Spherical Roller Bearings

1. Types, design features, and characteristics

Spherical roller bearings consist of an outer ring having a continuous spherical raceway and two rows of barrel-shaped rollers guided by an inner ring with two raceways. (Refer to **Fig. 1**) This bearing has self-aligning properties, and therefore is suited for use where misalignment between the inner and outer rings occurs from housing installation error or shaft bending.

Spherical roller bearings have a large capacity for radial loads, axial loads in either direction, and combined loads. They are also suited for applications where vibration and shock loads are encountered. When spherical roller bearings are used with a vertical shaft or under a large axial load, the load on the rollers of the row that is not subject to the axial load becomes small, and the resulting skidding on the rollers may result in wear. If the ratio of the axial load to the radial load exceeds the factor e in the dimension table ($F_a/F_r > e$), consult **NTN** Engineering.

In addition to spherical roller bearings with cylindrical bores, spherical roller bearings with tapered bores are also available. Bearings with tapered bores are specified by the suffix "K" at the end of the spherical roller bearing part number. The standard taper ratio is 1:12 for bearings with a "K" suffix; for bearings in series 240 and 241, the suffix "K30" indicates the taper ratio for a bearing is 1:30. Most tapered bore bearings incorporate the use of adapters and withdrawal sleeves for shaft mounting.

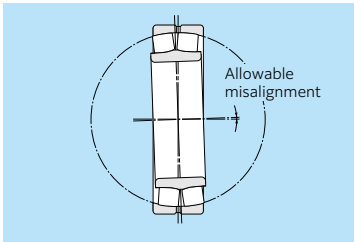
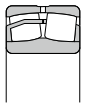
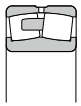
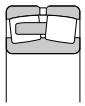
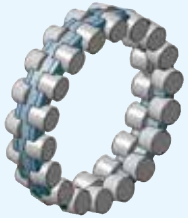
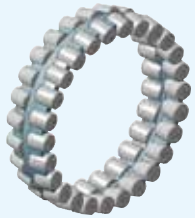
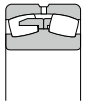
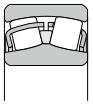
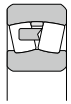
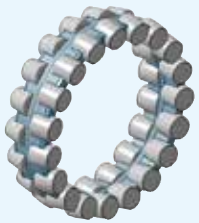


Fig. 1

Table 1 Types of spherical roller bearings

Type	ULTAGE series [1]		
	EA type	EM type	EM type (large size)
Design			
Bearing series	Series other than 213 with outer diameter of 420 mm or smaller		Series with outer diameter of 440 to 580 mm
Rollers	Symmetrical		
Cage type	Pressed cage	Machined cage	Machined cage
Cage shape			
Max. operating temperature	200°C		
Type	B type	213C type	213 type
Design			
Bearing series	Other than ULTAGE series (outer diameter of 300 mm or larger)	Series 213 with bore diameter of 50 mm or smaller	Series 213 with bore diameter of 55 mm or larger
Rollers	Asymmetrical	Symmetrical	Asymmetrical
Cage type	Two-piece machined cage	Two-piece pressed cage	Machined cage
Cage shape			
Max. operating temperature	120°C (instantaneous) 100°C (continuous)		

1) ULTAGE series spherical roller bearings has been developed for "longer life," "improved loading capability," and "higher speed," which are required for various types of industrial machinery.
For details, please refer to the special catalog "**ULTAGE series spherical roller bearings [EA and EM types] (CAT. No. 3033/E)**."

2. ULTAGE series fits

Table 2 Shaft tolerance class in common use

Condition		Shaft diameter (mm) Over	Shaft diameter (mm) Incl.	Shaft tolerance class	Note
Cylindrical bore bearing (class 0)					
Inner ring rotational load or load of undetermined direction	Light load [1] or Normal load [1] or Fluctuating load	18 25 40 60 100 200	25 40 60 100 200 500	k5 m5 n5 n6 p6 r6	
	Heavy load [1] or Impact load	50 70 140	70 140 200 [2]	n5 p6 r6	Use bearings with larger internal clearances than CN clearance bearings.
Inner ring: Stationary Load	Inner ring must move easily over shaft.	Overall shaft diameter		g6	For large bearings, f6 will suffice to facilitate movement.
	Inner ring does not have to move easily over shaft.	Overall shaft diameter		h6	
Tapered bore bearing (class 0) (with adapter or withdrawal sleeve)					
Full load		Overall shaft diameter		h9/IT5 [3]	h10/IT7 [3] will suffice for power transmitting shafts.

1) Standards for light loads, normal loads, and heavy loads
Light loads: dynamic equivalent radial load ≦ 0.05 C_r
Normal loads: 0.05 C_r < dynamic equivalent radial load ≦ 0.10 C_r
Heavy loads: 0.10 C_r < dynamic equivalent radial load
2) When the shaft diameter exceeds ϕ200 mm and the bearing is to be used under heavy load or impact load conditions, please consult **NTN** Engineering.
3) The shaft shape error (roundness, cylindricity, etc.) must be within the tolerance range of IT5 and IT7.
Note: 1. All values and fits listed in the above tables are for solid steel shafts.
2. Use the formula below to calculate necessary interference. The upper limit value should not exceed 1/1 000 of the shaft diameter.
When $F_r \leqq 0.3\,C_{0r}$, necessary interference Δd_F (μm) is $\Delta d_F = 0.08\,(d \cdot F_r/B)^{1/2}$
When $F_r > 0.3\,C_{0r}$, $\Delta d_F = 0.02\,(F_r/B)$
(d: bearing bore diameter (mm), B: inner ring width (mm), F_r: radial load, (N), C_{0r}: basic static rating load (N))
When the difference between the bearing temperature and the ambient temperature during bearing operation is to be considered, consider the effective interference Δ_{dT} (μm) by the temperature difference as the necessary interference.
$\Delta_{dT} = 0.0015 \cdot d \cdot \Delta T$
(ΔT: Difference between bearing temperature and ambient temperature °C)

Table 3 Housing bore tolerance class in common use

Condition				Housing bore tolerance class	Note
Housing	Load type, etc.		Outer ring axial direction movement		
Single housing or divided housing	Static outer ring load	All types of loads	Yes	H7	G7 can be used for large bearings or bearings with a large temperature differential between the outer ring and housing.
		Light [1] or ordinary load [1]	Yes	H8	—
		Shaft and inner ring become hot.	Easily	G7	F7 can be used for large bearings or bearings with a large temperature differential between the outer ring and housing.
Single housing		Requires precise rotation under light or ordinary loads.	Basically no Yes	K6 JS6	— —
		Requires low noise operation.	Yes	H6	—
	Indeterminate load	Light or ordinary load	Yes	JS7	—
		Ordinary or heavy load [1]	Basically no	K7	—
		High impact load	No	M7	—
	Rotating outer ring load	Light or fluctuating load	No	M7	—
		Ordinary or heavy load	No	N7	—
		Heavy load or large impact load with thin wall housing	No	P7	—

1) Standards for light loads, normal loads, and heavy loads
Light loads: dynamic equivalent radial load ≦ 0.05 C_r
Normal loads: 0.05 C_r < dynamic equivalent radial load ≦ 0.10 C_r
Heavy loads: 0.10 C_r < dynamic equivalent radial load

Note: All values and fits listed in the above tables are for cast iron or steel housings.

3. Allowable speed of ULTAGE series

As the rotational speed of the bearing increases, the temperature of the bearing also increases because of the friction heat produced inside the bearing. Excessive heat will significantly deteriorate the bearing performance, causing abnormal temperature rises and seizure.

Factors affecting the allowable speed of bearings are as follows.

(1) Bearing type
(2) Bearing size
(3) Lubrication (grease lubrication, circulating lubrication, oil lubrication, etc.)
(4) Bearing internal clearance (bearing internal clearance during operation)
(5) Bearing load
(6) Shaft and housing accuracy

The allowable speed specified in the bearing dimension table is the limit for heat dissipation and satisfactory lubrication conditions before the bearing is adversely affected.

The allowable speed of ULTAGE series spherical roller bearings specified in the catalog is defined as follows.

[Oil lubrication]

The allowable speed for oil lubrication is the speed at which the outer ring temperature reaches 80°C with room temperature spindle oil (lubrication oil viscosity: VG32) supplied at 1 liter/min under an operating load of 5% of the basic static load rating C_{0r}.

[Grease lubrication]

The allowable speed for grease lubrication is the speed at which the outer ring temperature reaches 80°C with lithium-based grease (consistency: NLGI3) filled 20%-30% of the free space under an operating load of 5% of the basic static load rating C_{0r}.

In either of the lubrication methods, the bearing temperature rise differs if the usage condition (operating load, rotational speed pattern, lubricating condition, etc.) is different; therefore, the bearings must be selected with sufficient allowable speed as specified in the catalog.

If 80% of the allowable speed specified in the dimension table is exceeded or the bearing is used in vibration or impact conditions, please consult **NTN** Engineering.

See section "9. Allowable speed" for the allowable speed of the spherical roller bearings that are not part of the ULTAGE series.

4. Oil hole and groove for outer ring

Both ULTAGE series and B type spherical roller bearings are provided with oil holes and an oil groove. (See **Fig. 2** and **Table 4**)

Types 213 and C do not have oil holes and grooves. However, they can be made based on customer request. Contact **NTN** Engineering with the bearing numbers and supplementary suffix code "D1" (refer to page A-48).

If a pin to prevent outer ring rotation is necessary, contact **NTN** Engineering.

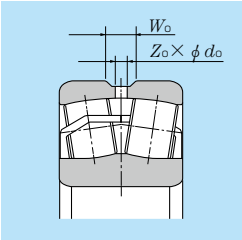


Fig. 2

Table 4 Oil inlet number

Nominal bearing outside diameter mm		Number of oil holes	
		D1	W33 (European spec)
Incl.	Below	Z_O	Z_O
–	320	4	3
320	1 010	8	3
1 010	–	12	–

For oil groove width W_O and diameter of oil hole d_O, see the dimension table.

5. Allowable misalignment angle

Spherical roller bearings have the same self-aligning properties as other self-aligning bearings. The allowable misalignment angle varies according to dimension series and load conditions, but the general allowable misalignment angles are listed below:

- Normal load or more: ····· 1/115
- Light load: ····· 1/30

* Increasing the misalignment angle beyond the allowable angle may cause the rollers to protrude from the outer ring and interfere with nearby components.

6. Adapters and withdrawal sleeves

Adapters are used for installation of bearings with tapered bores on cylindrical shafts. Withdrawal sleeves are also used to install and disassemble bearings with tapered bores onto and off of cylindrical shafts. In disassembling the bearing from the shaft, the nut is turned against the side face of the inner ring utilizing the bolt provided on the withdrawal sleeve, and then the sleeve is drawn away from the bearing's bore. (Precision and dimensions of adapter and withdrawal sleeve are defined in JIS B 1552 and JIS B 1556).

For bearings with a bore diameter of 200 mm or more, high pressure oil (hydraulic) type adapters and withdrawal sleeves can be made to make installation and disassembly easier. As shown in **Fig. 3** construction is designed to reduce friction by injecting high pressure oil between the surfaces of the adapter sleeve and bearing inner bore by means of a pressure fitting.

If the oil supply inlet is attached in the nut side of the adapter, the supplementary suffix "HF" is added to the bearing number; if the oil supply inlet is attached on the opposite side, the suffix "HB" is added to the bearing number. For adapter sleeves, the supplementary suffix "H" is added to the bearing's number for both cases. The hydraulic sleeve nut is equipped with holes for bolts used for mounting and dismounting and holes for hydraulic piping. The suffix SP (with screw holes) or SPB (with bolts) is added to the bearing number of the nut.

For information on the **hydraulic adapters and withdrawal sleeves**, see **the special catalog (CAT. No. 4201/E)**.

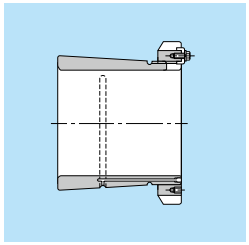
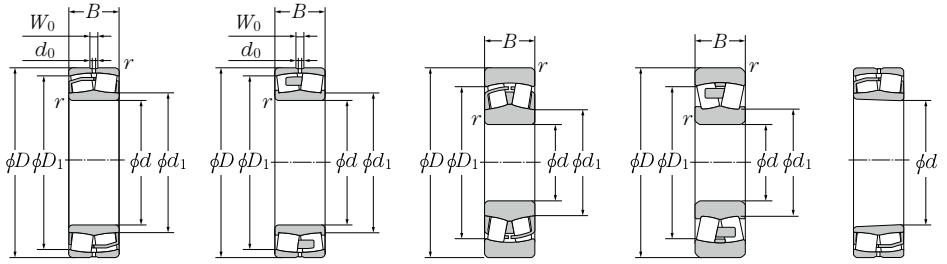


Fig. 3

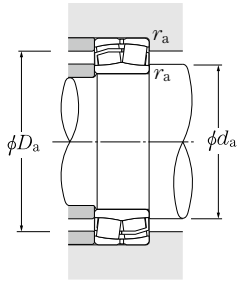


Cylindrical bore [EA type] | Cylindrical bore [EM type] | Cylindrical bore [213C type] | Cylindrical bore [213 type] | Tapered bore

d 25 ～ 60mm

Boundary dimensions mm						Basic load rating dynamic kN	static kN	Fatigue load limit kN	Allowable speed min^{-1} Grease lubrication	Oil lubrication	Bearing numbers [1] Cylindrical bore	Tapered bore [2) 4)]
d	D	B	$r_{s\,min}$ [3)]	W_0	d_0	C_r	C_{0r}	C_u				
25	52	18	1	3	1.5	57.3	46.1	3.23	10 400	13 000	∗22205EAW33	∗22205EAKW33
	52	18	1	3	1.5	57.3	46.1	3.23	10 400	13 000	∗22205EMW33	∗22205EMKW33
30	62	20	1	4	2	75.7	64.5	4.58	8 800	11 000	∗22206EAW33	∗22206EAKW33
	62	20	1	4	2	75.7	64.5	4.58	8 800	11 000	∗22206EMW33	∗22206EMKW33
35	72	23	1.1	5	2	100	92.0	6.11	7 500	9 400	∗22207EAW33	∗22207EAKW33
	72	23	1.1	5	2	100	92.0	6.11	7 500	9 400	∗22207EMW33	∗22207EMKW33
40	80	23	1.1	5	2.5	116	105	7.78	6 800	8 500	∗22208EAD1	∗22208EAKD1
	80	23	1.1	5	2.5	110	98.0	7.29	6 800	8 500	∗22208EMD1	∗22208EMKD1
	90	23	1.5	6	3	98.0	90.0	12.6	4 900	6 400	21308C	21308CK
	90	33	1.5	6	3	169	152	9.36	5 400	6 600	∗22308EAD1	∗22308EAKD1
	90	33	1.5	6	3	169	152	9.36	5 400	6 600	∗22308EMD1	∗22308EMKD1
45	85	23	1.1	6	2.5	121	113	8.76	6 100	7 700	∗22209EAD1	∗22209EAKD1
	85	23	1.1	6	2.5	116	106	8.24	6 100	7 700	∗22209EMD1	∗22209EMKD1
	100	25	1.5	6	3	114	106	14.1	4 400	5 700	21309C	21309CK
	100	36	1.5	6	3	206	187	11.8	4 600	5 700	∗22309EAD1	∗22309EAKD1
	100	36	1.5	6	3	206	187	11.8	4 600	5 700	∗22309EMD1	∗22309EMKD1
50	90	23	1.1	6	2.5	130	124	10.1	5 700	7 200	∗22210EAD1	∗22210EAKD1
	90	23	1.1	6	2.5	125	117	9.54	5 700	7 200	∗22210EMD1	∗22210EMKD1
	110	27	2	6	3	131	127	13.7	4 000	5 200	21310C	21310CK
	110	40	2	7	3.5	250	232	14.0	4 300	5 300	∗22310EAD1	∗22310EAKD1
	110	40	2	7	3.5	250	232	14.0	4 300	5 300	∗22310EMD1	∗22310EMKD1
55	100	25	1.5	6	3	155	148	12.6	5 300	6 700	∗22211EAD1	∗22211EAKD1
	100	25	1.5	6	3	148	140	11.9	5 300	6 700	∗22211EMD1	∗22211EMKD1
	120	29	2	6	3	161	163	16.1	3 700	4 800	21311	21311K
	120	43	2	8	3.5	296	274	17.4	3 900	4 800	∗22311EAD1	∗22311EAKD1
	120	43	2	8	3.5	296	274	17.4	3 900	4 800	∗22311EMD1	∗22311EMKD1
60	110	28	1.5	7	3	187	181	15.4	4 800	6 000	∗22212EAD1	∗22212EAKD1
	110	28	1.5	7	3	179	171	14.6	4 800	6 000	∗22212EMD1	∗22212EMKD1
	130	31	2.1	7	4	186	191	28.2	3 400	4 400	21312	21312K
	130	46	2.1	9	4	340	319	20.3	3 600	4 600	∗22312EAD1	∗22312EAKD1
	130	46	2.1	9	4	340	319	20.3	3 600	4 600	∗22312EMD1	∗22312EMKD1

1) Bearing part numbers with ∗ are ULTAGE Series and have outer ring oil holes and oil grooves as standard.
2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12. 3) Smallest allowable dimension for chamfer dimension r.
4) "W33" indicates the specification for Europe and have three oil holes.



