

Self-Aligning Ball Bearings



Self-Aligning Ball Bearings

NTN



1. Design features and characteristics

The outer ring raceway of self-aligning ball bearings forms a spherical surface whose center is common to the bearing center. The inner ring of the bearing has two raceways.

The balls, cage, and inner ring of these bearings are capable of shifting in order to compensate for a certain degree of misalignment with the outer rings. As a result, the bearing is able to align itself and compensate for shaft / housing finishing unevenness, bearing fitting error, and other sources of misalignment as shown in Fig. 1.

Since axial load capacity is limited, self-aligning ball bearings are not suitable for applications with heavy axial loads.

It is recommended to use an adapter on a self-aligning ball bearing with a tapered bore diameter for ease of installation and disassembly. These bearings and adapters are often used on drive shaft applications.

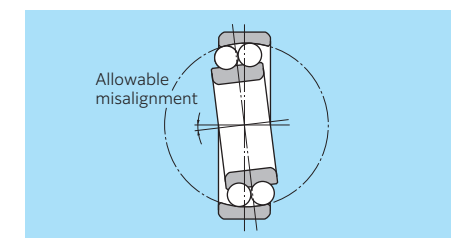


Fig. 1

2. Standard cage type

Pressed cages are the standard. However, 2321S and 2322S are equipped with a machined cage.

Table 1 Standard cage types of spherical ball bearings

Cage type	Pressed cage		Machined cage
Bearing series or model	12 and 13 series	22 and 23 series	2321S, 2322S

3. Ball protrusion

Bearings with part numbers listed in **Table 2** below have balls which protrude slightly from the bearing face as illustrated in **Fig. 2**. The total width dimensions are shown in **Table 2**.

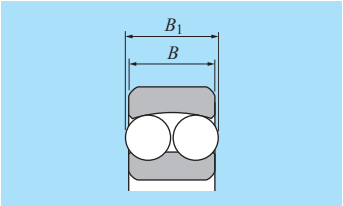


Fig. 2

Table 2 Unit: mm

Bearing numbers	Width dimension B	Total width dimension B_1
2222S (K)	53	54
2316S (K)	58	59
2319S (K)	67	68
2320S (K)	73	74
2321S	77	78
2322S (K)	80	81
1318S (K)	43	46
1319S (K)	45	49
1320S (K)	47	53
1321S	49	55
1322S (K)	50	56

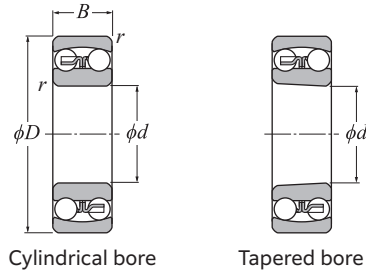
4. Allowable misalignment angle

The allowable misalignment angle can be determined by the following function. This degree of allowable misalignment may be limited by the design of mating components around the bearing.

Normal load 1/15

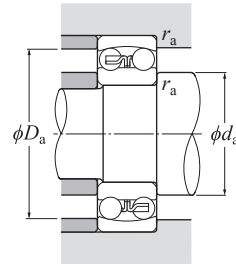
5. Precautions

Self-aligning ball bearings are unable to support large axial loads and therefore axial loading shall be limited.
Please consider using spherical roller bearings when a large axial load is to be applied.



Cylindrical bore

Tapered bore



d 10–35 mm

Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing numbers		Installation-related dimensions		
	mm	dynamic		min ⁻¹		Cylindrical bore	Tapered bore ²⁾	mm		
d	D	B	r _{s min} ¹⁾	C _r	C _{0r}	C _u		d _a Min.	D _a Max.	r _{as} Max.
10	30	9	0.6	5.55	1.19	0.049	22 000	28 000	1200S	—
	30	14	0.6	7.45	1.59	0.067	24 000	28 000	2200S	—
	35	11	0.6	7.35	1.62	0.074	20 000	24 000	1300S	—
	35	17	0.6	9.20	2.01	0.096	18 000	22 000	2300S	—
12	32	10	0.6	5.70	1.27	0.053	22 000	26 000	1201S	—
	32	14	0.6	7.75	1.73	0.089	22 000	26 000	2201S	—
	37	12	1	9.65	2.16	0.078	18 000	22 000	1301S	—
	37	17	1	12.1	2.73	0.120	17 000	22 000	2301S	—
15	35	11	0.6	7.60	1.75	0.072	18 000	22 000	1202S	—
	35	14	0.6	7.80	1.85	0.095	18 000	22 000	2202S	—
	42	13	1	9.70	2.29	0.081	16 000	20 000	1302S	—
	42	17	1	12.3	2.91	0.130	14 000	18 000	2302S	—
17	40	12	0.6	8.00	2.01	0.083	16 000	20 000	1203S	—
	40	16	0.6	9.95	2.42	0.130	16 000	20 000	2203S	—
	47	14	1	12.7	3.20	0.110	14 000	17 000	1303S	—
	47	19	1	14.7	3.55	0.160	13 000	16 000	2303S	—
20	47	14	1	10.0	2.61	0.110	14 000	17 000	1204S	1204SK
	47	18	1	12.8	3.30	0.140	14 000	17 000	2204S	2204SK
	52	15	1.1	12.6	3.35	0.140	12 000	15 000	1304S	1304SK
	52	21	1.1	18.5	4.70	0.210	11 000	14 000	2304S	2304SK
25	52	15	1	12.2	3.30	0.130	12 000	14 000	1205S	1205SK
	52	18	1	12.4	3.45	0.200	12 000	14 000	2205S	2205SK
	62	17	1.1	18.2	5.00	0.150	10 000	13 000	1305S	1305SK
	62	24	1.1	24.9	6.60	0.290	9 500	12 000	2305S	2305SK
30	62	16	1	15.8	4.65	0.190	10 000	12 000	1206S	1206SK
	62	20	1	15.3	4.55	0.260	10 000	12 000	2206S	2206SK
	72	19	1.1	21.4	6.30	0.190	8 500	11 000	1306S	1306SK
	72	27	1.1	32.0	8.75	0.380	8 000	10 000	2306S	2306SK
35	72	17	1.1	15.9	5.10	0.210	8 500	10 000	1207S	1207SK
	72	23	1.1	21.7	6.60	0.320	8 500	10 000	2207S	2207SK
	80	21	1.5	25.3	7.85	0.280	7 500	9 500	1307S	1307SK
	80	31	1.5	40.0	11.3	0.480	7 100	9 000	2307S	2307SK

1) Smallest allowable dimension for chamfer dimension r.

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

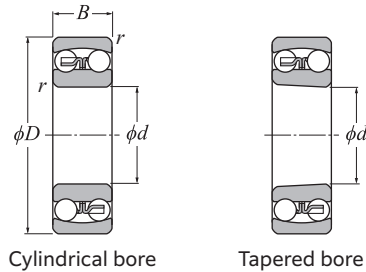
$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y ₁	0.65	Y ₂

Static equivalent radial load

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

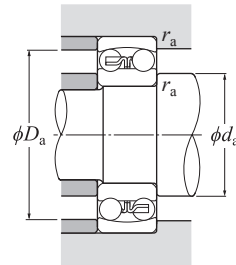
For values of e, Y₁, Y₂ and Y₀ see the table below.

Constant	Axial load factors				Mass (approx.) kg
e	Y ₁	Y ₂	Y ₀		Cylindrical bore
0.32	2.00	3.10	2.10		0.034
0.64	0.98	1.50	1.00		0.046
0.35	1.80	2.80	1.90		0.059
0.71	0.89	1.40	0.93		0.078
0.36	1.80	2.70	1.80		0.041
0.58	1.10	1.70	1.10		0.051
0.33	1.90	2.90	2.00		0.068
0.60	1.10	1.60	1.10		0.087
0.32	2.00	3.10	2.10		0.050
0.50	1.30	1.90	1.30		0.058
0.33	1.90	2.90	2.00		0.101
0.51	1.20	1.90	1.30		0.113
0.31	2.00	3.10	2.10		0.074
0.50	1.30	1.90	1.30		0.089
0.32	2.00	3.10	2.10		0.130
0.51	1.20	1.90	1.30		0.160
0.29	2.20	3.40	2.30		0.120
0.47	1.30	2.10	1.40		0.142
0.29	2.20	3.40	2.30		0.164
0.50	1.20	1.90	1.30		0.207
0.28	2.30	3.50	2.40		0.140
0.41	1.50	2.40	1.60		0.160
0.28	2.30	3.50	2.40		0.261
0.47	1.40	2.10	1.40		0.332
0.25	2.50	3.90	2.60		0.220
0.38	1.60	2.50	1.70		0.262
0.26	2.40	3.70	2.50		0.391
0.44	1.40	2.20	1.50		0.500
0.23	2.70	4.20	2.80		0.330
0.37	1.70	2.60	1.80		0.403
0.26	2.50	3.80	2.60		0.520
0.46	1.40	2.10	1.40		0.671



Cylindrical bore

Tapered bore



d 40–75 mm

Boundary dimensions				Basic load rating		Fatigue load limit kN C _u	Allowable speed		Bearing numbers		Installation-related dimensions		
mm				dynamic	static		min ⁻¹		Cylindrical bore	Tapered bore ²⁾	mm		
d	D	B	r _{s min} ¹⁾	C _r	C _{0r}		Grease lubrication	Oil lubrication					d _a Min.
40	80	18	1.1	19.3	6.50	0.260	7 500	9 000	1208S	1208SK	46.5	73.5	1
	80	23	1.1	22.4	7.35	0.390	7 500	9 000	2208S	2208SK	46.5	73.5	1
	90	23	1.5	29.8	9.70	0.300	6 700	8 500	1308S	1308SK	48.0	82.0	1.5
	90	33	1.5	45.5	13.5	0.580	6 300	8 000	2308S	2308SK	48.0	82.0	1.5
45	85	19	1.1	22.0	7.35	0.290	7 100	8 500	1209S	1209SK	51.5	78.5	1
	85	23	1.1	23.3	8.15	0.510	7 100	8 500	2209S	2209SK	51.5	78.5	1
	100	25	1.5	38.5	12.7	0.330	6 000	7 500	1309S	1309SK	53.0	92.0	1.5
	100	36	1.5	55.0	16.7	0.710	5 600	7 100	2309S	2309SK	53.0	92.0	1.5
50	90	20	1.1	22.8	8.10	0.330	6 300	8 000	1210S	1210SK	56.5	83.5	1
	90	23	1.1	23.3	8.45	0.570	6 300	8 000	2210S	2210SK	56.5	83.5	1
	110	27	2	43.5	14.1	0.350	5 600	6 700	1310S	1310SK	59.0	101	2
	110	40	2	65.0	20.2	0.860	5 000	6 300	2310S	2310SK	59.0	101	2
55	100	21	1.5	26.9	10.0	0.400	6 000	7 100	1211S	1211SK	63.0	92.0	1.5
	100	25	1.5	26.7	9.90	0.720	6 000	7 100	2211S	2211SK	63.0	92.0	1.5
	120	29	2	51.5	17.9	0.400	5 000	6 300	1311S	1311SK	64.0	111	2
	120	43	2	76.5	24.0	1.00	4 800	6 000	2311S	2311SK	64.0	111	2
60	110	22	1.5	30.5	11.5	0.460	5 300	6 300	1212S	1212SK	68.0	102	1.5
	110	28	1.5	34.0	12.6	0.840	5 300	6 300	2212S	2212SK	68.0	102	1.5
	130	31	2.1	57.5	20.8	0.510	4 500	5 600	1312S	1312SK	71.0	119	2
	130	46	2.1	88.5	28.3	1.20	4 300	5 300	2312S	2312SK	71.0	119	2
65	120	23	1.5	31.0	12.5	0.500	4 800	6 000	1213S	1213SK	73.0	112	1.5
	120	31	1.5	43.5	16.4	0.920	4 800	6 000	2213S	2213SK	73.0	112	1.5
	140	33	2.1	62.5	22.9	0.670	4 300	5 300	1313S	1313SK	76.0	129	2
	140	48	2.1	97.0	32.5	1.40	3 800	4 800	2313S	2313SK	76.0	129	2
70	125	24	1.5	35.0	13.8	0.550	4 800	5 600	1214S	—	78.0	117	1.5
	125	31	1.5	44.0	17.1	1.10	4 500	5 600	2214S	—	78.0	117	1.5
	150	35	2.1	75.0	27.7	0.690	4 000	5 000	1314S	—	81.0	139	2
	150	51	2.1	111	37.5	1.60	3 600	4 500	2314S	—	81.0	139	2
75	130	25	1.5	39.0	15.7	0.630	4 300	5 300	1215S	1215SK	83.0	122	1.5
	130	31	1.5	44.5	17.8	1.20	4 300	5 300	2215S	2215SK	83.0	122	1.5
	160	37	2.1	80.0	30.0	0.720	3 800	4 500	1315S	1315SK	86.0	149	2
	160	55	2.1	125	43.0	1.80	3 400	4 300	2315S	2315SK	86.0	149	2

1) Smallest allowable dimension for chamfer dimension r.

