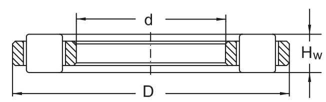


WS 8...

Abutment and fillet dimensions see on page 547



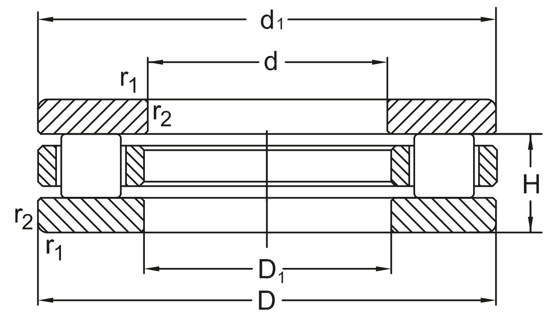
GS 8...



K 8...

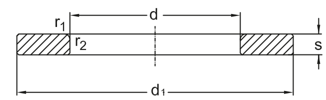
	Dimensions			Designation of Bearing Components			Mass
d	d_1	D_1	s	Cylindrical Roller and Cage thrust assembly	Shaft Washer	Housing Washer	
mm							[kg]
30	47	32	3	**K81106**	**WS81106**	**GS81106**	0,06
	52	32	4,25	**K81206**	**WS81206**	**GS81206**	0,13
35	52	37	3,5	**K81107**	**WS81107**	**GS81107**	0,08
	62	37	5,25	**K81207**	**WS81207**	**GS81207**	0,23
40	60	42	3,5	**K81108**	**WS81108**	**GS81108**	0,12
	68	42	5	**K81208**	**WS81208**	**GS81208**	0,27
45	65	47	4	**K81109**	**WS81109**	**GS81109**	0,14
	73	47	5,5	**K81209**	**WS81209**	**GS81209**	0,31
50	70	52	4	**K81110**	**WS81110**	**GS81110**	0,16
	78	52	6,5	**K81210**	**WS81210**	**GS81210**	0,38
55	78	57	5	**K81111**	**WS81111**	**GS81111**	0,23
	90	57	7	**K81211**	**WS81211**	**GS81211**	0,60
60	85	62	4,75	**K81112**	**WS81112**	**GS81112**	0,28
	95	62	7,5	**K81212**	**WS81212**	**GS81212**	0,74
65	90	67	5,25	**K81113**	**WS81113**	**GS81113**	0,33
	100	67	8	**K81213**	**WS81213**	**GS81213**	0,82
70	95	72	5,25	**K81114**	**WS81114**	**GS81114**	0,36
	105	72	8	**K81214**	**WS81214**	**GS81214**	0,87
75	100	77	5,75	**K81115**	**WS81115**	**GS81115**	0,43
	110	77	8	**K81215**	**WS81215**	**GS81215**	0,92
80	105	82	5,75	**K81116**	**WS81116**	**GS81116**	0,46
	115	82	8,5	**K81216**	**WS81216**	**GS81216**	1,02

Cylindrical Roller Thrust Bearings



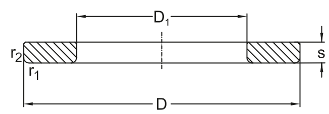
Dimension				Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min^{-1}	min^{-1}
85	110	19	1	**81117**	76,5	310	850	2600
	125	31	1	**81217**	153	550	800	2400
90	120	22	1	**81118**	104	415	800	2400
	135	35	1,1	**81218**	190	670	800	2400
100	135	25	1	**81120**	146	585	750	2200
	150	38	1,1	**81220**	224	815	700	2000
110	145	25	1	**81122**	160	655	700	2000
	160	38	1,1	**81222**	232	865	670	1900
120	155	25	1	**81124**	160	680	670	1900
	170	39	1,1	**81224**	245	950	630	1800
130	170	30	1	**81126**	186	780	600	1700
	190	45	1,5	**81226**	365	1400	560	1600
140	180	31	1	**81128**	196	865	560	1600
	200	46	1,5	**81228**	375	1460	530	1500
150	190	31	1	**81130**	204	930	530	1500
	215	50	1,5	**81230**	455	1800	500	1400
160	200	31	1	**81132**	212	980	500	1400
	225	51	1,5	**81232**	465	1900	500	1400
170	215	34	1,1	**81134**	265	1220	500	1400
	240	55	1,5	**81234**	520	2080	480	1300
180	225	34	1,1	**81136**	275	1290	480	1300
	250	56	1,5	**81236**	520	2160	450	1200

Cylindrical Roller Thrust Bearings

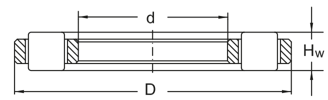


WS 8...

Abutment and fillet dimensions see on page 547



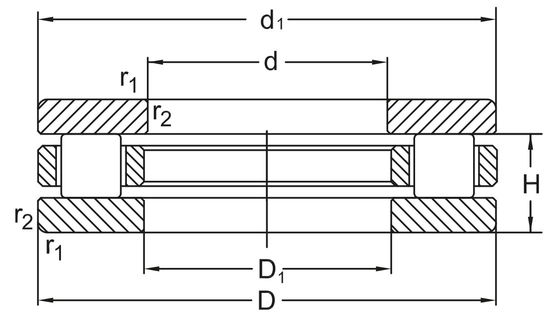
GS 8...



K 8...

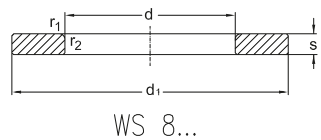
	Dimensions			Designation of Bearing Components			Mass
d	d_1	D_1	S	Cylindrical Roller and Cage thrust assembly	Shaft Washer	Housing Washer	
mm							[kg]
85	110	87	5,75	**K81117**	**WS81117**	**GS81117**	0,48
	125	88	9,5	**K81217**	**WS81217**	**GS81217**	1,36
90	120	92	6,5	**K81118**	**WS81118**	**GS81118**	0,72
	135	93	10,5	**K81218**	**WS81218**	**GS81218**	1,85
100	135	102	7	**K81120**	**WS81120**	**GS81120**	1,07
	150	103	11,5	**K81220**	**WS81220**	**GS81220**	2,45
110	145	112	7	**K81122**	**WS81122**	**GS81122**	1,12
	160	113	11,5	**K81222**	**WS81222**	**GS81222**	2,70
120	155	122	7	**K81124**	**WS81124**	**GS81124**	1,25
	170	123	12	**K81224**	**WS81224**	**GS81224**	2,98
130	170	132	9	**K81126**	**WS81126**	**GS81126**	1,72
	187	133	13	**K81226**	**WS81226**	**GS81226**	4,37
140	178	142	9,5	**K81128**	**WS81128**	**GS81128**	2,02
	197	143	13,5	**K81228**	**WS81228**	**GS81228**	4,76
150	188	152	9,5	**K81130**	**WS81130**	**GS81130**	2,15
	212	153	14,5	**K81230**	**WS81230**	**GS81230**	6,04
160	198	162	9,5	**K81132**	**WS81132**	**GS81132**	2,28
	222	163	15	**K81232**	**WS81232**	**GS81232**	6,52
170	213	172	10	**K81134**	**WS81134**	**GS81134**	3,01
	237	173	16,5	**K81234**	**WS81234**	**GS81234**	8,12
180	222	183	10	**K81136**	**WS81136**	**GS81136**	3,07
	247	183	17	**K81236**	**WS81236**	**GS81236**	8,69

Cylindrical Roller Thrust Bearings

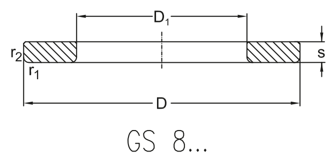


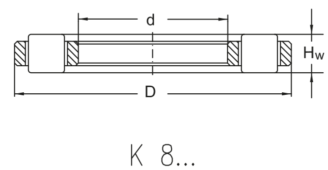
	Dimension			Designation	Basical axial load		Speed limit	
d	D	H	r_1, r_2 min.		dyn. C_a	stat. C_{0a}	grease	oil
mm					kN		min^{-1}	min^{-1}
190	240	37	1,1	**81138**	315	1500	450	1200
	270	62	2	**81238**	655	2650	430	1100
200	250	37	1,1	**81140**	325	1600	450	1200
	280	62	2	**81240**	695	2900	430	1100
220	270	37	1,1	**81144**	355	1830	430	1100
	300	63	2	**81244**	735	3200	400	1000
240	300	45	1,5	**81148**	465	2360	380	950
	340	78	2,1	**81248**	980	4250	360	900
260	320	45	1,5	**81152**	500	2650	360	900
	360	79	2,1	**81252**	1040	4650	340	850
280	350	53	1,5	**81156**	670	3450	340	850
	380	80	2,1	**81256**	1060	4900	320	800
300	380	62	2	**81160**	800	4000	300	750
	420	95	3	**81260**	1400	6200	280	700
360	440	65	2	**81172**	900	4900	240	630
	500	110	4	**81272**	1960	9150	220	600
380	460	65	2	**81176**	880	4900	240	630
	520	112	4	**81276**	2000	9500	200	560

Cylindrical Roller Thrust Bearings



Abutment and fillet dimensions see on page 547





	Dimensions			Designation of Bearing Components			Mass
d	d_1	D_1	S	Cylindrical Roller and Cage thrust assembly	Shaft Washer	Housing Washer	
mm							[kg]
190	237	193	11	**K81138**	**WS81138**	**GS81138**	3,99
	267	194	18	**K81238**	**WS81238**	**GS81238**	11,70
200	247	203	11	**K81140**	**WS81140**	**GS81140**	4,17
	277	204	18	**K81240**	**WS81240**	**GS81240**	12,2
220	267	223	11	**K81144**	**WS81144**	**GS81144**	4,65
	297	224	18,5	**K81244**	**WS81244**	**GS81244**	13,4
240	297	243	13,5	**K81148**	**WS81148**	**GS81148**	7,43
	335	244	23	**K81248**	**WS81248**	**GS81248**	23,10
260	317	263	13,5	**K81152**	**WS81152**	**GS81152**	7,99
	355	264	23,5	**K81252**	**WS81252**	**GS81252**	25,1
280	347	283	15,5	**K81156**	**WS81156**	**GS81156**	12
	375	284	24	**K81256**	**WS81256**	**GS81256**	27,1
300	376	304	18,5	**K81160**	**WS81160**	**GS81160**	17,2
	415	304	28,5	**K81260**	**WS81260**	**GS81260**	42,50
360	436	364	20	**K81172**	**WS81172**	**GS81172**	21,4
	495	365	32,5	**K81272**	**WS81272**	**GS81272**	68,7
380	456	384	20	**K81176**	**WS81176**	**GS81176**	22,4
	515	385	33,5	**K81276**	**WS81276**	**GS81276**	73,3

Cylindrical roller thrust bearings, single direction
Non-standardized

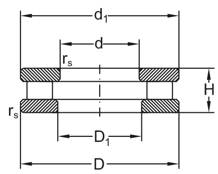


Fig. 1

Fig. 2

Fig. 3

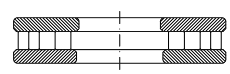


Fig. 4

Dimensions						Fig.	Basic axial load		Speed limit		Designation	Mass
d	D	H	r_s min.	d_1	D_1		dyn C_a	stat. C_{0a}	grease	oil	Bearing	
mm						-	kN		min^{-1}	min^{-1}		kg
25	49	15	0,6	49	25,2	1	37,1	92,7	3400	4800	**85205 M**	0,131
	52	18	0,5	52	25,2	1	36,8	92,4	3000	4300	**85105 M**	0,181
34.925	79	15,875	1,5	78	37	2	80	316	2200	3200	**892007 M**	0,43
40	91,035	15,5	0,3	87	45	3	92	378	2400	3400	**85108 M**	0,500
	105	16	0,5	105	48	10	141	591	2800	4000	**86208 M**	0,859
46	112,035	19	0,3	105	53	3	139	591	2000	2800	**85109 M**	1,04
50	105	20	0,5	105,5	54,5	9	172	776	2300	3300	**85110 TN**	0,655
	105	16	0,5	105,5	52	8	172	776	2800	4000	**85210 TN**	0,633
62	138,04	22	0,6	134	70	3	215	950	1700	2400	**85112 M**	1,87
70	95	6	0,3	-	72	1	46,2	234	3400	4800	**85114 M**	0,154
76,2	228,6	35	1	227	77,7	1	436	1996	1000	1500	**85115 M**	7,64
85	110	6	0,3	-	87	7	50	274	3000	4300	**85117 M**	0,18
96,15[1)]	181,6[1)]	17,2	0,3	175,05	96,15	4	286	1774	1700	2400	**85119 M**	2,39
100	210	67	3	208,5	103	2	669	2711	750	1100	**85320 M**	12,7
160	345	120	4	314	160,3	2	1836	7603	450	630	**85132 M**	66,8
200	280	62	2	277	204	1	735	3146	700	1000	**81240 M**	66,8
210	420	120	4	420	212	2	2380	11616	400	560	**85142 M**	95,6
	460	120	4	460	212	3	2500	12144	380	530	**85242 M**	117
240	540	125[2)]	5	540	242	4	5308	34918	360	500	**85148 M**	248
270	520	125	5	520	274	3	8239	16840	360	500	**85154 M**	148
272	480	132	5	480	274	3	2681	13010	360	500	**85254 M**	122
280	520	145	6	520	284	3	3296	16005	340	480	**85156 M**	160
340	620	170	6	620	344	3	4258	20698	280	400	**85168 M**	265

1) Cage diameters: d_c=82; D_c=181,6
2)Available with compensator ring, h=55

Cylindrical roller thrust bearings, single direction

Non-standardized

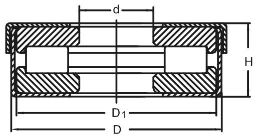


fig. 5

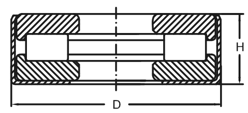


fig. 6

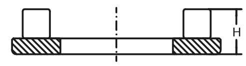


fig. 7

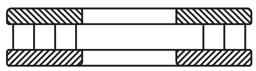


Fig. 8

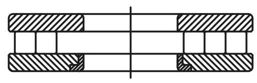


fig. 9

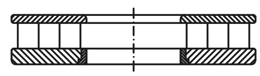


fig. 10

Dimensions							**Fig.**	**Basic axial load**		**Speed limit**		**Designation**	**Mass**
d	D	H	r_s min.	r_{1S} min.	d_1	D_1		dyn C_a	stat. C_{0a}	grease	oil	Bearing	
mm							-	kN		min^{-1}	min^{-1}		kg
22,45	48,02	15,9	0,3				6	38,5	87,1	2500	3200	**851Z04**	0,222
25,8	50,5	15,9	0,3				6	41	97	2400	3400	**861Z05**	0,139
32	61	17				55	5	27,3	72,6	2600	3800	**851Z06**	0,20
	61	17				55	5	27,3	72,6	2600	3800	**851Z06 TN**	0,20
39	73	20,5				69,5	6	67,7	190	2200	3200	**851Z08**	0,38
44	110	20		0,5	105	50	10	141	591	2300	3300	**86108 M**	1,147
50,952	74,74	15,875	0,6				6	52,2	155	2400	3600	**851Z10**	0,217
70	95	6	0,3		95	72	7	46	234	4900	7000	**890614 M**	0,154
85	110	6	0,3		110	87	7	50	273	4900	7000	**890717 M**	0,180

Cylindrical roller thrust bearings, double direction
Non-standardized

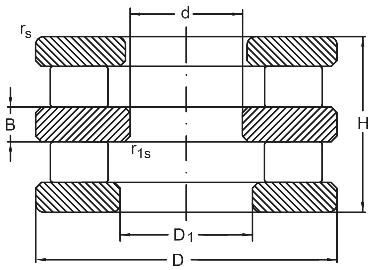


fig. 1

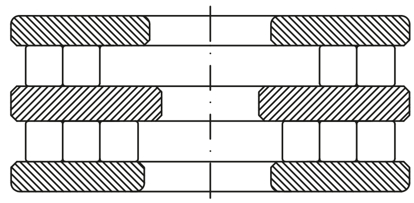


fig. 2

Dimensions								Basic axial load		Speed limit		Designation	Mass
d	D	H	B	r_s min.	r_{1S} min.	D_1	**Fig.**	dyn C_a	stat. C_{0a}	grease	oil	Bearing	
mm							-	kN		min^{-1}	min^{-1}		kg
35	71,85	33	8	1	1	62	1	44	118	2800	4000	**86107**	0,535
85	230	100	29	1,5	1,5	113	2	626	3086	700	1000	**86117 M**	21,82
140	200	72	19	1	1	154	1	253	1061	900	1300	**86228 M**	6,87
141	200	68	24	1	1	162,4	-	192	878	900	1300	**86128 M**	6,392
150	215	78	20	0,6	0,6	166	-	287	1217	900	1300	**86130 M**	8,82
210	400	262,7	95	3	3	242	-	2390	7770	430	630	**86142 M**	157

Cylindrical roller and cage thrust assemblies

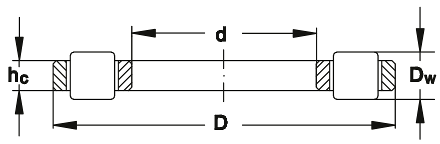


fig. 3

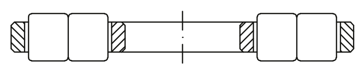
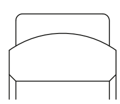
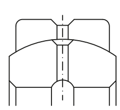
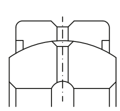


fig. 4

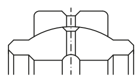
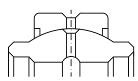
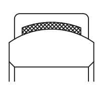
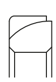
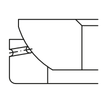
d	D	D_w	h_c	Fig.	Basic axial load dyn C_a	stat. C_{0a}	Speed limit grease	oil	Designation Bearing	Mass
mm				-	kN		min^{-1}	min^{-1}		kg
30,04	60	5,5	3,75	4	51,3	176	4000	5600	**K89306 M**	0,066
35,05	68	6	4,2	4	59	214	3100	4400	**K89307 M**	0,096
40,05	81	7	5	4	88,6	333	3000	4300	**K85108 TN**	0,084
60,06	85	7,5	5,2	3	71,7	257	2800	4000	**K81112 M**	0,129
65,06	90	7,5	5,2	3	72,8	268	2600	3800	**K81113 M**	0,134
70,05	100	11	7,5	3	127	432	2200	3000	**K81214 M**	0,319
75	169	19	15,5	4	480	1806	1300	1800	**K891215 M**	2,35
75,06	100	7,5	5,75	3	68,7	268	2000	2800	**K81115 M**	0,146
85	179	19	15,5	4	501	1956	1200	1700	**K891117 M**	2,54
90,06	120	9	6,5	3	106	416	1500	2200	**K8111S M**	0,209

Spherical plain bearings
Rod ends

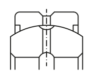
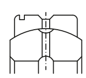
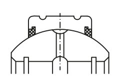
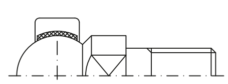
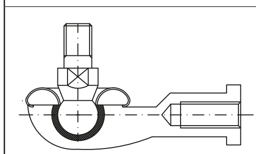
Spherical plain bearings and rod ends URB are manufactured with material of the best quality on machines of high precision, therefore we are able to garantee that they are products of high quality, suitable to a many lot of uses in sector of industry, farming, hydraulics, pneumatics and everywhere it is requested a precision use, or hard loads, or maintenance free. The tolerances of manufacture and assembly respect the rules of standard ISO (and DIN for some series used for hydraulics) and they ae interchangeable with products of the most important manufactures.

Name and number	**Equivalent**			**Bore diameter range (mm)**	**Design feature**
	SKF	**INA**	**IKO**		
page 566  Spherical plain radial bearings with fitting crack GE...E GEG...E	GE...E	GE...DO GE...FO	GE...E GE...G	4-12 4-12	Outer ring without single split in axial direction. No lubrication grooves and holes, both outer and inner rings are properly phosphorlylate-treated
page 568  Spherical plain radial bearings with fitting crack GE...ES GEG...ES	GE...ES GEH...ES	GE...DO GE...FO	GE...ES GE...GS	15-3000 15-280	Outer ring with single split in axial direction. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated
page 569  Spherical plain radial bearings with two seals and fitting crack GE...ES 2RS GEG...ES 2RS	GE...ES 2RS GEH...ES 2RS	GE...DO 2RS GE...FO 2RS	GE...ES 2RS GE...GS 2RS	15-300 15-280	Outer ring with single split in axial direction. With two seals. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated

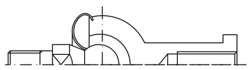
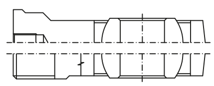
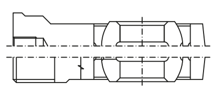
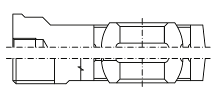
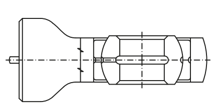
(Continued)

Name and number	Equivalent			Bore diameter range (mm)	Design feature
	SKF	INA	IKO		
page 570  Spherical plain radial bearings with wide inner ring and fitting crack. GEEW...ES	GEG...ES	GE...LO	-	12-100	Outer ring with single split in axial direction. Inner ring with cylindrical extension at either side. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated.
page 571  Spherical plain radial bearings with two seals and wide inner ring and fitting crack GEEW...ES 2RS GEEM...ES 2RS	GEM...ES 2RS	GE...HO 2RS	-	20-80 12-100	Outer ring with single split in axial direction. With two seals. Inner ring with cylindrical extension at either side. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated
page 572  Maitenance-free spherical plain radial bearings GE...E GE...ET 2RS GEG...C GEG...ET 2RS	GE...C GE...TE 2RS GEH...C GEH...C 2RS	GE...UK GE...UK 2RS GE...FW GE...FW 2RS	GE...EC GE...EL 2RS	4-30 20-140 4-30 30-140	Outer ring pressed around inner ring. To line SF1 material on the surface of spherical plain. Spherical surface of inner ring with chromium plating.
page 575  Angular contact spherical plain bearings GAC...S	GAC...F	GE...SW	-	25-120	Separable outer and inner rings. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated.
page 576  Spherical plain thrust bearings GX...S	GX...F	GE...AW	-	10-120	Separable shaft and housingwashers. Lubrication grooves and holes in the housing washer. Both shaft and housing washer are properly phosphorlylate-treated.

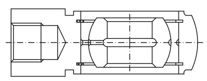
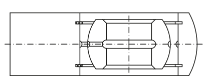
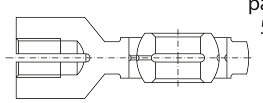
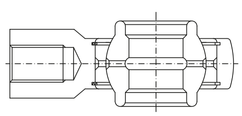
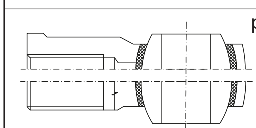
(Continued)

Name and number	Equivalent			Bore diameter range (mm)	Design feature
	SKF	INA	IKO		
page 577  Spherical plain radial bearings with fitting crack. Dimensions in inches. GEZ...ES GEZ...ES 2RS	GEZ...ES GEZ...ES 2RS	GE...ZO GE...ZO 2RS	SBB... SBB...2RS	12,7-152,4 12,7-152,4	As type GE...ES, but dimensions in inches.
page 579  Spherical plain radial bearings with two pieces. GE...XS K	-	-	SB...	12-150	Outer ring with two pieces in axial direction. Lubrication grooves and holes in the outer and inner rings. Both outer and inner rings are properly phosphorlylate-treated
page 581  Spherical plain radial bearings with two seals, two pieces. GEK...XS 2RS	-	-	-	25-60	Outer ring with two axial pieces and two seals. Spherical surface of inner ring with cromium plating. Lubrication grooves and holes in the outer and inner rings.
page 582  Ball joint rod ends with one shank. SQD...C	-	-	-	5-16	Ball joint housing is an outer ring of spherical plain radial bearing. To line SF1 material on the surface of spherical plain.
page 583  Winding shape ball joint rod ends with a dust cover. SQ...C RS	-	-	-	5-22	Ball joint housing is a "L" shaped shank with dust cover with female tread. They are available for right or left hand thread. To line SF1 material on the surface of spherical plain.

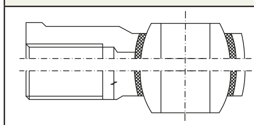
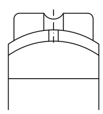
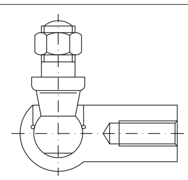
(Continued)

Name and number	Equivalent			Bore diameter range (mm)	Design feature
	SKF	INA	IKO		
page 585  Straight ball joint rod ends with a dust cover. SQZ...C RS	-	-	-	5-22	Ball joint housing is an axial shank with dust cover with femal thread. Stretching rod with right or left hand thread. To line SF1 material on the surface of spherical plain.
pages 587, 592  Combination rod ends SI...E SA...E	SI...E SA...E	GIR...DO GAR...DO	- -	5-12 5-12	Bearings with a streching rod. Stretching rod with right or left-hand, male or female thread. It is made up of a spherical plain radial bearing of type GE...E and rod body.
pages 587, 592  Combination rod ends SI...ES SA...ES SI...ES 2RS SA...ES 2RS	SI...ES/SIA...ES SA...ES/SIA...ES - -	GIR...DO GAR...DO GIR...DO 2RS GAR...DO 2RS	- - - -	15-80 15-80 15-80 15-80	Bearings with a stretching rod. Stretching rod with right or left-hand, male or female thread. It is made up of a spherical plain radial bearing of type GE...ES and rod body. The housing with a lubrication hole or a grease nipple.
pages 587, 592  Combination rod ends SI...C SA...C SI...C 2RS SA...C 2RS	SI...C SA...C SI...TE 2RS SA...TE 2RS	GIR...UK GAR...UK GIR...UK 2RS GAR...UK 2RS	- - - -	15-80 15-80 35-80 35-80	Bearings with a stretching rod. Stretching rod with right or left-hand, male or female thread. It is made up of a spherical plain radial bearing of type GE...ES and rod body. To line SF1 material on the surface of spherical plain.
page 593  Ball joint ends for hydraulics with grease nipple, welding steel body TAC		GK...DO	-	10-18	Round bal joint ends to weld on the bottom of cylinder. Standard dimensions DIN 648. Sliding contact surface: steel/steel

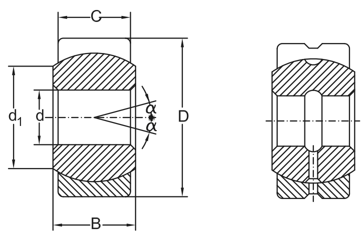
(Continued)

Name and number	Equivalent			Bore diameter range (mm)	Design feature
	SKF	INA	IKO		
page 594  Screwed ball joint ends for hydraulics also with screw lamping device and grease nipple TAPR...N	SIR...ES	GIHR...DO GIHRK...DO	- -	20-120 20-120	Screwed ball joint ends with screw on shank and also with body equipped of clamping screws in hard execution. Sliding contact surface: steel/steel
page 596  Ball joint ends for hydraulics with grease nipple, welding steel body TPN	SCF...ES	GF...DO	-	2020	Ball joint ends in strong execution to weld advisable with alternate loads. Sliding contact surface: steel/steel
page 597  Screw on ball joint ends for hydraulics with screw clamping device and grease nipple TAPR...DO	SIJ...ES	GIHO-K...DO	-	12-100	Ball joint ends with internal thread and clamping device through two screws on two sides Standard DIN 24555. Sliding contact surface: steel/steel
page 598  Screw on ball joint ends for hydraulics with screw clamping device and grease nipple TAPR...CE	SIQG...ES	GIHN-K...LO	-	12-125	Stout ball joint ends with internal thread. Standard DIN 24338 with screws clamping device sliding contact surface: steel/steel
pages 599, 600  Rod ends POS... PHS...	SAKAC...M SIKAC...M	GAKFR...PB GIKFR...PB	POS... PHS...	5-30 5-30	Bearings with a stretching rod. Stretching rod with right or left-hand, male or female thread. To line bronze material on the surface of spherical plain. Spherical surface of ball with chromium plating.

(Continued)

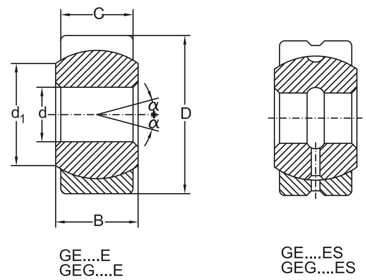
Name and number	Equivalent			Bore diameter range (mm)	Design feature
	SKF	INA	IKO		
 page 600 Maitanance-free rod POS...EC PHS...EC	SAKB...F SIKB...F	GAKFR...PW GIKFR...PW	POS...EC PHS...EC	5-30 5-30	Bearings with a stretching rod with right or left-hand, male or female thread. To line SF1 material on the surface of spherical plain. Spherical surface of ball with chromium plating.
 page 601 Spherical plain radial bearings SSR	-	-	- -	5-30	Outer ring with single split in axial direction. Lubrication grooves and holes in the outer rings. Sliding contact surfaces: bronze/steel.
 page 602 Ball joints rod ends DIN 71802	-	-	- - - -	8-19	Ball joints rod ends with shank and spring clamping.

Spherical plain radial bearings with fitting crack
Two seals and fitting crack, fitting groove
ISO 6124-1979, ISO 6125-1979



Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
4	12	5	3	6	2	10	16	**GE4 E**	0,0033
5	14	6	4	7	3,4	17	13	**GE5 S**	0,0038
6	14	6	4	8	3,4	17	13	**GE6 S**	0,0042
8	16	8	5	10	5,5	27	15	**GE8 S**	0,0075
10	19	9	6	13	8,1	40	12	**GE10 E**	0,011
12	22	10	7	15	10	54	10	**GE12 E**	0,015
15	26	12	9	18	17	85	8	**GE15 E**	0,027
	26	12	9	18	17	85	8	**GE15 ES-2RS**	0,027
17	30	14	10	20	21	106	10	**GE17 ES**	0,041
	30	14	10	20	21	106	10	**GE17 ES-RS**	0,041
20	35	16	12	24	30	146	9	**GE20 ES**	0,066
	35	16	12	24	30	146	9	**GE20 ES-2RS**	0,066
25	42	20	16	29	48	240	7	**GE25 ES**	0,119
	42	20	16	29	48	240	7	**GE25 ES-2RS**	0,119
30	47	22	18	34	62	310	6	**GE30 ES**	0,153
	47	22	18	34	62	310	6	**GE30 ES-2RS**	0,153
35	55	25	20	39	80	400	6	**GE35 ES**	0,233
	55	25	20	39	80	400	6	**GE35 ES-2RS**	0,233
40	62	28	22	45	100	500	7	**GE40 ES**	0,306
	62	28	22	45	100	500	7	**GE40 ES-2RS**	0,306
45	68	32	25	50	127	640	7	**GE45 ES**	0,427
	68	32	25	50	127	640	7	**GE45 ES-2RS**	0,427
50	75	35	28	55	156	780	6	**GE50 ES**	0,546
	75	35	28	55	156	780	6	**GE50 ES-2RS**	0,546
60	90	44	36	66	245	1220	6	**GE60 ES**	1,045
	90	44	36	66	245	1220	6	**GE60 ES-2RS**	1,045
70	105	49	40	77	315	1560	6	**GE70 ES**	1,55
	105	49	40	77	315	1560	6	**GE70 ES-2RS**	1,55
80	120	55	45	88	400	2000	6	**GE80 ES**	2,31
	120	55	45	88	400	2000	6	**GE80 ES-2RS**	2,31
90	130	60	50	98	490	2450	5	**GE90 ES**	2,75

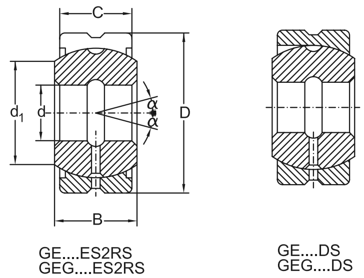
Spherical plain radial bearings with fitting crack
Two seals and fitting crack, fitting groove
ISO 6124-1979, ISO 6125-1979



Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
90	130	60	50	98	490	2450	5	**GE90 ES-2RS**	2,75
100	150	70	55	109	610	3050	7	**GE100 ES**	4,45
	150	70	55	109	610	3050	7	**GE100 ES-2RS**	4,45
110	160	70	55	120	655	3250	6	**GE110 ES**	4,82
	160	70	55	120	655	3250	6	**GE110 ES-2RS**	4,82
120	180	85	70	130	950	4750	6	**GE120 ES**	8,05
	180	85	70	130	950	4750	6	**GE120 ES-2RS**	8,05
140	210	90	70	150	1080	5400	7	**GE140 ES**	11,02
	210	90	70	150	1080	5400	7	**GE140 ES-2RS**	11,02
160	230	105	80	170	1370	6800	8	**GE160 ES**	14,01
	230	105	80	170	1370	6800	8	**GE160 ES-2RS**	14,01
180	260	105	80	192	1530	7650	6	**GE180 ES**	18,65
	260	105	80	192	1530	7650	6	**GE180 ES-2RS**	18,65
	260	105	80	192	1530	7650	6	**GE180 DS**	18,65
200	290	130	100	212	2120	10600	7	**GE200 ES**	28,03
	290	130	100	212	2120	10600	7	**GE200 ES-2RS**	28,03
	290	130	100	212	2120	10600	7	**GE200 DS**	28,03
220	320	135	100	238	2320	11600	8	**GE220 ES**	35,91
	320	135	100	238	2320	11600	8	**GE220 ES-2RS**	35,91
	320	135	100	238	2320	11600	8	**GE220 DS**	35,91
240	340	140	100	265	2550	12700	8	**GE240 ES**	39,91
	340	140	100	265	2550	12700	8	**GE240 ES-2RS**	39,91
	340	140	100	265	2550	12700	8	**GE240 DS**	39,91
260	370	150	110	285	3050	15300	7	**GE260 ES**	51,84
	370	150	110	285	3050	15300	7	**GE260 ES-2RS**	51,84
	370	150	110	285	3050	15300	7	**GE260 DS**	51,84
280	400	155	120	310	3550	18000	6	**GE280 ES**	65,36
	400	155	120	310	3550	18000	6	**GE280 ES-2RS**	65,36
	400	155	120	310	3550	18000	6	**GE280 DS**	65,36
300	430	165	120	330	3800	19000	7	**GE300 ES**	78,07
	430	165	120	330	3800	19000	7	**GE300 ES-2RS**	78,07
	430	165	120	330	3800	19000	7	**GE300 DS**	78,07

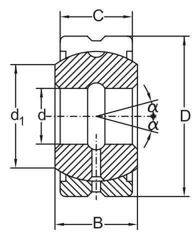
*The sizes are not binding.

Spherical plain radial bearings with fitting crack
Two seals and fitting crack, fitting groove
ISO 6124-1979, ISO 6125-1979

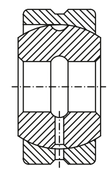


Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
4	14	7	4	7	3,4	17	20	**GEG4 E**	0,0045
5	16	9	5	8	5,5	27	21	**GEG5 S**	0,0066
6	16	9	5	9	5,5	27	21	**GEG6 S**	0,0081
8	19	11	6	11	8,1	40	21	**GEG8 E**	0,014
10	22	12	7	13	10	54	18	**GEG10 E**	0,021
12	26	15	9	16	17	85	18	**GEG12 E**	0,033
15	30	16	10	19	21	106	16	**GEG15 E**	0,049
	30	16	10	19	21	106	16	**GEG15 ES-2RS**	0,049
17	35	20	12	21	30	146	19	**GEG17 ES**	0,083
	35	20	12	21	30	146	19	**GEG17 ES-2RS**	0,083
20	42	25	16	24	48	240	17	**GEG20 ES**	0,153
	42	25	16	24	48	240	17	**GEG20 ES-2RS**	0,153
25	47	28	18	29	62	310	17	**GEG25 ES**	0,203
	47	28	18	29	62	310	17	**GEG25 ES-2RS**	0,203
30	55	32	20	34	80	400	17	**GEG30 ES**	0,304
	55	32	20	34	80	400	17	**GEG30 ES-2RS**	0,304
35	62	35	22	39	100	500	16	**GEG35 ES**	0,408
	62	35	22	39	100	500	16	**GEG35 ES-2RS**	0,408
40	68	40	25	44	127	640	17	**GEG40 ES**	0,542
	68	40	25	44	127	640	17	**GEG40 ES-2RS**	0,542
45	75	43	28	50	156	780	15	**GEG45 ES**	0,713
	75	43	28	50	156	780	15	**GEG45 ES-2RS**	0,713
50	90	56	36	57	245	1220	17	**GEG50 ES**	1,44
	90	56	36	57	245	1220	17	**GEG50 ES-2RS**	1,44
60	105	63	40	67	315	1560	17	**GEG60 ES**	1,60
	105	63	40	67	315	1560	17	**GEG60 ES-2RS**	1,60
70	120	70	45	77	400	2000	16	**GEG70 ES**	3,01
	120	70	45	77	400	2000	16	**GEG70 ES-2RS**	3,01
80	130	75	50	87	490	2450	14	**GEG80 ES**	3,64
	130	75	50	87	490	2450	14	**GEG80 ES-2RS**	3,64

Spherical plain radial bearings with fitting crack
Two seals and fitting crack, fitting groove
ISO 6124-1979, ISO 6125-1979



GE....ES2RS
GEG....ES2RS

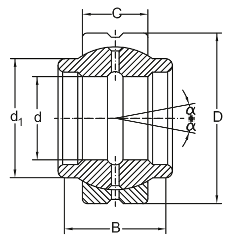


GE....DS
GEG....DS

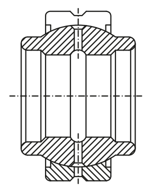
Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
90	150	85	55	98	610	3050	15	**GEG90 ES**	5,22
	150	85	55	98	610	3050	15	**GEG90 ES-2RS**	5,22
100	160	85	55	110	655	3250	14	**GEG100 ES**	6,05
	160	85	55	110	655	3250	14	**GEG100 ES-2RS**	6,05
110	180	100	70	122	950	4750	12	**GEG110 ES**	9,68
	180	100	70	122	950	4750	12	**GEG110 ES-2RS**	9,68
120	210	115	70	132	1080	5400	16	**GEG120 ES**	14,72
	210	115	70	132	1080	5400	16	**GEG120 ES-2RS**	14,72
140	230	130	80	151	1370	6800	16	**GEG140 ES**	19,01
	230	130	80	151	1370	6800	16	**GEG140 ES-2RS**	19,01
160	260	135	80	176	1530	7650	16	**GEG160 ES**	20,02
	260	135	80	176	1530	7650	16	**GEG160 ES-2RS**	20,02
	260	135	80	176	1530	7650	16	**GEG160 DS**	20,02
180	290	155	100	196	2120	10600	14	**GEG180 ES**	32,21
	290	155	100	196	2120	10600	14	**GEG180 ES-2RS**	32,21
	290	155	100	196	2120	10600	14	**GEG180 DS**	32,21
200	320	165	100	220	2320	11600	15	**GEG200 ES**	45,28
	320	165	100	220	2320	11600	15	**GEG200 ES-2RS**	45,28
	320	165	100	220	2320	11600	15	**GEG200 DS**	45,28
220	340	175	100	243	2550	12700	16	**GEG220 ES**	51,12
	340	175	100	243	2550	12700	16	**GEG220 ES-2RS**	51,12
	340	175	100	243	2550	12700	16	**GEG220 DS**	51,12
240	370	190	110	263	3050	15300	15	**GEG240 ES**	65,12
	370	190	110	263	3050	15300	15	**GEG240 ES-2RS**	65,12
	370	190	110	263	3050	15300	15	**GEG240 DS**	65,12
260	400	205	120	285	3550	18000	15	**GEG260 ES**	82,44
	400	205	120	285	3550	18000	15	**GEG260 ES-2RS**	82,44
	400	205	120	285	3550	18000	15	**GEG260 DS**	82,44
280	430	210	120	310	3800	19000	15	**GEG280 ES**	97,21
	430	210	120	310	3800	19000	15	**GEG280 ES-2RS**	97,21
	430	210	120	310	3800	19000	15	**GEG280 DS**	97,21

*The sizes are not binding.

Spherical plain radial bearings with wide inner ring and fitting crack
Two seals and wide inner ring and fitting crack
ISO 61204/2-1982



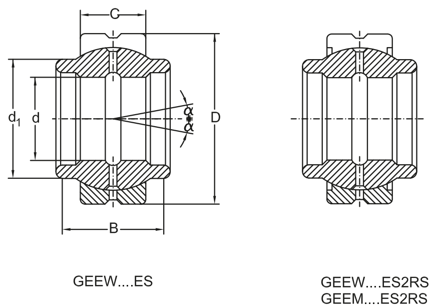
GEEW....ES



GEEW....ES2RS
GEEM....ES2RS

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
12	22	12	7	15,5	10	54	4	**GEEW12 ES**	0,022
	22	12	7	15,5	10	54	4	**GEEW12 ES-2RS***	0,022
15	26	15	9	18,5	17	85	5	**GEEW15 ES**	0,031
	26	15	9	18,5	17	85	5	**GEEW15 ES-2RS**	0,031
16	28	16	9	20	17	85	4	**GEEW16 ES**	0,035
	28	16	9	20	17	85	4	**GEEW16 ES-2RS**	0,035
17	30	17	10	21	21	106	7	**GEEW17 ES**	0,044
	30	17	10	21	21	106	7	**GEEW17 ES-2RS**	0,044
20	35	20	12	25	30	146	4	**GEEW20 ES**	0,071
	35	20	12	25	30	146	4	**GEEW20 ES-2RS**	0,071
25	42	25	16	30,5	48	240	4	**GEEW25 ES**	0,131
	42	25	16	30,5	48	240	4	**GEEW25 ES-2RS**	0,131
30	47	30	18	34	62	310	4	**GEEW30 ES**	0,168
	47	30	18	34	62	310	4	**GEEW30 ES-2RS**	0,168
32	52	32	18	37	62	310	4	**GEEW32 ES**	0,182
	52	32	18	37	62	310	4	**GEEW32 ES-2RS**	0,182
35	55	35	20	40	80	400	4	**GEEW35 ES**	0,253
	55	35	20	40	80	400	4	**GEEW35 ES-2RS**	0,253
40	62	40	22	46	100	500	4	**GEEW40 ES**	0,338
	62	40	22	46	100	500	4	**GEEW40 ES-2RS**	0,338
45	68	45	25	52	127	640	4	**GEEW45 ES**	0,481
	68	45	25	52	127	640	4	**GEEW45 ES-2RS**	0,481
50	75	50	28	57	156	780	4	**GEEW50 ES**	0,558
	75	50	28	57	156	780	4	**GEEW50 ES-2RS**	0,558
60	90	60	36	68	245	1220	3	**GEEW60 ES**	1,15
	90	60	36	68	245	1220	3	**GEEW60 ES-2RS**	1,15
63	95	63	36	71,5	245	1220	4	**GEEW63 ES**	1,23
	95	63	36	71,5	245	1220	4	**GEEW63 ES-2RS**	1,23
70	105	70	40	78	315	1560	4	**GEEW70 ES**	1,71
	105	70	40	78	315	1560	4	**GEEW70 ES-2RS**	1,71

Spherical plain radial bearings with wide inner ring and fitting crack
Two seals and wide inner ring and fitting crack
ISO 61204/2-1982

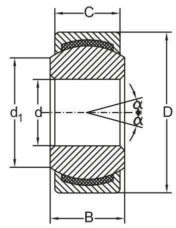


Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
80	120	80	45	91	400	2000	4	**GEEW80 ES**	2,39
	120	80	45	91	400	2000	4	**GEEW80 ES-2RS**	2,39
100	150	100	55	113	610	3050	4	**GEEW100 ES**	4,80
	150	100	55	113	610	3050	4	**GEEW100 ES-2RS**	4,80
125	180	125	70	138	950	4750	4	**GEEW125 ES**	8,50
	180	125	70	138	950	4750	4	**GEEW125 ES-2RS**	8,50
20	35	24	12	24	30	146	6	**GEEM20 ES-2RS**	0,073
25	42	29	16	29	48	240	4	**GEEM25 ES-2RS**	0,13
30	47	30	18	34	62	310	4	**GEEM30 ES-2RS**	0,17
35	55	35	20	40	80	400	4	**GEEM35 ES-2RS**	0,25
40	62	38	22	45	100	500	4	**GEEM40 ES-2RS**	0,35
45	68	40	25	52	127	640	4	**GEEM45 ES-2RS**	0,49
50	75	43	28	57	156	780	4	**GEEM50 ES-2RS**	0,60
60	90	54	36	68	245	1220	3	**GEEM60 ES-2RS**	1,15
70	105	65	40	78	315	1560	4	**GEEM70 ES-2RS**	1,65
80	120	74	45	90	400	2000	4	**GEEM80 ES-2RS**	2,50

*The sizes are not binding.

Maintenance free spherical plain radial bearings

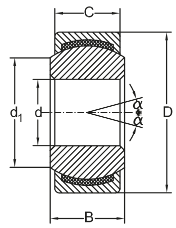
GB304.7-81, GB304.9-81 (ISO6124-1979, ISO6125-1979)



GE....C
GE....ET2RS

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
4	12	5	3	6	2,1	5,4	16	**GE4 C**	0,0033
5	14	6	4	7	3,6	9,1	13	**GE5 C**	0,0038
6	14	6	4	8	3,6	9,1	13	**GE6 C**	0,0042
8	16	8	5	10	5,8	14	15	**GE8 C**	0,0075
10	19	9	6	13	8,6	21	12	**GE10 C**	0,011
12	22	10	7	15	11	28	10	**GE12 C**	0,015
15	26	12	9	18	18	45	8	**GE15 C**	0,027
17	30	14	10	20	22	56	10	**GE17 C**	0,041
20	35	16	12	24	31	78	9	**GE20 C**	0,066
	35	16	12	24	31	78	9	**GE20 ET-2RS**	0,066
25	42	20	16	29	51	127	7	**GE25 C**	0,119
	42	20	16	29	51	127	7	**GE25 ET-2RS**	0,119
30	47	22	18	34	65	166	6	**GE30 C**	0,163
	47	22	18	34	65	166	6	**GE30 ET-2RS**	0,163
35	55	25	20	-	110	220	6	**GE35 ET-2RS**	0,25
40	62	28	22	-	140	280	6	**GE40 ET-2RS**	0,30
45	68	32	25	-	180	350	6	**GE45 ET-2RS**	0,35
50	75	35	28	-	220	430	6	**GE50 ET-2RS**	0,50
60	90	44	36	-	340	690	6	**GE60 ET-2RS**	1,00
70	105	49	40	-	430	870	6	**GE70 ET-2RS**	1,40
80	120	55	45	-	560	1140	6	**GE80 ET-2RS**	2,00
90	130	60	50	-	690	1350	6	**GE90 ET-2RS**	2,50

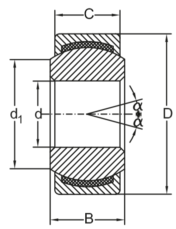
Maintenance free spherical plain radial bearings
GB304.7-81, GB304.9-81 (ISO6124-1979, ISO6125-1979)



GE....C
GE....ET2RS

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
100	150	70	55	-	850	1700	6	**GE100 ET-2RS**	4,00
110	160	70	55	-	900	1850	6	**GE110 ET-2RS**	4,50
120	180	85	70	-	1300	2700	6	**GE120 ET-2RS**	7,20
140	210	90	70	-	1500	3000	6	**GE140 ET-2RS**	10,00

Maintenance free spherical plain radial bearings
ISO6124-1979, ISO 6125-1979

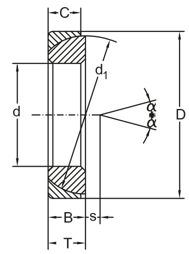


GE....C
GE....ET2RS

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
4	14	7	4	7	3,6	9,1	20	**GEG4 C**	0,0045
5	16	9	5	8	5,8	14	21	**GEG5 C**	0,0066
6	16	9	5	9	5,8	14	21	**GEG6 C**	0,0081
8	19	11	6	11	8,8	21	21	**GEG8 C**	0,014
10	22	12	7	13	11	28	18	**GEG10 C**	0,021
12	26	15	9	16	18	45	18	**GEG12 C**	0,033
15	30	16	10	19	22	56	16	**GEG15 C**	0,049
17	35	20	12	21	31	78	19	**GEG17 C**	0,083
20	42	25	16	24	51	127	17	**GEG20 C**	0,153
25	47	28	18	29	65	166	17	**GEG25 C**	0,203
30	55	32	20	34	83	212	17	**GEG30 C**	0,304
	55	32	20	-	110	220	17	**GEG30 ET-2RS**	0,30
35	62	35	22	-	140	270	17	**GEG35 ET-2RS**	0,35
40	68	40	25	-	180	350	15	**GEG40 ET-2RS**	0,50
45	75	43	28	-	220	430	15	**GEG45 ET-2RS**	0,60
50	90	56	36	-	340	680	15	**GEG50 ET-2RS**	1,40
60	105	63	40	-	430	850	15	**GEG60 ET-2RS**	2,00
70	120	70	45	-	550	1100	16	**GEG70 ET-2RS**	2,80
80	130	75	50	-	680	1350	14	**GEG80 ET-2RS**	3,40
90	150	85	55	-	850	1700	15	**GEG90 ET-2RS**	5,00
100	160	85	55	-	900	1800	14	**GEG100 ET-2RS**	5,50
110	180	100	70	-	1300	2700	12	**GEG110 ET-2RS**	9,00
120	210	115	70	-	1500	3000	15	**GEG120 ET-2RS**	14,50
140	230	130	80	-	1900	3500	15	**GEG140 ET-2RS**	18,20

*The sizes are not binding.
ET/C - To line SF1 material on the surface of spherical plain.

Angular contact spherical plain bearings

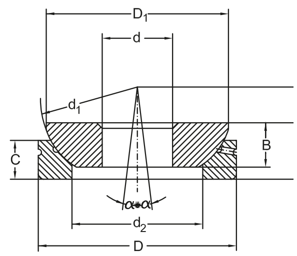


GAC....S

Dimensions							Load ratings			Designation	Mass
d	D	B	C	T	d_1	S	dyn.	stat.	α*		
mm							kN	kN		-	kg
25	47	15	14	15	42	0,6	47,5	236	3,5	**GAC25 S**	0,148
30	55	17	15	17	49,5	1,3	63	315	3	**GAC30 S**	0,208
35	62	18	16	18	55,5	2,1	76,5	390	3	**GAC35 S**	0,268
40	68	19	17	19	62	2,8	90	450	3	**GAC40 S**	0,327
45	75	20	18	20	68,5	3,5	106	530	3	**GAC45 S**	0,416
50	80	20	19	20	74	4,3	118	585	3	**GAC50 S**	0,455
60	95	23	21	23	88,5	5,7	160	800	3	**GAC60 S**	0,714
70	110	25	23	25	102	7,2	208	1040	2,5	**GAC70 S**	1,04
80	125	29	25,5	29	115	8,6	250	1250	2,5	**GAC80 S**	1,54
90	140	32	28	32	128,5	10,1	320	1600	2,5	**GAC90 S**	2,09
100	150	32	31	32	141	11,6	345	1760	2	**GAC100 S**	2,34
110	170	38	34	38	155	13	475	2360	2	**GAC110 S**	3,68
120	180	38	37	38	168	14,5	510	2550	2	**GAC120 S**	3,97

*The sizes are not binding.
On request: sliding contact surface steel / PTFE, example GX...C.

Spherical plain thrust bearing

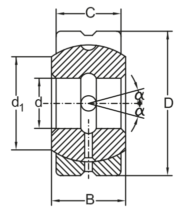


GX....S

Dimensions									Load ratings			Designation	Mass
d	D	H	B	C	d_1	d_2	D_1	S	dyn.	stat.	α*		
mm									kN	kN		-	kg
10	30	9,5	7,5	7	32	15,5	27,5	7	24	120	9	**GX10 S**	0,036
12	35	13	9,5	9,3	38	18	32	8	32,5	163	8	**GX12 S**	0,072
15	42	15	11	10,8	46	22,5	39	10	52	260	8	**GX15 S**	0,108
17	47	16	11,8	11,2	52	27	43,5	11	58,5	300	10	**GX17 S**	0,137
20	55	20	14,5	13,8	60	31	50	12,5	75	375	9	**GX20 S**	0,246
25	62	22,5	16,5	16,7	68	34,5	58,5	14	129	640	7	**GX25 S**	0,415
30	75	26	19	19	82	42	70	17,5	170	850	7	**GX30 S**	0,614
35	90	28	22	20,7	98	50,5	84	22	260	1290	8	**GX35 S**	0,973
40	105	32	27	21,5	114	59	97	24,5	375	1860	9	**GX40 S**	1,59
45	120	36,5	31	25,5	128	67	110	27,5	490	2450	9	**GX45 S**	2,24
50	130	42,5	33	30,5	139	70	120	30	655	3250	7	**GX50 S**	3,14
60	150	45	37	34	160	84	140	35	735	3650	8	**GX60 S**	4,63
70	160	50	42	36,5	176	94,5	153	35	800	4050	8	**GX70 S**	5,37
80	180	50	43,5	38	197	107,5	172	42,5	1040	5200	8	**GX80 S**	6,91
100	210	59	51	46	222	127	198	45	1200	6000	8	**GX100 S**	10,98
120	230	64	53,5	50	250	145	220	52,5	1250	6200	6	**GX120 S**	13,97

*The sizes are not binding.
On request: sliding contact surface steel / PTFE, example GX...C.

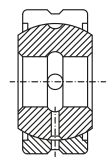
Spherical plain radial bearings dimension in inches
with fitting crack
Two seals and fitting crack



GE.Z....ES

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
12,7	22,225	11,1	9,525	14,1	13,7	41,5	6	**GEZ12 ES**	0,022
15,875	26,988	13,894	11,913	18,3	22,0	65,5	6	**GEZ15 ES**	0,036
19,05	31,75	16,662	14,275	21,8	31,5	95,0	6	**GEZ19 ES**	0,053
22,225	36,513	19,431	16,662	25,4	4,25	127	6	**GEZ22 ES**	0,085
25,4	41,275	22,225	19,05	27,6	56,0	166	6	**GEZ25 ES**	0,121
	41,275	22,225	19,05	27,6	56,0	166	6	**GEZ25 ES-2RS**	0,121
31,75	50,8	27,762	23,8	36,0	86,5	260	6	**GEZ31 ES**	0,232
	50,8	27,762	23,8	36,0	86,5	260	6	**GEZ31 ES-2RS**	0,232
34,925	55,563	30,15	26,187	38,6	102	310	6	**GEZ34 ES**	0,351
	55,563	30,15	26,187	38,6	102	310	6	**GEZ34 ES-2RS**	0,351
38,1	61,913	33,325	28,575	41,2	125	375	6	**GEZ38 ES**	0,422
	61,913	33,325	28,575	41,2	125	375	6	**GEZ38 ES-2RS**	0,422
44,5	71,438	38,887	33,325	50,7	170	510	6	**GEZ44 ES**	0,641
	71,438	38,887	33,325	50,7	170	510	6	**GEZ44 ES-2RS**	0,641
50,8	80,963	44,45	38,1	57,9	224	670	6	**GEZ50 ES**	0,932
	80,963	44,45	38,1	57,9	224	670	6	**GEZ50 ES-2RS**	0,932
57,15	90,488	50,013	42,85	64,9	280	850	6	**GEZ57 ES**	1,33
	90,488	50,013	42,85	64,9	280	850	6	**GEZ57 ES-2RS**	1,33
63,5	100,013	55,55	47,625	73,3	355	1060	6	**GEZ63 ES**	1,85
	100,013	55,55	47,625	73,3	355	1060	6	**GEZ63 ES-2RS**	1,85
69,85	111,125	61,112	52,375	79,1	415	1250	6	**GEZ69 ES**	2,42
	111,125	61,112	32,375	79,1	415	1250	6	**GEZ69 ES-2RS**	2,42
76,2	120,65	66,675	57,15	86,8	500	1500	6	**GEZ76 ES**	3,10
	120,65	66,675	57,15	86,8	500	1500	6	**GEZ76 ES-2RS**	3,10
82,55	130,175	72,238	61,9	94,5	585	1760	6	**GEZ82 ES**	3,82
	130,175	72,238	61,9	94,5	585	1760	6	**GEZ82 ES-2RS**	3,82
88,9	139,7	77,775	66,675	101,6	680	2040	6	**GEZ88 ES**	4,79
	139,7	77,775	66,675	101,6	680	2040	6	**GEZ88 ES-2RS**	4,79

Spherical plain radial bearings dimension in inches with fitting crack
Two seals and fitting crack

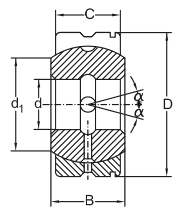


GEZ....ES2RS

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
95,25	149,225	83,337	71,425	108,7	780	2360	6	**GEZ95 ES**	5,78
	149,225	83,337	71,425	108,7	780	2360	6	**GEZ95 ES-2RS**	5,78
101,6	158,75	88,9	76,2	115,8	900	2650	6	**GEZ101 ES**	6,99
	158,75	88,9	76,2	115,8	900	2650	6	**GEZ101 ES-2RS**	6,99
107,95	168,275	94,463	80,95	122,8	1000	3000	6	**GEZ107 ES**	8,41
	168,275	94,463	80,95	122,8	1000	3000	6	**GEZ107 ES-2RS**	8,41
114,3	177,8	100,013	85,725	130,6	1120	3400	6	**GEZ114 ES**	9,79
	177,8	100,013	85,725	130,6	1120	3400	6	**GEZ114 ES-2RS**	9,79
120,65	187,325	105,562	90,475	137,6	1250	3750	6	**GEZ120 ES**	11,5
	187,325	105,562	90,475	137,6	1250	3750	6	**GEZ120 ES-2RS**	11,5
127	196	111,125	95,25	145,3	1400	4150	6	**GEZ127 ES**	13,5
	196	111,125	95,25	145,3	1400	4150	6	**GEZ127 ES-2RS**	13,5
152,4	222,25	120,65	104,775	168,2	1730	5200	5	**GEZ152 ES**	17,5
	222,25	120,65	104,775	168,2	1730	5200	5	**GEZ152 ES-2RS**	17,5

*The sizes are not binding.