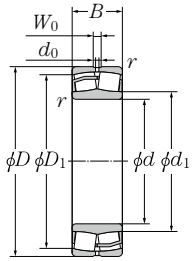
Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

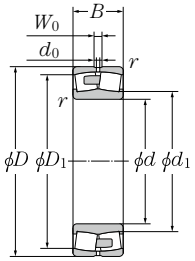
Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
30	30	46	46	1	0.34	2.00	2.98	1.96	0.173	0.169
30	30	46	46	1	0.34	2.00	2.98	1.96	0.174	0.171
37	36	56	55	1	0.31	2.15	3.20	2.10	0.278	0.272
37	36	56	55	1	0.31	2.15	3.20	2.10	0.281	0.275
45	42	65	63	1.1	0.31	2.21	3.29	2.16	0.438	0.43
45	42	65	63	1.1	0.31	2.21	3.29	2.16	0.442	0.433
50	47	73	71	1.1	0.27	2.47	3.67	2.41	0.528	0.518
50	47	73	71	1.1	0.27	2.47	3.67	2.41	0.529	0.519
52	48.5	81.5	76	1.5	0.26	2.55	3.80	2.50	0.705	0.694
52	49	81	78	1.5	0.36	1.87	2.79	1.83	1.02	1
52	49	81	78	1.5	0.36	1.87	2.79	1.83	1.03	1.01
54	52	78	76	1.1	0.26	2.64	3.93	2.58	0.572	0.561
54	52	78	76	1.1	0.26	2.64	3.93	2.58	0.577	0.566
58	53.5	91.5	85	1.5	0.26	2.60	3.87	2.54	0.927	0.912
58	54	91	87	1.5	0.36	1.90	2.83	1.86	1.37	1.34
58	54	91	87	1.5	0.36	1.90	2.83	1.86	1.38	1.35
59	57	83	81	1.1	0.24	2.84	4.23	2.78	0.614	0.602
59	57	83	81	1.1	0.24	2.84	4.23	2.78	0.616	0.604
65	60	100	93	2	0.26	2.64	3.93	2.58	1.21	1.19
63	61	99	95	2	0.36	1.87	2.79	1.83	1.82	1.79
63	61	99	95	2	0.36	1.87	2.79	1.83	1.84	1.8
66	64	91	90	1.5	0.23	2.95	4.40	2.89	0.83	0.814
66	64	91	90	1.5	0.23	2.95	4.40	2.89	0.827	0.811
73	65	110	102	2	0.25	2.69	4.00	2.63	1.71	1.69
68	66	109	104	2	0.36	1.87	2.79	1.83	2.31	2.26
68	66	109	104	2	0.36	1.87	2.79	1.83	2.34	2.29
71	69	101	99	1.5	0.24	2.84	4.23	2.78	1.14	1.12
71	69	101	99	1.5	0.24	2.84	4.23	2.78	1.15	1.13
78	72	118	109	2	0.25	2.69	4.00	2.63	2.1	2.07
75	72	118	113	2.1	0.35	1.95	2.90	1.91	2.86	2.8
75	72	118	113	2.1	0.35	1.95	2.90	1.91	2.91	2.85

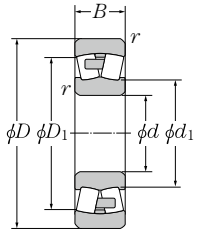
Note: For the bearings other than ULTAGE Series, outer rings with oil inlets and oil grooves can also be made based on your request. In this case, supplementary suffix "D1" is added after a bearing number. Example: 21311D1



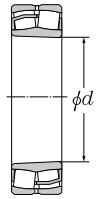
Cylindrical bore [EA type]



Cylindrical bore [EM type]



Cylindrical bore [213 type]

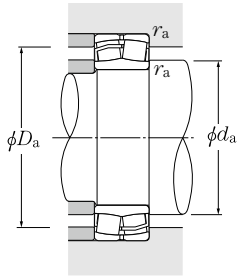


Tapered bore

d 65 ～ 95mm

	Boundary dimensions mm					Basic load rating dynamic kN	Basic load rating static kN	Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers [1]	
d	D	B	$r_{s\,min}$ [3]	W_0	d_0	C_r	C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [2]
65	120	31	1.5	8	3.5	226	224	18.2	4 400	5 500	∗22213EAD1	∗22213EAKD1
	120	31	1.5	8	3.5	217	212	17.2	4 400	5 500	∗22213EMD1	∗22213EMKD1
	140	33	2.1	7	4	216	228	31.0	3 100	4 000	21313	21313K
	140	48	2.1	9	4	369	343	23.4	3 300	4 100	∗22313EAD1	∗22313EAKD1
	140	48	2.1	9	4	369	343	23.4	3 300	4 100	∗22313EMD1	∗22313EMKD1
70	125	31	1.5	7	3.5	235	240	20.1	4 100	5 200	∗22214EAD1	∗22214EAKD1
	125	31	1.5	7	3.5	235	240	20.1	4 100	5 200	∗22214EMD1	∗22214EMKD1
	150	35	2.1	7	4	245	262	33.5	2 900	3 800	21314	21314K
	150	51	2.1	10	5	420	396	26.0	3 000	3 800	∗22314EAD1	∗22314EAKD1
	150	51	2.1	10	5	420	396	26.0	3 000	3 800	∗22314EMD1	∗22314EMKD1
75	130	31	1.5	7	3.5	244	249	21.1	4 000	5 000	∗22215EAD1	∗22215EAKD1
	130	31	1.5	7	3.5	244	249	21.1	4 000	5 000	∗22215EMD1	∗22215EMKD1
	160	37	2.1	7	4	266	287	27.5	2 700	3 500	21315	21315K
	160	55	2.1	10	5	491	467	29.8	2 900	3 600	∗22315EAD1	∗22315EAKD1
	160	55	2.1	10	5	491	467	29.8	2 900	3 600	∗22315EMD1	∗22315EMKD1
80	140	33	2	8	3.5	278	287	24.0	3 700	4 600	∗22216EAD1	∗22216EAKD1
	140	33	2	8	3.5	267	272	22.8	3 700	4 600	∗22216EMD1	∗22216EMKD1
	170	39	2.1	7	4	289	315	30.5	2 500	3 300	21316	21316K
	170	58	2.1	10	5	541	522	32.5	2 700	3 400	∗22316EAD1	∗22316EAKD1
	170	58	2.1	10	5	541	522	32.5	2 700	3 400	∗22316EMD1	∗22316EMKD1
85	150	36	2	8	3.5	324	330	27.1	3 400	4 300	∗22217EAD1	∗22217EAKD1
	150	36	2	8	3.5	324	330	27.1	3 400	4 300	∗22217EMD1	∗22217EMKD1
	180	41	3	7	4	320	355	45.0	2 400	3 100	21317	21317K
	180	60	3	11	5	599	604	36.4	2 600	3 200	∗22317EAD1	∗22317EAKD1
	180	60	3	11	5	599	604	36.4	2 600	3 200	∗22317EMD1	∗22317EMKD1
90	160	40	2	10	4.5	384	398	30.2	3 200	4 000	∗22218EAD1	∗22218EAKD1
	160	40	2	10	4.5	384	398	30.2	3 200	4 000	∗22218EMD1	∗22218EMKD1
	160	52.4	2	9	4	467	513	30.0	2 600	3 200	∗23218EMD1	∗23218EMKD1
	190	43	3	7	4	355	400	50.5	2 300	3 000	21318	21318K
	190	64	3	12	5	668	652	40.0	2 500	3 000	∗22318EAD1	∗22318EAKD1
	190	64	3	12	5	668	652	40.0	2 500	3 000	∗22318EMD1	∗22318EMKD1
95	170	43	2.1	10	4.5	416	417	33.4	3 000	3 800	∗22219EAD1	∗22219EAKD1
	170	43	2.1	10	4.5	416	417	33.4	3 000	3 800	∗22219EMD1	∗22219EMKD1

1) Bearing part numbers with ∗ are **ULTAGE Series** and have outer ring oil holes and oil grooves as standard.
2) "**K**" indicates bearings having a tapered bore with a taper ratio of 1:12. 3) Smallest allowable dimension for chamfer dimension r.



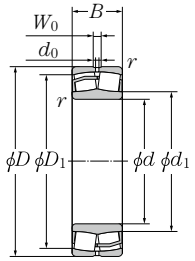
Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

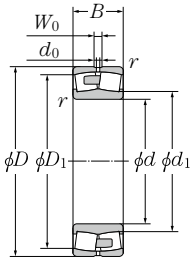
Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

	Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
78	74	111	107	1.5	0.24	2.79	4.15	2.73	1.52	1.49
78	74	111	107	1.5	0.24	2.79	4.15	2.73	1.53	1.5
85	77	128	119	2	0.25	2.69	4.00	2.63	2.55	2.51
81	77	128	122	2.1	0.33	2.06	3.06	2.01	3.48	3.41
81	77	128	122	2.1	0.33	2.06	3.06	2.01	3.5	3.43
84	79	116	113	1.5	0.22	3.01	4.48	2.94	1.61	1.58
84	79	116	113	1.5	0.22	3.01	4.48	2.94	1.64	1.6
91	82	138	126	2	0.25	2.69	4.00	2.63	3.18	3.14
85	82	138	131	2.1	0.34	2.00	2.98	1.96	4.25	4.16
85	82	138	131	2.1	0.34	2.00	2.98	1.96	4.31	4.22
88	84	121	118	1.5	0.22	3.14	4.67	3.07	1.67	1.64
88	84	121	118	1.5	0.22	3.14	4.67	3.07	1.71	1.67
99	87	148	136	2	0.24	2.84	4.23	2.78	3.81	3.76
91	87	148	139	2.1	0.34	2.00	2.98	1.96	5.18	5.07
91	87	148	139	2.1	0.34	2.00	2.98	1.96	5.27	5.16
94	91	129	127	2	0.22	3.14	4.67	3.07	2.09	2.05
94	91	129	127	2	0.22	3.14	4.67	3.07	2.11	2.07
105	92	158	144	2	0.23	2.95	4.40	2.89	4.53	4.47
98	92	158	148	2.1	0.34	2.00	2.98	1.96	6.12	5.99
98	92	158	148	2.1	0.34	2.00	2.98	1.96	6.28	6.15
100	96	139	137	2	0.22	3.07	4.57	3.00	2.59	2.54
100	96	139	137	2	0.22	3.07	4.57	3.00	2.67	2.62
111	99	166	152	2.5	0.25	2.69	4.00	2.63	5.35	5.28
107	99	166	157	3	0.32	2.09	3.11	2.04	7.18	7.04
107	99	166	157	3	0.32	2.09	3.11	2.04	7.29	7.15
105	101	149	144	2	0.23	2.90	4.31	2.83	3.34	3.27
105	101	149	144	2	0.23	2.90	4.31	2.83	3.43	3.37
104	101	149	141	2	0.30	2.25	3.34	2.20	4.43	4.31
119	104	176	162	2.5	0.24	2.84	4.23	2.78	6.3	6.21
110	104	176	166	3	0.33	2.06	3.06	2.01	8.42	8.25
110	104	176	166	3	0.33	2.06	3.06	2.01	8.53	8.35
110	107	158	153	2.1	0.23	2.95	4.40	2.89	3.98	3.9
110	107	158	153	2.1	0.23	2.95	4.40	2.89	4.06	3.98

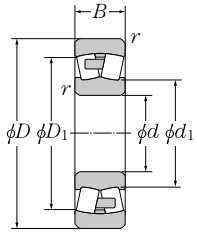
Note: For the bearings other than **ULTAGE Series**, outer rings with oil inlets and oil grooves can also be made based on your request. In this case, supplementary suffix "**D1**" is added after a bearing number. **Example: 21317D1**



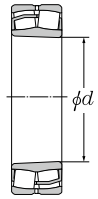
Cylindrical bore [EA type]



Cylindrical bore [EM type]



Cylindrical bore [213 type]

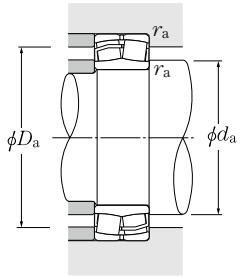


Tapered bore

d 95 ～ 130mm

Boundary dimensions mm						Basic load rating kN		Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers [1]	
d	D	B	$r_{s\,min}$ [3]	W_0	d_0	dynamic C_r	static C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [2]
95	200	45	3	7	4	375	420	54.0	2 100	2 700	**21319**	**21319K**
	200	67	3	12	6	732	751	43.4	2 300	2 800	∗**22319EAD1**	∗**22319EAKD1**
	200	67	3	12	6	732	751	43.4	2 300	2 800	∗**22319EMD1**	∗**22319EMKD1**
100	165	52	2	8	4	464	563	30.7	2 400	3 000	∗**23120EAD1**	∗**23120EAKD1**
	165	52	2	8	4	480	590	32.1	2 400	3 000	∗**23120EMD1**	∗**23120EMKD1**
	180	46	2.1	11	5	472	495	36.9	2 800	3 600	∗**22220EAD1**	∗**22220EAKD1**
	180	46	2.1	11	5	472	495	36.9	2 800	3 600	∗**22220EMD1**	∗**22220EMKD1**
	180	60.3	2.1	9	4.5	586	661	36.3	2 300	2 900	∗**23220EMD1**	∗**23220EMKD1**
	215	47	3	9	5	410	465	42.5	2 000	2 600	**21320**	**21320K**
	215	73	3	13	6	827	844	50.1	2 100	2 600	∗**22320EAD1**	∗**22320EAKD1**
	215	73	3	13	6	827	844	50.1	2 100	2 600	∗**22320EMD1**	∗**22320EMKD1**
110	170	45	2	8	3.5	417	517	32.1	2 600	3 300	∗**23022EAD1**	∗**23022EAKD1**
	170	45	2	8	3.5	417	517	32.1	2 600	3 300	∗**23022EMD1**	∗**23022EMKD1**
	180	56	2	9	4	547	669	36.2	2 200	2 800	∗**23122EAD1**	∗**23122EAKD1**
	180	56	2	9	4	547	669	36.2	2 200	2 800	∗**23122EMD1**	∗**23122EMKD1**
	180	69	2	8	4	622	769	35.7	2 200	2 700	∗**24122EMD1**	∗**24122EMK30D1**
	200	53	2.1	12	6	602	643	45.0	2 600	3 300	∗**22222EAD1**	∗**22222EAKD1**
	200	53	2.1	12	6	602	643	45.0	2 600	3 300	∗**22222EMD1**	∗**22222EMKD1**
	200	69.8	2.1	11	5	752	869	43.9	2 100	2 600	∗**23222EMD1**	∗**23222EMKD1**
	240	50	3	9	5	550	615	61.5	1 800	2 300	**21322**	**21322K**
	240	80	3	16	7	975	972	59.0	2 000	2 400	∗**22322EAD1**	∗**22322EAKD1**
	240	80	3	16	7	975	972	59.0	2 000	2 400	∗**22322EMD1**	∗**22322EMKD1**
120	180	46	2	8	3.5	446	577	35.8	2 400	3 100	∗**23024EAD1**	∗**23024EAKD1**
	180	46	2	8	3.5	446	577	35.8	2 400	3 100	∗**23024EMD1**	∗**23024EMKD1**
	180	60	2	8	3.5	526	726	34.4	2 100	2 600	∗**24024EMD1**	∗**24024EMK30D1**
	200	62	2	10	4.5	663	820	43.4	2 000	2 500	∗**23124EAD1**	∗**23124EAKD1**
	200	62	2	10	4.5	663	820	43.4	2 000	2 500	∗**23124EMD1**	∗**23124EMKD1**
	200	80	2	10	4.5	756	991	41.3	1 900	2 500	∗**24124EMD1**	∗**24124EMK30D1**
	215	58	2.1	12	6	688	753	49.9	2 400	3 000	∗**22224EAD1**	∗**22224EAKD1**
	215	58	2.1	12	6	688	753	49.9	2 400	3 000	∗**22224EMD1**	∗**22224EMKD1**
	215	76	2.1	11	5	857	998	49.8	1 900	2 400	∗**23224EMD1**	∗**23224EMKD1**
	260	86	3	18	8	1 170	1 280	68.4	1 800	2 200	∗**22324EAD1**	∗**22324EAKD1**
	260	86	3	18	8	1 170	1 280	68.4	1 800	2 200	∗**22324EMD1**	∗**22324EMKD1**
130	200	52	2	9	4	565	721	44.2	2 200	2 900	∗**23026EAD1**	∗**23026EAKD1**
	200	52	2	9	4	565	721	44.2	2 200	2 900	∗**23026EMD1**	∗**23026EMKD1**

1) Bearing part numbers with ∗ are **ULTAGE Series** and have outer ring oil holes and oil grooves as standard. 2) Bearings appended with "**K**" have a tapered bore ratio of 1:12; bearings appended with "**K30**" have a tapered bore ratio of 1:30. 3) Smallest allowable dimension for chamfer dimension r.



Dynamic equivalent radial load

$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

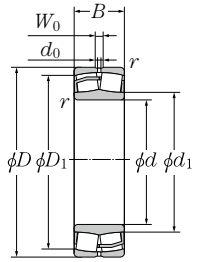
Static equivalent radial load

$P_{0r} = F_r + Y_0 F_a$

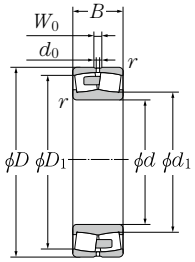
For values of e, Y_1, Y_2 and Y_0 see the table below.

Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
127	109	186	171	2.5	0.22	3.01	4.48	2.94	7.1	7
120	109	186	174	3	0.32	2.09	3.11	2.04	9.91	9.71
120	109	186	174	3	0.32	2.09	3.11	2.04	10.0	9.82
114	111	154	147	2	0.28	2.39	3.56	2.34	4.37	4.24
114	111	154	147	2	0.28	2.39	3.56	2.34	4.45	4.32
118	112	168	161	2.1	0.24	2.84	4.23	2.78	4.9	4.8
118	112	168	161	2.1	0.24	2.84	4.23	2.78	5.02	4.93
118	112	168	159	2.1	0.31	2.18	3.24	2.13	6.51	6.33
133	114	201	179	2.5	0.22	3.01	4.48	2.94	8.89	8.78
127	114	201	187	3	0.34	1.98	2.94	1.93	12.6	12.3
127	114	201	187	3	0.34	1.98	2.94	1.93	12.9	12.7
123	119	161	155	2	0.23	2.95	4.40	2.89	3.66	3.55
123	119	161	155	2	0.23	2.95	4.40	2.89	3.66	3.55
125	121	169	161	2	0.28	2.43	3.61	2.37	5.66	5.49
125	121	169	161	2	0.28	2.43	3.61	2.37	5.53	5.36
121	121	169	158	2	0.36	1.90	2.83	1.86	6.75	6.65
130	122	188	179	2.1	0.25	2.69	4.00	2.63	7.1	6.95
130	122	188	179	2.1	0.25	2.69	4.00	2.63	7.3	7.15
130	122	188	176	2.1	0.32	2.12	3.15	2.07	9.41	9.14
146	124	226	203	2.5	0.21	3.20	4.77	3.13	11.2	11.1
139	124	226	209	3	0.32	2.09	3.11	2.04	17	16.6
139	124	226	209	3	0.32	2.09	3.11	2.04	17.4	17.1
134	129	171	165	2	0.22	3.14	4.67	3.07	4.02	3.9
134	129	171	165	2	0.22	3.14	4.67	3.07	4.02	3.9
132	129	171	161	2	0.29	2.32	3.45	2.26	5.28	5.21
138	131	189	179	2	0.28	2.43	3.61	2.37	7.72	7.49
138	131	189	179	2	0.28	2.43	3.61	2.37	7.77	7.54
136	131	189	173	2	0.37	1.84	2.74	1.80	10	9.87
141	132	203	193	2.1	0.25	2.74	4.08	2.68	8.88	8.68
141	132	203	193	2.1	0.25	2.74	4.08	2.68	9.01	8.82
139	132	203	190	2.1	0.32	2.09	3.11	2.04	11.7	11.3
156	134	246	225	3	0.32	2.09	3.11	2.04	22.3	21.9
156	134	246	225	3	0.32	2.09	3.11	2.04	22.7	22.2
145	139	191	183	2	0.22	3.01	4.48	2.94	5.88	5.71
145	139	191	183	2	0.22	3.01	4.48	2.94	5.9	5.73

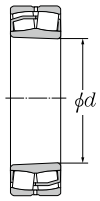
Note: For the bearings other than **ULTAGE Series**, outer rings with oil inlets and oil grooves can also be made based on your request. In this case, supplementary suffix "**D1**" is added after a bearing number. **Example: 21322D1**



Cylindrical bore
[EA type]



Cylindrical bore
[EM type]

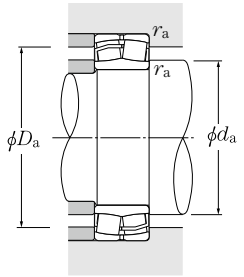


Tapered bore

d 130 ～ 160mm

Boundary dimensions mm					Basic load rating dynamic kN	Basic load rating static kN	Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers [1]	
d	D	B	$r_{s\,min}$ [3]	W_0	C_r	C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [2]
130	200	69	2	9	682	936	42.2	1 900	2 400	∗24026EMD1	∗24026EMK30D1
	210	64	2	10	710	906	47.1	1 900	2 400	∗23126EAD1	∗23126EAKD1
	210	64	2	10	710	906	47.1	1 900	2 400	∗23126EMD1	∗23126EMKD1
	210	80	2	10	803	1 080	45.0	1 800	2 400	∗24126EMD1	∗24126EMK30D1
	230	64	3	13	6	808	898	56.6	2 200	2 800	∗22226EAD1	∗22226EAKD1
	230	64	3	13	6	808	898	56.6	2 200	2 800	∗22226EMD1	∗22226EMKD1
	230	80	3	12	5	958	1 130	55.4	1 700	2 300	∗23226EMD1	∗23226EMKD1
	280	93	4	19	9	1 330	1 400	77.8	1 600	2 000	∗22326EAD1	∗22326EAKD1
	280	93	4	19	9	1 330	1 400	77.8	1 600	2 000	∗22326EMD1	∗22326EMKD1
140	210	53	2	9	4	597	783	47.5	2 100	2 700	∗23028EAD1	∗23028EAKD1
	210	53	2	9	4	597	783	47.5	2 100	2 700	∗23028EMD1	∗23028EMKD1
	210	69	2	9	4	709	990	46.0	1 800	2 200	∗24028EMD1	∗24028EMK30D1
	225	68	2.1	11	5	802	1 030	53.1	1 800	2 200	∗23128EAD1	∗23128EAKD1
	225	68	2.1	11	5	802	1 030	53.1	1 800	2 200	∗23128EMD1	∗23128EMKD1
	225	85	2.1	10	4.5	951	1 280	53.3	1 700	2 200	∗24128EMD1	∗24128EMK30D1
	250	68	3	14	7	912	1 010	65.8	2 000	2 500	∗22228EAD1	∗22228EAKD1
	250	68	3	14	7	912	1 010	65.8	2 000	2 500	∗22228EMD1	∗22228EMKD1
	250	88	3	13	6	1 140	1 370	64.2	1 600	2 100	∗23228EMD1	∗23228EMKD1
	300	102	4	19	9	1 540	1 720	88.8	1 500	1 900	∗22328EAD1	∗22328EAKD1
	300	102	4	19	9	1 540	1 720	88.8	1 500	1 900	∗22328EMD1	∗22328EMKD1
150	225	56	2.1	10	4.5	660	893	52.9	2 000	2 500	∗23030EAD1	∗23030EAKD1
	225	56	2.1	10	4.5	660	893	52.9	2 000	2 500	∗23030EMD1	∗23030EMKD1
	225	75	2.1	10	4.5	789	1 140	51.2	1 700	2 100	∗24030EMD1	∗24030EMK30D1
	250	80	2.1	13	6	1 060	1 350	65.1	1 600	2 000	∗23130EAD1	∗23130EAKD1
	250	80	2.1	13	6	1 060	1 350	65.1	1 600	2 000	∗23130EMD1	∗23130EMKD1
	250	100	2.1	12	6	1 180	1 590	62.8	1 600	2 000	∗24130EMD1	∗24130EMK30D1
	270	73	3	15	7	1 080	1 220	74.4	1 800	2 300	∗22230EAD1	∗22230EAKD1
	270	73	3	15	7	1 080	1 220	74.4	1 800	2 300	∗22230EMD1	∗22230EMKD1
	270	96	3	14	6	1 340	1 620	74.0	1 500	1 900	∗23230EMD1	∗23230EMKD1
	320	108	4	20	9	1 740	1 890	98.9	1 400	1 700	∗22330EMD1	∗22330EMKD1
160	220	45	2	9	4	455	683	45.6	1 900	2 400	∗23932EMD1	∗23932EMKD1
	240	60	2.1	11	5	748	1 000	59.1	1 800	2 300	∗23032EAD1	∗23032EAKD1
	240	60	2.1	11	5	748	1 000	59.1	1 800	2 300	∗23032EMD1	∗23032EMKD1
	240	80	2.1	10	5	901	1 290	56.8	1 600	2 000	∗24032EMD1	∗24032EMK30D1
	270	86	2.1	14	6	1 220	1 580	73.6	1 500	1 900	∗23132EAD1	∗23132EAKD1
	270	86	2.1	14	6	1 220	1 580	73.6	1 500	1 900	∗23132EMD1	∗23132EMKD1

1) Bearing part numbers with ∗ are **ULTAGE Series** and have outer ring oil holes and oil grooves as standard. 2) Bearings appended with "**K**" have a tapered bore ratio of 1:12; bearings appended with "**K30**" have a tapered bore ratio of 1:30. 3) Smallest allowable dimension for chamfer dimension r.

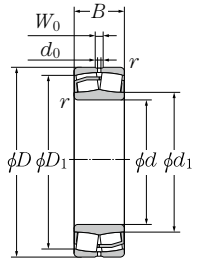


Dynamic equivalent radial load
$P_r = XF_r + YF_a$

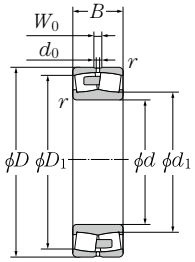
$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

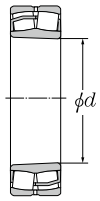
Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
143	139	191	178	2	0.31	2.20	3.27	2.15	7.82	7.71
148	141	199	189	2	0.27	2.51	3.74	2.45	8.45	8.19
148	141	199	189	2	0.27	2.51	3.74	2.45	8.51	8.25
146	141	199	183	2	0.34	1.96	2.92	1.92	10.7	10.5
151	144	216	206	3	0.25	2.69	4.00	2.63	11	10.7
151	144	216	206	3	0.25	2.69	4.00	2.63	11.1	10.9
150	144	216	203	3	0.32	2.12	3.15	2.07	13.8	13.4
164	147	263	243	4	0.33	2.06	3.06	2.01	27.2	26.6
164	147	263	243	4	0.33	2.06	3.06	2.01	28	27.5
155	149	201	193	2	0.22	3.14	4.67	3.07	6.32	6.13
155	149	201	193	2	0.22	3.14	4.67	3.07	6.37	6.18
153	149	201	188	2	0.28	2.37	3.53	2.32	8.27	8.15
159	152	213	203	2.1	0.26	2.55	3.80	2.50	10.3	9.94
159	152	213	203	2.1	0.26	2.55	3.80	2.50	10.3	10
156	152	213	198	2.1	0.34	1.98	2.94	1.93	12.9	12.8
163	154	236	224	3	0.25	2.74	4.08	2.68	13.9	13.6
163	154	236	224	3	0.25	2.74	4.08	2.68	14.2	13.9
162	154	236	220	3	0.33	2.06	3.06	2.01	18.2	17.7
181	157	283	261	4	0.33	2.03	3.02	1.98	34.4	33.7
181	157	283	261	4	0.33	2.03	3.02	1.98	35.4	34.7
167	161	214	207	2.1	0.21	3.20	4.77	3.13	7.68	7.45
167	161	214	207	2.1	0.21	3.20	4.77	3.13	7.73	7.5
165	161	214	202	2.1	0.29	2.32	3.45	2.26	10.4	10.3
171	162	238	223	2.1	0.29	2.35	3.50	2.30	15.7	15.2
171	162	238	223	2.1	0.29	2.35	3.50	2.30	15.8	15.3
168	162	238	216	2.1	0.36	1.85	2.76	1.81	19.7	19.4
177	164	256	242	3	0.25	2.74	4.08	2.68	17.6	17.3
177	164	256	242	3	0.25	2.74	4.08	2.68	18	17.7
174	164	256	237	3	0.33	2.03	3.02	1.98	23.6	22.9
188	167	303	279	4	0.34	2.00	2.98	1.96	42.2	41.3
175	169	211	205	2	0.17	3.90	5.81	3.81	5.09	4.94
177	171	229	221	2.1	0.21	3.20	4.77	3.13	9.32	9.03
177	171	229	221	2.1	0.21	3.20	4.77	3.13	9.37	9.09
175	171	229	215	2.1	0.29	2.32	3.45	2.26	12.6	12.4
185	172	258	240	2.1	0.29	2.35	3.50	2.30	20.1	19.5
185	172	258	240	2.1	0.29	2.35	3.50	2.30	20.2	19.6



Cylindrical bore [EA type]



Cylindrical bore [EM type]

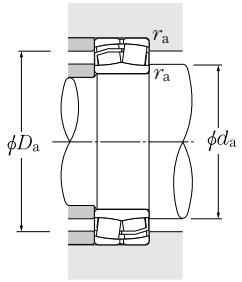


Tapered bore

d 160 ～ 190mm

d	D	B	$r_{s\,min}$ [3]	W_0	d_0	Basic load rating dynamic C_r (kN)	Basic load rating static C_{0r} (kN)	Fatigue load limit C_u (kN)	Allowable speed Grease lubrication (min^{-1})	Allowable speed Oil lubrication (min^{-1})	Bearing numbers [1] Cylindrical bore	Bearing numbers [1] Tapered bore [2]
160	270	109	2.1	14	6	1 360	1 860	70.6	1 500	1 800	∗24132EMD1	∗24132EMK30D1
	290	80	3	17	8	1 220	1 390	84.1	1 700	2 100	∗22232EAD1	∗22232EAKD1
	290	80	3	17	8	1 220	1 390	84.1	1 700	2 100	∗22232EMD1	∗22232EMKD1
	290	104	3	15	7	1 550	1 890	83.8	1 400	1 800	∗23232EMD1	∗23232EMKD1
	340	114	4	20	10	1 950	2 210	109	1 300	1 600	∗22332EMD1	∗22332EMKD1
170	230	45	2	9	4.5	468	723	48.8	1 800	2 300	∗23934EMD1	∗23934EMKD1
	260	67	2.1	12	5	914	1 240	68.8	1 700	2 200	∗23034EAD1	∗23034EAKD1
	260	67	2.1	12	5	914	1 240	68.8	1 700	2 200	∗23034EMD1	∗23034EMKD1
	260	90	2.1	11	5	1 100	1 600	66.3	1 500	1 900	∗24034EMD1	∗24034EMK30D1
	280	88	2.1	14	6	1 270	1 700	77.3	1 400	1 800	∗23134EAD1	∗23134EAKD1
	280	88	2.1	14	6	1 270	1 700	77.3	1 400	1 800	∗23134EMD1	∗23134EMKD1
	280	109	2.1	14	6	1 410	1 990	74.4	1 400	1 700	∗24134EMD1	∗24134EMK30D1
	310	86	4	18	8	1 400	1 610	94.7	1 600	2 000	∗22234EMD1	∗22234EMKD1
	310	110	4	16	8	1 700	2 070	94.6	1 300	1 700	∗23234EMD1	∗23234EMKD1
	360	120	4	20	10	2 200	2 630	121	1 200	1 500	∗22334EMD1	∗22334EMKD1
180	250	52	2	10	5	573	869	57.2	1 700	2 100	∗23936EMD1	∗23936EMKD1
	280	74	2.1	13	6	1 080	1 450	78.6	1 600	2 000	∗23036EAD1	∗23036EAKD1
	280	74	2.1	13	6	1 080	1 450	78.6	1 600	2 000	∗23036EMD1	∗23036EMKD1
	280	100	2.1	13	6	1 310	1 880	76.0	1 400	1 800	∗24036EMD1	∗24036EMK30D1
	300	96	3	15	7	1 490	1 960	88.7	1 300	1 700	∗23136EAD1	∗23136EAKD1
	300	96	3	15	7	1 490	1 960	88.7	1 300	1 700	∗23136EMD1	∗23136EMKD1
	300	118	3	15	7	1 660	2 290	85.5	1 300	1 600	∗24136EMD1	∗24136EMK30D1
	320	86	4	18	8	1 450	1 660	101	1 500	1 900	∗22236EMD1	∗22236EMKD1
	320	112	4	16	8	1 800	2 270	101	1 200	1 600	∗23236EMD1	∗23236EMKD1
	380	126	4	21	10	2 420	2 810	132	1 100	1 400	∗22336EMD1	∗22336EMKD1
190	260	52	2	10	5	603	935	62.8	1 600	2 000	∗23938EMD1	∗23938EMKD1
	290	75	2.1	13	6	1 140	1 570	83.5	1 500	1 900	∗23038EAD1	∗23038EAKD1
	290	75	2.1	13	6	1 140	1 570	83.5	1 500	1 900	∗23038EMD1	∗23038EMKD1
	290	100	2.1	13	6	1 360	2 000	80.7	1 300	1 700	∗24038EMD1	∗24038EMK30D1
	320	104	3	17	8	1 670	2 250	100	1 200	1 600	∗23138EMD1	∗23138EMKD1
	320	128	3	16	8	1 900	2 700	96.8	1 200	1 500	∗24138EMD1	∗24138EMK30D1
	340	92	4	20	9	1 620	1 870	112	1 400	1 800	∗22238EMD1	∗22238EMKD1
	340	120	4	18	8	1 990	2 480	109	1 200	1 500	∗23238EMD1	∗23238EMKD1
	400	132	5	21	10	2 600	3 120	145	1 000	1 300	∗22338EMD1	∗22338EMKD1

1) Bearing part numbers with ∗ are ULTAGE Series and have outer ring oil holes and oil grooves as standard.
2) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.
3) Smallest allowable dimension for chamfer dimension r.

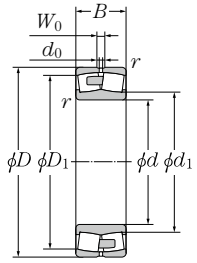


Dynamic equivalent radial load
$P_r = XF_r + YF_a$

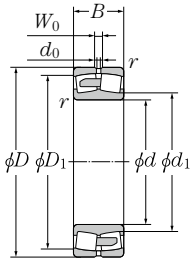
$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

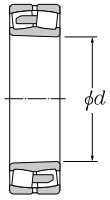
d	Installation-related dimensions mm d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	Constant e	Axial load factors Y_1	Y_2	Y_0	Mass (approx.) kg Cylindrical bore	Tapered bore
160	181	172	258	232	2.1	0.37	1.83	2.72	1.79	25.4	25.1
	190	174	276	260	3	0.25	2.69	4.00	2.63	22.3	21.8
	190	174	276	260	3	0.25	2.69	4.00	2.63	22.9	22.4
	187	174	276	254	3	0.33	2.03	3.02	1.98	29.6	28.8
	205	177	323	296	4	0.33	2.03	3.02	1.98	50.5	49.5
170	185	179	221	215	2	0.16	4.11	6.12	4.02	5.39	5.23
	190	181	249	238	2.1	0.22	3.07	4.57	3.00	12.7	12.3
	190	181	249	238	2.1	0.22	3.07	4.57	3.00	12.8	12.4
	186	181	249	231	2.1	0.30	2.23	3.32	2.18	17.2	16.9
	195	182	268	250	2.1	0.28	2.39	3.56	2.34	21.5	20.9
	195	182	268	250	2.1	0.28	2.39	3.56	2.34	21.6	20.9
	193	182	268	243	2.1	0.35	1.91	2.85	1.87	26.7	26.3
	201	187	293	277	4	0.26	2.60	3.87	2.54	28.3	27.7
	199	187	293	272	4	0.33	2.03	3.02	1.98	35.8	34.8
	223	187	343	313	4	0.32	2.09	3.11	2.04	60.3	59.1
180	199	189	241	232	2	0.17	3.90	5.81	3.81	7.79	7.56
	201	191	269	255	2.1	0.23	2.95	4.40	2.89	16.8	16.3
	201	191	269	255	2.1	0.23	2.95	4.40	2.89	16.9	16.4
	199	191	269	248	2.1	0.31	2.15	3.20	2.10	22.8	22.4
	205	194	286	267	3	0.29	2.32	3.45	2.26	27.2	26.4
	205	194	286	267	3	0.29	2.32	3.45	2.26	27.4	26.5
	202	194	286	259	3	0.36	1.87	2.79	1.83	33.5	33
	209	197	303	287	4	0.25	2.74	4.08	2.68	29.3	28.7
	210	197	303	282	4	0.33	2.06	3.06	2.01	38.2	37.1
	229	197	363	329	4	0.32	2.09	3.11	2.04	70.2	68.7
190	209	199	251	243	2	0.17	4.05	6.04	3.96	8.2	7.96
	213	201	279	266	2.1	0.22	3.01	4.48	2.94	17.8	17.3
	213	201	279	266	2.1	0.22	3.01	4.48	2.94	17.9	17.4
	209	201	279	258	2.1	0.30	2.23	3.32	2.18	23.8	23.4
	221	204	306	284	3	0.29	2.32	3.45	2.26	34.3	33.2
	216	204	306	275	3	0.37	1.84	2.74	1.80	42.1	41.5
	222	207	323	305	4	0.25	2.74	4.08	2.68	35.6	34.9
	220	207	323	299	4	0.33	2.03	3.02	1.98	46.1	44.7
	247	210	380	346	5	0.32	2.12	3.15	2.07	81.5	79.9



Cylindrical bore
[EM type]



Cylindrical bore
[EM type (large size)]