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

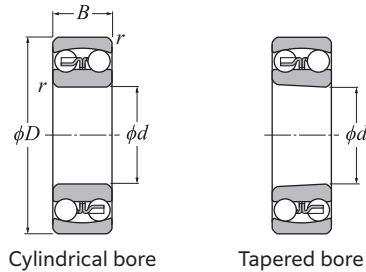
$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y ₁	0.65	Y ₂

Static equivalent radial load

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

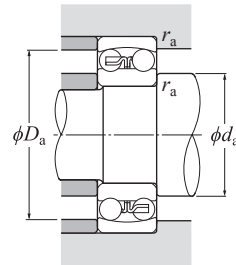
For values of e, Y₁, Y₂ and Y₀ see the table below.

Constant	Axial load factors			Mass (approx.) kg
e	Y ₁	Y ₂	Y ₀	Cylindrical bore
0.22	2.8	4.3	2.9	0.420
0.33	1.9	3.0	2.0	0.506
0.24	2.6	4.0	2.7	0.727
0.43	1.5	2.3	1.5	0.918
0.21	3.0	4.7	3.1	0.470
0.30	2.1	3.2	2.2	0.556
0.25	2.6	4.0	2.7	0.971
0.41	1.5	2.4	1.6	1.200
0.21	3.1	4.7	3.2	0.535
0.28	2.2	3.4	2.3	0.598
0.23	2.7	4.2	2.8	1.230
0.42	1.5	2.3	1.6	1.630
0.20	3.2	4.9	3.3	0.708
0.28	2.3	3.5	2.4	0.807
0.23	2.7	4.2	2.8	1.600
0.41	1.5	2.4	1.6	2.080
0.18	3.4	5.3	3.6	0.910
0.28	2.3	3.5	2.4	1.100
0.23	2.8	4.3	2.9	2.000
0.40	1.6	2.4	1.6	2.580
0.17	3.7	5.7	3.8	1.160
0.28	2.3	3.5	2.4	1.500
0.23	2.7	4.2	2.9	2.470
0.39	1.6	2.5	1.7	3.200
0.18	3.4	5.3	3.6	1.300
0.26	2.4	3.7	2.5	1.550
0.22	2.8	4.4	3.0	3.030
0.38	1.7	2.6	1.8	3.900
0.17	3.6	5.6	3.8	1.360
0.25	2.5	3.9	2.6	1.600
0.22	2.8	4.4	2.9	3.630
0.38	1.6	2.5	1.7	4.780



Cylindrical bore

Tapered bore



d 80–110 mm

Boundary dimensions				Basic load rating		Fatigue load limit	Allowable speed		Bearing numbers		Installation-related dimensions		
mm				dynamic	static		min ⁻¹		Cylindrical bore	Tapered bore ²⁾	mm		
	<i>D</i>	<i>B</i>	<i>r</i> _{s min} ¹⁾	<i>C</i> _r	<i>C</i> _{0r}	<i>C</i> _u	Grease lubrication	Oil lubrication					<i>d</i> _a Min.
80	140	26	2	40.0	17.0	0.680	4 000	5 000	1216S	1216SK	89	131	2
	140	33	2	49.0	19.9	1.30	4 000	5 000	2216S	2216SK	89	131	2
	170	39	2.1	89.0	33.0	0.800	3 600	4 300	1316S	1316SK	91	159	2
	170	58	2.1	130	45.0	1.90	3 200	4 000	2316S	2316SK	91	159	2
85	150	28	2	49.5	20.8	0.830	3 800	4 500	1217S	1217SK	94	141	2
	150	36	2	58.5	23.6	1.50	3 800	4 800	2217S	2217SK	94	141	2
	180	41	3	98.5	38.0	0.950	3 400	4 000	1317S	1317SK	98	167	2.5
	180	60	3	142	51.5	2.10	3 000	3 800	2317S	2317SK	98	167	2.5
90	160	30	2	57.5	23.5	0.940	3 600	4 300	1218S	1218SK	99	151	2
	160	40	2	70.5	28.7	1.80	3 600	4 300	2218S	2218SK	99	151	2
	190	43	3	117	44.5	1.20	3 200	3 800	1318S	1318SK	103	177	2.5
	190	64	3	154	57.5	2.40	2 800	3 600	2318S	2318SK	103	177	2.5
95	170	32	2.1	64.0	27.1	1.10	3 400	4 000	1219S	1219SK	106	159	2
	170	43	2.1	84.0	34.5	2.00	3 400	4 000	2219S	2219SK	106	159	2
	200	45	3	129	51.0	1.40	3 000	3 600	1319S	1319SK	108	187	2.5
	200	67	3	161	64.5	2.70	2 800	3 400	2319S	2319SK	108	187	2.5
100	180	34	2.1	69.5	29.7	1.20	3 200	3 800	1220S	1220SK	111	169	2
	180	46	2.1	94.5	38.5	2.30	3 200	3 800	2220S	2220SK	111	169	2
	215	47	3	140	57.5	1.60	2 800	3 400	1320S	1320SK	113	202	2.5
	215	73	3	187	79.0	3.30	2 400	3 200	2320S	2320SK	113	202	2.5
105	190	36	2.1	75.0	32.5	1.30	3 000	3 600	1221S	—	116	179	2
	190	50	2.1	109	45.0	2.60	3 000	3 600	2221S	—	116	179	2
	225	49	3	154	64.5	1.80	2 600	3 200	1321S	—	118	212	2.5
	225	77	3	200	87.0	3.60	2 400	3 000	2321S³⁾	—	118	212	2.5
110	200	38	2.1	87.0	38.5	1.50	2 800	3 400	1222S	1222SK	121	189	2
	200	53	2.1	122	51.5	2.90	2 800	3 400	2222S	2222SK	121	189	2
	240	50	3	161	72.5	2.10	2 400	3 000	1322S	1322SK	123	227	2.5
	240	80	3	211	94.5	3.90	2 200	2 800	2322S³⁾	2322SK	123	227	2.5

1) Smallest allowable dimension for chamfer dimension r .

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12.

3) A machined cage is the standard for 2321S and 2322S(K).

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

Static equivalent radial load

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

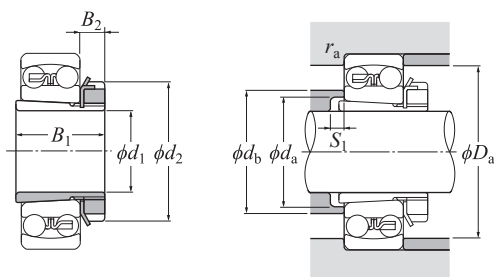
For values of e , Y_1 , Y_2 and Y_0 see the table below.

Constant	Axial load factors				Mass (approx.) kg Cylindrical bore
e	Y_1	Y_2	Y_0		
0.16	3.9	6.0	4.1	1.68	
0.25	2.5	3.9	2.7	2.02	
0.22	2.9	4.5	3.1	4.24	
0.39	1.6	2.5	1.7	5.63	
0.17	3.7	5.7	3.8	2.10	
0.25	2.5	3.9	2.6	2.56	
0.21	2.9	4.6	3.1	5.03	
0.37	1.7	2.6	1.8	6.56	
0.17	3.8	5.8	3.9	2.56	
0.27	2.4	3.7	2.5	3.22	
0.22	2.8	4.3	2.9	5.83	
0.38	1.7	2.6	1.7	7.75	
0.17	3.7	5.8	3.9	3.12	
0.27	2.4	3.7	2.5	3.96	
0.23	2.8	4.3	2.9	6.79	
0.38	1.7	2.6	1.8	8.97	
0.17	3.6	5.6	3.8	3.74	
0.27	2.4	3.7	2.5	4.71	
0.24	2.7	4.1	2.8	8.40	
0.38	1.7	2.6	1.8	11.5	
0.18	3.6	5.5	3.7	4.43	
0.28	2.3	3.5	2.4	5.73	
0.23	2.7	4.2	2.9	9.58	
0.38	1.7	2.6	1.7	14.5	
0.18	3.7	5.7	3.9	5.21	
0.28	2.2	3.5	2.3	6.75	
0.22	2.8	4.4	3.0	11.5	
0.37	1.7	2.6	1.8	17.5	

Adapters

(For self-aligning ball bearings)

NTN



d₁ 17–50 mm

Boundary dimensions				Numbers		Installation-related dimensions					Mass ¹⁾
mm				Bearing	Adapter	d _a	d _b	mm	D _a	r _{as}	kg
d ₁	B ₁	d ₂	B ₂			Min.	Max.	S ₁	Max.	Max.	(approx.)
17	24	32	7	1204SK	;H204	23	27	5	41	1	0.041
	28	32	7	2204SK	;H304	24	28	5	41	1	0.045
	28	32	7	1304SK	;H304	24	31	8	45	1	0.045
	31	32	7	2304SK	;H2304	24	28	5	45	1	0.049
20	26	38	8	1205SK	;H205X	28	33	5	46	1	0.07
	29	38	8	2205SK	;H305X	29	33	5	46	1	0.075
	29	38	8	1305SK	;H305X	29	37	6	55	1	0.075
	35	38	8	2305SK	;H2305X	29	34	5	55	1	0.087
25	27	45	8	1206SK	;H206X	33	39	5	56	1	0.099
	31	45	8	2206SK	;H306X	34	39	5	56	1	0.109
	31	45	8	1306SK	;H306X	34	44	6	65	1	0.109
	38	45	8	2306SK	;H2306X	35	40	5	65	1	0.126
30	29	52	9	1207SK	;H207X	38	46	5	65	1	0.125
	35	52	9	2207SK	;H307X	39	45	5	65	1	0.142
	35	52	9	1307SK	;H307X	39	50	7	71.5	1.5	0.142
	43	52	9	2307SK	;H2307X	40	46	5	71.5	1.5	0.165
35	31	58	10	1208SK	;H208X	44	52	5	73	1	0.174
	36	58	10	2208SK	;H308X	44	50	5	73	1	0.189
	36	58	10	1308SK	;H308X	44	56	5	81.5	1.5	0.189
	46	58	10	2308SK	;H2308X	45	52	5	81.5	1.5	0.224
40	33	65	11	1209SK	;H209X	49	57	5	78	1	0.227
	39	65	11	2209SK	;H309X	49	57	8	78	1	0.248
	39	65	11	1309SK	;H309X	49	61	5	91.5	1.5	0.248
	50	65	11	2309SK	;H2309X	50	58	5	91.5	1.5	0.28
45	35	70	12	1210SK	;H210X	53	62	5	83	1	0.274
	42	70	12	2210SK	;H310X	54	63	10	83	1	0.303
	42	70	12	1310SK	;H310X	54	67	5	100	2	0.303
	55	70	12	2310SK	;H2310X	56	65	5	100	2	0.362
50	37	75	12	1211SK	;H211X	60	70	6	91.5	1.5	0.308

1) Indicates adapter mass.