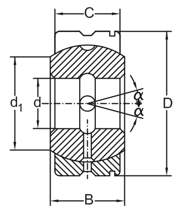
Spherical plain radial bearings with two piece outer ring



GE....XSK

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
12	22	11	9	14	12,9	39,2	7	**GE12 XS-K**	0,019
15	26	13	11	17,5	19,5	57,8	6	**GE15 XS-K**	0,028
20	32	16	14	23	31,3	94,8	4	**GE20 XS-K**	0,053
22	37	19	16	25,5	40,3	122	6	**GE22 XS-K**	0,085
25	42	21	18	29	51,1	155	5	**GE25 XS-K**	0,116
30	50	27	23	36	81,2	248	6	**GE30 XS-K**	0,225
35	55	30	26	40	103	314	5	**GE35 XS-K**	0,302
40	62	33	28	44	122	370	6	**GE40 XS-K**	0,375
45	72	36	31	50,5	152	461	5	**GE45 XS-K**	0,598
50	80	42	36	58,5	225	622	5	**GE50 XS-K**	0,869
55	90	47	40	64,5	253	768	6	**GE55 XS-K**	1,26
60	100	53	45	72,5	321	980	6	**GE60 XS-K**	1,72
65	105	55	47	76	350	1060	5	**GE65 XS-K**	2,05
70	110	58	50	81,5	396	1220	5	**GE70 S-K**	2,23
75	120	64	55	89,5	478	1450	5	**GE75 XS-K**	3,01
80	130	70	60	97,5	571	1730	5	**GE80 XS-K**	3,98
85	135	74	63	100,5	624	1890	6	**GE85 XS-K**	4,31
90	140	76	65	105,5	670	2030	5	**GE90 XS-K**	4,72
95	150	82	70	113,5	776	2350	5	**GE95 XS-K**	6,05
100	160	88	75	121,5	891	2700	5	**GE100 XS-K**	7,43

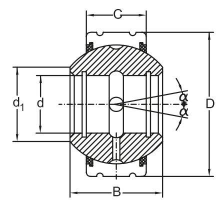
Spherical plain radial bearings with two piece outer ring



GE....XSK

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
110	170	93	80	130	1010	3070	5	**GE110 XS-K**	8,54
115	180	98	85	132,5	1110	3370	5	**GE115 XS-K**	10,3
120	190	105	90	140	1250	3780	6	**GE120 XS-K**	12,4
130	200	110	95	148,5	1390	4220	5	**GE130 XS-K**	13,8
150	220	120	105	166	1710	5170	5	**GE150 XS-K**	17,1

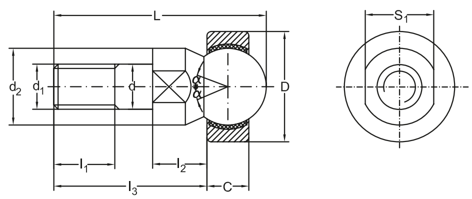
Spherical plain radial bearings with two seals and two piece outer ring



GEK....XS2ES

Dimensions					Load ratings			Designation	Mass
d	D	B	C	d_1 min	dyn.	stat.	α*		
mm					kN	kN		-	kg
25	68	40	28	30	117	590	19	**GEK25 XS-2RS**	0,516
30	70	47	32	37,3	163	813	19	**GEK30 XS-2RS**	0,785
35	80	54	38	44,5	226	1130	17	**GEK35 XS-2RS**	1,23
40	90	64	44	48	298	1490	19	**GEK40 XS-2RS**	1,83
45	100	72	52	54	398	1990	17	**GEK45 XS-2RS**	2,56
50	110	80	58	60	493	2450	17	**GEK50 XS-2RS**	3,43
55	125	90	64	63,2	598	2990	19	**GEK55 XS-2RS**	5,02
60	135	98	72	69,3	732	3660	17	**GEK60 XS-2RS**	6,43

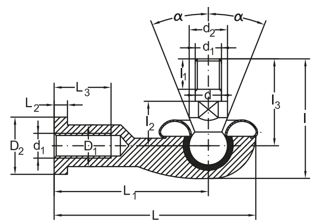
Ball joint ends with one shank



SQD...C

Dimensions										Load ratings			Designation	Mass
d	d_1	d_2 min	L_{max}	l_1 min	l_2	$l_3$max	S_1	C	D	dyn.	stat.	α*		
mm										kN	kN		-	kg
5	M5	9	27,5	8	8	19	7	6	16	2,4	6,2	25	**SQD5 C**	0,014
6	M6	10	33,5	11	8,8	23,8	8	6,75	18	3,2	8,1	25	**SQD6 C**	0,021
8	M8	12	41	12	11,6	28,6	10	9	22	5,5	14	25	**SQD8 C**	0,042
10	M10x1,25	14	49	15	14,2	34,2	11	10,5	26	7,8	20	25	**SQD10 C**	0,067
12	M12x1,25	19	55,1	17	15,1	38,1	16	12	30	10	27	25	**SQD12 C**	0,108
14	M14x1,25	19	70,7	22	16,8	51,3	16	13,5	34	13	35	20	**SQD14 C**	0,167
16	M16x1,25	22	76,3	23	18	54,5	18	15	38	17	45	20	**SQD16 C**	0,238

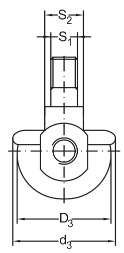
Winding shape ball joint rod ends



SQ...C RS

Dimensions d	 d_1	 d_2 min	 d_3 max	 l max	 l_1 min	 l_2	 l_3 max	 S_1	 L max	 L_1
mm										
5	M5	9	20	30	8	10	21	7	36	27
	M5	9	20	30	8	10	21	7	36	27
6	M6	10	20	36	11	11	26	8	40,5	30
	M6	10	20	36	11	11	26	8	40,5	30
8	M8	12	24	43,5	12	14	31	10	49	36
	M8	12	24	43,5	12	14	31	10	49	36
10	M10X1,25	14	30	51,5	15	17	37	11	58	43
	M10X1,25	14	30	51,5	15	17	37	11	58	43
12	M12X1,25	19	32	57,5	17	19	42	16	66	50
	M12X1,25	19	32	57,5	17	19	42	16	66	50
14	M14X1,25	19	38	73,5	22	21,5	56	16	75	57
	M14X1,25	19	38	73,5	22	21,5	56	16	75	57
16	M16X1,25	22	44	79,5	23	23,5	60	18	84	64
	M16X1,25	22	44	79,5	23	23,5	60	18	84	64
18	M18X1,25	25	45	90	25	26,5	68	21	93	71
	M18X1,25	25	45	90	25	26,5	68	21	93	71
20	M20X1,25	29	50	90	25	27	68	24	99	77
	M20X1,25	29	50	90	25	27	68	24	99	77
22	M22X1,25	29	52	95	26	28	70	24	109	84
	M22X1,25	29	52	95	26	28	70	24	109	84

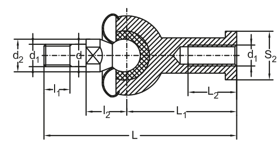
Winding shape ball joint rod ends

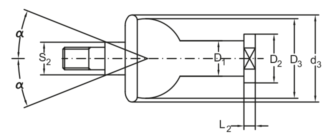


						Load ratings			Designation	Mass
l_2 max	l_3 min	D_1 max	D_2 max	D_3 max	S_2	dyn.	stat.	α*		
						kN	kN		-	kg
4	14	9	12	18	10	2,7	9,2	25	**SQ5 C**	0,025
4	14	9	12	18	10	2,7	9,2	25	**SQ5 C-RS**	0,025
5	14	10	13	20	10	3,6	12	25	**SQ6 C**	0,039
5	14	10	13	20	10	3,6	12	25	**SQ6 C-RS**	0,039
5	17	12,5	16	25	13	5,7	19	25	**SQ8 C**	0,068
5	17	12,5	16	25	13	5,7	19	25	**SQ8 C-RS**	0,068
6,5	21	15	19	29	16	8,2	27	25	**SQ10 C**	0,112
6,5	21	15	19	29	16	8,2	27	25	**SQ10 C-RS**	0,112
6,5	25	17,5	22	31	18	11	37	25	**SQ12 C**	0,164
6,5	25	17,5	22	31	18	11	37	25	**SQ12 C-RS**	0,164
8	26	20	25	35	21	14	48	25	**SQ14 C**	0,254
8	26	20	25	35	21	14	48	25	**SQ14 C-RS**	0,254
8	32	22	27	39	24	16	53	20	**SQ16 C**	0,336
8	32	22	27	39	24	16	53	20	**SQ16 C-RS**	0,336
10	34	25	31	44	27	18	61	20	**SQ18 C**	0,464
10	34	25	31	44	27	18	61	20	**SQ18 C-RS**	0,464
10	35	27,5	34	44	30	18	612	20	**SQ20 C**	0,538
10	35	27,5	34	44	30	18	612	20	**SQ20 C-RS**	0,538
12	41	30	37	50	30	22	75	16	**SQ22 C**	0,713
12	41	30	37	50	30	22	75	16	**SQ22 C-RS**	0,713

*The sizes are not binding.
Avalaible with thread M1,5 (SQ10 and SQ12) and M2 (SQ14 and SQ16)
C - to line SF1 material on the surface of spherical plain. The shank of ball joint housing may be left - hand thread, for left - hand thread, suffix "L" is added to bearings number and thread sign, e. g. SQL6C, M6L - 6H.

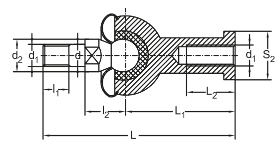
Straightball joint rod ends

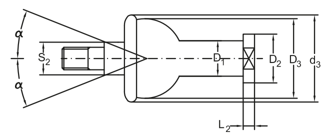




SQZ....C RS

Dimensions d	d_1	d_2 min	d_3 max	l_1 min	l_2	S_1	L max	L_1	L_2 max	L_3 min
mm										
5	M5	9	20	8	11	7	46	24	4	12
	M5	9	20	8	11	7	46	24	4	12
6	M6	10	20	11	12,2	8	55,2	28	5	15
	M6	10	20	11	12,2	8	55,2	28	5	15
8	M8	12	24	12	16	10	65	32	5	16
	M8	12	24	12	16	10	65	32	5	16
10	M10X1,25	14	30	15	19,5	11	74,5	35	6,5	18
	M10X1,25	14	30	15	19,5	11	74,5	35	6,5	18
12	M12X1,25	19	32	17	21	16	84	40	6,5	20
	M12X1,25	19	32	17	21	16	84	40	6,5	20
14	M14X1,25	19	38	22	23,5	16	104,5	45	8	25
	M14X1,25	19	38	22	23,5	16	104,5	45	8	25
16	M16X1,25	22	44	23	25,5	18	112	50	8	27
	M16X1,25	22	44	23	25,5	18	112	50	8	27
18	M18X1,25	25	45	25	31	21	130,5	58	10	32
	M18X1,25	25	45	25	31	21	130,5	58	10	32
20	M20X1,25	29	50	25	31	24	133	63	10	38
	M20X1,25	29	50	25	31	24	133	63	10	38
22	M22X1,25	29	52	26	33	24	145	70	12	43
	M22X1,25	29	52	26	33	24	145	70	12	43





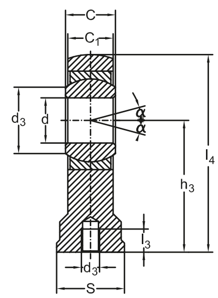
SQZ....C RS

D_1 max	D_2 max	D_3 max	S_2	Load ratings dyn.	stat.	α*	Designation	Mass
				kN	kN		-	kg
9	12	17	10	1,7	5,7	15	**SQZ5 C**	0,025
9	12	17	10	1,7	5,7	15	**SQZ5 C-RS**	0,025
10	13	20	10	2,2	7,5	15	**SQZ6 C**	0,040
10	13	20	10	2,2	7,5	15	**SQZ6 C-RS**	0,040
12,5	16	24	13	3,3	11	15	**SQZ8 C**	0,075
12,5	16	24	13	3,3	11	15	**SQZ8 C-RS**	0,075
15	19	28	16	4,8	16	15	**SQZ10 C**	0,121
15	19	28	16	4,8	16	15	**SQZ10 C-RS**	0,121
17,5	22	32	18	6,6	22	15	**SQZ12 C**	0,187
17,5	22	32	18	6,6	22	15	**SQZ12 C-RS**	0,187
20	25	36	21	8,7	29	11	**SQZ14 C**	0,277
20	25	36	21	8,7	29	11	**SQZ14 C-RS**	0,277
22	27	40	24	10	33	11	**SQZ16 C**	0,361
22	27	40	24	10	33	11	**SQZ16 C-RS**	0,361
25	31	45	27	11	37	11	**SQZ18 C**	0,539
25	31	45	27	11	37	11	**SQZ18 C-RS**	0,539
27,5	34	45	30	11	37	7,5	**SQZ20 C**	0,575
27,5	34	45	30	11	37	7,5	**SQZ20 C-RS**	0,575
30	37	50	30	14	46	7,5	**SQZ22 C**	0,757
30	37	50	30	14	46	7,5	**SQZ22 C-RS**	0,757

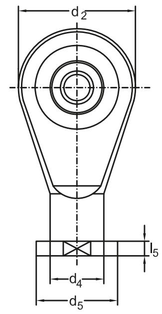
*The sizes are not binding.

C - to line SF1 material on the surface of spherical plain. The shank of ball joint housing may be left - hand thread, for left - hand thread, suffix "L" is added to bearings number and thread sign, e. g. SQL6C, M6L - 6H.

Combination (series e) rod ends
(ISO 6126 - 1982)

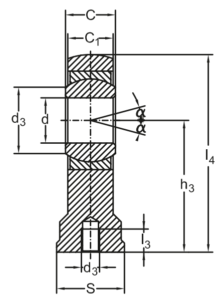


Dimensions d	B	C_1 max	d_1 min	d_2 max	d_3	h_1	l_3 min	l_4 max	l_5 max	d_4 max
mm										
5	6	4,5	7	21	M5	30	11	42	5	10
6	6	4,5	8	21	M6	30	11	42	5	11
	6	4,5	8	21	M6	30	11	42	5	11
8	8	6,5	10	24	M8	36	15	49	5	13
	8	6,5	10	24	M8	36	15	49	5	13
10	9	7,5	13	29	M10	43	15	58	6,5	16
	9	7,5	13	29	M10	43	15	58	6,5	16
12	10	8,5	15	34	M12	50	18	67	7	18
	10	8,5	15	34	M12	50	18	67	7	18
15	12	10,5	18	40	M14	61	21	81	8	21
	12	10,5	18	40	M14	61	21	81	8	21
	12	10,5	18	40	M14	61	21	81	8	21
17	14	11,5	20	46	M16	67	24	90	10	24
	14	11,5	20	46	M16	67	24	90	10	24
	14	11,5	20	48	M16	67	24	90	10	24
20	16	13,5	24	53	M20x1,5	77	30	104	10	28
	16	13,5	24	53	M20x1,5	77	30	104	10	28
	16	13,5	24	53	M20x1,5	77	30	104	10	28
25	20	18	29	64	M24x2	94	36	126	12	35
	20	18	29	64	M24x2	94	36	126	12	35
	20	18	29	64	M24x2	94	36	126	12	35
30	22	20	34	73	M30x2	110	45	147	15	42
	22	20	34	73	M30x2	110	45	147	15	42
	22	20	34	73	M30x2	110	45	147	15	42

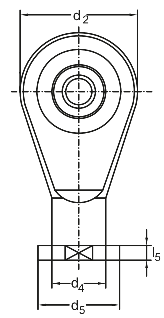


d_5 max	S	Load ratings dyn.	stat.	α*	Designation	Mass
mm		kN	kN	-	-	kg
13	10	3,4	8,1	13	**SI5 E**	0,016
13	11	3,4	8,1	13	**SI6 E**	0,017
13	11	3,4	8,1	13	**SI6 C****	0,017
16	13	5,5	12,9	15	**SI8 E**	0,035
16	13	5,5	12,9	15	**SI8 C****	0,035
19	16	8,1	17,6	12	**SI10 E**	0,061
19	16	8,1	17,6	12	**SI610 C****	0,061
22	18	10,8	24,5	10	**SI12 E**	0,096
22	18	10,8	24,5	10	**SI12 C****	0,096
26	21	17	36	8	**SI15 ES**	0,162
26	21	17	36	8	**SI15 ES-2RS**	0,162
26	21	17	36	8	**SI15 C****	0,162
29	24	21	45	10	**SI17 ES**	0,233
29	24	21	45	10	**SI17 ES-2RS**	0,233
29	24	21	45	10	**SI17 C****	0,233
34	30	30	60	9	**SI20 ES**	0,324
34	30	30	60	9	**SI20 ES-2RS**	0,324
34	30	30	60	9	**SI20 C****	0,324
42	36	48	83	7	**SI25 ES**	0,625
42	36	48	83	7	**SI25 ES-2RS**	0,625
42	36	48	83	7	**SI25 C****	0,625
50	46	62	110	6	**SI30 ES**	0,976
50	46	62	110	6	**SI30 ES-2RS**	0,976
50	46	62	110	6	**SI30 C****	0,976

Combination (series e) rod ends
(ISO 6126 - 1982)



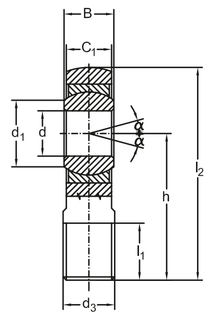
Dimensions d	B	C_1 max	d_1 min	d_2 max	d_3	h_1	l_3 min	l_4 max	l_5 max	d_4 max
mm										
35	25	22	39	82	M36x2	125	60	167	15	48
	25	22	39	82	M36x2	125	60	167	15	48
	25	22	39	82	M36x2	125	60	167	15	48
40	28	24	45	92	M39x2	142	65	190	18	52
	28	24	45	92	M39x2	142	65	190	18	52
	28	24	45	92	M39x2	142	65	190	18	52
45	32	28	50	102	M42x3	145	65	199	20	58
	32	28	50	102	M42x3	145	65	199	20	58
	32	28	50	102	M42x3	145	65	199	20	58
50	35	31	55	112	M45x3	160	68	221	20	62
	35	31	55	112	M45x3	160	68	221	20	62
	35	31	55	112	M45x3	160	68	221	20	62
60	44	39	66	135	M52x3	175	70	247	20	70
	44	39	66	135	M52x3	175	70	247	20	70
	44	39	66	135	M52x3	175	70	247	20	70
70	49	43	77	160	M56x4	200	80	283	20	80
	49	43	77	160	M56x4	200	80	283	20	80
	49	43	77	160	M56x4	200	80	283	20	80
80	55	48	88	180	M64x4	230	85	325	25	95
	55	48	88	180	M64x4	230	85	325	25	95
	55	48	88	180	M64x4	230	85	325	25	95



d_5 max	S	Load ratings dyn.	stat.	α*	Designation	Mass
mm		kN	kN	-	-	kg
58	55	80	146	6	**SI35 ES**	1,52
58	55	80	146	6	**SI35 ES-2RS**	1,52
58	55	80	146	6	**SI35 C****	1,52
65	60	100	180	7	**SI40 ES**	2,06
65	60	100	180	7	**SI40 ES-2RS**	2,06
65	60	100	180	7	**SI40 C****	2,06
70	65	127	240	7	**SI45 ES**	2,72
70	65	127	240	7	**SI45 ES-2RS**	2,72
70	65	127	240	7	**SI45 C-2RS****	2,72
75	70	156	290	6	**SI50 ES**	3,57
75	70	156	290	6	**SI50 ES-2RS**	3,57
75	70	156	290	6	**SI50 ES-2RS****	3,57
88	80	245	450	6	**SI60 ES**	5,63
88	80	245	450	6	**SI60 ES-2RS**	5,63
88	80	245	450	6	**SI60 ES-2RS****	5,63
98	85	315	610	6	**SI70 ES**	8,33
98	85	315	610	6	**SI70 ES-2RS**	8,33
98	85	315	610	6	**SI70 ES-2RS****	8,33
110	95	400	750	6	**SI80 ES**	13,04
110	95	400	750	6	**SI80 ES-2RS**	13,04
110	95	400	750	6	**SI80 ES-2RS****	13,04

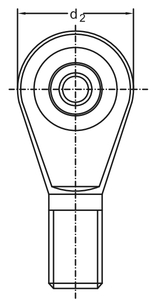
SIL..ES - for left hand thread. Suffix "L" is added to bearings number and thread sign, eg. SIL30ES. Sliding contact surface: steel/steel. Available with increased thread
*The sizes are not binding.
**Sliding contact surface: steel/PTFE.

Combination (series e) rod ends
(ISO 6126 - 1982)



SA...E/ES
SA...ES2RS

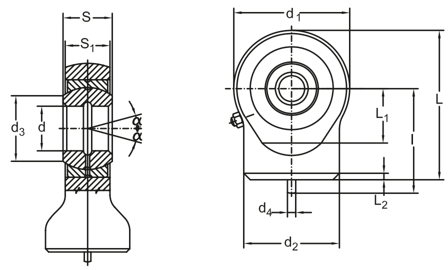
Dimensions									Load ratings			Designation	Mass
d	B	C_1 max	d_1 min	d_2 max	d_3	h	l_1 min	l_2 max	dyn.	stat.	α*		
mm									kN	kN			
5	6	4,5	7	21	M5	36	16	48	3,4	8,1	1	**SA5 E**	0,011
6	6	4,5	8	21	M6	36	16	48	3,4	8,1	13	**SA6 E**	0,013
	6	4,5	8	21	M6	42	21	48	3,4	8,1	13	**SA6 C****	0,013
8	8	6,5	10	24	M8	42	21	55	5,5	12,9	15	**SA8 E**	0,026
	8	6,5	10	24	M8	42	21	55	5,5	12,9	15	**SA8 C****	0,026
10	9	7,5	13	29	M10	48	26	63	8,1	17,8	12	**SA10 E**	0,044
	9	7,5	13	29	M10	48	26	63	8,1	17,8	12	**SA10 C****	0,044
12	10	8,5	15	34	M12	54	28	71	10,8	24,5	10	**SA12 E**	0,066
	10	8,5	15	34	M12	54	28	71	10,8	24,5	10	**SA12 C****	0,066
15	12	105	18	40	M14	63	34	83	17	36	8	**SA15 ES**	0,121
	12	105	18	40	M14	63	34	83	17	36	8	**SA15 ES-2RS**	0,121
	12	105	18	40	M14	63	34	83	17	36	8	**SA15 C****	0,121
17	14	115	20	46	M16	69	36	92	21	45	10	**SA17 ES**	0,172
	14	115	20	46	M16	69	36	92	21	45	10	**SA17 ES-2RS**	0,172
	14	115	20	46	M16	69	36	92	21	45	10	**SA17 C****	0,172
20	16	135	24	53	M20x1,5	78	43	105	30	60	9	**SA20 ES**	0,283
	16	135	24	53	M20x1,5	78	43	105	30	60	9	**SA20 ES-2RS**	0,283
	16	135	24	53	M20x1,5	78	43	105	30	60	9	**SA20 C****	0,283
25	20	18	29	64	M24x2	94	53	126	48	83	7	**SA25 ES**	0,504
	20	18	29	64	M24x2	94	53	126	48	83	7	**SA25 ES-2RS**	0,504
	20	18	29	64	M24x2	94	53	126	48	83	7	**SA25 C****	0,504
30	22	20	34	73	M30x2	110	65	147	62	110	6	**SA30 ES**	0,835
	22	20	34	73	M30x2	110	65	147	62	110	6	**SA30 ES-2RS**	0,835
	22	20	34	73	M30x2	110	65	147	62	110	6	**SA30 C****	0,835



Dimensions									Load ratings			Designation	Mass
d	B	C_1 max	d_1 min	d_2 max	d_3	h	l_1 min	l_2 max	dyn.	stat.	α*		
mm									kN	kN			
35	25	22	39	82	M36x2	140	82	182	80	148	6	**SA35 ES**	1,41
	25	22	39	82	M36x3	140	82	182	80	148	6	**SA35 ES-2RS**	1,41
	25	22	39	82	M36x3	140	82	182	80	146	6	**SA35 C-2RS****	1,41
40	28	24	45	92	M39x3	150	86	198	100	180	7	**SA40 ES**	1,86
	28	24	45	92	M39x3	150	86	198	100	180	7	**SA40 ES-2RS**	1,86
	28	24	45	92	M39x3	150	86	198	100	180	7	**SA40 2RSC****	1,86
45	32	28	50	102	M42x3	163	92	217	127	240	7	**SA45 ES**	2,57
	32	28	50	102	M42x3	163	92	217	127	240	7	**SA45 ES-2RS**	2,57
	32	28	50	102	M42x3	163	92	217	127	240	7	**SA45 C-2RS****	2,57
50	35	31	55	112	M45x3	185	104	246	156	290	6	**SA50 ES**	3,58
	35	31	55	112	M45x3	185	104	246	156	290	6	**SA50 ES-2RS**	3,58
	35	31	55	112	M45x3	185	104	246	156	290	6	**SA50 C-2RS****	3,58
60	44	39	66	135	M52x3	210	115	282	245	450	6	**SA60 ES**	5,73
	44	39	66	135	M52x3	210	115	282	245	450	6	**SA60 ES-2RS**	5,73
	44	39	66	135	M52x3	210	115	282	245	450	6	**SA60 C-2RS****	5,73
70	49	43	77	160	M56x4	235	125	318	315	610	6	**SA70 ES**	7,94
	49	43	77	160	M56x4	235	125	318	315	610	6	**SA70 ES-2RS**	7,94
	49	43	77	160	M56x4	235	125	318	315	610	6	**SA70 C-2RS****	7,94
80	55	48	88	180	M64x4	270	140	365	400	750	6	**SA80 ES**	12,06
	55	48	88	180	M64x4	270	140	365	400	750	6	**SA80 ES-2RS**	12,06
	55	48	88	180	M64x4	270	140	365	400	750	6	**SA80 C-2RS****	12,06

For left hand thread. Suffix "L" is added to bearings number and thread sign, eg. SAL30ES. Sliding contact surface: steel/steel. Available with increased thread
*The sizes are not binding.
**Sliding contact surface: steel/PTFE.

Rod ends for hydraulic components

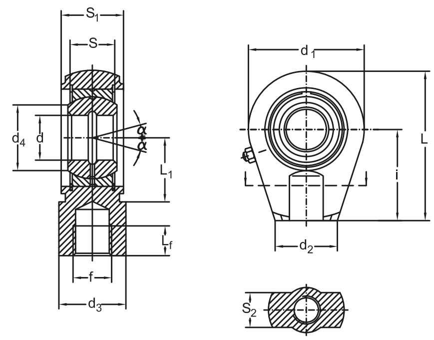


TAC...

Dimensions											Designation
d	S	d_1	l	d_2	d_3	d_4	S_1	L	L_1	L_2	
mm											-
10	9	29	24	15	13	3	7	38,5	14	2	**TAC 210**
12	10	34	27	17,5	15	3	8	44	16	2	**TAC 212**
15	12	40	31	21	18	4	10	51	18	2,5	**TAC 215**
17	14	46	35	24	20,5	4	11	58	20	3	**TAC 217**
20	16	53	38	27,5	24	4	13	65,4	23	3	**TAC 220**
25	20	64	45	33,5	29	4	17	77	27	4	**TAC 225**
30	22	73	51	40	34	4	19	87,5	30	4	**TAC 230**
35	25	82	61	47	39,5	4	21	102	37	4	**TAC 235**
40	28	92	69	52	45	4	23	115	44	5	**TAC 240**
45	32	102	77	58	50,5	6	27	128	48	5	**TAC 245**
50	35	112	88	62	56	6	30	144	58	6	**TAC 250**
60	44	135	100	70	66,5	6	38	167,5	68	8	**TAC 260**
70	49	160	115	80	77,5	6	42	195	78	10	**TAC 270**
80	55	180	141	95	89	6	47	231	91	10	**TAC 280**

Contact surface: steel / steel
The sizes are not binding.

Rod ends for hydraulic components

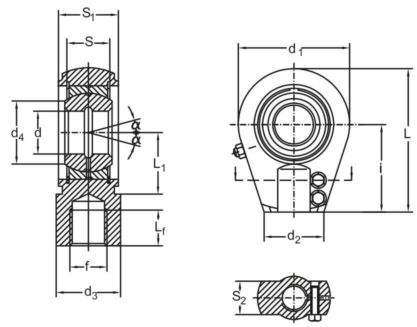


TAPR...N

Dimensions													Designation
d	S	d_1	l	L_f	d_2	d_3	d_4	S_1	S_2	L	L_1	f	
mm													-
20	16	56	50	17	36	25	24	19	17	80	25	M16x1,5	**TAPR 420 N**
25	20	56	50	17	36	25	29	23	21	80	28	M16x1,5	**TAPR 425 N**
30	22	64	60	23	40	32	34	28	26	94	30	M22x1,5	**TAPR 430 N**
35	25	78	70	29	50	40	39,5	30	28	112	38	M28x1,5	**TAPR 435 N**
40	28	94	85	36	60	49	45	35	33	135	45	M35x1,5	**TAPR 440 N**
50	35	116	105	46	72	61	56	40	37	168	55	M45x1,5	**TAPR 450 N**
60	44	130	130	59	90	75	66,5	50	46	200	65	M58x1,5	**TAPR 460 N**
70	49	154	150	66	100	86	77,5	55	51	232	75	M65x1,5	**TAPR 470 N**
80	55	176	170	81	125	102	89	60	55	265	80	M80x2	**TAPR 480 N**
90	60	206	210	101	146	124	98	65	60	323	90	M100x2	**TAPR 490 N**
100	70	230	235	111	166	138	109,5	70	65	360	105	M110x2	**TAPR 495 N**
110	70	265	265	125	190	152	121	80	75	407,5	115	M120x3	**TAPR 496 N**
120	85	340	310	135	257	172	135,5	90	85	490	140	M130x5	**TAPR 497 N**

Contact surface: steel / steel
The sizes are not binding.

Rod ends for hydraulic components

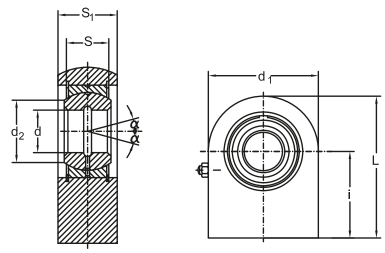


TAPR...U

Dimensions													Designation
d	S	d_1	l	L_f	d_2	d_3	d_4	S_1	S_2	L	L_1	f	
mm													-
20	16	56	50	17	36	25	24	19	17	80	25	M16x1,5	**TAPR 520 U**
25	20	56	50	17	36	25	29	23	21	80	28	M16x1,5	**TAPR 525 U**
30	22	64	60	23	40	32	34	28	26	94	30	M16x1,5	**TAPR 530 U**
35	25	78	70	29	50	40	39,5	30	28	112	38	M28x1,5	**TAPR 535 U**
40	28	94	85	36	60	49	45	35	33	135	45	M35x1,5	**TAPR 540 U**
50	35	116	105	46	72	61	56	40	37	168	55	M45x1,5	**TAPR 550 U**
60	44	130	130	59	90	75	66,5	50	46	200	65	M58x1,5	**TAPR 560 U**
70	49	154	150	66	100	86	77,5	55	51	232	75	M65x1,5	**TAPR 570 U**
80	55	176	170	81	125	102	89	60	55	265	80	M80x2	**TAPR 580 U**
90	60	206	210	101	146	124	98	65	60	323	90	M100x2	**TAPR 590 U**
100	70	230	235	111	168	138	109,5	70	65	360	105	M110x2	**TAPR 595U**
110	70	265	265	125	190	152	121	80	75	407,5	115	M120x3	**TAPR 596 U**
120	85	340	310	135	257	172	135	90	85	490	140	M130x5	**TAPR 597 U**

Contact surface: steel / steel
The sizes are not binding.

Rod ends for hydraulic components



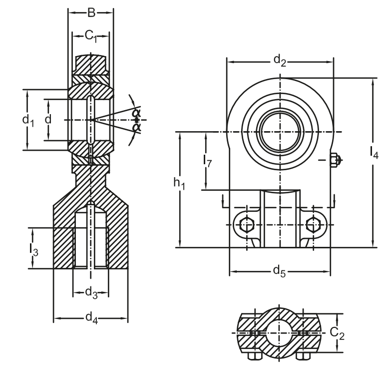
TPN....

Dimensions							Designation
d	S	d_1	i	d_2	S_1	L	
mm							-
20	16	50	38	24	19	63	**TPN 320**
25	20	55	45	29	23	72,5	**TPN 325**
30	22	65	51	34	28	83,5	**TPN 330**
35	25	83	61	39,5	30	102,5	**TPN 335**
40	28	100	69	45	35	119	**TPN 340**
45	32	110	77	50,5	40	132	**TPN 345**
50	35	123	88	56	40	149,5	**TPN 350**
60	44	140	100	66,5	50	170	**TPN 360**
70	49	164	115	77,5	55	197	**TPN 370**
80	55	180	141	89	60	231	**TPN 380**
90	60	226	150	98	65	263	**TPN 390**
100	70	250	170	109,5	70	295	**TPN 395**
110	70	295	185	121	80	332,5	**TPN 396**
120	85	360	210	135,5	90	390	**TPN 397**

Contact surface: steel / steel
The sizes are not binding.

Rod ends for hydraulic components

DIN 24555



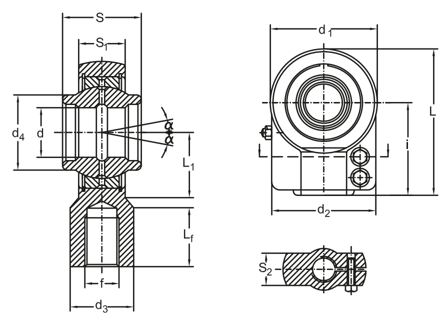
TAPR...DO

Dimensions													**Designation**
d	B	d_2	d_1	d_3	d_4	d_5	C_1	C_2	h_1	l_3	l_4	l_7	
mm													-
12	10	32	15	M10x1,25	17	40	8	13	42	15	58	18	**TAPR 701 DO**
16	14	42	20	M12x1,25	21	45	11	13	48	17	69	22	**TAPR 702 DO**
20	16	50	25	M14x1,5	25	55	13	17	58	19	83	28	**TAPR 703 DO**
25	20	62	29	M16x1,5	30	62	-	68	23	99	34		**TAPR 704 DO**
30	22	76	34	M20x1,5	36	80	19	-	85	29	123	38	**TAPR 705 DO**
40	28	96	45	M27x2	45	90	23	-	105	37	153	48	**TAPR 706 DO**
50	35	116	55	M33x2	55	105	30	-	130	46	188	62	**TAPR 707 DO**
60	44	150	66	M42x2	68	134	38	-	150	57	255	74	**TAPR 708 DO**
80	55	195	88	M48x2	78	156	47	-	185	64	282,5	98	**TAPR 709 DO**
100	70	235	109	M64x3	100	190	57	-	240	86	357,5	122	**TAPR 710 DO**

Contact surface: steel / steel
The sizes are not binding.

Rod ends for hydraulic components

DIN 24338



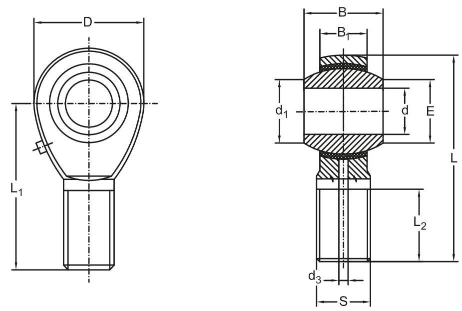
TAPR...CE

Dimensions													**Designation**
d	S	d_1	l	L_f	d_2	d_3	d_4	S_1	S_2	L	L_1	f	
mm													-
12	12	32	38	17	32	16	15,5	10,5	12	54	14	M12x1,25	**TAPR 612 CE**
16	16	40	44	19	40	21	20	13	11,5	64	18	M14x1,5	**TAPR 616 CE**
20	20	47	52	23	47	25	25	17	14	77	22	M16x1,5	**TAPR 620 CE**
25	25	58	65	29	54	30	30,5	21	17	96	27	M20x1,5	**TAPR 625 CE**
32	32	70	80	37	66	38	38	27	22	118	32	M27x2	**TAPR 632 CE**
40	40	89	97	46	80	47	46	32	26	145,5	41	M33x2	**TAPR 640 CE**
50	50	108	120	57	96	58	57	40	32	179	50	M24x2	**TAPR 650 CE**
63	63	132	140	64	114	70	71,5	52	38	211	62	M48x2	**TAPR 663 CE**
70	70	155	160	76	135	80	79	57	42	245	70	M56x2	**TAPR 670 CE**
80	80	168	180	86	148	90	91	66	48	270	78	M64x3	**TAPR 680 CE**
90	90	185	195	91	160	100	99	72	52	296	85	M72x3	**TAPR 690 CE**
100	100	210	210	96	178	110	113	84	62	322	98	M80x3	**TAPR 695 CE**
110	110	235	235	101	190	125	124	88	62	364	105	M90x3	**TAPR 696 CE**
125	125	264	260	106	200	135	138	103	72	405	120	M100x3	**TAPR 697 CE**

Contact surface: steel / steel
The sizes are not binding.

Rod ends

ISO 6126 - 1982

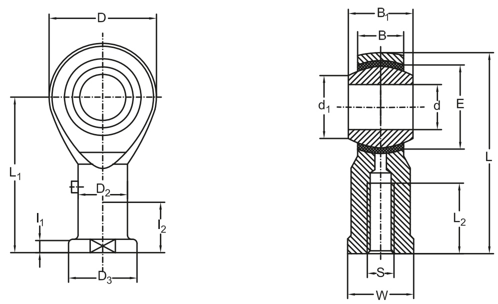


POS
POS...EC

Dimensions									**Load ratings**		**Designation**	**Mass**
d	d_1	B_1	E	B	D	S	L_1	L_2	dyn.	stat.		
mm									kN	kN	-	kg
5	7,7	8	11,11	7	16	M5x0,8	33	20	3,2	7	**POS5***	0,014
	7,7	8	11,11	7,5	18	M5	33	20	3,2	7	**POS5 EC****	0,014
6	9	9	12,70	7	18	M6x1	36	22	3,5	8	**POS6***	0,019
	8,9	9	12,70	7,5	20	M6	36	22	3,5	8	**POS6 EC****	0,019
8	10,4	12	15,88	9	22	M8x1,25	42	25	5,8	13	**POS8***	0,036
	10,3	12	15,88	9,5	24	M8	42	25	5,8	13	**POS8 EC****	0,036
10	12,9	14	19,05	11	26	M10x1,5	48	29	8,6	18	**POS10***	0,060
	12,9	14	19,05	11,5	30	M10	48	29	8,6	18	**POS10 EC****	0,070
12	15,4	16	22,23	12	30	M12x1,75	54	33	11,5	24	**POS12***	0,089
	15,4	16	22,23	12,5	34	M12	54	33	11,5	24	**POS12 EC***	0,110
14	16,9	19	25,40	14	34	M14x2	60	36	17,5	36	**POS14***	0,129
	16,8	19	25,40	14,5	38	M14	60	36	17,5	36	**POS14 EC****	0,130
16	19,4	21	28,58	15	38	M16x2	66	40	20	40	**POS16***	0,181
	19,3	21	28,58	15,5	42	M16	66	40	20	40	**POS16 EC****	0,220
17	20,6	22	30,16	16	40	M16x1,5	69	42	22	45	**POS17***	0,206
18	21,9	23	31,75	17	42	M18x1,5	72	44	27	50	**POS18***	0,250
	21,8	23	31,75	17,5	46	M18x1,5	72	44	27	50	**POS18 EC****	0,290
20	24,4	25	34,93	18	46	M20x1,5	78	47	31	60	**POS20***	0,333
	24,3	25	34,93	18,5	50	M20x1,5	78	47	31	60	**POS20 EC****	0,360
22	25,9	28	38,10	20	50	M22x1,5	84	51	43	72	**POS22***	0,430
	25,8	28	38,1	21	56	M22x1,5	84	51	43	72	**POS22 EC****	0,490
25	29,5	31	42,86	22	56	M24x2	94	57	50	85	**POS25***	0,575
	29,5	31	42,86	23	60	M24x2	94	57	50	85	**POS25 EC****	0,65
28	32,3	35	47,59	25	66	M27x2	103	62	60	90	**POS28***	0,800
	32,2	35	47,59	26	66	M27x2	103	62	60	90	**POS28 EC****	0,870
30	34,9	37	50,80	26	67	M30x2	110	66	66	110	**POS30***	0,996
	34,8	37	50,80	27	70	M30x2	110	66	66	110	**POS30 EC****	1,060

*For left hand thread, suffix "L" is added to bearings number and thread sign, eg. TSML. Sliding contact surface: steel/steel. Available with increased thread. Sliding contact surface: steel/bronze.
**For left hand thread, suffix "L" is added to bearings number and thread sign, eg. TSML...C. Sliding contact surface: steel/steel. Available with increased thread. Sliding contact surface: steel/PTFE. The sizes are not binding.

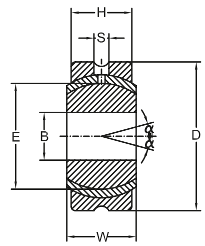
Rod ends
ISO 6126 - 1982



PHS
PHS...EC

Dimensions													Load ratings		Designation	Mass
d	d_1	B_1	E	B	D	S	L_1	L_2	D_2	D_3	l_1	W	dyn.	stat.		
mm													kN	kN	-	kg
5	7,7	8	11,11	7	16	M5x0,8	27	8	9	12	4	9	3,2	7	**PHS5**	0,018
	7,7	8	11,11	7,5	18	M5	27	8	9	12	4	10	3,2	7	**PHS5 EC**	0,018
6	9,0	9	12,71	7	18	M6x1	30	9	10	13	5	11	3,5	8	**PHS6**	0,026
	8,9	9	12,71	7,5	20	M6	30	9	10	13	5	10	3,5	8	**PHS6 EC**	0,026
8	10,4	12	15,88	9	22	M8x1,25	36	12	12,5	16	5	14	5,8	13	**PHS8**	0,045
	10,3	12	15,88	9,5	24	M8	36	12	12,5	16	5	13	5,8	13	**PHS8 EC**	0,045
10	12,9	14	19,05	11	26	M10x1,5	43	15	15	19	6,5	17	8,6	18	**PHS10**	0,076
	12,9	14	19,05	11	26	M10x1,25	43	15	15	19	6,5	17	8,6	18	**PHS10,1**	0,076
	12,9	14	19,05	11,5	30	M10	43	15	15	19	6,5	16	8,6	18	**PHS10 EC**	0,088
	12,9	14	19,05	11,5	30	M10x1,25	43	15	15	19	6,5	16	8,6	18	**PHS10,1 EC**	0,088
12	15,4	16	22,23	12	30	M12x1,75	50	18	17,5	22	6,5	19	11,5	24	**PHS12**	0,114
	15,4	16	22,23	12	30	M12x1,25	50	18	17,5	22	6,5	19	11,5	24	**PHS12,1**	0,114
	15,4	16	22,23	12,5	34	M12	50	18	17,5	22	6,5	18	11,5	24	**PHS12 EC**	0,120
	15,4	16	22,23	12,5	34	M12x1,25	50	18	17,5	22	6,5	18	11,5	24	**PHS12,1 EC**	0,120
14	16,9	19	25,40	14	34	M14x2	57	21	20	25	8	22	17,5	36	**PHS14**	0,158
	16,8	19	25,40	14,5	38	M14	57	21	20	25	8	21	17,5	36	**PHS14 EC**	0,140
16	19,4	21	28,58	15	38	M16x2	64	24	22	27	8	22	20	40	**PHS16**	0,200
	19,4	21	28,58	15	38	M16x1,5	64	24	22	27	8	22	20	40	**PHS16,1**	0,200
	19,3	21	28,58	15,5	42	M16	64	24	22	27	8	24	20	40	**PHS16 EC**	0,240
	19,3	21	28,58	15,5	42	M16x1,5	64	24	22	27	8	24	20	40	**PHS16,1 EC**	0,240
17	20,6	22	30,16	16	40	M16x1,5	67	25	24	31	10	27	22	45	**PHS17**	0,259
18	21,9	23	31,75	17	42	M18x1,5	71	27	25	31	10	27	27	50	**PHS18**	0,288
	21,8	23	31,75	17,5	46	M18	71	27	25	31	10	27	27	50	**PHS18 EC**	0,320
20	24,4	25	34,93	18	46	M20x1,5	77	30	27,5	37	10	30	31	60	**PHS20**	0,372
	24,3	25	34,93	18,5	50	M20	77	30	27,5	37	10	30	31	60	**PHS20 EC**	0,430
22	25,9	28	38,10	20	50	M22x1,5	84	33	30	37	12	32	43	72	**PHS22**	0,475
	25,8	28	38,10	21	56	M22	84	33	30	37	12	34	43	72	**PHS22 EC**	0,610
	29,6	31	42,86	22	56	M24x2	94	36	33,5	42	12	36	50	85	**PHS25**	0,673
25	29,5	31	42,86	23	60	M24	94	36	33,5	42	12	36	50	85	**PHS25 EC**	0,810
28	32,3	35	47,59	25	66	M27x2	103	41	37	46	14	41	60	90	**PHS28**	0,950
	32,2	35	47,59	26	66	M27	103	41	37	46	14	41	60	90	**PHS28 EC**	1,120
30	34,9	37	50,80	26	67	M30x2	110	45	40	50	15	41	66	110	**PHS30**	1,050
	34,8	37	50,80	27	70	M30	110	45	40	50	15	46	66	110	**PHS30 EC**	1,350

Spherical plain bearings



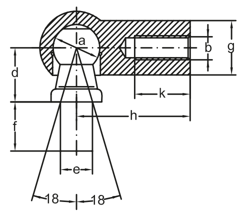
SSR

Dimensions									Max static load ratings		Designation	Mass
B	W	H	O	D	R	S	E	α	dyn.	stat.		
mm									kN	kN	-	kg
5	8	7	7,71	16	0,5	1,5	11,11	24	9,30	2,30	**SSR5**	0,010
6	9	7	8,96	18	0,5	1,5	12,7	28	10,70	2,70	**SSR6**	0,012
8	12	9	10,4	22	0,5	1,5	15,88	25	17,20	4,30	**SSR8**	0,024
10	14	11	12,92	26	0,5	1,5	19,05	23	25,10	6,30	**SSR10**	0,040
12	16	12	15,43	30	1	2	22,23	24	32,00	8,00	**SSR12**	0,058
14	19	14	16,86	34	1	2	25,4	23	42,70	10,70	**SSR14**	0,086
15	20	14	18,2	36	1	2	26,99	24	45,30	11,30	**SSR15**	0,098
16	21	15	19,39	38	1	2	28,58	24	51,40	12,90	**SSR16**	0,116
17	22	16	20,63	40	1	2,5	30,16	23	57,90	14,50	**SSR17**	0,135
18	23	17	21,89	42	1,5	2,5	31,75	23	64,80	162,0	**SSR18**	0,157
20	25	18	24,38	46	1,5	2,5	34,93	24	75,40	18,90	**SSR20**	0,200
22	28	20	25,84	50	1,5	2,5	38,1	23	91,40	22,90	**SSR22**	0,262
25	31	22	29,6	56	1,5	3	42,86	23	113,20	28,30	**SSR25**	0,362
28	35	25	32,29	62	1,5	3	47,83	22	142,90	35,70	**SSR28**	0,500
30	37	26	34,81	67	2	3	50,8	23	158,50	39,60	**SSR30**	0,608

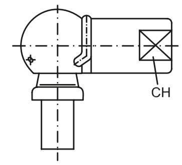
Materials: - housing - steel
- insert - bronze
- ball - chrome steel

The sizes are not binding.

Ball joint rod end with spring clamping
DIN 71802



B



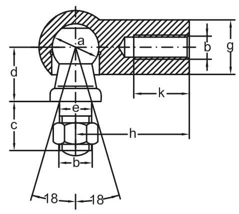
BS

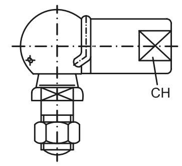
	Dimensions								Mass
a H9/h8	b	d	e h11	f	g	h	k	CH*	B and BS
mm								-	kg
8	M5	9	5	4	8	22	10,2	**7**	12,85
8	M5	9	5	7,5	8	22	10,2	**7**	13,35
10	M6	11	6	4,5	10	25	11,5	**8**	21,3
10	M6	11	6	8	10	25	11,5	**8**	22
13	M8	13	8	5	13	30	14	**11**	43,2
13	M8	13	8	10	13	30	14	**11**	45
16	M10	16	10	6	16	35	15,5	**13**	82,3
16	M10	16	10	13	16	35	15,5	**13**	86,6
19	M14x1,5	20	14	12	22	45	21,5	**17**	181
19	M14x2	20	14	18	22	45	21,5	**17**	188,7

Surface: zinc - plating FeZN7 Uni 4721 - or coarse oiled surface by request.
*Clamping plains.
C45 special.
The sizes are not binding.

Ball joint rod end with spring clamping and safety ring

DIN 71802





Dimensions											**Mass**
a H9/h8	b	c	d	e h11	g	h	L_1	L_2	k	CH*	A and AS
mm										-	g
8	M5	10	9	5	8	22	25,2	28,5	10,2	**7**	15,2
10	M6	12	11	6	10	25	30,2	32,5	11,5	**8**	25,2
13	M8	16	13	8	13	30	38,2	39,5	14	**11**	53,1
16	M10	19	16	10	16	35	47,5	47	15,5	**13**	102,8
19	M14x1,5	27	20	14	22	45	62,5	60	21,5	**17**	220,9
19	M14x2	27	20	14	22	45	62,5	60	21,5	**17**	220,9

Surface: zinc - plating FeZN7 Uni 4721 - or coarse oiled surface by request.
*Clamping plains.
C45 special.
The sizes are not binding.

URB

URB GROUP

URB-ROMANIA ART-TURKEY MGM-HUNGARY

Linear ball bearings bushing

Load Rating

Basic dynamic load rating

This term is arrived at based on an evaluation of a number of identical linear systems individually run in the same conditions, if 90% of them can run with the load with a constant value in a constant direction) for a distance of 50 km without damage caused by rolling fatigue. This is the basis of the rating.

Allowable static moment

This term defines the allowable limit value of static moment load with reference to the amount of permanent deformation similar to that used for evaluation of basic rated load (Co).

Static safety factor

This factor is used based on the application condition as swown in Table 1.

Basic static load rating

This term defines a static load such that, at the contacting position where the maximum stress is exercised, the sum of the permanent deformation of the rolling elements and that of the rolling plane is 0,0001 time of the diameter of the rolling elements.

Static safety factors

Table 1

Condition of use	Low limit of fs
When the shaft has less deflection and shock	1 to 2
When elastic deformation should be considered with respect to pinch load	2 to 4
When the equipment is subject to vibration and impacts	3 to 5

Rating life

Rating life of the linear system

As long as linear system reciprocates while being loaded, continous stress acts on the linear system to couse flaking on the rolling bodies and planes because of material fatigue. The travelling distance of linear system until the first flaking occurs is called the life of the system. The life of the dimensions, structure, material, heat treatment and processing method, when used in the same conditions. This variation is brought about from the essential variations in the material fatigue itself. The rating life defined below is used as an index for the life expectancy of the linear system.

Rating life

Rating life is the total travelling distance that 90% of a group of systems of the same size can reach without causing any flaking when they operate under the same conditions.

The rating life can be obtained from the following equation with the basic dynamic load rating and the load on the linear system:

For ball type:

$$L = \left(\frac{C}{P}\right)^3 \times 50$$

where:

L - rating life, km,
C - basic dynamic load rating, N,
P - load, N.

Consideration and influence of vibration impact loads and distribution of load should be taken into account when designing a linear motion system. It is difficult to calculate the actual load.

The rating life is also affected by the operating temperature. In these conditions, the expression (1) is arranged as follows:

For ball type:

$$L = \left(\frac{f_H^3 \times f_r \times f_C}{f_W \times P}\right)$$

where:

- L - rating life, km,
- f_H - hardness factor (see figure 1),
- C - basic dynamic load rating, N,
- f_T - temperature coefficient (see figure 2),
- P - load, N,
- f_C - contact coefficient (see table 2),
- f_W - load coefficient (see table 3).

The rating life in hours can be calculated by obtaining the travelling distance per unit time. The rating life in hours can be obtained from the following expression when the stroke length and the number of strokes are constant:

$$L_h = \frac{L \times 10^3}{2\, l_s \times n_1 \times 60},$$

where:

- L_h - rating life in hours, hr,
- l_s - stroke length, m
- L - rating life, km,
- n_1 - no of trokes per minute, cpm.

Hardness factor

The shaft be sufficiently hardened when a linear bushing is used. If not properly hardened, permissible load is lowered and the life of the bushing will be shortened

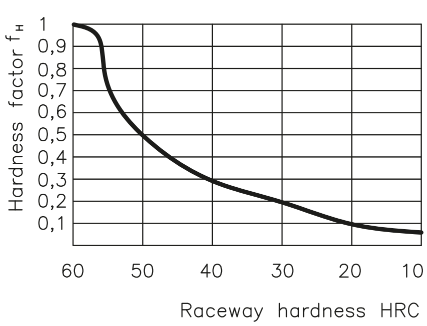


Fig. 1

Temperature coefficient

If the temperature of the linear system exceeds 100°C, Hardness of the linear system and the shaft lowers to decresure the permissible load compared to that of the linear system used at room temperature rise shortens the rating life.

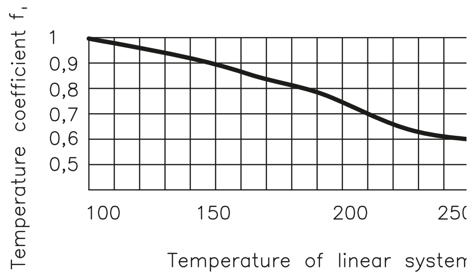


Fig. 2

Contact coefficient

Generally two or more linear bushing are used on one shaft. Thus, the load on each linear system differs depending on each precessing accuracy. Because the linear bushing are not loaded equally, the number of linear bushing per shaft changes the permissible load of system.

Contact coefficient

Table 2

Number of linear system per shaft	Contact coefficient f_c
1	1,00
2	0,81
3	0,72
4	0,66
5	0,61

Load coefficient

When calculating the load on the linear system, it is necessary to accurately obtain object weight, inertial force based on motion speed, moment load, and each transition as time passes. However, it is difficult to calculate those values accurately because reciprocating motion involves the repetition of start and stop as well as vibration and impact. A more practical approach is to obtain the load coefficient by taking the actual oprating conditions into account.

Load coefficient (Table 3)	
Operating Conditions	**f_w**
Operation at low speed (15 m/min. or less) without impulsive shock from outside	1,0 to 1,5
Operation at intermediate speed (60 m/min. or less) without impulsive shock	1,5 to 2,0
Operation at high speed (over 60 m/min.) with impulsive shock from outside	2,0 to 3,5

Frictional resistance

The static frictional resitance of the URB linear system is so low as to be only slightly different from the kinetic frictional resitance, enabling smooth linear movement from low to high speeds. In general, the friction resitance is expressed by the following equation.

$F = \mu W + f$,

where:

F - frictional resitance,
μ - coefficient of friction,
W - load weight,
f - sealing resistance.

The frictional resistance of each URB linear system depends on the model, load weight, speed, and lubricant. The sealing resistance depends on lip interference and lubricant, regardless of the load weigh. The sealing resistance of one linear system is about 200 to 500 gf. The coefficient of friction depends on the load weight, moment load, and preload. Table 6 shows the coefficient of kinetic friction of each type of linear system which has been instaled and lucricated properly and applied with normal load (P/C=0,2)

Coefficient of linear system friction (Table 4)		
Linear System Type	**Models**	**Ambient Working Temperature**
Linear Bushing	LM LME LMB	0,002 to 0,003

Ambient working temperature

The ambient working temperature range for each URB linear system depends on the model. Consult URB on use outside the recommended temperature range.

Temperature conversion equation:

$$C = \frac{5}{9}(F - 32)$$

$$F = 32 + \frac{9}{5}C$$

Ambient working temperature (Table 5)		
Linear System Type	**Models**	**Ambient Working Temperature**
Linear Bushing	LM LME LMB	-20 to 80ºC

Lubrication and dust prevention

Using URB linear systems without lubrication increases the abrasion of the rolling elements, shortening the life span. The URB linear systems, therefore require appropriate lubrication. For lubrication URB recommends turbine oil conforming to ISO Standards G32 to G68 or lithium base soap grease no. 2. Some URB linear systems are sealed to block dust out and seal lubricant in. If used in a harsh or corrosive environment, however, apply a protective cover to the part involving linear motion.

Structure and features

The URB linear bushing consists of an outer cylinder, ball retainer, balls and two end rings. The ball retainer which holds the balls, in the recirculating trucks inheld inside the outer cylinder by end rings.

Those parts are assembled to optimize their required functions.

The outer cylinder is maintained sufficient hardness by heat treatment, therefore if ensures the bushings projected travel life and satisfactory durability.

The ball retainer is made from synthetics to reduce running noise.

High precision and rigidity

The URB linear bushing is reduced from a solid steel outer cylinder and incorporates an industrial strenght resin retainer.

Ease of assembly

The standard type of URB linear bushing can be loaded from any direction. Precision control is possible using only the shaft supporter, and the mounting surface can be machined easily.

Ease of replacement

URB linear bushing od each type are completely interchangeable because of their standardized dimensions and strict precision control. Replacement because of wear or damage is therefore easy and accurate.

Variety of types

URB offers a full line of linear bushing: The standard, integral single - retainer closed type, the clearance adjustable type and the open type. The user can choose from among these according to the application requirements to be met.

Linear ball bushing designation

Designation			
Group I	Group II	Group III	Group IV
Type	Nominal shaft diameter	Modification	Seal

Example:
LM 25 UU AJ

Type:
LM - metric dimension series most widely used in Japan,
LME - metric dimension series generally used in Europe,
LMB - inch dimension series used mainly in USA.

Modification:
No entry - standard type,
AJ - adjustable type,
OP - open type.

Seal:
No entry - no seal,
U - seal on one side,
UU - seals on both sides.

Tolerance

Note that precision of inscribed circle diameters and outside diameters for the clearance adjustable type (...-AJ) and the open type (...-OP) indicates the value obtained before the corresponding type is subjected to cutting process.

Load rating and life expectancy

The life of a linear bushing can be obtained from the following equation with the basic dynamic load rating and the load applied to the bush:

$$L = \left(\frac{f_H \times f_T \times f_C}{f_W \times P} \times \frac{C}{P}\right)^3 \times 50$$

where:
L - ratedlife, km,
C - basic dynamic load rating, N
P - working load, N,
f_w - load coefficient,
f_H - hardness factor (see page 607),
f_T - temperature coefficient (see page 607),
f_C - contact coefficient (see page 607).

The lifespan of a linear bushing in hours can be obtained by calculating the travelling distance per unit time.
The lifespan can be obtained from the following equation if the stroke lenght and the number of strokes are constant:

$$L_h = \left(\frac{L \times 10^3}{2 \times l_s \times n_1 \times 60}\right)$$

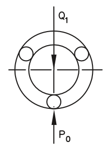
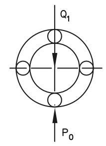
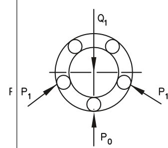
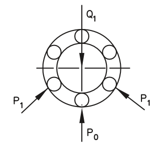
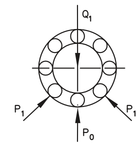
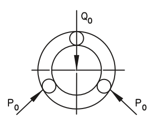
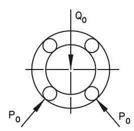
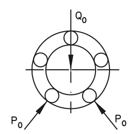
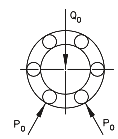
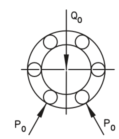
where:
L_h - lifespan, hr,
l_S - stroke lenght, m,
L - rated life, km,
n_1 - number of strokes per minute, cpm.

Relation between ball circuits and load rating

The URB linear bushing includes ball circuits that are spaced equally and circumferentially. The load rating varies according to the loaded position on the circumference.

The value in the dimension table indicates the load rating when the load is placed on top of one ball circuit. If the URB linear bushing is used with two ball circuits loaded uniformly, the load raing will be greater. The following table shows the values by the number of ball circuits in such cases:

Table 6

Row position load ratio	Number of rows				
	3	4	5	6	8
Row position load ratio	 $Q_1 = P_0$	 $Q_1 = P_0$	 $Q_1 = 1{,}106P_0$	 $Q_1 = 1{,}1354P_0$	 $Q_1 = 1{,}841P_0$
Row position	 $Q_0 = P_0$	 $Q_0 = 1{,}414P_0$	 $Q_0 = 1{,}618P_0$	 $Q_0 = 1{,}732P_0$	 $Q_0 = 2{,}052P_0$
Load ratio	$Q_0/Q_1 = 1$	$Q_0/Q_1 = 1{,}414$	$Q_0/Q_1 = 1{,}463$	$Q_0/Q_1 = 1{,}280$	$Q_0/Q_1 = 1{,}115$

Sample calculations

Obtaining the rated life and lifespan the URB linear bushing used in the following conditions:

Linear bushing	LM20
Stroke lenght	50 mm
Number of strokes per minute	50 cpm
Load per bush	490 N

The basic dynamic load rating of the linear bushing is 882N from the dimension table. From equation (1) therefore, the rated life is obtained as follows:

$$L = \left(\frac{f_H \times f_T \times f_c}{f_W \times P} \times \frac{C}{P}\right)^3 \times 50 = \left(\frac{882}{490}\right)^3 \times 50 = 292\,\text{km},$$

where:

$F_H = f_T = f_C = f_W = 1.0$

From equation (2), the lifespan is obtained as followes:

$$L_h = \left(\frac{L \times 10^3}{2 \times l_s \times n_1 \times 60}\right) = \left(\frac{292 \times 10^3}{2 \times 0{,}05 \times 50 \times 60}\right) = 973\,\text{hr}$$

Selecting the linear bushing type satisfying the following conditions:

Number of linear bushing used	4
Stroke lenght	1 m
Traveling speed	10 m/min
Number of strokes per minute	5 cpm
Lifespan	10 hr
Total load	980 N

From equation (2), the travelling distance within the lifespan is obtained as follows

$L = 2 \times l_s \times n_1 \times 60 \times L_h = 6\,000$ km

From equation (1), the basic dynamic load rating is obtained as follows:

$$C = \sqrt[3]{\frac{L}{50}} \times \left(\frac{f_W}{f_H + f_T + f_c}\right) \times P = 1\,492\text{ N}$$

Assume the following with a pair of shafts each with two linear bushing:

$f_C = 0{,}81$, $f_W = f_T = f_H = 1$

As a result, LM30 is selected from the dimension table as the URB linear bushing type satisfying the value of C.

Clearance and fit

When a standard-type URB linear bushing is used with a shaft, inadequate clearance, adjustment may cause early bush failure and/or poor, rough traveling.

The clearance adjustable linear bush and open linear bush can be clearance adjusted when assembled in the housing which can control the outside cylinder diameter. However, too much clearance adjustment increases the deformation of the outside cylinder, to affect its precision and life. Therefore, the appropriate clearance between the bush and shaft, and clearance between the bush and housing are required according to the application. Table 7 shows recommended fit of the bush:

Table 7

Division / Model	Shaft Normal fit High class	Transitional	Housing Loose fit	Tight fit
LM	g6	h6	H7	J7
LMB				
LME	h6	j6	H7	J7

Note. The clearance may be zero or negative. Please attention the movement.

Shaft and housing

To optimize performance of the URB linear bushing high precision of the shaft and housing is required.

Shaft

The rolling balls in the URB linear bushing are in point contact with the shaft surface. Therefore, the shaft dimensions, tolerance, surface finish and hardness greatly afect the travelling performance of the bush. The shaft should be manufactered with due attention to the following points:

- Since the surface finish critically affects smooth rolling of balls, grind the shaft at 1,5 S or better.

- The best hardness of the shaft is HRC 60 to 64; Hardness less than HRC 60 decreases the life considerably, and hence reduces the permissible load. On the other hand, hardness over HRC 64 accelerates ball wear.

- The shaft diameter for the clearance adjustable linear bush and open linear bush should as much as possible be of the lower value of the inscribed circle diameter in the specification table. Do not set the shaft diameter to the upper value.

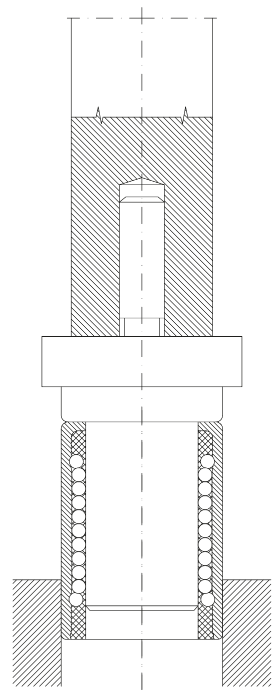
- Zero clearance or negative clearance increases the frictional resistance slightly. If the negative clearance is too tight, the deformation of the outside cylinder will become larger, to shorten the bush life.

Housing

There is a wide range of housing differing in design, machining and mounting. For the fitness and shapes of housing see in table 8 and the folowing section on mounting.