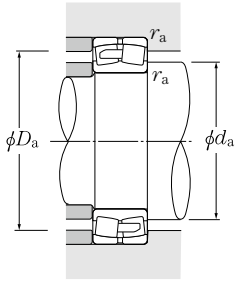


Tapered bore

d 200 ～ 280mm

Boundary dimensions mm						Basic load rating kN		Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers [1]	
d	D	B	$r_{s\,min}$ [3]	W_0	d_0	dynamic C_r	static C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [2]
200	280	60	2.1	12	6	766	1 190	71.8	1 500	1 900	∗23940EMD1	∗23940EMKD1
	310	82	2.1	15	7	1 310	1 790	94.1	1 400	1 800	∗23040EMD1	∗23040EMKD1
	310	109	2.1	14	7	1 570	2 280	91.1	1 200	1 600	∗24040EMD1	∗24040EMK30D1
	340	112	3	18	8	1 890	2 510	110	1 100	1 400	∗23140EMD1	∗23140EMKD1
	340	140	3	17	8	2 130	2 930	105	1 100	1 400	∗24140EMD1	∗24140EMK30D1
	360	98	4	20	10	1 810	2 100	124	1 400	1 700	∗22240EMD1	∗22240EMKD1
	360	128	4	19	9	2 250	2 840	120	1 100	1 300	∗23240EMD1	∗23240EMKD1
	420	138	5	21	10	2 830	3 530	158	950	1 200	∗22340EMD1	∗22340EMKD1
220	300	60	2.1	12	6	789	1 260	79.4	1 400	1 700	∗23944EMD1	∗23944EMKD1
	340	90	3	15	7	1 530	2 110	109	1 300	1 600	∗23044EMD1	∗23044EMKD1
	340	118	3	15	7	1 850	2 720	106	1 100	1 400	∗24044EMD1	∗24044EMK30D1
	370	120	4	19	9	2 190	2 940	128	1 000	1 300	∗23144EMD1	∗23144EMKD1
	370	150	4	19	9	2 540	3 620	124	1 000	1 300	∗24144EMD1	∗24144EMK30D1
	400	108	4	21	11	2 210	2 690	149	1 200	1 500	∗22244EMD1	∗22244EMKD1
	400	144	4	20	10	2 890	3 830	147	1 000	1 200	∗23244EMD1	∗23244EMKD1
	460	145	5	20	12	3 010	3 560	163	850	1 090	∗22344EMD1	∗22344EMKD1
240	320	60	2.1	12	6	815	1 350	87.7	1 300	1 600	∗23948EMD1	∗23948EMKD1
	360	92	3	16	8	1 630	2 350	120	1 100	1 400	∗23048EMD1	∗23048EMKD1
	360	118	3	16	8	1 940	2 980	116	1 000	1 300	∗24048EMD1	∗24048EMK30D1
	400	128	4	20	9	2 510	3 500	147	960	1 200	∗23148EMD1	∗23148EMKD1
	400	160	4	19	9	2 910	4 290	142	960	1 200	∗24148EMD1	∗24148EMK30D1
	440	120	4	16	10	2 470	3 110	159	1 060	1 350	∗22248EMD1	∗22248EMKD1
	440	160	4	20	12	3 140	4 260	156	850	1 090	∗23248EMD1	∗23248EMKD1
	500	155	5	20	12	3 500	4 170	193	780	1 000	∗22348EMD1	∗22348EMKD1
260	360	75	2.1	14	7	1 130	1 940	105	1 100	1 400	∗23952EMD1	∗23952EMKD1
	400	104	4	18	8	2 060	2 910	144	1 000	1 300	∗23052EMD1	∗23052EMKD1
	400	140	4	18	8	2 520	3 820	139	960	1 200	∗24052EMD1	∗24052EMK30D1
	440	144	4	20	12	2 780	4 020	160	860	1 090	∗23152EMD1	∗23152EMKD1
	440	180	4	27	16	3 290	4 880	147	850	1 090	∗24152EMD1	∗24152EMK30D1
	480	130	5	20	12	2 890	3 680	183	970	1 240	∗22252EMD1	∗22252EMKD1
	480	174	5	27	16	3 650	5 050	180	780	1 000	∗23252EMD1	∗23252EMKD1
	540	165	6	27	16	4 020	4 830	221	720	920	∗22352EMD1	∗22352EMKD1
280	380	75	2.1	14	7	1 180	2 050	115	1 000	1 300	∗23956EMD1	∗23956EMKD1
	420	106	4	18	8	2 170	3 150	155	960	1 200	∗23056EMD1	∗23056EMKD1

1) Bearing part numbers with ∗ are ULTAGE Series and have outer ring oil holes and oil grooves as standard. Bearing models having outer diameter D dimension of 440 mm or more are the EM type (large size). 2) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30. 3) Smallest allowable dimension for chamfer dimension r.

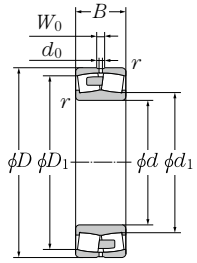


Dynamic equivalent radial load
$P_r = XF_r + YF_a$

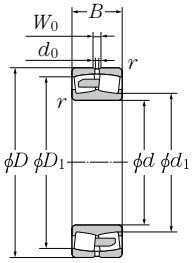
$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Static equivalent radial load
$P_{0r} = F_r + Y_0F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

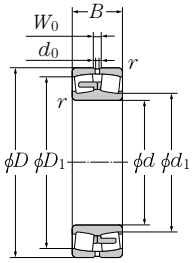
Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
221	211	269	260	2.1	0.18	3.76	5.59	3.67	12	11.6
223	211	299	283	2.1	0.23	2.95	4.40	2.89	22.8	22.1
221	211	299	275	2.1	0.31	2.18	3.24	2.13	30.2	29.7
231	214	326	301	3	0.30	2.25	3.34	2.20	41.9	40.6
224	214	326	291	3	0.39	1.74	2.59	1.70	51.5	50.7
234	217	343	323	4	0.25	2.74	4.08	2.68	42.7	41.8
232	217	343	315	4	0.34	1.98	2.94	1.93	55.2	53.6
265	220	400	364	5	0.31	2.15	3.20	2.10	94.6	92.7
241	231	289	280	2.1	0.17	4.05	6.04	3.96	12.5	12.1
246	233	327	310	3	0.23	2.95	4.40	2.89	29.9	29.1
243	233	327	302	3	0.31	2.20	3.27	2.15	39.2	38.6
252	237	353	328	4	0.30	2.28	3.39	2.23	52.3	50.7
247	237	353	317	4	0.38	1.78	2.65	1.74	65.2	64.3
264	237	383	358	4	0.25	2.74	4.08	2.68	59.6	58.4
261	237	383	349	4	0.34	2.00	2.98	1.96	79.4	77.1
277	240	440	388	5	0.32	2.10	3.13	2.06	119	116
262	251	309	301	2.1	0.15	4.40	6.56	4.31	13.5	13.1
267	253	347	329	3	0.22	3.07	4.57	3.00	32	31.7
264	253	347	322	3	0.28	2.37	3.53	2.32	42.2	41.6
276	257	383	356	4	0.29	2.32	3.45	2.26	65.1	63.1
270	257	383	344	4	0.37	1.82	2.70	1.78	81	79.8
288	257	423	383	4	0.27	2.53	3.77	2.47	82.6	80.9
284	257	423	372	4	0.36	1.86	2.77	1.82	108	105
299	260	480	421	5	0.32	2.12	3.15	2.07	149	146
292	271	349	335	2.1	0.17	3.90	5.81	3.81	23.9	23.1
291	275	385	366	4	0.23	2.95	4.40	2.89	47.8	46.3
286	275	385	354	4	0.31	2.16	3.22	2.12	63.6	62.6
302	277	423	380	4	0.31	2.15	3.20	2.10	92.2	89.5
295	277	423	371	4	0.40	1.69	2.52	1.65	111	109
312	280	460	415	5	0.27	2.53	3.77	2.47	108	105
310	280	460	405	5	0.36	1.87	2.79	1.83	143	139
324	286	514	456	6	0.31	2.16	3.22	2.12	186	183
310	291	369	356	2.1	0.16	4.16	6.20	4.07	25.2	24.4
310	295	405	386	4	0.22	3.07	4.57	3.00	51.3	49.7



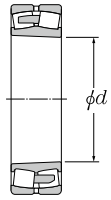
Cylindrical bore
[EM type]



Cylindrical bore
[EM type (large size)]



Cylindrical bore

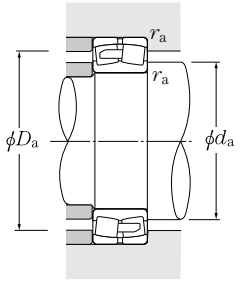


Tapered bore

d 280 ~ 360mm

Boundary dimensions mm						Basic load rating kN		Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers [1]	
d	D	B	$r_{s\,min}$ [3]	W_0	d_0	dynamic C_r	static C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [2]
280	420	140	4	18	8	2 620	4 060	150	880	1 100	∗24056EMD1	∗24056EMK30D1
	460	146	5	20	12	2 980	4 400	182	810	1 030	∗23156EMD1	∗23156EMKD1
	460	180	5	27	16	3 550	5 450	167	810	1 030	∗24156EMD1	∗24156EMK30D1
	500	130	5	20	12	3 010	3 920	198	920	1 180	∗22256EMD1	∗22256EMKD1
	500	176	5	27	16	3 810	5 420	193	740	950	∗23256EMD1	∗23256EMKD1
	580	175	6	27	16	4 490	5 450	249	670	860	∗22356EMD1	∗22356EMKD1
300	420	90	3	14	8	1 600	2 620	145	890	1 140	∗23960EMD1	∗23960EMKD1
	460	118	4	16	10	2 400	3 610	176	890	1 130	∗23060EMD1	∗23060EMKD1
	460	160	4	20	12	3 150	5 190	166	760	970	∗24060EMD1	∗24060EMK30D1
	500	160	5	20	12	3 540	5 170	205	750	950	∗23160EMD1	∗23160EMKD1
	500	200	5	27	16	4 270	6 610	198	750	950	∗24160EMD1	∗24160EMK30D1
	540	140	5	20	12	3 470	4 590	232	860	1 080	∗22260EMD1	∗22260EMKD1
	540	192	5	27	16	4 520	6 280	228	690	880	∗23260EMD1	∗23260EMKD1
	620	185	7.5	27	16	4 000	5 400	490	550	720	22360B	22360BK
320	440	90	3	14	8	1 670	2 820	154	840	1 080	∗23964EMD1	∗23964EMKD1
	480	121	4	20	12	2 540	4 020	191	850	1 070	∗23064EMD1	∗23064EMKD1
	480	160	4	20	12	3 250	5 400	184	720	920	∗24064EMD1	∗24064EMK30D1
	540	176	5	27	16	4 020	6 020	227	700	880	∗23164EMD1	∗23164EMKD1
	540	218	5	33	20	5 010	7 720	225	690	880	∗24164EMD1	∗24164EMK30D1
	580	150	5	20	12	3 950	5 100	261	800	1 020	∗22264EMD1	∗22264EMKD1
	580	208	5	33	20	5 230	7 370	259	640	820	∗23264EMD1	∗23264EMKD1
340	460	90	3	14	8	1 710	2 980	162	800	1 020	∗23968EMD1	∗23968EMKD1
	520	133	5	20	12	2 990	4 690	219	790	1 000	∗23068EMD1	∗23068EMKD1
	520	180	5	27	16	3 910	6 510	206	670	860	∗24068EMD1	∗24068EMK30D1
	580	190	5	27	16	4 670	6 870	257	650	830	∗23168EMD1	∗23168EMKD1
	580	243	5	33	20	5 980	9 340	254	650	830	∗24168EMD1	∗24168EMK30D1
	620	224	6	33	20	4 950	8 000	585	490	630	23268B	23268BK
360	480	90	3	14	8	1 750	3 090	171	760	970	∗23972EMD1	∗23972EMKD1
	540	134	5	20	12	3 070	4 910	232	750	950	∗23072EMD1	∗23072EMKD1
	540	180	5	27	16	4 040	6 840	220	640	820	∗24072EMD1	∗24072EMK30D1
	600	192	5	27	16	4 200	7 050	530	490	630	23172B	23172BK
	600	243	5	33	20	5 100	9 150	470	490	630	24172B	24172BK30
	650	232	6	33	20	5 400	8 700	620	450	590	23272B	23272BK

1) Bearing part numbers with ∗ are ULTAGE Series and have outer ring oil holes and oil grooves as standard. Bearing models having outer diameter D dimension of 440 mm or more are the EM type (large size). 2) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30. 3) Smallest allowable dimension for chamfer dimension r.



Dynamic equivalent radial load

$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

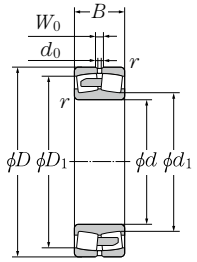
Static equivalent radial load

$P_{0r} = F_r + Y_0F_a$

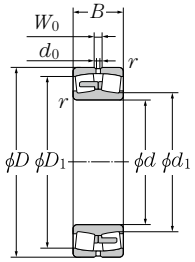
For values of e, Y_1, Y_2 and Y_0 see the table below.

Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
306	295	405	376	4	0.29	2.30	3.42	2.25	67.3	66.3
322	300	440	403	5	0.30	2.23	3.32	2.18	98.4	95.3
316	300	440	394	5	0.38	1.78	2.65	1.74	118	117
333	300	480	437	5	0.25	2.69	4.00	2.63	113	111
331	300	480	426	5	0.35	1.95	2.90	1.91	152	148
349	306	554	489	6	0.31	2.18	3.24	2.13	228	223
329	313	407	387	3	0.20	3.42	5.09	3.34	40.1	39.2
338	315	445	413	4	0.24	2.81	4.19	2.75	72.9	70.9
332	315	445	401	4	0.33	2.04	3.04	2.00	98.0	96.9
345	320	480	436	5	0.31	2.20	3.27	2.15	129	125
340	320	480	425	5	0.39	1.74	2.59	1.70	159	157
358	320	520	469	5	0.25	2.69	4.00	2.63	134	131
352	320	520	461	5	0.35	1.92	2.86	1.88	194	188
381	336	584	522	6	0.32	2.13	3.17	2.08	270	265
350	333	427	407	3	0.19	3.62	5.39	3.54	42.1	40.8
360	335	465	433	4	0.23	2.92	4.35	2.86	78.9	76.6
352	335	465	423	4	0.31	2.15	3.20	2.10	104	102
373	340	520	468	5	0.31	2.15	3.20	2.10	169	164
363	340	520	457	5	0.39	1.71	2.54	1.67	204	201
383	340	560	510	5	0.25	2.69	4.00	2.63	177	174
376	340	560	493	5	0.35	1.91	2.85	1.87	245	238
370	353	447	427	3	0.18	3.80	5.66	3.72	44.5	43.1
384	358	502	466	5	0.24	2.87	4.27	2.80	98.5	95.5
377	358	502	456	5	0.33	2.06	3.06	2.01	140	137
393	360	560	500	5	0.32	2.12	3.15	2.07	213	206
385	360	560	486	5	0.41	1.65	2.46	1.61	266	262
435	368	592	598	5	0.37	1.84	2.75	1.80	300	291
390	373	467	447	3	0.17	4.00	5.96	3.91	46.2	44.8
405	378	522	488	5	0.23	2.98	4.44	2.92	111	108
398	378	522	478	5	0.31	2.16	3.22	2.12	147	145
417	382	578	520	4	0.32	2.11	3.15	2.07	222	215
414	382	578	507	4	0.40	1.67	2.48	1.63	281	277
429	388	622	551	5	0.36	1.87	2.78	1.83	339	329

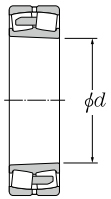
Note: Bearings other than the ULTAGE Series with outer diameter D dimension of 320 mm or more are also provided with outer ring oil inlets and oil grooves.



Cylindrical bore
[EM type (large size)]



Cylindrical bore

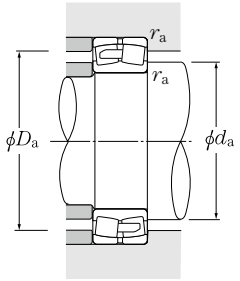


Tapered bore

d 380 ～ 480mm

d	Boundary dimensions mm D	B	$r_{s\,min}$ [3]	W_0	d_0	Basic load rating kN dynamic C_r	static C_{0r}	Fatigue load limit kN C_u	Allowable speed min^{-1} Grease lubrication	Oil lubrication	Bearing numbers [1] Cylindrical bore	Tapered bore [2]
380	520	106	4	16	10	2 300	3 920	205	710	910	∗23976EMD1	∗23976EMKD1
	560	135	5	20	12	3 230	5 270	247	720	910	∗23076EMD1	∗23076EMKD1
	560	180	5	27	16	4 140	7 280	240	610	780	∗24076EMD1	∗24076EMK30D1
	620	194	5	27	16	4 350	7 500	560	450	590	23176B	23176BK
	620	243	5	33	20	5 350	9 650	570	450	590	24176B	24176BK30
	680	240	6	33	20	5 800	9 650	665	430	550	23276B	23276BK
400	540	106	4	16	10	2 370	4 170	215	680	870	∗23980EMD1	∗23980EMKD1
	600	148	5	20	12	3 300	6 050	450	520	680	23080B	23080BK
	600	200	5	27	16	4 250	8 400	485	460	600	24080B	24080BK30
	650	200	6	27	16	4 650	8 050	630	430	560	23180B	23180BK
	650	250	6	33	20	5 650	10 300	585	430	560	24180B	24180BK30
	720	256	6	33	20	6 500	10 600	740	400	520	23280B	23280BK
420	560	106	4	16	10	2 390	4 320	230	650	830	∗23984EMD1	∗23984EMKD1
	620	150	5	20	12	3 450	6 400	475	490	640	23084B	23084BK
	620	200	5	27	16	4 300	8 450	470	440	570	24084B	24084BK30
	700	224	6	33	20	5 800	9 950	680	410	530	23184B	23184BK
	700	280	6	33	20	6 850	12 200	755	410	530	24184B	24184BK30
	760	272	7.5	33	20	7 300	12 000	820	380	490	23284B	23284BK
440	600	118	4	16	10	2 260	4 700	325	500	650	23988	23988K
	650	157	6	20	12	3 650	6 850	530	470	610	23088B	23088BK
	650	212	6	33	20	4 800	9 450	530	420	540	24088B	24088BK30
	720	226	6	33	20	5 800	10 100	685	390	500	23188B	23188BK
	720	280	6	33	20	7 200	13 100	715	390	500	24188B	24188BK30
	790	280	7.5	33	20	7 700	12 800	870	360	470	23288B	23288BK
460	620	118	4	16	10	2 340	4 950	325	480	620	23992	23992K
	680	163	6	27	16	4 000	7 450	560	450	580	23092B	23092BK
	680	218	6	33	20	5 100	10 200	590	390	510	24092B	24092BK30
	760	240	7.5	33	20	6 350	11 400	775	360	470	23192B	23192BK
	760	300	7.5	33	20	7 900	14 500	805	360	470	24192B	24192BK30
	830	296	7.5	33	20	8 650	14 500	925	340	440	23292B	23292BK
480	650	128	5	20	12	2 590	5 500	365	450	590	23996	23996K
	700	165	6	27	16	4 050	7 700	570	420	550	23096B	23096BK
	700	218	6	33	20	5 200	10 500	610	380	490	24096B	24096BK30

1) Bearing part numbers with ∗ are the **ULTAGE Series** EM type (large size) and have outer ring oil holes and oil grooves as standard.
2) Bearings appended with "**K**" have a tapered bore ratio of 1:12; bearings appended with "**K30**" have a tapered bore ratio of 1:30.
3) Smallest allowable dimension for chamfer dimension r.