Note: 1. Refer to page B-82 through page B-85 for bearing dimensions, basic rated loads, and mass.

2. Adapters for bearing series 12 can also be used with series H2 and H3. Caution: the B₁ dimension of series H3 is longer than that of series H2.

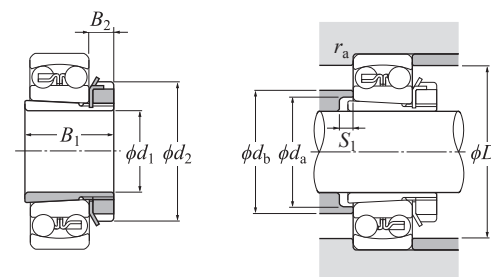
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washers with straight inner tabs.

4. Refer to page D-2 through page D-7 and page D-12 through page D-14 for adapter locknut and washer dimensions.

Adapters

(For self-aligning ball bearings)

NTN



d₁ 50–85 mm

Boundary dimensions				Numbers		Installation-related dimensions					Mass ¹⁾
mm				Bearing	Adapter	d _a	d _b	mm	D _a	r _{as}	kg
d ₁	B ₁	d ₂	B ₂			Min.	Max.	S ₁	Max.	Max.	(approx.)
50	45	75	12	2211SK	;H311X	60	69	11	91.5	1.5	0.345
	45	75	12	1311SK	;H311X	60	73	6	110	2	0.345
	59	75	12	2311SK	;H2311X	61	71	6	110	2	0.42
	38	80	13	1212SK	;H212X	64	76	5	101.5	1.5	0.346
55	47	80	13	2212SK	;H312X	65	75	9	101.5	1.5	0.394
	47	80	13	1312SK	;H312X	65	79	5	118	2	0.394
	62	80	13	2312SK	;H2312X	66	77	5	118	2	0.481
	40	85	14	1213SK	;H213X	70	83	5	111.5	1.5	0.401
60	50	85	14	2213SK	;H313X	70	81	8	111.5	1.5	0.458
	50	85	14	1313SK	;H313X	70	85	5	128	2	0.458
	65	85	14	2313SK	;H2313X	72	84	5	128	2	0.557
	43	98	15	1215SK	;H215X	80	93	5	121.5	1.5	0.707
65	55	98	15	2215SK	;H315X	80	93	12	121.5	1.5	0.831
	55	98	15	1315SK	;H315X	80	97	5	148	2	0.831
	73	98	15	2315SK	;H2315X	82	96	5	148	2	1.05
	46	105	17	1216SK	;H216X	85	100	5	130	2	0.882
70	59	105	17	2216SK	;H316X	86	98	12	130	2	1.03
	59	105	17	1316SK	;H316X	86	103	5	158	2	1.03
	78	105	17	2316SK	;H2316X	87	103	5	158	2	1.28
	50	110	18	1217SK	;H217X	90	106	6	140	2	1.02
75	63	110	18	2217SK	;H317X	91	104	12	140	2	1.18
	63	110	18	1317SK	;H317X	91	110	6	166	2.5	1.18
	82	110	18	2317SK	;H2317X	94	110	6	166	2.5	1.45
	52	120	18	1218SK	;H218X	95	111	6	150	2	1.19
80	65	120	18	2218SK	;H318X	96	112	10	150	2	1.37
	65	120	18	1318SK	;H318X	96	116	6	176	2.5	1.37
	86	120	18	2318SK	;H2318X	99	117	6	176	2.5	1.69
	55	125	19	1219SK	;H219X	101	118	7	158	2	1.37
85	68	125	19	2219SK	;H319X	102	117	9	158	2	1.56

1) Indicates adapter mass.

Note: 1. Refer to page B-84 through page B-87 for bearing dimensions, basic rated loads, and mass.

2. Adapters for bearing series 12 can also be used with series H2 and H3. Caution: the B₁ dimension of series H3 is longer than that of series H2.

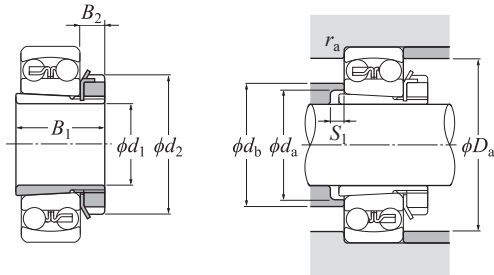
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washers with straight inner tabs.

4. Refer to page D-2 through page D-7 and page D-12 through page D-14 for adapter locknut and washer dimensions.

Adapters

(For self-aligning ball bearings)

NTN



d_1 85–100 mm

Boundary dimensions				Numbers		Installation-related dimensions					Mass ¹⁾
mm				Bearing	Adapter	d_a Min.	d_b Max.	mm S_1 Min.	D_a Max.	r_{as} Max.	kg (approx.)
d_1	B_1	d_2	B_2								
85	68	125	19	1319SK	;H319X	102	123	7	186	2.5	1.56
	90	125	19	2319SK	;H2319X	105	123	7	186	2.5	1.92
90	58	130	20	1220SK	;H220X	106	125	7	168	2	1.49
	71	130	20	2220SK	;H320X	107	123	8	168	2	1.69
	71	130	20	1320SK	;H320X	107	130	7	201	2.5	1.69
	97	130	20	2320SK	;H2320X	110	129	7	201	2.5	2.15
100	63	145	21	1222SK	;H222X	116	138	7	188	2	1.93
	77	145	21	2222SK	;H322X	117	137	6	188	2	2.18
	77	145	21	1322SK	;H322X	117	150	9	226	2.5	2.18
	105	145	21	2322SK	;H2322X	121	142	7	226	2.5	2.74

1) Indicates adapter mass.

Note: 1. Refer to page B-86 through page B-87 for bearing dimensions, basic rated loads, and mass.

2. Adapters for bearing series 12 can also be used with series H2 and H3. Caution: the B_1 dimension of series H3 is longer than that of series H2.

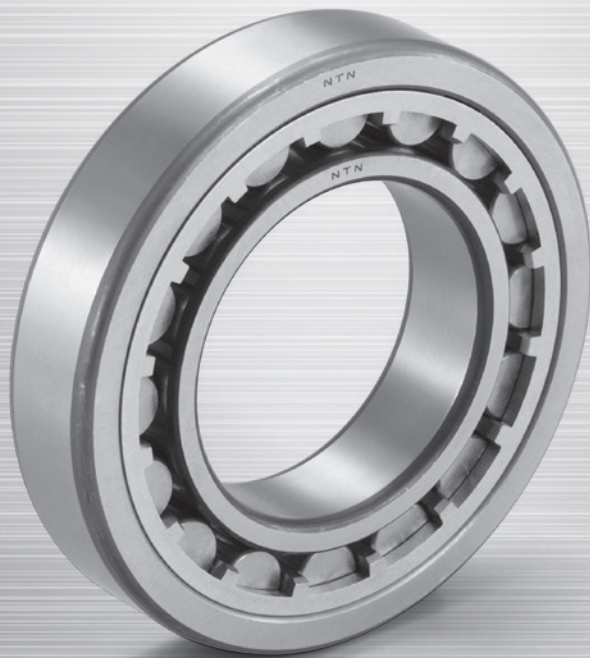
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washers with straight inner tabs.

4. Refer to page D-2 through page D-7 and page D-12 through page D-14 for adapter locknut and washer dimensions.

Adapters

NTN

Cylindrical Roller Bearings



Cylindrical roller bearing



E Type cylindrical roller bearing



Double-row cylindrical roller bearing

1. Types, design features, and characteristics

Cylindrical roller bearings can accommodate heavy radial loads due to the line contact formed between their rolling elements and raceways. These bearings are also suitable for high speed applications since the rollers are guided by either inner or outer ring ribs. Cylindrical roller bearings are separable, allowing them to be easily installed and disassembled even when interference fits are required.

Among the various types of cylindrical roller bearings, E type and EA type have a high load capacity while maintaining standard boundary dimensions. HT type has a large axial load

capacity, and HL type provides extended fatigue life in poor lubrication conditions. Multiple row bearing arrangements are also available.

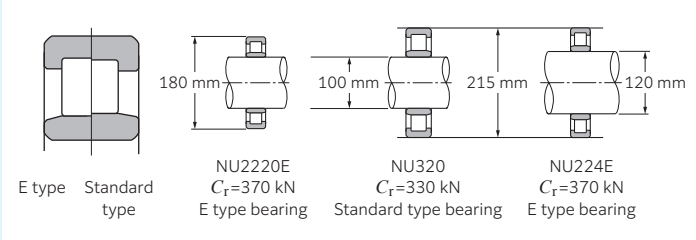
For extremely heavy load applications, the non-separable full complement SL type bearing offers special advantages. For SL type and four-row cylindrical roller bearings, see section "C. Special application bearings."

Table 1 shows the various types and characteristics of single row cylindrical roller bearings. **Table 2** shows the characteristics of non-standard type cylindrical roller bearings.

Table 1 Cylindrical roller bearing types and characteristics

Type code	Design	Characteristics
NU type N type	 NU type  N type	● NU type outer rings have two ribs. The outer ring, roller, and cage assembly can be separated from the inner ring. ● N type inner rings have two ribs. The inner ring, roller, and cage assembly can be separated from the outer ring. ● Unable to accommodate any axial loading. ● This is widely used as the floating side bearing in a fixed-float arrangement.
NJ type NF type	 NJ type  NF type	● NJ type has two ribs on the outer ring, a single rib on the inner ring; NF type has a single rib on the outer ring, and two ribs on the inner ring. ● Can receive single direction axial loads. ● When there is no distinction between the fixed side and floating side bearing, these types can be used as a pair in close proximity.
NUP type NH type (NJ + HJ)	 NUP type  NH type	● NUP type has a collar ring attached to the ribless side of the inner ring; NH type is NJ type with an L type collar ring attached. All of these collar rings are separable, and therefore it is necessary to fix the inner ring axially. ● Can accommodate axial loads in either direction. ● Widely used as the shaft's fixed-side bearing.

Table 2 Non-standard type cylindrical roller bearing characteristics

Designation	Characteristics
E type and EA type Cylindrical roller bearing	- Boundary dimensions are the same as the standard type, but the diameter, length and number of the rollers have been increased, resulting in higher load capacity. - Identified by the addition of "E" to the end of the basic roller number. - Enables compact design due increased load rating. - Rollers' inscribed circle diameter differs from the standard type rollers and therefore cannot be interchanged. - EA type bearings are ULTAGE series¹⁾.  E type Standard type NU2220E $C_r=370$ kN E type bearing NU320 $C_r=330$ kN Standard type bearing NU224E $C_r=370$ kN E type bearing Note: In the dimension tables, both E type and EA type are listed.
Cylindrical roller bearing for axial loads (HT type)	- Can accommodate larger axial loads than the standard type due to improved geometry of the rib roller end surface. - Please consult NTN Engineering concerning necessary considerations, such as load, lubricant, and installation conditions.
Double-row cylindrical roller bearing	- NN type and NNU type are available. - Widely used for applications requiring thin-walled bearings, such the main shafts of machine tools, rolling machine rollers, and in printing equipment. - Internal radial clearance is adjusted for the spindle of machine tools by pressing the tapered bore of the inner ring on a tapered shaft. Remarks: For precision bearings for machine tools, see the special catalog "Precision Rolling Bearings (CAT. No. 2260/E)."