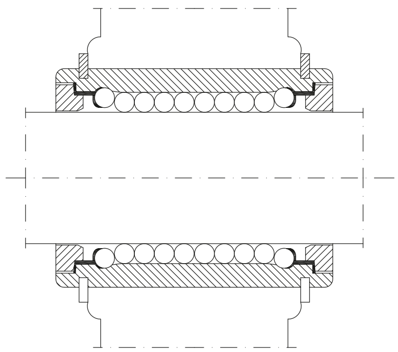
Mounting

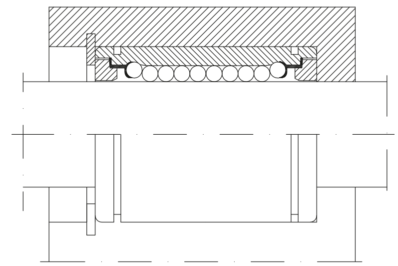
When inserting the linear bush into the bushing do not hit the linear bush on the side ring holding the retainer but apply the cylinder circumference with a proper jig and push the linear bush into the housing by hand or lightly knock it in. In inserting the shaft after mounting the bush, be careful not to shock the balls. Note that if two shafts are used in parallel, the parallelism is the most important factor to assure the smooth linear movement. Take care in setting the shafts.

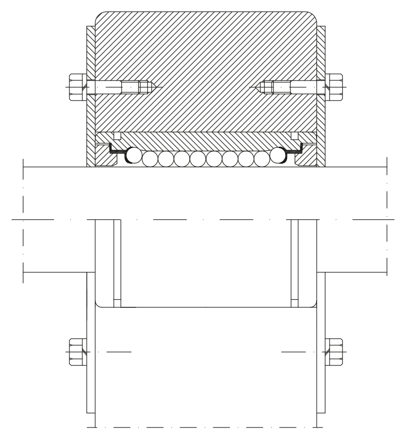


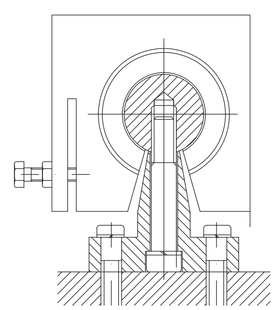
Exemples of mounting

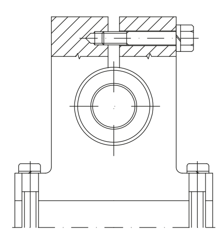
The popular way to mount a linear bush is to operate it with an appropriate interference. It is recommended, however, to make a loose fit in principle because otherwise precision is apt to be minimized. The following examples show assembling of the inserted bush in terms of designing and mounting for reference.











URB ball bushing interchangeability list

Ball bushing compact type

URB	NTN	STAR	INA	SKF	FAG
KH...	KH...	0658 - 0... -00	KH...	LBBR...	LNA...
				LBBS...	LFA
KH... PP	KH...LL	0658 - 2... -40	KN...PP	LBBR...2LS	LNA...2RS
				LBBS...2LS	LFA...2RS

Ball bushing resin retainer

URB	NB	INA	SKF	THK	IKO	THOMSON	EASE
LME	KB...G	KB	LBAR/LBCR	LME...	LBE...	MA M...	SDE
LME...UU	KB...GUU	KB...PP	LBAR/LBCR...2LS	LME...UU	LBE...UU	MA M...WW	SDE...UU
LME...AJ	KB...GAJ	KBS...	LBAS...	LME...AJ	LBE...AJ	MA M...ADJ	SDE...AJ
LME...UUAJ	KB...GUUAJ	KBS...PP	LBAS...2LS	LME...UUAJ	LBE...UUAJ	MA M...ADJ WW	SDE...UUAJ
LME...OP	KB...GOP	KBO...	LBAT/LBCT...	LME...OP	LBE...OP	MA M...OPN	SDE...OP
LME...UUOP	KB...GUUOP	KBO...PP	LBAT/LBCT...2LS	LME...UUOP	LBE...UUOP	MA M...OPN WW	SDE...UUOP

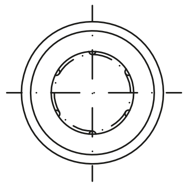
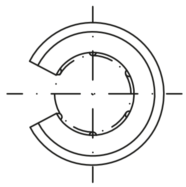
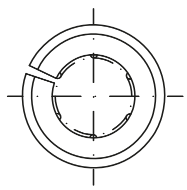
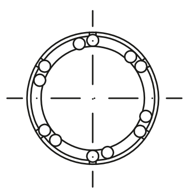
The above types are metric dimension series generally used in Europe.

URB	NB	THK	EASE
LM	SM...G	LM...	SDM
LM...UU	SM...GUU	LM...UU	SDM...UU
LM...AJ	SM...GAJ	LM...AJ	SDM...AJ
LM...UUAJ	SM...GUUAJ	LM...UUAJ	SDM...UUAJ
LM...OP	SM...GOP	LM...OP	SDM...OP
LM...UUOP	SM...GUUOP	LM...UUOP	SDM...UUOP

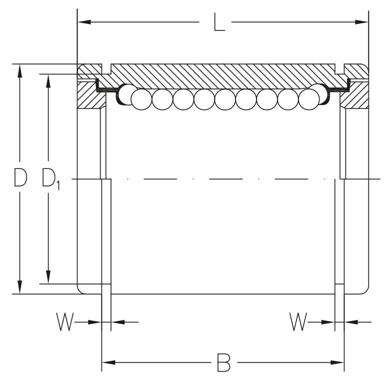
The above types are metric dimension series generally used in Japan and other countries.

URB	NB	THK	EASE
LMB	SW...G	LMB...	SDB
LMB...UU	SW...GUU	LMB...UU	SDB...UU
LMB...AJ	SW...GAJ	LMB...AJ	SDB...AJ
LMB...UUAJ	SW...GUUAJ	LMB...UUAJ	SDB...UUAJ
LMB...OP	SW...GOP	LMB...OP	SDB...OP
LMB...UUOP	SW...GUUOP	LMB...UUOP	SDB...UUOP

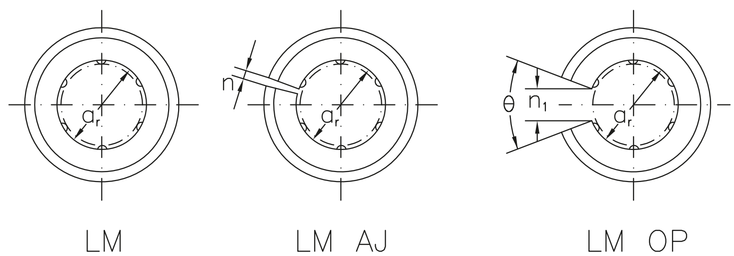
The above types are inch dimension series generally used in US.

Standard type		page 615 - 620	
Open type		page 615 - 620	One ball circuit (50° - 80°) is removed to allow an opening slot to fit over rail supports.
Adjustable type		page 615 - 620	This type has a slot in the outside cylinder. This design allows for clearance adjustment.
Drawn cup type		page 621	This type linear ball bushing consist of thin walled drawn cups, plastic cages and grade 10 steel balls. Bushings are available with seals at one or both ends.

Linear ball bushing



Nominal part no.						Nominal shaft diameter
Standard type	Seal type	Ball circuit	Mass	Adjustable type	Open type	Tolerance
-	-		gr	-	-	mm
LM5	**LM5 UU**	4	4	-	-	$5^{\ 0}_{-0,008}$
LM6	**LM6 UU**	4	8	**LM6 AJ**	-	$6^{\ 0}_{-0,009}$
LM8 S	**LM8 SUU**	4	11	**LM8 SAJ**	-	8
LM8	**LM8 UU**	4	16	**LM8 AJ**	-	8
LM10	**LM10 UU**	4	30	**LM10 AJ**	-	10
LM12	**LM12 UU**	4	31,5	**LM12 AJ**	**LM12 OP**	12
LM13	**LM13 UU**	4	43	**LM13 AJ**	**LM13 OP**	13
LM16	**LM16 UU**	4	69	**LM16 AJ**	**LM16 OP**	16
LM20	**LM20 UU**	5	87	**LM20 AJ**	**LM20 OP**	$20^{\ 0}_{-0,010}$
LM25	**LM25 UU**	6	220	**LM25 AJ**	**LM25 OP**	25
LM30	**LM30 UU**	6	250	**LM30 AJ**	**LM30 OP**	30
LM35	**LM35 UU**	6	390	**LM35 AJ**	**LM35 OP**	$35^{\ 0}_{-0,012}$
LM40	**LM40 UU**	6	585	**LM40 AJ**	**LM40 OP**	40
LM50	**LM50 UU**	6	1580	**LM50 AJ**	**LM50 OP**	50
LM60	**LM60 UU**	6	2000	**LM60 AJ**	**LM60 OP**	$60^{\ 0}_{-0,015}$

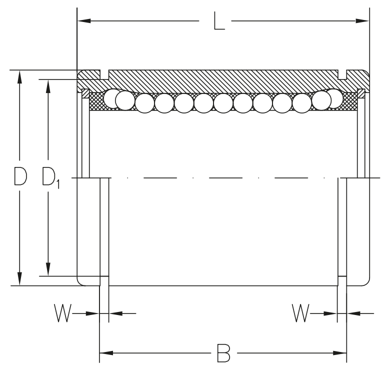


Major dimensions and tolerance

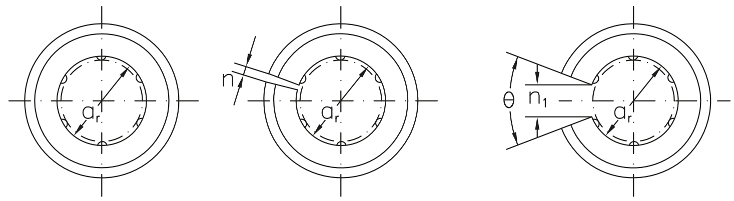
D Tolerance	L Tolerance	B Tolerance	W	D1	H	h1		Eccen-tricity max	Radial clearance max	Basic load C	Rating C_0	Nominal part no.
mm								µm		kN		
10 $^{0}_{-0,009}$	15 $^{0}_{-0,012}$	10,2 $^{0}_{-0,2}$	1,1	9,6	-	-	-	8	-3	0,17	0,21	**LM5**
12 $^{0}_{-0,011}$	19 $^{0}_{-0,02}$	13,5 $^{0}_{-0,2}$	1,1	11,5	1	-	-	12	-5	0,21	0,27	**LM6**
15 $^{0}_{-0,011}$	17 $^{0}_{-0,02}$	11,5 $^{0}_{-0,2}$	1,1	14,3	1	-	-	12	-5	0,18	0,23	**LM8S**
15 $^{0}_{-0,011}$	24 $^{0}_{-0,02}$	17,5 $^{0}_{-0,2}$	1,1	14,3	1	-	-	12	-5	0,27	0,41	**LM8**
19 $^{0}_{-0,013}$	29 $^{0}_{-0,02}$	22 $^{0}_{-0,2}$	1,3	18	1	-	-	12	-5	0,38	0,56	**LM10**
21 $^{0}_{-0,013}$	30 $^{0}_{-0,02}$	23 $^{0}_{-0,2}$	1,3	20	1,5	8	80º	12	-5	0,42	0,61	**LM12**
23 $^{0}_{-0,013}$	32 $^{0}_{-0,02}$	23 $^{0}_{-0,2}$	1,3	22	1,5	9	80º	12	-7	0,52	0,79	**LM13**
28 $^{0}_{-0,013}$	37 $^{0}_{-0,02}$	26,5 $^{0}_{-0,2}$	1,6	27	1,5	11	80º	12	-7	0,79	1,2	**LM16**
32 $^{0}_{-0,016}$	42 $^{0}_{-0,02}$	30,5 $^{0}_{-0,2}$	1,6	30,5	1,5	11	60º	15	-9	0,88	1,4	**LM20**
40 $^{0}_{-0,016}$	59 $^{0}_{-0,03}$	41 $^{0}_{-0,3}$	1,85	38	2	12	50º	15	-9	1	1,6	**LM25**
45 $^{0}_{-0,016}$	64 $^{0}_{-0,03}$	44,5 $^{0}_{-0,3}$	1,85	43	2,5	15	50º	15	-9	1,6	2,8	**LM30**
52 $^{0}_{-0,019}$	70 $^{0}_{-0,03}$	49,5 $^{0}_{-0,3}$	2,1	49	2,5	17	50º	20	-13	1,7	3,2	**LM35**
60 $^{0}_{-0,019}$	80 $^{0}_{-0,03}$	60,5 $^{0}_{-0,3}$	2,1	57	3	20	50º	20	-13	2,2	4,1	**LM40**
70 $^{0}_{-0,022}$	100 $^{0}_{-0,03}$	74 $^{0}_{-0,3}$	2,6	76,5	3	25	50º	20	-13	3,9	8,1	**LM50**
80 $^{0}_{-0,022}$	110 $^{0}_{-0,03}$	85 $^{0}_{-0,3}$	3,15	86,5	3	30	50º	25	-16	4,8	10,2	**LM60**

LM < Built-in synthetics resin retainers >
This type is a metric dimension series widely used in Japan and other countries.

Linear ball bushing



Nominal part no.						Nominal shaft diameter
Standard type	Seal type	Ball circuit	Mass	Adjustable type	Open type	Tolerance
-	-		gr	-	-	mm
LME5	**LME5 UU**	3	11	**LME5 AJ**	**-**	5 $^{+0,008}_{0}$
LME8	**LME8 UU**	4	20	**LME8 AJ**	**-**	8
LME12	**LME12 UU**	4	41	**LME12 AJ**	**LME12 OP**	12
LME16	**LME16 UU**	4	57	**LME16 AJ**	**LME16 OP**	16 $^{+0,009}_{-0,001}$
LME20	**LME20 UU**	5	91	**LME20 AJ**	**LME20 OP**	20
LME25	**LME25 UU**	6	215	**LME25 AJ**	**LME25 OP**	25 $^{+0,011}_{-0,001}$
LME30	**LME30 UU**	6	325	**LME30 AJ**	**LME30 OP**	30
LME40	**LME40 UU**	6	705	**LME40 AJ**	**LME40 OP**	40 $^{+0,013}_{-0,002}$
LME50	**LME50 UU**	6	1130	**LME50 AJ**	**LME50 OP**	50
LME60	**LME60 UU**	6	2220	**LME60 AJ**	**LME60 OP**	60



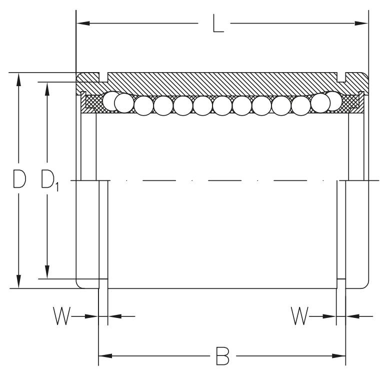
LME LME AJ LME OP

Major dimensions and tolerance

D Tolerance	L Tolerance	B Tolerance	W	D1	H	h1		Eccen-tricity max	Radial clearance max	Basic load C	Rating C_0	Nominal part no.
mm								µm		kgF		
12 $^{0}_{-0,008}$	22 $^{0}_{-0,02}$	14,5 $^{0}_{-0,2}$	1,1	11,5	1	-	-	12	-5	21	27	**LME5**
16 $^{0}_{-0,008}$	25 $^{0}_{-0,02}$	16,5 $^{0}_{-0,2}$	1,1	15,2	1	-	-	12	-5	21	41	**LME8**
22 $^{0}_{-0,009}$	32 $^{0}_{-0,02}$	22,9 $^{0}_{-0,2}$	1,3	21	1,5	7,5	78°	12	-7	52	79	**LME12**
26 $^{0}_{-0,009}$	36 $^{0}_{-0,02}$	24,9 $^{0}_{-0,2}$	1,3	24,9	1,5	10	78°	12	-7	59	91	**LME16**
32 $^{0}_{-0,011}$	45 $^{0}_{-0,02}$	31,5 $^{0}_{-0,2}$	1,6	30,3	2	10	60°	15	-9	88	140	**LME20**
40 $^{0}_{-0,011}$	58 $^{0}_{-0,03}$	44,1 $^{0}_{-0,3}$	1,85	37,5	2	12,5	60°	15	-9	100	160	**LME25**
47 $^{0}_{-0,011}$	68 $^{0}_{-0,03}$	52,1 $^{0}_{-0,3}$	1,85	44,5	2	12,5	50°	15	-9	160	280	**LME30**
62 $^{0}_{-0,013}$	80 $^{0}_{-0,03}$	60,6 $^{0}_{-0,3}$	2,15	59	3	16,8	50°	17	-13	220	410	**LME40**
75 $^{0}_{-0,013}$	100 $^{0}_{-0,03}$	77,6 $^{0}_{-0,3}$	2,65	72	3	21	50°	17	-13	390	810	**LME50**
90 $^{0}_{-0,015}$	125 $^{0}_{-0,04}$	101,7 $^{0}_{-0,4}$	3,15	86,5	3	27,2	54°	20	-13	480	1020	**LME60**

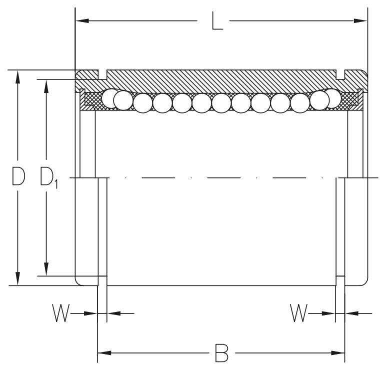
LM < Built-in synthetics resin retainers >
This type is a metric dimension series generally used in Europe.

Linear ball bushing



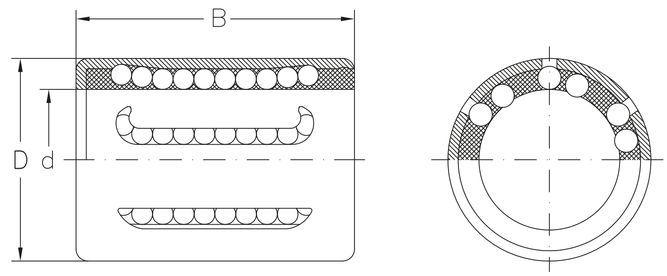
Nominal diameter	Nominal part no.						Nominal shaft diameter		Major dimensions and tolerance	
	Standard type	Seal type	Ball circuit	Mass	Adjustable type	Open type		Tolerance	D	Tolerance
inch/mm	-	-		kg	-	-	inch/mm			
1/4 6,350	**LMB4**	**LMB4 UU**	4	0,008	**LMB4 AJ**	**-**	0,250 6,350	0 -0,0040	0,5000 12,700	0 -0,00045
										0 -0,011
3/8 9,525	**LMB6**	**LMB6 UU**	4	0,014	**LMB6 AJ**	**-**	0,3750 9,525		0,6250 15,875	0 -0,00050
1/2 12,700	**LMB8**	**LMB8 UU**	4	0,037	**LMB8 AJ**	**LMB8 OP**	0,5000 12,700	0 -0,0090	0,8750 22,225	0 -0,013
5/8 15,875	**LMB10**	**LMB10 UU**	4	0,076	**LMB10 AJ**	**LMB10 OP**	0,625 15,875		1,1250 28,575	
3/4 19,050	**LMB12**	**LMB12 UU**	5	0,095	**LMB12 AJ**	**LMB12 OP**	0,7500 19,050	0 -0,0040	1,2500 31,750	0 -0,00065
1 25,400	**LMB16**	**LMB16 UU**	6	0,200	**LMB16 AJ**	**LMB16 OP**	1,0000 25,400		1,5625 39,688	
1-1/4 31,750	**LMB20**	**LMB20 UU**	6	0,440	**LMB20 AJ**	**LMB20 OP**	1,2500 31,750	0 -0,0050	2,0000 50,800	0 -0,00075
1-1/2 38,000	**LMB24**	**LMB24 UU**	6	0,670	**LMB24 AJ**	**LMB24 OP**	1,5000 38,100		2,3750 60,325	0 -0,019
2 50,800	**LMB32**	**LMB32 UU**	6	0,114	**LMB32 AJ**	**LMB32 OP**	2,0000 50,800	0 -0,0010	3,0000 76,200	0 -0,00090
										0 -0,022

LM < Built-in synthetics resin retainers >
This type is a metric dimension series widely used in Japan and other countries



L	Tolerance	B	Tolerance	W	D1	h	h1	θ	Eccen-tricity max	Radial clearance max	Basic load rating C	C_0	Nominal part no.
inch/mm													
0,7500 19,050	0 -0,008	0,5110 12,98	0 -0,008	0,390 0,992	0,4687 11,906	0,04 1	-	-	0,0005 12	-0,0001 -3	206	265	**LMB4**
	0 -0,200		0 -0,200										
0,8750 22,225		0,6358 16,15		0,390 0,992	0,5880 14,935	0,04 1	-	-	0,0005 12	-0,0001 -3	225	314	**LMB6**
1,2500 31,750		0,9625 24,46		0,0459 1,168	0,8209 20,853	0,06 1,5	0,34 7,9375	80°	0,0005 12	-0,0001 -4	510	764	**LMB8**
1,5000 38,100		1,1039 28,04		0,0559 1,422	1,0590 26,899	0,06 1,5	0,375 9,525	80°	0,0005 12	-0,0001 -4	774	1180	**LMB10**
1,6250 41,275		1,1657 29,61		0,0559 1,422	1,1760 29,870	0,06 1,5	0,4375 11,1125	60°	0,0006 15	-0,0002 -6	862	1370	**LMB12**
2,2500 57,150	0 -0,012	1,7547 44,57	0 -0,012	0,0679 1,727	1,4687 37,306	0,06 1,5	0,5625 14,2875	50°	0,0006 15	-0,0002 -6	980	1570	**LMB16**
2,6250 66,675	0 -0,300	2,0047 50,92	0 -0,300	0,0679 1,727	1,8859 47,904	0,10 2,5	0,625 15,875	50°	0,0008 20	-0,0003 -8	1570	2740	**LMB20**
3,000 76,200		2,4118 61,26		0,0859 2,184	2,2389 56,870	0,12 3	0,75 19,05	50°	0,0008 20	-0,0003 -8	2180	4020	**LMB24**
4,000 101,600		3,1917 81,07		0,1029 2,616	2,8379 72,085	0,12 3	1,0 25,40	50°	0,0010 25	-0,0005 -13	3820	7940	**LMB32**
	0 -0,022												

Standard linear ball bushing
Steel drawn cup/cage plastic



Dimensions			Load capacity		Designation	Mass
d	D	B	dyn.	stat.	bearing	
mm					-	g
6	12	22	400	239	**KH0622**	7
8	15	24	435	280	**KH0824**	12
10	17	26	500	370	**KH1026**	14,5
12	19	28	620	510	**KH1228**	18,5
14	21	28	620	520	**KH1428**	20,5
16	24	30	800	620	**KH1630**	27,5
20	28	30	950	790	**KH2030**	32,5
25	35	40	1990	1670	**KH2540**	66
30	40	50	2800	2700	**KH3050**	95
40	52	60	4400	4450	**KH4060**	182
50	62	70	5500	6300	**KH5070**	252

URB GROUP

URB-ROMANIA ART-TURKEY MGM-HUNGARY

Pillow blocks

Feature

The spherical outside surface ball bearings of URB are deep groove ball bearings with wide and narrow inner rings, consisting of insert bearings (SA200, SB200, UC200, UEL200, UK200, UCX00 and UC300) and various housing. The type of bearing units are defined according to the different mounting methods of the bearings to shafts: the set-screws type, the adapter type, the accentric locking collar type.

The URB housing are mainly casting housing. There are pressed steel plate housing as well align with ease during operation and can be conveniently mounted or dismounted.

The bearing units can operate satisfactorily under working conditions, especially for machines operating in dusty or muddy surroundings. Thus, they are widely used in agricultural, construction and transmission machineries, etc.

There are various types of sealing devices for our products, such as synthetic rubber seals, slinger with synthetic rubber seals and triple lip seals etc.

Sufficient lubricating grease has been put into the bearing during manufacturing, which can act as lubricating as well as rust proof. No more grease is needed to put in during the lubricating period when the bearings operate under normal conditions. Lubricating grease can be added from the fittings when the relubricate bearings operate under hard conditions.

The outer ring of the bearing, has spherical outside surface which can be fitted to the concave spherical surface of the housing, and the fit between them can be clearance fit or interference fit according to different conditions. This combination provides self-alignment between the self-contained bearing and the housing, and compensates for a certain alignment errors or flexing of the shaft when the bearing is in operation. This definitely increases the bearing service life.

Lubrication

The Spherical Outside Surface Ball Bearings of URB generally use CG-2 rust proof lithium based lubricating grease, with physical chemical properties shown in the following table 1. Grease iss filled in the spherical outside surface ball bearings during manufacturing.

Static safety factors

Table 1

Density 1/mm	Without operation	268
	Operated 60 times	260
Dropping point °C		128
Mechanical impurities pc/gr	10-25 µm	within 1000
	25-75 µm	within 500
	above 75 µm	0
Base oil kinematical viscosity 40° cst		80,3

The bearings usually operate below the temperature of 120°C (the measuring temperature of the outer rings is 100°C). Grease life reduction has to be taken into account when the bearing continues to operate at a temperature should not be lower than -30°C.

The permissible speed of rotation is connected with the fit between shaft and bearing. It is reconnected with the fit between shaft and bearing. It is recommended that, under normal operating conditions, the fit between the bearing and the shaft is h7. Looser fit allowing lower speed is recommended when heavier load is applied.

Tolerance for bearing units

Tolerances on inner rings of bearing with cylindrical bore
Unit: 0.001 mm

Table 2

Nominal bore diameter		**Cylindrical bore**						**Radial run-out**
d		bore diameter dm deviations		d deviations		width Bi deviations		
over	incl.	high	low	high	low	high	low	max.
mm								
10	18	+18	0	+22	-4	0	-120	12
18	30	+21	0	+25	-4	0	-120	15
30	50	+25	0	+30	-5	0	-120	18
50	80	+30	0	+36	-6	0	-150	22
80	120	+35	0	+42	-7	0	-200	28
120	150	+40	0	+48	-8	0	-250	35

Note: dm is defined as the arithmetical mean of the largest and smallest diameter obtained by two-point measurements.

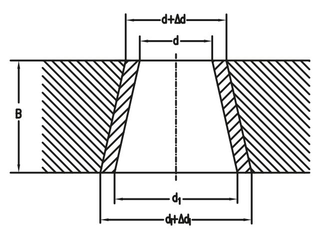
Tolerances on inner rings of bearings with tapered bore
Unit: 0.001 mm

Table 3

Nominal bore diameter		**Δd**		**Δd1-Δd**	
d		deviations			
over	incl.	high	low	max.	min.
mm					
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	150	+63	0	+40	0

Note: The deviation from nominal taper are defined by the limits of (Δd1-Δd), where Δd1 is actual deviations of d1 from nominal diameter at the largest end of bore and Δd is actual deviation of d from bearing bore nominal diameter.
d1 is obtained by the following formula:
d1 = d + 0.083333 B, where B is width of the bearing inner ring.
The nominal taper angle = 2º 23’9,4”.

Please refer to the figures 1.



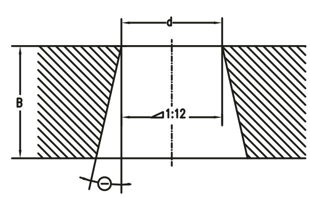


Fig. 1

Tolerances on outer ring Unit: 0.001 mm				
				Table 4
Nominal bore diameter		**D_m**		**Radial run-out**
D over	incl.	deviations high	low	max.
mm				
40	50	0	-11	20
50	80	0	-13	25
80	120	0	-15	35
120	150	0	-18	40
150	160	0	-25	45

Note: D_m is defined as the arithmetical means of the largest and the smallest diameter obtained by two-point measurement.
The low deviation of outside diameter D_m does not apply within the distance of 1/4 the width of outer ring from the sides.

Tolerance for distance "h" between the radial plane passing through center of outer ring and a side of inner ring Unit: 0.001 mm		
		Table 5
Nominal bore diameter		**n**
d over	incl.	deviations
mm		
40	50	± 200
50	80	± 250
80	120	± 300
120	160	± 350

Please refer to the figures 2.

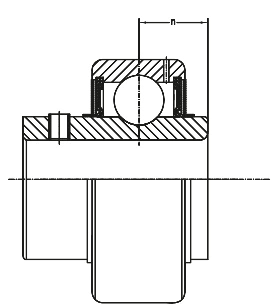


Fig. 2

Chamfer dimensions		
		Table 6
Nominal dimensions		**r**
r	max.	min.
mm		
1	1.5	0.6
1.5	2	1
2	2.5	1.5
2.5	3	2
3	3.5	2.5
3.5	4	3
4	4.5	3.5
5	6	4

Please refer to the figures 3.

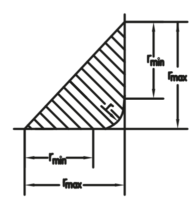


Fig. 3

Center height tolerances for pillow block type housing

Please refer to below figures 4 and table 7

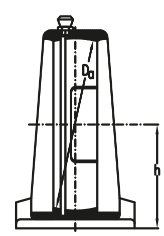


Fig. 4

URB

Tolerances for flaged type housing (F, FS, FL, FT, FA, FB, FC)

Please refer below figures 5a, 5b and table 8a, 8b.

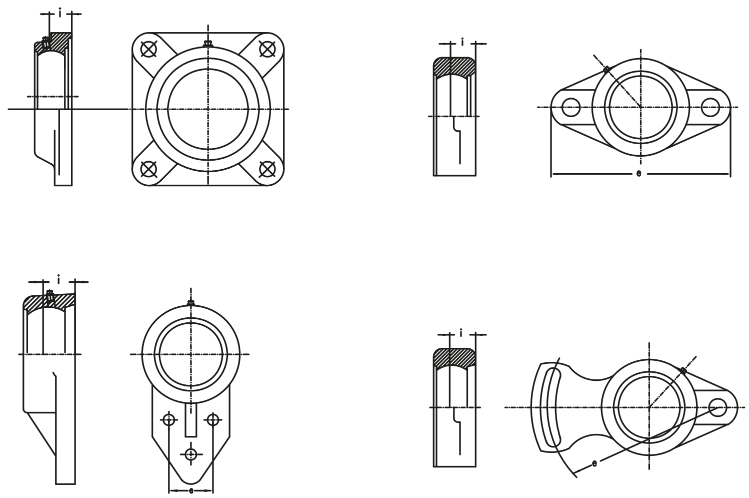


Fig. 5a

Tolerances for flanged type housings (F, FS, FL, FT, FA, FB)
Center height tolerances for pillow block type housings
Unit: 0.001 mm

Table 7

Housing number						**h** deviations
mm						
			AK204			
P203			AK205	PA203		
P204			AK206	PA204	PH204	
P205		P305	AK207	PA205	PH205	
P206	PX05	P306	AK208	PA206	PH206	±150
P207	PX06	P307	AK209	PA207	PH207	
P208	PX07	P308	AK210	PA208	PH208	
P209	PX08	P309	AK211	PA209	PH209	
P210	PX09	P310	AK212	PA210	PH210	
P211	PX10	P311	AK213	PA211	PH211	
P212	PX11	P312	AK214	PA212	PH212	
P213	PX12	P313	AK215	PA213	PH213	
P214	PX13	P314			PH214	
P215	PX14	P315			PH215	±200
P216	PX15	P316			PH216	
P217	PX16					
P218						

Unit: 0.001 mm

Table 8a

Housing number								e deviations	i deviations
mm									
F204		FL204		FT204	FS204	FA204	FB204		
F205	F305	FL205	FL305	FT205	FS205	FA205	FB205		
F206	F306	FL206	FL306	FT206	FS206	FA206	FB206		
F207	F307	FL207	FL307	FT207	FS207	FA207	FB207	±700	±500
F208	F308	FL208	FL308	FT208	FS208	FA208	FB208		
F209	F309	FL209	FL309	FT209	FS209	FA209	FB209		
F210	F310	FL210	FL310	FT210	FS210	FA210	FB210		
F211	F311	FL211	FL311	FT211	FS211	FA211	FB211		
F212	F312	FL212	FL312	FT212	FS212	FA212	FB212		
F213	F313	FL213	FL313	FT213	FS213	FA213	FB213		
F214	F314	FL214	FL314	FT214	FS214				
F215	F315	FL215	FL315		FS215			±1000	±800
F216		FL216							
F217		FL217							
F218		FL218							

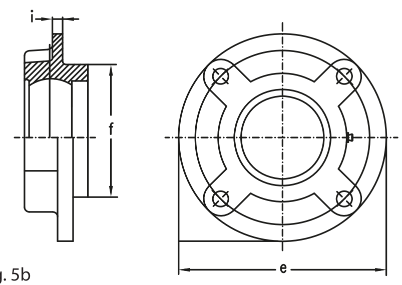


Fig. 5b

Tolerance for take-up type housing (T,ST)

Please refer to below figure 6 and table 9a, 9b.

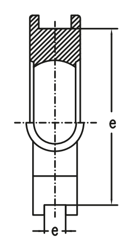


Fig. 6

Tolerance for flaged type housing (FC)
Unit: 0.001 mm

Table 8b

Housing number	f deviations high	f deviations low	e deviations	i deviations	Radial run-out of machined pilot max
mm					
FC 204					
FC 205	0	-46			
FC 206					
FC 207			± 700	± 500	200
FC 208					
FC 209	0	-54			
FC 210					
FC 211					
FC 212					
FC 213					
FC 214					
FC 215	0	-63	± 1000	± 800	300
FC 216					
FC 217					
FC 218	0	-72			

Tolerances for take-up type housing (T)
Unit: 0,001 mm

Table 9a

Housing number	k deviations high	k deviations low	e deviations	Parallelism of guide max
mm				
T204	+200		0	500
T210	0		- 500	
T211	+300		0	600
T217	0		- 800	

Tolerances for take-up type housing (ST) Unit: 0.001 mm				
				Table 9b
Housing number	k deviations		e deviations	Parallelism of guide
	high	low		max
mm				
ST204	+500		± 250	500
ST210	-250			
ST211	+1000		± 250	600
ST215	- 250			

Note:
Dam = (Da max + Da min) / 2
Da max - maximum measured value of Da
Da min - minimum measured value of Da

Dimensional tolerances for spherical inside diameter of housing are classified as H7 for clearance fit and J7 for interference fit.

As the self - contained for bearings are equipped with locking-pin, clearance fit H7 is normally applied.

Tolerances on spherical inside diameter
Unit: 0.001 mm

Table 10

Nominal spherical inside diameter D_a		**Symbol H7**		**Symbol J7**					
		D_{am} deviations	deviations	D_a deviations	deviations	D_{am}	deviations	Da	
over	incl.	high	low	high	low	high	low	high	low
mm									
30	50	+25	0	+30	-5	+14	-11	+19	- 16
50	80	+30	0	+36	-6	+18	-12	+24	- 18
80	120	+35	0	+42	-7	+22	-13	+29	- 20
120	180	+40	0	+48	-8	+26	-14	+34	- 22
180	250	+46	0	+55	-9	+30	-16	+39	- 25

Machining tolerances

Table 11

Nominal dimension		**Dimensional**
over	incl.	tolerance
mm		
4	16	± 0,2
16	63	± 0,3
63	250	± 0,5

Casting tolerances on lenght

Table 12

Nominal dimension		**Dimensional**
over	incl.	tolerance
mm		
up	100	± 1,5
100	200	± 2,0
200	400	± 3,0
400	800	± 4,0

Casting tolerances on thickness

Table 13

Nominal dimension		**Dimensional**
over	incl.	tolerance
mm		
up	5	± 1
5	10	± 1,5
10	20	± 2
20	30	± 3
30	50	± 3,5

One side maching tolerances

Table 14

Nominal dimension		**Dimensional**
over	incl.	tolerance
mm		
up	5	± 1
5	100	± 1,5
100	200	± 2
200	400	± 3

Note:
Dimensional tolerances and deviations are for ordinary grade;
Dimensional tolerances on lenght and thickness may be added with deviations on draft taper.

Radial internal clearance of bearings

The radial internal clearance of the bearing for the unit is the same as the value of ISO 5753, the internal radial clearance for the spherical outside surface ball bearing is usually greater than that for the same size of deep groove ball bearing. The clearance for the cylindrical bore bearing is shown in table 15, while the clearance for the tapered bore bearing is shown in table 16.

Radial internal clearance of cylindrical bore bearings (with set-screws and eccentric locking collar)
Unit: 0,001 mm

Table 15

Nominal bore diameter		Clearance symbol					
d		C2		normal		c3	
over	incl.	min.	max.	min.	max.	min.	max.
mm							
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	88	71	114

Radial internal clearance of tapered bore bearings (with adapter sleeve)
Unit: 0,001 mm

Table 16

Nominal bore diameter		Clearance symbol					
d		C2		normal		c3	
over	incl.	min.	max.	min.	max.	min.	max.
mm							
10	18	10	25	18	33	25	45
18	24	12	28	20	36	28	48
24	30	12	28	23	43	30	61
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	150	160

Bearing Size selection

The bearing size is usually selected according to the required life and reliability under a specific type of load charged on the spherical outside surface ball bearing

The load applied to the bearing operating under static or slow oscillating and rotating (n<10r/min) condition is defined as dynamic load.

The load capacity of the bearing is expressed by the basic dynamic load rating which is shown in the spherical outside surface ball bearing's table.

Under normal mounting, lubricating and maintaining conditions, the operating bearing will have fatigue flaking due to the repeating action of variable load charged on the contact area between the rings and rolling elements. Generally, the fatigue flaking is the cause of normal damage of rolling bearings. Therefore, the usual bearing life refers to the bearing fatigue life. The life of group of apparently identical bearings operating under a considerable dispersion. For this reason, the bearing life is closely connected with the damaging probability or the reliability requirement.

The radial rating load of ball bearing with 90% reliability and 500 hours minimum life is shown in figure 7.

Life:	The life of a rolling bearing is defined as the total number of revolution which the bearing is capable of enduring before the first evidence of fatigue flaking develops on any one rings or rolling elements.
Reliability:	The reliability is the percentage of the bearings of a group of apparently identical bearings operating under identical conditions which can expect to attain or exceed a certain defined life. The reliability of individual bearings is the probability of the bearing to attain or exceed a defined life.
Basic rating life:	For a group of apparently identical rolling bearings operating under identical conditions, the basic rating life is defined as the total number of revolutions that 90% of the bearings can be expected to complete or exceed.

Basic rating life

The fatigue rating life of spherical outside surface ball bearings is calculated by the following formula:

$$L_{10} = \left(\frac{C}{P}\right)^3, \text{ or } \frac{C}{P} = L_{10}^{1/3}$$

where:

L_{10} - basic rating life, 10^6r

P - basic dynamic load rating, N

N - equivalent dynamic bearing load, N

The basic dynamic load rating C is a hypothetical constant load with a fixed direction under which the bearing can attain a basic life of one milion revolutions theoretically. For radial bearings, the load refers to the radial load.

The equivalent dynamic bearing load P is a constant load with a fixed direction under which the bearing life is identical to that of the bearing operating under actual load.

For a bearing operating with a constant rotation speed, the basic rating life can be expressed in terms of operating hours:

$$L_{10h} = \frac{10^6}{60\,n}\left(\frac{C}{P}\right)^3, \text{ or } L_{10h} = \frac{10^6}{60\,n}\; L_{10h} = \frac{16666}{n}\left(\frac{C}{P}\right)^3$$

where:

L_{10h} - basic rating life, h

n - bearing operating speed of rotation, r/min

For easier calculation, 500 hours as base of rating life is taken, and the speed factor f_n and the life factor f_h is introduced.

$$f_n = \left(\frac{331/3}{n}\right), \quad f_h = \left(\frac{L_{10h}}{500}\right)$$

In this, the formula is simplified to:

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

The values of f_h and f_n can be found in figure 7 by referring to the operation speed n and the anticipated bearing service life L_{10h}. Then, with the radial load (or the equivalent dynamic bearing load), the basic dynamic load rating can be determined according to the spherical outside surface ball bearing's table. If the bearing operate under indeterminate loads and rotaion speed, the following formula should be applied when calculating the bearing life:

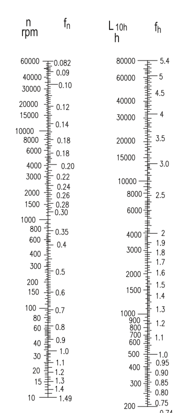
$$P_m = \sqrt[3]{\frac{1}{N}\int_0^N P^3 dN}$$

where:

P_m - mean equivalent dynamic bearing load, N

P - equivalent dynamic bearing load, N

N - total revolution numbers with one load changing cycle, r



Anticipated bearing service life

When selecting a bearing, one should usually predetermine an appropriate service life according to the relevant machine type, operating condition and reliability requirement. Generally the anticipated bearing service life can be determined by refering to the maintenance period of a machine.

Calculating method of equivalent dynamic bearing load P.

The basic equivalent dynamic bearing load is determined under a hypothetical condition. When calculating the bearing life, the actual load has to be converted to dynamic bearing load which is in conformity with the load condition determining the dynamic load rating. General equation for calculating the equivalent dynamic bearing load:

$$P = XF_r + YF_a,$$

where:

- P - equivalent dynamic bearing load, N
- F_r - actual radial load, N
- F_a - actual axial load, N
- X - radial factor
- Y - thrust factor

The values of X and Y are determined by the ratio between the applied axial load Fa and the basic static load rating C0. The axial load which the spherical outside surface ball bearing can carry is determined by the mounting method of the bearing on the shaft.

For bearing of set-screw Locking type or eccentric Locking collar type, if flexible shafts are applied and the set-screws are tightened enough, the axial load Fa which the bearings can carry not surpass 20% of the radial load Fr.

For bearing of adapter sleeve Locking type, if the nut is properly tightened, the axial load Fa can be maximally 15% to 20% of the radial load.

The value of radial and thrust factors X and Y for spherical outside surface ball bearings can be obtained from the following Table 17.

When twist load is applied to the bearing, the equivalent dynamic bearing load is calculated by the following equation:

$$P_m = f_m P$$

where:

- P_m - equivalent dynamic bearing load when considering twist load
- f_m - twist load factor, which is defined as follows:
  - when the twist load is small: fm = 1,5
  - when the twist load is big: fm = 2

Example of bearing size selection

When shocking load is applied to the bearing, the equivalent dynamic bearing load can be calculated by the following equation:

$$P_d = f_d P$$

where:

- P_d - equivalent dynamic bearing load when considerating shocking load
- f_d - shocking load factor, which is defined as follows:
  - when no shocking load or mirror shocking load is applied: fd = 1-1,2
  - when adequate shocking load is applied: fd = 1,2 - 1,8

How to select the size of bearing: one spherical outside surface ball bearings is to operate at a rotation speed of 1000r/min under only a radial load of F_r = 3000 N, with a basic rating life of a least 20,000 hours.

Select the bearing size

From the required rotation speed it can be found that: f_n = 0,322 (figure 7 shows about 0,32, refer to page 631).

From the required basic rating life (anticipated service life), it can be found that:

f_h = 3,42 (figure 7 shows about 3,4, refer to page 631).

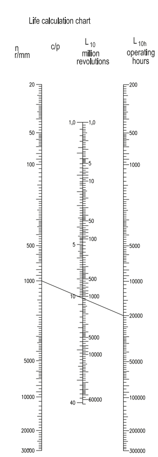
Under only radial load, i.e.

P = Fr = 3000 N

Therefore,

$$C = \frac{\int h}{\int n} P = \frac{3,42}{0,322} = 31,863\,\text{N}$$

A simplified way to calculate the bearing life can be applied by using figure 8.



Radial and thrust factors X and Y for spherical outside surface ball bearings										
										Table 17
Clearance for normal						Clearance for C3				
$\frac{Fa}{Ca}$	$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$		e	$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$		e
	X	Y	X	Y		X	Y	X	Y	
0,025	1	0	0,56	2	0,22	1	0	0,46	1,74	0,3
0,04	1	0	0,56	1,8	0,24	1	0	0,46	1,61	0,33
0,07	1	0	0,56	1,6	0,27	1	0	0,46	1,46	0,36
0,13	1	0	0,56	1,4	0,31	1	0	0,46	1,3	0,41
0,25	1	0	0,56	1,2	0,37	1	0	0,46	1,14	0,47
0,5	1	0	0,56	1	0,44	1	0	0,46	1	0,54

By connecting n and the required basic rating life L_{10h} with a straight line, it can be found that C/P value is 10,6.

As is know, P = F_r = 3000 N, thus the required basic dynamic load rating is:

C = 3000 x 10,6 = 31,800, N

In this way, we can select the shperical outside surface ball bearings inside this catalogue (refer to pages 699-705).

Adjusted rating life equation

The basic rating life L10 calculated with bearing life calculation formula can be applied to calculate the rating life of bearings made of ordinary bearing steel (i.e. bearing life with reliability of 90%)

Due to more and more of machinery products demanding higher reliability and better quality steel (ISO 281/1-1977), an adjusted rating life calculation equation is suggested. i.e.

L_n = a1 a2 a3 L10

For spherical outside surface ball bearing:

L_n = a1 a2 a3 $(C/P)^3$

where:

Ln - under specified material and lubricating conditions, bearing life with (100-n)% no breaking probability (i.e. reability).
a1 - life adjustment factor for reability (table 18)
a2 - life adjustment factor materials (table 19)
a3 - life adjustment factor for operating conditions (table 20)

Life adjustment factor for reability a_1						
						Table 18
Reability	90	95	96	97	98	99
%						
L_n	L_{10}	L_5	L_4	L_3	L_2	L_1
a1	1	0,62	0,53	0,44	0,33	0,21

Life adjustment factor for materials a_2		
		Table 19
Normal chromium bearing steel		a2 = 1
Special smelted bearing steel	Vacuum degassed bearing steel	a2 = 3
	Vacuum resmelted bearing steel	a2 = 5
When material hardness lowered by high frequency	tempering	a2 < 1

Life adjustment factor for operating conditions a_3	
	Table 20
When under normal operating conditions: - properly mounted - sufficiently lubricated - without outside matters intrustion	a3 = 1
When under operating temperature, the spherical outside surface ball bearings lubricating grease viscosity lower than 13 mm^2/s	a3 < 1

Selection of shaft

The shaft on which bearing units are mounted shall be free from band and flexure.

For the units with cylindrical bore (with set-screws or eccentric locking collar) clearance fit is usually adopted for mounting the units on the shaft, and shaft tolerances in table 21 are recommended for such loose fit, but for high speed or highly accurate operation or such application which is accompanied by heavy shock loads, interference fit is to be adopted. Table 22 shows recommended shaft with inerference fit, the eccentric locking collar may omitted.

Tapered bore bearings permit wider tolerances of the shaft since they are locked to the shaft by means of adapted sleeves.

Recommended shaft tolerances for tapered bore bearings listed in table 23.

Shaft tolerances for clearance fit for bearing with cylindrical bore

Table 21

Shaft diameter		**Deviation of tolerances in saft**							
		For lower speed		**For medium speed**		**For rather high speed**		**For high speed**	
over	incl.	h9		h8		h7		J6	
mm		max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	-43	0	-27	0	-18	+8	-3
18	30	0	-52	0	-33	0	-21	+9	-4
30	50	0	-62	0	-39	0	-25	+11	-5
50	80	0	-74	0	-46	0	-30	+12	-7
80	120	0	-87	0	-54	0	-35	+13	-9
120	180	0	-100	0	-63	0	-40	+14	-11

Shaft tolerances for interference fit for bearing with cylindrical bore

Table 22

Shaft diameter		**Deviation of tolerances in saft**							
		Higher speed		**Rather heavy load**		**Highest load**		**Heavy load**	
over	incl.	m6		m7		m6		m7	
mm		max.	min.	max.	min.	max.	min.	max.	min.
10	18	+18	+7	+25	+7	+23	+12	+30	+12
18	30	+21	+8	+29	+8	+28	+15	+36	+15
30	50	+25	+9	+34	+9	+33	+17	+42	+17
50	80	+30	+11	+41	+11	+39	+20	+50	+20
80	120	+35	+13	+48	+13	+45	+23	+58	+23
120	180	+40	+15	+55	+15	+52	+27	+67	+27

Shaft tolerances for bearing with tapered bore

Table 23

Shaft diameter		Deviation of tolerances For shot shaft		Deviation of tolerances For shot shaft	
over	incl.	h9		h10	
mm		max.	min.	max.	min.
10	18	0	-43	0	-70
18	30	0	-52	0	-84
30	50	0	-62	0	-100
50	80	0	-74	0	-120
80	120	0	-87	0	-140
120	180	0	-100	0	-160

Mounting of bearing units on shaft

The bearing units can be easy installed in principle at any place. However, in order to have a long service life, it is desirable that the mounting base if flat and rigid.

In case of either the vibration is caused to the bearing, the alternating movement takes place, the load applied to the bearing is large, or the shaft rotation speed is rapid, it is desired to provide with the filed seat or concave section at the part where the set-screws contact with the shaft. If large thrust load is charged, it is recommended that joggling tightened with nuts be used to install the bearing most effectively to the shaft: as shown in figure 9.

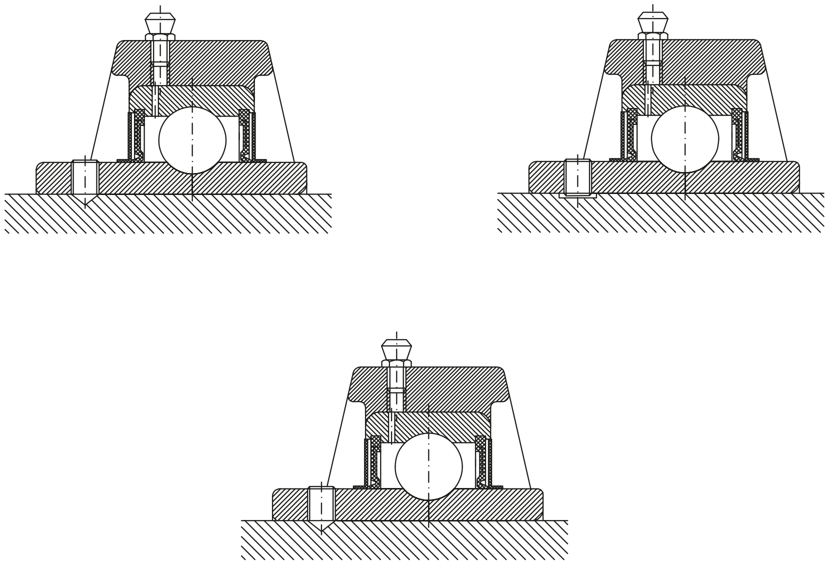


Fig. 9

Bearings units with adapter sleeve

Bearing unit with adapter sleeve permits wider shaft tolerance and can be used in applications where vibrations and shocks are heavly.

Mounting processes of these units as follows:

First, the sleeve is instaled to an arbitrary position. After the shark proof washer is inserted, the nut is tightened.

The proper nut tightening condition can be obtained if it is tightened enough by hand and then rotated by 2/5 to 3/5 revolution with a spanner.

After tightening the nut, bend the shark proof washer within the slot. Otherwise, the nut may be loosened and creep may be caused between the shaft and sleeve. It is necessary the nut can not be tightened too much.

Bearings units with eccentric locking collar

The eccentric part of the collar mates with the inner ring of the bearing which is made eccentric with the collar. When locked to the shaft by hand in direction of the shaft rotation, the eccentric locking collar tightens automatically to the shaft by force of working radial load. Then, lock the set-srews provided on the collar to fix the eccentric collar to the shaft. At the shaft rotation force or load is not charged on the set-screws directly, it will not loosen during operation.

Bearing units with set-screws

There are two set-screws located at two places on one side of the wide inner ring 120 apart with which the bearing units can be mounted to the shaft. When mounting the bearing to the shaft, the torque shown in the following table 23 is recommended to tighten the set screws to shaft.

The material for cast iron housing

The material of cast iron housing under ISO/DIS GG20, the mechanical properties please refer to table 24.

Proper tightening torque of set-screws

Table 24

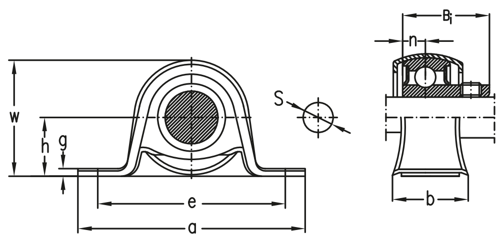
Set-screws type	**Bearing type**	**Tightening torque**		
mm	inch		N.m	lbf.in
M 5x0,8	No. 10-32 UNF	SB 201 - SB 203, UC 201 - UC 203	3 - 3,5	28
M 6x1	1/4-28 UNF	SB 204 - SB 207, UC 204 - UC 206 SA 201 - SA 206, UEL 201 - UEL 205 UC X05, UC 305 - UC 306	3,5 - 4	30 - 35,4
M 8x1	5/16-24 UNF	SB 208, UC 207 - UC 209 SA 207 - SA 210, UEL 206 - UEL 210 UC X06 - UC X08, UC 307	8,0 - 8,5	69 - 73,5
M 10X1,25	3/8-24 UNF	UC 210 - UC 212 SA 211, UEL 211 - UEL 215 UC X09 - UC X11, UC308 - 309	16,5 - 17,5	144 - 152
M 12X1,25	7/16-20 UNF	UC 213 - UC 218 UC X12 - UC X16 UC 310 - UC 314	26,5 - 27,5	235 - 243
M 14X1,5	1/2-20 UNF	UC 315 - UC 316	33,5 - 34,5	296 - 304

The mechanical properties of cast iron housing

Table 25

Number	**Major wall thickness of casting piece**	**Strain stress**	**Hardness** m6
	mm	N/mm^2	HB
ISO/DIS GG20	2,5-10	220	
U.S.A. Grade 35	>10-20	195	170 - 220
JIS FC20	>20-30	170	
	30-50	160	

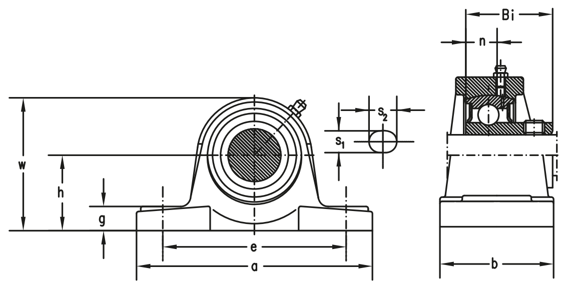
Standard duty pillow blocks pressed steel housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
12	22,2	86	68	25	9,5	3,2	43,8	22	6	M8	**SBPP201**	**SB201**	**PP203**	0,17
15	22,2	86	68	25	9,5	3,2	43,8	22	6	M8	**SBPP202**	**SB202**	**PP203**	0,16
17	22,2	86	68	25	9,5	3,2	43,8	22	6	M8	**SBPP203**	**SB203**	**PP203**	0,15
20	25,4	98	76	32	9,5	3,2	50,5	25	7	M8	**SBPP204**	**SB204**	**PP204**	0,22
25	28,6	108	86	32	11,5	4	56,6	27	7,5	M10	**SBPP205**	**SB205**	**PP205**	0,31
30	33,3	117	95	38	11,5	4	66,3	29	8	M10	**SBPP206**	**SB206**	**PP206**	0,45
35	39,7	129	106	42	11,5	4,6	78	32	8,5	M10	**SBPP207**	**SB207**	**PP207**	0,61

Note: Inch sizes available on request.

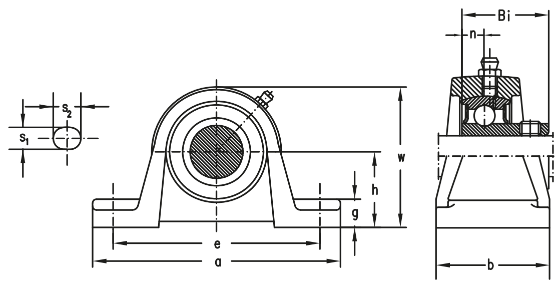
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	31,8	128	98	38	11	14	14	63	25	7	M10	**SBAK204**	**SB204**	**AK204**	0,70
25	33,3	140	105	40	11	14	15	66,5	27	7,5	M10	**SBAK205**	**SB205**	**AK205**	0,81
30	39,7	160	121	44	14	19	17	79	29	8	M12	**SBAK206**	**SB206**	**AK206**	1,18
35	46	167	127	48	14	19	18	91	32	8,5	M12	**SBAK207**	**SB207**	**AK207**	1,61
40	49,2	181	140	52	14	19	19	98	34	9,5	M12	**SBAK208**	**SB208**	**AK208**	1,99

Note: Inch sizes available on request.

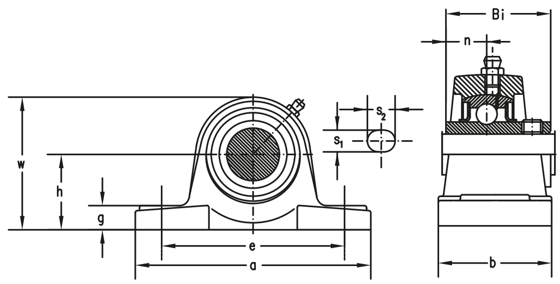
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	33,3	127	96	35	13	16	14	65	25	7,0	M10	**SBP204**	**SB204**	**P204**	0,62
25	36,5	140	105	36	13	19	15	71	27	7,5	M10	**SBP205**	**SB205**	**P205**	0,73
30	42,9	160	121	42	14	19	16	84	29	8	M12	**SBP206**	**SB206**	**P206**	1,16
35	47,6	167	127	45	15	19	17	94	32	8,5	M12	**SBP207**	**SB207**	**P207**	1,46
40	49,2	180	137	49	15	21	18	100	34	9,5	M12	**SBP208**	**SB208**	**P208**	1,74

Note: Inch sizes available on request.

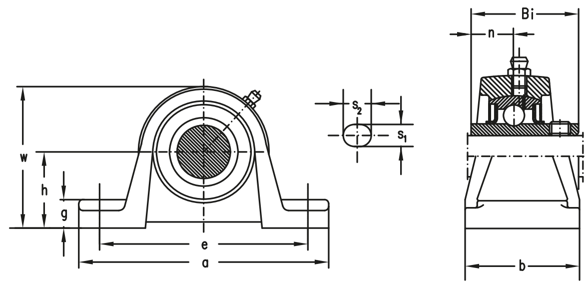
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	31,8	128	98	38	11	14	14	63	31	12,7	M10	**UCAK204**	**UC204**	**AK204**	0,74
25	33,3	140	105	40	11	14	15	66,5	34	14,3	M10	**UCAK205**	**UC205**	**AK205**	0,85
30	39,7	160	121	44	14	19	17	79	38,1	15,9	M12	**UCAK206**	**UC206**	**AK206**	1,24
35	46,0	167	127	48	14	19	18	91	42,9	17,5	M12	**UCAK207**	**UC207**	**AK207**	1,70
40	49,2	181	140	52	14	19	19	98	49,2	19	M12	**UCAK208**	**UC208**	**AK208**	2,13
45	52,4	189	146	54	14	19	20	105	49,2	19	M12	**UCAK209**	**UC209**	**AK209**	2,39
50	55,6	203	159	57	17,5	21	21	111,5	51,6	19	M16	**UCAK210**	**UC210**	**AK210**	2,83
55	61,9	232	181	60	18	24	23	123	55,6	22,2	M16	**UCAK211**	**UC211**	**AK211**	3,85
60	68,3	241	191	64	18	24	25	136	65,1	25,4	M16	**UCAK212**	**UC212**	**AK212**	4,92
65	74,6	262	203	70	21	28	27	147,5	65,1	25,4	M20	**UCAK213**	**UC213**	**AK213**	6,13
70	77,8	266	210	74	21	28	28	153,5	74,6	30,2	M20	**UCAK214**	**UC214**	**AK214**	6,90
75	82,6	304	241	78	22	32	30	162	77,8	33,3	M20	**UCAK215**	**UC215**	**AK215**	8,56

Note: Inch sizes available on request.

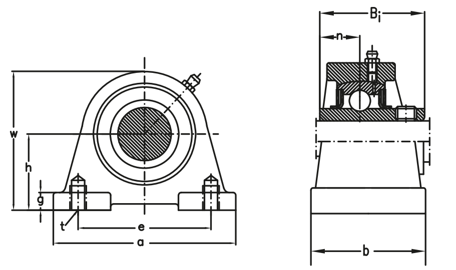
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
12	30,2	127	96	38	13	16	11	60,7	31	12,7	M10	**UCP201**	**UC201**	**P203**	0,68
15	30,2	127	96	38	13	16	11	60,7	31	12,7	M10	**UCP202**	**UC202**	**P203**	0,67
17	30,2	127	96	38	13	16	11	60,7	31	12,7	M10	**UCP203**	**UC203**	**P203**	0,66
20	33,3	127	96	35	13	16	14	65,0	31	12,7	M10	**UCP204**	**UC204**	**P204**	0,66
25	36,5	140	105	36	13	19	15	71,0	34	14,3	M10	**UCP205**	**UC205**	**P205**	0,77
30	42,9	160	121	42	14	19	16	84,0	38,1	15,9	M12	**UCP206**	**UC206**	**P206**	1,22
35	47,6	167	127	45	15	19	17	94,0	42,9	17,5	M12	**UCP207**	**UC207**	**P207**	1,55
40	49,2	180	137	49	15	21	18	100,0	49,2	19	M12	**UCP208**	**UC208**	**P208**	1,88
45	54	189	146	50	15	21	20	107,5	49,2	19	M12	**UCP209**	**UC209**	**P209**	2,19
50	57,2	204	159	56	19	22	21	114,0	51,6	19	M16	**UCP210**	**UC210**	**P210**	2,73
55	63,5	217	172	58	19	22	22	126	55,6	22,2	M16	**UCP211**	**UC211**	**P211**	3,38
60	69,9	238	186	64	19	25	24	139	65,1	25,4	M16	**UCP212**	**UC212**	**P212**	4,75
65	76,2	262	203	70	23	29	26	149	65,1	25,4	M20	**UCP213**	**UC213**	**P213**	5,81
70	79,4	266	210	72	23	29	27	155	74,6	30,2	M20	**UCP214**	**UC214**	**P214**	6,50
75	82,6	274	217	74	25	29	28	161,6	77,8	33,3	M20	**UCP215**	**UC215**	**P215**	7,11
80	88,9	292	232	78	25	30	30	174	82,6	33,3	M20	**UCP216**	**UC216**	**P216**	8,69
85	95,2	310	247	83	25	30	32	186	85,7	34,1	M20	**UCP217**	**UC217**	**P217**	10,63
90	101,6	326	262	88	27	30	33	198	96	39,7	M22	**UCP218**	**UC218**	**P218**	12,95

Note: Inch sizes available on request.