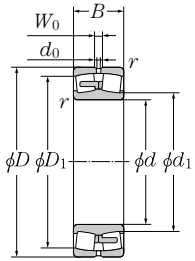
Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

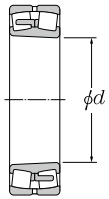
Static equivalent radial load
$P_{0r} = F_r + Y_0F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

Installation-related dimensions mm d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	Constant e	Axial load factors Y_1	Y_2	Y_0	Mass (approx.) kg Cylindrical bore	Tapered bore
412	395	505	481	4	0.18	3.66	5.46	3.58	68.0	65.9
425	398	542	509	5	0.22	3.07	4.57	3.00	117	113
420	398	542	499	5	0.30	2.25	3.34	2.20	154	151
436	402	598	540	4	0.31	2.16	3.22	2.12	235	228
431	402	598	529	4	0.39	1.73	2.58	1.69	292	287
453	408	652	575	5	0.36	1.89	2.82	1.85	380	369
433	415	525	501	4	0.18	3.80	5.66	3.72	71.4	69.2
451	422	578	542	4	0.24	2.80	4.16	2.73	149	144
446	422	578	528	4	0.32	2.09	3.11	2.04	202	200
458	428	622	567	5	0.31	2.21	3.29	2.16	264	256
453	428	622	552	5	0.38	1.77	2.63	1.73	329	324
473	428	692	612	5	0.37	1.81	2.69	1.77	457	443
454	435	545	522	4	0.17	3.95	5.88	3.86	74.9	72.6
471	442	598	562	4	0.24	2.85	4.24	2.79	157	152
465	442	598	551	4	0.32	2.13	3.17	2.08	210	207
488	448	672	611	5	0.32	2.11	3.15	2.07	354	343
477	448	672	592	5	0.40	1.69	2.51	1.65	440	433
501	456	724	643	6	0.36	1.86	2.77	1.82	544	528
483	458	582	551	3	0.18	3.66	5.46	3.58	101	98
490	468	622	585	5	0.24	2.85	4.24	2.79	181	175
486	468	622	576	5	0.32	2.11	3.15	2.07	245	241
504	468	692	627	5	0.31	2.15	3.21	2.11	370	358
498	468	692	614	5	0.39	1.75	2.61	1.71	456	449
525	476	754	671	6	0.36	1.88	2.80	1.84	600	582
503	478	602	572	3	0.17	3.95	5.88	3.86	107	104
512	488	652	613	5	0.23	2.88	4.29	2.82	206	200
509	488	652	604	5	0.31	2.15	3.21	2.11	276	272
534	496	724	660	6	0.31	2.14	3.19	2.10	443	429
523	496	724	645	6	0.39	1.71	2.55	1.67	550	541
547	496	794	703	6	0.36	1.87	2.78	1.83	704	683
527	502	628	599	4	0.18	3.85	5.73	3.76	123	119
532	508	672	633	5	0.23	2.94	4.38	2.88	217	209
530	508	672	625	5	0.30	2.22	3.30	2.17	285	280

Note: Outer ring oil inlets/oil grooves are provided.



Cylindrical bore

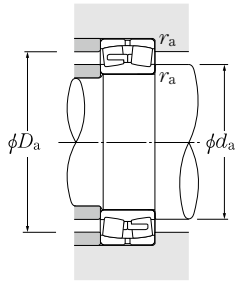


Tapered bore

d 480 ～ 630mm

d	Boundary dimensions mm D	B	$r_{s\,min}$ 2)	W_0	d_0	Basic load rating dynamic C_r kN	static C_{0r} kN	Fatigue load limit C_u kN	Allowable speed min^{-1} Grease lubrication	Oil lubrication	Bearing numbers Cylindrical bore	Tapered bore 1)
480	790	248	7.5	33	20	6 900	12 300	860	350	450	**23196B**	**23196BK**
	790	308	7.5	33	20	8 250	15 300	860	350	450	**24196B**	**24196BK30**
	870	310	7.5	33	20	9 200	15 500	1 000	320	420	**23296B**	**23296BK**
500	670	128	5	20	12	2 640	5 600	460	430	560	**239/500**	**239/500K**
	720	167	6	27	16	4 250	8 300	645	410	530	**230/500B**	**230/500BK**
	720	218	6	33	20	5 300	10 900	640	350	460	**240/500B**	**240/500BK30**
	830	264	7.5	33	20	7 700	13 700	875	330	430	**231/500B**	**231/500BK**
	830	325	7.5	42	25	9 000	16 700	870	330	430	**241/500B**	**241/500BK30**
	920	336	7.5	42	25	10 500	17 800	1 100	310	400	**232/500B**	**232/500BK**
530	710	136	5	20	12	2 940	6 450	400	400	520	**239/530**	**239/530K**
	780	185	6	27	16	4 850	9 350	710	380	490	**230/530B**	**230/530BK**
	780	250	6	33	20	6 200	12 700	700	330	430	**240/530B**	**240/530BK30**
	870	272	7.5	33	20	7 800	14 200	920	310	400	**231/530B**	**231/530BK**
	870	335	7.5	42	25	9 250	17 400	910	310	400	**241/530B**	**241/530BK30**
	980	355	9.5	42	25	11 500	19 800	1 210	280	370	**232/530B**	**232/530BK**
560	750	140	5	20	12	3 200	6 900	525	380	490	**239/560**	**239/560K**
	820	195	6	27	16	5 350	10 500	800	350	450	**230/560B**	**230/560BK**
	820	258	6	33	20	6 750	14 100	750	310	400	**240/560B**	**240/560BK30**
	920	280	7.5	33	20	8 550	15 500	1 000	280	370	**231/560B**	**231/560BK**
	920	355	7.5	42	25	11 100	20 800	1 030	280	370	**241/560B**	**241/560BK30**
	1 030	365	9.5	42	25	12 300	21 100	1 320	260	340	**232/560B**	**232/560BK**
600	800	150	5	20	12	3 600	8 000	490	350	450	**239/600**	**239/600K**
	870	200	6	27	16	5 800	12 000	835	310	420	**230/600B**	**230/600BK**
	870	272	6	33	20	7 150	15 600	750	280	370	**240/600B**	**240/600BK30**
	980	300	7.5	33	20	10 000	18 400	1 160	260	340	**231/600B**	**231/600BK**
	980	375	7.5	42	25	11 900	23 200	1 130	260	340	**241/600B**	**241/600BK30**
	1 090	388	9.5	42	25	13 600	23 700	930	250	320	**232/600B**	**232/600BK**
630	850	165	6	27	16	4 100	9 250	545	320	420	**239/630**	**239/630K**
	920	212	7.5	33	20	6 550	13 000	950	310	400	**230/630B**	**230/630BK**
	920	290	7.5	33	20	8 400	17 900	915	270	350	**240/630B**	**240/630BK30**
	1 030	315	7.5	33	20	10 700	19 900	1 190	250	320	**231/630B**	**231/630BK**
	1 030	400	7.5	42	25	12 900	25 000	1 200	250	320	**241/630B**	**241/630BK30**
	1 150	412	12	42	25	15 200	26 800	1 540	230	300	**232/630B**	**232/630BK**

1) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.
2) Smallest allowable dimension for chamfer dimension r.



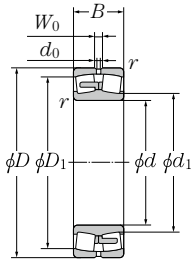
Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

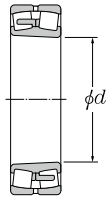
Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

d	Installation-related dimensions mm d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	Constant e	Axial load factors Y_1	Y_2	Y_0	Mass (approx.) kg Cylindrical bore	Tapered bore
480	554	516	754	687	6	0.31	2.15	3.21	2.11	492	477
	546	516	754	671	6	0.39	1.74	2.59	1.70	608	600
	574	516	834	737	6	0.36	1.87	2.78	1.83	814	790
500	547	522	648	621	4	0.17	4.02	5.98	3.93	131	127
	552	528	692	653	5	0.23	2.98	4.44	2.92	226	218
	550	528	692	646	5	0.30	2.28	3.40	2.23	295	290
	580	536	794	724	6	0.32	2.12	3.16	2.08	584	566
	572	536	794	703	6	0.39	1.72	2.57	1.69	716	705
	600	536	884	773	6	0.39	1.74	2.59	1.70	1 000	971
530	579	552	688	654	4	0.17	3.95	5.88	3.86	157	152
	594	558	752	704	5	0.22	3.03	4.52	2.97	306	295
	586	558	752	689	5	0.30	2.24	3.33	2.19	413	406
	617	566	834	757	6	0.30	2.22	3.30	2.17	653	633
	605	566	834	737	6	0.38	1.79	2.67	1.75	800	788
	600	574	936	723	8	0.39	1.74	2.59	1.70	1 200	1 170
560	547	582	728	621	4	0.16	4.10	6.10	4.01	182	176
	627	588	792	741	5	0.22	3.03	4.51	2.96	353	340
	620	588	792	726	5	0.30	2.29	3.40	2.24	467	459
	650	596	884	801	6	0.30	2.27	3.38	2.22	752	729
	638	596	884	787	6	0.39	1.75	2.61	1.71	948	934
	677	604	986	867	8	0.36	1.88	2.80	1.84	1 360	1 320
600	654	622	778	739	4	0.18	3.85	5.73	3.76	218	211
	672	628	842	785	5	0.21	3.17	4.72	3.10	400	386
	667	628	842	770	5	0.29	2.33	3.47	2.28	544	535
	694	636	944	860	6	0.30	2.22	3.30	2.17	908	880
	685	636	944	832	6	0.37	1.81	2.70	1.77	1 130	1 110
	722	644	1 046	919	8	0.36	1.86	2.77	1.82	1 540	1 490
630	690	658	822	781	5	0.18	3.66	5.46	3.58	277	268
	704	666	884	834	6	0.22	3.14	4.67	3.07	481	464
	697	666	884	815	6	0.30	2.28	3.40	2.23	657	646
	731	666	994	899	6	0.30	2.27	3.38	2.22	1 050	1 020
	718	666	994	872	6	0.38	1.78	2.66	1.74	1 330	1 310
	760	684	1 096	969	10	0.36	1.87	2.78	1.83	1 900	1 840

Note: Outer ring oil inlets/oil grooves are provided.



Cylindrical bore

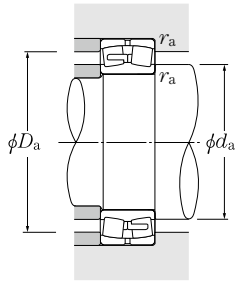


Tapered bore

d 670 ~ 950mm

d	Boundary dimensions mm D	B	$r_{s\,min}$ 2)	W_0	d_0	Basic load rating dynamic kN C_r	static kN C_{0r}	Fatigue load limit kN C_u	Allowable speed min^{-1} Grease lubrication	Oil lubrication	Bearing numbers Cylindrical bore	Tapered bore 1)
670	900	170	6	27	16	4 550	10 300	795	300	390	**239/670**	**239/670K**
	980	230	7.5	33	20	7 300	14 600	1 000	280	360	**230/670B**	**230/670BK**
	980	308	7.5	33	20	9 650	20 600	1 040	250	320	**240/670B**	**240/670BK30**
	1 090	336	7.5	42	25	12 500	23 600	1 400	230	300	**231/670B**	**231/670BK**
	1 090	412	7.5	42	25	14 100	28 000	1 340	230	300	**241/670B**	**241/670BK30**
	1 220	438	12	42	25	17 900	32 000	1 770	220	280	**232/670B**	**232/670BK**
710	950	180	6	27	16	4 950	11 500	665	280	370	**239/710**	**239/710K**
	1 030	236	7.5	33	20	8 000	16 200	1 140	260	340	**230/710B**	**230/710BK**
	1 030	315	7.5	33	20	10 300	22 500	1 150	230	300	**240/710B**	**240/710BK30**
	1 150	345	9.5	42	25	13 000	24 900	1 470	220	280	**231/710B**	**231/710BK**
	1 150	438	9.5	42	25	16 100	32 000	1 190	220	280	**241/710B**	**241/710BK30**
	1 280	450	12	42	25	18 100	32 500	1 200	200	260	**232/710B**	**232/710BK**
750	1 000	185	6	27	16	5 600	13 000	990	260	340	**239/750**	**239/750K**
	1 090	250	7.5	33	20	9 100	18 300	1 290	250	320	**230/750B**	**230/750BK**
	1 090	335	7.5	42	25	11 300	24 600	1 230	220	280	**240/750B**	**240/750BK30**
	1 220	365	9.5	42	25	14 300	27 200	1 130	200	260	**231/750B**	**231/750BK**
	1 360	475	15	42	25	20 300	36 500	1 980	180	240	**232/750B**	**232/750BK**
800	1 060	195	6	27	16	6 000	13 700	1 040	240	310	**239/800**	**239/800K**
	1 150	258	7.5	33	20	9 350	19 500	1 340	220	290	**230/800B**	**230/800BK**
	1 150	345	7.5	42	25	12 400	27 800	1 360	200	260	**240/800B**	**240/800BK30**
	1 280	375	9.5	42	25	16 000	31 000	1 780	180	240	**231/800B**	**231/800BK**
850	1 120	200	6	27	16	6 500	15 100	1 080	220	290	**239/850**	**239/850K**
	1 220	272	7.5	33	20	10 900	22 700	1 510	210	270	**230/850B**	**230/850BK**
	1 220	365	7.5	42	25	13 900	31 500	1 490	180	240	**240/850B**	**240/850BK30**
	1 360	400	12	42	25	17 300	34 000	1 380	170	220	**231/850B**	**231/850BK**
900	1 180	206	6	33	20	7 400	17 300	1 230	210	270	**239/900**	**239/900K**
	1 280	280	7.5	33	20	11 400	24 700	1 580	190	250	**230/900B**	**230/900BK**
	1 280	375	7.5	42	25	14 700	33 500	1 580	170	220	**240/900B**	**240/900BK30**
	1 420	412	12	42	25	18 700	38 000	2 030	150	200	**231/900B**	**231/900BK**
950	1 250	224	7.5	33	20	8 650	20 500	1 390	190	250	**239/950**	**239/950K**
	1 360	300	7.5	33	20	12 800	28 400	1 750	180	230	**230/950B**	**230/950BK**
	1 360	412	7.5	42	25	17 200	40 000	1 780	160	210	**240/950B**	**240/950BK30**

1) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.
2) Smallest allowable dimension for chamfer dimension r.



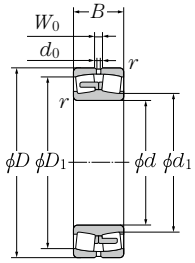
Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

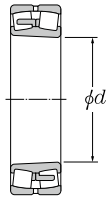
Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

d	Installation-related dimensions mm d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	Constant e	Axial load factors Y_1	Y_2	Y_0	Mass (approx.) kg Cylindrical bore	Tapered bore
670	733	698	872	830	5	0.18	3.76	5.59	3.67	317	307
	750	706	944	886	6	0.22	3.07	4.57	3.00	594	573
	741	706	944	870	6	0.29	2.29	3.41	2.24	794	781
	773	706	1 054	956	6	0.30	2.22	3.30	2.17	1 250	1 210
	764	706	1 054	926	6	0.37	1.83	2.73	1.79	1 530	1 510
	807	724	1 166	1 034	10	0.36	1.89	2.81	1.85	2 270	2 200
710	778	738	922	876	5	0.18	3.85	5.73	3.76	375	363
	792	746	994	937	6	0.22	3.02	4.50	2.96	663	640
	783	746	994	916	6	0.29	2.36	3.51	2.31	884	870
	822	754	1 106	1 005	8	0.29	2.32	3.45	2.27	1 420	1 380
	805	754	1 106	979	8	0.37	1.83	2.72	1.79	1 800	1 770
	851	764	1 226	1 081	10	0.35	1.91	2.84	1.87	2 540	2 470
750	818	778	972	924	5	0.17	3.90	5.81	3.81	412	399
	834	786	1 054	991	6	0.21	3.20	4.76	3.13	790	763
	828	786	1 054	969	6	0.29	2.35	3.49	2.29	1 060	1 040
	868	794	1 176	1 066	8	0.29	2.32	3.45	2.27	1 700	1 650
	903	814	1 296	1 149	12	0.35	1.92	2.86	1.88	3 050	2 960
800	868	828	1 032	983	5	0.17	4.05	6.04	3.96	487	471
	893	836	1 114	1 049	6	0.21	3.15	4.69	3.08	890	859
	881	836	1 114	1 026	6	0.28	2.41	3.59	2.36	1 190	1 170
	912	844	1 236	1 122	8	0.29	2.32	3.45	2.27	1 890	1 830
850	924	878	1 092	1 043	5	0.16	4.25	6.32	4.15	550	532
	945	886	1 184	1 114	6	0.20	3.32	4.95	3.25	1 050	1 010
	936	886	1 184	1 089	6	0.28	2.42	3.61	2.37	1 410	1 390
	979	904	1 306	1 194	10	0.28	2.37	3.54	2.32	2 270	2 200
900	974	928	1 152	1 101	5	0.16	4.32	6.44	4.23	623	603
	999	936	1 244	1 167	6	0.20	3.32	4.95	3.25	1 170	1 130
	988	936	1 244	1 147	6	0.27	2.48	3.70	2.43	1 570	1 540
	1 031	954	1 366	1 251	10	0.28	2.42	3.60	2.36	2 500	2 420
950	1 029	986	1 214	1 165	6	0.16	4.20	6.26	4.11	774	749
	1 063	986	1 324	1 239	6	0.21	3.26	4.85	3.18	1 430	1 380
	1 044	986	1 324	1 213	6	0.28	2.39	3.56	2.34	1 970	1 940

Note: Outer ring oil inlets/oil grooves are provided.