1) ULTAGE series cylindrical roller bearings are the products developed to meet the demands of "long operating life," "improved load capability," and "higher speed" that are required for various industrial machinery. For details, see the special catalog "ULTAGE series Cylindrical Roller Bearings (CAT. No. 3037/E)."

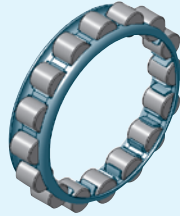
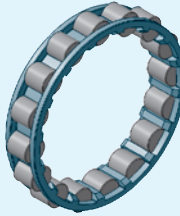
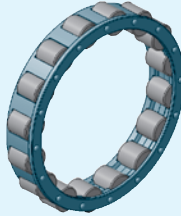
2. Standard cage type

Table 3 shows the standard cage types for cylindrical roller bearings.

The basic load ratings listed in the dimension charts correspond to use of the standard cages listed in Table 3. The basic load ratings

listed in the dimension tables are for standard configurations. These ratings can change when a different cage type and number of rolling elements is utilized.

Table 3 Standard cage types

Cage type	Resin cage	Pressed cage	Machined cage	
			Single type	Studded double type
Bearing series				
NU10	—	—	—	1005 to 10/500
NU2	—	208 to 230	232 to 240	244 to 264
NU2E	—	—	220E to 240E	—
NU2EA	204EA to 219EA	—	—	—
NU22	—	2208 to 2230	2232 to 2240	2244 to 2264
NU22E	—	—	2219E to 2240E	—
NU22EA	2204EA to 2218EA	—	—	—
NU3	—	308 to 324	326 to 330	332 to 356
NU3E	—	—	316E to 332E	—
NU3EA	304EA to 315EA	—	—	—
NU23	—	2308 to 2320	2322 to 2330	2332 to 2356
NU23E	—	—	2316E to 2332E	—
NU23EA	2304EA to 2315EA	—	—	—
NU4	—	405 to 416	—	—

Note: 1. Within the same bearing series, cage type is constant regardless of the cylindrical roller bearing type (NJ, NUP, N, NF).
2. For high speed and other special applications, machined cages can be manufactured when necessary. Consult **NTN** Engineering.
3. Among EA type bearings that use resin cages as standard, certain varieties use pressed cages. Consult **NTN** Engineering.
4. Although machined cages are the standard for two-row cylindrical roller bearings, resin cages may also be used in some of these bearings for machine tool applications.

3. Allowable misalignment

Edge loading due to misalignment under general load conditions should be avoided to prevent premature bearing failure. The maximum allowable misalignment based on bearing series can be found below. The values apply when the bearings are to be used as the floating side of NU and N types. For NJ, NUP, and NH types that are to be used for the fixed side, consult **NTN Engineering**. Depending on the magnitude of the axial load, the edge loading may exceed recommended limits, which could lead to a reduction in bearing life.

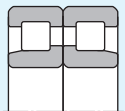
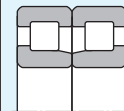
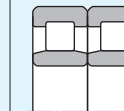
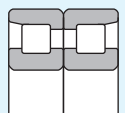
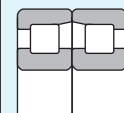
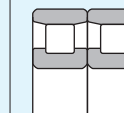
- Bearing series 0 or 1 1/1 000
- Bearing series 2 1/2 000
- Bearing series 0, 1, and 2 single-row ULTAGE 1/500
- Double-row cylindrical roller bearings¹⁾ 1/2 000

1) Does not include high precision bearings for machine tool main shaft applications.

4. Combinations of cylindrical roller bearings

Table 4 shows the representative combinations of bearings.

Table 4 Combination type

Back-to-back arrangement (DB)	Face-to-face arrangement (DF)	Symmetrical parts arrangement (D2)
		
NJ type	NJ type	NU type
		
NF type	NF type	N type

Note: 1. Bearings are manufactured in a set so that two bearings receive a load evenly; therefore, they must be assembled together with identically numbered bearings and not mixed with other arrangements.
2. Triplex arrangements of bearings are also available. Consult **NTN Engineering** for details.

5. Tolerance of inscribed circle diameter and circumscribed circle diameter of rollers of interchangeable cylindrical roller bearings

Table 5 Tolerance of inscribed circle diameter and circumscribed circle diameter of rollers of interchangeable cylindrical roller bearings Unit: μm

Nominal bore diameter d mm		Dimensional tolerance of roller inscribed circle diameter ΔF_w		Dimensional tolerance of roller circumscribed circle diameter ΔE_w	
Over	Incl.	Upper	Lower	Upper	Lower
17 ¹⁾	20	+10	0	0	-10
20	50	+15	0	0	-15
50	120	+20	0	0	-20
120	200	+25	0	0	-25
200	250	+30	0	0	-30
250	315	+35	0	0	-35
315	400	+40	0	0	-40
400	500	+45	0	0	-45

1) 17 mm is included in this dimensional division.

Note: Interchangeable cylindrical roller bearings are bearings having the same number in the group. The bearing function is not impaired even if an outer ring is combined with an inner ring with rollers or an inner ring is combined with an outer ring with rollers.

6. Allowable speed of cylindrical roller bearing 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. Operation at excessive temperatures will significantly deteriorate the lubricant 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 reference speed limit which allows for satisfactory heat dissipation and lubrication conditions before adversely affecting the bearing. The allowable speed of ULTAGE series cylindrical 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: ISO VG32) supplied at 1 liter/min under an operating load of 5 % of the basic static load rating C_{0r} .

[Grease lubrication]

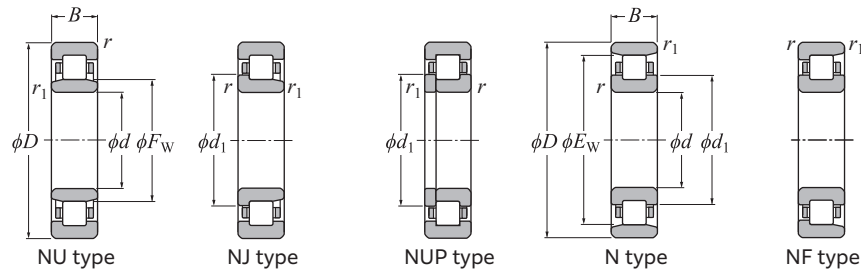
The allowable speed for grease lubrication is the speed at which the outer ring temperature reaches 80 °C with lithium-based grease (consistency: NLGI3) filled 20 to 30 % of the free space under an operating load of 5 % of the basic static load rating C_{0r} .

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 under vibration or impact conditions, please consult **NTN Engineering**.

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



d 20–45 mm

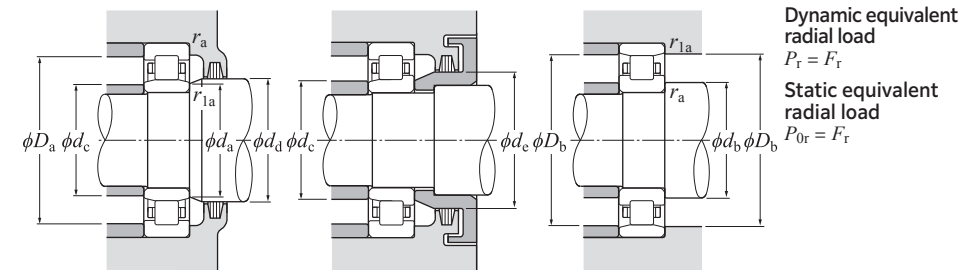
Boundary dimensions					Basic load rating		Fatigue load limit kN C _u	Allowable speed ²⁾		Bearing number ^{3) 4) 5)}				
mm					dynamic	static		Grease lubrication	min ⁻¹ Oil lubrication	NU type	NJ type	NUP type	N type	NF type
d	D	B	r _{s min} ¹⁾	r _{1s min} ¹⁾	C _r	C _{0r}								
20	47	14	1	0.6	32.5	24.7	3.00	15 000	21 600	*NU204EA	NJ	NUP	N	NF
	47	18	1	0.6	38.5	31.0	3.75	14 000	19 200	*NU2204EA	NJ	NUP	N	NF
	52	15	1.1	0.6	37.5	26.9	3.25	13 000	18 000	*NU304EA	NJ	NUP	N	NF
	52	21	1.1	0.6	49.5	39.0	4.75	12 000	16 800	*NU2304EA	NJ	NUP	N	NF
25	47	12	0.6	0.3	16.7	14.1	1.72	16 000	19 000	NU1005	NJ	NUP	N	—
	52	15	1	0.6	34.5	27.7	3.40	13 000	18 000	*NU205EA	NJ	NUP	N	NF
	52	18	1	0.6	41.5	34.5	4.25	11 000	15 600	*NU2205EA	NJ	NUP	N	NF
	62	17	1.1	1.1	49.0	37.5	4.55	11 000	15 600	*NU305EA	NJ	NUP	N	NF
	62	24	1.1	1.1	67.5	56.0	6.85	9 700	13 200	*NU2305EA	NJ	NUP	N	NF
	80	21	1.5	1.5	51.5	40.0	4.85	8 500	10 000	NU405	NJ	NUP	N	NF
30	55	13	1	0.6	21.8	19.6	2.39	14 000	16 000	NU1006	NJ	NUP	N	—
	62	16	1	0.6	46.0	37.5	4.55	11 000	15 600	*NU206EA	NJ	NUP	N	NF
	62	20	1	0.6	58.0	50.0	6.10	9 700	13 200	*NU2206EA	NJ	NUP	N	NF
	72	19	1.1	1.1	63.0	50.0	6.15	9 300	13 200	*NU306EA	NJ	NUP	N	NF
	72	27	1.1	1.1	88.0	77.5	9.45	8 300	11 600	*NU2306EA	NJ	NUP	N	NF
	90	23	1.5	1.5	69.5	55.0	6.70	7 300	8 500	NU406	NJ	NUP	N	NF
35	62	14	1	0.6	25.1	23.2	2.82	12 000	15 000	NU1007	NJ	NUP	N	—
	72	17	1.1	0.6	59.5	50.0	6.10	9 500	13 200	*NU207EA	NJ	NUP	N	NF
	72	23	1.1	0.6	73.0	65.5	7.95	8 500	12 000	*NU2207EA	NJ	NUP	N	NF
	80	21	1.5	1.1	83.5	71.0	8.65	8 100	11 500	*NU307EA	NJ	NUP	N	NF
	80	31	1.5	1.1	117	109	13.3	7 200	10 200	*NU2307EA	NJ	NUP	N	NF
	100	25	1.5	1.5	83.5	69.0	8.40	6 400	7 500	NU407	NJ	NUP	N	NF
40	68	15	1	0.6	30.5	29.0	3.55	11 000	13 000	NU1008	NJ	NUP	N	—
	80	18	1.1	1.1	48.5	43.0	5.25	9 400	11 000	*NU208	NJ	NUP	N	NF
	80	18	1.1	1.1	66.0	55.5	6.75	8 500	12 000	*NU208EA	NJ	NUP	N	NF
	80	23	1.1	1.1	64.5	62.0	7.55	8 500	10 000	*NU2208	NJ	NUP	N	—
	80	23	1.1	1.1	85.5	77.5	9.45	7 600	10 700	*NU2208EA	NJ	NUP	N	NF
	90	23	1.5	1.5	65.0	57.0	6.95	8 000	9 400	*NU308	NJ	NUP	N	NF
	90	23	1.5	1.5	98.5	81.5	9.95	7 200	10 200	*NU308EA	NJ	NUP	N	NF
	90	33	1.5	1.5	91.5	88.0	10.7	7 000	8 200	*NU2308	NJ	NUP	N	—
	90	33	1.5	1.5	135	122	14.9	6 400	9 000	*NU2308EA	NJ	NUP	N	NF
	110	27	2	2	106	89.0	10.9	5 700	6 700	NU408	NJ	NUP	N	NF

1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

3) Bearing numbers marked "*" designate ULTAGE series bearings.