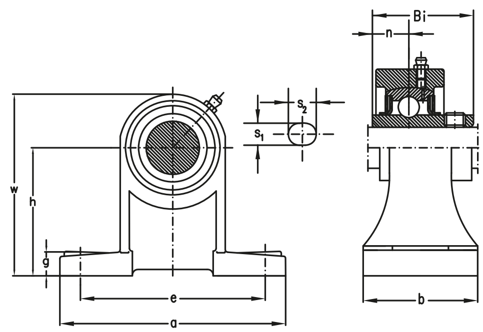
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	g	w	f	t	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
12	30,2	76	52	40	11	62	13	M10	31	12,7	M10	**UCPA201**	**UC201**	**PA204**	0,57
15	30,2	76	52	40	11	62	13	M10	31	12,7	M10	**UCPA202**	**UC202**	**PA204**	0,56
17	30,2	76	52	40	11	62	13	M10	31	12,7	M10	**UCPA203**	**UC203**	**PA204**	0,55
20	30,2	76	52	40	11	62	13	M10	31	12,7	M10	**UCPA204**	**UC204**	**PA204**	0,53
25	36,5	84	56	38	12	72	15	M10	34	14,3	M10	**UCPA205**	**UC205**	**PA205**	0,71
30	42,9	94	66	48	13	84	18	M14	38,1	15,9	M14	**UCPA206**	**UC206**	**PA206**	1,07
35	47,6	110	80	48	13	95	20	M14	42,9	17,5	M14	**UCPA207**	**UC207**	**PA207**	1,49
40	49,2	116	84	54	13	100	20	M14	49,2	19	M14	**UCPA208**	**UC208**	**PA208**	1,75
45	54,2	120	90	60	13	108	25	M14	49,2	19	M14	**UCPA209**	**UC209**	**PA209**	2,17
50	57,2	130	94	60	14	116	25	M16	51,6	19	M16	**UCPA210**	**UC210**	**PA210**	2,53
55	63,5	140	104	66	14	125	25	M16	55,6	22,2	M16	**UCPA211**	**UC211**	**PA211**	3,17
60	69,9	150	114	68	15	138	25	M16	65,1	25,4	M16	**UCPA212**	**UC212**	**PA212**	4,17
65	76,2	160	124	70	15	150	25	M16	65,1	25,4	M16	**UCPA213**	**UC213**	**PA213**	4,96

Note: Inch sizes available on request.

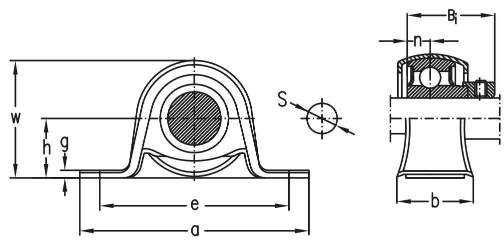
Standard duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions										Bolt size	Unit number	Bearing number	Housing number	Mass
	h	a	e	b	s_1	s_2	g	w	Bi	n					
mm												-			Kg
12	70	127	95	40	12	16	13	101	30	12,7	M10	**UCPH201**	**UC201**	**PH204**	0,81
15	70	127	95	40	12	16	13	101	30	12,7	M10	**UCPH202**	**UC202**	**PH204**	0,80
17	70	127	95	40	12	16	13	101	31	12,7	M10	**UCPH203**	**UC203**	**PH204**	0,79
20	70	127	95	40	12	16	13	101	31	12,7	M10	**UCPH204**	**UC204**	**PH204**	0,77
25	80	140	105	50	13	19	16	114	34	14,3	M10	**UCPH205**	**UC205**	**PH205**	1,01
30	90	165	121	50	17	21	18	130	38,1	15,9	M14	**UCPH206**	**UC206**	**PH206**	1,56
35	95	167	127	60	17	21	19	140	42,9	17,5	M14	**UCPH207**	**UC207**	**PH207**	1,88
40	100	184	137	66	17	21	20	150	49,2	19,0	M14	**UCPH208**	**UC208**	**PH208**	2,44
45	105	190	146	70	17	21	20	158	49,2	19,0	M14	**UCPH209**	**UC209**	**PH209**	2,72
50	110	204	159	70	19	22	22	165	51,6	19,0	M16	**UCPH210**	**UC210**	**PH210**	3,08
55	120	217	171	75	19	22	23	181	55,6	22,2	M16	**UCPH211**	**UC211**	**PH211**	4,05
60	130	236	186	80	19	22	24	197	65,1	25,4	M16	**UCPH212**	**UC212**	**PH212**	4,78
65	140	258	203	85	23	28	26	213	65,1	25,4	M20	**UCPH213**	**UC213**	**PH213**	5,93
70	150	266	210	90	23	28	27	227	74,6	30,2	M20	**UCPH214**	**UC214**	**PH214**	6,99
75	160	274	217	95	23	28	28	240	77,8	33,3	M20	**UCPH215**	**UC215**	**PH215**	7,84
80	170	290	232	100	24	28	30	256	82,6	33,3	M20	**UCPH216**	**UC216**	**PH216**	9,13

Note: Inch sizes available on request.

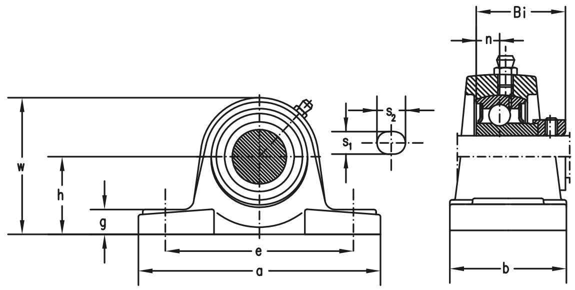
Standard duty pillow blocks pressed steel housing eccentric locking collar type



Shaft dia.	Nominal dimensions h	a	e	b	s	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
12	22,2	86	68	25	9,5	3,2	43,8	28,5	6	M8	**SAPP201**	**SA201**	**PP203**	0,21
15	22,2	86	68	25	9,5	3,2	43,8	28,5	6	M8	**SAPP202**	**SA202**	**PP203**	0,20
17	22,2	86	68	25	9,5	3,2	43,8	28,5	6	M8	**SAPP203**	**SA203**	**PP203**	0,19
20	25,4	98	76	32	9,5	3,2	50,5	29,7	7	M8	**SAPP204**	**SA204**	**PP204**	0,27
25	28,6	108	86	32	11,5	4	56,6	30,5	7,5	M10	**SAPP205**	**SA205**	**PP205**	0,34
30	33,3	117	95	38	11,5	4	66,3	33,9	8	M10	**SAPP206**	**SA206**	**PP206**	0,52
35	39,7	129	106	42	11,5	4,6	78	37,5	8,5	M10	**SAPP207**	**SA207**	**PP207**	0,73

Note: Inch sizes available on request.

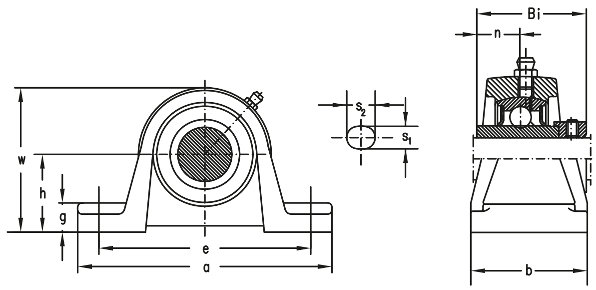
Standard duty pillow blocks pressed steel housing eccentric locking collar type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	31,8	128	98	38	11	14	14	63,0	29,5	7,0	M10	**SAAK204**	**SA204**	**AK204**	0,75
25	33,3	140	105	40	11	14	15	66,5	30,5	7,5	M10	**SAAK205**	**SA205**	**AK205**	0,84
30	39,7	160	121	44	14	19	17	79	33,9	8	M12	**SAAK206**	**SA206**	**AK206**	1,25
35	46	167	127	48	14	19	18	91	37,5	8,5	M12	**SAAK207**	**SA207**	**AK207**	1,73
40	49,2	181	140	52	14	19	19	98	40,5	9,5	M12	**SAAK208**	**SA208**	**AK208**	2,14
45	52,4	189	146	54	14	19	20	105	42,2	10	M12	**SAAK209**	**SA209**	**AK209**	2,40
50	55,6	203	159	57	17,5	21	21	111,5	43,7	10,5	M16	**SAAK210**	**SA210**	**AK210**	2,83
55	61,9	232	181	60	18	24	23	123	48,4	11,5	M16	**SAAK211**	**SA211**	**AK211**	3,60

Note: Inch sizes available on request.

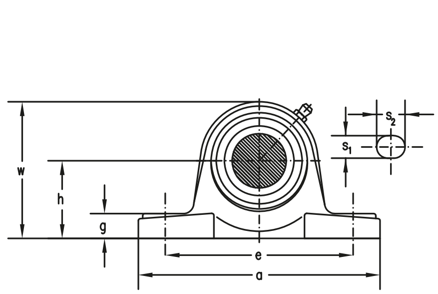
Standard duty pillow blocks cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	33,3	127	96	35	13	16	14	65	29,5	7	M10	**SAP204**	**SA204**	**P204**	0,67
25	36,5	140	105	36	13	19	15	71	30,5	7,5	M10	**SAP205**	**SA205**	**P205**	0,76
30	42,9	160	121	42	14	19	16	84	33,9	8	M12	**SAP206**	**SA206**	**P206**	1,23
35	47,6	167	127	45	15	19	17	94	37,5	8,5	M12	**SAP207**	**SA207**	**P207**	1,58
40	49,2	180	137	49	15	21	18	100	40,5	9,5	M12	**SAP208**	**SA208**	**P208**	1,89
45	54	189	146	50	15	21	20	107,5	42,2	10	M12	**SAP209**	**SA209**	**P209**	2,20
50	57,2	204	159	56	19	22	21	114	43,7	10,5	M16	**SAP210**	**SA210**	**P210**	2,73
55	63,5	217	172	58	19	22	22	126	48,4	11,5	M16	**SAP211**	**SA211**	**P211**	3,13

Note: Inch sizes available on request.

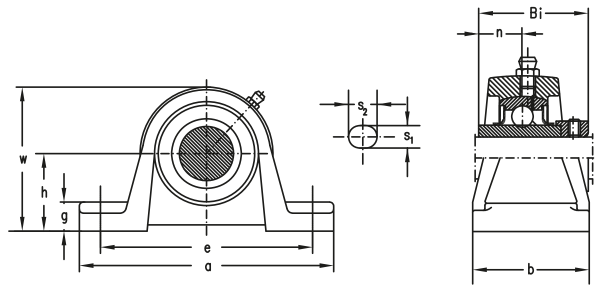
Standard duty pillow blocks cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	31,8	128	98	38	11	14	14	63,0	43,5	17	M10	**UELAK204**	**UEL204**	**AK204**	0,79
25	33,3	140	105	40	11	14	15	66,5	44,3	17,4	M10	**UELAK205**	**UEL205**	**AK205**	0,89
30	39,7	160	121	44	14	19	17	79,0	48,3	18,2	M12	**UELAK206**	**UEL206**	**AK206**	1,33
35	46,0	167	127	48	14	19	18	91,0	51,1	18,8	M12	**UELAK207**	**UEL207**	**AK207**	1,83
40	49,2	181	140	52	14	19	19	98,0	56,3	21,4	M12	**UELAK208**	**UEL208**	**AK208**	2,27
45	52,4	189	146	54	14	19	20	105,0	56,3	21,4	M12	**UELAK209**	**UEL209**	**AK209**	2,56
50	55,6	203	159	57	17,5	21	21	111,5	62,7	24,6	M16	**UELAK210**	**UEL210**	**AK210**	3,04
55	61,9	232	181	60	18	24	23	123	71,3	27,7	M16	**UELAK211**	**UEL211**	**AK211**	4,12
60	68,3	241	191	64	18	24	25	136	77,7	30,9	M16	**UELAK212**	**UEL212**	**AK212**	5,26
65	74,6	262	203	70	21	28	27	147,5	85,7	34,1	M20	**UELAK213**	**UEL213**	**AK213**	6,68
70	77,8	266	210	74	21	28	28	153,5	85,7	34,1	M20	**UELAK214**	**UEL214**	**AK214**	7,42
75	82,6	304	241	78	21	32	30	162	92,1	37,3	M20	**UELAK215**	**UEL215**	**AK215**	9,19

Note: Inch sizes available on request.

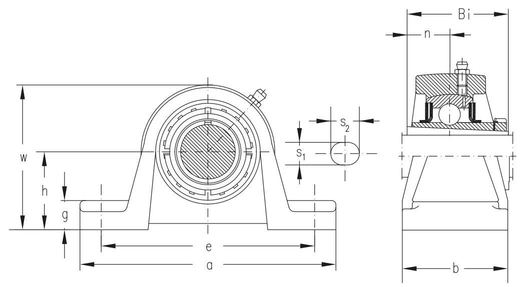
Standard duty pillow blocks cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
12	30,2	127	96	38	13	16	11	60,7	43,5	17,0	M10	**UELP201**	**UEL201**	**P203**	0,74
15	30,2	127	96	38	13	16	11	60,7	43,5	17,0	M10	**UELP202**	**UEL202**	**P203**	0,72
17	30,2	127	96	38	13	16	11	60,7	43,5	17,0	M10	**UELP203**	**UEL203**	**P203**	0,71
20	33,3	127	96	35	13	16	14	65,0	43,5	17,0	M10	**UELP204**	**UEL204**	**P204**	0,71
25	36,5	140	105	36	13	19	15	71,0	44,3	17,4	M10	**UELP205**	**UEL205**	**P205**	0,81
30	42,9	160	121	42	14	19	16	84,0	48,3	18,2	M12	**UELP206**	**UEL206**	**P206**	1,31
35	47,6	167	127	45	15	19	17	94,0	51,1	18,8	M12	**UELP207**	**UEL207**	**P207**	1,68
40	49,2	180	137	49	15	21	18	100,0	56,3	21,4	M12	**UELP208**	**UEL208**	**P208**	2,02
45	54	189	146	50	15	21	20	107,5	56,3	21,4	M12	**UELP209**	**UEL209**	**P209**	2,36
50	57,2	204	159	56	19	22	21	114,0	62,7	24,6	M16	**UELP210**	**UEL210**	**P210**	2,94
55	63,5	217	172	58	19	22	22	126	71,3	27,7	M16	**UELP211**	**UEL211**	**P211**	3,59
60	69,9	238	186	64	19	25	24	139	77,7	30,9	M16	**UELP212**	**UEL212**	**P212**	4,95
65	76,2	262	203	70	23	25	26	149	85,7	34,1	M20	**UELP213**	**UEL213**	**P213**	6,35
70	79,4	266	210	72	23	29	27	155	85,7	34,1	M20	**UELP214**	**UEL214**	**P214**	6,95
75	82,6	274	217	74	25	29	28	161,6	92,1	37,3	M20	**UELP215**	**UEL215**	**P215**	7,70

Note: Inch sizes available on request.

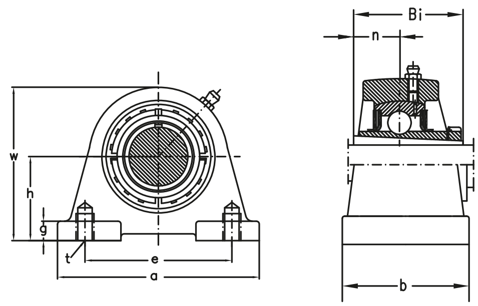
Standard duty pillow blocks cast housing adapter type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	36,5	140	105	36	13	19	15	71	35	M10	**UKP205**	**UK205**	**P205**	0,71
25	42,9	160	121	42	14	19	16	84	38	M12	**UKP206**	**UK206**	**P206**	1,15
30	47,6	167	127	45	15	19	17	94	43	M12	**UKP207**	**UK207**	**P207**	1,45
35	49,2	180	137	49	15	21	18	100	46	M12	**UKP208**	**UK208**	**P208**	1,72
40	54	189	146	50	15	21	20	107,5	50	M12	**UKP209**	**UK209**	**P209**	2,04
45	57,2	204	159	56	19	22	21	114	55	M16	**UKP210**	**UK210**	**P210**	2,52
50	63,5	217	172	58	19	22	22	126	59	M16	**UKP211**	**UK211**	**P211**	3,03
55	69,9	238	186	64	19	25	24	139	62	M16	**UKP212**	**UK212**	**P212**	4,25
60	76,2	262	203	70	23	29	26	149	65	M20	**UKP213**	**UK213**	**P213**	5,31

Note: Inch sizes available on request.

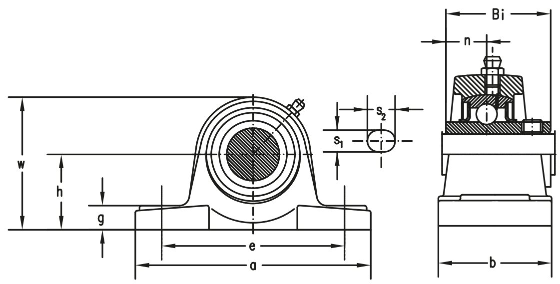
Standard duty pillow blocks cast housing adapter type



Shaft dia.	Nominal dimensions h	a	e	b	g	w	f	t	Bi	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	36,5	84	56	38	12	72	15	M10	35	M10	**UKPA205**	**UK205**	**PA205**	0,65
25	42,9	94	66	48	13	84	18	M14	38	M14	**UKPA206**	**UK206**	**PA206**	1,00
30	47,6	110	80	48	13	95	20	M14	43	M14	**UKPA207**	**UK207**	**PA207**	1,39
35	49,2	116	84	54	13	100	20	M14	46	M14	**UKPA208**	**UK208**	**PA208**	1,59
40	54,2	120	90	60	13	108	25	M14	50	M14	**UKPA209**	**UK209**	**PA209**	2,02
45	57,2	130	94	60	14	116	25	M16	55	M16	**UKPA210**	**UK210**	**PA210**	2,32
50	63,5	140	104	66	14	125	25	M16	59	M16	**UKPA211**	**UK211**	**PA211**	2,82
55	69,9	150	114	68	15	138	25	M16	62	M16	**UKPA212**	**UK212**	**PA212**	3,67
60	76,2	160	124	70	15	150	25	M16	65	M16	**UKPA213**	**UK213**	**PA213**	4,46

Note: Inch sizes available on request.

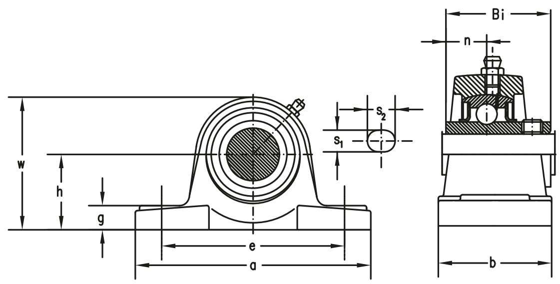
Medium duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
25	44,4	159	119	51	17	20	17	85	38,1	15,9	M14	**UCPX05**	**UCX05**	**PX05**	1,48
30	47,6	175	127	54	17	20	20	93	42,9	17,5	M14	**UCPX06**	**UCX06**	**PX06**	1,85
35	54	203	144	57	17	20	21	105	49,2	19	M14	**UCPX07**	**UCX07**	**PX07**	2,49
40	58,7	222	156	65	20	23	23	112	49,2	19	M16	**UCPX08**	**UCX08**	**PX08**	3,13
45	58,7	222	156	67	20	23	25	116	51,6	19	M16	**UCPX09**	**UCX09**	**PX09**	3,35
50	63,5	240	171	71	20	23	25	126	55,6	22,2	M16	**UCPX10**	**UCX10**	**PX10**	4,17
55	69,8	260	184	79	25	28	29	137	65,1	25,4	M20	**UCPX11**	**UCX11**	**PX11**	5,65
60	76,2	280	203	81	25	28	31	149	65,1	25,4	M20	**UCPX12**	**UCX12**	**PX12**	6,80
65	76,2	286	203	83	25	28	33	152	74,6	30,2	M20	**UCPX13**	**UCX13**	**PX13**	7,42
70	88,9	320	229	85	27	30	34	170	77,8	33,3	M22	**UCPX14**	**UCX14**	**PX14**	9,59
75	88,9	330	229	92	27	30	35	175	82,6	33,3	M22	**UCPX15**	**UCX15**	**PX15**	10,91
80	101,6	378	283	99	27	30	37	194	85,7	34,1	M22	**UCPX16**	**UCX16**	**PX16**	15,09

Note: Inch sizes available on request.

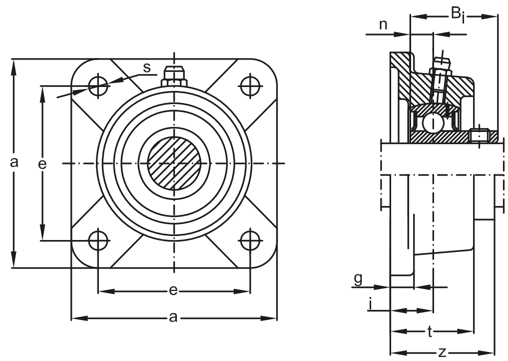
Heavy duty pillow blocks cast housing set screws type



Shaft dia.	Nominal dimensions h	a	e	b	s_1	s_2	g	w	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
25	45	173	132	45	17	20	15	85	38	15	M14	**UCP305**	**UC305**	**P305**	1,27
30	50	180	140	50	17	20	15	95	43	17	M14	**UCP306**	**UC306**	**P306**	1,86
35	56	210	160	56	17	25	19	106	48	19	M14	**UCP307**	**UC307**	**P307**	2,66
40	60	218	170	62	18	25	19	116	52	19	M14	**UCP308**	**UC308**	**P308**	3,37
45	67	244	190	66	20	26	23	129	57	22	M16	**UCP309**	**UC309**	**P309**	4,26
50	75	271	212	74	20	30	26	143	61	22	M16	**UCP310**	**UC310**	**P310**	6,17
55	80	300	236	80	20	32	29	154	66	25	M16	**UCP311**	**UC311**	**P311**	7,12
60	85	325	250	85	23	35	31	164	71	26	M20	**UCP312**	**UC312**	**P312**	9,10
65	90	335	260	90	25	38	33	176	75	30	M20	**UCP313**	**UC313**	**P313**	11,04
70	95	360	280	93	27	40	34	187	78	33	M22	**UCP314**	**UC314**	**P314**	12,82
75	100	380	290	100	27	40	35	198	82	32	M22	**UCP315**	**UC315**	**P315**	15,40
80	106	400	300	105	27	40	37	210	86	34	M22	**UCP316**	**UC316**	**P316**	18,00

Note: Inch sizes available on request.

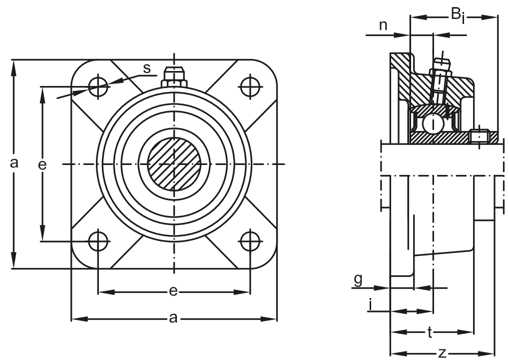
Standard duty flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	63,5	19	15	29,5	11,5	37,0	25	7,0	M10	**SBFS204**	**SB204**	**FS204**	0,59
25	93	70,0	19	15	30,0	11,5	38,5	27	7,5	M10	**SBFS205**	**SB205**	**FS205**	0,72
30	106	82,5	20	16	32,5	13,0	41,0	29	8,0	M12	**SBFS206**	**SB206**	**FS206**	0,95
35	116	92,0	21	17	35,0	13,0	44,5	32	8,5	M12	**SBFS207**	**SB207**	**FS207**	1,25
40	129	101,5	24	17	39,0	14,0	48,5	34	9,5	M12	**SBFS208**	**SB208**	**FS208**	1,60

Note: Inch sizes available on request.

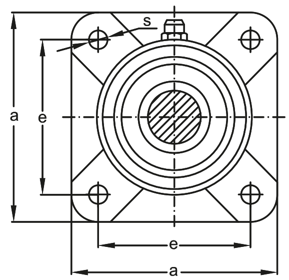
Standard duty flanged units cast housing set screws type

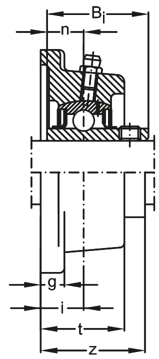


Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	64	15	12	25,5	12	33,0	25	7,0	M10	**SBF204**	**SB204**	**F204**	0,49
25	95	70	16	13	27,0	12	35,5	27	7,5	M10	**SBF205**	**SB205**	**F205**	0,70
30	108	83	18	13	31,0	12	39,0	29	8,0	M10	**SBF206**	**SB206**	**F206**	0,99
35	117	92	19	15	34,0	14	42,5	32	8,5	M12	**SBF207**	**SB207**	**F207**	1,25
40	130	102	21	15	36,0	16	45,5	34,0	9,5	M14	**SBF208**	**SB208**	**F208**	1,63

Note: Inch sizes available on request.

Standard duty flanged units cast housing set screws type

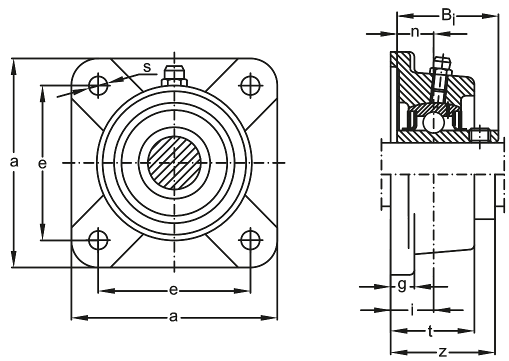




Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	63,5	19	15	29,5	11,5	37,3	31,0	12,7	M10	**UCFS204**	**UC204**	**FS204**	0,63
25	93	70,0	19	15	30,0	11,5	38,7	34,0	14,3	M10	**UCFS205**	**UC205**	**FS205**	0,76
30	106	82,5	20	16	32,5	13,0	42,2	38,1	15,9	M12	**UCFS206**	**UC206**	**FS206**	1,01
35	116	92,0	21	17	35,0	13,0	46,4	42,9	17,5	M12	**UCFS207**	**UC207**	**FS207**	1,34
40	129	101,5	24	17	39,0	14,0	54,2	49,2	19,0	M12	**UCFS208**	**UC208**	**FS208**	1,74
45	135	105,0	24	18	40,0	16,0	54,2	49,2	19,0	M14	**UCFS209**	**UC209**	**FS209**	1,98
50	143	111,0	28	20	45,0	16,0	60,6	51,6	19,0	M14	**UCFS210**	**UC210**	**FS210**	2,43
55	162	130,0	31	21	49,0	17,0	64,4	55,6	22,2	M14	**UCFS211**	**UC211**	**FS211**	3,43
60	175	143,0	34	22	53,5	17,0	73,7	65,1	25,4	M14	**UCFS212**	**UC212**	**FS212**	4,24
65	184	149,0	38	22	58,0	18,0	77,7	65,1	25,4	M16	**UCFS213**	**UC213**	**FS213**	5,11
70	188	152,0	38	23	60,0	18,0	82,4	74,6	30,2	M16	**UCFS214**	**UC214**	**FS214**	5,30
75	200	152,4	41	24	62,0	20,0	85,5	77,8	33,3	M16	**UCFS215**	**UC215**	**FS215**	6,38

Note: Inch sizes available on request.

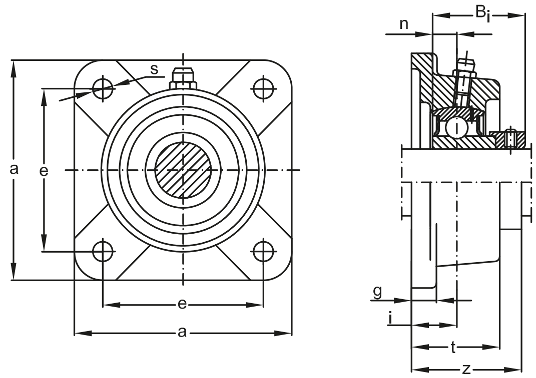
Standard duty flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
12	86	64	15	12	25,5	12	33,3	31,0	12,7	M10	**UCF201**	**UC201**	**F204**	0,57
15	86	64	15	12	25,5	12	33,3	31,0	12,7	M10	**UCF202**	**UC202**	**F204**	0,56
17	86	64	15	12	25,5	12	33,3	31,0	12,7	M10	**UCF203**	**UC203**	**F204**	0,55
20	86	64	15	12	25,5	12	33,3	31,0	12,7	M10	**UCF204**	**UC204**	**F204**	0,53
25	95	70	16	13	27	12	35,7	34,0	14,3	M10	**UCF205**	**UC205**	**F205**	0,74
30	108	83	18	13	31	12	40,2	38,1	15,9	M10	**UCF206**	**UC206**	**F206**	1,05
35	117	92	19	15	34	14	44,4	42,9	17,5	M12	**UCF207**	**UC207**	**F207**	1,34
40	130	102	21	15	36	16	51,2	49,2	19	M14	**UCF208**	**UC208**	**F208**	1,77
45	137	105	22	16	38	16	52,2	49,2	19	M14	**UCF209**	**UC209**	**F209**	2,05
50	143	111	22	16	40	16	54,6	51,6	19	M14	**UCF210**	**UC210**	**F210**	2,35
55	162	130	25	18	43	19	58,4	55,6	22,2	M16	**UCF211**	**UC211**	**F211**	3,00
60	175	143	29	18	48	19	68,7	65,1	25,4	M16	**UCF212**	**UC212**	**F212**	3,57
65	187	149	30	22	50	19	69,7	65,1	25,4	M16	**UCF213**	**UC213**	**F213**	4,92
70	193	152	31	22	54	19	75,4	74,6	30,2	M16	**UCF214**	**UC214**	**F214**	5,62
75	200	159	34	22	56	19	78,5	77,8	33,3	M16	**UCF215**	**UC215**	**F215**	5,55
80	208	165	34	24	58	23	83,3	82,6	33,3	M20	**UCF216**	**UC216**	**F216**	6,99
85	220	175	36	26	63	23	87,6	85,7	34,1	M20	**UCF217**	**UC217**	**F217**	8,58
90	235	187	40	26	68	23	96,3	96,0	39,7	M20	**UCF218**	**UC218**	**F218**	11,20

Note: Inch sizes available on request.

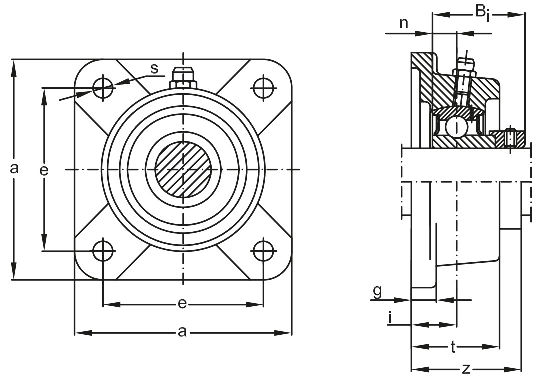
Standard duty flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	63,5	19	15	29,5	11,5	41,5	29,5	7,0	M10	**SAFS204**	**SA204**	**FS204**	0,64
25	93	70,0	19	15	30,0	11,5	42,0	30,5	7,5	M10	**SAFS205**	**SA205**	**FS205**	0,75
30	106	82,5	20	16	32,5	13,0	45,9	33,9	8,0	M12	**SAFS206**	**SA206**	**FS206**	1,02
35	116	92,0	21	17	35,0	13,0	50,0	37,5	8,5	M12	**SAFS207**	**SA207**	**FS207**	1,37
40	129	101,5	24	17	39,0	14,0	55,0	40,5	9,5	M12	**SAFS208**	**SA208**	**FS208**	1,75
45	135	105,0	24	18	40,0	16,0	56,2	42,2	10,0	M14	**SAFS209**	**SA209**	**FS209**	1,99
50	143	111,0	28	20	45,0	16,0	61,2	43,7	10,5	M14	**SAFS210**	**SA210**	**FS210**	2,43
55	162	130,0	31	21	49,0	17,0	67,9	48,4	11,5	M14	**SAFS211**	**SA211**	**FS211**	3,18

Note: Inch sizes available on request.

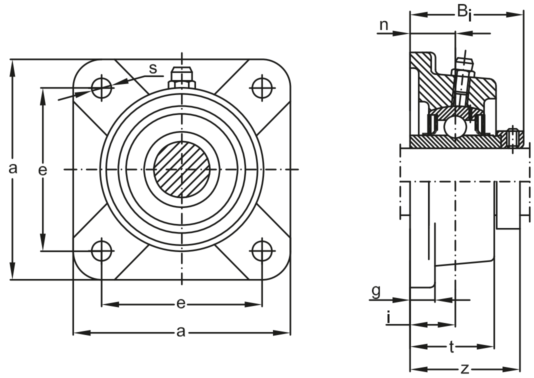
Standard duty flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	64	15	12	25,5	12	37,5	29,5	7,0	M10	**SAF204**	**SA204**	**F204**	0,54
25	95	70	16	13	27,0	12	39,0	30,5	7,5	M10	**SAF205**	**SA205**	**F205**	0,73
30	108	83	18	13	31,0	12	43,9	33,9	8,0	M10	**SAF206**	**SA206**	**F206**	1,06
35	117	92	19	15	34,0	14	48,0	37,5	8,5	M12	**SAF207**	**SA207**	**F207**	1,37
40	130	102	21	15	36,0	16	52,0	40,5	9,5	M14	**SAF208**	**SA208**	**F208**	1,78
45	137	105	22	16	38,0	16	54,2	42,2	10,0	M14	**SAF209**	**SA209**	**F209**	2,06
50	143	111	22	16	40,0	16	55,2	43,7	10,5	M14	**SAF210**	**SA210**	**F210**	2,35
55	162	130	25	18	43,0	19	61,9	48,4	11,5	M16	**SAF211**	**SA211**	**F211**	2,75

Note: Inch sizes available on request.

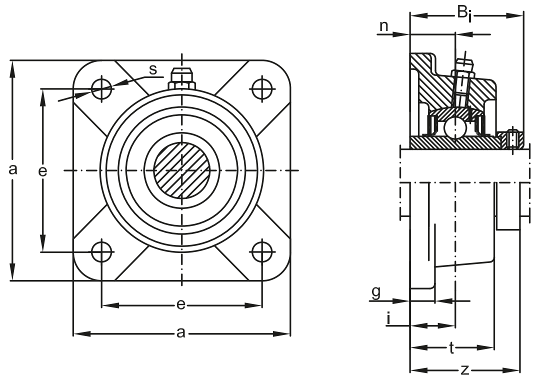
Standard duty flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	86	63,5	19	15	29,5	11,5	45,5	43,5	17	M10	**UELFS204**	**UEL204**	**FS204**	0,68
25	93	70	19	15	30	11,5	45,9	44,3	17,4	M10	**UELFS205**	**UEL205**	**FS205**	0,80
30	106	82,5	20	16	32,5	13,0	50,1	48,3	18,2	M12	**UELFS206**	**UEL206**	**FS206**	1,10
35	116	92	21	17	35	13	53,3	51,1	18,8	M12	**UELFS207**	**UEL207**	**FS207**	1,47
40	129	101,5	24	17	39	14	58,9	56,3	21,4	M12	**UELFS208**	**UEL208**	**FS208**	1,88
45	135	105	24	18	40	16	58,9	56,3	21,4	M14	**UELFS209**	**UEL209**	**FS209**	2,15
50	143	111	28	20	45	16	66,1	62,7	24,6	M14	**UELFS210**	**UEL210**	**FS210**	2,64
55	162	130	31	21	49	17	74,6	71,3	27,7	M14	**UELFS211**	**UEL211**	**FS211**	3,70
60	175	143	34	22	53,5	17	80,8	77,7	30,9	M14	**UELFS212**	**UEL212**	**FS212**	4,58
65	184	149	38	22	58	18	89,6	85,7	34,1	M16	**UELFS213**	**UEL213**	**FS213**	5,66
70	188	152	38	23	60	18	89,6	85,7	34,1	M16	**UELFS214**	**UEL214**	**FS214**	5,82
75	200	152,4	41	24	62	20	95,8	92,1	37,3	M16	**UELFS215**	**UEL215**	**FS215**	7,01

Note: Inch sizes available on request.

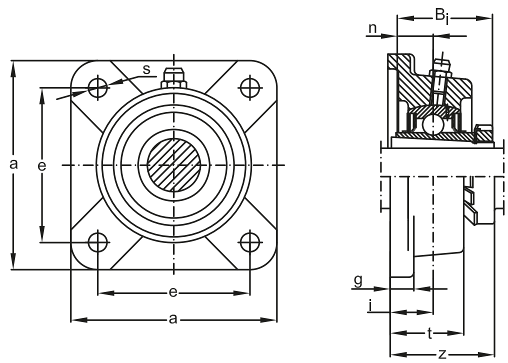
Standard duty flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
12	86	64	15	12	25,5	12	41,5	43,5	17	M10	**UELF201**	**UEL201**	**F204**	0,63
15	86	64	15	12	25,5	12	41,5	43,5	17	M10	**UELF202**	**UEL202**	**F204**	0,61
17	86	64	15	12	25,5	12	41,5	43,5	17	M10	**UELF203**	**UEL203**	**F204**	0,60
20	86	64	15	12	25,5	12	41,5	43,5	17	M10	**UELF204**	**UEL204**	**F204**	0,58
25	95	70	16	13	27	12	42,9	44,3	17,4	M10	**UELF205**	**UEL205**	**F205**	0,78
30	108	83	18	13	31	12	48,1	48,3	18,2	M10	**UELF206**	**UEL206**	**F206**	1,14
35	117	92	19	15	34	14	51,3	51,1	18,8	M12	**UELF207**	**UEL207**	**F207**	1,47
40	130	102	21	15	36	16	55,9	56,3	21,4	M14	**UELF208**	**UEL208**	**F208**	1,91
45	137	105	22	16	38	16	56,9	56,3	21,4	M14	**UELF209**	**UEL209**	**F209**	2,22
50	143	111	22	16	40	16	60,1	62,7	24,6	M14	**UELF210**	**UEL210**	**F210**	2,56
55	162	130	25	18	43	19	68,6	71,3	27,7	M16	**UELF211**	**UEL211**	**F211**	3,27
60	175	143	29	18	48	19	75,8	77,7	30,9	M16	**UELF212**	**UEL212**	**F212**	3,91
65	187	149	30	22	50	19	81,6	85,7	34,1	M16	**UELF213**	**UEL213**	**F213**	5,47
70	193	152	31	22	54	19	82,6	85,7	34,1	M16	**UELF214**	**UEL214**	**F214**	6,14
75	200	159	34	22	56	19	88,8	92,1	37,3	M16	**UELF215**	**UEL215**	**F215**	6,18

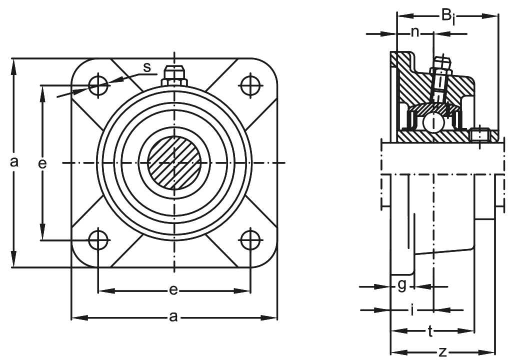
Note: Inch sizes available on request.

Standard duty flanged units cast housing adapter type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
20	95	70	16	13	27	12	35,5	35		M10	**UKF205**	**UK205**	**F205**	0.68
25	108	83	18	13	31	12	39,0	38		M10	**UKF206**	**UK206**	**F206**	0.98
30	117	92	19	15	34	14	42,5	43		M12	**UKF207**	**UK207**	**F207**	1.24
35	130	102	21	15	36	16	46,5	46		M14	**UKF208**	**UK208**	**F208**	1.61
40	137	105	22	16	38	16	48,5	50		M14	**UKF209**	**UK209**	**F209**	1.90
45	143	111	22	16	40	16	50,0	55		M14	**UKF210**	**UK210**	**F210**	2.14
50	162	130	25	18	43	19	54,5	59		M16	**UKF211**	**UK211**	**F211**	2.65
55	175	143	29	18	48	19	61,0	62		M16	**UKF212**	**UK212**	**F212**	3.07
60	187	149	30	22	50	19	64,0	65		M16	**UKF213**	**UK213**	**F213**	4.42

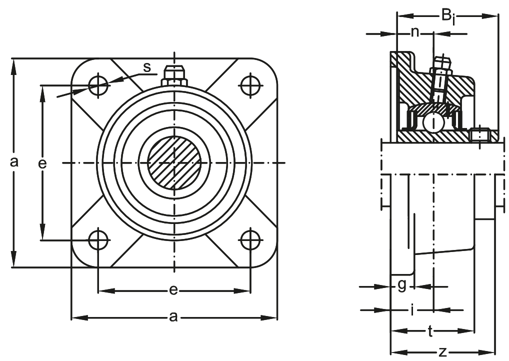
Medium duty flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
25	108	82,5	18	13	30	12	40,2	38,1	15,9	M10	**UCFX05**	**UCX05**	**FX05**	1,15
30	117	92,0	19	14	34	16	44,4	42,9	17,5	M14	**UCFX06**	**UCX06**	**FX06**	1,50
35	130	101,5	21	14	38	16	51,2	49,2	19,0	M14	**UCFX07**	**UCX07**	**FX07**	1,97
40	137	105,0	22	14	40	19	52,2	49,2	19,0	M16	**UCFX08**	**UCX08**	**FX08**	2,18
45	143	111,0	23	14	40	19	55,6	51,6	19,0	M16	**UCFX09**	**UCX09**	**FX09**	2,37
50	162	130,0	26	20	44	19	59,4	55,6	22,2	M16	**UCFX10**	**UCX10**	**FX10**	3,47
55	175	143,0	29	20	49	19	68,7	65,1	25,4	M16	**UCFX11**	**UCX11**	**FX11**	4,13
60	187	149	34	21	59	19	73,7	65,1	25,4	M16	**UCFX12**	**UCX12**	**FX12**	5,70
65	187	149	34	21	59	19	78,4	74,6	30,2	M18	**UCFX13**	**UCX13**	**FX13**	5,77
70	197	152	37	24	60	23	81,5	77,8	33,3	M20	**UCFX14**	**UCX14**	**FX14**	6,79
75	197	152	40	24	68	23	89,3	82,6	33,3	M20	**UCFX15**	**UCX15**	**FX15**	7,66
80	214	171	40	24	70	23	91,6	85,7	34,1	M20	**UCFX16**	**UCX16**	**FX16**	9,99

Note: Inch sizes available on request.

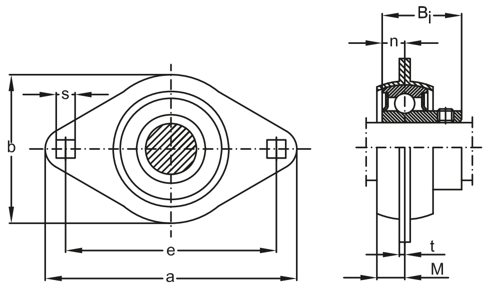
Heavy duty flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm											-			Kg
25	108	80	16	13	29	16	39	38	15	M14	**UCF305**	**UC305**	**F305**	1,01
30	125	95	18	15	32	16	44	43	17	M14	**UCF306**	**UC306**	**F306**	1,53
35	135	100	20	16	36	19	49	48	19	M16	**UCF307**	**UC307**	**F307**	1,86
40	150	112	23	17	40	19	56	52	19	M16	**UCF308**	**UC308**	**F308**	2,65
45	160	125	25	18	44	19	60	57	22	M16	**UCF309**	**UC309**	**F309**	3,21
50	175	132	28	20	48	23	67	61	22	M20	**UCF310**	**UC310**	**F310**	4,32
55	185	140	30	20	52	23	71	66	25	M20	**UCF311**	**UC311**	**F311**	5,24
60	193	150	33	22	56	23	78	71	26	M20	**UCF312**	**UC312**	**F312**	6,40
65	208	166	33	22	58	23	78	75	30	M20	**UCF313**	**UC313**	**F313**	7,54
70	226	178	36	25	61	25	81	78	33	M22	**UCF314**	**UC314**	**F314**	9,02
75	236	184	39	25	66	25	89	82	32	M22	**UCF315**	**UC315**	**F315**	10,45
80	250	196	38	27	68	31	90	86	34	M27	**UCF316**	**UC316**	**F316**	14,00

Note: Inch sizes available on request.

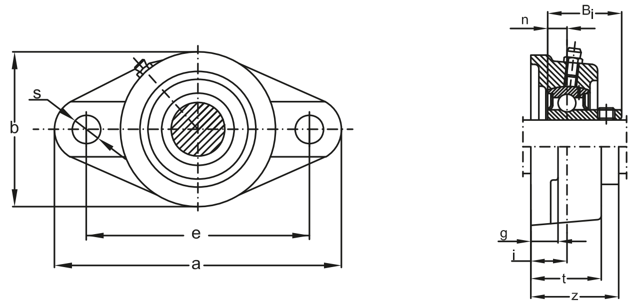
Standard duty two bolts flanged units pressed steel housing set screws type



Shaft dia.	Nominal dimensions a	e	M	t	s	b	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm										-			Kg
12	81	63,5	7,0	2,0	7,1	59	22	6	M6	**SBPFL201**	**SB201**	**PFL203**	0,18
15	81	63,5	7,0	2,0	7,1	59	22	6	M6	**SBPFL202**	**SB202**	**PFL203**	0,17
17	81	63,5	7,0	2,0	7,1	59	22	6	M6	**SBPFL203**	**SB203**	**PFL203**	0,16
20	90	71,5	8,0	2,0	9	67	25	7	M8	**SBPFL204**	**SB204**	**PFL204**	0,22
25	95	76,0	9,0	2,0	9	71	27	7,5	M8	**SBPFL205**	**SB205**	**PFL205**	0,27
30	113	90,5	9,5	2,6	11	84	29	8	M10	**SBPFL206**	**SB206**	**PFL206**	0,44
35	122	100	11	2,6	11	94	32	8,5	M10	**SBPFL207**	**SB207**	**PFL207**	0,58

Note: Inch sizes available on request.

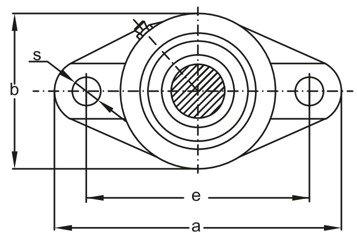
Standard duty two bolts flanged units cast housing set screws type

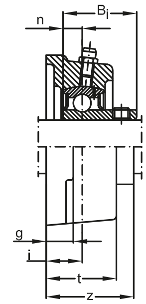


Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	112,5	90	19	15	29,5	10	61	37	25	7	M8	**SBFT204**	**SB204**	**FT204**	0,40
25	123	99	19	15	30	11,5	70	38,5	27	7,5	M10	**SBFT205**	**SB205**	**FT205**	0,56
30	142	116,5	20	16	32,5	11,5	82	41	29	8	M10	**SBFT206**	**SB206**	**FT206**	0,79
35	158	130	21	17	36	13	94	44,5	32	8,5	M10	**SBFT207**	**SB207**	**FT207**	1,18
40	172	143,5	24	17	39	13	103	48,5	34	9,5	M10	**SBFT208**	**SB208**	**FT208**	1,35

Note: Inch sizes available on request.

Standard duty two bolts flanged units cast housing set screws type

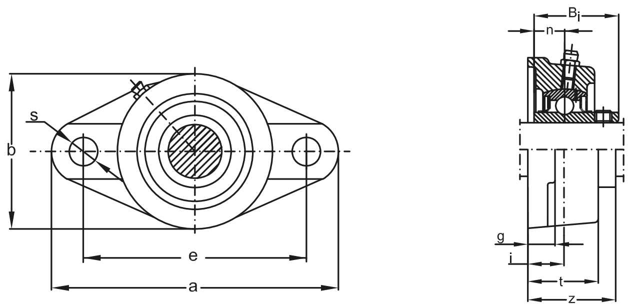




Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	113	90	15	11	25,5	12	60	33	25	7	M10	**SBFL204**	**SB204**	**FL204**	0,39
25	130	99	16	13	27	16	68	35,5	27	7,5	M14	**SBFL205**	**SB205**	**FL205**	0,56
30	148	117	18	13	31	16	80	39	29	8	M14	**SBFL206**	**SB206**	**FL206**	0,85
35	161	130	19	14	34	16	90	42,5	32	8,5	M14	**SBFL207**	**SB207**	**FL207**	1,05
40	175	144	21	14	36	16	100	45,5	34	9,5	M14	**SBFL208**	**SB208**	**FL208**	1,29

Note: Inch sizes available on request.

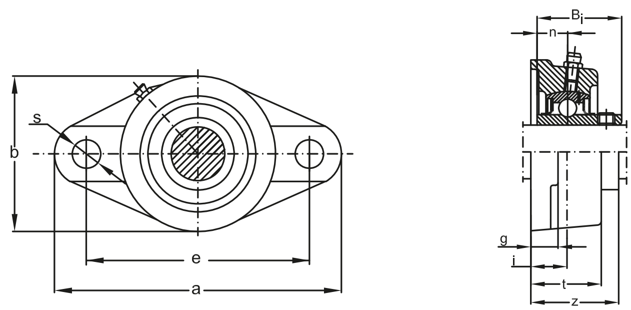
Standard duty two bolts flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	112,5	90	19	15	29,5	10	61	37,3	31	12,7	M8	**UCFT204**	**UC204**	**FT204**	0,51
25	123	99	19	15	30	11,5	70	38,7	34	14,3	M10	**UCFT205**	**UC205**	**FT205**	0,60
30	142	116,5	20	16	32,5	11,5	82	42,2	38,1	15,9	M10	**UCFT206**	**UC206**	**FT206**	0,85
35	158	130	21	17	36	13	94	46,4	42,9	17,5	M10	**UCFT207**	**UC207**	**FT207**	1,27
40	172	143,5	24	17	39	13	103	54,2	49,2	19	M10	**UCFT208**	**UC208**	**FT208**	1,49
45	180	148,5	24	18	40	15	108	54,2	49,2	19	M12	**UCFT209**	**UC209**	**FT209**	1,71
50	190	157	28	20	45	15	114	60,6	51,6	19	M12	**UCFT210**	**UC210**	**FT210**	1,97
55	217	184	31	21	48	16,5	128	64,4	55,6	22,2	M14	**UCFT211**	**UC211**	**FT211**	2,79
60	237	202	34	21	53	16,5	138	73,7	65,1	25,4	M14	**UCFT212**	**UC212**	**FT212**	3,62
65	256	210	38	22	56	21	152	77,7	65,1	25,4	M20	**UCFT213**	**UC213**	**FT213**	4,51
70	264	216	38	23	58	21	157	82,4	74,6	30,2	M20	**UCFT214**	**UC214**	**FT214**	4,81

Note: Inch sizes available on request.

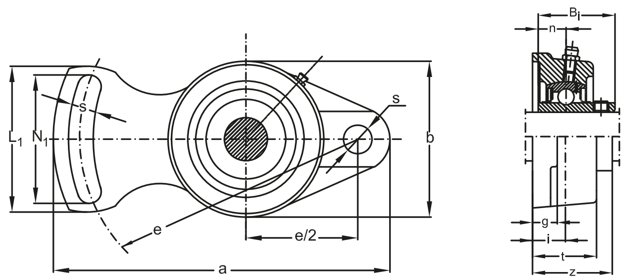
Standard duty two bolts flanged units cast housing set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
12	113	90	15	11	25,5	12	60	33,3	31	12,7	M10	**UCFL201**	**UC201**	**FL201**	0,47
15	113	90	15	11	25,5	12	60	33,3	31	12,7	M10	**UCFL202**	**UC202**	**FL202**	0,46
17	113	90	15	11	25,5	12	60	33,3	31	12,7	M10	**UCFL203**	**UC203**	**FL203**	0,45
20	113	90	15	11	25,5	12	60	33,3	31	12,7	M10	**UCFL204**	**UC204**	**FL204**	0,43
25	130	99	16	13	27	16	68	35,7	34	14,3	M14	**UCFL205**	**UC205**	**FL205**	0,60
30	148	117	18	13	31	16	80	40,2	38,1	15,9	M14	**UCFL206**	**UC206**	**FL206**	0,91
35	161	130	19	14	34	16	90	44,4	42,9	17,5	M14	**UCFL207**	**UC207**	**FL207**	1,14
40	175	144	21	14	36	16	100	51,2	49,2	19	M14	**UCFL208**	**UC208**	**FL208**	1,43
45	188	148	22	16	38	19	108	52,2	49,2	19	M16	**UCFL209**	**UC209**	**FL209**	1,80
50	197	157	22	16	40	19	115	54,6	51,6	19	M16	**UCFL210**	**UC210**	**FL210**	2,13
55	224	184	25	18	43	19	130	58,4	55,6	22,2	M16	**UCFL211**	**UC211**	**FL211**	2,86
60	250	202	29	18	48	23	140	68,7	65,1	25,4	M20	**UCFL212**	**UC212**	**FL212**	3,76
65	258	210	30	20	50	23	155	69,7	65,1	25,4	M20	**UCFL213**	**UC213**	**FL213**	4,63
70	265	216	31	20	54	23	160	75,4	74,6	30,2	M20	**UCFL214**	**UC214**	**FL214**	5,22
75	275	225	34	20	56	23	165	78,5	77,8	33,3	M20	**UCFL215**	**UC215**	**FL215**	5,36
80	290	233	34	22	58	25	180	83,3	82,6	33,3	M22	**UCFL216**	**UC216**	**FL216**	6,99
85	305	248	36	22	63	25	190	87,6	85,7	34,1	M22	**UCFL217**	**UC217**	**FL217**	8,28
90	320	265	40	23	68	25	205	96,3	96	39,7	M22	**UCFL218**	**UC218**	**FL218**	10,7

Note: Inch sizes available on request.

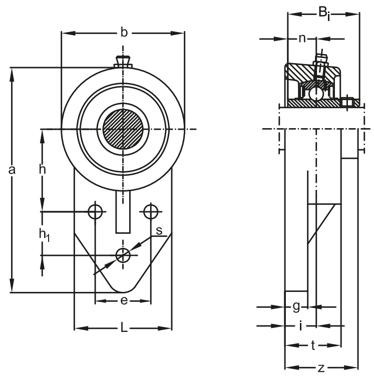
Standard duty flanged units cast housing special type set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	N_1	b	L_1	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm														-			Kg
12	102	78	15	12	25,5	10	40	60	54	33,3	31	12,7	M8	**UCFA201**	**UC201**	**FA201**	0,49
15	102	78	15	12	25,5	10	40	60	54	33,3	31	12,7	M8	**UCFA202**	**UC202**	**FA202**	0,48
17	102	78	15	12	25,5	10	40	60	54	33,3	31	12,7	M8	**UCFA203**	**UC203**	**FA203**	0,47
20	102	78	15	12	25,5	10	40	60	54	33,3	31	12,7	M8	**UCFA204**	**UC204**	**FA204**	0,45
25	125	98	16	14	27	12	51	68	65	34,7	34	14,3	M10	**UCFA205**	**UC205**	**FA205**	0,64
30	144	117	18	14	31	12	58	80	72	40,2	38,1	15,9	M10	**UCFA206**	**UC206**	**FA206**	0,92
35	161	130	19	16	34	14	66	90	82	45,4	42,9	17,5	M12	**UCFA207**	**UC207**	**FA207**	1,27
40	175	144	21	16	36	14	71	100	87	52,2	49,2	19	M12	**UCFA208**	**UC208**	**FA208**	1,62
45	178	146	22	16	38	16	72	108	88	52,2	49,2	19	M14	**UCFA209**	**UC209**	**FA209**	1,84
50	188	155	22	16	39	16	75	114	92	54,6	51,6	19	M14	**UCFA210**	**UC210**	**FA210**	2,10
55	216	182	25	18	42,5	16	84	128	102	58,4	55,6	22,2	M14	**UCFA211**	**UC211**	**FA211**	2,16
60	238	202	29	19	47,5	18	104	140	122	68,7	65,1	25,4	M16	**UCFA212**	**UC212**	**FA212**	2,92
65	248	210	30	20	49	18	106	152	126	69,7	65,1	25,4	M16	**UCFA213**	**UC213**	**FA213**	3,61

Note: Inch sizes available on request.

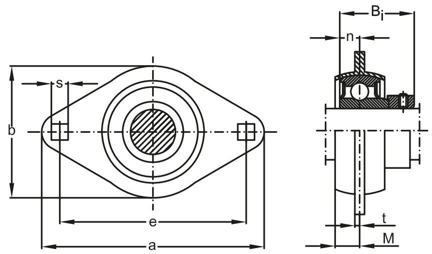
Standard duty flanged units cast housing special type set screws type



Shaft dia.	Nominal dimensions a	e	i	g	t	s	h	h_1	L	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm															-			Kg
12	109	32	15	11	25,5	10	42	27	52	60	33,3	31	12,7	M8	**UCFB201**	**UC201**	**FB201**	0,53
15	109	32	15	11	25,5	10	42	27	52	60	33,3	31	12,7	M8	**UCFB202**	**UC202**	**FB202**	0,52
17	109	32	15	11	25,5	10	42	27	52	60	33,3	31	12,7	M8	**UCFB203**	**UC203**	**FB203**	0,51
20	109	32	15	11	25,5	10	42	27	52	60	33,3	31	12,7	M8	**UCFB204**	**UC204**	**FB204**	0,49
25	116	34	16	13	27	10	45	27	56	68	35,7	34	14,3	M8	**UCFB205**	**UC205**	**FB205**	0,66
30	132	40	18	13	31	10	50	29	65	80	40,2	38,1	15,9	M8	**UCFB206**	**UC206**	**FB206**	0,99
35	144	46	19	14	33	10	55	32	70	90	44,4	42,9	17,5	M8	**UCFB207**	**UC207**	**FB207**	1,21
40	164	50	21	16	35	12	60	41	78	100	51,2	49,2	19	M10	**UCFB208**	**UC208**	**FB208**	1,72
45	175	54	22	16	38	12	65	43	80	108	52,2	49,2	19	M10	**UCFB209**	**UC209**	**FB209**	1,86
50	184	58	22	16	39	12	68	46	86	114	54,6	51,6	19	M10	**UCFB210**	**UC210**	**FB210**	2,36
55	207	62	25	18	42,5	14	78	50	90	128	58,4	55,6	22,2	M12	**UCFB211**	**UC211**	**FB211**	3,11
60	224	66	29	19	47,5	14	84	55	94	140	68,7	65,1	25,4	M12	**UCFB212**	**UC212**	**FB212**	4,07
65	244	70	30	20	49	14	92	60	102	152	69,7	65,1	25,4	M12	**UCFB213**	**UC213**	**FB213**	4,86

Note: Inch sizes available on request.

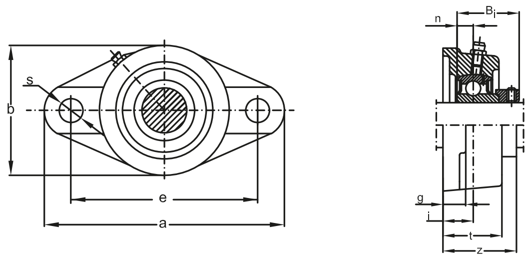
Standard duty two bolts flanged units pressed steel housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	e	M	t	s	b	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm										-			Kg
12	81	63,5	7	2	7,1	59	28,5	6	M6	**SAPFL201**	**SA201**	**PFL201**	0,22
15	81	63,5	7	2	7,1	59	28,5	6	M6	**SAPFL202**	**SA202**	**PFL202**	0,21
17	81	63,5	7	2	7,1	59	28,5	6	M6	**SAPFL203**	**SA203**	**PFL203**	0,20
20	90	71,5	8	2	9	67	29,5	7	M8	**SAPFL204**	**SA204**	**PFL204**	0,27
25	95	76	9	2	9	71	30,5	7,5	M8	**SAPFL205**	**SA205**	**PFL205**	0,30
30	113	90,5	9,5	2,6	11	84	33,9	8	M10	**SAPFL206**	**SA206**	**PFL206**	0,51
35	122	100	11	2,6	11	94	37,5	8,5	M10	**SAPFL207**	**SA207**	**PFL207**	0,70

Note: Inch sizes available on request.