Cylindrical bore

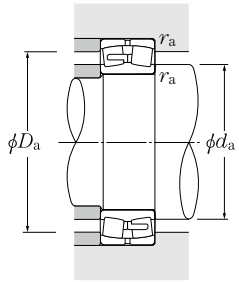


Tapered bore

d 1000 ～ 1400mm

Boundary dimensions mm						Basic load rating kN		Fatigue load limit kN	Allowable speed min^{-1}		Bearing numbers	
d	D	B	$r_{s\,min}$ [2]	W_0	d_0	dynamic C_r	static C_{0r}	C_u	Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore [1]
1000	1 320	236	7.5	33	20	9 550	22 700	1 520	180	230	**239/1000**	**239/1000K**
	1 420	308	7.5	33	20	13 800	30 000	1 460	170	220	**230/1000B**	**230/1000BK**
	1 420	412	7.5	42	25	17 800	42 000	1 890	150	190	**240/1000B**	**240/1000BK30**
1060	1 400	250	7.5	33	20	10 400	24 700	1 670	160	210	**239/1060**	**239/1060K**
	1 500	325	9.5	42	25	15 100	33 500	1 610	150	200	**230/1060B**	**230/1060BK**
	1 500	438	9.5	42	25	19 800	47 000	2 060	140	180	**240/1060B**	**240/1060BK30**
1120	1 460	250	7.5	33	20	10 900	26 700	1 470	150	200	**239/1120**	**239/1120K**
	1 580	345	9.5	42	25	17 400	39 000	2 310	150	190	**230/1120B**	**230/1120BK**
	1 580	462	9.5	42	25	21 700	52 500	2 230	120	160	**240/1120B**	**240/1120BK30**
1180	1 540	272	7.5	33	20	12 200	29 800	1 650	140	180	**239/1180**	**239/1180K**
1250	1 630	280	7.5	33	20	13 400	33 500	1 810	120	160	**239/1250**	**239/1250K**
1320	1 720	300	7.5	33	20	15 100	38 000	1 930	120	150	**239/1320**	**239/1320K**
1400	1 820	315	9.5	33	20	16 800	43 000	2 570	100	130	**239/1400**	**239/1400K**

1) Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.
2) Smallest allowable dimension for chamfer dimension r.



Dynamic equivalent radial load
$P_r = XF_r + YF_a$

$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Static equivalent radial load
$P_{0r} = F_r + Y_0 F_a$
For values of e, Y_1, Y_2 and Y_0 see the table below.

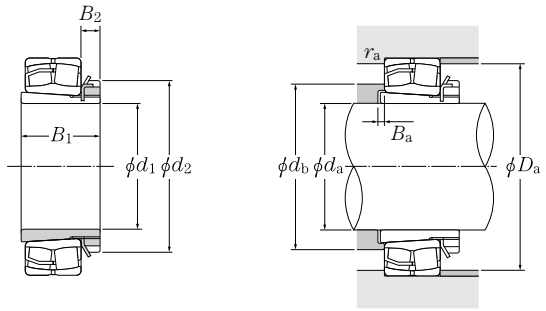
Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
d_1	$d_{a\,min}$	$D_{a\,max}$	D_1	$r_{as\,max}$	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
1 084	1 036	1 284	1 230	6	0.16	4.21	6.26	4.11	916	887
1 107	1 036	1 384	1 294	6	0.20	3.37	5.02	3.29	1 580	1 520
1 097	1 036	1 384	1 272	6	0.27	2.51	3.73	2.45	2 110	2 080
1 153	1 096	1 364	1 400	6	0.16	4.20	6.26	4.11	1 090	1 060
1 172	1 104	1 456	1 368	8	0.20	3.36	5.00	3.28	1 850	1 790
1 160	1 104	1 456	1 343	8	0.27	2.49	3.71	2.44	2 450	2 140
1 208	1 156	1 424	1 362	6	0.15	4.42	6.58	4.32	1 140	1 100
1 234	1 164	1 536	1 442	8	0.21	3.19	4.75	3.12	2 160	2 090
1 227	1 164	1 536	1 418	8	0.27	2.50	3.72	2.44	2 890	2 840
1 271	1 216	1 504	1 437	6	0.15	4.40	6.56	4.31	1 390	1 340
1 352	1 286	1 594	1 525	6	0.15	4.42	6.58	4.32	1 600	1 550
1 423	1 356	1 684	1 605	6	0.16	4.34	6.46	4.24	1 900	1 840
1 513	1 444	1 776	1 703	8	0.15	4.39	6.54	4.29	2 230	2 160

Note: Outer ring oil inlets/oil grooves are provided.

Adapters

NTN

(For spherical roller bearings)



d_1 35 ~ 70mm

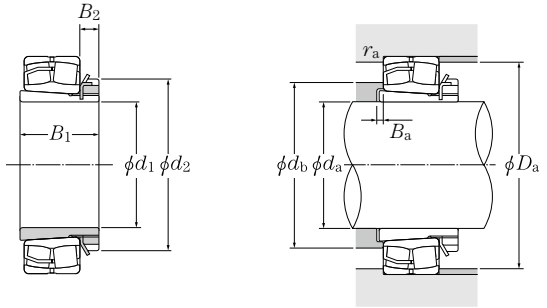
Boundary dimensions mm				Numbers [1]		Installation-related dimensions mm						Mass [2] kg
d_1	B_1	d_2	B_2	Bearing	Adapter	d_a Min.	d_b Max.	B_a Min.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)
35	36	58	10	∗ 22208EAKD1	**H 308X**	44	50	5	71	73	1.1	0.189
	36	58	10	21308CK	**H 308X**	44	52	5	76	81.5	1.5	0.189
	46	58	10	∗ 22308EAKD1	**H2308X**	45	52	5	78	81	1.5	0.224
40	39	65	11	∗ 22209EAKD1	**H 309X**	49	54	8	76	78	1.1	0.248
	39	65	11	21309CK	**H 309X**	49	57	5	85	91.5	1.5	0.248
	50	65	11	∗ 22309EAKD1	**H2309X**	50	58	5	87	91	1.5	0.280
45	42	70	12	∗ 22210EAKD1	**H 310X**	54	59	10	81	83	1.1	0.303
	42	70	12	21310CK	**H 310X**	54	65	5	93	100	2	0.303
	55	70	12	∗ 22310EAKD1	**H2310X**	56	63	5	95	99	2	0.362
50	45	75	12	∗ 22211EAKD1	**H 311X**	60	66	11	90	91	1.5	0.345
	45	75	12	21311K	**H 311X**	60	73	6	102	110	2	0.345
	59	75	12	∗ 22311EAKD1	**H2311X**	61	68	6	104	109	2	0.420
55	47	80	13	∗ 22212EAKD1	**H 312X**	65	71	9	99	101	1.5	0.394
	47	80	13	21312K	**H 312X**	65	78	5	109	118	2	0.394
	62	80	13	∗ 22312EAKD1	**H2312X**	66	75	5	113	118	2.1	0.481
60	50	85	14	∗ 22213EAKD1	**H 313X**	70	78	8	107	111	1.5	0.458
	50	85	14	21313K	**H 313X**	70	85	5	119	128	2	0.458
	65	85	14	∗ 22313EAKD1	**H2313X**	72	81	5	122	128	2.1	0.557
65	55	98	15	∗ 22215EAKD1	**H 315X**	80	88	12	118	121	1.5	0.831
	55	98	15	21315K	**H 315X**	80	99	5	136	148	2	0.831
	73	98	15	∗ 22315EAKD1	**H2315X**	82	91	5	139	148	2.1	1.05
70	59	105	17	∗ 22216EAKD1	**H 316X**	86	94	12	127	129	2	1.03
	59	105	17	21316K	**H 316X**	86	105	5	144	158	2	1.03
	78	105	17	∗ 22316EAKD1	**H2316X**	87	98	5	148	158	2.1	1.28

1) Bearing numbers marked "∗" designate **ULTAGE Series**. 2) Indicates the adapter mass.
Note: 1. Refer to pages **B-218** to **B-221** for bearing dimensions, rated loads, and mass.
2. Refer to pages **D-2** to **D-10** and **D-12** to **D-14** for adapter locknut and washer dimensions.
3. Adapter numbers which are appended with the code "**X**" indicate narrow slit type adapters which use washers with straight inner tabs.

Adapters

NTN

(For spherical roller bearings)



d_1 75 ~ 115mm

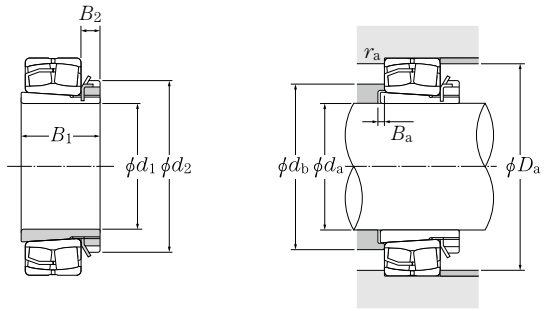
Boundary dimensions mm				Numbers [1]		Installation-related dimensions mm						Mass [2] kg
d_1	B_1	d_2	B_2	Bearing	Adapter	d_a Min.	d_b Max.	B_a Min.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)
75	63	110	18	∗ 22217EAKD1	**H 317X**	91	100	12	137	139	2	1.18
	63	110	18	21317K	**H 317X**	91	111	6	152	166	2.5	1.18
	82	110	18	∗ 22317EAKD1	**H2317X**	94	107	6	157	166	3	1.45
80	65	120	18	∗ 22218EAKD1	**H 318X**	96	105	10	144	149	2	1.37
	86	120	18	∗ 23218EMKD1	**H2318X**	99	104	18	141	149	2	1.69
	65	120	18	21318K	**H 318X**	96	119	6	162	176	2.5	1.37
	86	120	18	∗ 22318EAKD1	**H2318X**	99	110	6	166	176	3	1.69
85	68	125	19	∗ 22219EAKD1	**H 319X**	102	110	9	153	158	2.1	1.56
	68	125	19	21319K	**H 319X**	102	127	7	171	186	2.5	1.56
	90	125	19	∗ 22319EAKD1	**H2319X**	105	120	7	174	186	3	1.92
90	71	130	20	∗ 22220EAKD1	**H 320X**	107	118	8	161	168	2.1	1.69
	97	130	20	∗ 23220EMKD1	**H2320X**	110	118	19	159	168	2.1	2.15
	71	130	20	21320K	**H 320X**	107	133	7	179	201	2.5	1.69
	97	130	20	∗ 22320EAKD1	**H2320X**	110	127	7	187	201	3	2.15
100	81	145	21	∗ 23122EAKD1	**H3122X**	117	125	7	161	169	2	2.25
	77	145	21	∗ 22222EAKD1	**H 322X**	117	130	6	179	188	2.1	2.18
	105	145	21	∗ 23222EMKD1	**H2322X**	121	130	17	176	188	2.1	2.74
	77	145	21	21322K	**H 322X**	117	146	9	203	226	2.5	2.18
	105	145	21	∗ 22322EAKD1	**H2322X**	121	139	7	209	226	3	2.74
110	72	145	22	∗ 23024EAKD1	**H3024X**	127	134	7	165	171	2	1.93
	88	155	22	∗ 23124EAKD1	**H3124X**	128	138	7	179	189	2	2.64
	88	155	22	∗ 22224EAKD1	**H3124X**	128	141	11	193	203	2.1	2.64
	112	155	22	∗ 23224EMKD1	**H2324X**	131	139	17	190	203	2.1	3.19
	112	155	22	∗ 22324EAKD1	**H2324X**	131	156	7	225	246	3	3.19
115	80	155	23	∗ 23026EAKD1	**H3026**	137	145	8	183	191	2	2.85
	92	165	23	∗ 23126EAKD1	**H3126**	138	148	8	189	199	2	3.66
	92	165	23	∗ 22226EAKD1	**H3126**	138	151	8	206	216	3	3.66
	121	165	23	∗ 23226EMKD1	**H2326**	142	150	21	203	216	3	4.6
	121	165	23	∗ 22326EAKD1	**H2326**	142	164	8	243	263	4	4.6

1) Bearing numbers marked "∗" designate **ULTAGE Series**. 2) Indicates the adapter mass.
Note: 1. Refer to pages **B-220** to **B-225** for bearing dimensions, rated loads, and mass.
2. Refer to pages **D-2** to **D-10** and **D-12** to **D-14** for adapter locknut and washer dimensions.
3. Adapter numbers which are appended with the code "**X**" indicate narrow slit type adapters which use washers with straight inner tabs.

Adapters

NTN

(For spherical roller bearings)



d_1 125 ~ 170mm

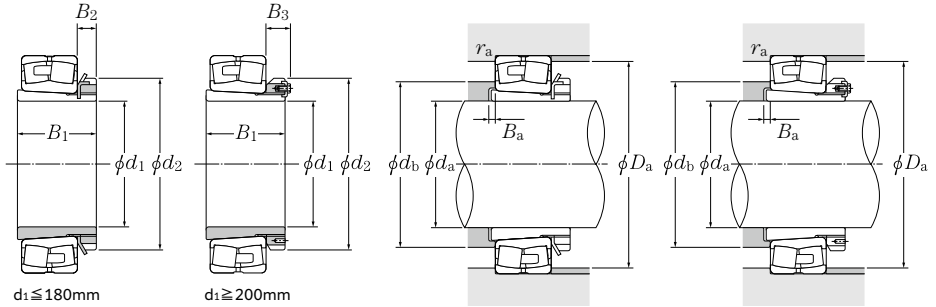
Boundary dimensions mm				Numbers [1]		Installation-related dimensions mm					Mass [2] kg
d_1	B_1	d_2	B_2	Bearing	Adapter	d_a Min.	d_b Max.	B_a Min.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)
125	82	165	24	∗ 23028EAKD1	**H3028**	147	155	8	193	201	2	3.16
	97	180	24	∗ 23128EAKD1	**H3128**	149	159	8	203	213	2.1	4.34
	97	180	24	∗ 22228EAKD1	**H3128**	149	163	8	224	236	3	4.34
	131	180	24	∗ 23228EMKD1	**H2328**	152	162	22	220	236	3	5.55
	131	180	24	∗ 22328EAKD1	**H2328**	152	181	8	261	283	4	5.55
135	87	180	26	∗ 23030EAKD1	**H3030**	158	167	8	207	214	2.1	3.89
	111	195	26	∗ 23130EAKD1	**H3130**	160	171	8	223	238	2.1	5.52
	111	195	26	∗ 22230EAKD1	**H3130**	160	177	15	242	256	3	5.52
	139	195	26	∗ 23230EMKD1	**H2330**	163	174	20	237	256	3	6.63
	139	195	26	∗ 22330EMKD1	**H2330**	163	188	8	279	303	4	6.63
140	93	190	28	∗ 23032EAKD1	**H3032**	168	177	8	221	229	2.1	5.21
	119	210	28	∗ 23132EAKD1	**H3132**	170	185	8	240	258	2.1	7.67
	119	210	28	∗ 22232EAKD1	**H3132**	170	190	14	260	276	3	7.67
	147	210	28	∗ 23232EMKD1	**H2332**	174	187	18	254	276	3	9.14
	147	210	28	∗ 22332EMKD1	**H2332**	174	205	8	296	323	4	9.14
150	101	200	29	∗ 23034EAKD1	**H3034**	179	190	8	238	249	2.1	5.99
	122	220	29	∗ 23134EAKD1	**H3134**	180	195	8	250	268	2.1	8.38
	122	220	29	∗ 22234EAKD1	**H3134**	180	201	10	277	293	4	8.38
	154	220	29	∗ 23234EMKD1	**H2334**	185	199	18	272	293	4	10.2
	154	220	29	∗ 22334EMKD1	**H2334**	185	223	8	313	343	4	10.2
160	109	210	30	∗ 23036EAKD1	**H3036**	189	201	8	255	269	2.1	6.83
	131	230	30	∗ 23136EAKD1	**H3136**	191	205	8	267	286	3	9.5
	131	230	30	∗ 22236EMKD1	**H3136**	191	209	18	287	303	4	9.5
	161	230	30	∗ 23236EMKD1	**H2336**	195	210	22	282	303	4	11.3
	161	230	30	∗ 22336EMKD1	**H2336**	195	229	8	329	363	4	11.3
170	112	220	31	∗ 23038EAKD1	**H3038**	199	213	9	266	279	2.1	7.45
	141	240	31	∗ 23138EMKD1	**H3138**	202	221	9	284	306	3	10.8
	141	240	31	∗ 22238EMKD1	**H3138**	202	222	21	305	323	4	10.8
	169	240	31	∗ 23238EMKD1	**H2338**	206	220	21	299	323	4	12.6
	169	240	31	∗ 22338EMKD1	**H2338**	206	247	9	346	380	5	12.6

1) Bearing numbers marked "∗" designate **ULTAGE Series**. 2) Indicates the adapter mass.
Note: 1. Refer to pages **B-224** to **B-227** for bearing dimensions, rated loads, and mass.
2. Refer to pages **D-2** to **D-10** and **D-12** to **D-14** for adapter locknut and washer dimensions.