4) Bearing marked "**" are going to be integrated with ULTAGE series.



Dynamic equivalent radial load
 $P_r = F_r$

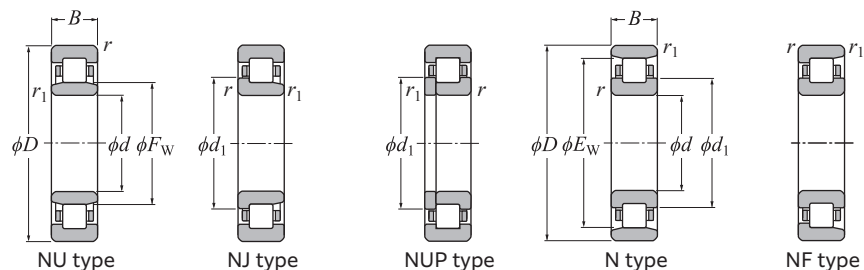
Static equivalent radial load
 $P_{0r} = F_r$

Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	r_{as} Min. ⁶⁾	r_{1as} Max.	NU type (approx.)	N type	
26.5	41.5	29.5	24	25	26	29	32	42	42	42	1	0.6	0.115	0.11
26.5	41.5	29.5	24	25	26	29	32	42	42	42	1	0.6	0.146	0.144
27.5	45.5	31.1	24	26.5	27	30	33	45.5	45.5	45.5	1	0.6	0.176	0.147
27.5	45.5	31.1	24	26.5	27	30	33	45.5	45.5	45.5	1	0.6	0.242	0.212
30.5	41.5	32.7	27	29	30	32	33	43	45	42.5	0.6	0.3	0.092	0.091
31.5	46.5	34.5	29	30	31	34	37	47	47	47	1	0.6	0.151	0.13
31.5	46.5	34.5	29	30	31	34	37	47	47	47	1	0.6	0.186	0.163
34	54	38	31.5	31.5	33	37	40	55.5	55.5	55	1	1	0.275	0.242
34	54	38	31.5	31.5	33	37	40	55.5	55.5	55	1	1	0.386	0.345
38.8	62.8	43.6	33	33	38	41	46	72	72	64	1.5	1.5	0.55	0.536
36.5	48.5	38.9	34	35	35	38	39.5	50	51	49.5	1	0.6	0.13	0.128
37.5	55.5	41.1	34	35	37	40	44	57	57	56.5	1	0.6	0.226	0.205
37.5	55.5	41.1	34	35	37	40	44	57	57	56.5	1	0.6	0.297	0.259
40.5	62.5	44.9	36.5	36.5	40	44	48	65.5	65.5	64	1	1	0.398	0.353
40.5	62.5	44.9	36.5	36.5	40	44	48	65.5	65.5	64	1	1	0.58	0.526
45	73	50.5	38	38	44	47	52	82	82	74	1.5	1.5	0.751	0.732
42	55	44.6	39	40	41	44	45	57	58	56	1	0.6	0.179	0.176
44	64	48	39	41.5	43	46	50	65.5	65.5	65.5	1	0.6	0.327	0.294
44	64	48	39	41.5	43	46	50	65.5	65.5	65.5	1	0.6	0.455	0.405
46.2	70.2	51	41.5	43	45	48	53	72	72	71.5	1.5	1	0.545	0.483
46.2	70.2	51	41.5	43	45	48	53	72	72	71.5	1.5	1	0.78	0.737
53	83	59	43	43	52	55	61	92	92	84	1.5	1.5	0.99	0.965
47	61	49.8	44	45	46	49	50.5	63	64	62	1	0.6	0.22	0.217
50	70	54.2	46.5	46.5	49	52	56	73.5	73.5	72	1	1	0.378	0.37
49.5	71.5	53.9	46.5	46.5	49	52	56	73.5	73.5	72.5	1	1	0.426	0.365
50	70	54.2	46.5	46.5	49	52	56	73.5	73.5	72	1	1	0.49	0.48
49.5	71.5	53.9	46.5	46.5	49	52	56	73.5	73.5	72.5	1	1	0.552	0.491
53.5	77.5	58.4	48	48	51	55	60	82	82	80	1.5	1.5	0.658	0.643
52	80	57.6	48	48	51	55	60	82	82	81.5	1.5	1.5	0.754	0.658
53.5	77.5	58.4	48	48	51	55	60	82	82	80	1.5	1.5	0.951	0.932
52	80	57.6	48	48	51	55	60	82	82	81.5	1.5	1.5	1.06	0.952
58	92	64.8	49	49	57	60	67	101	101	93	2	2	1.3	1.27

5) Bearing numbers having no standard form are switched to type E or ULTAGE series.

6) Does not apply to the sides of the outer ring rib of type NF bearings.

NTN



d 45–60 mm

Boundary dimensions					Basic load rating		Fatigue load limit kN C_u	Allowable speed ²⁾		Bearing number ^{3) 4)}					
mm					dynamic	static		min ⁻¹	Oil lubrication	NU type	NJ type	NUP type	N type	NF type	
d	D	B	$r_{s\min}^{1)}$	$r_{Is\min}^{1)}$	C_r	kN C_{Or}	Grease lubrication								
45	85	19	1.1	1.1	51.0	47.0	5.70	8 400	9 900	**NU209	NJ	NUP	N	NF	
	85	19	1.1	1.1	74.5	66.5	8.10	7 600	10 800	**NU209EA	NJ	NUP	N	NF	
	85	23	1.1	1.1	68.0	68.0	8.25	6 800	9 000	**NU2209	NJ	NUP	N	—	
	85	23	1.1	1.1	90.0	84.5	10.3	6 000	9 600	**NU2209EA	NJ	NUP	N	NF	
	100	25	1.5	1.5	82.0	71.0	8.65	7 200	8 400	**NU309	NJ	NUP	N	NF	
	100	25	1.5	1.5	115	98.5	12.0	6 500	9 100	**NU309EA	NJ	NUP	N	NF	
	100	36	1.5	1.5	110	104	12.7	6 300	7 400	**NU2309	NJ	NUP	N	—	
	100	36	1.5	1.5	162	153	18.7	5 700	8 200	**NU2309EA	NJ	NUP	N	NF	
120	29	2	2	119	102	12.4	5 100	6 000	NU409	NJ	NUP	N	NF		
50	80	16	1	0.6	35.5	36.0	4.40	8 900	11 000	NU1010	NJ	NUP	N	—	
	90	20	1.1	1.1	53.5	51.0	6.20	7 600	9 000	**NU210	NJ	NUP	N	NF	
	90	20	1.1	1.1	81.5	76.5	9.30	6 900	9 700	**NU210EA	NJ	NUP	N	NF	
	90	23	1.1	1.1	71.0	73.5	9.00	6 900	8 100	**NU2210	NJ	NUP	N	—	
	90	23	1.1	1.1	98.5	97.0	11.9	6 200	8 800	**NU2210EA	NJ	NUP	N	NF	
	110	27	2	2	96.5	86.0	10.5	6 500	7 700	**NU310	NJ	NUP	N	NF	
	110	27	2	2	130	113	13.8	5 900	8 300	**NU310EA	NJ	NUP	N	NF	
	110	40	2	2	134	131	16.0	5 700	6 700	**NU2310	NJ	NUP	N	—	
	110	40	2	2	192	187	22.7	5 200	7 300	**NU2310EA	NJ	NUP	N	NF	
130	31	2.1	2.1	143	124	15.1	4 700	5 500	NU410	NJ	NUP	N	NF		
55	90	18	1.1	1	42.0	44.0	5.35	8 200	9 700	NU1011	NJ	NUP	N	—	
	100	21	1.5	1.1	64.5	62.5	7.60	6 900	8 200	**NU211	NJ	NUP	N	NF	
	100	21	1.5	1.1	102	98.5	12.0	6 300	8 900	**NU211EA	NJ	NUP	N	NF	
	100	25	1.5	1.1	83.5	87.0	10.6	6 300	7 400	**NU2211	NJ	NUP	N	—	
	100	25	1.5	1.1	120	122	14.8	5 600	7 900	**NU2211EA	NJ	NUP	N	NF	
	120	29	2	2	123	111	13.6	5 900	7 000	**NU311	NJ	NUP	N	NF	
	120	29	2	2	162	143	17.4	5 300	7 600	**NU311EA	NJ	NUP	N	NF	
	120	43	2	2	164	162	19.8	5 200	6 100	**NU2311	NJ	NUP	N	—	
	120	43	2	2	238	233	28.4	4 700	6 700	**NU2311EA	NJ	NUP	N	NF	
140	33	2.1	2.1	154	138	16.9	4 300	5 000	NU411	NJ	NUP	N	NF		
60	95	18	1.1	1	44.5	48.5	5.95	7 500	8 800	NU1012	NJ	NUP	N	—	
	110	22	1.5	1.5	76.0	75.0	9.15	6 400	7 600	**NU212	NJ	NUP	N	NF	
	110	22	1.5	1.5	115	107	13.1	5 800	8 200	**NU212EA	NJ	NUP	N	NF	
	110	28	1.5	1.5	107	116	14.1	5 800	6 800	**NU2212	NJ	NUP	N	—	
	110	28	1.5	1.5	155	157	19.1	5 200	7 300	**NU2212EA	NJ	NUP	N	NF	

1) Smallest allowable dimension for chamfer dimension r or r_1 .

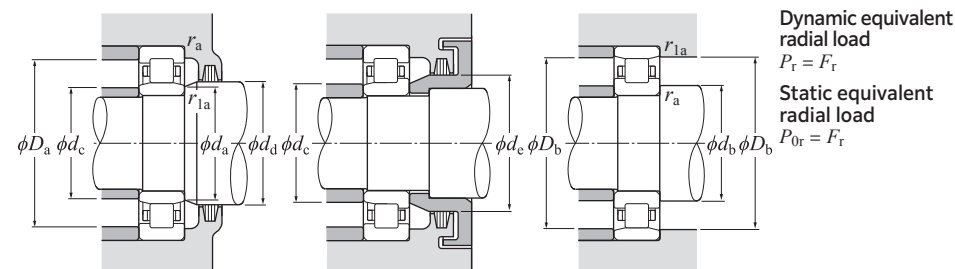
2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

3) Bearing numbers marked "*" designate ULTAGE series bearings.

4) Bearing marked "**" are going to be integrated with **ULTAGE** series.