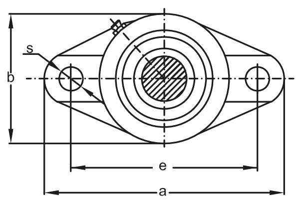
Standard duty two bolts flanged units cast housing eccentric locking collar type

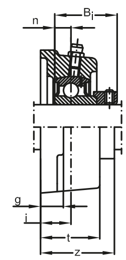


Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	112,5	90	19	15	29,5	10	61	41,5	29,5	7	M8	**SAFT204**	**SA204**	**FT204**	0,52
25	123	99	19	15	30	11,5	70	42	30,5	7,5	M10	**SAFT205**	**SA205**	**FT205**	0,59
30	142	116,5	20	16	32,5	11,5	82	45,9	33,0	8	M10	**SAFT206**	**SA206**	**FT206**	0,86
35	158	130	21	17	36	13	94	50	37,5	8,5	M10	**SAFT207**	**SA207**	**FT207**	1,30
40	172	143,5	24	17	39	13	103	55	40,5	9,5	M10	**SAFT208**	**SA208**	**FT208**	1,50
45	180	148,5	24	18	40	15	108	56,2	42,2	10	M12	**SAFT209**	**SA209**	**FT209**	1,72
50	190	157	28	20	45	15	114	61,2	43,7	10,5	M12	**SAFT210**	**SA210**	**FT210**	1,97
55	217	184	31	21	48	16,5	128	67,9	48,4	11,5	M14	**SAFT211**	**SA211**	**FT211**	2,54

Note: Inch sizes available on request.

Standard duty two bolts flanged units cast housing eccentric locking collar type

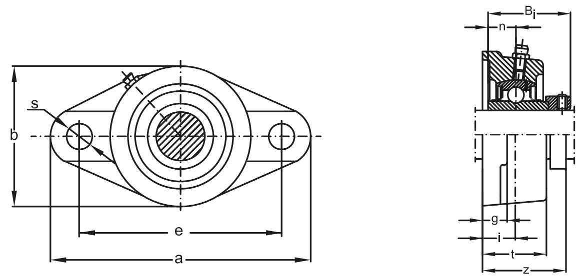




Shaft dia.	Nominal dimensions a	e	i	g	t	s	b	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm												-			Kg
20	113	90	15	11	25,5	12	60	37,5	29,5	7	M10	**SAFL204**	**SA204**	**FL204**	0,44
25	130	99	16	13	27	16	68	39	30,5	7,5	M14	**SAFL205**	**SA205**	**FL205**	0,59
30	148	117	18	13	31	16	80	43,9	33,9	8	M14	**SAFL206**	**SA206**	**FL206**	0,92
35	161	130	19	14	34	16	90	48	37,5	8,5	M14	**SAFL207**	**SA207**	**FL207**	1,17
40	175	144	21	14	36	16	100	52	40,5	9,5	M14	**SAFL208**	**SA208**	**FL208**	1,44
45	188	148	22	16	38	19	108	54,2	42,2	10	M16	**SAFL209**	**SA209**	**FL209**	1,81
50	197	157	22	16	40	19	115	55,2	43,7	10,5	M16	**SAFL210**	**SA210**	**FL210**	2,13
55	224	184	25	18	43	19	130	61,9	48,4	11,5	M16	**SAFL211**	**SA211**	**FL211**	2,61

Note: Inch sizes available on request.

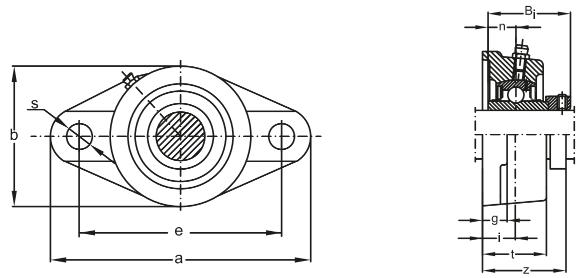
Standard duty two bolts flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions										Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	i	g	t	s	b	z	Bi	n					
mm															
20	112,5	90	19	15	29,5	10	61	45,5	43,5	17	M8	**UELFT204**	**UEL204**	**FT204**	0,56
25	123	99	19	15	30	11,5	70	45,9	44,3	17,4	M10	**UELFT205**	**UEL205**	**FT205**	0,64
30	142	116,5	20	16	32,5	11,5	82	50,1	48,3	18,2	M10	**UELFT206**	**UEL206**	**FT206**	0,94
35	158	130	21	17	36	13	94	53,3	51,1	18,8	M10	**UELFT207**	**UEL207**	**FT207**	1,40
40	172	143,5	24	17	39	13	103	58,9	56,3	21,4	M10	**UELFT208**	**UEL208**	**FT208**	1,63
45	180	148,5	24	18	40	15	108	58,9	56,3	21,4	M12	**UELFT209**	**UEL209**	**FT209**	1,88
50	190	157	28	20	45	15	114	66,1	62,7	24,6	M12	**UELFT210**	**UEL210**	**FT210**	2,18
55	217	184	31	21	48	16,5	128	74,6	71,3	27,7	M14	**UELFT211**	**UEL211**	**FT211**	3,06
60	237	202	34	21	53	16,5	138	80,8	77,7	30,9	M14	**UELFT212**	**UEL212**	**FT212**	3,96
65	256	210	38	22	56	21	152	89,6	85,7	34,1	M20	**UELFT213**	**UEL213**	**FT213**	5,06
70	264	216	38	23	58	21	157	89,6	85,7	34,1	M20	**UELFT214**	**UEL214**	**FT214**	5,33

Note: Inch sizes available on request.

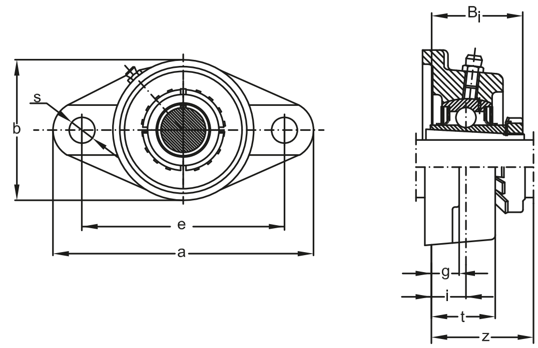
Standard duty two bolts flanged units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions										Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	i	g	t	s	b	z	Bi	n					
mm															
12	113	90	15	11	25,5	60	12	41,5	43,5	17	M10	**UELFL201**	**UEL201**	**FL201**	0,53
15	113	90	15	11	25,5	60	12	41,5	43,5	17	M10	**UELFL202**	**UEL202**	**FL202**	0,51
17	113	90	15	11	25,5	60	12	41,5	43,5	17	M10	**UELFL203**	**UEL203**	**FL203**	0,50
20	113	90	15	11	25,5	60	12	41,5	43,5	17	M10	**UELFL204**	**UEL204**	**FL204**	0,48
25	130	99	16	13	27	68	16	42,9	44,3	17,4	M14	**UELFL205**	**UEL205**	**FL205**	0,64
30	148	117	18	13	31	80	16	48,1	48,3	18,2	M14	**UELFL206**	**UEL206**	**FL206**	1,00
35	161	130	19	14	34	90	16	51,3	51,1	18,8	M14	**UELFL207**	**UEL207**	**FL207**	1,27
40	175	144	21	14	36	100	16	55,9	56,3	21,4	M14	**UELFL208**	**UEL208**	**FL208**	1,57
45	188	148	22	16	38	108	19	56,9	56,3	21,4	M16	**UELFL209**	**UEL209**	**FL209**	1,97
50	197	157	22	16	40	115	19	60,1	62,7	24,6	M16	**UELFL210**	**UEL210**	**FL210**	2,34
55	224	184	25	18	43	130	19	68,6	71,3	27,7	M16	**UELFL211**	**UEL211**	**FL211**	3,13
60	250	202	29	18	48	140	23	75,8	77,3	30,9	M20	**UELFL212**	**UEL212**	**FL212**	4,10
65	258	210	30	20	50	155	23	81,6	85,7	34,1	M20	**UELFL213**	**UEL213**	**FL213**	5,18
70	265	216	31	20	54	160	23	82,6	85,7	34,1	M20	**UELFL214**	**UEL214**	**FL214**	5,74
75	275	255	34	20	56	165	23	88,8	92,1	37,3	M20	**UELFL215**	**UEL215**	**FL215**	5,99

Note: Inch sizes available on request.

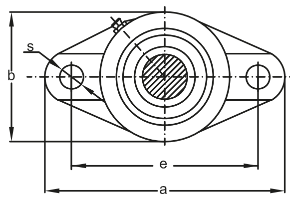
Standard duty two bolts flanged units cast housing adapter type

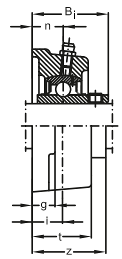


Shaft dia.	Nominal dimensions									Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	i	g	t	b	s	z	Bi					
mm														
20	130	99	16	13	27	68	16	35,5	35	M14	**UKFL205**	**UK205**	**FL205**	0,54
25	148	117	18	13	31	80	16	39	38	M14	**UKFL206**	**UK206**	**FL206**	0,84
30	161	130	19	14	34	90	16	42,5	43	M14	**UKFL207**	**UK207**	**FL207**	1,04
35	175	144	21	14	36	100	16	46,5	46	M14	**UKFL208**	**UK208**	**FL208**	1,27
40	188	148	22	16	38	108	19	48,5	50	M16	**UKFL209**	**UK209**	**FL209**	1,65
45	197	157	22	16	40	115	19	50	55	M16	**UKFL210**	**UK210**	**FL210**	1,92
50	224	184	25	18	43	130	19	54,5	59	M16	**UKFL211**	**UK211**	**FL211**	2,51
55	250	202	29	18	48	140	23	61	62	M20	**UKFL212**	**UK212**	**FL212**	3,26
60	258	210	30	20	50	155	23	64	65	M20	**UKFL213**	**UK213**	**FL213**	4,13

Note: Inch sizes available on request.

Medium duty two bolts flanged units cast housing set screws type

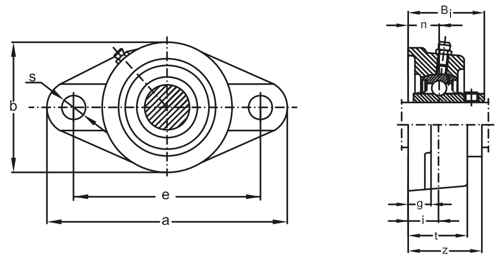




Shaft dia.	Nominal dimensions										Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	i	g	t	b	s	z	Bi	n					
mm															
25	141	117	18	13	30	83	12	40,2	38,1	15,9	M10	**UCFLX05**	**UCX05**	**FLX05**	0,95
30	156	130	19	15	34	95	16	44,4	42,9	17,5	M14	**UCFLX06**	**UCX06**	**FLX06**	1,34
35	171	144	22	16	38	105	16	51,2	49,2	19	M14	**UCFLX07**	**UCX07**	**FLX07**	1,74
40	179	148	22	16	40	111	16	52,2	49,2	19	M14	**UCFLX08**	**UCX08**	**FLX08**	1,97
45	189	157	23	16	40	116	16	55,6	51,6	19	M14	**UCFLX09**	**UCX09**	**FLX09**	2,18
50	216	184	26	18	44	133	19	59,4	55,6	22,2	M16	**UCFLX10**	**UCX10**	**FLX10**	3,19

Note: Inch sizes available on request.

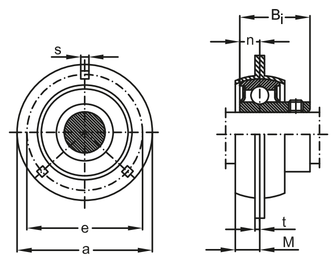
Heavy duty two bolts flanged units cast housing set screws type



Shaft dia.	Nominal dimensions										Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	i	g	t	b	s	z	Bi	n					
mm															
25	150	113	16	13	29	80	19	39	38	15	M16	**UCFL305**	**UC305**	**FL305**	0,88
30	180	134	18	15	32	90	23	44	43	17	M20	**UCFL306**	**UC306**	**FL306**	1,34
35	185	141	20	16	36	100	23	49	48	19	M20	**UCFL307**	**UC307**	**FL307**	1,59
40	200	158	23	17	40	112	23	56	52	19	M20	**UCFL308**	**UC308**	**FL308**	2,11
45	230	177	25	18	44	125	25	60	57	22	M22	**UCFL309**	**UC309**	**FL309**	3,07
50	240	187	28	19	48	140	25	67	61	22	M22	**UCFL310**	**UC310**	**FL310**	3,83
55	250	198	30	20	52	150	25	71	66	25	M22	**UCFL311**	**UC311**	**FL311**	4,66
60	270	212	33	22	56	160	31	78	71	26	M27	**UCFL312**	**UC312**	**FL312**	5,59
65	295	240	33	25	58	175	31	78	75	30	M27	**UCFL313**	**UC313**	**FL313**	6,99
70	315	250	36	28	61	185	35	81	78	33	M30	**UCFL314**	**UC314**	**FL314**	8,42
75	320	260	39	30	66	195	35	89	82	32	M30	**UCFL315**	**UC315**	**FL315**	9,80
80	355	285	38	32	68	210	38	90	86	34	M33	**UCFL316**	**UC316**	**FL316**	13,00

Note: Inch sizes available on request.

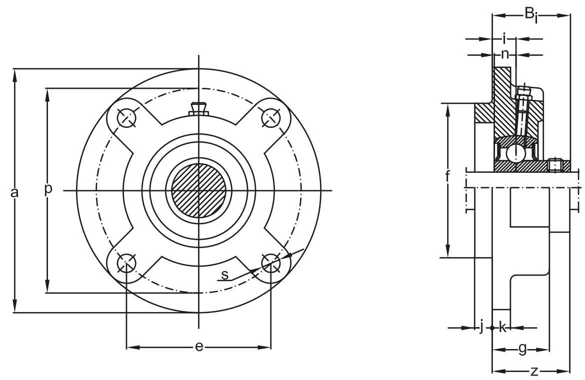
Standard duty flanged cartridge units pressed steel housing set screws type



Shaft dia.	Nominal dimensions							Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	t	s	M	Bi	n					
mm												
12	81	63,5	2	7,1	7	22	6	M6	**SBPF203**	**SB201**	**PF201**	0,23
15	81	63,5	2	7,1	7	22	6	M6	**SBPF203**	**SB202**	**PF202**	0,22
17	81	63,5	2	7,1	7	22	6	M6	**SBPF203**	**SB203**	**PF203**	0,21
20	90	71,5	2	9	8	25	7	M8	**SBPF204**	**SB204**	**PF204**	0,29
25	95	76	2	9	9	27	7,5	M8	**SBPF205**	**SB205**	**PF205**	0,37
30	113	90,5	2,6	11	9,5	29	8	M10	**SBPF206**	**SB206**	**PF206**	0,58
35	122	100	2,6	11	11	32	8,5	M10	**SBPF207**	**SB207**	**PF207**	0,74

Note: Inch sizes available on request.

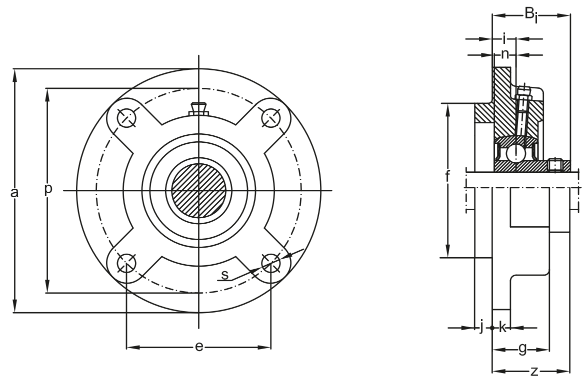
Standard duty flanged cartridge units cast housing set screws type



Shaft dia.	Nominal dimensions												Bolt size	Unit number	Bearing number	Housing number	Mass
	a	p	e	i	s	j	k	g	f	z	Bi	n					
mm														-			
20	100	78	55,1	10	12	5	6	20,5	62	28	25	7	M10	**SB204**	**SBFC204**	**FC204**	0,65
25	115	90	63,6	10	12	6	7	21	70	29,5	27	7,5	M10	**SB205**	**SBFC205**	**FC205**	0,95
30	125	100	70,7	10	12	8	8	23	80	31	29	8	M10	**SB206**	**SBFC206**	**FC206**	1,19
35	135	110	77,8	11	14	9	9	26	90	34,5	32	8,5	M12	**SB207**	**SBFC207**	**FC 207**	1,55
40	145	120	84,8	11	14	9	9	26	100	35,5	34	9,5	M12	**SB208**	**SBFC208**	**FC208**	1,87

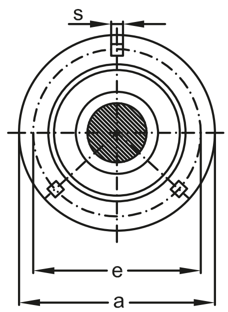
Note: Inch sizes available on request.

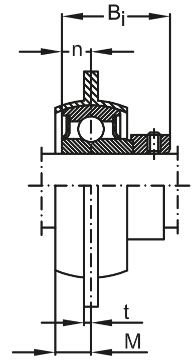
Standard duty flanged cartridge units cast housing set screws type



Shaft dia.	Nominal dimensions												Bolt size	Unit number	Bearing number	Housing number	Mass
	a	p	e	i	s	j	k	g	f	z	Bi	n					
mm														-			
12	100	78	55,1	10	12	5	6	20,5	62	28,3	31	12,7	M10	**UCFC201**	**UC201**	**FC201**	0,73
15	100	78	55,1	10	12	5	6	20,5	62	28,3	31	12,7	M10	**UCFC202**	**UC202**	**FC202**	0,72
17	100	78	55,1	10	12	5	6	20,5	62	28,3	31	12,7	M10	**UCFC203**	**UC203**	**FC203**	0,71
20	100	78	55,1	10	12	5	6	20,5	62	28,3	31	12,7	M10	**UCFC204**	**UC204**	**FC204**	0,69
25	115	90	63,6	10	12	6	7	21	70	29,7	34	14,3	M10	**UCFC205**	**UC205**	**FC205**	0,99
30	125	100	70,7	10	12	8	8	23	80	32,2	38,1	15,9	M10	**UCFC206**	**UC206**	**FC206**	1,25
35	135	110	77,8	11	14	8	9	26	90	36,4	42,9	17,5	M12	**UCFC207**	**UC207**	**FC207**	1,64
40	145	120	84,8	11	14	10	9	26	100	41,2	49,2	19	M12	**UCFC208**	**UC208**	**FC208**	2,01
45	160	132	93,3	10	16	12	10	26	105	40,2	49,2	19	M14	**UCFC209**	**UC209**	**FC209**	2,57
50	165	138	97,6	10	16	12	14	28	110	42,6	51,6	19	M14	**UCFC210**	**UC210**	**FC210**	2,85
55	185	150	106,1	13	19	12	13	30	125	46,4	55,6	22,2	M16	**UCFC211**	**UC211**	**FC211**	3,92
60	195	160	113,1	17	19	12	15	36	135	56,7	65,1	25,4	M16	**UCFC212**	**UC212**	**FC212**	5,03
65	205	170	120,2	16	19	14	15	35	145	55,7	65,1	25,4	M16	**UCFC213**	**UC213**	**FC213**	5,52
70	215	177	125,1	17	19	14	16	38	150	61,4	74,6	30,2	M16	**UCFC214**	**UC214**	**FC214**	6,55
75	220	184	130,1	18	19	16	17	39	160	62,5	77,8	33,3	M16	**UCFC215**	**UC215**	**FC215**	7,01
80	240	200	141,4	18	23	16	18	42	170	67,3	82,6	33,3	M20	**UCFC216**	**UC216**	**FC216**	8,94
85	250	208	147,1	18	23	18	20	45	180	69,6	85,7	34,1	M20	**UCFC217**	**UC217**	**FC217**	10,68
90	265	220	155,5	22	23	20	18	50	190	78,3	96	39,7	M20	**UCFC218**	**UC218**	**FC218**	12,95

Standard duty flanged cartridge units pressed steel housing set screws type

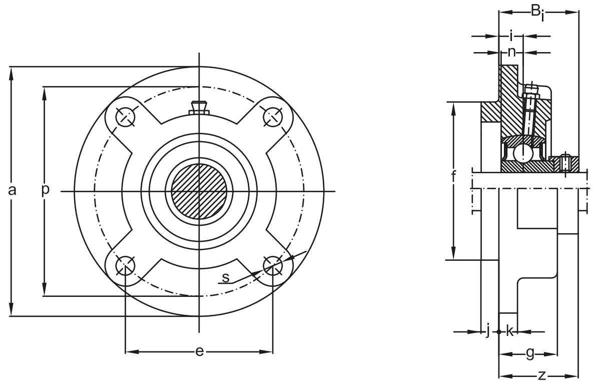




Shaft dia.	Nominal dimensions							Bolt size	Unit number	Bearing number	Housing number	Mass
	a	e	t	s	M	Bi	n					
mm									-			
12	81	63,5	2	7,1	7	28,5	6	M6	**SAPF201**	**SA201**	**PF201**	0,27
15	81	63,5	2	7,1	7	28,5	6	M6	**SAPF202**	**SA202**	**PF202**	0,26
17	81	63,5	2	7,1	7	28,5	6	M6	**SAPF203**	**SA203**	**PF203**	0,25
20	90	71,5	2	9	8	29,5	7	M8	**SAPF204**	**SA204**	**PF204**	0,34
25	95	76	2	9	9	30,5	7,5	M8	**SAPF205**	**SA205**	**PF205**	0,40
30	113	90,5	2,6	11	9,5	33,9	8	M10	**SAPF206**	**SA206**	**PF206**	0,65
35	122	100	2,6	11	11	37,5	8,5	M10	**SAPF207**	**SA207**	**PF207**	0,86

Note: Inch sizes available on request.

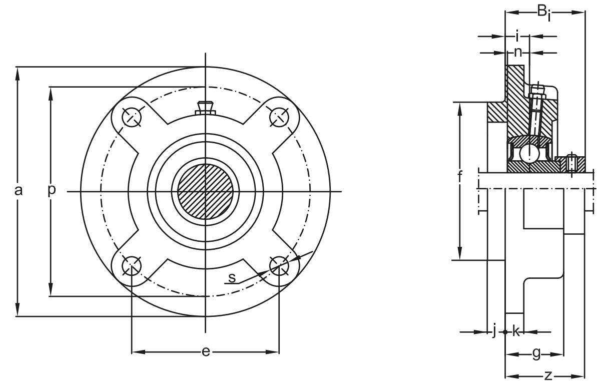
Standard duty flanged cartridge units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions a	p	e	i	s	j	k	g	f	z	Bi	n	Bolt size	Unit number	Bearing number	Housing number	Mass
mm														-			
20	100	78	55,1	10	12	5	6	20,5	62	32,5	29,5	7	M10	**SAFC204**	**SA204**	**FC204**	0,70
25	115	90	63,6	10	12	6	7	21	70	33	30,5	7,5	M10	**SAFC205**	**SA205**	**FC205**	0,98
30	125	100	70,7	10	12	8	8	23	80	35,9	33,9	8	M10	**SAFC206**	**SA206**	**FC206**	1,26
35	135	110	77,8	11	14	8	9	26	90	40	37,5	8,5	M12	**SAFC207**	**SA207**	**FC207**	1,67
40	145	120	84,8	11	14	10	9	26	100	42	40,5	9,5	M12	**SAFC208**	**SA208**	**FC208**	2,02
45	160	132	93,3	10	16	12	10	26	105	42,2	42,2	10	M14	**SAFC209**	**SA209**	**FC209**	2,58
50	165	138	97,6	10	16	12	14	28	110	43,2	43,7	10,5	M14	**SAFC210**	**SA210**	**FC210**	2,85
55	185	150	106,1	13	19	12	13	30	125	49,9	48,4	11,5	M16	**SAFC211**	**SA211**	**FC211**	3,67

Note: Inch sizes available on request.

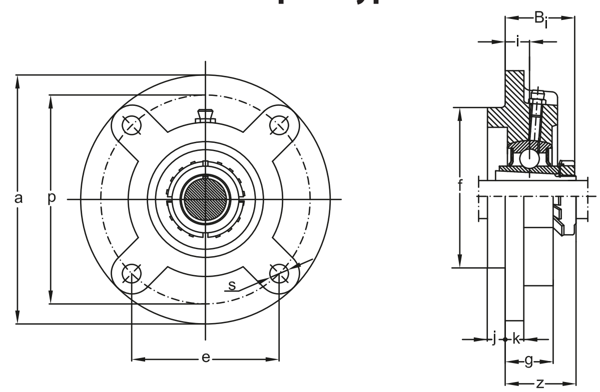
Standard duty flanged cartridge units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions												Bolt size	Unit number	Bearing number	Housing number	Mass
	a	p	e	i	s	j	k	g	f	z	Bi	n					
mm																	
12	100	78	55,1	10	12	5	6	20,5	62	36,5	43,5	17	M10	**UELFC201**	**UEL201**	**FC201**	0,79
15	100	78	55,1	10	12	5	6	20,5	62	36,5	43,5	17	M10	**UELFC202**	**UEL202**	**FC202**	0,77
17	100	78	55,1	10	12	5	6	20,5	62	36,5	43,5	17	M10	**UELFC203**	**UEL203**	**FC203**	0,76
20	100	78	55,1	10	12	5	6	20,5	62	36,5	43,5	17	M10	**UELFC204**	**UEL204**	**FC204**	0,74
25	115	90	63,6	10	12	6	7	21	70	36,9	44,3	17,4	M10	**UELFC205**	**UEL205**	**FC205**	1,03
30	125	100	70,7	10	12	8	8	23	80	40,1	48,3	18,2	M10	**UELFC206**	**UEL206**	**FC206**	1,34
35	135	110	77,8	11	14	8	9	26	90	43,3	51,1	18,8	M12	**UELFC207**	**UEL207**	**FC207**	1,77
40	145	120	84,8	11	14	10	9	26	100	45,9	56,3	21,4	M12	**UELFC208**	**UEL208**	**FC208**	2,15
45	160	132	93,3	10	16	12	10	26	105	44,9	56,3	21,4	M14	**UELFC209**	**UEL209**	**FC209**	2,74
50	165	138	97,6	10	16	12	14	28	110	48,1	62,7	24,6	M14	**UELFC210**	**UEL210**	**FC210**	3,06
55	185	150	106,1	13	19	12	13	30	125	56,6	71,3	27,7	M16	**UELFC211**	**UEL211**	**FC211**	4,19
60	195	160	113,1	17	19	12	15	36	135	63,8	77,7	30,9	M16	**UELFC212**	**UEL212**	**FC212**	5,37
65	205	170	120,2	16	19	14	15	35	145	67,6	85,7	34,1	M16	**UELFC213**	**UEL213**	**FC213**	6,07
70	215	177	125,1	17	19	14	16	38	150	68,6	85,7	34,1	M16	**UELFC214**	**UEL214**	**FC214**	7,07
75	220	184	130,1	18	19	16	17	39	160	72,8	92,1	37,3	M16	**UELFC215**	**UEL215**	**FC215**	7,64

Note: Inch sizes available on request.

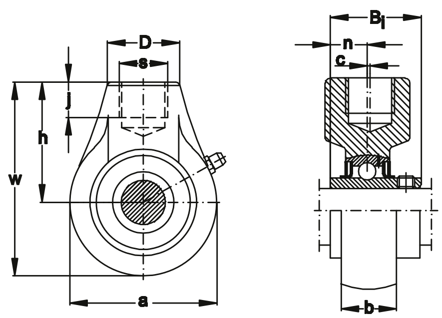
Standard duty flanged cartridge units cast housing adapter type



Shaft dia.	Nominal dimensions											Bolt size	Unit number	Bearing number	Housing number	Mass
	a	p	e	i	s	j	k	g	f	z	Bi					
mm																
20	115	90	63,6	10	12	6	7	21	70	29,5	35	M10	**UKFC205**	**UK205**	**FC205**	0,93
25	125	100	70,7	10	12	8	8	23	80	31	38	M10	**UKFC206**	**UK206**	**FC206**	1,18
30	135	110	77,8	11	14	8	9	26	90	34,5	43	M12	**UKFC207**	**UK207**	**FC207**	1,54
35	145	120	84,8	11	14	10	9	26	100	36,5	46	M12	**UKFC208**	**UK208**	**FC208**	1,85
40	160	132	93,3	10	16	12	10	26	105	36,5	50	M14	**UKFC209**	**UK209**	**FC209**	2,42
45	165	138	97,6	10	16	12	14	28	110	38	55	M14	**UKFC210**	**UK210**	**FC210**	2,64
50	185	150	106,1	13	19	12	13	30	125	42,5	59	M16	**UKFC211**	**UK211**	**FC211**	3,57
55	195	160	113,1	17	19	12	15	36	135	49	62	M16	**UKFC212**	**UK212**	**FC212**	4,53
60	205	170	120,2	16	19	14	15	35	145	50	65	M16	**UKFC213**	**UK213**	**FC213**	5,02

Note: Inch sizes available on request.

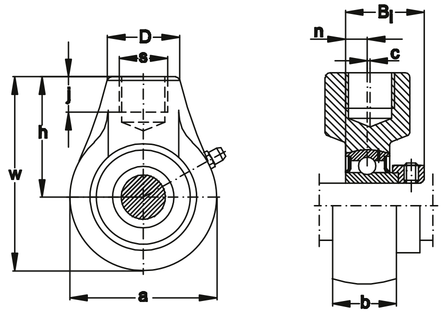
Standard duty hanger units set screws type



Shaft dia.	Nominal dimensions										Unit number	Bearing number	Housing number	Mass
	a	w	c	b	h	s	n	D	j	Bi				
mm														
12	64	96	0	22	64	RP 3/4	40	19	31	12,7	**UCHA201**	**UC201**	**HA201**	0,66
15	64	96	0	22	64	RP 3/4	40	19	31	12,7	**UCHA202**	**UC202**	**HA202**	0,65
17	64	96	0	22	64	RP 3/4	40	19	31	12,7	**UCHA203**	**UC203**	**HA203**	0,64
20	64	96	0	22	64	RP 3/4	40	19	31	12,7	**UCHA204**	**UC204**	**HA204**	0,62
25	78	103	0	23	64	RP 3/4	40	19	34	14,3	**UCHA205**	**UC205**	**HA205**	0,83
30	78	103	0	25	64	RP 3/4	40	19	38,1	15,9	**UCHA206**	**UC206**	**HA206**	0,78
35	92	116	0	26	70	RP 3/4	40	19	42,9	17,5	**UCHA207**	**UC207**	**HA207**	1,11
40	96	121	2	30	73	RP 3/4	40	19	49,2	19	**UCHA208**	**UC208**	**HA208**	1,25
45	108	136	5	30	82	RP 1	48	21	49,2	19	**UCHA209**	**UC209**	**HA209**	1,65
50	115	140,5	5	32	83	RP 1	48	21	51,6	19	**UCHA210**	**UC210**	**HA210**	1,95
55	126	150	7	33	87	RP 1-1/4	60	24	55,6	22,2	**UCHA211**	**UC211**	**HA211**	2,48
60	142	173	9	36	102	RP 1-1/4	60	28	65,1	25,4	**UCHA212**	**UC212**	**HA212**	3,59
65	166	200	9,5	38	117	RP 1-1/2	70	32	65,1	25,4	**UCHA213**	**UC213**	**HA213**	5,37
70	166	200	9,5	40	117	RP 1-1/2	70	32	74,6	30,2	**UCHA214**	**UC214**	**HA214**	5,47
75	166	200	9,5	40	117	RP 1-1/2	70	32	77,8	33,3	**UCHA215**	**UC215**	**HA215**	5,11

Note: Inch sizes available on request.

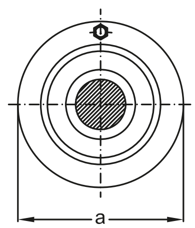
Standard duty hanger units set screws type

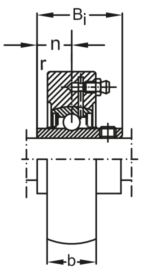


Shaft dia.	Nominal dimensions										Unit number	Bearing number	Housing number	Mass
	a	w	c	b	h	s	n	D	j	Bi				
mm														
20	64	96	0	22	64	RP 3/4	40	19	29,5	7	**SAHA204**	**SA204**	**HA204**	0,63
25	78	103	0	23	64	RP 3/4	40	19	30,5	7,5	**SAHA205**	**SA205**	**HA205**	0,82
30	78	103	0	25	64	RP 3/4	40	19	33,9	8	**SAHA206**	**SA206**	**HA206**	0,79
35	92	116	0	26	70	RP 3/4	40	19	37,5	8,5	**SAHA207**	**SA207**	**HA207**	1,14
40	96	121	2	30	73	RP 3/4	40	19	40,5	9,5	**SAHA208**	**SA208**	**HA208**	1,26
45	108	136	5	30	82	RP 1	48	21	42,2	10	**SAHA209**	**SA209**	**HA209**	1,66
50	115	140,5	5	32	83	RP 1	48	21	43,7	10,5	**SAHA210**	**SA210**	**HA210**	1,95
55	126	150	7	33	87	RP 1-1/4	60	24	48,4	11,5	**SAHA211**	**SA211**	**HA211**	2,23

Note: Inch sizes available on request.

Standard duty cylindrical cartridge units set screws type

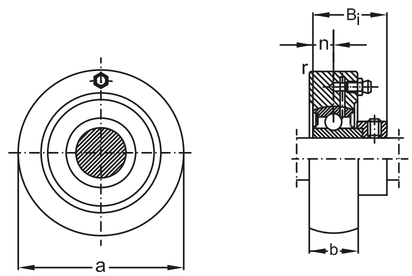




Shaft dia.	Nominal dimensions a	b	r	Bi	n	Unit number	Bearing number	Housing number	Mass
mm						-			Kg
12	72	20	2	31	12,7	**UCC201**	**UC201**	**C204**	0,53
15	72	20	2	31	12,7	**UCC202**	**UC202**	**C204**	0,52
17	72	20	2	31	12,7	**UCC203**	**UC203**	**C204**	0,51
20	72	20	2	31	12,7	**UCC204**	**UC204**	**C204**	0,49
25	80	22	2	34	14,3	**UCC205**	**UC205**	**C205**	0,65
30	85	27	2	38,1	15,9	**UCC206**	**UC206**	**C206**	0,81
35	90	28	2	42,9	17,5	**UCC207**	**UC207**	**C207**	0,90
40	100	30	2,5	49,2	19	**UCC208**	**UC208**	**C208**	1,19
45	110	31	2,5	49,2	19	**UCC209**	**UC209**	**C209**	1,49
50	120	33	2,5	51,6	19	**UCC210**	**UC210**	**C210**	1,92
55	125	35	2,5	55,6	22,2	**UCC211**	**UC211**	**C211**	2,21
60	130	38	2,5	65,1	25,4	**UCC212**	**UC212**	**C212**	2,48
65	140	40	3	65,1	25,4	**UCC213**	**UC213**	**C213**	2,97

Note: Inch sizes available on request.

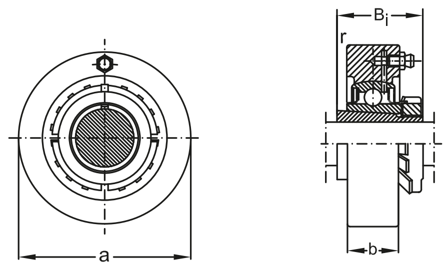
Standard duty cylindrical cartridge units eccentric locking collar type



Shaft dia.	Nominal dimensions a	b	r	Bi	n	Unit number	Bearing number	Housing number	Mass
mm						-			Kg
20	72	20	2	7	29,5	**SAC204**	**SA204**	**C204**	0,50
25	80	22	2	7,5	30,5	**SAC205**	**SA205**	**C205**	0,64
30	85	27	2	8	33,9	**SAC206**	**SA206**	**C206**	0,82
35	90	28	2	8,5	37,5	**SAC207**	**SA207**	**C207**	0,93
40	100	30	2,5	9,5	40,5	**SAC208**	**SA208**	**C208**	1,20
45	110	31	2,5	10	42,2	**SAC209**	**SA209**	**C209**	1,50
50	120	33	2,5	10,5	43,7	**SAC210**	**SA210**	**C210**	1,92
55	125	35	2,5	11,5	48,4	**SAC211**	**SA211**	**C211**	1,96

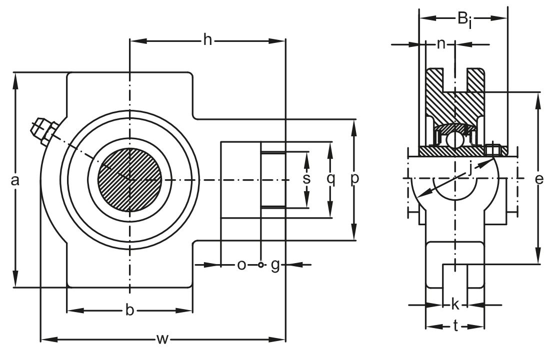
Note: Inch sizes available on request.

Standard duty cylindrical cartridge units adapter type



Shaft dia.	Nominal dimensions a	b	r	Bi	Unit number	Bearing number	Housing number	Mass
mm					-			Kg
20	80	22	2	35	**UKC205**	**UK205**	**C205**	0,59
25	85	27	2	38	**UKC206**	**UK206**	**C206**	0,74
30	90	28	2	43	**UKC207**	**UK207**	**C207**	0,80
35	100	30	2,5	46	**UKC208**	**UK208**	**C208**	1,03
40	110	31	2,5	50	**UKC209**	**UK209**	**C209**	1,34
45	120	33	2,5	55	**UKC210**	**UK210**	**C210**	1,71
50	125	35	2,5	59	**UKC211**	**UK211**	**C211**	1,86
55	130	38	2,5	62	**UKC212**	**UK212**	**C212**	1,98
60	140	40	3	65	**UKC213**	**UK213**	**C213**	2,47

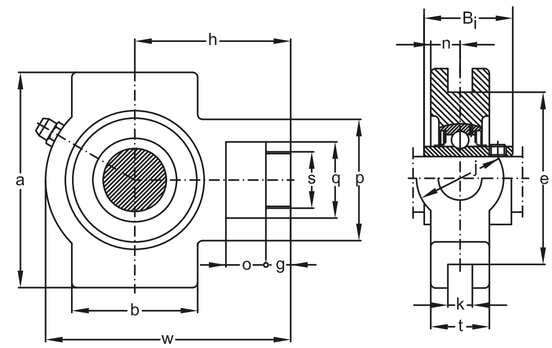
Standard duty take-up units cast housing set screws type



Shaft dia.	Nominal dimensions															Unit number	Bearing number	Housing number	Mass
	o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n				
mm																-			Kg
20	16	10	51	32	19	51	13,5	76	89	94	32	21	61	31	12,7	**UCST204**	**UC204**	**ST204**	0,73
25	16	10	51	32	19	51	13,5	76	89	97	32	24	62	34	14,3	**UCST205**	**UC205**	**ST205**	0,83
30	16	10	56	37	22	57	13,5	89	102	113	37	28	70	38,1	15,9	**UCST206**	**UC206**	**ST206**	1,26
35	16	13	64	37	22	64	13,5	89	102	129	37	30	78	42,9	17,5	**UCST207**	**UC207**	**ST207**	1,58
40	19	16	83	49	29	83	17,5	101	114	144	49	33	88	49,2	19	**UCST208**	**UC208**	**ST208**	2,30
45	19	16	83	49	29	83	17,5	101	117	144	49	35	87	49,2	19	**UCST209**	**UC209**	**ST209**	2,27
50	19	16	83	49	29	86	17,5	101	117	149	49	37	90	51,6	19	**UCST210**	**UC210**	**ST210**	2,49
55	25	19	102	64	35	95	27	130	146	171	64	38	106	55,6	22,2	**UCST211**	**UC211**	**ST211**	3,77
60	32	19	102	64	35	102	27	130	146	194	64	42	119	65,1	25,4	**UCST212**	**UC212**	**ST212**	4,77
65	32	21	111	70	41	121	27	151	167	224	70	44	137	65,1	25,4	**UCST213**	**UC213**	**ST213**	6,65
70	32	21	111	70	41	121	27	151	167	224	70	46	137	74,6	30,2	**UCST214**	**UC214**	**ST214**	6,74
75	32	21	111	70	41	121	27	151	167	232	70	48	140	77,8	33,3	**UCST215**	**UC215**	**ST215**	7,10

Note: Inch sizes available on request.

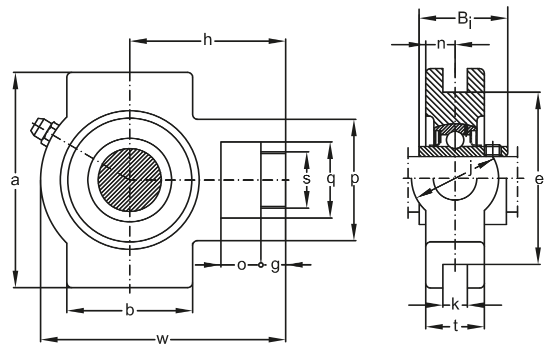
Standard duty take-up units cast housing set screws type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n	Unit number	Bearing number	Housing number	Mass
mm																-			Kg
12	16	10	51	32	19	51	12	76	89	94	32	21	61	31	12,7	**UCT201**	**UC201**	**T204**	0,70
15	16	10	51	32	19	51	12	76	89	94	32	21	61	31	12,7	**UCT202**	**UC202**	**T204**	0,76
17	16	10	51	32	19	51	12	76	89	94	32	21	61	31	12,7	**UCT203**	**UC203**	**T204**	0,75
20	16	10	51	32	19	51	12	76	89	94	32	21	61	31	12,7	**UCT204**	**UC204**	**T204**	0,73
25	16	10	51	32	19	51	12	76	89	97	32	24	62	34	14,3	**UCT205**	**UC205**	**T205**	0,83
30	16	10	56	37	22	57	12	89	102	113	37	28	70	38,1	15,9	**UCT206**	**UC206**	**T206**	1,26
35	16	13	64	37	22	64	12	89	102	129	37	30	78	42,9	17,5	**UCT207**	**UC207**	**T207**	1,58
40	19	16	83	49	29	83	16	102	114	144	49	33	88	49,2	19	**UCT208**	**UC208**	**T208**	2,31
45	19	16	83	49	29	83	16	102	117	144	49	35	87	49,2	19	**UCT209**	**UC209**	**T209**	2,28
50	19	16	83	49	29	86	16	102	117	149	49	37	90	51,6	19	**UCT210**	**UC210**	**T210**	2,50
55	25	19	102	64	35	95	22	130	146	171	64	38	106	55,6	22,2	**UCT211**	**UC211**	**T211**	3,79
60	32	19	102	64	35	102	22	130	146	194	64	42	119	65,1	25,4	**UCT212**	**UC212**	**T212**	4,79
65	32	21	111	70	41	121	26	151	167	224	70	44	137	65,1	25,4	**UCT213**	**UC213**	**T213**	6,66
70	32	21	111	70	41	121	26	151	167	224	70	46	137	74,6	30,2	**UCT214**	**UC214**	**T214**	6,75
75	32	21	111	70	41	121	26	151	167	232	70	48	140	77,8	33,3	**UCT215**	**UC215**	**T215**	7,11
80	32	21	111	70	41	121	26	165	184	235	70	51	140	82,6	33,3	**UCT216**	**UC216**	**T216**	8,19
85	38	29	124	73	48	157	30	173	198	260	73	54	162	85,7	34,1	**UCT217**	**UC217**	**T217**	10,58

Note: Inch sizes available on request.

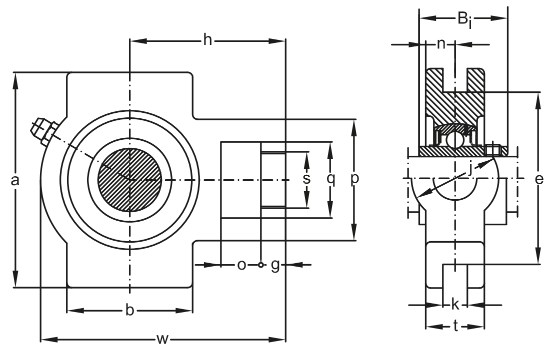
Standard duty take-up units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n	Unit number	Bearing number	Housing number	Mass
mm																-			Kg
20	16	10	51	32	19	51	13,5	76	89	94	32	21	61	29,5	7	**SAST204**	**SA204**	**ST204**	0,74
25	16	10	51	32	19	51	13,5	76	89	97	32	24	62	30,5	7,5	**SAST205**	**SA205**	**ST205**	0,82
30	16	10	56	37	22	57	13,5	89	102	113	37	28	70	33,9	8	**SAST206**	**SA206**	**ST206**	1,27
35	16	13	64	37	22	64	13,5	89	102	129	37	30	78	37,5	8,5	**SAST207**	**SA207**	**ST207**	1,61
40	19	16	83	49	29	83	17,5	101	114	144	49	33	88	40,5	9,5	**SAST208**	**SA208**	**ST208**	2,31
45	19	16	83	49	29	83	17,5	101	117	144	49	35	87	42,2	10	**SAST209**	**SA209**	**ST209**	2,28
50	19	16	83	49	29	86	17,5	101	117	149	49	37	90	43,7	10,5	**SAST210**	**SA210**	**ST210**	2,49
55	25	19	102	64	35	95	27	130	146	171	64	38	106	48,4	11,5	**SAST211**	**SA211**	**ST211**	3,52

Note: Inch sizes available on request.

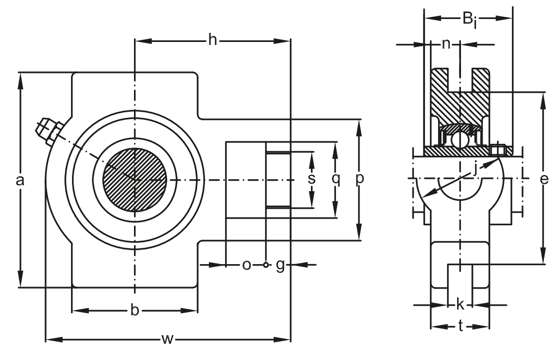
Standard duty take-up units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n	Unit number	Bearing number	Housing number	Mass
mm																-			Kg
20	16	10	51	32	19	51	12	76	89	94	32	21	61	29,5	7	**SAT204**	**SA204**	**T204**	0,74
25	16	10	51	32	19	51	12	76	89	97	32	24	62	30,5	7,5	**SAT205**	**SA205**	**T205**	0,82
30	16	10	56	37	22	57	12	89	102	113	37	28	70	33,9	8	**SAT206**	**SA206**	**T206**	1,27
35	16	13	64	37	22	64	12	89	102	129	37	30	78	37,5	8,5	**SAT207**	**SA207**	**T207**	1,61
40	19	16	83	49	29	83	16	102	114	144	49	33	88	40,5	9,5	**SAT208**	**SA208**	**T208**	2,32
45	19	16	83	49	29	83	16	102	117	144	49	35	87	42,2	10	**SAT209**	**SA209**	**T209**	2,29
50	19	16	83	49	29	86	16	102	117	149	49	37	90	43,7	10,5	**SAT210**	**SA210**	**T210**	2,50
55	25	19	102	64	35	95	22	130	146	171	64	38	106	48,4	11,5	**SAT211**	**SA211**	**T211**	3,54

Note: Inch sizes available on request.

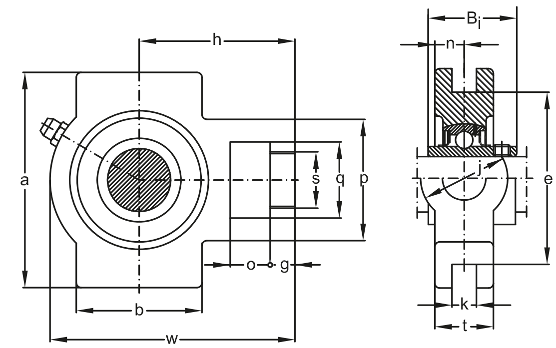
Standard duty take-up units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n	Unit number	Bearing number	Housing number	Mass
mm																-			Kg
20	16	10	51	32	19	51	13,5	76	89	94	32	21	61	43,5	17	**UELST204**	**UEL204**	**ST204**	0,78
25	16	10	51	32	19	51	13,5	76	89	97	32	24	62	44,3	17,4	**UELST205**	**UEL205**	**ST205**	0,87
30	16	10	56	37	22	57	13,5	89	102	113	37	28	70	48,3	18,2	**UELST206**	**UEL206**	**ST206**	1,35
35	16	13	64	37	22	64	13,5	89	102	129	37	30	78	51,1	18,8	**UELST207**	**UEL207**	**ST207**	1,71
40	19	16	83	49	29	83	17,5	101	114	144	49	33	88	56,3	21,4	**UELST208**	**UEL208**	**ST208**	2,44
45	19	16	83	49	29	83	17,5	101	117	144	49	35	87	56,3	21,4	**UELST209**	**UEL209**	**ST209**	2,44
50	19	16	83	49	29	86	17,5	101	117	149	49	37	90	62,7	24,6	**UELST210**	**UEL210**	**ST210**	2,70
55	25	19	102	64	35	95	27	130	146	171	64	38	106	71,3	27,7	**UELST211**	**UEL211**	**ST211**	4,04
60	32	19	102	64	35	102	27	130	146	194	64	42	119	77,7	30,9	**UELST212**	**UEL212**	**ST212**	5,11
65	32	21	111	70	41	121	27	151	167	224	70	44	137	85,7	34,1	**UELST213**	**UEL213**	**ST213**	7,20
70	32	21	111	70	41	121	27	151	167	224	70	46	137	85,7	34,1	**UELST214**	**UEL214**	**ST214**	7,26
75	32	21	111	70	41	121	27	151	167	232	70	48	140	92,1	37,3	**UELST215**	**UEL215**	**ST215**	7,73

Note: Inch sizes available on request.

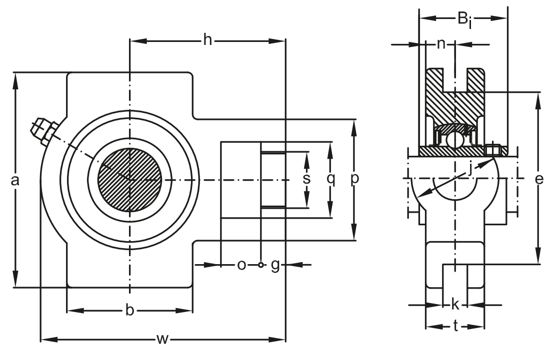
Standard duty take-up units cast housing eccentric locking collar type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	n	Unit number	Bearing number	Housing number	Mass
mm																-			Kg
12	16	12	51	32	19	51	12	76	89	94	32	21	61	43,5	17	**UELT201**	**UEL201**	**T204**	0,83
15	16	12	51	32	19	51	12	76	89	94	32	21	61	43,5	17	**UELT202**	**UEL202**	**T204**	0,81
17	16	12	51	32	19	51	12	76	89	94	32	21	61	43,5	17	**UELT203**	**UEL203**	**T204**	0,80
20	16	12	51	32	19	51	12	76	89	94	32	21	61	43,5	17	**UELT204**	**UEL204**	**T204**	0,78
25	16	12	51	32	19	51	12	76	89	97	32	24	62	44,3	17,4	**UELT205**	**UEL205**	**T205**	0,87
30	16	12	56	37	22	57	12	89	102	113	37	28	70	48,3	18,2	**UELT206**	**UEL206**	**T206**	1,35
35	16	15	64	37	22	64	12	89	102	129	37	30	78	51,1	18,8	**UELT207**	**UEL207**	**T207**	1,71
40	19	18	83	49	29	83	16	102	114	144	49	33	88	56,3	21,4	**UELT208**	**UEL208**	**T208**	2,45
45	19	18	83	49	29	83	16	102	117	144	49	35	87	56,3	21,4	**UELT209**	**UEL209**	**T209**	2,45
50	19	18	83	49	29	86	16	102	117	149	49	37	90	62,7	24,6	**UELT210**	**UEL210**	**T210**	2,71
55	25	21	102	64	35	95	22	130	146	171	64	38	106	71,3	27,7	**UELT211**	**UEL211**	**T211**	4,06
60	32	21	102	64	35	102	22	130	146	194	64	42	119	77,7	30,9	**UELT212**	**UEL212**	**T212**	5,13
65	32	23	111	70	41	121	26	151	167	224	70	44	137	85,7	34,1	**UELT213**	**UEL213**	**T213**	7,21
70	32	23	111	70	41	121	26	151	167	224	70	46	137	85,7	34,1	**UELT214**	**UEL214**	**T214**	7,27
75	32	23	111	70	41	121	26	151	167	232	70	48	140	92,1	37,3	**UELT215**	**UEL215**	**T215**	7,74

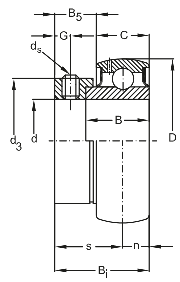
Note: Inch sizes available on request.

Standard duty take-up units cast housing adapter type



Shaft dia.	Nominal dimensions o	g	p	q	s	b	k	e	a	w	j	t	h	Bi	Unit number	Bearing number	Housing number	Mass
mm															-			Kg
20	16	12	51	32	19	51	12	76	89	97	32	24	62	35	**UKT205**	**UK205**	**T205**	0,77
25	16	12	56	37	22	57	12	89	102	113	37	28	70	38	**UKT206**	**UK206**	**T206**	1,19
30	16	15	64	37	22	64	12	89	102	129	37	30	78	43	**UKT207**	**UK207**	**T207**	1,48
35	19	18	83	49	29	83	16	102	114	144	49	33	88	46	**UKT208**	**UK208**	**T208**	2,15
40	19	18	83	49	29	83	16	102	117	144	49	35	87	50	**UKT209**	**UK209**	**T209**	2,13
45	19	18	83	49	29	86	16	102	117	149	49	37	90	55	**UKT210**	**UK210**	**T210**	2,29
50	25	21	102	64	35	95	22	130	146	171	64	38	106	59	**UKT211**	**UK211**	**T211**	3,44
55	32	21	102	64	35	102	22	130	146	194	64	42	119	62	**UKT212**	**UK212**	**T212**	4,29
60	32	23	111	70	41	121	26	151	167	224	70	44	137	65	**UKT213**	**UK213**	**T213**	6,16

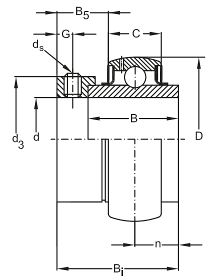
Standard duty spherical outside surface ball bearings set screws type



Shaft dia. d	Nominal dimensions D	Bi	C	n	s	G	d_s	Bearing number	Basic load ratings dyn. C_r	stat. C_{or}	Mass
mm								-	N		Kg
12	40	22	12	6	16	4	M5X0,8	**SB201**	9,6	4,6	0,10
15	40	22	12	6	16	4	M5X0,8	**SB202**	9,6	4,6	0,09
17	40	22	12	6	16	4	M5X0,8	**SB203**	9,6	4,6	0,08
20	47	25	14	7	18	5	M6X1	**SB204**	12,8	6,65	0,13
25	52	27	15	7,5	19,5	5,5	M6X1	**SB205**	14	7,85	0,17
30	62	29	16	8	21	6	M6X1	**SB206**	19,5	11,3	0,26
35	72	32	17	8,5	23,5	6,5	M6X1	**SB207**	25,7	15,3	0,38
40	80	34	19	9,5	24,5	7	M8X1	**SB208**	29,1	17,8	0,50

Note: Inch sizes available on request.

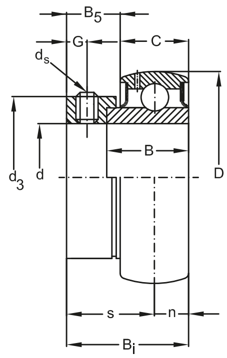
Standard duty spherical outside surface ball bearings set screws type



Shaft dia. d	Nominal dimensions D	Bi	C	n	s	G	F	d_s	Bearing number	Basic load ratings dyn. C_r	stat. C_{or}	Mass
mm									-	N		Kg
12	47	31	16	12,7	18,3	5	3,5	M5X0,8	**UC201**	12,8	6,65	0,21
15	47	31	16	12,7	18,3	5	3,5	M5X0,8	**UC202**	12,8	6,65	0,20
17	47	31	16	12,7	18,3	5	3,5	M5X0,8	**UC203**	12,8	6,65	0,19
20	47	31	16	12,7	18,3	5	3,5	M6X1	**UC204**	12,8	6,65	0,17
25	52	34	17	14,3	19,7	5,5	4	M6X1	**UC205**	14	7,85	0,21
30	62	38,1	19	15,9	22,2	6	4,2	M6X1	**UC206**	19,5	11,3	0,32
35	72	42,9	20	17,5	25,4	6,5	4,3	M8X1	**UC207**	25,7	15,3	0,47
40	80	49,2	21	19	30,2	8	4,2	M8X1	**UC208**	29,1	17,8	0,64
45	85	49,2	22	19	30,2	8	4,2	M8X1	**UC209**	32,5	20,4	0,68
50	90	51,6	23	19	32,6	9	4,8	M10X1,25	**UC210**	35	23,2	0,80
55	100	55,6	25	22,2	33,4	9	5,3	M10X1,25	**UC211**	43,5	29,2	1,12
60	110	65,1	27	25,4	39,7	10,5	5,3	M10X1,25	**UC212**	52,5	36	1,53
65	120	65,1	28	25,4	39,7	12	6	M12X1,25	**UC213**	57,5	40	1,86
70	125	74,6	30	30,2	44,4	12	6	M12X1,25	**UC214**	62	44	2,05
75	130	77,8	30	33,3	44,5	12	6	M12X1,25	**UC215**	66	49,5	2,21
80	140	82,6	33	33,3	49,3	14	6,3	M12X1,25	**UC216**	72,5	53	2,79
85	150	85,7	35	34,1	51,6	14	6,5	M12X1,25	**UC217**	83,5	64	3,38
90	160	96	37	39,7	56,3	14	6,5	M12X1,25	**UC218**	96	71,5	4,45

Note: Inch sizes available on request.

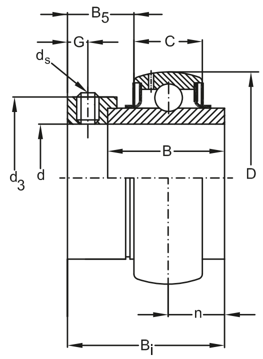
Standard duty spherical outside surface ball bearings eccentric locking collar type



Shaft dia.	Nominal dimensions										Bearing number	Basic load ratings		Mass
d	D	B_i	B	C	n	s	G	d_s	d_3	B_5		dyn C_r	stat. C_{0r}	
mm											-	N		kg
12	40	28,5	19	12	6	22,5	4,8	M6X1	28,6	13,5	**SA201**	9,6	4,6	0,14
15	40	28,5	19	12	6	22,5	4,8	M6X1	28,6	13,5	**SA202**	9,6	4,6	0,13
17	40	28,5	19	12	6	22,5	4,8	M6X1	28,6	13,5	**SA203**	9,6	4,6	0,12
20	47	29,5	20	14	7	22,5	4,8	M6X1	33,3	13,5	**SA204**	12,8	6,65	0,18
25	52	30,5	21	15	7,5	23	4,8	M6X1	38,1	13,5	**SA205**	14	7,85	0,20
30	62	33,9	22	16	8	25,9	6	M6X1	44,5	15,9	**SA206**	19,5	11,3	0,33
35	72	37,5	24	17	8,5	29	6,8	M8X1	55,6	17,5	**SA207**	25,7	15,3	0,50
40	80	40,5	27	19	9,5	31	6,8	M8X1	60,3	18,3	**SA208**	29,1	17,8	0,65
45	85	42,2	28,7	20	10	32,2	6,8	M8X1	63,5	18,3	**SA209**	32,5	20,4	0,69
50	90	43,7	30,2	21	10,5	33,2	6,8	M8X1	69,9	18,3	**SA210**	35	23,2	0,80
55	100	48,8	32,4	23	11,5	36,9	8	M10X1,25	76,2	18,3	**SA211**	43,5	29,2	0,87

Note: Inch sizes available on request.

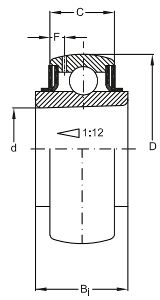
Standard duty spherical outside surface ball bearings eccentric locking collar type



Shaft dia.	Nominal dimensions										Bearing number	Basic load ratings		Mass
d	D	B_i	C	n	B	G	d_3	B_5	F	d_s		dyn C_r	stat. C_{0r}	
mm											-	N		kg
12	47	43,5	16	17	34	4,8	33,3	13,5	3,5	M6X1	**UEL201**	12,8	6,65	0,27
15	47	43,5	16	17	34	4,8	33,3	13,5	3,5	M6X1	**UEL202**	12,8	6,65	0,25
17	47	43,5	16	17	34	4,8	33,3	13,5	3,5	M6X1	**UEL203**	12,8	6,65	0,24
20	47	43,5	16	17	34	4,8	33,3	13,5	3,5	M6X1	**UEL204**	12,8	6,65	0,22
25	52	44,3	17	17,4	34,8	4,8	38,1	13,5	4	M6X1	**UEL205**	14	7,85	0,25
30	62	48,3	19	18,2	36,4	6	44,5	15,9	4,2	M8X1	**UEL206**	19,5	11,3	0,41
35	72	51,1	20	18,8	37,6	6,8	55,6	17,5	4,3	M8X1	**UEL207**	25,7	15,3	0,60
40	80	56,3	21	21,4	42,8	6,8	60,3	18,3	4,2	M8X1	**UEL208**	29,1	17,8	0,78
45	85	56,3	22	21,4	42,8	6,8	63,5	18,3	4,2	M8X1	**UEL209**	32,5	20,4	0,85
50	90	62,7	23	24,6	49,2	6,8	69,9	18,3	4,8	M8X1	**UEL210**	35	23,2	1,01
55	100	71,3	25	27,7	55,4	8	76,2	20,7	5,3	M10X1,25	**UEL211**	43,5	29,2	1,39
60	110	77,7	27	30,9	61,8	8	84	22,3	5,3	M10X1,25	**UEL212**	52,5	36	1,87
65	120	85,7	28	34,1	68,2	8,7	86	23,5	6	M10X1,25	**UEL213**	57,5	40	2,41
70	125	85,7	30	34,1	68,2	8,7	96	23,9	6	M10X1,25	**UEL214**	62	44	2,57
75	130	92,1	30	37,3	74,6	8,7	102	23,9	6	M10X1,25	**UEL215**	66	49,5	2,84

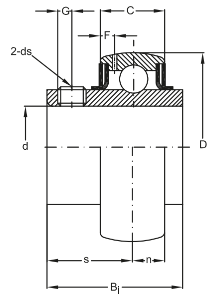
Note: Inch sizes available on request.