Adapters

NTN

(For spherical roller bearings)



d_1 180 ~ 300mm

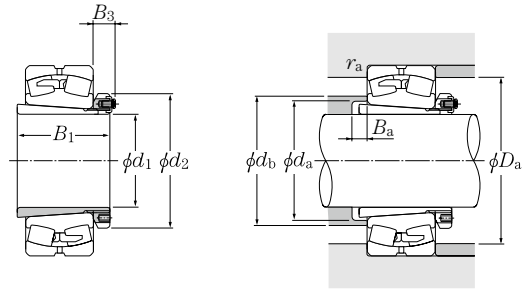
Boundary dimensions mm				Numbers [1]		Installation-related dimensions mm					Mass [2] kg
d_1	B_1	d_2	B_2	Bearing	Adapter	d_a Min.	d_b Max.	B_a Min.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)
180	120	240	32	–	∗ 23040EMKD1	**H3040**	210	223	10	283	299	2.1	9.19
	150	250	32	–	∗ 23140EMKD1	**H3140**	212	231	10	301	326	3	12.1
	150	250	32	–	∗ 22240EMKD1	**H3140**	212	234	24	323	343	4	12.1
	176	250	32	–	∗ 23240EMKD1	**H2340**	216	232	20	315	343	4	13.9
	176	250	32	–	∗ 22340EMKD1	**H2340**	216	265	10	364	400	5	13.9
200	126	260	–	41	∗ 23044EMKD1	**H3044**	231	246	12	310	327	3	10.3
	158	280	–	44	∗ 23144EMKD1	**H3144**	233	252	10	328	353	4	14.7
	158	280	–	44	∗ 22244EMKD1	**H3144**	233	264	22	358	383	4	14.7
	183	280	–	44	∗ 23244EMKD1	**H2344**	236	261	11	349	383	4	16.7
	183	280	–	44	∗ 22344EMKD1	**H2344**	236	277	10	388	440	5	16.7
220	133	290	–	46	∗ 23048EMKD1	**H3048**	251	267	11	329	347	3	13.2
	169	300	–	46	∗ 23148EMKD1	**H3148**	254	276	11	356	383	4	17.3
	169	300	–	46	∗ 22248EMKD1	**H3148**	254	288	19	383	423	4	17.3
	196	300	–	46	∗ 23248EMKD1	**H2348**	257	284	6	372	423	4	19.7
	196	300	–	46	∗ 22348EMKD1	**H2348**	257	299	11	421	480	5	19.7
240	145	310	–	46	∗ 23052EMKD1	**H3052**	272	291	13	366	385	4	15.3
	187	330	–	49	∗ 23152EMKD1	**H3152**	276	302	11	380	423	4	22
	187	330	–	49	∗ 22252EMKD1	**H3152**	276	312	25	415	460	5	22
	208	330	–	49	∗ 23252EMKD1	**H2352**	278	310	2	405	460	5	24.2
	208	330	–	49	∗ 22352EMKD1	**H2352**	278	324	11	456	514	6	24.2
260	152	330	–	50	∗ 23056EMKD1	**H3056**	292	310	12	386	405	4	17.7
	192	350	–	51	∗ 23156EMKD1	**H3156**	296	322	12	403	440	5	24.5
	192	350	–	51	∗ 22256EMKD1	**H3156**	296	333	28	437	480	5	24.5
	221	350	–	51	∗ 23256EMKD1	**H2356**	299	331	11	426	480	5	27.8
	221	350	–	51	∗ 22356EMKD1	**H2356**	299	349	12	489	554	6	27.8
280	168	360	–	54	∗ 23060EMKD1	**H3060**	313	338	12	413	445	4	22.8
	208	380	–	53	∗ 23160EMKD1	**H3160**	317	345	12	436	480	5	30.2
	208	380	–	53	∗ 22260EMKD1	**H3160**	317	358	32	469	520	5	30.2
	240	380	–	53	∗ 23260EMKD1	**H3260**	321	352	12	461	520	5	34.1
300	171	380	–	55	∗ 23064EMKD1	**H3064**	334	360	13	433	465	4	24.6
	226	400	–	56	∗ 23164EMKD1	**H3164**	339	373	13	468	520	5	34.9
	226	400	–	56	∗ 22264EMKD1	**H3164**	339	383	39	510	560	5	34.9

1) Bearing numbers marked "∗" designate **ULTAGE Series**. 2) Indicates the adapter mass.
Note: 1. Refer to pages **B-228** to **B-231** for bearing dimensions, rated loads, and mass.
2. Refer to pages **D-2** to **D-10** and **D-12** to **D-14** for adapter locknut, washer, and lockplate dimensions.

Adapters

NTN

(For spherical roller bearings)



d_1 300 ～ 470mm

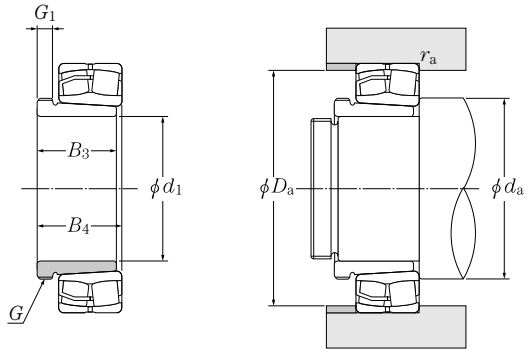
Boundary dimensions mm				Numbers [1]		Installation-related dimensions mm						Mass [2] kg
d_1	B_1	d_2	B_2	Bearing	Adapter	d_a Min.	d_b Max.	B_a Min.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)
300	258	400	56	∗ 23264EMKD1	**;H3264**	343	376	13	493	560	5	39.3
	187	400	58	∗ 23068EMKD1	**;H3068**	355	384	14	466	502	5	28.7
320	254	440	72	∗ 23168EMKD1	**;H3168**	360	393	14	500	560	5	49.5
	288	440	72	23268BK	**;H3268**	364	410	14	524	592	5	54.6
	188	420	58	∗ 23072EMKD1	**;H3072**	375	405	14	488	522	5	30.5
340	259	460	75	23172BK	**;H3172**	380	417	14	520	578	4	54.2
	299	460	75	23272BK	**;H3272**	385	429	14	551	622	5	60.2
	193	450	62	∗ 23076EMKD1	**;H3076**	396	425	15	509	542	5	35.8
360	264	490	77	23176BK	**;H3176**	401	436	15	540	598	4	61.7
	310	490	77	23276BK	**;H3276**	405	453	15	575	652	5	69.6
	210	470	66	23080BK	**;H3080**	417	451	15	542	578	4	41.3
380	272	520	82	23180BK	**;H3180**	421	458	15	568	622	5	70.6
	328	520	82	23280BK	**;H3280**	427	473	15	612	692	5	81
	212	490	66	23084BK	**;H3084**	437	471	16	562	598	4	43.7
400	304	540	90	23184BK	**;H3184**	443	488	16	611	672	5	84.2
	228	520	77	23088BK	**;H3088**	458	490	17	585	622	5	65.2
410	307	560	90	23188BK	**;H3188**	464	504	17	627	692	5	104
	234	540	77	23092BK	**;H3092**	478	512	17	613	652	5	69.5
430	326	580	95	23192BK	**;H3192**	485	534	17	660	724	6	116
	237	560	77	23096BK	**;H3096**	499	532	18	633	672	5	73.3
450	335	620	95	23196BK	**;H3196**	505	554	18	687	754	6	133
	247	580	85	230/500BK	**;H30/500**	519	552	18	653	692	5	81.8
470	356	630	100	231/500BK	**;H31/500**	527	580	18	724	794	6	143

1) Bearing numbers marked "∗" designate **ULTAGE Series**. 2) Indicates the adapter mass.
Note: 1. Refer to pages **B-230** to **B-235** for bearing dimensions, rated loads, and mass.
2. Refer to pages **D-2** to **D-10** and **D-12** to **D-14** for adapter locknut and lockplate dimensions.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 35 ～ 70 mm

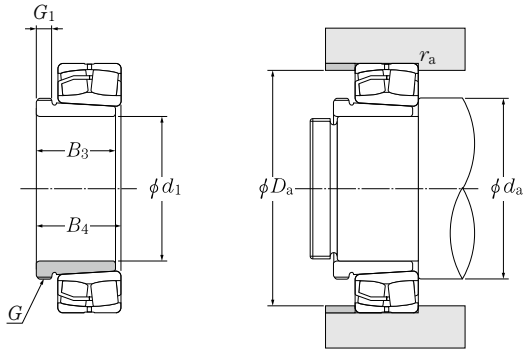
Boundary dimensions mm					Numbers [3]		Installation-related dimensions mm					Mass [4] kg	Applied nut number
d_1	Thread nominal dimension [1] G	B_3	G_1	B_4 [2]	Bearing	Withdrawal sleeve	d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	(approx.)	Bearing number [5]
	M45×1.5	29	6	32	∗ 22208EAKD1	**;AH 308**	47	50	71	73	1.1	0.09	AN09
35	M45×1.5	29	6	32	21308CK	**;AH 308**	48.5	52	76	81.5	1.5	0.09	AN09
	M45×1.5	40	7	43	∗ 22308EAKD1	**;AH 2308**	49	52	78	81	1.5	0.128	AN09
	M50×1.5	31	6	34	∗ 22209EAKD1	**;AH 309**	52	54	76	78	1.1	0.109	AN10
40	M50×1.5	31	6	34	21309CK	**;AH 309**	53.5	57	85	91.5	1.5	0.109	AN10
	M50×1.5	44	7	47	∗ 22309EAKD1	**;AH 2309**	54	58	87	91	1.5	0.164	AN10
	M55×2	35	7	38	∗ 22210EAKD1	**;AHX 310**	57	59	81	83	1.1	0.137	AN11
45	M55×2	35	7	38	21310CK	**;AHX 310**	60	65	93	100	2	0.137	AN11
	M55×2	50	9	53	∗ 22310EAKD1	**;AHX 2310**	61	63	95	99	2	0.209	AN11
	M60×2	37	7	40	∗ 22211EAKD1	**;AHX 311**	64	66	90	91	1.5	0.161	AN12
50	M60×2	37	7	40	21311K	**;AHX 311**	65	73	102	110	2	0.161	AN12
	M60×2	54	10	57	∗ 22311EAKD1	**;AHX 2311**	66	68	104	109	2	0.253	AN12
	M65×2	40	8	43	∗ 22212EAKD1	**;AHX 312**	69	71	99	101	1.5	0.189	AN13
55	M65×2	40	8	43	21312K	**;AHX 312**	72	78	109	118	2.1	0.189	AN13
	M65×2	58	11	61	∗ 22312EAKD1	**;AHX 2312**	72	75	113	118	2.1	0.297	AN13
	M75×2	42	8	45	∗ 22213EAKD1	**;AH 313**	74	78	107	111	1.5	0.253	AN15
60	M75×2	42	8	45	21313K	**;AH 313**	77	85	119	128	2.1	0.253	AN15
	M75×2	61	12	64	∗ 22313EAKD1	**;AH 2313**	77	81	122	128	2.1	0.395	AN15
	M80×2	43	8	47	∗ 22214EAKD1	**;AH 314**	79	84	113	116	1.5	0.28	AN16
65	M80×2	43	8	47	21314K	**;AH 314**	82	91	126	138	2.1	0.28	AN16
	M80×2	64	12	68	∗ 22314EAKD1	**;AHX 2314**	82	85	131	138	2.1	0.466	AN16
	M85×2	45	8	49	∗ 22215EAKD1	**;AH 315**	84	88	118	121	1.5	0.313	AN17
70	M85×2	45	8	49	21315K	**;AH 315**	87	99	136	148	2.1	0.313	AN17
	M85×2	68	12	72	∗ 22315EAKD1	**;AHX 2315**	87	91	139	148	2.1	0.534	AN17

1) Standard thread shapes and dimensions are as per **JIS B 0205-1** and **JIS B 0205-4** (general metric thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "∗" designate **ULTAGE Series**.
4) Indicates withdrawal sleeve mass.
5) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-218** to **B-221** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 75 ～ 115mm

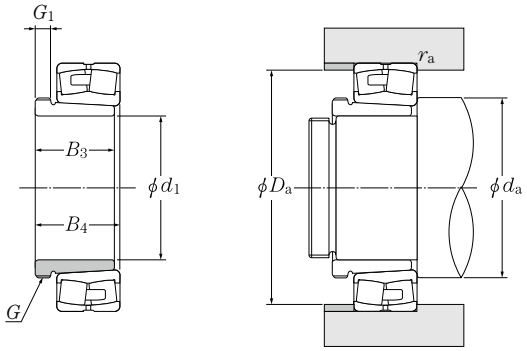
d_1	Boundary dimensions mm Thread nominal dimension 1) G	B_3	G_1	B_4 2)	Numbers 3) Bearing	Withdrawal sleeve	Installation-related dimensions mm d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass 4) kg (approx.)	Applied nut number Bearing number 5)
75	M90×2	48	8	52	∗ 22216EAKD1	**;AH 316**	91	94	127	129	2	0.365	AN18
	M90×2	48	8	52	21316K	**;AH 316**	92	105	144	158	2	0.365	AN18
	M90×2	71	12	75	∗ 22316EAKD1	**;AHX 2316**	92	98	148	158	2.1	0.597	AN18
80	M95×2	52	9	56	∗ 22217EAKD1	**;AHX 317**	96	100	137	139	2	0.429	AN19
	M95×2	52	9	56	21317K	**;AHX 317**	99	111	152	166	2.5	0.429	AN19
	M95×2	74	13	78	∗ 22317EAKD1	**;AHX 2317**	99	107	157	166	3.0	0.67	AN19
85	M100×2	53	9	57	∗ 22218EAKD1	**;AHX 318**	101	105	144	149	2	0.461	AN20
	M100×2	63	10	67	∗ 23218EMKD1	**;AHX 3218**	101	104	141	149	2	0.576	AN20
	M100×2	53	9	57	21318K	**;AHX 318**	104	119	162	176	2.5	0.461	AN20
	M100×2	79	14	83	∗ 22318EAKD1	**;AHX 2318**	104	110	166	176	3	0.779	AN20
90	M105×2	57	10	61	∗ 22219EAKD1	**;AHX 319**	107	110	153	158	2.1	0.532	AN21
	M105×2	57	10	61	21319K	**;AHX 319**	109	127	171	186	2.5	0.532	AN21
	M105×2	85	16	89	∗ 22319EAKD1	**;AHX 2319**	109	120	174	186	3	0.886	AN21
95	M110×2	59	10	63	∗ 22220EAKD1	**;AHX 320**	112	118	161	168	2.1	0.582	AN22
	M110×2	73	11	77	∗ 23220EMKD1	**;AHX 3220**	112	118	159	168	2.1	0.767	AN22
	M110×2	59	10	63	21320K	**;AHX 320**	114	133	179	201	2.5	0.582	AN22
	M110×2	90	16	94	∗ 22320EAKD1	**;AHX 2320**	114	127	187	201	3	0.998	AN22
105	M120×2	68	11	72	∗ 23122EAKD1	**;AHX 3122**	121	125	161	169	2	0.76	AN24
	M115×2	82	13	91	∗ 24122EMK30D1	**;AH 24122**	121	121	158	169	2	0.73	AN23
	M120×2	68	11	72	∗ 22222EAKD1	**;AHX 3122**	122	130	179	188	2.1	0.76	AN24
	M125×2	82	11	86	∗ 23222EMKD1	**;AHX 3222**	122	130	176	188	2.1	1.04	AN25
	M120×2	63	12	67	21322K	**;AHX 322**	124	146	203	226	2.5	0.663	AN24
	M125×2	98	16	102	∗ 22322EAKD1	**;AHX 2322**	124	139	209	226	3	1.35	AN25
115	M130×2	60	13	64	∗ 23024EAKD1	**;AHX 3024**	129	134	165	171	2	0.75	AN26
	M125×2	73	13	82	∗ 24024EMK30D1	**;AH 24024**	129	132	161	171	2	0.65	AN25
	M130×2	75	12	79	∗ 23124EAKD1	**;AHX 3124**	131	138	179	189	2	0.95	AN26
	M130×2	93	13	102	∗ 24124EMK30D1	**;AH 24124**	131	136	173	189	2	1	AN26

1) Standard thread shapes and dimensions are as per **JIS B 0205-1** and **JIS B 0205-4** (general metric thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "∗" designate **ULTAGE Series**.
4) Indicates withdrawal sleeve mass.
5) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-220** to **B-223** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 115 ～ 150mm

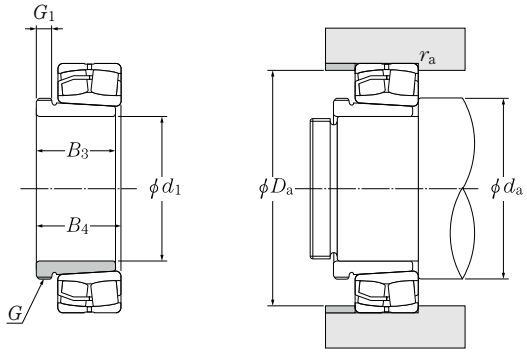
d_1	Boundary dimensions mm Thread nominal dimension 1) G	B_3	G_1	B_4 2)	Numbers 3) Bearing	Withdrawal sleeve	Installation-related dimensions mm d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass 4) kg (approx.)	Applied nut number Bearing number 5)
115	M130×2	75	12	79	∗ 22224EAKD1	**;AHX 3124**	132	141	193	203	2.1	0.95	AN26
	M135×2	90	13	94	∗ 23224EMKD1	**;AHX 3224**	132	139	190	203	2.1	1.3	AN27
	M135×2	105	17	109	∗ 22324EAKD1	**;AHX 2324**	134	156	225	246	3	1.6	AN27
125	M140×2	67	14	71	∗ 23026EAKD1	**;AHX 3026**	139	145	183	191	2	0.93	AN28
	M135×2	83	14	93	∗ 24026EMK30D1	**;AH 24026**	139	143	178	191	2	0.84	AN27
	M140×2	78	12	82	∗ 23126EAKD1	**;AHX 3126**	141	148	189	199	2	1.08	AN28
	M140×2	94	14	104	∗ 24126EMK30D1	**;AH 24126**	141	146	183	199	2	1.11	AN28
	M140×2	78	12	82	∗ 22226EAKD1	**;AHX 3126**	144	151	206	216	3	1.08	AN28
	M145×2	98	15	102	∗ 23226EMKD1	**;AHX 3226**	144	150	203	216	3	1.58	AN29
	M145×2	115	19	119	∗ 22326EAKD1	**;AHX 2326**	147	164	243	263	4	1.97	AN29
135	M150×2	68	14	73	∗ 23028EAKD1	**;AHX 3028**	149	155	193	201	2	1.01	AN30
	M145×2	83	14	93	∗ 24028EMK30D1	**;AH 24028**	149	153	188	201	2	0.91	AN29
	M150×2	83	14	88	∗ 23128EAKD1	**;AHX 3128**	152	159	203	213	2.1	1.28	AN30
	M150×2	99	14	109	∗ 24128EMK30D1	**;AH 24128**	152	156	198	213	2.1	1.25	AN30
	M150×2	83	14	88	∗ 22228EAKD1	**;AHX 3128**	154	163	224	236	3	1.28	AN30
	M155×3	104	15	109	∗ 23228EMKD1	**;AHX 3228**	154	162	220	236	3	1.84	AN31
	M155×3	125	20	130	∗ 22328EAKD1	**;AHX 2328**	157	181	261	283	4	2.33	AN31
145	M160×3	72	15	77	∗ 23030EAKD1	**;AHX 3030**	161	167	207	214	2.1	1.15	AN32
	M155×3	90	15	101	∗ 24030EMK30D1	**;AH 24030**	161	165	202	214	2.1	1.04	AN31
	M165×3	96	15	101	∗ 23130EAKD1	**;AHX 3130**	162	171	223	238	2.1	1.79	AN33
	M160×3	115	15	126	∗ 24130EMK30D1	**;AH 24130**	162	168	216	238	2.1	1.56	AN32
	M165×3	96	15	101	∗ 22230EAKD1	**;AHX 3130**	164	177	242	256	3	1.79	AN33
	M165×3	114	17	119	∗ 23230EMKD1	**;AHX 3230**	164	174	237	256	3	2.22	AN33
	M165×3	135	24	140	∗ 22330EMKD1	**;AHX 2330**	167	188	279	303	4	2.82	AN33
150	M170×3	77	16	82	∗ 23032EAKD1	**;AH 3032**	171	177	221	229	2.1	2.06	AN34
	M170×3	95	15	106	∗ 24032EMK30D1	**;AH 24032**	171	175	215	229	2.1	2.33	AN34
	M180×3	103	16	108	∗ 23132EAKD1	**;AH 3132**	172	185	240	258	2.1	3.21	AN36
	M170×3	124	15	135	∗ 24132EMK30D1	**;AH 24132**	172	181	232	258	2.1	3	AN34
	M180×3	103	16	108	∗ 22232EAKD1	**;AH 3132**	174	190	260	276	3	3.21	AN36