B-100

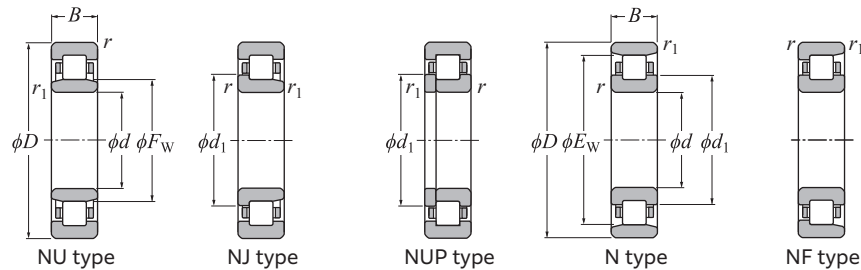
- NTN



Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_l	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	D_b Min. ⁵⁾	r_{as} Max.	r_{las} Max.	NU type (approx.)	N type
55	75	59	51.5	51.5	54	57	61	78.5	78.5	77	1	1	0.432	0.423
54.5	76.5	58.9	51.5	51.5	54	57	61	78.5	78.5	77.5	1	1	0.495	0.423
55	75	59	51.5	51.5	54	57	61	78.5	78.5	77	1	1	0.53	0.52
54.5	76.5	58.9	51.5	51.5	54	57	61	78.5	78.5	77.5	1	1	0.6	0.533
58.5	86.5	64	53	53	57	60	66	92	92	89	1.5	1.5	0.877	0.857
58.5	88.5	64.5	53	53	57	60	66	92	92	90.5	1.5	1.5	0.996	0.865
58.5	86.5	64	53	53	57	60	66	92	92	89	1.5	1.5	1.27	1.24
58.5	88.5	64.5	53	53	57	60	66	92	92	90.5	1.5	1.5	1.41	1.3
64.5	100.5	71.8	54	54	63	66	74	111	111	102	2	2	1.62	1.58
57.5	72.5	60.5	54	55	57	59	61	75	76	73.5	1	0.6	0.295	0.291
60.4	80.4	64.6	56.5	56.5	58	62	67	83.5	83.5	83	1	1	0.47	0.46
59.5	81.5	63.9	56.5	56.5	58	62	67	83.5	83.5	82.5	1	1	0.503	0.47
60.4	80.4	64.6	56.5	56.5	58	62	67	83.5	83.5	83	1	1	0.571	0.56
59.5	81.5	63.9	56.5	56.5	58	62	67	83.5	83.5	82.5	1	1	0.587	0.584
65	95	71	59	59	63	67	73	101	101	98	2	2	1.14	1.11
65	97	71.4	59	59	63	67	73	101	101	99	2	2	1.3	1.12
65	95	71	59	59	63	67	73	101	101	98	2	2	1.7	1.67
65	97	71.4	59	59	63	67	73	101	101	99	2	2	1.9	1.75
70.8	110.8	78.8	61	61	69	73	81	119	119	112	2	2	2.02	1.97
64.5	80.5	67.7	60	61.5	63	66	68.5	83.5	85	81.5	1	1	0.442	0.435
66.5	88.5	70.8	61.5	63	65	68	73	92	93.5	91	1.5	1	0.638	0.626
66	90	70.8	61.5	63	65	68	73	92	92	91	1.5	1	0.675	0.635
66.5	88.5	70.8	61.5	63	65	68	73	92	93.5	91	1.5	1	0.773	0.758
66	90	70.8	61.5	63	65	68	73	92	92	91	1.5	1	0.807	0.805
70.5	104.5	77.2	64	64	69	72	80	111	111	107	2	2	1.45	1.42
70.5	106.5	77.7	64	64	69	72	80	111	111	108.5	2	2	1.65	1.43
70.5	104.5	77.2	64	64	69	72	80	111	111	107	2	2	2.17	2.13
70.5	106.5	77.7	64	64	69	72	80	111	111	108.5	2	2	2.37	2.23
77.2	117.2	85.2	66	66	76	79	87	129	129	119	2	2	2.48	2.42
69.5	85.5	72.7	65	66.5	68	71	73.5	88.5	90	86.5	1	1	0.474	0.467
73.5	97.5	78.4	68	68	71	75	80	102	102	100	1.5	1.5	0.818	0.802
72	100	77.6	68	68	71	75	80	102	102	101	1.5	1.5	0.923	0.798
73.5	97.5	78.4	68	68	71	75	80	102	102	100	1.5	1.5	1.06	1.04
72	100	77.6	68	68	71	75	80	102	102	101	1.5	1.5	1.21	1.08

5) Does not apply to the sides of the outer ring rib of type **NF** bearings.

B-101



d 60–75 mm

Boundary dimensions					Basic load rating		Fatigue load limit kN C _u	Allowable speed ²⁾		Bearing number ^{3) 4)}					
mm					dynamic	static		min ⁻¹	Grease lubrication	Oil lubrication	NU type	NJ type	NUP type	N type	NF type
d	D	B	r _{s min⁻¹}	r _{1s min⁻¹}	C _r	C _{0r}									
60	130	31	2.1	2.1	137	126	15.4	5 500	6 500	**NU312	NJ	NUP	N	NF	
	130	31	2.1	2.1	177	157	19.1	4 900	7 000	**NU312EA	NJ	NUP	N	NF	
	130	46	2.1	2.1	187	188	22.9	4 800	5 700	**NU2312	NJ	NUP	N	—	
	130	46	2.1	2.1	263	262	32.0	4 400	6 200	**NU2312EA	NJ	NUP	N	NF	
	150	35	2.1	2.1	185	168	20.2	3 900	4 600	NU412	NJ	NUP	N	NF	
65	100	18	1.1	1	45.5	51.0	6.30	7 000	8 200	NU1013	NJ	NUP	N	—	
	120	23	1.5	1.5	93.0	94.5	11.5	5 900	7 000	**NU213	NJ	NUP	N	NF	
	120	23	1.5	1.5	127	119	14.5	5 400	7 600	**NU213EA	NJ	NUP	N	NF	
	120	31	1.5	1.5	133	149	18.2	5 400	6 300	**NU2213	NJ	NUP	N	—	
	120	31	1.5	1.5	176	181	22.1	4 800	6 700	**NU2213EA	NJ	NUP	N	NF	
	140	33	2.1	2.1	150	139	16.8	5 100	6 000	**NU313	NJ	NUP	N	NF	
	140	33	2.1	2.1	213	191	23.1	4 600	6 500	**NU313EA	NJ	NUP	N	NF	
	140	48	2.1	2.1	208	212	25.7	4 400	5 200	**NU2313	NJ	NUP	N	—	
	140	48	2.1	2.1	293	287	34.5	4 100	5 800	**NU2313EA	NJ	NUP	N	NF	
160	37	2.1	2.1	202	186	21.9	3 600	4 300	NU413	NJ	NUP	N	NF		
70	110	20	1.1	1	64.5	70.5	8.60	6 500	7 600	NU1014	NJ	NUP	N	—	
	125	24	1.5	1.5	92.5	95.0	11.6	5 500	6 500	**NU214	NJ	NUP	N	NF	
	125	24	1.5	1.5	140	137	16.7	5 000	7 100	**NU214EA	NJ	NUP	N	NF	
	125	31	1.5	1.5	132	151	18.4	5 000	5 900	**NU2214	NJ	NUP	N	—	
	125	31	1.5	1.5	184	194	23.7	4 500	6 200	**NU2214EA	NJ	NUP	N	NF	
	150	35	2.1	2.1	175	168	20.0	4 700	5 500	**NU314	NJ	NUP	N	NF	
	150	35	2.1	2.1	242	222	26.2	4 200	6 000	**NU314EA	NJ	NUP	N	NF	
	150	51	2.1	2.1	247	262	31.0	4 100	4 800	**NU2314	NJ	NUP	N	—	
	150	51	2.1	2.1	325	325	38.0	3 800	5 300	**NU2314EA	NJ	NUP	N	NF	
	180	42	3	3	253	236	26.8	3 400	4 000	NU414	NJ	NUP	N	NF	
75	115	20	1.1	1	66.5	74.5	9.10	6 100	7 100	NU1015	NJ	NUP	N	—	
	130	25	1.5	1.5	107	111	13.4	5 100	6 000	**NU215	NJ	NUP	N	NF	
	130	25	1.5	1.5	154	156	18.9	4 700	6 600	**NU215EA	NJ	NUP	N	NF	
	130	31	1.5	1.5	144	162	19.6	4 700	5 500	**NU2215	NJ	NUP	N	—	
	130	31	1.5	1.5	191	207	25.0	4 200	5 900	**NU2215EA	NJ	NUP	N	NF	
	160	37	2.1	2.1	211	205	23.8	4 400	5 200	**NU315	NJ	NUP	N	NF	
	160	37	2.1	2.1	284	263	30.5	4 000	5 600	**NU315EA	NJ	NUP	N	NF	
	160	55	2.1	2.1	286	300	35.0	3 800	4 500	**NU2315	NJ	NUP	N	—	
	160	55	2.1	2.1	390	395	45.5	3 500	4 900	**NU2315EA	NJ	NUP	N	NF	
	190	45	3	3	291	274	30.5	3 200	3 700	NU415	NJ	NUP	N	NF	

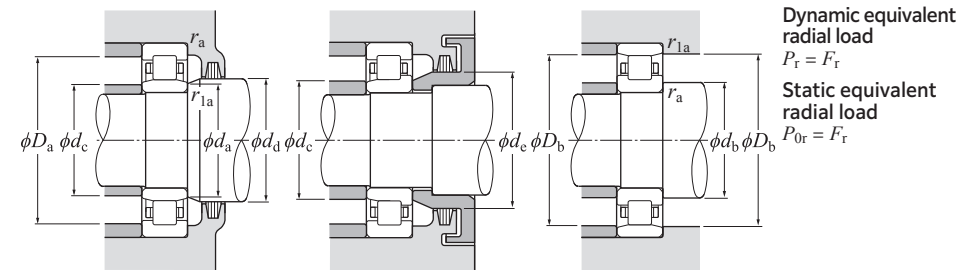
1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

3) Bearing numbers marked "*" designate ULTAGE series bearings.

4) Bearing marked "**" are going to be integrated with **ULTAGE** series.