Standard duty spherical outside surface ball bearings adapter type



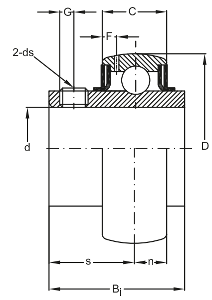
Shaft dia.	Nominal dimensions				Bearing number	Basic load ratings		Mass
d	D	B_i	C	F		dyn C_r	stat. C_{0r}	
mm					-	N		kg
20	52	21	17	4.2	**UK205**	14	7,85	0,15
25	62	25	19	4,5	**UK206**	19,5	11,3	0,25
30	72	27	20	4,2	**UK207**	25,7	15,3	0,37
35	80	29	21	4,2	**UK208**	29,1	17,8	0,48
40	85	30	22	4,2	**UK209**	32,5	20,4	0,53
45	90	31	23	5	**UK210**	35	23,2	0,59
50	100	33	27	6,3	**UK211**	43,5	29,2	0,77
55	110	36	27	5,3	**UK212**	52,5	36	1,03
60	120	36	28	6	**UK213**	57,5	40	1,36

Medium duty spherical outside surface ball bearings set screws type



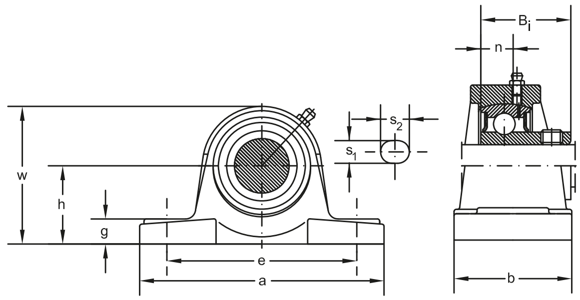
Shaft dia.	Nominal dimensions								Bearing number	Basic load ratings		Mass
d	D	B_i	C	n	s	G	F	d_s		dyn C_r	stat. C_{0r}	
mm									-	N		kg
25	62	38,1	19	15,9	22,2	6	5	M6X1	**UCX05**	19,5	11,3	0,39
30	72	42,9	22	17,5	25,4	6,5	5,8	M8X1	**UCX06**	25,7	15,3	0,58
35	80	49,2	21	19	30,2	8	6,3	M8X1	**UCX07**	29,1	17,8	0,74
40	85	49,2	22	19	30,2	8	6,8	M8X1	**UCX08**	32,5	20,4	0,83
45	90	51,6	23	19	32,6	9	6,5	M10X1,25	**UCX09**	35	23,2	0,95
50	100	55,6	25	22,2	33,4	9	7,2	M10X1,25	**UCX10**	43,5	29,2	1,29
55	110	65,1	27	25,4	39,7	10,5	8,2	M10X1,25	**UCX11**	52,5	36	1,80
60	120	65,1	28	25,4	39,7	12	8	M12X1,25	**UCX12**	57,5	40	2,05
65	125	74,6	30	30,2	44,4	12	9	M12X1,25	**UCX13**	62	44	2,52
70	130	77,8	30	33,3	44,5	12	9	M12X1,25	**UCX14**	66	49,5	2,74
75	140	82,6	33	33,3	49,3	14	10,3	M12X1,25	**UCX15**	72,5	53	3,41
80	150	85,7	35	34,1	51,6	14	11	M12X1,25	**UCX16**	83,2	63,8	3,87

Heavy duty spherical outside surface ball bearings set screws type



Shaft dia.	Nominal dimensions								Bearing number	Basic load ratings		Mass
d	D	B_i	C	n	s	G	F	d_s		dyn C_r	stat. C_{0r}	
mm									-	N		kg
25	62	38	21	15	23	6	4,3	M6X1	**UC305**	21,2	10,9	0,35
30	72	43	24	17	26	6	5,5	M6X1	**UC306**	26,7	15	0,56
35	80	48	25	19	29	8	5,3	M8X1	**UC307**	33,5	19,1	0,71
40	90	52	28	19	33	10	5,5	M10X1,25	**UC308**	40,5	24	0,96
45	100	57	30	22	35	10	6	M10X1,25	**UC309**	53	32	1,28
50	110	61	32	22	39	12	6,1	M12X1,25	**UC310**	62	38,5	1,65
55	120	66	34	25	41	12	6,4	M12X1,25	**UC311**	71,5	45	1,90
60	130	71	36	26	45	12	6,7	M12X1,25	**UC312**	82	52	2,60
65	140	75	38	30	45	12	6,9	M12X1,25	**UC313**	92,5	60	3,25
70	150	78	40	33	47	12	7,2	M12X1,25	**UC314**	104	68	3,95
75	160	82	42	32	50	14	7,5	M14X1,5	**UC315**	113	77	4,33
80	170	86	44	34	52	14	7,5	M14X1,5	**UC316**	122	86	5,57

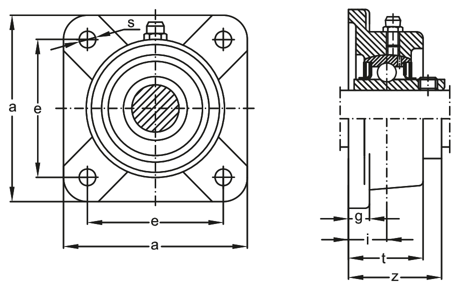
SSUCP series pillow blocks
Normal duty with set screw lock and grease fitting



Dimensions											Unit no.	Bolt size	Bearing no.	Housing no.
d	B	n	b	h	g	w	a	e	s_1	s_2				
mm											-	mm		
12	27,4	11,5	38	30,2	14	62	127	95	12	19	**SSUCP201**	M10	**SSUC201**	**SSP203**
15	27,4	11,5	38	30,2	14	62	127	95	12	19	**SSUCP202**	M10	**SSUC202**	**SSP203**
17	27,4	11,5	38	30,2	14	62	127	95	12	19	**SSUCP203**	M10	**SSUC203**	**SSP203**
20	31	12,7	38	33,3	15	65	127	95	12	19	**SSUCP204**	M10	**SSUC204**	**SSP204**
25	34,1	14,3	38	36,5	16	70	140	105	15	19	**SSUCP205**	M10	**SSUC205**	**SSP205**
30	38,1	15,9	48	42,9	18	83	165	121	15	21	**SSUCP206**	M12	**SSUC206**	**SSP206**
35	42,9	17,5	48	47,6	19	94	167	127	15	21	**SSUCP207**	M12	**SSUC207**	**SSP207**
40	49,2	19	54	49,2	19	100	184	137	15	23	**SSUCP208**	M12	**SSUC208**	**SSP208**
45	49,2	19	54	54	20	108	190	146	15	23	**SSUCP209**	M12	**SSUC209**	**SSP209**
50	51,6	19	60	57,2	22	114	206	159	19	23	**SSUCP210**	M16	**SSUC210**	**SSP210**

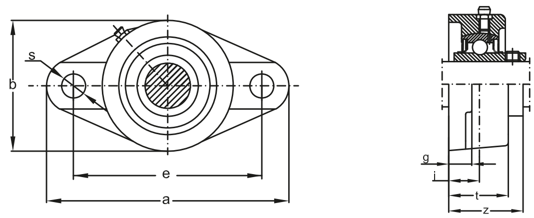
Note: Grease fitting 1/4 - 28 UNF

SSUCF series four bolt flanges
Normal duty with set screw lock and grease fitting



Dimensions								Unit no.	Bolt size	Bearing no.	Housing no.
d	z	t	g	i	s	a	e				
mm								-	mm		
12	30,9	24	11	15	12	76	54	**SSUCF201**	M10	**SSUC201**	**SSF203**
15	30,9	24	11	15	12	76	54	**SSUCF202**	M10	**SSUC202**	**SSF203**
17	20,9	24	11	15	12	76	54	**SSUCF203**	M10	**SSUC203**	**SSF203**
20	33,3	25	11	15	12	86	63,5	**SSUCF204**	M10	**SSUC204**	**SSF204**
25	35,8	26,5	13	16	12	95	70	**SSUCF205**	M10	**SSUC205**	**SSF205**
30	40,2	30	13	18	15	108	82,5	**SSUCF206**	M12	**SSUC206**	**SSF206**
35	44,4	33	14	19	15	117	92	**SSUCF207**	M12	**SSUC207**	**SSF207**
40	51,2	36	14	21	15	130	101,5	**SSUCF208**	M12	**SSUC208**	**SSF208**
45	52,2	38	14	22	15	137	105	**SSUCF209**	M12	**SSUC209**	**SSF209**
50	54,6	39	15	22	19	143	111	**SSUCF210**	M16	**SSUC210**	**SSF210**

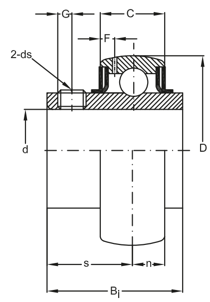
SSUCFL series two bolt flanges
Normal duty with set screw lock and grease fitting



Dimensions									Unit no.	Bolt size	Bearing no.	Housing no.
d	z	t	g	i	b	s	a	e				
mm									-	mm		
12	30,9	24	11	15	55	12	98,5	76,5	**SSUCFL201**	M10	**SSUC201**	**SSFL203**
15	30,9	24	11	15	55	12	98,5	76,5	**SSUCFL202**	M10	**SSUC202**	**SSFL203**
17	30,9	24	11	15	55	12	98,5	76,5	**SSUCFL203**	M10	**SSUC203**	**SSFL203**
20	33,3	25	11	15	60	12	112	90	**SSUCFL204**	M10	**SSUC204**	**SSFL204**
25	35,8	26,5	13	16	68	12	124	99	**SSUCFL205**	M10	**SSUC205**	**SSFL205**
30	40,2	30	13	18	80	15	141	116,5	**SSUCFL206**	M12	**SSUC206**	**SSFL206**
35	44,4	33	14	19	90	15	155,5	130	**SSUCFL207**	M12	**SSUC207**	**SSFL207**
40	51,2	36	14	21	100	15	171,5	143,5	**SSUCFL208**	M12	**SSUC208**	**SSFL208**
45	52,2	38	14	22	108	15	179	148,5	**SSUCFL209**	M12	**SSUC209**	**SSFL209**
50	54,6	39	15	22	115	19	189	157	**SSUCFL210**	M16	**SSUC210**	**SSFL210**

Note: Grease fitting 1/4 - 28 UNF

SSUC series bearing insert
Normal duty with set screw lock



Dimensions								Basic load ratings		Designation
d H7	D H5	B	S	r_{min}	C	d_s	G	C_r*	C_{0r}	
mm								N		
12	40	27,4	11,5	0,6	14	M5 x 0,5	4	7350	4750	**SSUC201**
15	40	27,4	11,5	0,6	14	M5 x 0,5	4	7350	4750	**SSUC202**
17	40	27,4	11,5	0,6	14	M5 x 0,5	4	7350	4750	**SSUC203**
20	47	31	12,7	1	17	M6 x 0,75	5	9800	6550	**SSUC204**
25	52	34,1	14,3	1	17	M6 x 0,75	5	10800	7800	**SSUC205**
30	62	38,1	15,9	1	19	M6 x 0,75	5	15000	11200	**SSUC206**
35	72	42,9	17,5	1,1	20	M8 x 1	7	19600	15300	**SSUC207**
40	80	49,2	19	1,1	21	M8 x 1	8	23600	19000	**SSUC208**
45	85	49,2	19	1,1	22	M8 x 1	8	25500	21600	**SSUC209**
50	90	51,6	19	1,1	24	M10 x 1	10	27000	23200	**SSUC210**

Note: *Multiply the load "Cr" by 1,3 if the tolerance of mounted shaft is "h6" or higher.

Cam Rollers

Standards, Boundary dimensions

Standard plans	DIN 616

General

Cam Rollers are non - separable radial bearings. They are special variants of either radial **deep groove bearings** or **double row angular contact ball bearings**.

Cam roller run either directly on a guide track or against a surface that has been machined for a guidance.

To achieve this cam rollers feature an extra thick - walled outer ring this enables cam roller to accept high radial forces, including shock loads.

As cam rollers often run misaligned they are generally used with crowned outer ring syrfaces.

Cam rollers normally run outside the machine compartment, under extreme operating conditions, in the presence of heavy contaminations (i.e. dust and dirt, etc).

For this reason, cam rollers are produced and fitted with contacting seals.

Some types of the Double Row cam rollers are also available with shields.

Design variants
(see also drawings on following pages)

Cam rollers are readily available in several design variants. For the most common designs see drawings on page 713.

Single Row Cam Rollers

Cam rollers of the narrow series (series **3612..** and **3612.. R**, are based on the proven sealed single row deep groove ball bearings, (suffix **.2RS**) for their internal design.

The **URB cam rollers**, series **3612..** and **3612..R**, respectively, are produced with **.2RS**. - type contacting seals as standard. These seals provide a very effective and efficient sealing of the bearing compartment against penetration by foreign particles even under unfavourable operating conditions.

The narrow **URB cam rollers**, series **3612** are available with either cylindrical (without extra suffix) or crowned outer ring diameter (suffix **R**) as standard.

The radius of crowning on single row cam rollers for the series **3612.. R**, is standardised at **R = 400 mm, irrespective of their outer diameter**.

Double Row Cam Rollers

The internal design of **URB double row cam rollers** (series **305** and **306**) are based on the double row angular contact ball bearings of the series **32..** (for series **305**) or 33.. (for series **306** cam rollers), respectively.

URB double row cam rollers have contact angles of 25° they also feature polyamide cages as standard.

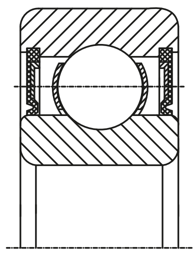
Double row cam rollers are widely used with pressed steel shields, (suffix **.2Z**), they are also available with **rubbing seals** (suffix **.2RS**) as standard.

As for single row rollers, **URB double row cam** rollers are produced with either a, cylindrical or sphered outer ring diameters.

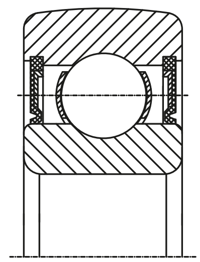
The radius of crowning of double row cam roller outer diameter is also **standardised at R = 400 mm**.

Material of seals

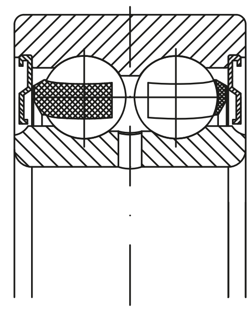
For the contacting seal of sealed **URB - cam**



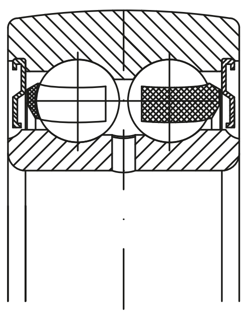
3612...



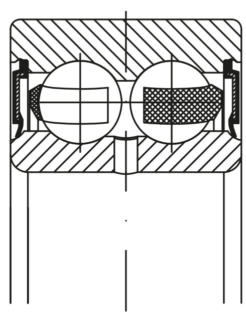
3612...R



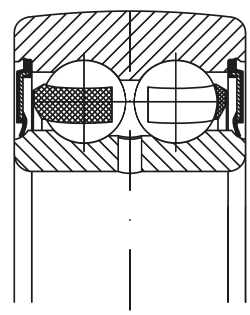
3057...2Z
3067...2Z



3058...2Z
3068...2Z



3057...2RS
3067...2RS



3058...2RS
3068...2RS

rollers (suffix **.2RS**) a wear - resistant **synthetic rubber (NBR)** is used as standard material.

This seal material is suitable for operating temperatures of **-30°C** up to **+120°C**.

On request, the **URB** - cam rollers are supplied with alternative seal materials, such as high - temperature **FPM** - contacting seals.

Grease filling

URB cam rollers incorporating either seals or shieds (suffixes) are supplied grease filled from the factory with a proven high quality, lithium soap based rolling bearing grease suitable for operating temperatures of **-30°C** up to **+110°C**.

Although cam rollers, operating under normal conditions, run generally maintenance free.

Some application require additional lubrication where high speeds, heavy dust, permanent operating temperatures over 70°C exist.

Double Row cam rollers only feature a lubrication hole in the inner rings to provide a simple and effective relubricating method.

Where relubrication is necessary, it is emphasised that, undue pressure by the regreasing metgod may cause unnecessary damage to either the seals or shields.

URB cam rollers are be supplied with special grease filles according to customer specification or with varialbe grease fill volumes than the standard.

Cages

Single Row Cam Rollers are standard fitted with pressed steel cages as standard. **Double Row Cam Rollers** feature solid polyamide cages as standard.

Tolerances

URB cam rollers, with cylindrical outer ring diameter, are produced to normal class tolerances (**PN**) as standard.

For cam rollers with sphered outer ring diameters the outer ring diameter tolerance is double the standard value.

For detailed tolerance values see in the chapter "**Bearing tolerances**" page 28.

Internal clearance

URB cam rollers are produced with **normal internal clearance** group (**CN**) **as standard** according to DIN 620.

URB cam rollers are also produced to other internal clearances.

Load carrying capability

Unlike the "normal" rolling element bearings, the outer ring of cam rollers contact their adjacent mating surface on a very small contacting area, this causes deformations of the outer ring.

These deformations are considered by the recommanded maximum values for the permissible dynamic and static radial loads as shown in by the product tables.

Equivalent dynamic load

Cam rollers must be calculated as rolling element bearings:

$$\mathbf{P = F_r}$$

But, **P** must be ≤ $\mathbf{F_r}$ **max**
(for $\mathbf{F_r}$ max see product tables)

Equivalent static bearing load

For Cam rollers:

$$\mathbf{P_0 = F_r}$$

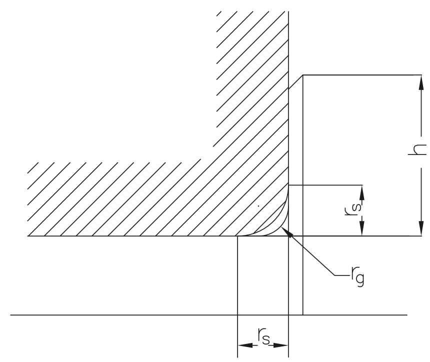
But, $\mathbf{P_0}$ must be ≤ $\mathbf{F_{0r}}$ **max**
(for $\mathbf{F_{0r}}$ max see product tables)

Abutment and Fillet dimensions for cam rollers

The bearing inner ring must contact adjacent surfaces with their side faces only. The radius of inner ring corners must not touch the fillet radius of the shaft shoulder.

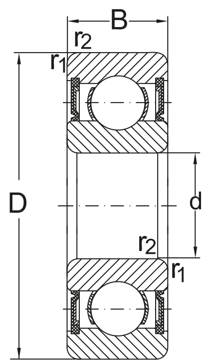
Therefore, the largest fillet radius ($\mathbf{r_g}$) must be smaller than the minimum fillet dimension of the cam roller inner rings ($\mathbf{r_s}$) as listed in the product tables.

Since cam rollers normally have point loaded inner rings, their shaft fits may be rather loose, (i.e. according to ISO - tolerance fields g6, h6 or j6).

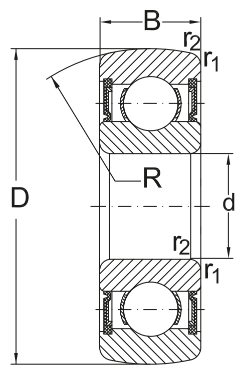


r_{smin}	r_{gmax}	h_{min}
0.6	0.6	2.1
1	1	2.8
1.1	1	3.5
1.5	1.5	4.5
2	2	5.5

Cam Rollers, Single Row



3612...



3612...R

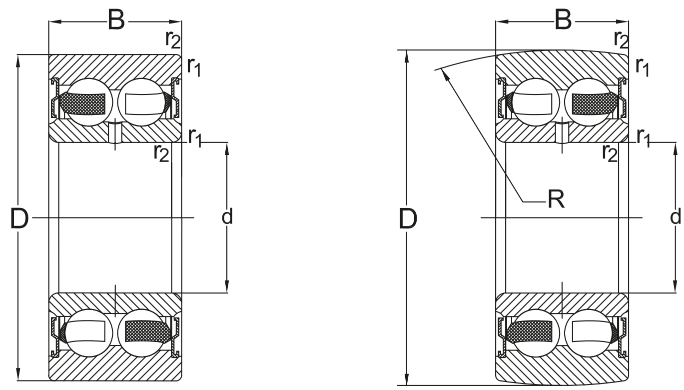
Dimensions					Designation	
D	d	B	R	r_1, r_2 min.	With cylindrical outer ring	With sphered outer ring
mm						
32	10	9	400	0,6	**361200**	**361200 R**
35	12	10	400	0,6	**361201**	**361201 R**
40	15	11	400	0,6	**361202**	**361202 R**
47	17	12	400	0,6	**361203**	**361203 R**
52	20	14	400	1	**361204**	**361204 R**
62	25	15	400	1	**361205**	**361205 R**
72	30	16	400	1	**361206**	**361206 R**
80	35	17	400	1,1	**361207**	**361207 R**
85	40	18	400	1,1	**361208**	**361208 R**
90	45	19	400	1,1	**361209**	**361209 R**

Cam Rollers, Single Row

Abutment and fillet dimensions see on page 714

Speed rating	Load ratings as bearing dyn. C_r	stat. C_{0r}	as cam roller dyn. C_{LR}	stat. C_{0LR}	Max. permissible radial load dyn. $F_{r\,max}$	stat. $F_{0r\,max}$	Mass
min^{-1}	kN				kN		kg
17000	5,1	2,4	4,6	2	3,4	4,9	0,041
15000	6,8	3,1	6,2	2,6	3,3	4,7	0,052
13000	7,8	3,8	7,1	3,2	5	7,2	0,074
12000	9,6	4,8	8,8	4,2	8,2	11,6	0,11
10000	12,7	6,6	11,4	5,4	7,4	10,6	0,16
8500	14	7,8	12,7	6,8	12,9	18	0,24
7500	19,5	11,2	17,4	9,3	14,3	20,4	0,34
6300	25,5	15,3	22,1	11,8	12,7	18	0,43
5000	32,5	19,8	22,8	13,6	13,4	23,1	0,45
4500	32,5	20,4	22,5	13,7	13,3	22,8	0,50

Cam Rollers, Double Row

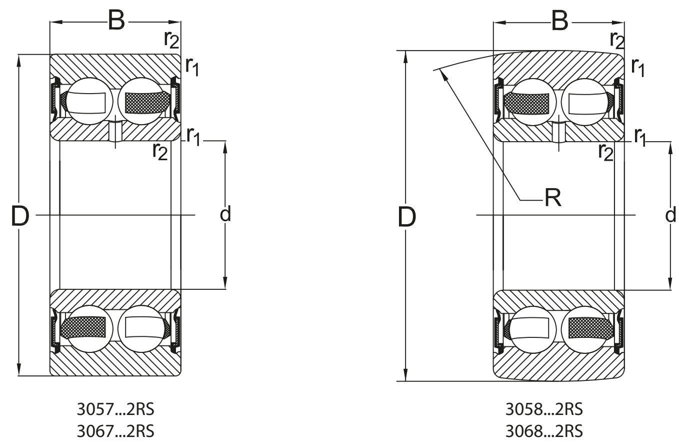


3057...2Z
3067...2Z

3058...2Z
3068...2Z

Dimensions					Designation	
D	d	B	R	r_1, r_2 min.	With cylindrical outer ring	With sphered outer ring
mm						
32	10	14	400	0,6	**305700 2Z**	**305800 2Z**
	10	14	400	0,6	**305700 2RS**	**305800 2RS**
35	12	15,9	400	0,6	**305701 2Z**	**305801 2Z**
	12	15,9	400	0,6	**305701 2RS**	**305801 2RS**
40	15	15,9	400	0,6	**305702 2Z**	**305802 2Z**
	15	15,9	400	0,6	**305702 2RS**	**305802 2RS**
47	17	17,5	400	0,6	**305703 2Z**	**305803 2Z**
	17	17,5	400	0,6	**305703 2RS**	**305803 2RS**
	15	19	400	1,0	**306702 2Z**	**306802 2Z**
	15	19	400	1,0	**306702 2RS**	**306802 2RS**
52	20	20,6	400	1	**305704 2Z**	**305804 2Z**
	20	20,6	400	1	**305704 2RS**	**305804 2RS**
	17	22,2	400	1,0	**306703 2Z**	**306803 2Z**
	17	22,2	400	1,0	**306703 2RS**	**306803 2RS**
62	25	20,6	400	1	**305705 2Z**	**305805 2Z**
	25	20,6	400	1	**305705 2RS**	**305805 2RS**

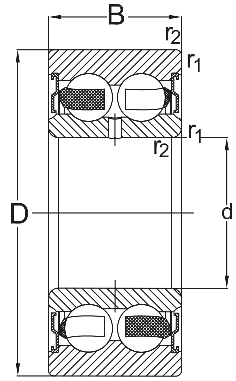
Cam Rollers, Double Row



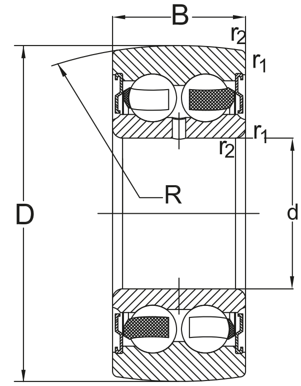
Abutment and fillet dimensions see on page 714

Speed rating	Load ratings as bearing dyn. C_r	Load ratings as bearing stat. C_{0r}	Load ratings as cam roller dyn. C_{LR}	Load ratings as cam roller stat. C_{0LR}	Max. permissible radial load dyn. $F_{r\,max}$	Max. permissible radial load stat. $F_{0r\,max}$	Mass
min^{-1}	kN				kN		kg
13000	7,8	4,5	7,4	4,1	9	12,9	0,062
8500	7,8	4,5	7,4	4,1	9	12,9	0,062
11000	10,6	5,9	10	5,2	8,3	12	0,078
7300	10,6	5,9	10	5,2	8,3	12	0,078
10000	11,9	7,1	11,1	6,4	12,2	17,6	0,10
6500	11,9	7,1	11,1	6,4	12,2	17,6	0,10
9000	14,6	9	13,8	8,3	19,3	27,5	0,16
6000	14,6	9	13,8	8,3	19,3	27,5	0,16
10000	17,7	10,3	14,6	9,2	12,5	18,4	0,15
6500	17,7	10,3	14,6	9,2	12,5	18,4	0,15
8000	19,5	12,5	18,2	11	17	24,5	0,22
5300	19,5	12,5	18,2	11	17	24,5	0,22
9500	21,1	12,5	17,2	11	15,5	22,2	0,20
6300	21,1	12,5	17,2	11	15,5	22,2	0,20
7000	21,2	14,6	19,9	13,4	30,5	44	0,32
4500	21,2	14,6	19,9	13,4	30,5	44	0,32

Cam Rollers, Double Row



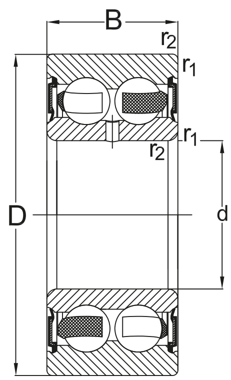
3057...2Z
3067...2Z



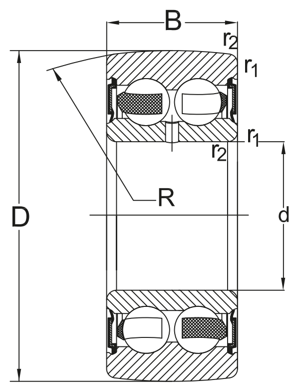
3058...2Z
3068...2Z

Dimensions					Designation	
D	d	B	R	r_1, r_2 min.	With cylindrical outer ring	With sphered outer ring
mm						
62	20	22,2	400	1,1	**306704 2Z**	**306804 2Z**
	20	22,2	400	1,1	**306704 2RS**	**306804 2RS**
72	30	23,8	400	1	**305706 2Z**	**305806 2Z**
	30	23,8	400	1	**305706 2RS**	**305806 2RS**
	25	25,4	400	1,1	**306705 2Z**	**306805 2Z**
	25	25,4	400	1,1	**306705 2RS**	**306805 2RS**
80	35	27	400	1,1	**305707 2Z**	**305807 2Z**
	35	27	400	1,1	**305707 2RS**	**305807 2RS**
	30	30,2	400	1,1	**306706 2Z**	**306806 2Z**
	30	30,2	400	1,1	**306706 2RS**	**306806 2RS**
90	35	34,9	400	1,5	**306707 2Z**	**306807 2Z**
	35	34,9	400	1,5	**306707 2RS**	**306807 2RS**
100	40	36,5	400	1,5	**306708 2Z**	**306808 2Z**
	40	36,5	400	1,5	**306708 2RS**	**306808 2RS**

Cam Rollers, Double Row



3057...2RS
3067...2RS



3058...2RS
3068...2RS

Abutment and fillet dimensions see on page 714

	Load ratings				Max. permissible radial load		Mass
	as bearing		as cam roller				
Speed rating	dyn. C_r	stat. C_{0r}	dyn. C_{LR}	stat. C_{0LR}	dyn. $F_{r\,max}$	stat. $F_{0r\,max}$	
min^{-1}	kN				kN		kg
9000	24,5	15,8	21,1	14,5	27	29	0,34
6000	24,5	15,8	21,1	14,5	27	29	0,34
6000	29,6	21,2	27,6	18,6	34	49	0,49
4000	29,6	21,2	27,6	18,6	34	49	0,49
7900	32,5	21,6	27,5	19,5	34,5	39	0,5
5200	32,5	21,6	27,5	19,5	34,5	39	0,5
5300	39	28,5	35,1	24	31	44	0,65
3500	39	28,5	35,1	24	31	44	0,65
6200	45,5	31,5	36,5	26,5	43,5	53	0,67
4100	45,5	31,5	36,5	26,5	43,5	53	0,67
5100	56	39,5	44,5	33	39,5	66	0,95
3400	56	39,5	44,5	33	39,5	66	0,95
4700	69	49,5	56	42	70	84	1,2
4700	69	49,5	56	42	70	84	1,2

URB

Support rollers

Standards, Boundary dimensions

Standard plans DIN 616

General

Support Rollers are either needle roller or cylindrical roller bearings with an extra radially thick outer ring. Depending on their series, support rollers may be both separable and non - separable radial bearings.

Support Rollers usually run with their outer ring either directly on a guide track or against a machine surface that is for guidance. Due to their extra - thick outer rings, Suport rollers are able to accept high radial forces as well as shock loads.

Their ability to accomodate axial forces, however, depends on the particular design of the support roller.

Support roller are usually exposed to minor misalignments during operation. To minimize the negative effects of such misalignments, (e.g. high edge stresses), support rollers are more frequently used with sphered outer rings.

URB - support rollers with parallel (cylindrical) outer diameters are indicated by the suffix "**X**".

Design variants

In order to cover as many applications as possible, **URB Support rollers** are available in several different design variants as standard.

To provide simple re-lubrication, all suport roller have lubrication holes in their inner rings.

For the most common design are shown in the figures on the pages 725 and 727.

Support Rollers without axial guidance

The most simple design of support rollers is provided by the **STO** - type rollers.

For these rollers the outer ring, inner ring and the needle roller and cage assembly may be fitted separately. Since **STO** - type support rollers do not provide any axial guidance to their needle roller and cage assembly they adequately accept radial loads only.

The axial guidance of outer ring and needle roller and cage assembly must be provided by a suitable design of adjacent machine parts.

STO - Type suport rollers are frequently used without their inner rings, namely **RSTO** - rollers. The needle roler and cage assembly of **RSTO** - type support rollers run directly onto the shaft surface, which must be designed in an adequate manner, (e.g. hardened and ground).

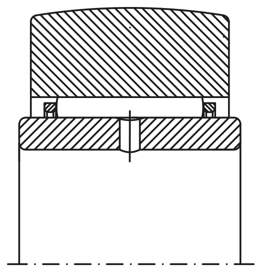
For detailed guide lines on the design of bearing raceways on shafts see chapter **"Bearing application"** on page 46.

STO and **RSTO** - type support rollers are the only support rollers that are satisfactory for operating with oil lubrication.

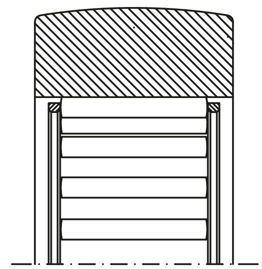
Unlike the **STO** - type support rollers, the outer ring, and the needle rollers and cage assembly of series **NA 22 ..2RS** build a unit, whilst the inner ring may be dealt with individually.

NA 22 ..2RS - type support rollers also accomodate radial loads only. They also require adequate axial guidance of their outer rings by adjacent parts.

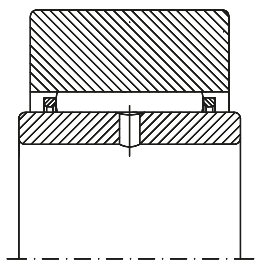
Due to the contact seals, which are integrated in their outer rings, **NA 22 ..2RS -** type support rollers provide the possibility for maintenance - free bearing arrangements.



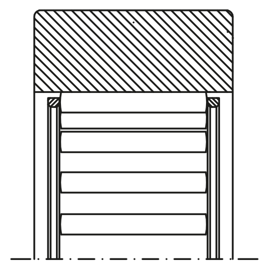
STO



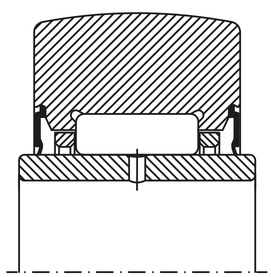
RSTO



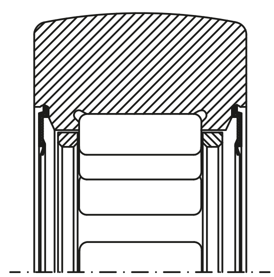
STO...X



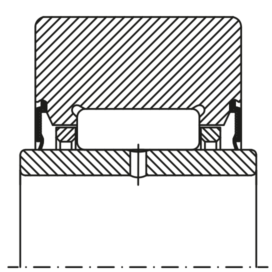
RSTO...X



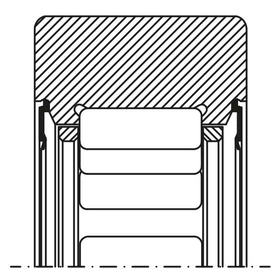
NA22...2RS



RNA22...2RS



NA22...2RS.X



RNA22...2RS.X

Sealed support rollers, without inner rings, are also produced, namely **RNA 22...2RS**.
For these types both the needle rollers and the rubbing seals run on the contacting shaft surface.

Support Rollers with axial guidance

These types of supporting rollers are also to accommodate additional thrust loads as they occur, due to aligning errors or if rollers run out of line.
That is why no extra external guiding surfaces are required.
Where high axial loads are anticipated effective axial support of side washers must be achieved by the adjacent machine components.

Support rollers, type STO..2Z

STO...2Z - type support rollers are designed similar to the **STO** - type but have two loose side plates to accept axial forces.
These types of support rollers are separable, this enables simple mounting of the rollers due to the separable parts.
Particular attention must be paid to the adequate axial camping of loose side washers during mounting.
The side plates of STO...2Z - type support rollers must not have any axial play when they are mounted.

Support rollers, type NATR

The side washers of NATR - type needle roller support rollers are pressed into the inner ring to ensure guidance of the outer ring and the needle roller and cage assembly.

Therefore, these roller types are non - separable. NATR - type needle roller support roller are optimum for applications where the rollers are exposed to high radial loads at high speeds.

The sealed support rollers, namely, **NATR.. PP**, which feature integrated rubbing seals on each side of the outer ring are very suitable for operating in harsh conditions (e.g. heavy dust, dirt and other contaminates).

Support rollers, type NATV

NATV-type rollers are identical to the **NATR**-type except they have no fitted cage (i.e. full complement type).
This enables an increased numbers of needle roller to be fitted in the available space (i.e. full circumferentially and radially). Therefore, significantly higher "basic" load ratings are achived.
NATV type full complement rollers are unsuitable for high speed applications due to the differing kinematic operating condition. Also they must be re-lubricated more frequently.

For applications of harsh operating conditions the sealed support roller, namely, **NATV...PP** is also available.

NUTR - type support rollers

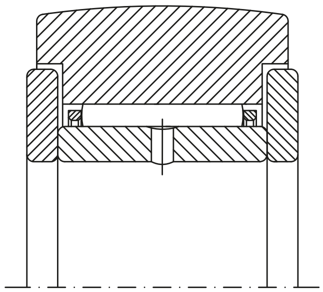
The base internal design of **NUTR** - type support rollers is similar to that of double row cylindrical roller bearings.
Since the outer ring has tow shoulders these support rollers are able to accommodate greater thrust loads.
NUTR - type support rollers are non separable.
The separate loose ribs of these type are retained using either cupped washers pressfitted into the outer ring or with lamellar rings which sit in the formed circumferential grooves machined in the loose rib outer diameter.
Both methods also act as a gap seal.

Due to do their full complement design, **NUTR** - type support roller feature a maximum load rating but they must be more frequently re-lubrication.

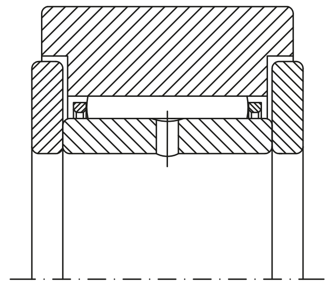
For extra heavy duty applications, particularly where heavy shock loads occur **NUTR** - type support rollers are available with an extra - radialy thick walled outer ring (see sketch).

URB's extra heavy duty **NUTR** -type support rollers with increased outer ring wall thickness are identified by the fact that their nominal diameters are included in their designation.

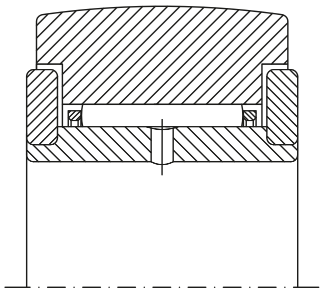
Examples:
NUTR 1747
or
NUTR 50110.



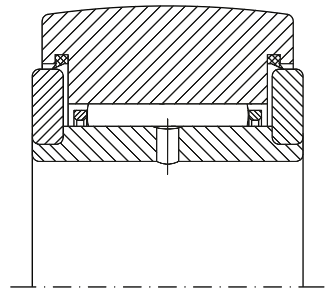
STO...2Z



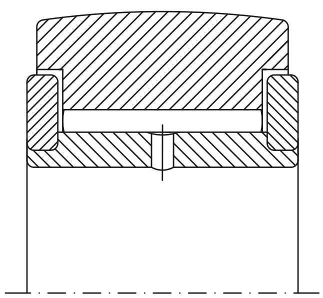
STO...2ZX



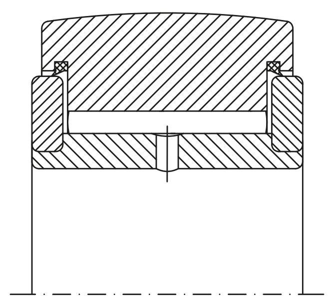
NATR



NATR...PP



NATV



NATV...PP

Tolerance values of ISO - tolerance fields F6 and h12 [µm]

Nominal dimension		>	**3**	**6**	**10**	**18**	**30**	**50**
	[mm]	≤	**6**	**10**	**18**	**30**	**50**	**80**
ISO - Tolerance field	**F6**	min	+10	+13	+16	+20	+25	+30
		max	+18	+22	+27	+33	+41	+49
ISO - Tolerance field	**h12**	min	-120	-150	-180	-210	-250	-300
		max	0	0	0	0	0	0

All **URB support rollers are produced with crowned outer ring diameter as standard** they are also available with parallel (cylindrical) outer diameters indicated by the suffix **"X",** see the relevant designs.

Material of seals

Several types of URB support rollers, such as series **NA22...2RS, NATR .. PP** und **NATV...PP** are also available in sealed versions.

These support rollers feature contacting seals made from wear - rezistant synthetic rubber compound (**NBR**) that provides an efficient and effective seal against the penetration of impurities or the escape of grease.

The synthetic rubber used for these contacting seals is satisfactory for operation temperatures of **-30°C** up to **+120°C**.

Grease filling

All **URB Support rollers** are already supplied filled with a high quality, lithium - soaped bearing grease as standard.

This lubricant is adequate for operating temperatures of **-30°C** up to ca. **+110°C**. Although support rollers under normal operating conditions usually run maintenance - free, they may require more frequent re - lubrication under certain unfavourable operating conditions such as heavy dust, high speeds, permanent operating temperatures of more than 70°C, and the presence of increased humidity etc.

Therefore a **URB support rollers** feature a lubrication hole in the inner ring to provide the possibility of re-lubricating the rollers, when necessary.

It must be considered where relubrication is necessary, with a satisfactory grease, the force of pressure to re-grease must be of a level not to cause permanent damage to either the seals or shields.

URB also produce roller with alternative grease fill according to customer's specidication upon order request.

Cages

URB support rollers, with cages fitted, have normally pressed steel cages as standard. Only small support rollers without axial guidance, series **STO** and **RSTO**, respectively, are fitted with solid polyamide cages (suffix **TN**), as standard.

Tolerances

URB support rollers are produced to normal tolerance class (**PN**) as standard, according to DIN - standard DIN 620.

The exceptions being the outer ring outer diameter tolerance of crowned outer rings and the width tolerance of supporting roller of series **STO ...2Z**, **NATR**, **NATV** and **NUTR**.

The tolerance for the outer ring diameter of support rollers with sphered outer ring is uniform at:

0 / -0,05 mm

The width tolerance of support rollers of series **STO ...2Z**, **NATR**, **NATV** and **NUTR** is lateral and lies in the ISO - tolerance field **h12**.

The tolerance for the **inside diameter of the needle roller complement**, (**F**), of **RSTO** and **RNA 22...2RS** - type support rollers that are used without inner rings, is lateral in the ISO - tolerance field **F6**.

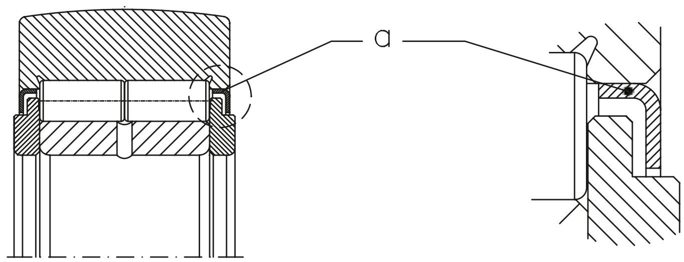
Values of ISO - tolerance field F6 and h12 are listed in the table below. For detailed values of tolerances to DIN 620 see chapter "**Bearing tolerances**" page 28.

Internal Clearance

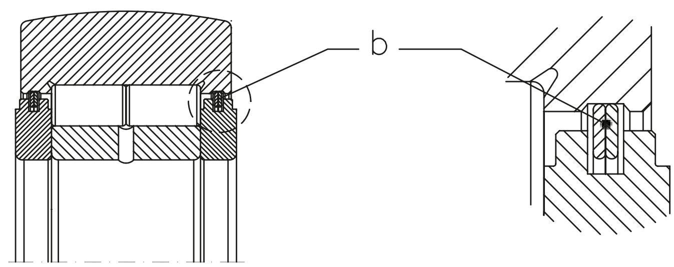
URB Support rollers are produced to normal internal clearance group (**CN**) as standard according to DIN 620.

Load carrying capability

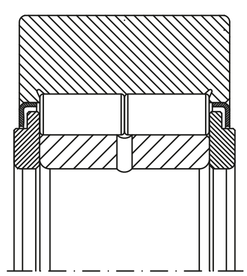
Unlike "normal" rolling element bearings, the outer ring of support rollers contact the adjacent parts with a very small contacting surface only.



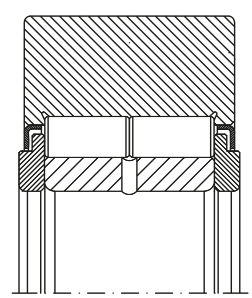
NUTR (a)



NUTR (b)



NUTR...X



NUTR...XXXX

This causes deformations of the outer ring. These are considered by the recommended maximum values for the permissible dynamic and static radial loads as given by the product tables.

Equivalent dynamic load

Where Support rollers must be calculated as rolling element bearings:

$$\mathbf{P = F_r}$$

But, **P** must be ≤ $\mathbf{F_r}$ **max**
(for $\mathbf{F_r}$ **max** see product tables)

Equivalent static bearing load

For Support rollers:

$$\mathbf{P_0 = F_r}$$

But, $\mathbf{P_0}$ must be ≤ $\mathbf{F_{0r}}$ **max**
(for $\mathbf{F_{0r}}$ **max** see product tables)

Design of adjacent machine components

For support rollers of the series **STO**, **RSTO**, **NA22..2RS** and **RNA22..2RS**, an effective axial guidance of the outer rings must be provided by satisfactory designed surrounding parts.

These guiding surfaces must have a clean and plain machined surface, minimum fine turned, without any burrs.

These guide surfaces which are machined should reach **50%**, or greater, of the outer ring radial wall section or the equivalent diameter.

Hardened guide surfaces, however, feature a higher wear - resistance and may therefore be smaller in diameter.

RSTO and **RNA22..2RS** - type support rollers that run directly on a shaft require an **axial play** of 0,2 mm minimum between the lateral guiding surfaces in mounted condition.

The diameter of the supposed shaft raceway should have a diameter tolerance according to **k5**.

The shaft or pin have to fulfil certain requirements in terms of hardness, dimensional and geometric accuracy.

For detailed information on the design requirements see the chapter "**Bearing application**" on page 46.

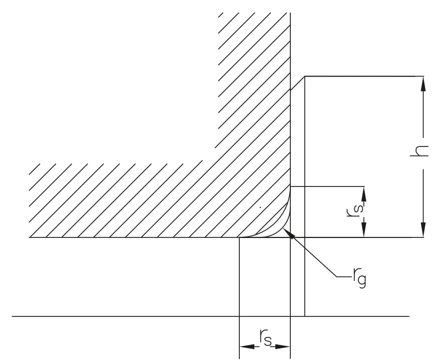
For support roller which are exposed to high axial loads, effective lateral support of their side washers is necessary.

Since Support rollers usually have point loaded inner rings, their shaft may be rather loose (i.e. according to ISO - tolerance fields **g6**, **h6** or **j6**).

Abutment and Fillet dimensions for Support rollers

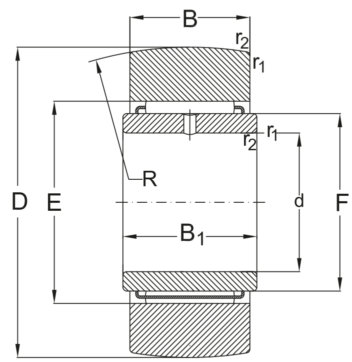
The bearing inner ring must contact adjacent surfaces with their side faces only. The fillet radius of inner ring corners must not touch the fillet radius of shaft shoulder.

Therefore, the largest fillet radius ($\mathbf{r_g}$) must be smaller than the minimum fillet dimension of the Support roller inner rings ($\mathbf{r_s}$) as listed in the product tables.

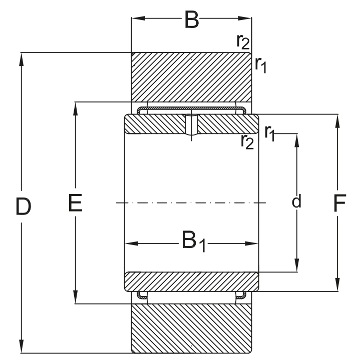


r_{smin}	r_{gmax}	h_{min}
0.6	0.6	2.1
1	1	2.8
1.1	1	3.5
1.5	1.5	4.5
2	2	5.5

Support Rollers without axial guidance



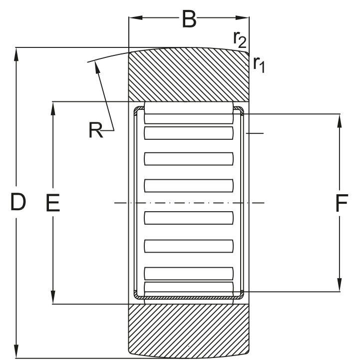
STO...



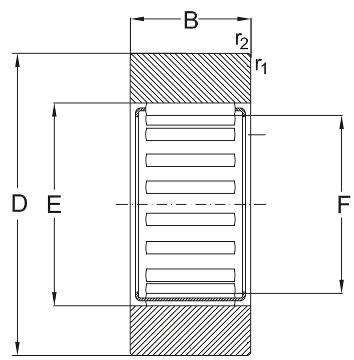
STO...X

Dimensions						Designation	
D	d	B	B_1	r_1, r_2 min.	R	with sphered outer ring	with cylindrical outer ring
mm							
16	-	7,8	-	0,3	500	**RSTO5 TN**	**RSTO5 XTN**
19	-	9,8	-	0,3	500	**RSTO6**	**RSTO6 X**
	6	9,8	10	0,3	500	**STO6**	**STO6 X**
24	-	9,8	-	0,3	500	**RSTO8**	**RSTO8 X**
	8	9,8	10	0,3	500	**STO8**	**STO8 X**
30	-	11,8	-	0,3	500	**RSTO10**	**RSTO10 X**
	10	11,8	12	0,3	500	**STO10**	**STO10 X**
32	-	11,8	-	0,3	500	**RSTO12**	**RSTO12 X**
	12	11,8	12	0,3	500	**STO12**	**STO12 X**
35	-	11,8	-	0,3	500	**RSTO15**	**RSTO15 X**
	15	11,8	12	0,3	500	**STO15**	**STO15 X**
40	-	15,8	-	0,3	500	**RSTO17**	**RSTO17 X**
	17	15,8	16	0,3	500	**STO17**	**STO17**
47	-	15,8	-	0,3	500	**RSTO20**	**RSTO20 X**
	20	15,8	16	0,3	500	**STO20**	**STO20 X**

Support Rollers without axial guidance



RSTO...

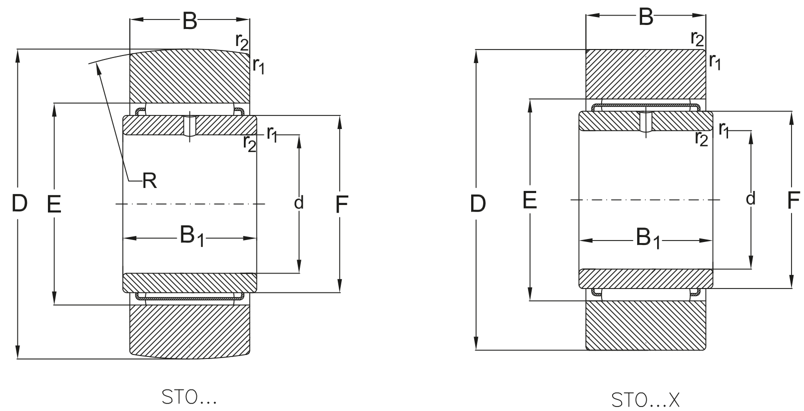


RSTO...X

Recommended Abutment and fillet dimensions see on page 728

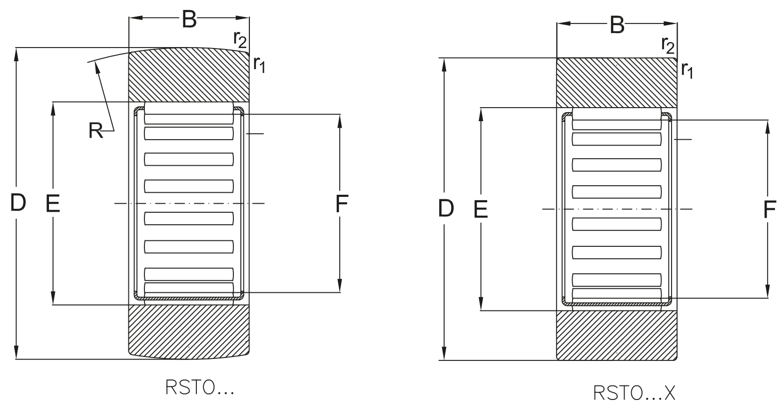
Dimensions		**Speed rating**	**Load ratings**				**max. permissible radial load**		**Mass**
			as bearing		**as support roller**				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
F	E		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min $^{-1}$	kN				kN		kg
7	10	24000	2,65	2,5	2,36	2,5	2,9	3	0,01
10	13	18000	5,2	6,55	4	4,5	3,9	5,6	0,01
10	13	18000	5,2	6,55	4	4,5	3,9	5,6	0,02
12	15	16000	5,6	7,65	4,5	5,4	6,4	7,5	0,02
12	15	16000	5,6	7,65	4,5	5,4	6,4	7,5	0,03
14	20	12000	10	10,8	8,15	8,8	7,35	10,6	0,04
14	20	12000	10	10,8	8,15	8,8	7,35	10,6	0,05
16	22	10000	10,6	12	8,3	9,8	7,35	10,8	0,05
16	22	10000	10,6	12	8,3	9,8	7,35	10,8	0,06
20	26	7000	12,5	15,6	8,65	10,6	6,55	11	0,05
20	26	7000	12,5	15,6	8,65	10,6	6,55	11	0,06
22	29	6300	18,3	23,6	13,2	17,6	10,8	18	0,09
22	29	6300	18,3	23,6	13,2	17,6	10,8	18	0,11
25	32	5300	19	26	14,3	15,6	15,6	22,4	0,13
25	32	5300	19	26	14,3	15,6	15,6	22,4	0,15

Support Rollers without axial guidance



Dimensions						Designation	
D	d	B	B_1	r_1, r_2 min.	R	with sphered outer ring	with cylindrical outer ring
mm							
52	-	15,8	-	0,3	500	**RSTO25**	**RSTO25 X**
	25	15,8	16	0,3	500	**STO25**	**STO25 X**
62	-	19,8	-	0,6	500	**RSTO30**	**RSTO30 X**
	30	19,8	20	0,6	500	**STO30**	**STO30 X**
72	-	19,8	-	0,6	500	**RSTO35**	**RSTO35 X**
	35	19,8	20	0,6	500	**STO35**	**STO35 X**
80	-	19,8	-	1	500	**RSTO40**	**RSTO40 X**
	40	19,8	20	1	500	**STO40**	**STO40 X**
85	-	19,8	-	1	500	**RSTO45**	**RSTO45 X**
	45	19,8	20	1	500	**STO45**	**STO45 X**
90	-	19,8	-	1	500	**RSTO50**	**RSTO50 X**
	50	19,8	20	1	500	**STO50**	**STO50 X**

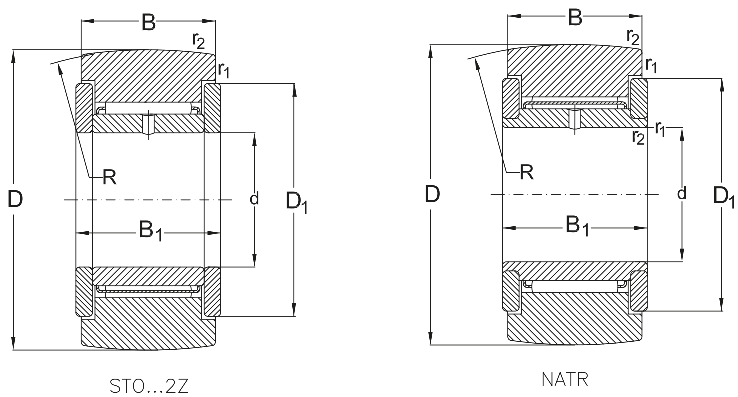
Support Rollers without axial guidance



Recommended Abutment and fillet dimensions see on page 728

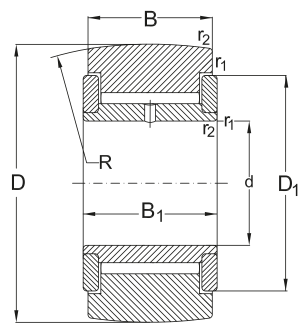
Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
F	E		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
30	37	4300	21,2	31,5	15	22,8	16	23,6	0,15
30	37	4300	21,2	31,5	15	22,8	16	23,6	0,18
38	46	3000	31,5	52	21,2	34,5	22	33,5	0,26
38	46	3000	31,5	52	21,2	34,5	22	33,5	0,31
42	50	2400	33,5	57	24	40,5	31,5	43	0,38
42	50	2400	33,5	57	24	40,5	31,5	43	0,44
50	58	1800	36,5	68	23,8	39,0	32,5	45	0,42
50	58	1800	36,5	68	23,8	39,0	32,5	45	0,53
55	63	1600	38	75	24,5	43,0	33,5	45,5	0,45
55	63	1600	38	75	24,5	43,0	33,5	45,5	0,58
60	68	1500	40	80	25	45,5	34,5	45,5	0,48
60	68	1500	40	80	25	45,5	34,5	45,5	0,62

Support Rollers with axial guidance

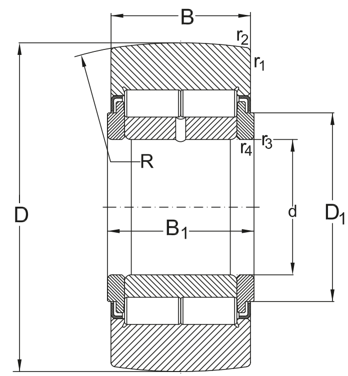


Dimensions							Designation	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
16	5	11	12	0,1	-	500	**NATR5**	**NATR5 X**
	5	11	12	0,1	-	500	**NATV5**	**NATV5 X**
19	6	11	12	0,1	-	500	**NATR6**	**NATR6 X**
	6	11	12	0,1	-	500	**NATV6**	**NATV6 X**
	6	13,8	14	0,3	-	500	**STO6 2Z**	**STO6 2ZX**
24	8	14	15	0,3	-	500	**NATR8**	**NATR8 X**
	8	14	15	0,3	-	500	**NATV8**	**NATV8 X**
	8	13,8	14	0,3	-	500	**STO8 2Z**	**STO8 2ZX**
30	10	14	15	0,6	-	500	**NATR10**	**NATR10 X**
	10	14	15	0,6	-	500	**NATV10**	**NATV10 X**
	10	15,8	16	0,3	-	500	**STO10 2Z**	**STO10 2ZX**
32	12	14	15	0,6	-	500	**NATR12**	**NATR12 X**
	12	14	15	0,6	-	500	**NATV12**	**NATV12 X**
	12	15,8	16	0,3	-	500	**STO12 2Z**	**STO12 2ZX**
35	15	18	19	0,6	-	500	**NATR15**	**NATR15 X**
	15	18	19	0,6	-	500	**NATV15**	**NATV15 X**

Support Rollers with axial guidance



NATV

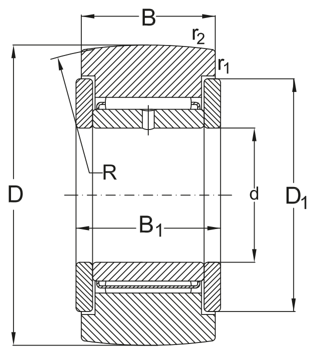


NUTR

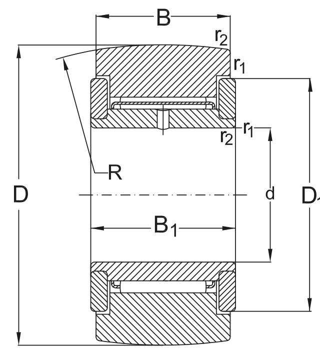
Recommended Abutment and fillet dimensions see on page 728

Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	D_1		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min $^{-1}$	kN				kN		kg
16	12	22000	3,7	3,9	3,1	3,2	2,9	4,1	0,02
	12	11000	6	8,8	4,7	6,5	4	5,7	0,02
19	14	20000	4,15	4,75	3,25	3,8	3,45	5,5	0,02
	14	10000	6,9	11	5,3	8	5,1	7,4	0,02
	15	18000	5,1	6,55	4	5,1	4,2	5,85	0,03
24	19	17000	6,6	7,8	5,3	6,1	4,8	7,35	0,04
	19	8500	9,7	16	7,4	11,4	7,4	10,4	0,04
	18	16000	5,6	7,65	4,65	6,4	7,1	7,5	0,04
30	23	15000	7,8	9,65	6,4	8	7,1	11,2	0,06
	23	7500	11,4	19,3	8,9	14,6	11	15,6	0,07
	23	12000	10	10,8	8,3	8,8	8,15	11	0,07
32	25	14000	8,4	10,8	6,6	8,5	7,1	10	0,07
	25	7000	12,3	22	9,3	15,3	10,6	15	0,07
	25	10000	10,6	12	8,3	9,3	8	11,2	0,08
35	27	13000	12,3	19,3	9,5	13,7	11,4	16,3	0,10
	27	6700	17,2	35,5	12,3	23,2	14,6	20,8	0,11