1) Standard thread shapes and dimensions are as per **JIS B 0205-1** and **JIS B 0205-4** (metric trapezoidal screw thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "∗" designate **ULTAGE Series**.
4) Indicates withdrawal sleeve mass.
5) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-222** to **B-227** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 150 ～ 190mm

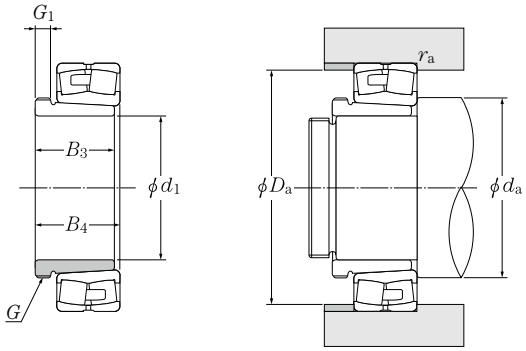
d_1	Thread nominal dimension 1) G	B_3	G_1	B_4 2)	Bearing	Withdrawal sleeve	d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass 4) kg (approx.)	Applied nut number Bearing number 5)
					Boundary dimensions mm	**Numbers** 3)	**Installation-related dimensions** mm						
150	M180×3	124	20	130	＊ 23232EMKD1	**;AH 3232**	174	187	254	276	3	4.08	AN36
	M180×3	140	24	146	＊ 22332EMKD1	**;AH 2332**	177	205	296	323	4	4.72	AN36
160	M180×3	85	17	90	＊ 23034EAKD1	**;AH 3034**	181	190	238	249	2.1	2.43	AN36
	M180×3	106	16	117	＊ 24034EMK30D1	**;AH 24034**	181	186	231	249	2.1	2.8	AN36
	M190×3	104	16	109	＊ 23134EAKD1	**;AH 3134**	182	195	250	268	2.1	3.4	AN38
	M180×3	125	16	136	＊ 24134EMK30D1	**;AH 24134**	182	193	243	268	2.1	3.21	AN36
	M190×3	104	16	109	＊ 22234EMKD1	**;AH 3134**	187	201	277	293	4	3.4	AN38
	M190×3	134	24	140	＊ 23234EMKD1	**;AH 3234**	187	199	272	293	4	4.8	AN38
	M190×3	146	24	152	＊ 22334EMKD1	**;AH 2334**	187	223	313	343	4	5.25	AN38
170	M190×3	92	17	98	＊ 23036EAKD1	**;AH 3036**	191	201	255	269	2.1	2.81	AN38
	M190×3	116	16	127	＊ 24036EMK30D1	**;AH 24036**	191	199	248	269	2.1	3.1	AN38
	M200×3	116	19	122	＊ 23136EAKD1	**;AH 3136**	194	205	267	286	3	4.22	AN40
	M190×3	134	16	145	＊ 24136EMK30D1	**;AH 24136**	194	202	254	286	3	3.68	AN38
	M200×3	105	17	110	＊ 22236EMKD1	**;AH 2236**	197	209	287	303	4	3.73	AN40
	M200×3	140	24	146	＊ 23236EMKD1	**;AH 3236**	197	210	282	303	4	5.32	AN40
	M200×3	154	26	160	＊ 22336EMKD1	**;AH 2336**	197	229	324	363	4	5.83	AN40
180	Tr205×4	96	18	102	＊ 23038EAKD1	**;AH 3038**	201	213	266	279	2.1	3.32	HNL41
	M200×3	118	18	131	＊ 24038EMK30D1	**;AH 24038**	201	209	258	279	2.1	3.5	AN40
	Tr210×4	125	20	131	＊ 23138EMKD1	**;AH 3138**	204	221	284	306	3	4.89	HN42
	M200×3	146	18	159	＊ 24138EMK30D1	**;AH 24138**	204	216	275	306	3	4.28	AN40
	Tr210×4	112	18	117	＊ 22238EMKD1	**;AH 2238**	207	222	305	323	4	4.25	HN42
	Tr210×4	145	25	152	＊ 23238EMKD1	**;AH 3238**	207	220	299	323	4	5.9	HN42
	Tr210×4	160	26	167	＊ 22338EMKD1	**;AH 2338**	210	247	346	380	5	6.63	HN42
190	Tr215×4	102	19	108	＊ 23040EMKD1	**;AH 3040**	211	223	283	299	2.1	3.8	HNL43
	Tr210×4	127	18	140	＊ 24040EMK30D1	**;AH 24040**	211	221	275	299	2.1	3.93	HN42
	Tr220×4	134	21	140	＊ 23140EMKD1	**;AH 3140**	214	231	301	326	3	5.49	HN44
	Tr210×4	158	18	171	＊ 24140EMK30D1	**;AH 24140**	214	224	291	326	3	5.1	HN42

1) Standard thread shapes and dimensions are as per **JIS B 0205-1** and **JIS B 0205-4** (general metric thread), and **JIS B 0206** (metric trapezoidal screw thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "＊" designate **ULTAGE Series**.
4) Indicates withdrawal sleeve mass.
5) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-226** to **B-229** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 190 ～ 260mm

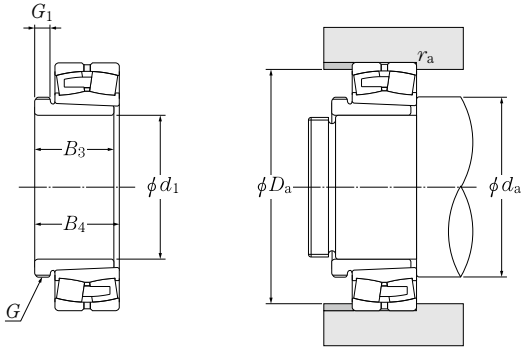
d_1	Thread nominal dimension 1) G	B_3	G_1	B_4 2)	Bearing	Withdrawal sleeve	d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass 5) kg (approx.)	Applied nut number Bearing number 6)
					Boundary dimensions mm	**Numbers** 3) 4)	**Installation-related dimensions** mm						
190	Tr220×4	118	19	123	＊ 22240EMKD1	**;AH 2240**	217	234	323	343	4	4.68	HN44
	Tr220×4	153	25	160	＊ 23240EMKD1	**;AH 3240**	217	232	315	343	4	6.68	HN44
	Tr220×4	170	30	177	＊ 22340EMKD1	**;AH 2340**	220	265	364	400	5	7.54	HN44
200	Tr235×4	111	20	117	＊ 23044EMKD1	**;AH 3044**	233	246	310	327	3	7.4	HNL47
	Tr230×4	138	20	152	＊ 24044EMK30D1	**;AH 24044H**	233	243	302	327	3	8.25	HN46
	Tr240×4	145	23	151	＊ 23144EMKD1	**;AH 3144**	237	252	328	353	4	10.4	HN48
	Tr230×4	170	20	184	＊ 24144EMK30D1	**;AH 24144H**	237	247	317	353	4	10.2	HN46
	Tr240×4	130	20	136	＊ 22244EMKD1	**;AH 2244**	237	264	358	383	4	9.1	HN48
	Tr240×4	181	30	189	＊ 23244EMKD1	**;AH 2344**	237	261	349	383	4	13.5	HN48
	Tr240×4	181	30	189	＊ 22344EMKD1	**;AH 2344**	240	277	388	440	5	13.5	HN48
220	Tr260×4	116	21	123	＊ 23048EMKD1	**;AH 3048**	253	267	329	347	3	8.75	HNL52
	Tr250×4	138	20	153	＊ 24048EMK30D1	**;AH 24048H**	253	264	322	347	3	8.98	HN50
	Tr260×4	154	25	161	＊ 23148EMKD1	**;AH 3148**	257	276	356	383	4	12	HN52
	Tr260×4	180	20	195	＊ 24148EMK30D1	**;AH 24148H**	257	270	344	383	4	12.5	HN52
	Tr260×4	144	21	150	＊ 22248EMKD1	**;AH 2248**	257	288	383	423	4	11.1	HN52
	Tr260×4	189	30	197	＊ 23248EMKD1	**;AH 2348**	257	284	372	423	4	15.5	HN52
	Tr260×4	189	30	197	＊ 22348EMKD1	**;AH 2348**	260	299	421	480	5	15.5	HN52
240	Tr280×4	128	23	135	＊ 23052EMKD1	**;AH 3052**	275	291	366	385	4	10.7	HNL56
	Tr270×4	162	22	178	＊ 24052EMK30D1	**;AH 24052**	275	286	354	385	4	11.8	HN54
	Tr290×4	172	26	179	＊ 23152EMKD1	**;AH 3152**	277	302	380	423	4	16.2	HN58
	Tr280×4	202	22	218	＊ 24152EMK30D1	**;AH 24152H**	277	295	371	423	4	15.4	HN56
	Tr290×4	155	23	161	＊ 22252EMKD1	**;AH 2252**	280	312	415	460	5	14	HN58
	Tr290×4	205	30	213	＊ 23252EMKD1	**;AH 2352**	280	310	405	460	5	19.6	HN58
	Tr290×4	205	30	213	＊ 22352EMKD1	**;AH 2352**	286	324	458	514	6	19.6	HN58
260	Tr300×4	131	24	139	＊ 23056EMKD1	**;AH 3056**	295	310	386	405	4	12	HNL60
	Tr290×4	162	22	179	＊ 24056EMK30D1	**;AH 24056H**	295	306	376	405	4	12.8	HN58
	Tr310×5	175	28	183	＊ 23156EMKD1	**;AH 3156**	300	322	403	440	5	17.5	HN62

1) Standard thread shapes and dimensions are as per **JIS B 0206** (metric trapezoidal screw thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "＊" designate **ULTAGE Series**.
4) Withdrawal sleeve numbers appended with the suffix "**H**" signify the high pressure oil (hydraulic) design.
5) Indicates withdrawal sleeve mass.
6) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-228** to **B-231** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 260 ～ 360mm

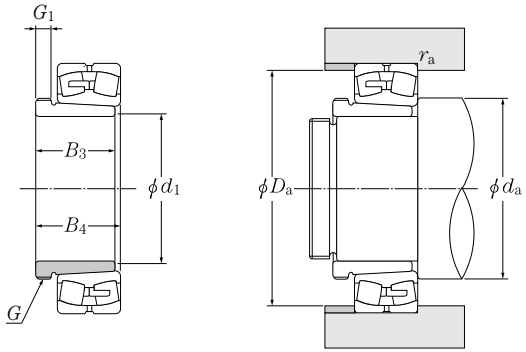
d_1	Thread nominal dimension[1] G	B_3	G_1	B_4[2]	Bearing	Withdrawal sleeve	d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass[5] kg (approx.)	Applied nut number Bearing number[6]
		mm			Numbers[3][4]		mm						
260	Tr300×4	202	22	219	＊24156EMK30D1	**;AH 24156H**	300	316	394	440	5	16.3	HN60
	Tr310×5	155	24	163	＊22256EMKD1	**;AH 2256**	300	333	437	480	5	15.2	HN62
	Tr310×5	212	30	220	＊23256EMKD1	**;AH 2356**	300	331	426	480	5	21.6	HN62
	Tr310×5	212	30	220	＊22356EMKD1	**;AH 2356**	306	349	489	554	6	21.6	HN62
280	Tr320×5	145	26	153	＊23060EMKD1	**;AH 3060**	315	338	413	445	4	14.4	HNL64
	Tr310×5	184	24	202	＊24060EMK30D1	**;AH 24060H**	315	332	401	445	4	15.5	HN62
	Tr330×5	192	30	200	＊23160EMKD1	**;AH 3160**	320	345	436	480	5	20.8	HN66
	Tr320×5	224	24	242	＊24160EMK30D1	**;AH 24160H**	320	340	425	480	5	19.5	HN64
	Tr330×5	170	26	178	＊22260EMKD1	**;AH 2260**	320	358	469	520	5	18.1	HN66
	Tr330×5	228	34	236	＊23260EMKD1	**;AH 3260**	320	352	461	520	5	26	HN66
300	Tr345×5	149	27	157	＊23064EMKD1	**;AH 3064**	335	360	433	465	4	16	HNL69
	Tr340×5	184	24	202	＊24064EMK30D1	**;AH 24064H**	335	352	423	465	4	16.6	HN68
	Tr350×5	209	31	217	＊23164EMKD1	**;AH 3164**	340	373	468	520	5	24.5	HN70
	Tr340×5	242	24	260	＊24164EMK30D1	**;AH 24164H**	340	363	457	520	5	21.4	HN68
	Tr350×5	180	27	190	＊22264EMKD1	**;AH 2264**	340	383	510	560	5	20.2	HN70
	Tr350×5	246	36	254	＊23264EMKD1	**;AH 3264**	340	376	493	560	5	30.6	HN70
320	Tr365×5	162	28	171	＊23068EMKD1	**;AH 3068**	358	384	466	502	5	19.5	HNL73
	Tr360×5	206	26	225	＊24068EMK30D1	**;AH 24068H**	358	377	456	502	5	21.7	HNL72
	Tr370×5	225	33	234	＊23168EMKD1	**;AH 3168**	360	393	500	560	5	29	HN74
	Tr360×5	269	26	288	＊24168EMK30D1	**;AH 24168H**	360	385	486	560	5	27.1	HNL72
340	Tr385×5	167	30	176	＊23072EMKD1	**;AH 3072**	378	405	488	522	5	21	HNL77
	Tr380×5	206	26	226	＊24072EMK30D1	**;AH 24072H**	378	398	478	522	5	22.7	HNL76
	Tr400×5	229	35	238	23172BK	**;AH 3172**	382	417	520	578	5	33	HN80
	Tr380×5	269	26	289	24172BK30	**;AH 24172H**	382	414	507	578	5	29.6	HNL76
360	Tr410×5	170	31	180	＊23076EMKD1	**;AH 3076**	398	425	509	542	5	23.2	HNL82
	Tr400×5	208	28	228	＊24076EMK30D1	**;AH 24076H**	398	420	499	542	5	23.7	HNL80
	Tr420×5	232	36	242	23176BK	**;AH 3176**	402	436	540	598	5	35.7	HN84
	Tr400×5	271	28	291	24176BK30	**;AH 24176H**	402	431	529	598	5	31.3	HNL80

1) Standard thread shapes and dimensions are as per **JIS B 0216** (metric trapezoidal screw thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Bearing numbers marked "＊" designate **ULTAGE Series**.
4) Withdrawal sleeve numbers appended with the suffix "**H**" signify the high pressure oil (hydraulic) design.
5) Indicates withdrawal sleeve mass.
6) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-230** to **B-233** for bearing dimensions, rated loads, and mass.

Withdrawal Sleeves

NTN

(For spherical roller bearings)



d_1 380 ～ 460mm

d_1	Thread nominal dimension[1] G	B_3	G_1	B_4[2]	Bearing	Withdrawal sleeve	d_a Min.	d_a Max.	D_a Min.	D_a Max.	r_{as} Max.	Mass[4] kg (approx.)	Applied nut number Bearing number[5]
		mm			Numbers[3]		mm						
380	Tr430×5	183	33	193	23080BK	**;AH 3080**	422	451	542	578	5	27.3	HNL86
	Tr420×5	228	28	248	24080BK30	**;AH 24080H**	422	446	528	578	5	27.1	HNL84
	Tr440×5	240	38	250	23180BK	**;AH 3180**	428	458	568	622	6	39.5	HN88
	Tr420×5	278	28	298	24180BK30	**;AH 24180H**	428	452	552	622	6	34.4	HNL84
400	Tr450×5	186	34	196	23084BK	**;AH 3084**	442	471	562	598	5	29	HNL90
	Tr440×5	230	30	252	24084BK30	**;AH 24084H**	442	465	551	598	5	29	HNL88
	Tr460×5	266	40	276	23184BK	**;AH 3184**	448	488	611	672	6	46.5	HN92
	Tr440×5	310	30	332	24184BK30	**;AH 24184H**	448	477	592	672	6	40.3	HNL88
420	Tr470×5	194	35	205	23088BK	**;AHX 3088**	468	490	585	622	6	32	HNL94
	Tr460×5	242	30	264	24088BK30	**;AH 24088H**	468	485	576	622	6	31.9	HNL92
	Tr480×5	270	42	281	23188BK	**;AHX 3188**	468	504	627	692	6	49.8	HN96
	Tr460×5	310	30	332	24188BK30	**;AH 24188H**	468	498	614	692	6	42.3	HN92
440	Tr490×5	202	37	213	23092BK	**;AHX 3092**	488	512	613	652	6	35.2	HNL98
	Tr510×6	285	43	296	23192BK	**;AHX 3192**	496	534	660	724	7.5	57.9	HN102
	Tr480×5	332	32	355	24192BK30	**;AH 24192H**	496	523	645	724	7.5	47.4	HNL96
460	Tr520×6	205	38	217	23096BK	**;AHX 3096**	508	532	633	672	6	39.2	HNL104
	Tr530×6	295	45	307	23196BK	**;AHX 3196**	516	554	687	754	7.5	63.1	HN106

1) Standard thread shapes and dimensions are as per **JIS B 0216** (metric trapezoidal screw thread).
2) Indicates reference dimensions before withdrawal sleeves are attached.
3) Withdrawal sleeve numbers appended with the suffix "**H**" signify the high pressure oil (hydraulic) design.
4) Indicates withdrawal sleeve mass.
5) Indicates the number of nuts to be used at the time of disassembly. Refer to pages **D-2** to **D-10** for nut dimensions.
Note: Refer to pages **B-232** to **B-235** for bearing dimensions, rated loads, and mass.