● Cylindrical Roller Bearings

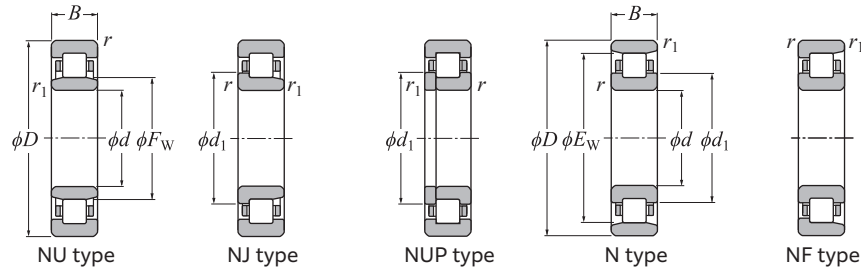


Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_l	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	r_{as} Min. ⁵⁾	r_{las} Max.	NU type (approx.)	N type	
77	113	84.2	71	71	75	79	86	119	119	116	2	2	1.8	1.76
77	115	84.6	71	71	75	79	86	119	119	117	2	2	2.05	1.77
77	113	84.2	71	71	75	79	86	119	119	116	2	2	2.71	2.66
77	115	84.6	71	71	75	79	86	119	119	117	2	2	2.96	2.73
83	127	91.8	71	71	82	85	94	139	139	128	2	2	3	2.93
74.5	90.5	77.7	70	71.5	73	76	78.5	93.5	95	91.5	1	1	0.485	0.477
79.6	105.6	84.8	73	73	77	81	87	112	112	108	1.5	1.5	1.02	1
78.5	108.5	84.5	73	73	77	81	87	112	112	110	1.5	1.5	1.21	1.01
79.6	105.6	84.8	73	73	77	81	87	112	112	108	1.5	1.5	1.4	1.37
78.5	108.5	84.5	73	73	77	81	87	112	112	110	1.5	1.5	1.6	1.44
83.5	121.5	91	76	76	81	85	93	129	129	125	2	2	2.23	2.18
82.5	124.5	91	76	76	81	85	93	129	129	127	2	2	2.54	2.2
83.5	121.5	91	76	76	81	85	93	129	129	125	2	2	3.27	3.2
82.5	124.5	91	76	76	81	85	93	129	129	127	2	2	3.48	3.25
89.3	135.3	98.5	76	76	88	91	100	149	149	137	2	2	3.6	3.5
80	100	84	75	76.5	78	82	85	103.5	105	101	1	1	0.699	0.689
84.5	110.5	89.6	78	78	82	86	92	117	117	114	1.5	1.5	1.12	1.1
83.5	113.5	89.5	78	78	82	86	92	117	117	115	1.5	1.5	1.3	1.13
84.5	110.5	89.6	78	78	82	86	92	117	117	114	1.5	1.5	1.47	1.44
83.5	113.5	89.5	78	78	82	86	92	117	117	115	1.5	1.5	1.7	1.52
90	130	98	81	81	87	92	100	139	139	134	2	2	2.71	2.65
89	133	98	81	81	87	92	100	139	139	136	2	2	3.1	2.75
90	130	98	81	81	87	92	100	139	139	134	2	2	3.98	3.9
89	133	98	81	81	87	92	100	139	139	136	2	2	4.25	3.95
100	152	110.5	83	83	99	102	112	167	167	153	2.5	2.5	5.24	5.1
85	105	89	80	81.5	83	87	90	108.5	110	106	1	1	0.738	0.727
88.5	116.5	94	83	83	87	90	96	122	122	120	1.5	1.5	1.23	1.21
88.5	118.5	94.5	83	83	87	90	96	122	122	120	1.5	1.5	1.41	1.28
88.5	116.5	94	83	83	87	90	96	122	122	120	1.5	1.5	1.55	1.52
88.5	118.5	94.5	83	83	87	90	96	122	122	120	1.5	1.5	1.79	1.61
95.5	139.5	104.2	86	86	93	97	106	149	149	143	2	2	3.28	3.21
95	143	104.6	86	86	93	97	106	149	149	146	2	2	3.74	3.28
95.5	139.5	104.2	86	86	93	97	106	149	149	143	2	2	4.87	4.77
95	143	104.6	86	86	93	97	106	149	149	—	2	2	5.25	4.85
104.5	160.5	116	88	88	103	107	118	177	177	162	2.5	2.5	6.22	6.06

5) Does not apply to the sides of the outer ring rib of type **NF** bearings.

Cylindrical Roller Bearings

NTN



d 95–130 mm

Boundary dimensions					Basic load rating		Fatigue load limit kN C _u	Allowable speed ²⁾		Bearing number				
mm					dynamic	static		Grease lubrication	min ⁻¹ Oil lubrication	NU type	NJ type	NUP type	N type	NF type
d	D	B	r _s min ¹⁾	r _{1s} min ¹⁾	C _r	C _{0r}								
95	200	67	3	3	410	460	50.0	3 000	3 500	NU2319	NJ	NUP	N	—
	200	67	3	3	510	585	63.0	2 700	3 200	NU2319E	NJ	NUP	—	—
100	150	24	1.5	1.1	103	126	14.4	4 600	5 400	NU1020	NJ	NUP	N	—
	180	34	2.1	2.1	203	217	23.9	3 800	4 500	NU220	NJ	NUP	N	NF
	180	34	2.1	2.1	277	305	33.5	3 500	4 100	NU220E	NJ	NUP	—	—
	180	46	2.1	2.1	286	340	37.5	3 500	4 100	NU2220	NJ	NUP	N	—
	180	46	2.1	2.1	370	445	49.0	3 100	3 600	NU2220E	NJ	NUP	—	—
	215	47	3	3	330	335	36.0	3 300	3 800	NU320	NJ	NUP	N	NF
	215	47	3	3	420	425	45.0	2 900	3 500	NU320E	NJ	NUP	—	—
	215	73	3	3	455	505	54.0	2 900	3 400	NU2320	NJ	NUP	N	—
	215	73	3	3	630	715	76.0	2 600	3 100	NU2320E	NJ	NUP	—	—
105	160	26	2	1.1	117	142	16.0	4 300	5 100	NU1021	NJ	NUP	N	—
	190	36	2.1	2.1	223	241	26.1	3 600	4 300	NU221	NJ	NUP	N	NF
	225	49	3	3	355	360	37.5	3 100	3 700	NU321	NJ	NUP	N	NF
110	170	28	2	1.1	146	174	19.2	4 100	4 800	NU1022	NJ	NUP	N	—
	200	38	2.1	2.1	266	290	31.0	3 400	4 000	NU222	NJ	NUP	N	NF
	200	38	2.1	2.1	325	365	39.0	3 100	3 700	NU222E	NJ	NUP	—	—
	200	53	2.1	2.1	350	415	44.0	3 100	3 700	NU2222	NJ	NUP	N	—
	200	53	2.1	2.1	425	515	55.0	2 800	3 300	NU2222E	NJ	NUP	—	—
	240	50	3	3	395	400	41.5	3 000	3 500	NU322	NJ	NUP	N	NF
	240	50	3	3	500	525	54.0	2 700	3 100	NU322E	NJ	NUP	—	—
	240	80	3	3	670	790	81.5	2 600	3 100	NU2322	NJ	NUP	N	—
	240	80	3	3	750	880	90.5	2 400	2 800	NU2322E	NJ	NUP	—	—
120	180	28	2	1.1	154	191	20.6	3 800	4 400	NU1024	NJ	NUP	N	—
	215	40	2.1	2.1	288	320	33.5	3 200	3 700	NU224	NJ	NUP	N	NF
	215	40	2.1	2.1	370	420	44.0	2 900	3 400	NU224E	NJ	NUP	—	—
	215	58	2.1	2.1	385	460	48.0	2 900	3 400	NU2224	NJ	NUP	N	—
	215	58	2.1	2.1	500	620	64.5	2 600	3 000	NU2224E	NJ	NUP	—	—
	260	55	3	3	500	510	51.0	2 700	3 200	NU324	NJ	NUP	N	NF
	260	55	3	3	585	610	61.0	2 400	2 800	NU324E	NJ	NUP	—	—
	260	86	3	3	785	920	92.5	2 400	2 800	NU2324	NJ	NUP	N	—
	260	86	3	3	880	1 030	103	2 200	2 500	NU2324E	NJ	NUP	—	—
130	200	33	2	1.1	191	238	24.9	3 400	4 000	NU1026	NJ	NUP	N	—

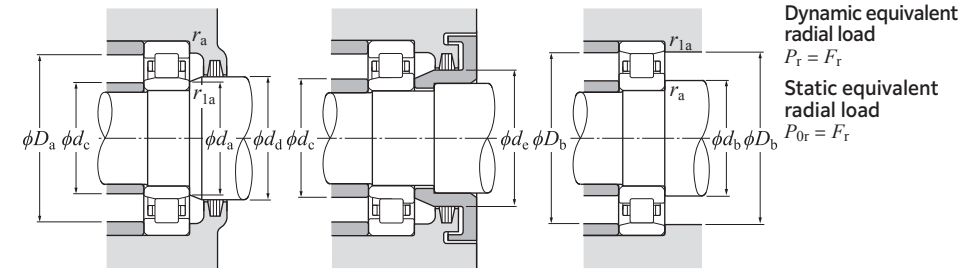
1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

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Cylindrical Roller Bearings

NTN



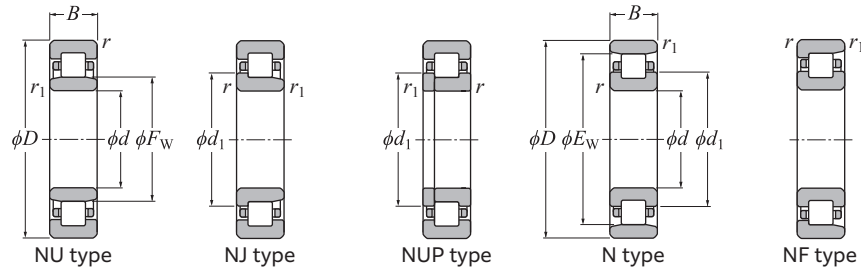
Dynamic equivalent radial load
 $P_r = F_r$

Static equivalent radial load
 $P_{0r} = F_r$

Dimension				Installation-related dimensions										Mass	
mm				mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	D_b Min. ³⁾	r_{as} Max.	r_{1as} Max.	NU type (approx.)	N type	
121.5	173.5	132	108	108	119	124	134	187	187	178	2.5	2.5	9.2	9.02	
121.5	—	132.7	108	—	119	124	134	187	—	—	2.5	2.5	9.8	—	
113	137	117.8	106.5	108	111	116	119	142	143.5	139	1.5	1	1.45	1.43	
120	160	128	111	111	117	122	130	169	169	164	2	2	3.33	3.26	
119	—	128	111	—	117	122	130	169	—	—	2	2	3.66	—	
120	160	128	111	111	117	122	130	169	169	164	2	2	4.57	4.48	
119	—	128	111	—	117	122	130	169	—	—	2	2	5.01	—	
129.5	185.5	140.5	113	113	125	132	143	202	202	190	2.5	2.5	7.49	7.32	
127.5	—	140.3	113	—	125	132	143	202	—	—	2.5	2.5	8.57	—	
129.5	185.5	140.5	113	113	125	132	143	202	202	190	2.5	2.5	11.7	11.5	
127.5	—	140.3	113	—	125	132	143	202	—	—	2.5	2.5	12.8	—	
119.5	145.5	124.7	111.5	114	118	122	126	151	153.5	147.5	2	1	1.84	1.81	
126.8	168.8	135	116	116	124	129	137	179	179	173	2	2	3.95	3.87	
135	195	147	118	118	132	137	149	212	212	199	2.5	2.5	8.53	8.33	
125	155	131	116.5	119	124	128	132	161	163.5	157	2	1	2.33	2.3	
132.5	178.5	141.5	121	121	130	135	144	189	189	182	2	2	4.63	4.54	
132.5	—	142.1	121	—	130	135	144	189	—	—	2	2	4.27	—	
132.5	178.5	141.5	121	121	130	135	144	189	189	182	2	2	6.56	6.43	
132.5	—	142.1	121	—	130	135	144	189	—	—	2	2	7.4	—	
143	207	155.5	123	123	140	145	158	227	227	211	2.5	2.5	10	9.77	
143	—	156.6	123	—	140	145	158	227	—	—	2.5	2.5	11.1	11.4	
143	207	155.5	123	123	140	145	158	227	227	211	2.5	2.5	17.1	16.8	
143	—	156.6	123	—	140	145	158	227	—	—	2.5	2.5	19.4	—	
135	165	141	126.5	129	134	138	142	171	173.5	167	2	1	2.44	2.4	
143.5	191.5	153	131	131	141	146	156	204	204	196	2	2	5.57	5.46	
143.5	—	153.9	131	—	141	146	156	204	—	—	2	2	5.97	—	
143.5	191.5	153	131	131	141	146	156	204	204	196	2	2	8.19	8.03	
143.5	—	153.9	131	—	141	146	156	204	—	—	2	2	9.18	—	
154	226	168.5	133	133	151	156	171	247	247	230	2.5	2.5	12.8	12.5	
154	—	169.2	133	—	151	156	171	247	—	—	2.5	2.5	13.9	—	
154	226	168.5	133	133	151	156	171	247	247	230	2.5	2.5	21.5	21.1	
154	—	169.2	133	—	151	156	171	247	—	—	2.5	2.5	26.1	—	
148	182	154.8	136.5	139	146	151	156	191	193.5	184	2	1	3.69	3.63	

3) Does not apply to the sides of the outer ring rib of type NF bearings.