Support Rollers with axial guidance



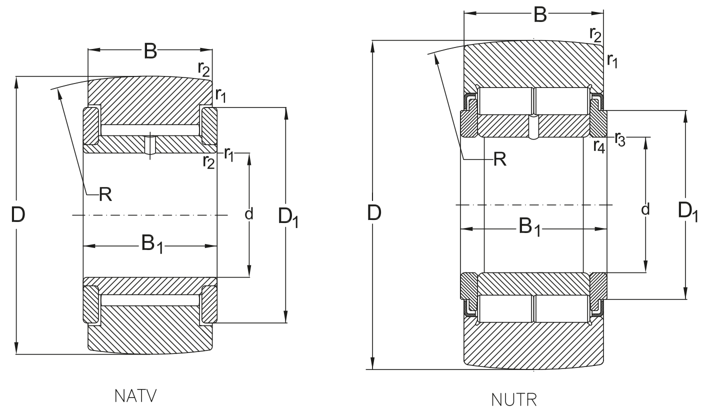
STO...2Z



NATR

Dimensions							**Designation**	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
35	15	18	19	0,6	0,3	500	**NUTR15**	**NUTR15 X**
	15	15,8	16	0,3	-	500	**STO15 2Z**	**STO15 2ZX**
40	17	20	21	1	-	500	**NATR17**	**NATR17 X**
	17	20	21	1	-	500	**NATV17**	**NATV17 X**
	17	20	21	1	0,3	500	**NUTR17**	**NUTR17 X**
	17	19,8	20	0,3	-	500	**STO17 2Z**	**STO17 2ZX**
42	15	18	19	0,6	0,3	500	**NUTR1542**	**NUTR1542 X**
47	20	24	25	1	-	500	**NATR20**	**NATR20 X**
	20	24	25	1	-	500	**NATV20**	**NATV20 X**
	17	20	21	1	0,3	500	**NUTR1747**	**NUTR1747 X**
	20	24	25	1	0,3	500	**NUTR20**	**NUTR20 X**
	20	19,8	20	0,3	-	500	**STO20 2Z**	**STO20 2ZX**
52	25	24	25	1	-	500	**NATR25**	**NATR25 X**
	25	24	25	1	-	500	**NATV25**	**NATV25 X**
	20	24	25	1	0,3	500	**NUTR2052**	**NUTR2052 X**
	25	24	25	1	0,3	500	**NUTR25**	**NUTR25 X**

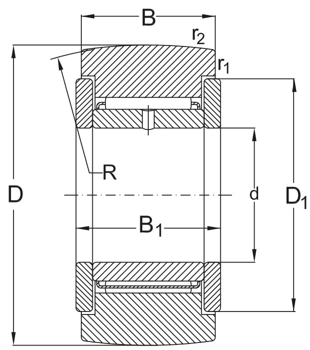
Support Rollers with axial guidance



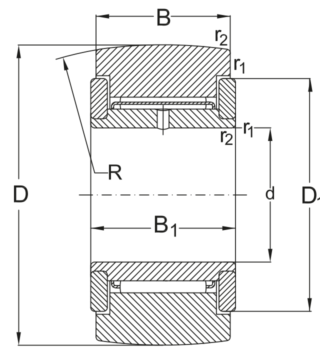
Recommended Abutment and fillet dimensions see on page 728

Dimensions		**Speed rating**	**Load ratings**				**max. permissible radial load**		**Mass**
			as bearing		**as support roller**				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	D_1		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
35	20	5600	24,2	28,5	16,8	17,6	8,7	12,2	0,10
	30	7000	12,3	15,6	8,8	10,6	7,8	6,95	0,09
40	32	10000	13,4	20,4	10,5	14,6	12,5	18	0,14
	32	5600	19,4	40	14,2	26,5	17	24,5	0,15
	22	5300	26	32	19	20	14	22,2	0,15
	33	6300	18,3	23,6	13,2	16,6	11,4	18,6	0,15
42	20	5600	24,2	28,5	20,1	17,6	21,6	31	0,16
47	37	9500	18,7	32,5	14,7	24,5	23,6	33,5	0,25
	37	5300	26	60	19,4	41,5	30,5	43	0,26
	22	5300	26	32	22	27	30	43	0,22
	27	4500	39	49	28,6	33,5	17	25	0,25
	37	5300	19	26	14,6	19,6	16,6	22,8	0,2
52	42	8000	20,5	38	14,7	25,5	21,6	31	0,28
	42	4300	28,6	72	19,8	44	28,5	40,5	0,29
	27	4500	39	49	30	39	30	42,5	0,32
	31	3800	44,6	61	29,7	36	18	25,5	0,28

Support Rollers with axial guidance



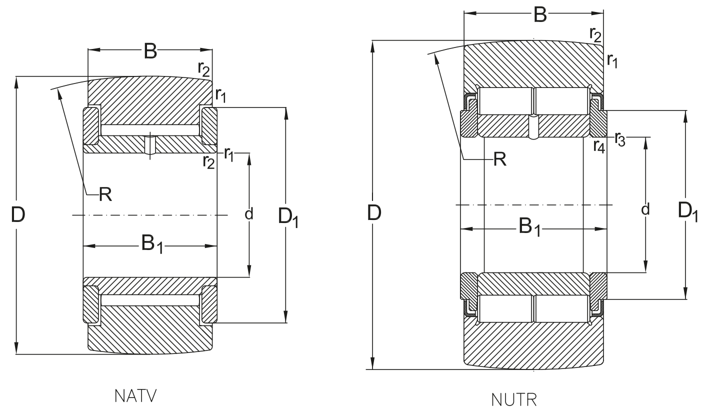
STO...2Z



NATR

Dimensions							Designation	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
52	25	19,8	20	0,3	-	500	**STO25 2Z**	**STO25 2ZX**
62	30	28	29	1	-	500	**NATR30**	**NATR30 X**
	30	28	29	1	-	500	**NATV30**	**NATV30 X**
	25	24	25	1	0,3	500	**NUTR 2562**	**NUTR2562 X**
	30	28	29	1	0,3	500	**NUTR 30**	**NUTR30 X**
	30	24,8	25	0,6	-	500	**STO30 2Z**	**STO30 2ZX**
72	35	28	29	1,1	-	500	**NATR35**	**NATR35 X**
	35	28	29	1,1	-	500	**NATV35**	**NATV35 X**
	30	28	29	1	0,3	500	**NUTR3072**	**NUTR3072 X**
	35	28	29	1,1	0,3	500	**NUTR35**	**NUTR35 X**
	35	24,8	25	0,6	-	500	**STO35 2Z**	**STO35 2ZX**
80	40	30	32	1,1	-	500	**NATR40**	**NATR40 X**
	40	30	32	1,1	-	500	**NATV40**	**NATV40 X**
	35	28	29	1,1	0,6	500	**NUTR3580**	**NUTR3580 X**
	40	30	32	1,1	0,6	500	**NUTR40**	**NUTR40 X**
	40	25,8	26	0,6	-	500	**STO40 2Z**	**STO40 2ZX**

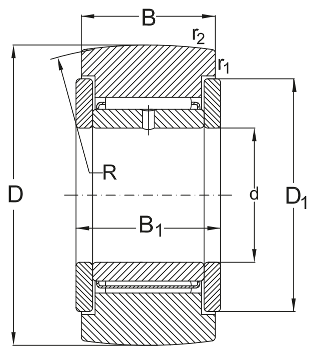
Support Rollers with axial guidance



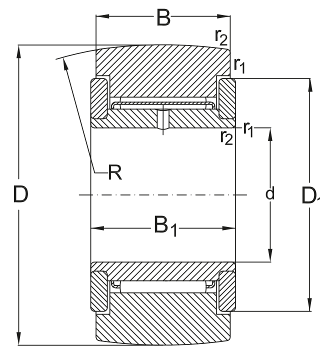
Recommended Abutment and fillet dimensions see on page 728

Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	D_1		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
52	42	4300	21,2	31,5	15,3	21,6	17	24	0,2
62	51	7000	33	60	22,9	37,5	26,5	38	0,47
	51	3600	44,6	108	29,2	62	34,5	49	0,48
	31	3800	44,6	61	35,8	48	44	63	0,45
	38	3200	60	78	41,3	47,5	24	34,5	0,47
	52	3000	31,4	52	21,2	32	22,8	35,5	0,42
72	58	6000	35,8	69,5	24,6	43	33,5	48	0,64
	58	3000	49,5	129	31,9	72	43	62	0,65
	38	3200	60	78	46,5	61	52	76,5	0,71
	40	2800	65,5	91,5	44	57	33,5	47,5	0,63
	56	2400	31,9	54	22,8	36,5	34	41,5	0,56
80	66	5300	46,8	95	31,9	57	41,5	58,5	0,80
	66	2600	60,5	160	39,1	88	51	73,5	0,89
	44	2800	65,5	91,5	49	68	57	81,5	0,86
	51	2400	91,3	134	57,2	72	32	45,5	0,82
	64	1800	36,5	68	24,5	42,5	35,5	45,5	0,70

Support Rollers with axial guidance



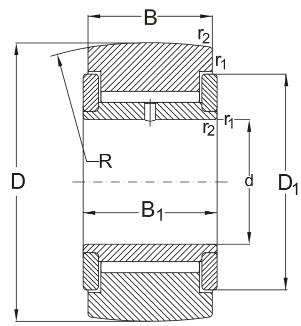
STO...2Z



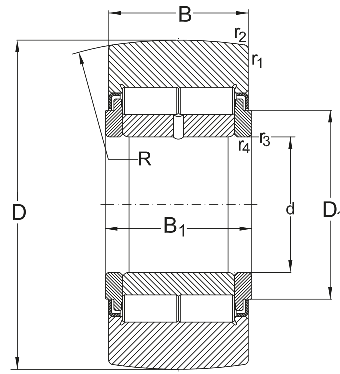
NATR

Dimensions							Designation	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
85	45	30	32	1,1	-	500	**NATR45**	**NATR45 X**
	45	30	32	1,1	0,6	500	**NUTR45**	**NUTR45 X**
	45	25.8	26	0,6	-	500	**STO45 2Z**	**STO45 2ZX**
90	50	30	32	1,1	-	500	**NATR50**	**NATR50 X**
	50	30	32	1,1	-	500	**NATV50**	**NATV50 X**
	40	30	32	1,1	0,6	500	**NUTR4090**	**NUTR4090 X**
	50	30	32	1,1	0,6	500	**NUTR50**	**NUTR50 X**
100	45	30	32	1,1	0,6	500	**NUTR45100**	**NUTR45100 X**
110	50	30	32	1,1	0,6	500	**NUTR50110**	**NUTR50110 X**

Support Rollers with axial guidance



NATV

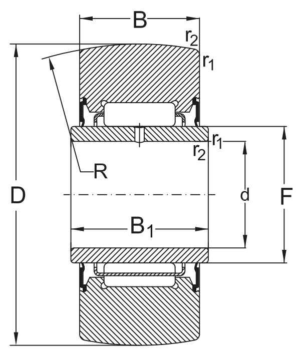


NUTR

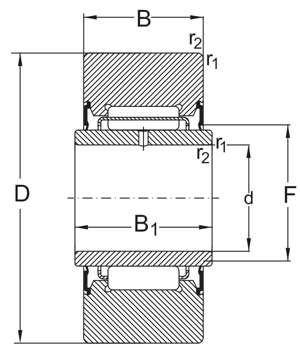
Recommended Abutment and fillet dimensions see on page 728

Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	D_1		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
85	72	5000	48,4	102	31,4	57	40	57	0,91
	55	2000	98,8	146	58,3	75	32,5	46,5	0,88
	69	1600	38	75	24,5	43	36,5	47,5	0,77
90	76	4500	50,1	108	30,8	58,5	40	57	0,96
	76	2000	67,1	193	39,1	93	50	72	1,00
	51	2400	91,3	134	68,2	91,5	63	90	1,16
	60	1900	101	160	58,3	78	32,5	47,5	0,95
100	55	2000	96,8	146	73,6	104	80	114	1,43
110	60	1900	101	160	78,1	116	98	140	1,73

Sealed Support Rollers without axial guidance



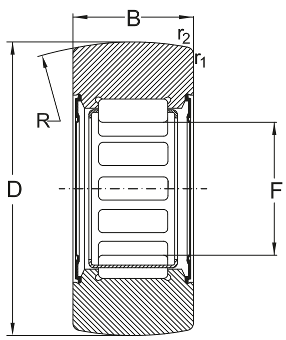
NA22...2RS



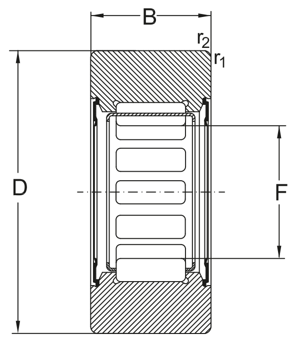
NA22...2RS.X

Dimensions							Designation	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
19	-	-	11,8	0,3	-	500	**RNA22/6 2RS**	**RNA22/6 2RSX**
	6	12	11,8	0,3	0,3	500	**NA22/6 2RS**	**NA22/6 2RSX**
24	-	-	11,8	0,3	-	500	**RNA22/8 2RS**	**RNA22/8 2RSX**
	8	12	11,8	0,3	0,3	500	**NA22/8 2RS**	**NA22/8 2RSX**
30	-	-	13,8	0,6	-	500	**RNA2200 2RS**	**RNA2200 2RSX**
	10	14	13,8	0,6	0,3	500	**NA2200 2RS**	**NA2200 2RSX**
32	-	-	13,8	0,6	-	500	**RNA2201 2RS**	**RNA2201 2RSX**
	12	14	13,8	0,6	0,3	500	**NA2201 2RS**	**NA2201 2RSX**
35	-	-	13,8	0,6	-	500	**RNA2202 2RS**	**RNA2202 2RSX**
	15	14	13,8	0,6	0,3	500	**NA2202 2RS**	**NA2202 2RSX**
40	-	-	15,8	1	-	500	**RNA2203 2RS**	**RNA2203 2RSX**
	17	16	15,8	1	0,3	500	**NA2203 2RS**	**NA2203 2RSX**
47	-	-	17,8	1	-	500	**RNA2204 2RS**	**RNA2204 2RSX**
	20	18	17,8	1	0,3	500	**NA2204 2RS**	**NA2204 2RSX**

Sealed Support Rollers without axial guidance



RNA22...2RS

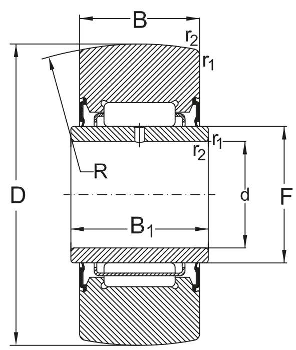


RNA22...2RS.X

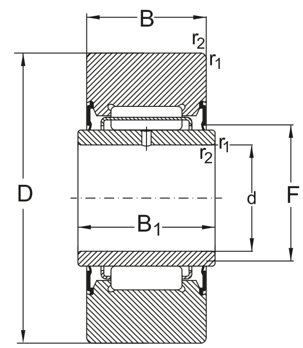
Recommended Abutment and fillet dimensions see on page 728

Dimensions		**Speed rating**	**Load ratings**				**max. permissible radial load**		**Mass**
			as bearing		**as support roller**				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	F		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min $^{-1}$	kN				kN		kg
19	10	16000	4,5	4,1	3,5	3	1,9	2,8	0,01
	10	16000	4,5	4,1	3,5	3	1,9	2,8	0,02
24	12	14000	5,4	5,2	4,5	4,4	5	7,1	0,03
	12	14000	5,4	5,2	4,5	4,4	5	7,1	0,03
30	14	13000	7,4	8,2	6,4	7,2	12	17	0,05
	14	13000	7,4	8,2	6,4	7,2	12	17	0,06
32	16	12000	8,1	9,1	6,9	8,2	11,6	16,6	0,06
	16	12000	8,1	9,1	6,9	8,2	11,6	16,6	0,07
35	20	9500	9,1	12	7,2	9	9,6	13,7	0,06
	20	9500	9,1	12	7,2	9	9,6	13,7	0,07
40	22	9000	11,3	16,3	9,4	12,9	16	22,8	0,09
	22	9000	11,3	16,3	9,4	12,9	16	22,8	0,11
47	25	7500	19,4	22,4	15,4	17,3	17,6	25,5	0,15
	25	7500	19,4	22,4	15,4	17,3	17,6	25,5	0,18

Sealed Support Rollers without axial guidance



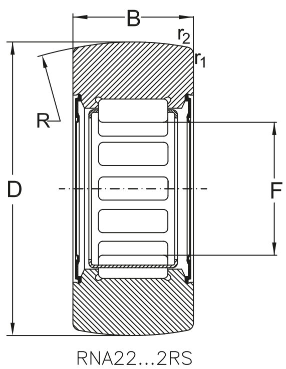
NA22...2RS

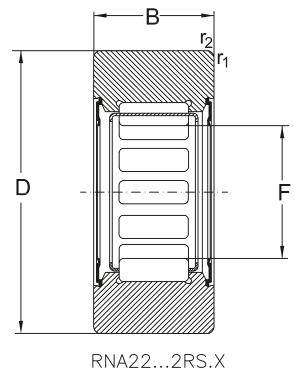


NA22...2RS.X

Dimensions							Designation	
D	d	B	B_1	r_1, r_2 min.	r_3, r_4 min.	R	with sphered outer ring	with cylindrical outer ring
mm								
52	-	-	17,8	1	-	500	**RNA2205 2RS**	**RNA2205 2RSX**
	25	18	17,8	1	0,3	500	**NA2205 2RS**	**NA2205 2RSX**
62	-	-	19,8	1	-	500	**RNA2206 2RS**	**RNA2206 2RSX**
	30	20	19,8	1	0,3	500	**NA2206 2RS**	**NA2206 2RSX**
72	-	-	22,7	1,1	-	500	**RNA2207 2RS**	**RNA2207 2RSX**
	35	23	22,7	1,1	0,6	500	**NA2207 2RS**	**NA2207 2RSX**
80	-	-	22,7	1,1	-	500	**RNA2208 2RS**	**RNA2208 2RSX**
	40	23	22,7	1,1	0,6	500	**NA2208 2RS**	**NA2208 2RSX**
85	-	-	22,7	1,1	-	500	**RNA2209 2RS**	**RNA2209 2RSX**
	45	23	22,7	1,1	0,6	500	**NA2209 2RS**	**NA2209 2RSX**
90	-	-	22,7	1,1	-	500	**RNA2210 2RS**	**RNA2210 2RSX**
	50	23	22,7	1,1	0,6	500	**NA2210 2RS**	**NA2210 2RSX**

Sealed Support Rollers without axial guidance

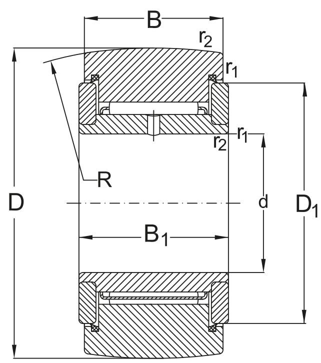




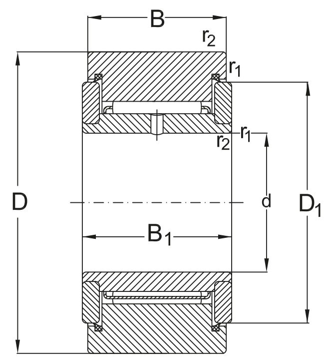
Recommended Abutment and fillet dimensions see on page 728

Dimensions		**Speed rating**	**Load ratings**				**max. permissible radial load**		**Mass**
			as bearing		**as support roller**				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	F		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
52	30	6300	21,6	27,5	16,1	19	17,4	24,6	0,17
	30	6300	21,6	27,5	16,1	19	17,4	24,6	0,20
62	35	5600	22,4	32	17,6	24,5	28,5	40,5	0,29
	35	5600	22,4	32	17,6	24,5	28,5	40,5	0,32
72	42	4800	28,5	46,5	22	34	39	56	0,42
	42	4800	28,5	46,5	22	34	39	56	0,49
80	48	4000	36,9	58,5	27	39	37,5	53	0,515
	48	4000	36,9	58,5	27	39	37,5	53	0,615
85	52	3800	39	63	27,5	41,5	39	56	0,565
	52	3800	39	63	27,5	41,5	39	56	0,661
90	58	3400	40	71	27	41,5	36,5	52	0,59
	58	3400	40	71	27	41,5	36,5	52	0,712

Sealed Support Rollers with axial guidance



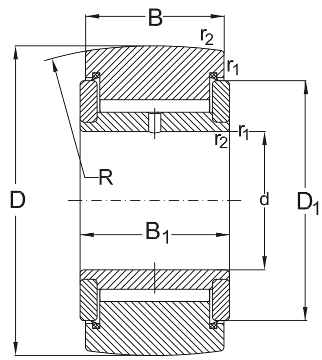
NATR...PP



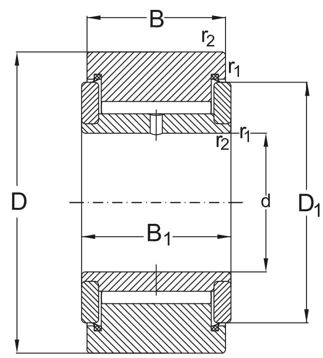
NATR...PPX

Dimensions						Designation	
D	d	B	B_1	r_1, r_2 min.	R	with sphered outer ring	with cylindrical outer ring
mm							
16	5	11	12	0,1	500	**NATR5 PP**	**NATR5 PPX**
	5	11	12	0,1	500	**NATV5 PP**	**NATV5 PPX**
19	6	11	12	0,1	500	**NATR6 PP**	**NATR6 PPX**
	6	11	12	0,1	500	**NATV6 PP**	**NATV6 PPX**
24	8	14	15	0,3	500	**NATR8 PP**	**NATR8 PPX**
	8	14	15	0,3	500	**NATV8 PP**	**NATV8 PPX**
30	10	14	15	0,6	500	**NATR10 PP**	**NATR10 PPX**
	10	14	15	0,6	500	**NATV10 PP**	**NATV10 PPX**
32	12	14	15	0,6	500	**NATR12 PP**	**NATR12 PPX**
	12	14	15	0,6	500	**NATV12 PP**	**NATV12 PPX**
35	15	18	19	0,6	500	**NATR15 PP**	**NATR15 PPX**
	15	18	19	0,6	500	**NATV15 PP**	**NATV15 PPX**
40	17	20	21	1	500	**NATR17 PP**	**NATR17 PPX**
	17	20	21	1	500	**NATV17 PP**	**NATV17 PPX**
47	20	24	25	1	500	**NATR20 PP**	**NATR20 PPX**
	20	24	25	1	500	**NATV20 PP**	**NATV20 PPX**

Sealed Support Rollers with axial guidance



NATV...PP

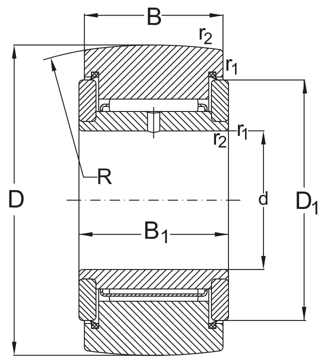


NATV...PPX

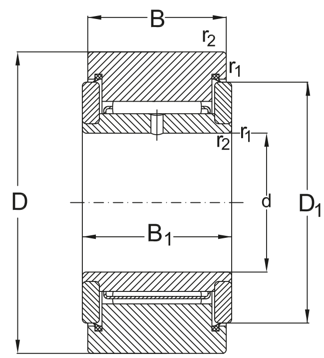
Recommended Abutment and fillet dimensions see on page 728

Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
			dyn.	stat.	dyn.	stat.	dyn.	stat.	
D	F		C_r	C_{0r}	C_{LR}	C_{0LR}	$F_{r\,max}$	$F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
16	12	20000	3,7	3,9	3,1	3,2	2,9	4,2	0,01
	12	11000	6	8,8	4,7	6,5	4	5,7	0,02
19	14	17000	4,15	4,8	3,25	3,8	3,45	5,5	0,02
	14	10000	6,9	11	5,3	8	5,1	7,3	0,02
24	19	15000	6,6	7,8	5,3	6,1	5,2	7,65	0,04
	19	8500	9,6	16	7,4	11,4	7,3	10,4	0,04
30	23	13000	7,8	9,65	6,4	8	7,1	11,2	0,07
	23	7500	11,4	19,3	8,9	14,6	11	15,6	0,07
32	25	11000	8,4	10,8	6,6	8,5	7,1	10	0,07
	25	7000	12,3	22	9,3	15,3	10,6	15	0,07
35	27	10000	12,3	19,3	9,5	13,7	11,4	16,3	0,10
	27	6700	17,2	35,5	12,3	23,2	14,6	20,8	0,11
40	32	9000	13,4	20,4	10,5	14,6	12,5	18	0,14
	32	5600	19,4	40	14,2	26,5	17	24,5	0,15
47	37	8000	18,7	32,5	14,7	24,5	23,6	33,5	0,25
	37	5300	26	60	19,4	41,5	30,5	43	0,26

Sealed Support Rollers with axial guidance



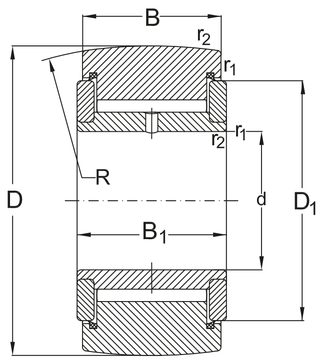
NATR…PP



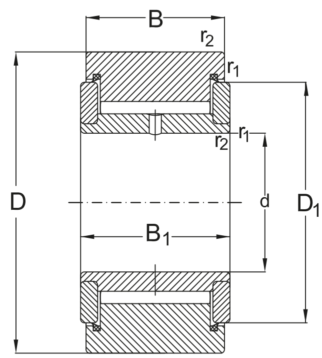
NATR…PPX

Dimensions						**Designation**	
D	d	B	B_1	r_1, r_2 min.	R	with sphered outer ring	with cylindrical outer ring
mm							
52	25	24	25	1	500	**NATR25 PP**	**NATR25 PPX**
	25	24	25	1	500	**NATV25 PP**	**NATV25 PPX**
62	30	28	29	1	500	**NATR30 PP**	**NATR 30 PPX**
	30	28	29	1	500	**NATV30 PP**	**NATV30 PPX**
72	35	28	29	1,1	500	**NATR35 PP**	**NATR35 PPX**
	35	28	29	1,1	500	**NATV35 PP**	**NATV35 PPX**
80	40	30	32	1,1	500	**NATR40 PP**	**NATR40 PPX**
	40	30	32	1,1	500	**NATV40 PP**	**NATV40 PPX**
85	45	30	32	1,1	500	**NATR45 PP**	**NATR45 PPX**
90	50	30	32	1,1	500	**NATR50 PP**	**NATR50 PPX**
	50	30	32	1,1	500	**NATV50 PP**	**NATV50 PPX**

Sealed Support Rollers with axial guidance



NATV…PP



NATV…PPX

Recommended Abutment and fillet dimensions see on page 728

Dimensions		Speed rating	Load ratings				max. permissible radial load		Mass
			as bearing		as support roller				
D	F		dyn. C_r	stat. C_{0r}	dyn. C_{LR}	stat. C_{0LR}	dyn. $F_{r\,max}$	stat. $F_{0r\,max}$	
mm		min^{-1}	kN				kN		kg
52	42	6700	20,5	38	14,7	25,5	21,6	31	0,28
	42	4300	28,6	72	19,8	44	28,5	40,5	0,29
62	51	5300	33	60	22,9	37,5	26,5	38	0,47
	51	3600	44,6	108	29,2	62	34,5	49	0,48
72	58	4500	38,5	69,5	24,6	43	33,5	48	0,64
	58	3000	49,5	129	31,9	72	43	62	0,65
80	66	4000	46,8	95	31,9	57	41,5	58,5	0,80
	66	2600	60,5	160	39,1	88	51	73,5	0,89
85	72	3600	48,4	102	31,4	57	40	57	0,91
90	76	3400	50,1	108	30,8	58,5	40	57	0,96
	76	2000	67,1	193	39,1	93	50	72	1,00

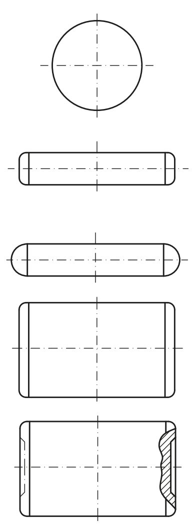
Rolling Elements

General

Rolling Elements are simple geometric bodies that are produced to very high precision standard by the rolling bearing industry.
Rolling elements are made from hardened bearing steel. They have fine ground or even superfinished surfaces as standard.

Rolling elements such as Balls, Cylindrical Rollers and Needle Rolers are used in a wide variety of Rolling Bearings for a whole spectrum of applications and industries.
Additional to the use in rolling bearings, individual rolling elements are frecquently used separately or loose for other requirements or applications, such as Valve Balls, Gauge Rollers, Cycles wheels etc.

The more popular sizes are normally available and supplied loose from stock.



Balls

Standard, Boundary dimensions
Balls of through - hardening
rolling bearing steel DIN 5401 / Part 1
ISO 3290

Hardness

Balls made from through - hardened rolling bearing steel according to DIN 17 230 generally, have the following hardness values and ranges as stated in the table below.

Ball diameter DW [mm]		Hardness [HRC]	
>	≤	>	≤
-	12,7	62	67
12,7	50,8	60	66
50,8	70	59	65
70	120	57	63
120	-	55	61

Ball grades, Tolerances

URB balls from rolling bearing steel are supplied according to the following tolerances.
The balls are clasified and graded according to their diameters, each grade is sorted into individual ball gauges, each gauge is separately packaged.
Each package is clearly identified with ball diameter, grade and gauge. Where there are no specific grade and gauge requirements readily available standard ball diameters will be despatched.

Symbols

$\mathbf{D_W}$	nominal ball diameter
$\mathbf{D_{Ws}}$	Single diameter of a ball. Distance between two parallel planes that contact the surface of the ball.
$\mathbf{D_{Wm}}$	Mean ball diameter. Arithmetical mean of largest and smallest (measured) single ball diameter.
Lot	A defined quantity of balls that have been manufactured under uniform conditions and have therefore similar characteristics.
$\mathbf{D_{WmL}}$	Mean ball diameter of a ball lot Arithmetical mean of largest and smallest mean ball diameter ($\mathbf{D_{Wm}}$) within a lot.
$\mathbf{V_{DWs}}$	Variation of ball diameter. Difference between largest and smallest measured single diameter of one ball, ($\mathbf{D_{Ws}}$)
$\mathbf{V_{DWL}}$	Variation of ball diameters within a lot. Difference between largest and smallest mean ball diameter, ($\mathbf{D_{Wm}}$) within a lot.
tDW	Deviation from spherical form as defined by DIN ISO 1011.
Gauge	The amount by which the lot mean diameter, ($\mathbf{D_{WmL}}$), differs from the nominal ball diameter, ($\mathbf{D_W}$). This amount being one of a defined series. Each ball gauge is a whole multiple of ball gauge interval (**I**).
I	Ball gauge interval; Amount in which the permissible deviation of ball diameter is divided.
$\mathbf{R_a}$	Surface finish roughness, according to DIN 4768
Grade	Defined combination of quality features such as dimensional and geometrical accuracy, surface roughness, shape and gauge intervals of a specific ball.

Tolerance Values for hardened balls from rolling bearing steel according to ISO 3290

Ball Grade	ΦD_w >	ΦD_w ≤	Tolerances V_{Dws} max	t_{Dw} max	R_a max	V_{DwL} max	Gauge interval I	Gauge mean values (deviation range)		
	mm		µm				µm			
G3	-	12,7	0,08	0,08	0,012	0,13	0,5	-5 ... -0,5	0	+0,5 ... +5
G5	-	12,7	0,13	0,13	0,020	0,25	1	-5 ... -1	0	+1 ... +5
G10	-	25,4	0,25	0,25	0,025	0,5	1	-9 ... -1	0	+1 ... +9
G16	-	25,4	0,4	0,4	0,032	0,8	2	-10 ... -2	0	+2 ... +10
G20	-	25,4	0,5	0,5	0,040	1	2	-10 ... -2	0	+2 ... +10
G28	25,4	50,8	0,7	0,7	0,050	1,4	2	-12 ... -2	0	+2 ... +12
G40	-	101,6	1	1	0,080	2	4	-16 ... -4	0	+4 ... +16
G100	101,6	152,4	2,5	2,5	0,125	5	5	-20 ... -5	0	+5 ... +20
	152,4	175	2,5	2,5	0,125	5	10	-40 ... -10	0	+10 ... +40
G200	175	250	5	5	0,200	10	15	-60 ... -15	0	+15 ... +60
G500	-	25,4	13	13	0,200	-	50	-50	0	+50
	25,4	50,8	19	19	0,200	-	75	-75	0	+75
	50,8	76,2	25	25	0,200	-	100	-100	0	+100
	76,2	101,6	32	32	0,200	-	125	-125	0	+125
	101,6	127	38	38	0,200	-	150	-150	0	+150
	127	152,4	44	44	0,400	-	175	-175	0	+175
G600	all		-	-	-	-	400	-	0	-
G700	all		-	-	-	-	2000	-	0	-

Designation

Balls are classified according to their diameters, each grade and gauge is separately packed and despatched.

URB balls made from chromium rolling bearing steel are designated following the system as shown below:

RB 12,7 G10 P4

where:

RB	Symbols for balls made from chromium rolling bearing steel
12,7	Nominal ball diameter $\mathbf{D_w}$ [mm]
G10	Grade **G10**
P4	Gauge **P4**
	(the mean deviation of this specific lot equals +4 µm

To avoid possible misinterpretations by poor visible printings etc. the **mean deviation** is stated according to the following system:

P	**Plus** e.g. **P4** = mean deviation + **4** µm
N	0
M	**Minus** e.g. **M3**=mean deviation - **3** µm

Therefore, the mean diameter deviation of a ball from a specific lot is

12,704 mm ± 0,5 µm

For a ball with the designation **RB 5,556 G3 M2**, the mean diameter deviation would be:

5,554 ± 0,25 µm

Balls from other materials

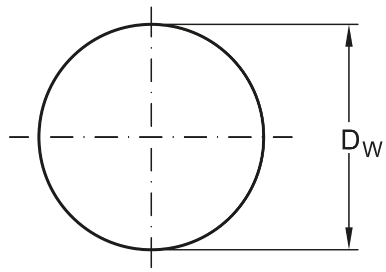
Aditional to the balls produced from chromium bearing steel, **URB** also produce balls suitable for different purposes from alternative materials.

Examples are balls of:

mild steel, unhardened
stainless steel
bronze
brass, etc.

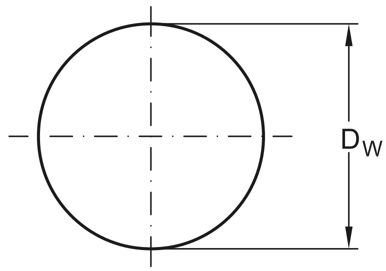
URB will provide detailed information on request.

Steel Balls



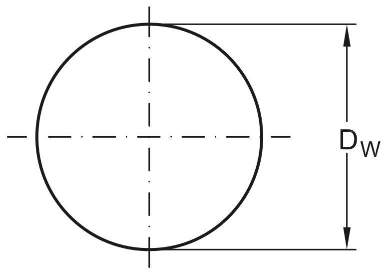
Ball diameter, D_W		Designation	Mass per 100 balls
mm	inch		kg
0,4	**-**	**RB 0,4**	0,0001
0,5	**-**	**RB 0,5**	0,0001
1	**-**	**RB 1**	0,0004
1,5	**-**	**RB 1,5**	0,0014
1,588	**1/16**	**RB 1,588**	0,0016
2	**-**	**RB 2**	0,0033
2,381	**3/32**	**RB 2,381**	0,0055
2,5	**-**	**RB 2,5**	0,0064
3	**-**	**RB 3**	0,0111
3,175	**1/8**	**RB 3,175**	0,0132
3,5	**-**	**RB 3,5**	0,0177
3,969	**5/32**	**RB 3,969**	0,0257
4	**-**	**RB 4**	0,0263
4,5	**-**	**RB 4,5**	0,0374
4,762	**3/16**	**RB 4,762**	0,0446
5	**-**	**RB 5**	0,0514
5,5	**-**	**RB 5,5**	0,0679
5,556	**7/32**	**RB 5,556**	0,702
6	**-**	**RB 6**	0,0882
6,350	**1/4**	**RB 6,350**	0,103
6,5	**-**	**RB 6,5**	0,113
7	**-**	**RB 7**	0,141
7,144	**9/32**	**RB 7,144**	0,150
7,5	**-**	**RB 7,5**	0,174
7,938	**5/16**	**RB 7,938**	0,106

Steel Balls



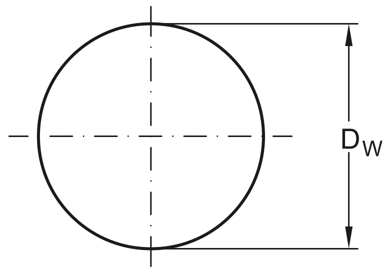
Ball diameter, D_W		Designation	Mass per 100 balls
mm	inch		kg
8	**-**	**RB 8**	0,210
8,5	**-**	**RB 8,5**	0,220
8,731	**11/32**	**RB 8,731**	0,266
9	**-**	**RB 9**	0,330
9,525	**3/8**	**RB 9,525**	0,355
10	**-**	**RB 10**	0,411
10,319	**13/32**	**RB 10,319**	0,443
10,5	**-**	**RB 10,5**	0,476
11	**-**	**RB 11**	0,547
11,112	**7/16**	**RB 11,112**	0,564
11,5	**-**	**RB 11,5**	0,625
11,906	**15/32**	**RB 11,906**	0,693
12	**-**	**RB 12**	0,710
12,5	**-**	**RB 12,5**	0,803
12,700	**1/2**	**RB 12,700**	0,842
13	**-**	**RB 13**	0,903
13,494	**17/32**	**RB 13,494**	1,01
14	**-**	**RB 14**	1,13
14,288	**9/16**	**RB 14,288**	1,20
15	**-**	**RB 15**	1,39
15,081	**19/32**	**RB 15,081**	1,41
15,875	**5/8**	**RB 15,875**	1,65
16	**-**	**RB 16**	1,68
16,5	**-**	**RB 16,5**	1,85
16,669	**21/32**	**RB 16,669**	1,91

Steel Balls



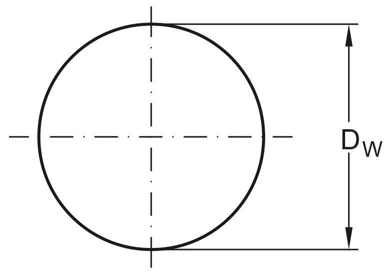
Ball diameter, D_W		Designation	Mass per 100 balls
mm	inch		kg
17	**-**	**RB 17**	2,02
17,462	**11/16**	**RB 17,462**	2,19
18	**-**	**RB 18**	2,40
18,256	**23/32**	**RB 18,256**	2,50
19	**-**	**RB 19**	2,82
19,050	**3/4**	**RB 19,050**	2,84
19,844	**25/32**	**RB 19,844**	3,24
20	**-**	**RB 20**	3,29
20,5	**-**	**RB 20,5**	3,54
20,638	**13/16**	**RB 20,638**	3,62
21	**-**	**RB 21**	3,81
22	**-**	**RB 22**	4,38
22,225	**7/8**	**RB 22,225**	4,52
22,5	**-**	**RB 22,5**	4,68
23	**-**	**RB 23**	5,00
23,812	**15/16**	**RB 23,812**	5,55
24	**-**	**RB 24**	5,68
25	**-**	**RB 25**	6,42
25,400	**1**	**RB 25,400**	6,74
26	**-**	**RB 26**	7,23
26,988	**1 1/16**	**RB 26,988**	8,08
28	**-**	**RB 28**	9,02
28,575	**1 1/8**	**RB 28,575**	9,55
30	**-**	**RB 30**	11,1
30,162	**1 3/16**	**RB 30,162**	11,3

Steel Balls



Ball diameter, D_W		Designation	Mass per 100 balls
mm	inch		kg
31,750	**1 1/4**	**RB 31,750**	13,2
32	**-**	**RB 32**	13,5
33	**-**	**RB 33**	14,8
33,338	**1 5/16**	**RB 33,338**	15,2
34	**-**	**RB 34**	16,2
34,925	**1 3/8**	**RB 34,925**	17,5
35	**-**	**RB 35**	17,7
36	**-**	**RB 36**	19,2
36,512	**1 7/16**	**RB 36,512**	20,0
38	**-**	**RB 38**	22,5
38,100	**1 1/2**	**RB 38,100**	22,7
39,688	**1 9/16**	**RB 39,688**	25,7
40	**-**	**RB 40**	26,3
41,275	**1 5/8**	**RB 41,275**	29,0
42,862	**1 11/16**	**RB 42,862**	32,4
44,450	**1 3/4**	**RB 44,450**	36,1
45	**-**	**RB 45**	37,4
46,038	**1 13/16**	**RB 46,038**	40,3
47,625	**1 7/8**	**RB 47,625**	44,6
49,212	**1 15/16**	**RB 49,212**	49,0
50	**-**	**RB 50**	51,4
50,800	**2**	**RB 50,800**	53,9
53,975	**2 1/8**	**RB 53,975**	64,6
55	**-**	**RB 55**	67,9
57,15	**2 1/4**	**RB 57,15**	76,7

Steel Balls



Ball diameter, D_W		Designation	Mass per 100 balls
mm	inch		kg
60	**-**	**RB 60**	88,2
60,325	**2 3/8**	**RB 60,325**	90,2
63,500	**2 1/2**	**RB 63,500**	103
65	**-**	**RB 65**	113
66,675	**2 5/8**	**RB 66,675**	122
69,850	**2 3/4**	**RB 69,850**	140
70	**-**	**RB 70**	141
73,025	**2 7/8**	**RB 73,025**	160
75	**-**	**RB 75**	174
76,200	**3**	**RB 76,200**	182
80	**-**	**RB 80**	210
82,550	**3 1/4**	**RB 82,550**	231
85	**-**	**RB 85**	252
88,900	**3 1/2**	**RB 88,900**	289
90	**-**	**RB 90**	300
95	**-**	**RB 95**	352
95,250	**3 3/4**	**RB 95,250**	355
100	**-**	**RB 100**	411
110	**-**	**RB 110**	547
120	**-**	**RB 120**	710
127	**5**	**RB 127**	842
150	**-**	**RB 150**	1390
200	**-**	**RB 200**	3290
250	**-**	**RB 250**	6420

Cylindrical Rollers

Standards, Boundary dimensions

Cylindrical rollers of Through-hardering Rolling bearings steel DIN 5402/part 1

Hardness

URB cylindrical rollers made from through - hardened rolling bearing steel according to DIN 17 230 have a surface hardness of **58** up to **65 HRC**.

Design features

URB cylindrical rollers are produced using the latest technology, with the modified surface profile (i.e. semi-crowned) as standard (see sketch below).

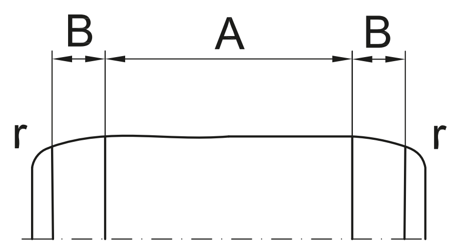
This modified profile features a cylindrical centre diameter (**A**) that blends into a slightly curved area (**B**) which blends into the roller radii (**r**) and end face.

This feature reduces considerably the negative effect of edge loading and, therefore, additional stresses.

For manufacturing reasons, small cylindrical rollers may have shallow dimples in their end faces.

Such dimples have a depth of approximately 0,5 mm, tthe diameter is approximately half the nominal roller diameter ($\mathbf{D_W}$).

In cases where such dimpled cylinfrical rollers are unsuitable for application reasons, it must be clearly stated on the order.

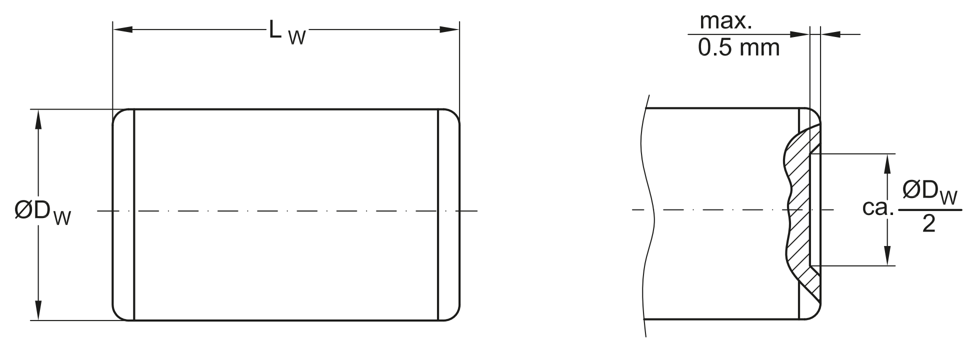


Tolerances for URB Cylindrical Rollers

Values of dimensional and geometrical accuracy of **URB** cylindrical rollers

Roller diameter Nominal **ΦD$_w$** >	≤	**Tolerances** min.	max.	**Gauge interval I**	**Gauge mean values** (deviation range)			**Roundness tolerance to DIN ISO 1101**
mm		µm		µm	µm			µm
-	**26**	-17	+11	2	-8 ... -1	0	+1 ... +6	1
26	**40**	-19,5	+10,5	3	-9 ... -1,5	0	+1,5 ... +6	1,2

Roller lenght Nominal **L$_w$** >	≤	**Tolerances** min.	max.	**Gauge interval I**	**Gauge mean values** (deviation range)	**Tolerance of end face runout to DIN ISO 1101**
mm		µm		µm	µm	µm
-	**48**	-20	+10	6	-18 / -12 / -6 / 0 / +6	6
48	**-**	-45	+15	10	-30 / -20 / -10 / 0 / +10	10



a

b

Grades, Tolerances

URB cylindrical rollers are classified and grades according to their nominal diameters and lenghts. Each grade is sorted into gauge ranges, each gauge is separately package.

Each package is clearly identified with the mean gauge interval of both, cylindrical roller diameter and roller length.

Where there are no specific Grade or gauge requirements specified the standard available cylindrical roller stock size will be despatched.

Designation

Cylindrical Rollers are classified according to their nominal diameters and lenghts, each individual grade and gauge is separately packed and despatched.

URB Cylindrical Rollers made from chromium rolling bearing steel are designated following the system as shown below:

RC 6,5X9 P2/M6

where:

RC	Symbol for cylindrical rollers from chromium rolling bearing steel
6,5	Nominal roller diameter, $\mathbf{D_w}$ [mm]
9	Nominal roller length, $\mathbf{L_w}$ [mm]
P2	Diameter gauge **P2** (the mean deviation of roller diameter of this specific lot equals + 2 µm)
M6	Lenght gauge **M6** (the mean deviation of roller lenght of this specific lot is - 6 µm)

To avoid possible misinterpretations by poor visible printings etc., the **mean deviation** is stated acording to the following system:

P	**Plus**
	e.g. **P2** = mean deviation + 2 µm
N	**0**
M	**Minus**
	e.g. **M6** = mean deviation - 6 µm

Therefore, the **mean diameter deviation** of a cylindrical roller from this specific lot is

6,502 mm ±1 µm.

The **mean roller length deviation** of a cylindrical roller from a specific lot is

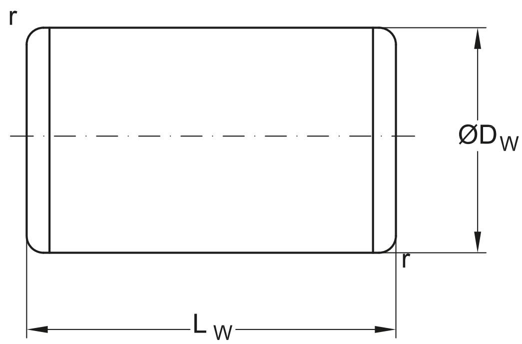
8,994 mm ±3 µm.

Cylindrical Rollers to other Tolerances

URB also produces cylindrical rollers with reduced tolerances to customer order requirements.

URB will provide detailed information on request.

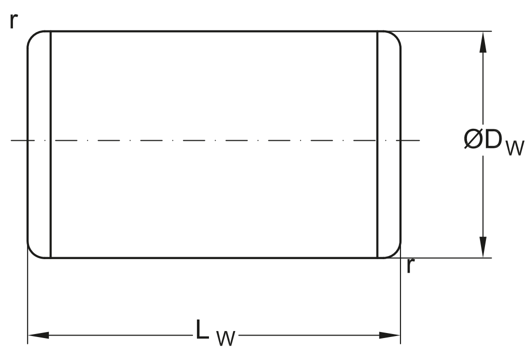
Cylindrical Rollers



Dimensions				Designation	Mass per 100 rollers
D_W	L_W	r_{min}	r_{max}		
		mm			kg
3	5	0,2	0,4	**RC 3 X 5**	0,027
3,5	5	0,2	0,4	**RC 3,5 X 5**	0,037
	8	0,2	0,4	**RC 3,5 X 8**	0,060
4	4	0,2	0,4	**RC 4 X 4**	0,038
	6	0,2	0,4	**RC 4 X 6**	0,058
	8	0,2	0,4	**RC 4 X 8**	0,078
4,5	6	0,2	0,6	**RC 4,5 X 6**	0,073
5	5	0,2	0,6	**RC 5 X 5**	0,075
	6	0,2	0,6	**RC 5 X 6**	0,091
	7	0,2	0,6	**RC 5 X 7**	0,106
	8	0,2	0,6	**RC 5 X 8**	0,121
	10	0,2	0,6	**RC 5 X 10**	0,152
5,5	5,5	0,2	0,6	**RC 5,5 X 5,5**	0,100
	8	0,2	0,6	**RC 5,5 X 8**	0,146
6	6	0,2	0,6	**RC 6 X 6**	0,130
	8	0,2	0,6	**RC 6 X 8**	0,178
	12	0,2	0,6	**RC 6 X 12**	0,261
6,5	6,5	0,2	0,6	**RC 6,5 X 6,5**	0,166
	9	0,2	0,6	**RC 6,5 X 9**	0,230

Dimensions				Designation	Mass per 100 rollers
D_W	L_W	r_{min}	r_{max}		
		mm			kg
7	7	0,2	0,6	**RC 7 X 7**	0,206
	10	0,2	0,6	**RC 7 X 10**	0,30
	14	0,2	0,6	**RC 7 X 14**	0,42
7,5	7,5	0,2	0,6	**RC 7,5 X 7,5**	0,25
	11	0,2	0,6	**RC 7,5 X 11**	0,37
8	8	0,2	0,6	**RC 8 X 8**	0,31
	12	0,2	0,6	**RC 8 X 12**	0,47
9	9	0,3	0,7	**RC 9 X 9**	0,44
	14	0,3	0,7	**RC 9 X 14**	0,68
10	10	0,3	0,7	**RC 10 X 10**	0,60
	14	0,3	0,7	**RC 10 X 14**	0,85
11	11	0,3	0,7	**RC 11 X 11**	0,81
	15	0,3	0,7	**RC 11 X 15**	1,10
12	12	0,3	0,7	**RC 12 X 12**	1,04
	18	0,3	0,7	**RC 12 X 18**	1,57
13	13	0,4	0,8	**RC 13 X 13**	1,33
	20	0,4	0,8	**RC 13 X 20**	2,04
14	14	0,4	0,8	**RC 14 X 14**	1,66
	20	0,4	0,8	**RC 14 X 20**	2,38

Cylindrical Rollers



Dimensions				Designation	Mass per 100 rollers
D_W	L_W	r_{min}	r_{max}		
		mm			kg
15	15	0,4	0,8	**RC 15 X 15**	2,04
	22	0,4	0,8	**RC 15 X 22**	3,00
16	16	0,4	0,8	**RC 16 X 16**	2,48
	24	0,4	0,8	**RC 16 X 24**	3,73
17	17	0,4	1	**RC 17 X 17**	2,97
	24	0,4	1	**RC 17 X 24**	4,20
18	18	0,4	1	**RC 18 X 18**	3,57
	26	0,4	1	**RC 18 X 26**	5,10
19	19	0,4	1	**RC 19 X 19**	4,16
	28	0,4	1	**RC 19 X 28**	6,10
20	20	0,4	1	**RC 20 X 20**	4,85
	30	0,4	1	**RC 20 X 30**	7,30
21	21	0,5	1,1	**RC 21 X 21**	5,60
	30	0,5	1,1	**RC 21 X 30**	8,0
22	22	0,5	1,1	**RC 22 X 22**	6,4
	34	0,5	1,1	**RC 22 X 34**	10,0
23	23	0,5	1,1	**RC 23 X 23**	7,4
	34	0,5	1,1	**RC 23 X 34**	11,2
24	24	0,5	1,1	**RC 24 X 24**	8,4

Cylindrical Rollers

Dimensions				Designation	Mass per 100 rollers
D_W	L_W	r_{min}	r_{max}		
		mm			kg
24	36	0,5	1,1	**RC 24 X 36**	12,6
25	25	0,5	1,1	**RC 25 X 25**	9,5
	36	0,5	1,1	**RC 25 X 36**	13,7
26	26	0,5	1,1	**RC 26 X 26**	10,7
	40	0,5	1,1	**RC 26 X 40**	16,4
28	28	0,6	1,4	**RC 28 X 28**	13,3
	44	0,6	1,4	**RC 28 X 44**	21,0
30	30	0,6	1,4	**RC 30 X 30**	16,3
	48	0,6	1,4	**RC 30 X 48**	26,2
32	32	0,6	1,4	**RC 32 X 32**	19,9
	52	0,6	1,4	**RC 32 X 52**	32,4
34	34	0,6	1,4	**RC 34 X 34**	23,9
	55	0,6	1,4	**RC 34 X 55**	38,7
36	36	0,7	1,7	**RC 36 X 36**	28,3
	58	0,7	1,7	**RC 36 X 58**	45,7
38	38	0,7	1,7	**RC 38 X 38**	33,3
	62	0,7	1,7	**RC 38 X 62**	55,0
40	40	0,7	1,7	**RC 40 X 40**	38,9
	65	0,7	1,7	**RC 40 X 65**	63,0

Needle Rollers

Standards, Bondary dimensions

Needle rollers of through-hardened rolling bearing steel DIN 5402 / part 3

Hardness

URB - needle rollers made from through - hardened rolling bearing steel according to DIN 17 230 generally, have a hardness value range of **58** to **65 HRC**.

Design features

URB Needler Rollers are produced using the latest technology.

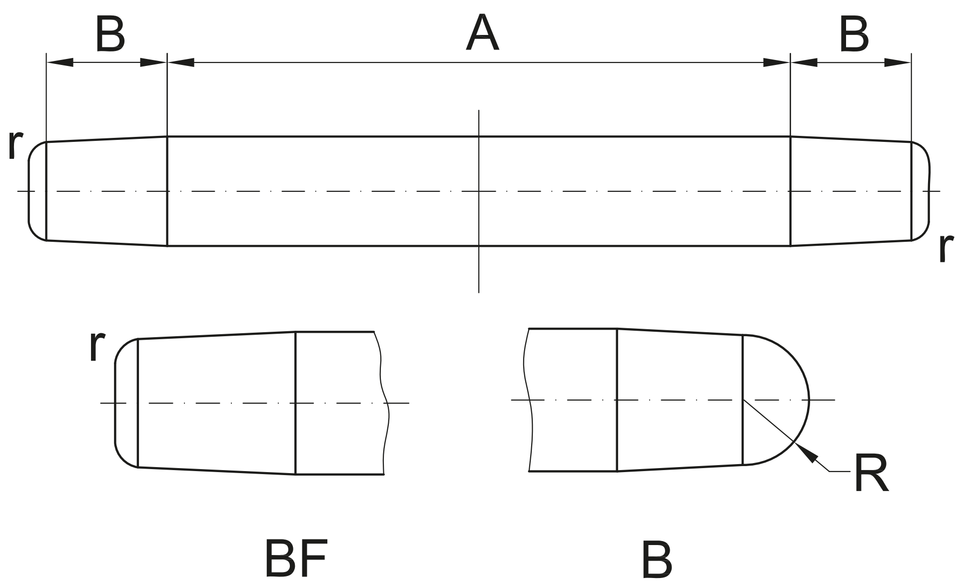
One detail of outstanding importance to needle rollers is the modified profile that is established as a standard for all **URB needle rollers**, see sletch below.

The modified profile features a cylindrical section in the centre (**A**) that blends into a slightly curved area (**B**) which blends into the roller radii (**r**) and end face.

This feature reduces considerably the potentially negative effect of edge loading and, therefore, additional stresses.

Needle rollers are available in two different designs as standard (see sketch below).

Needle rollers of type "**B**" have spherical end faces, whilst needle rollers of the "**BF**" - design are produced with flat ends.



Grades, tolerances

URB Needle rollers are classified and graded according to their diameters into tharee **Grades** (**G2, G3** and **G5**).

Furthermore, the needle diameters of every grade are subdivided in **gauges**.

The tolerance ranges of each gauge are different depending on the grade.

Each package is clearly identified with the nominal needle roller diameter, grade, individual gauge range and length.

Each gauge is packed and despached separately.

Where there is no specific grade and/or gauge requirements G2-Needle rollers from available stock sizes will be despatched.

The **lenght tolerances** of needle rollers correspond uniformly to ISO tolerance field **h13**.

Values of dimensional and geometrical accuracy of URB Needle Rollers

Grade	Tolerances		Gauge internal	Gauges (limit values)	Roundness tolerance
	min.	max.	I		
mm	µm		µm	µm	µm
G2	-10	0	2	0 / -2, -1 / -3, -2 / -4, -3 / -5, -4 / -6 -5 / -7, -6 / -8, -7 / -9, -8 / -10	1
G3	-10	0	3	0 / -3, -1,5 / / -4,5, -3 / -6, -4,5 / -7,5, -6 / -9, -7 / -10	1,2
G5	-10	0	5	0 / -5, -3 / -8, -5 / -10	2,5

The lenght tolerance of needle rollers correspond uniformly to ISO tolerance field h13.

Designation

The URB designation system for needle rollers made from chromium rolling bearing steel follows the system as shown bellow:

RN 2X13,8 BF M2/M4 G2

where:

RN Symbols for needle rollers from chromium rolling bearing steel

2 Nominal diameter of needle roller $\mathbf{D_w}$ [mm]

13,8 Nominal lenght of needle roller, $\mathbf{L_W}$ [mm]

BF Needle rollers with flat ends

M2/M4 Diameter gauge **M2/M4** (the physical roller diameter size of this specific lot lies between 1,998 to 1,996 mm)

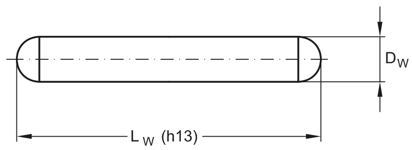
G2 Grade of needle rollers

To avoid possible misinterpretation by poor visible printings, etc., the **diameter** gauges are stated acording the following system:

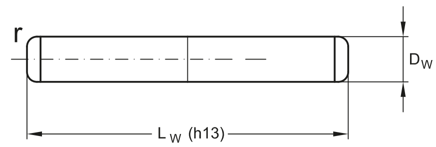
N **0**

M **Minus**
e.g. **M2/M4** = -2 / -4 µm

Needle Rollers



B



BF

Dimensions				Designation		Mass per 100 needles
D_W	L_W	r_{min}	r_{max}	"Sphered end" type	"Flat end" type	
		mm				kg
1,5	5,8	0,1	0,4	**RN 1,5 X 5,8 B**	**RN 1,5 X 5,8 BF**	0,008
	7,8	0,1	0,4	**RN 1,5 X 7,8 B**	**RN 1,5 X 7,8 BF**	0,011
	9,8	0,1	0,4	**RN 1,5 X 9,8 B**	**RN 1,5 X 9,8 BF**	0,013
	11,8	0,1	0,4	**RN 1,5 X 11,8 B**	**RN 1,5 X 11,8 BF**	0,016
	13,8	0,1	0,4	**RN 1,5 X 13,8 B**	**RN 1,5 X 13,8 BF**	0,020
2	7,8	0,1	0,4	**RN 2 X 7,8 B**	**RN 2 X 7,8 BF**	0,02
	9,8	0,1	0,4	**RN 2 X 9,8 B**	**RN 2 X 9,8 BF**	0,02
	11,8	0,1	0,4	**RN 2 X 11,8 B**	**RN 2 X 11,8 BF**	0,03
	13,8	0,1	0,4	**RN 2 X 13,8 B**	**RN 2 X 13,8 BF**	0,03
	15,8	0,1	0,4	**RN 2 X 15,8 B**	**RN 2 X 15,8 BF**	0,04
	17,8	0,1	0,4	**RN 2 X 17,8 B**	**RN 2 X 17,8 BF**	0,04
	19,8	0,1	0,4	**RN 2 X 19,8 B**	**RN 2 X 19,8 BF**	0,05
	21,8	0,1	0,4	**RN 2 X 21,8 B**	**RN 2 X 21,8 BF**	0,05
2,5	7,8	0,1	0,4	**RN 2,5 X 7,8 B**	**RN 2,5 X 7,8 BF**	0,03
	9,8	0,1	0,4	**RN 2,5 X 9,8 B**	**RN 2,5 X 9,8 BF**	0,04
	11,8	0,1	0,4	**RN 2,5 X 11,8 B**	**RN 2,5 X 11,8 BF**	0,05
	13,8	0,1	0,4	**RN 2,5 X 13,8 B**	**RN 2,5 X 13,8 BF**	0,05

Dimensions				Designation		Mass per 100 needles
D_W	L_W	r_{min}	r_{max}	"Sphered end" type	"Flat end" type	
		mm				kg
2,5	15,8	0,1	0,4	**RN 2,5 X 15,8 B**	**RN 2,5 X 15,8 BF**	0,06
	17,8	0,1	0,4	**RN 2,5 X 17,8 B**	**RN 2,5 X 17,8 BF**	0,07
	19,8	0,1	0,4	**RN 2,5 X 19,8 B**	**RN 2,5 X 19,8 BF**	0,08
	21,8	0,1	0,4	**RN 2,5 X 21,8 B**	**RN 2,5 X 21,8 BF**	0,08
	23,8	0,1	0,4	**RN 2,5 X 23,8 B**	**RN 2,5 X 23,8 BF**	0,09
3	9,8	0,1	0,4	**RN 3 X 9,8 B**	**RN 3 X 9,8 BF**	0,05
	11,8	0,1	0,4	**RN 3 X 11,8 B**	**RN 3 X 11,8 BF**	0,07
	13,8	0,1	0,4	**RN 3 X 13,8 B**	**RN 3 X 13,8 BF**	0,08
	15,8	0,1	0,4	**RN 3 X 15,8 B**	**RN 3 X 15,8 BF**	0,09
	17,8	0,1	0,4	**RN 3 X 17,8 B**	**RN 3 X 17,8 BF**	0,10
	19,8	0,1	0,4	**RN 3 X 19,8 B**	**RN 3 X 19,8 BF**	0,11
	23,8	0,1	0,4	**RN 3 X 23,8 B**	**RN 3 X 23,8 BF**	0,13
	27,8	0,1	0,6	**RN 3 X 27,8 B**	**RN 3 X 27,8 BF**	0,15
3,5	29,8	0,1	0,6	**RN 3,5 X 29,8 B**	**RN 3,5 X 29,8 BF**	0,23
	34,8	0,1	0,6	**RN 3,5 X 34,8 B**	**RN 3,5 X 34,8 BF**	0,27
4	39,8	0,1	0,6	**RN 4 X 39,8 B**	**RN 4 X 39,8 BF**	0,40
5	49,8	0,1	0,6	**RN 5 X 49,8 B**	**RN 5 X 49,8 BF**	0,75

Adapter and Withdrawal Sleeves

General

Adapter and Withdrawal Sleeves are devices using to mount and secure rolling element bearings with tapered bores onto cylindrical shaft seats.
This enables the mounting or dismounting of rolling element bearings in a simple and effective way to for a variety of applications.

Since, adapter and withdrawal sleeves are able to adapt to shaft diameter variations within certain limits, larger than normal **shaft diameter tolerances** are accomodated.
The **geometrical accuracy**, however, must be more closely defined, as the forms errors of the shaft affect the running accuracy of the total bearing arrangement in a direct way.

Furthermore, using adapter or withdrawal sleeves allows bearing seats with lower surface qualities, (e.g. turned surfaces) to be acceptable. For applications where no accurate shaft guidance of bearings is required, bright drawn round bar stock may also be used.

Generally the following tolerances may be used for guidance:

Expected running accuracy	Diameter tolerance	Form accuracy
Normal	h7, h8, h9	$\frac{IT5}{2}$
Low	h10, h11	$\frac{IT7}{2}$

Adapter sleeves

Standards, boundary, dimensions

Adapter Sleeves DIN 5415

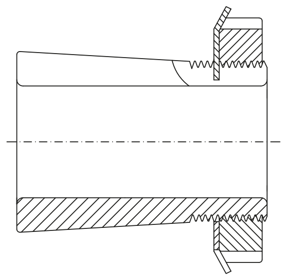
General

Adapter sleeves (see sketch below) are slotted steel sleeves that have a tapered outer diameter, taper 1:12 on one side and a thread on the opposite side.
Small adapter sleeves may have phosphated surfaces, normally they are only oil preserved.

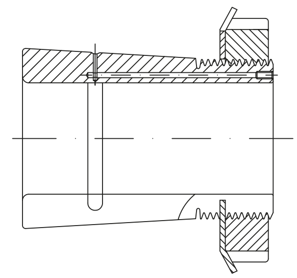
URB adapter sleeves are supplied complete with lock nut and locking washer as standard.
Beside the standard design (see figure **a**), there are also larger adapter sleeves available with oil bores and oil distribution ducs, (prefix **OH**) as required for applying the oil injection method as shown in figure **b**.

On smooth straight shafts, (e.g. on a drawn round stock), adapter sleeves allow a simple positioning of bearings in any position, (see figure **c**).
In applications where bearings with adapter sleeves are mounted on straight shafts without axial support, (see figure **c**), their ability to accept axial forces is limited by the friction between the adapter sleeve and the shaft.

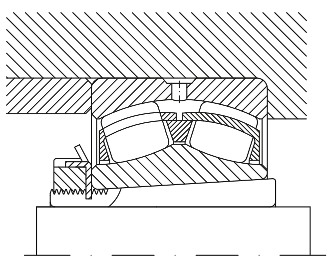
in the case of higher axial forces, the bearing needs to be secured additionaly by **supporting rings** (see figure **d**).
When designing such supporting rings, however, the abutment dimensions recommended by the product tables must be considered.



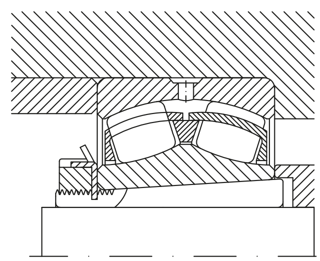
a



b



c



d

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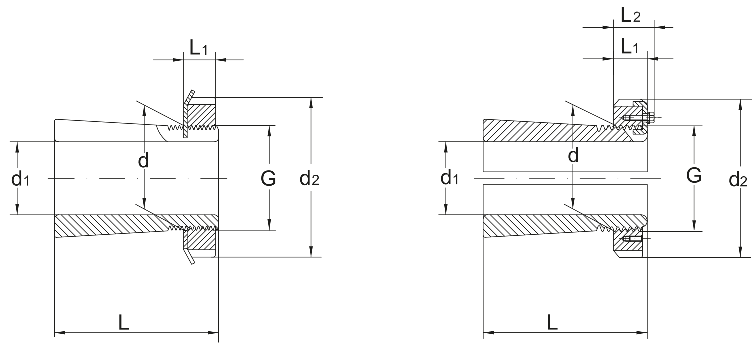
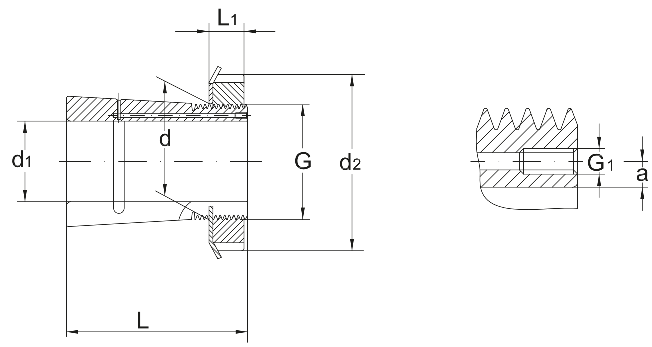
URB

Adapter Sleeves



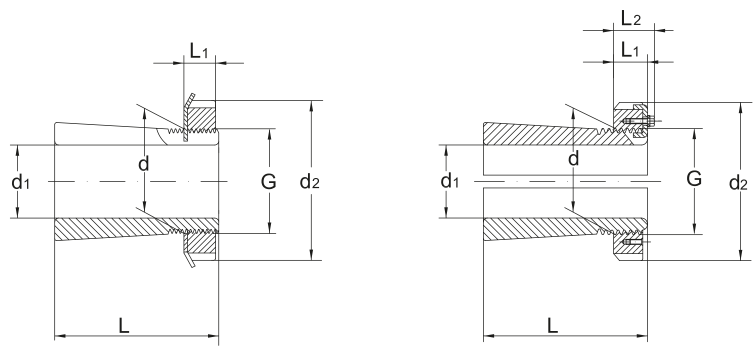
Shaft Φ	Dimension			Designation adapter sleeve, complete	Mass
d_1	d	d_2	L		
mm	mm				kg
17	20	32	24	**H204**	0,04
		32	28	**H304**	0,04
		32	31	**H2304**	0,05
20	25	38	26	**H205**	0,06
		38	29	**H305**	0,07
		38	35	**H2305**	0,09
25	30	45	27	**H206**	0,09
		45	31	**H306**	0,10
		45	38	**H2306**	0,11
30	35	52	29	**H207**	0,12
		52	35	**H307**	0,14
		52	43	**H2307**	0,15
35	40	58	31	**H208**	0,16
		58	36	**H308**	0,18
		58	46	**H2308**	0,22
40	45	65	33	**H209**	0,21
		65	39	**H309**	0,23
		65	50	**H2309**	0,27
45	50	70	35	**H210**	0,24
		70	42	**H310**	0,27
		70	55	**H2310**	0,34
50	55	75	37	**H211**	0,28
		75	45	**H311**	0,32
		75	59	**H2311**	0,39

Adapter Sleeves



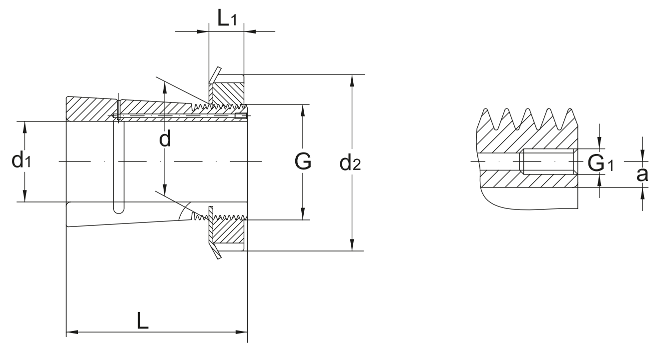
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
17	M 20 X 1	7	-	-	-	MK4	MB4
	M 20 X 1	7	-	-	-	MK4	MB4
	M 20 X 1	7	-	-	-	MK4	MB4
20	M 25 X 1,5	8	-	-	-	MK5	MB5
	M 25 X 1,5	8	-	-	-	MK5	MB5
	M 25 X 1,5	8	-	-	-	MK5	MB5
25	M 30 X 1,5	8	-	-	-	MK6	MB6
	M 30 X 1,5	8	-	-	-	MK6	MB6
	M 30 X 1,5	8	-	-	-	MK6	MB6
30	M 35 X 1,5	9	-	-	-	MK7	MB7
	M 35 X 1,5	9	-	-	-	MK7	MB7
	M 35 X 1,5	9	-	-	-	MK7	MB7
35	M 40 X 1,5	10	-	-	-	MK8	MB8
	M 40 X 1,5	10	-	-	-	MK8	MB8
	M 40 X 1,5	10	-	-	-	MK8	MB8
40	M 45 X 1,5	11	-	-	-	MK9	MB9
	M 45 X 1,5	11	-	-	-	MK9	MB9
	M 45 X 1,5	11	-	-	-	MK9	MB9
45	M 50 X 1,5	12	-	-	-	MK10	MB10
	M 50 X 1,5	12	-	-	-	MK10	MB10
	M 50 X 1,5	12	-	-	-	MK10	MB10
50	M 55 X 2	12,5	-	-	-	MK11	MB11
	M 55 X 2	12,5	-	-	-	MK11	MB11
	M 55 X 2	12,5	-	-	-	MK11	MB11

Adapter Sleeves



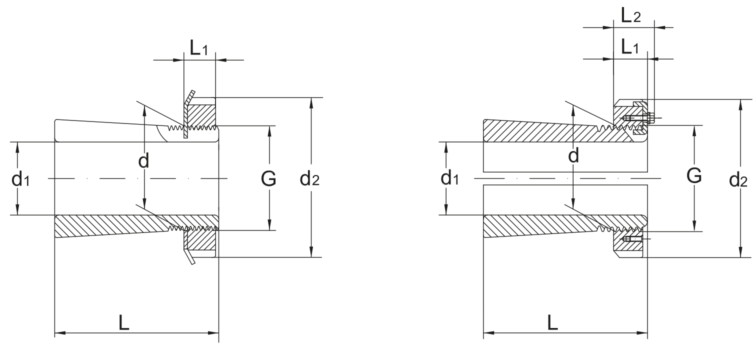
Shaft Φ d_1	Dimension d	d_2	L	Designation adapter sleeve, complete	Mass
mm	mm				kg
55	60	80	38	**H212**	0,31
		80	47	**H312**	0,35
		80	62	**H2312**	0,45
60	65	85	40	**H213**	0,36
	65	85	50	**H313**	0,42
	65	85	65	**H2313**	0,52
	70	92	52	**H314**	0,68
	70	92	68	**H2314**	0,88
65	75	98	43	**H215**	0,66
		98	55	**H315**	0,78
		98	73	**H2315**	1,1
70	80	105	46	**H216**	0,81
		105	59	**H316**	0,95
		105	78	**H2316**	1,2
75	85	110	50	**H217**	0,94
		110	63	**H317**	1,1
		110	82	**H2317**	1,35
80	90	120	52	**H218**	1,1
		120	65	**H318**	1,3
		120	86	**H2318**	1,6
85	95	125	55	**H219**	1,25
		125	68	**H319**	1,4
		125	90	**H2319**	1,8
90	100	130	58	**H220**	1,4

Adapter Sleeves



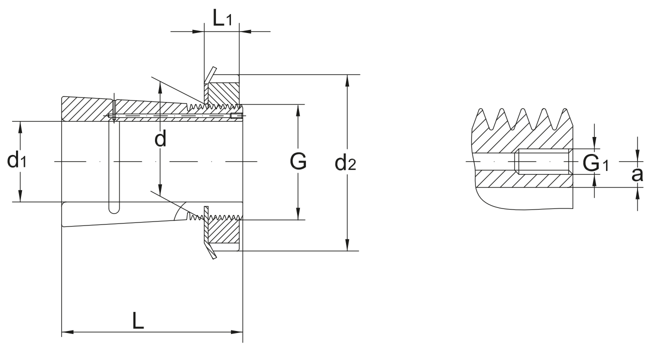
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
55	M 60 X 2	13	-	-	-	KM12	MB 12
	M 60 X 2	13	-	-	-	KM12	MB12
	M 60 X 2	13	-	-	-	KM12	MB12
60	M 65 X 2	14	-	-	-	KM13	MB13
	M 65 X 2	14	-	-	-	KM13	MB13
	M 65 X 2	14	-	-	-	KM13	MB13
	M 70 X 2	14	-	-	-	KM14	MB14
	M 70 X 2	14	-	-	-	KM14	MB14
65	M 75 X 2	15	-	-	-	KM15	MB15
	M 75 X 2	15	-	-	-	KM15	MB15
	M 75 X 2	15	-	-	-	KM15	MB15
70	M 80 X 2	17	-	-	-	KM16	MB16
	M 80 X 2	17	-	-	-	KM16	MB16
	M 80 X 2	17	-	-	-	KM16	MB16
75	M 85 X 2	18	-	-	-	KM17	MB17
	M 85 X 2	18	-	-	-	KM17	MB17
	M 85 X 2	18	-	-	-	KM17	MB17
80	M 90 X 2	18	-	-	-	KM18	MB18
	M 90 X 2	18	-	-	-	KM18	MB18
	M 90 X 2	18	-	-	-	KM18	MB18
85	M 95 X 2	19	-	-	-	KM19	MB19
	M 95 X 2	19	-	-	-	KM19	MB19
	M 95 X 2	19	-	-	-	KM19	MB19
90	M 100 X 2	20	-	-	-	KM20	MB20

Adapter Sleeves



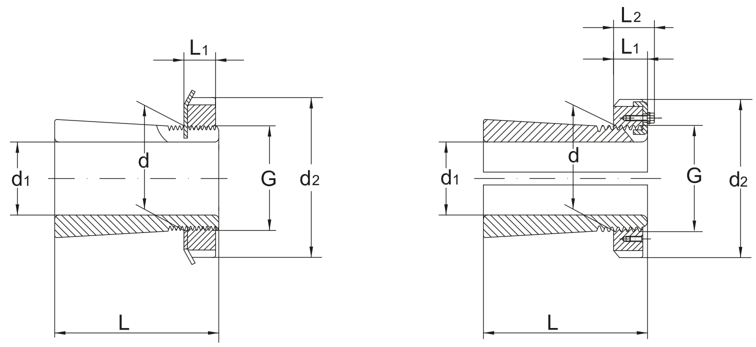
Shaft Φ d_1	Dimension d	d_2	L	Designation adapter sleeve, complete	Mass
mm	mm				kg
90	100	130	71	**H320**	1,6
		130	97	**H2320**	2
	105	130	76	**H3120**	1,8
95		140	60	**H221**	1,6
		140	74	**H321**	1,85
100	110	145	63	**H222**	1,8
		145	77	**H322**	2,05
		145	105	**H2322**	2,75
		145	81	**H3122**	2,1
110	120	155	112	**H2324**	3
		145	72	**H3024**	1,8
		155	88	**H3124**	2,5
115	130	165	121	**H2326**	4,45
		155	80	**H3026**	2,8
		165	92	**H3126**	3,45
125	140	180	131	**H2328**	5,4
		165	82	**H3028**	3,05
		180	97	**H3128**	4,1
135	150	195	139	**H2330**	6,4
		180	87	**H3030**	3,75
		195	111	**H3130**	5,25
140	160	210	147	**H2332**	8,8
		210	147	**OH2332 H**	8,8
		190	93	**H3032**	5,1

Adapter Sleeves



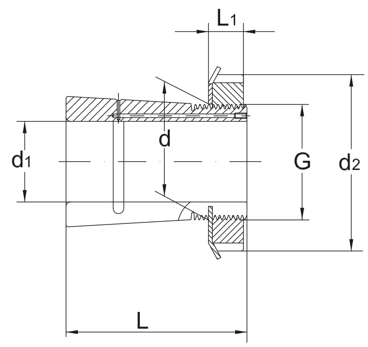
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
90	M 100 X 2	20	-	-	-	KM20	MB20
	M 100 X 2	20	-	-	-	KM20	MB20
	M 100 X 2	20	-	-	-	KM20	MB20
95	M 105 X 2	20	-	-	-	KM21	MB21
	M 105 X 2	20	-	-	-	KM21	MB21
100	M 110 X 2	21	-	-	-	KM22	MB22
	M 110 X 2	21	-	-	-	KM22	MB22
	M 110 X 2	21	-	-	-	KM22	MB22
	M 110 X 2	31	-	-	-	KM22	MB22
110	M 120 X 2	22	-	-	-	KM24	MB24
	M 120 X 2	22	-	-	-	KML24	MBL24
	M 120 X 2	22	-	-	-	KM24	MB24
115	M 130 X 2	23	-	-	-	KM26	MB26
	M 130 X 2	23	-	-	-	KML26	MBL26
	M 130 X 2	23	-	-	-	KM26	MB26
125	M 140 X 2	24	-	-	-	KM28	MB28
	M 140 X 2	24	-	-	-	KML28	MBL28
	M 140 X 2	24	-	-	-	KM28	MB28
135	M 150 X 2	26	-	-	-	KM30	MB30
	M 150 X 2	26	-	-	-	KML30	MBL30
	M 150 X 2	26	-	-	-	KM30	MB30
140	M 160 X 3	28	-	-	-	KM32	MB32
	M 160 X 3	28	-	M 6	4,2	KM32	MB32
	M 160 X 3	27,5	-	-	-	KML32	MBL32

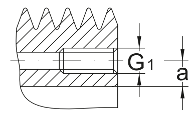
Adapter Sleeves



Shaft Φ d_1	Dimension d	d_2	L	Designation adapter sleeve, complete	Mass
mm	mm				kg
140	160	190	93	**OH3032 H**	5,1
		210	119	**H3132**	7,25
		210	119	**OH3132 H**	7,25
150	170	220	154	**H2334**	9,9
		220	154	**OH2334 H**	9,9
		200	101	**H3034**	5,8
		200	101	**OH3034 H**	5,8
		220	101	**H3134**	8,1
		220	122	**OH3134 H**	8,1
160	180	230	161	**H2336**	11
		230	161	**OH2336 H**	11
		210	109	**H3036**	6,7
		210	109	**OH3036 H**	6,7
		230	131	**H3136**	9,15
		230	131	**OH3136 H**	9,15
170	190	240	169	**H2338**	12
		240	169	**OH2338 H**	12
		220	112	**H3038**	7,25
		220	112	**OH3038 H**	7,25
		240	141	**H3138**	10,5
		240	141	**OH3138 H**	10,5
180	200	250	176	**H2340**	13,5
		250	176	**OH2340 H**	13,5
		240	120	**H3040**	8,9

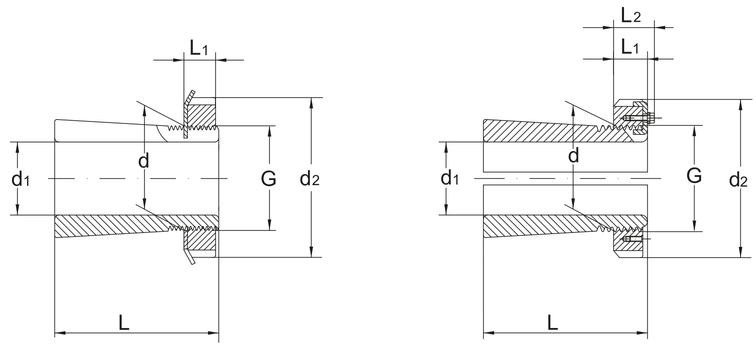
Adapter Sleeves





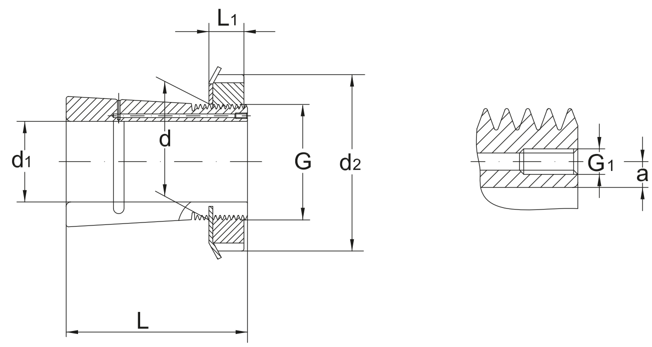
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
140	M 160 X 3	27,5	-	M 6	4,2	KML32	MBL32
	M 160 X 3	28	-	-	-	KM32	MB32
	M 160 X 3	28	-	M 6	4,2	KM32	MB32
150	M 170 X 3	29	-	-	-	KM34	MB34
	M 170 X 3	29	-	M 6	4,2	KM34	MB34
	M 170 X 3	28,5	-	-	-	KML34	MBL34
	M 170 X 3	28,5	-	M 6	4,2	KML34	MBL34
	M 170 X 3	29	-	-	-	KM34	MB34
	M 170 X 3	29	-	M 6	4,2	KM34	MB34
160	M 180 X 3	30	-	-	-	KM36	MB36
	M 180 X 3	30	-	M 6	4,2	KM36	MB36
	M 180 X 3	29,5	-	-	-	KML36	MBL36
	M 180 X 3	29,5	-	M 6	4,2	KML36	MBL36
	M 180 X 3	30	-	-	-	KM36	MB36
	M 180 X 3	30	-	M 6	4,2	KM36	MB36
170	M 190 X 3	31	-	-	-	KM38	MB38
	M 190 X 3	31	-	M 6	4,2	KM38	MB38
	M 190 X 3	30,5	-	-	-	KML38	MBL38
	M 190 X 3	30,5	-	M 6	4,2	KML38	MBL38
	M 190 X 3	31	-	-	-	KM38	MB38
	M 190 X 3	31	-	M 6	4,2	KM38	MB38
180	M 200 X 3	32	-	-	-	KM40	MB40
	M 200 X 3	32	-	M 6	4,2	KM40	MB40
	M 200 X 3	31,5	-	-	-	KML40	MBL40

Adapter Sleeves



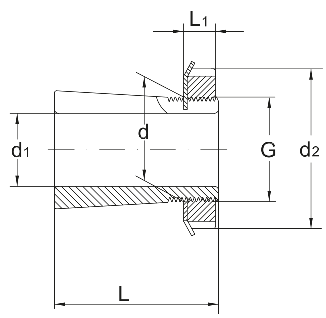
Shaft Φ d_1	Dimension d	 d_2	 L	Designation adapter sleeve, complete	Mass
mm	mm				kg
180	200	240	120	**OH3040 H**	8,9
		250	150	**H3140**	12
		250	150	**OH3140 H**	12
200	220	280	186	**H2344**	17
		280	186	**OH2344 H**	17
		260	126	**H3044**	9,9
		260	126	**OH3044 H**	9,9
		280	161	**H3144**	15
		280	161	**OH3144 H**	15
220	240	300	199	**H2348**	19
		300	199	**OH2348 H**	19
		290	133	**H3048**	12
		290	133	**OH3048 H**	12
		300	172	**H3148**	16
		300	172	**OH3148 H**	16
240	260	330	211	**H2352**	23
		330	211	**OH2352 H**	23
		310	145	**H3052**	13,5
		310	145	**OH3052 H**	13,5
		330	190	**H3152**	21
		330	190	**OH3152 H**	21
260	280	350	224	**H2356**	27
		350	224	**OH2356 H**	27
		330	152	**H3056**	16
		330	152	**OH3056 H**	16

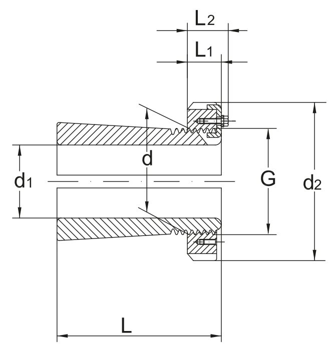
Adapter Sleeves



Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
180	M 200 X 3	31,5	-	M6	4,2	KML40	MBL40
	M 200 X 3	32	-	-	-	KM40	MB40
	M 200 X 3	32	-	M6	4,2	KM40	MB40
200	Tr 220 X 4	35	-	-	-	HM44 T	MB44
	Tr 220 X 4	35	-	M6	4,2	HM44 T	MB44
	Tr 220 X 4	30	41	-	-	HM3044	MS3044
	Tr 220 X 4	30	41	M6	4,2	HM3044	MS3044
	Tr 220 X 4	35	-	-	-	HM44 T	MB44
	Tr 220 X 4	35	-	M6	4,2	HM44 T	MB44
220	Tr 240 X 4	37	-	-	-	HM48 T	MB48
	Tr 240 X 4	37	-	M6	4,2	HM48 T	MB48
	Tr 240 X 4	34	46	-	-	HM3048	MS3052-48
	Tr 240 X 4	34	46	M6	4,2	HM3048	MS3052-48
	Tr 240 X 4	37	-	-	-	HM48 T	MB48
	Tr 240 X 4	37	-	M6	4,2	HM48 T	MB48
240	Tr 260 X 4	39	-	-	-	HM52 T	MB52
	Tr 260 X 4	39	-	M6	4,2	HM52 T	MB52
	Tr 260 X 4	34	46	-	-	HM3052	MS3052-48
	Tr 260 X 4	34	46	M6	4,2	HM3052	MS3052-48
	Tr 260 X 4	39	-	-	-	HM52 T	MB52
	Tr 280 X 4	39	-	M6	4,2	HM52 T	MB52
260	Tr 280 X 4	41	-	-	-	HM56 T	MB56
	Tr 280 X 4	41	-	M6	4,2	HM56 T	MB56
	Tr 280 X 4	38	50	-	-	HM3056	MS3056
	Tr 280 X 4	38	50	M6	4,2	HM3056	MS3056

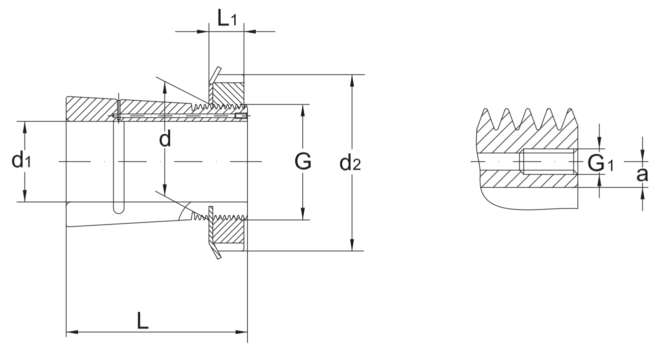
Adapter Sleeves





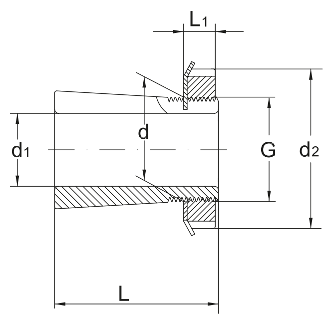
Shaft Φ d1	Dimension d	d2	L	Designation adapter sleeve, complete	Mass
mm	mm				kg
260	280	350	195	**H3156**	23
		350	195	**OH3156 H**	23
280	300	360	168	**H3060**	20,5
		360	168	**OH3060 H**	20,5
		380	208	**H3160**	29
		380	208	**OH3160 H**	29
		380	240	**H3260**	32
		380	240	**OH3260 H**	32
300	320	380	171	**H3064**	22
		380	171	**OH3064 H**	22
		400	226	**H3164**	32
		400	226	**OH3164 H**	32
		400	258	**H3264**	35
		400	258	**OH3264 H**	35
320	340	400	187	**H3068**	27
		400	187	**OH3068 H**	27
		440	254	**H3168**	50
		440	254	**OH3168 H**	50
		440	288	**H3268**	51,5
		440	288	**OH3268**	51,5
340	360	420	188	**H3072**	29
		420	188	**OH3072 H**	29
		460	259	**H3172**	56
		460	259	**OH3172 H**	56

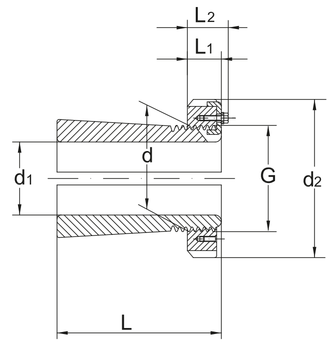
Adapter Sleeves



Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
260	Tr 280 X 4	41	-	-	-	HM56 T	MB56
	Tr 280 X 4	41	-	M6	4,2	HM56 T	MB56
280	Tr 300 X 4	42	54	-	-	HM3060	MS3060
	Tr 300 X 4	42	54	M6	4,2	HM3060	MS3060
	Tr 300 X 4	40	53	-	-	HM3160	MS3160
	Tr 300 X 4	40	53	M6	4,2	HM3460	MS3460
	Tr 300 X 4	40	53	-	-	HM3160	MS3160
	Tr 300 X 4	40	53	M6	4,2	HM3160	MS3160
300	Tr 320 X 5	42	55	-	-	HM3064	MS3068-64
	Tr 320 X 5	42	55	M6	4	HM3064	MS3068-64
	Tr 320 X 5	42	56	-	-	HM3164	MS3164
	Tr 320 X 5	42	56	M6	4	HM3164	MS3164
	Tr 320 X 5	42	56	-	-	HM3164	MS3164
	Tr 320 X 5	42	56	M6	4	HM3164	MS3164
320	Tr 340 X 5	45	58	-	-	HM3068	MS3068-64
	Tr 340 X 5	45	58	M6	4	HM3068	MS3068-64
	Tr 340 X 5	55	72	-	-	HM3168	MS3172-68
	Tr 340 X 5	55	72	M6	4	HM3168	MS3172-68
	Tr 340 X 5	55	72	-	-	HM3168	MS3172-68
	Tr 340 X 5	55	72	M6	4	HM3168	MS3172-68
340	Tr 360 X 5	45	58	-	-	HM3072	MS3072
	Tr 360 X 5	45	58	M6	4	HM3072	MS3072
	Tr 360 X 5	58	75	-	-	HM3172	MS3172-68
	Tr 360 X 5	58	75	M6	4	HM3172	MS3172-68

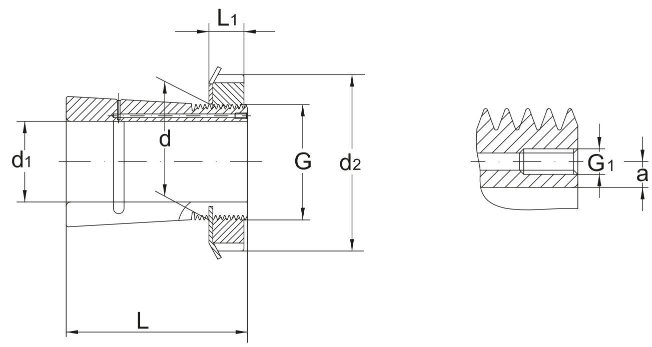
Adapter Sleeves





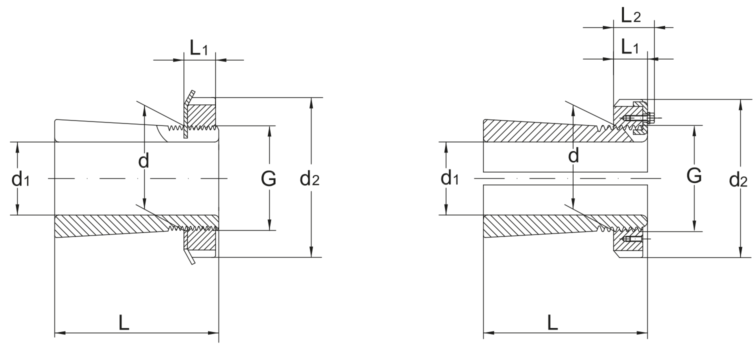
Shaft Φ	Dimension			Designation adapter sleeve, complete	Mass
d_1	d	d_2	L		
mm	mm				kg
340	360	460	299	**H3272**	60,5
		460	299	**OH3272 H**	60,5
360	380	450	193	**H3076**	35,5
		450	193	**OH3076 H**	35,5
		490	264	**H3176**	61,5
		490	264	**OH3176 H**	61,5
		490	310	**H3276**	69,5
		490	310	**OH3276 H**	69,5
380	400	470	210	**H3080**	40
		470	210	**OH3080 H**	40
		520	272	**H3180**	73
		520	272	**OH3180 H**	73
400	420	490	212	**H3084**	47
		490	212	**OH3084 H**	47
		540	304	**H3184**	80
		540	304	**OH3184 H**	80
410	440	520	228	**H3088**	65
		520	228	**OH3088 H**	65
		560	307	**H3188**	95
		560	307	**OH3188 H**	95
430	460	540	234	**H3092**	71
		540	234	**OH3092 H**	71

Adapter Sleeves



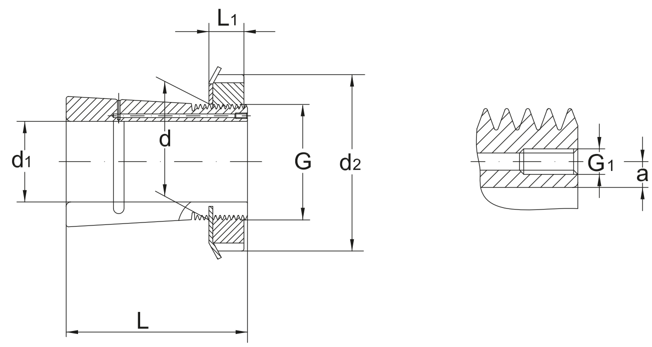
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
340	Tr 360 X 5	58	75	-	-	HM3172	MS3172-68
	Tr 360 X 5	58	75	-	10	HM3172	MS3172-68
360	Tr 380 X 5	48	62	-		HM3076	MS3080-76
	Tr 380 X 5	48	62	M6	4	HM3076	MS3080-76
	Tr 380 X 5	60	77	-	-	HM3176	MS3176
	Tr 380 X 5	60	77	M6	4	HM3176	MS3176
	Tr 380 X 5	60	77	-	-	HM3176	MS3176
	Tr 380 X 5	60	77	-	10,5	HM3176	MS3176
380	Tr 400 X 5	52	66	-	-	HM3080	MS3080-76
	Tr 400 X 5	52	66	M6	4	HM3080	MS3080-76
	Tr 400 X 5	62	82	-	-	HM3180	MS3184-80
	Tr 400 X 5	62	82	M6	4	HM3180	MS3184-80
400	Tr 420 X 5	52	66	-	-	HM3084	MS3084
	Tr 420 X 5	52	66	M6	4	HM3084	MS3084
	Tr 420 X 5	70	90	-	-	HM3184	MS3184-80
	Tr 420 X 5	70	90	M6	4	HM3184	MS3184-80
410	Tr 440 X 5	60	77	-	-	HM3088	MS3092-88
	Tr 440 X 5	60	77	M8	6,5	HM3088	MS3092-88
	Tr 440 X 5	70	90	-	-	HM3188	MS3192-88
	Tr 440 X 5	70	90	M8	6,5	HM3188	MS3192-88
430	Tr 460 X 5	60	77	-	-	HM3092	MS3092-88
	Tr 460 X 5	60	77	M8	6,5	HM3092	MS3092-88

Adapter Sleeves



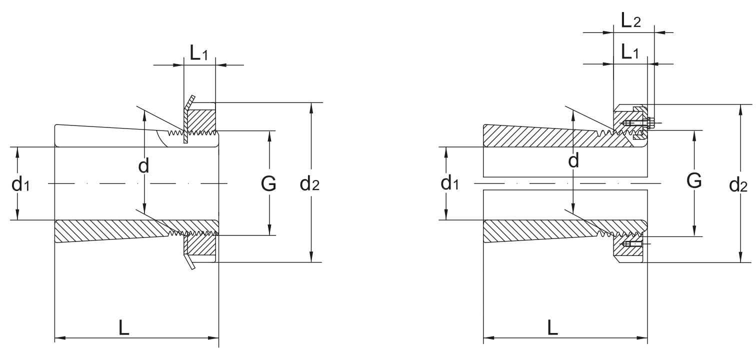
Shaft Φ d_1	Dimension d	 d_2	 L	Designation adapter sleeve, complete	Mass
mm	mm				kg
430	460	580	326	**H3192**	119
		580	326	**OH3192 H**	119
450	480	560	237	**H3096**	75
		560	237	**OH3096 H**	75
		620	335	**H3196**	135
		620	335	**OH3196 H**	135
470	500	580	247	**H30/500**	82
		580	247	**OH30/500 H**	82
		630	356	**H31/500**	145
		630	356	**OH31/500 H**	145
500	530	630	265	**H30/530**	105
		630	265	**OH30/530 H**	105
530	560	650	282	**H30/560**	112
		650	282	**OH30/560 H**	112
560	600	700	289	**H30/600**	147
		700	289	**OH30/600 H**	147
600	630	730	301	**H30/630**	138
		730	301	**OH30/630 H**	138
630	670	780	324	**H30/670**	190
		780	324	**OH30/670 H**	190
670	710	830	342	**H30/710**	228
		830	342	**OH30/710 H**	228

Adapter Sleeves



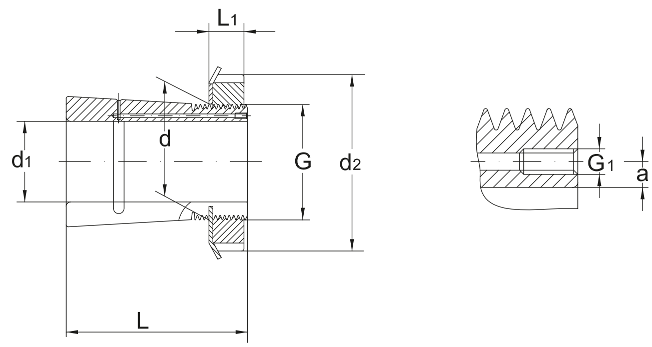
Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
430	Tr 460 X 5	75	95	-	-	HM3192	MS3192-88
	Tr 460 X 5	75	95	M8	6,5	HM3192	MS3192-88
450	Tr 480 X 5	60	77	-	-	HM3096	MS30/500-96
	Tr 480 X 5	60	77	M8	6,5	HM3096	MS30/500-96
	Tr 480 X 5	75	95	-	-	HM3196	MS3196
	Tr 480 X 5	75	95	M8	6,5	HM3196	MS3196
470	Tr 500 X 5	68	85	-	-	HM30/500	MS30/500-96
	Tr 500 X 5	68	85	M8	6,5	HM30/500	MS30/500-96
	Tr 500 X 5	80	100	-	-	HM31/500	MS31/500
	Tr 500 X 5	80	100	M8	6,5	HM31/500	MS31/500
500	Tr 530 X 6	68	90	-	-	HM30/530	MS30/600-530
	Tr 530 X 6	68	90	M8	6	HM30/530	MS30/600-530
530	Tr 560 X 6	75	97	-	-	HM30/560	MS30/560
	Tr 560 X 6	75	97	M8	6	HM30/560	MS30/560
560	Tr 600 X 6	75	97	-	-	HM30/600	MS30/600-530
	Tr 600 X 6	75	97	-	8	HM30/600	MS30/600-530
600	Tr 630 X 6	75	97	-	-	HM30/630	MS30/630
	Tr 630 X 6	75	97	M8	6	HM30/630	MS30/630
630	Tr 670 X 6	80	102	-	-	HM30/670	MS30/670
	Tr 670 X 6	80	102	-	8	HM30/670	MS30/670
670	Tr 710 X 7	90	112	-	-	HM30/710	MS30/710
	Tr 710 X 7	90	112	-	8	HM30/710	MS30/710

Adapter Sleeves



Shaft Φ d_1	Dimension d	d_2	L	Designation adapter sleeve, complete	Mass
mm	mm				kg
710	750	870	356	**H30/750**	246
		870	356	**OH30/750 H**	246
750	800	920	366	**H30/800**	302
		920	366	**OH30/800 H**	302
800	850	980	380	**H30/850**	341
		980	380	**OH30/850 H**	341

Adapter Sleeves



Shaft Φ	Thread	Dimensions				Lock nut	Locking Device
d_1	G	L_1	L_2	G_1	a		
mm							
710	Tr 750 X 7	90	112	-	-	HM30/750	MS30/800-750
	Tr 750 X 7	90	112	-	8	HM30/750	MS30/800-750
750	Tr 840 X 7	90	112	-	-	HM30/800	MS30/800-750
	Tr 800 X 7	90	112	-	10	HM30/800	MS30/800-750
800	Tr 850 X 7	90	115	-	-	HM30/850	MS30/900-850
	Tr 850 X 7	90	115	-	10	HM30/850	MS30/900-850

Withdrawal Sleeves

Standards, Boundary dimensions

Withdrawal Sleeves	DIN 5416

General

Withdrawal sleeves (see sketch below) are slotted steel sleeves that have a tapered outer diameter on one side and a thread on the large diameter on the opposite side.

Standard withdrawal sleeves have tapered outers, taper **1:12** except for withdrawal sleeves of series **AH 240** and **AH 241** having tapers **1:30**.

URB Withdrawal Sleeves are supplied without lock nut as standard.

URB Withdrawal Sleeves are produced in two different designs as standard.

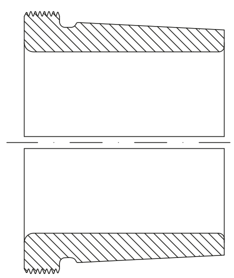
Beside the standard design (see figure **a**), larger withdrawal sleeves from bore diameter 200 mm onwards are also available with oil bores and oil distribution ducts as required for applying the oil injection method as shown in figure **b**.

URB withdrawal sleeves that are foreseen with facilities for an application of the oil injection method are designated "**AOH...**"

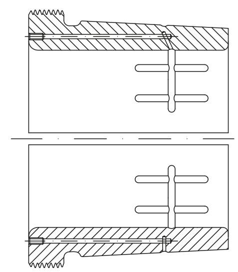
When withdrawal sleeves are used, the bearing inner ring must to be supported by an effective suface contact, such as a shaft shoulder, (see figure **a**).

Where larger radii bearing journals and shaft shoulders are necessary for strenght reasons, (e.g. where such radii become larger than the bearing fillet, suitable distance rings must be applied.

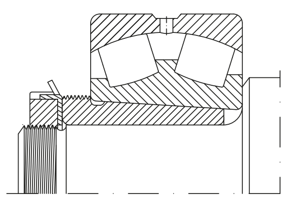
In each case the withdrawal sleeves must be secured against axial displacement loosening by means of lock nuts (see fig. **c**) or end plates (see fig. **d**).



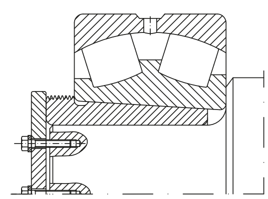
a



b

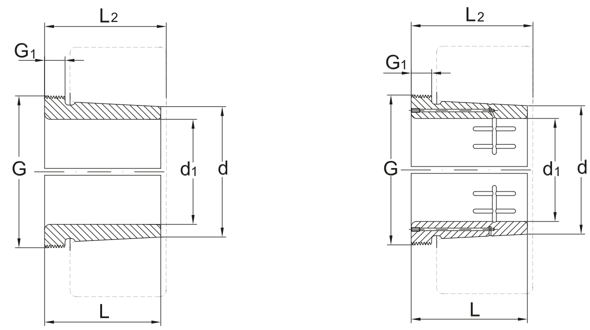


c



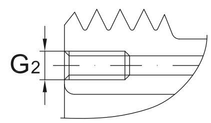
d

Withdrawal Sleeves



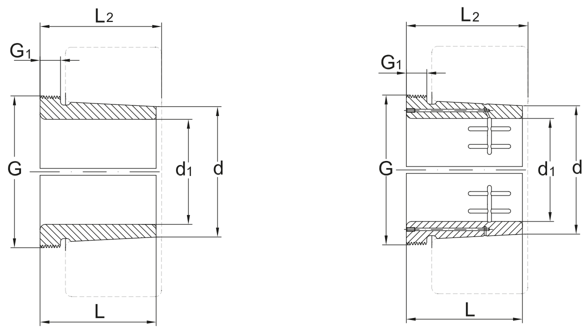
Shaft Φ d_1	d	Dimension G	G_1	G_2	L	L_1	Designation adapter sleeve, complete	Mass	Lock Nut
mm		mm						kg	
35	40	M 45 X 1,5	6	-	29	32	**AH308**	0,09	KM 9
		M 45 X 1,5	7	-	40	43	**AH2308**	0,13	KM 9
40	45	M 50 X 1,5	6	-	31	34	**AH309**	0,12	KM 10
		M 50 X 1,5	7	-	44	47	**AH2309**	0,16	KM 10
45	50	M 55 X 2	7	-	35	38	**AHX310**	0,13	KM 11
		M 55 X 2	9	-	50	53	**AHX2310**	0,19	KM 11
50	55	M 60 X 2	7	-	37	40	**AHX311**	0,16	KM 12
		M 60 X 2	10	-	54	57	**AHX2311**	0,26	KM 12
55	60	M 65 X 2	8	-	40	43	**AHX312**	0,19	KM 13
		M 65 X 2	11	-	58	61	**AHX2312**	0,30	KM 13
60	65	M 70 X 2	8	-	42	45	**AH313 G**	0,22	KM 14
		M 75 X 2	12	-	61	64	**AH2313**	0,39	KM 15
65	70	M 75 X 2	8	-	43	47	**AH314 G**	0,24	KM 15
		M 80 X 2	12	-	64	68	**AHX2314**	0,45	KM 16
70	75	M 80 X 2	8	-	45	49	**AH315 G**	0,29	KM 16
	75	M 85 X 2	12	-	68	72	**AHX2315**	0,53	KM 17
75	80	M 90 X 2	8	-	48	52	**AH316**	0,37	KM 18
		M 90 X 2	12	-	71	75	**AHX2316**	0,57	KM 18
80	85	M 95 X 2	9	-	52	56	**AHX317**	0,43	KM 19

Withdrawal Sleeves



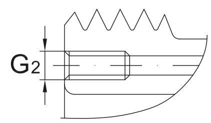
Shaft Φ		Dimension					Designation adapter sleeve, complete	Mass	L ock Nut
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
80	85	M 95 X 2	13	-	74	78	**AHX2317**	0,65	KM 19
85	90	M 100 X 2	9	-	53	57	**AHX318**	0,46	KM 20
		M 100 X 2	10	-	63	67	**AHX3218**	0,57	KM 20
		M 100 X 2	14	-	79	83	**AHX2318**	0,76	KM 20
90	95	M 105 X 2	10	-	57	61	**AHX319**	0,54	KM 21
		M 105 X 2	16	-	57	61	**AHX2319**	0,90	KM 21
95	100	M 110 X 2	10	-	59	63	**AHX320**	0,58	KM 22
		M 110 X 2	11	-	64	68	**AHX3120**	0,66	KM 22
		M 110 X 2	11	-	73	77	**AHX3220**	0,76	KM 22
		M 110 X 2	16	-	90	94	**AHX2320**	1,00	KM 22
105	110	M 120 X 2	11	-	68	72	**AHX3122**	0,76	KM 24
		M 125 X 2	11	-	82	86	**AHX3222**	1,05	KM 25
		M 125 X 2	16	-	98	102	**AHX2322**	1,35	KM 25
		M 115 X 2	13	-	82	91	**AH24122**	0,71	KM 23
115	120	M 130 X 2	13	-	60	64	**AHX3024**	0,73	KM 26
		M 130 X 2	12	-	75	79	**AHX3124**	0,94	KM 26
		M 135 X 2	13	-	90	94	**AHX3224**	1,30	KM 27
		M 135 X 2	17	-	105	109	**AHX2324**	1,65	KM 27
		M 125 X 2	13	-	73	82	**AH24024**	0,70	KM 25

Withdrawal Sleeves



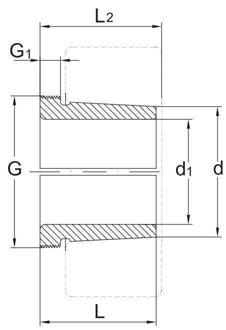
Shaft Φ		Dimension					Designation adapter sleeve, complete	Mass	Lock Nut
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
115	120	M 130 X 2	13	-	93	102	**AH24124**	1,00	KM 26
125	130	M 140 X 2	14	-	67	71	**AHX3026**	0,91	KM 28
		M 140 X 2	12	-	78	82	**AHX3126**	1,10	KM 28
		M 145 X 2	15	-	98	102	**AHX3226**	1,55	KM 29
		M 145 X 2	19	-	115	119	**AHX2326**	2,00	KM 29
		M 135 X 2	14	-	83	93	**AH24026**	0,88	KM 27
		M 140 X 2	14	-	94	104	**AH24126**	1,15	KM 28
135	140	M 150 X 2	14	-	68	73	**AHX3028**	1,00	KM 30
		M 150 X 2	14	-	83	88	**AHX3128**	1,30	KM 30
		M 155 X 3	15	-	104	109	**AHX3228**	1,85	KM 31
		M 155 X 3	20	-	125	130	**AHX2328**	2,35	KM 31
		M 145 X 2	14	-	83	93	**AH24028**	0,95	KM 29
		M 150 X 2	14	-	99	109	**AH24128**	1,30	KM 30
145	150	M 160 X 3	15	-	72	77	**AHX3030**	1,15	KM 32
		M 165 X 3	15	-	96	101	**AHX3130**	1,80	KM 33
		M 165 X 3	17	-	114	119	**AHX3230**	2,20	KM 33
		M 165 X 3	24	-	135	140	**AHX2330**	2,80	KM 33
		M 155 X 3	15	-	90	101	**AH24030**	1,05	KM 31
		M 160 X 3	15	-	115	126	**AH24130**	1,55	KM 32
150	160	M 170 X 3	16	-	77	82	**AH3032**	2,05	KM 34

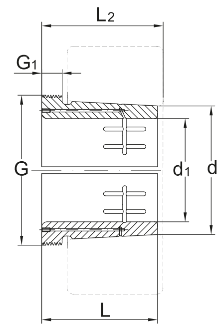
Withdrawal Sleeves



Shaft Φ		Dimension					Designation adapter sleeve, complete	Mass	Lock Nut
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
150	160	M 180 X 3	16	-	103	108	**AH3132**	3,20	KM 36
		M 180 X 3	20	-	124	130	**AH3232**	4,00	KM 36
		M 180 X 3	24	-	140	146	**AH2332**	4,65	KM 36
		M 170 X 3	15	-	95	106	**AH24032**	2,30	KM 34
		M 170 X 3	15	-	124	135	**AH24132**	3,05	KM 34
160	170	M 180 X 3	17	-	85	90	**AH3034**	2,40	KM 36
		M 190 X 3	16	-	104	109	**AH3134**	3,45	KM 38
		M 190 X 3	24	-	134	140	**AH3234**	4,80	KM 38
		M 190 X 3	24	-	146	152	**AH2334**	5,25	KM 38
		M 180 X 3	16	-	106	117	**AH24034**	2,70	KM 36
		M 180 X 3	16	-	125	136	**AH24134**	3,25	KM 36
170	180	M 190 X 3	17	-	92	98	**AH3036**	2,80	KM 38
		M 200 X 3	17	-	105	110	**AH2236**	3,75	KM 40
		M 200 X 3	19	-	116	122	**AH3136**	4,25	KM 40
		M 200 X 3	24	-	140	146	**AH3236**	5,25	KM 40
		M 200 X 3	26	-	154	160	**AH2336**	6,05	KM 40
		M 190 X 3	16	-	116	127	**AH24036**	3,20	KM 38
		M 190 X 3	16	-	134	145	**AH24136**	3,75	KM 38
180	190	Tr 205 X 4	18	-	96	102	**AH3238**	3,40	HML 41 T
		Tr 210 X 4	18	-	112	117	**AH2238**	4,25	HM 42 T
		Tr 210 X 4	20	-	125	131	**AH3138**	4,90	HM 42 T

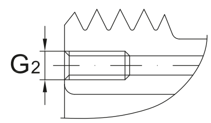
Withdrawal Sleeves





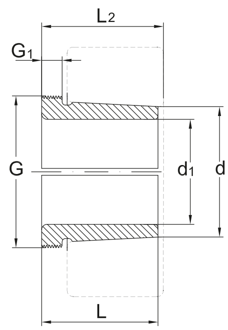
Shaft Φ		Dimension					Designation adapter sleeve, complete	Mass	Lock Nut
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
180	190	Tr 210 X 4	25	-	145	152	**AH3238**	5,90	HM 42 T
		Tr 210 X 4	26	-	160	167	**AH2338**	6,70	HM 42 T
		M 200 X 3	18	-	118	131	**AH24038**	3,55	KM 40
		M 200 X 3	18	-	146	159	**AH24138**	4,45	KM 40
190	200	Tr 215 X 4	19	-	102	108	**AH3040**	3,85	HML 43 T
		Tr 220 X 4	19	-	118	123	**AH2240**	4,70	HM 44 T
		Tr 220 X 4	21	-	134	140	**AH3140**	5,65	HM 44 T
		Tr 220 X 4	25	-	153	160	**AH3240**	6,60	HM 44 T
		Tr 220 X 4	30	-	170	177	**AH2340**	7,60	HM 44 T
		Tr 210 X 4	18	-	127	140	**AH24040**	4,00	HM 42 T
		Tr 210 X 4	18	-	158	171	**AH24140**	5,05	HM 42 T
200	220	Tr 235 X 4	20	G 1/8	111	117	**AH3044**	7,40	HML 47 T
		Tr 240 X 4	23	G 1/4	145	115	**AH3144**	9,30	HM 48 T
		Tr 240 X 4	30	G 1/4	181	189	**AH2344**	13,5	HM 48 T
		Tr 230 X 4	20	G 1/8	138	152	**AH24044**	8,20	HM 46 T
		Tr 230 X 4	20	G 1/8	170	184	**AH24144**	10,0	HM 46 T
220	240	Tr 260 X 4	21	G 1/4	116	123	**AH3048**	7,95	HM 3052
		Tr 260 X 4	25	G 1/4	154	161	**AH3148**	12,0	HM 52 T
		Tr 260 X 4	30	G 1/4	189	197	**AH2348**	14,0	HM 52 T
		Tr 250 X 4	20	G 1/8	138	153	**AOH24048**	8,05	HM 50 T

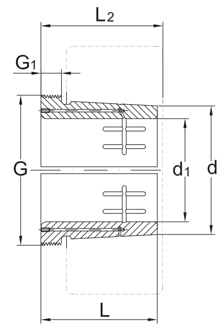
Withdrawal Sleeves



Shaft Φ d_1	d	Dimension G	G_1	G_2	L	L_1	Designation adapter sleeve, complete	Mass	Lock Nut
mm		mm						kg	
220	240	Tr 260 X 4	20	G 1/4	180	195	**AOH24148**	11,5	HM 52 T
240	260	Tr 280 X 4	23	G 1/4	128	135	**AOH3052**	9,60	HM 3056
		Tr 290 X 4	23	G 1/4	155	161	**AOH2252**	12,5	HM 58 T
		Tr 290 X 4	26	G 1/4	172	179	**AOH3152**	16,0	HM 58 T
		Tr 290 X 4	30	G 1/4	205	213	**AOH2352**	17,5	HM 58 T
		Tr 270 X 4	22	G 1/8	162	178	**AOH24052**	10,5	HM 54 T
		Tr 280 X 4	22	G 1/4	202	218	**AOH24152**	14,0	HM 56 T
260	280	Tr 300 X 4	24	G 1/4	131	139	**AOH3056**	11,0	HM 3060
		Tr 310 X 5	28	G 1/4	175	183	**AOH3156**	15,5	HM 62 T
		Tr 310 X 5	30	G 1/4	212	220	**AOH2356**	19,5	HM 62 T
		Tr 290 X 4	22	G 1/8	162	179	**AOH24056**	11,5	HM 58 T
		Tr 300 X 4	22	G 1/4	202	219	**AOH24156**	15,0	HM 3160
280	300	Tr 320 X 5	26	G 1/4	145	153	**AOH3060**	13,0	HM 3064
		Tr 330 X 5	30	G 1/4	192	200	**AOH3160**	19,0	HM 66 T
		Tr 330 X 5	34	G 1/4	228	236	**AOH3260**	23,5	HM 66 T
		Tr 310 X 5	24	G 1/8	184	202	**AOH24060**	14,0	HM 62 T
		Tr 320 X 5	24	G 1/4	224	242	**AOH24160**	18,5	HM 3164
300	320	Tr 345 X 5	27	G 1/4	149	157	**AOH3064**	14,5	HM 69 T
		Tr 350 X 5	31	G 1/4	209	217	**AOH3164**	22,5	HM 70 T
		Tr 350 X 5	36	G 1/4	246	254	**AOH3264**	27,5	HM 70 T
		Tr 330 X 5	24	G 1/8	184	202	**AOH24064**	15,0	HM 66 T

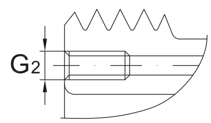
Withdrawal Sleeves





Shaft Φ		**Dimension**					**Designation adapter sleeve, complete**	**Mass**	**Lock Nut**
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
300	320	Tr 340 X 5	24	G 1/4	242	260	**AOH24164**	20,5	HM 3168
320	340	Tr 365 X 5	28	G 1/4	162	171	**AOH3068**	17,5	HML 73 T
		Tr 370 X 5	33	G 1/4	225	234	**AOH3168**	26,5	HM 74 T
		Tr 370 X 5	38	G 1/4	264	273	**AOH3268**	32,0	HM 74 T
		Tr 360 X 5	26	G 1/4	206	225	**AOH24068**	18,0	HM 3072
		Tr 360 X 5	26	G 1/4	269	288	**AOH24168**	25,5	HM 3172
340	360	Tr 385 X 5	30	G 1/4	167	176	**AOH3072**	19,0	HML 77 T
		Tr 400 X 5	35	G 1/4	229	238	**AOH3172**	30,0	HM 3180
		Tr 400 X 5	40	G 1/4	274	283	**AOH3272**	33,0	HM 3180
		Tr 380 X 5	26	G 1/4	206	226	**AOH24072**	20,0	HM 3076
		Tr 380 X 5	26	G 1/4	269	289	**AOH24172**	26,0	HM 3176
360	380	Tr 410 X 5	31	G 1/4	170	180	**AOH3076**	23,5	HML 82 T
		Tr 420 X 5	36	G 1/4	232	242	**AOH3176**	38,0	HM 3184
		Tr 420 X 5	42	G 1/4	284	294	**AOH3276**	45,5	HM 3184
		Tr 400 X 5	28	G 1/4	208	228	**AOH24076**	23,5	HM 3080
		Tr 400 X 5	28	G 1/4	271	291	**AOH24176**	31,0	HM 3180
380	400	Tr 430 X 5	33	G 1/4	183	193	**AOH3080**	27,0	HML 86 T
		Tr 440 X 5	38	G 1/4	240	250	**AOH3180**	39,5	HM 3188
		Tr 440 X 5	44	G 1/4	302	312	**AOH3280**	51,5	HM 3188

Withdrawal Sleeves



Shaft Φ		Dimension					Designation adapter sleeve, complete	Mass	Lock Nut
d_1	d	G	G_1	G_2	L	L_1			
mm		mm						kg	
380	400	Tr 420 X 5	28	G 1/4	228	248	**AOH24080**	27,0	HM 3084
		Tr 420 X 5	28	G 1/4	278	298	**AOH24180**	35,0	HM 3184
400	420	Tr 450 X 5	34	G 1/4	186	196	**AOH3084**	29,0	HML 90 T
		Tr 460 X 5	40	G 1/4	266	276	**AOH3184**	46,0	HM 3192
		Tr 440 X 5	30	G 1/4	230	252	**AOH24084**	29,0	HM 3088
		Tr 440 X 5	30	G 1/4	310	332	**AOH24184**	39,0	HM 3188
420	440	Tr 460 X 5	30	G 1/4	242	264	**AOH24088**	32,0	HML 92 T
		Tr 460 X 5	30	G 1/4	310	332	**AOH24188**	45,5	HM 3192
440	460	Tr 480 X 5	32	G 1/4	332	355	**AOH24192**	50,0	HM 3196
460	480	Tr 500 X 5	32	G 1/4	340	363	**AOH24196**	51,5	HM 31/500
480	500	Tr 530 X 6	35	G 1/4	360	383	**AOH241/500**	57,0	HM 31/530
500	530	Tr 550 X 6	35	G 1/4	370	394	**AOH241/530**	86,0	HM 110 T
530	560	Tr 580 X 6	38	G 1/4	393	417	**AOH241/560**	97,0	HM 116 T
560	600	Tr 630 X 6	38	G 1/4	413	439	**AOH241/600**	120	HM 126 T
600	630	Tr 650 X 6	40	G 1/4	440	466	**AOH241/630**	130	HM 130 T

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