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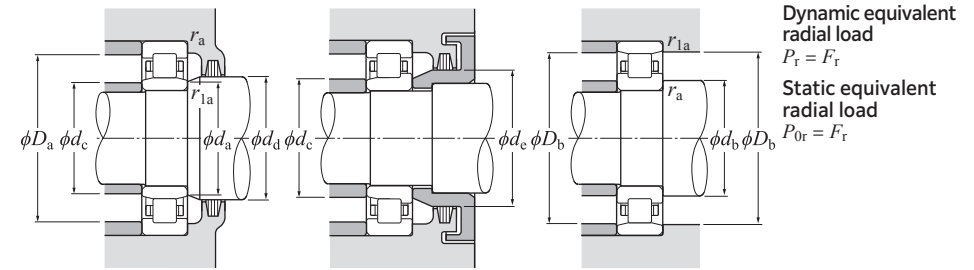


d 130–160 mm

Boundary dimensions					Basic load rating		Fatigue load limit kN <i>C_u</i>	Allowable speed ²⁾		Bearing number				
mm					dynamic	static		min ⁻¹		NU type	NJ type	NUP type	N type	NF type
<i>d</i>	<i>D</i>	<i>B</i>	<i>r_s</i> min ⁻¹⁾	<i>r_{1s}</i> min ⁻¹⁾	<i>C_r</i>	kN <i>C_{0r}</i>		Grease lubrication	Oil lubrication					
130	230	40	3	3	300	340	35.0	2 900	3 400	NU226	NJ	NUP	N	NF
	230	40	3	3	405	455	46.0	2 600	3 100	NU226E	NJ	NUP	—	—
	230	64	3	3	420	530	54.0	2 600	3 100	NU2226	NJ	NUP	N	—
	230	64	3	3	590	735	75.0	2 300	2 700	NU2226E	NJ	NUP	—	—
	280	58	4	4	620	665	65.5	2 500	2 900	NU326	NJ	NUP	N	NF
	280	58	4	4	685	735	72.0	2 200	2 600	NU326E	NJ	NUP	—	—
	280	93	4	4	930	1 130	111	2 200	2 600	NU2326	NJ	NUP	N	—
	280	93	4	4	1 020	1 230	121	2 000	2 300	NU2326E	NJ	NUP	—	—
140	210	33	2	1.1	195	250	25.7	3 200	3 800	NU1028	NJ	NUP	N	—
	250	42	3	3	345	400	39.5	2 700	3 100	NU228	NJ	NUP	N	NF
	250	42	3	3	435	515	51.0	2 400	2 800	NU228E	NJ	NUP	—	—
	250	68	3	3	495	635	63.5	2 400	2 800	NU2228	NJ	NUP	N	—
	250	68	3	3	635	835	83.0	2 100	2 500	NU2228E	NJ	NUP	—	—
	300	62	4	4	685	745	72.0	2 300	2 700	NU328	NJ	NUP	N	NF
	300	62	4	4	735	795	76.5	2 100	2 400	NU328E	NJ	NUP	—	—
	300	102	4	4	1 020	1 250	120	2 000	2 300	NU2328	NJ	NUP	N	—
150	300	102	4	4	1 130	1 380	133	1 800	2 100	NU2328E	NJ	NUP	—	—
	225	35	2.1	1.5	224	294	29.6	3 000	3 500	NU1030	NJ	NUP	N	—
	270	45	3	3	380	435	42.5	2 500	2 900	NU230	NJ	NUP	N	NF
	270	45	3	3	495	595	58.0	2 200	2 600	NU230E	NJ	NUP	—	—
	270	73	3	3	555	710	69.5	2 200	2 600	NU2230	NJ	NUP	N	—
	270	73	3	3	735	980	95.5	2 000	2 400	NU2230E	NJ	NUP	—	—
	320	65	4	4	735	805	76.0	2 100	2 500	NU330	NJ	NUP	N	NF
	320	65	4	4	840	920	86.5	1 900	2 300	NU330E	NJ	NUP	—	—
160	320	108	4	4	1 130	1 400	132	1 900	2 200	NU2330	NJ	NUP	N	—
	320	108	4	4	1 290	1 600	150	1 700	2 000	NU2330E	NJ	NUP	—	—
	240	38	2.1	1.5	263	340	34.0	2 800	3 300	NU1032	NJ	NUP	N	—
	290	48	3	3	475	570	54.5	2 300	2 700	NU232	NJ	NUP	N	NF
	290	48	3	3	555	665	63.5	2 100	2 400	NU232E	NJ	NUP	—	—
	290	80	3	3	700	940	90.0	2 100	2 400	NU2232	NJ	NUP	N	—
	290	80	3	3	895	1 190	114	1 900	2 200	NU2232E	NJ	NUP	—	—
	340	68	4	4	775	875	81.0	2 000	2 300	NU332	NJ	NUP	N	NF
340	68	4	4	950	1 050	97.5	1 800	2 100	NU332E	NJ	NUP	—	—	
340	114	4	4	1 190	1 520	141	1 700	2 000	NU2332	NJ	NUP	N	—	
340	114	4	4	1 460	1 820	168	1 600	1 900	NU2332E	NJ	NUP	—	—	

1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.



Dynamic equivalent radial load
 $P_r = F_r$

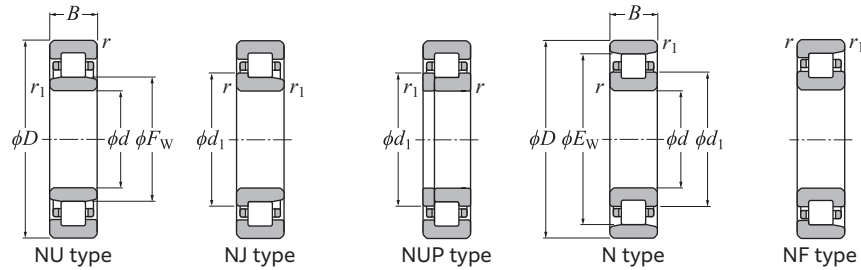
Static equivalent radial load
 $P_{0r} = F_r$

Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	r_{as} Min. ³⁾	r_{1as} Max.	NU type (approx.)	N type	
156	204	165.5	143	143	151	158	168	217	217	208	2.5	2.5	6.3	6.17
153.5	—	164.7	143	—	151	158	168	217	—	—	2.5	2.5	6.9	—
156	204	165.5	143	143	151	158	168	217	217	208	2.5	2.5	10.2	10
153.5	—	164.7	143	—	151	158	168	217	—	—	2.5	2.5	11.8	—
167	243	182	146	146	164	169	184	264	264	247	3	3	17.4	17
167	—	183	146	—	164	169	184	264	—	—	3	3	19.4	—
167	243	182	146	146	164	169	184	264	264	247	3	3	26.9	26.4
167	—	183	146	—	164	169	184	264	—	—	3	3	30.9	—
158	192	164.8	146.5	149	156	161	166	201	203.5	194	2	1	4.05	3.98
169	221	179.5	153	153	166	171	182	237	237	225	2.5	2.5	7.88	7.72
169	—	180.2	153	—	166	171	182	237	—	—	2.5	2.5	8.73	—
169	221	179.5	153	153	166	171	182	237	237	225	2.5	2.5	12.9	12.6
169	—	180.2	153	—	166	171	182	237	—	—	2.5	2.5	15.8	—
180	260	196	156	156	176	182	198	284	284	265	3	3	21.2	20.7
180	—	196.8	156	—	176	182	198	284	—	—	3	3	23.2	—
180	260	196	156	156	176	182	198	284	284	265	3	3	33.8	33.1
180	—	196.8	156	—	176	182	198	284	—	—	3	3	38.7	—
169.5	205.5	176.7	158	161	167	173	178	214	217	207.5	2	1.5	4.77	4.7
182	238	193	163	163	179	184	196	257	257	242	2.5	2.5	9.92	9.72
182	—	194	163	—	179	184	196	257	—	—	2.5	2.5	11	—
182	238	193	163	163	179	184	196	257	257	242	2.5	2.5	16.3	16
182	—	194	163	—	179	184	196	257	—	—	2.5	2.5	19.7	—
193	277	210	166	166	190	195	213	304	304	282	3	3	25.3	24.7
193	—	211	166	—	190	195	213	304	—	—	3	3	28.4	—
193	277	210	166	166	190	195	213	304	304	282	3	3	40.6	39.8
193	—	211	166	—	190	195	213	304	—	—	3	3	47.2	—
180	220	188	168	171	178	184	189	229	232	222	2	1.5	5.9	5.81
195	255	207	173	173	192	197	210	277	277	259	2.5	2.5	13.7	13.4
195	—	207.8	173	—	192	197	210	277	—	—	2.5	2.5	15.6	—
195	255	207	173	173	192	197	210	277	277	259	2.5	2.5	22	21.6
193	—	206.6	173	—	192	197	210	277	—	—	2.5	2.5	25.1	—
208	292	225	176	176	200	211	228	324	324	297	3	3	31.3	30.6
204	—	223.2	176	—	200	211	228	324	—	—	3	3	34	—
208	292	225	176	176	200	211	228	324	324	297	3	3	50.5	49.5
204	—	223.2	176	—	200	211	228	324	—	—	3	3	56	—

3) Does not apply to the sides of the outer ring rib of type NF bearings.

Cylindrical Roller Bearings

NTN



d 170–220 mm

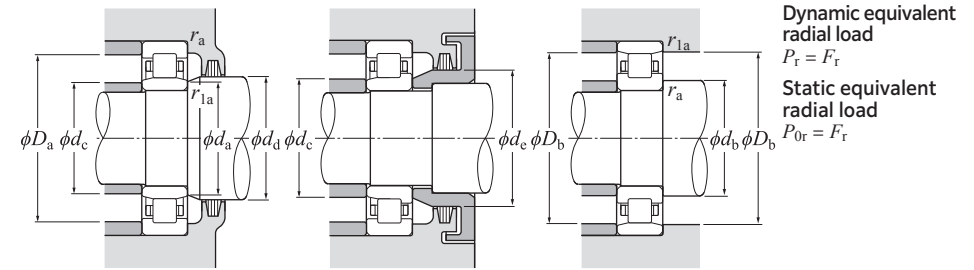
d	Boundary dimensions					Basic load rating		Fatigue load limit		Allowable speed ²⁾		Bearing number				
	mm					dynamic	static	load limit		min ⁻¹						
	D	B	r _{s min} ¹⁾	r _{1s min} ¹⁾		C _r	C _{0r}	kN	C _u	Grease lubrication	Oil lubrication	NU type	NJ type	NUP type	N type	NF type
170	260	42	2.1	2.1		310	400	38.5	2 600	3 000		NU1034	NJ	NUP	N	—
	310	52	4	4		530	635	59.5	2 200	2 500		NU234	NJ	NUP	N	NF
	310	52	4	4		670	800	75.0	2 000	2 300		NU234E	NJ	NUP	—	—
	310	86	4	4		795	1 080	101	2 000	2 300		NU2234	NJ	NUP	N	—
	310	86	4	4		1 070	1 410	132	1 800	2 100		NU2234E	NJ	NUP	—	—
	360	72	4	4		885	1 010	92.0	1 800	2 200		NU334	NJ	NUP	N	NF
	360	120	4	4		1 360	1 750	159	1 600	1 900		NU2334	NJ	NUP	N	—
180	280	46	2.1	2.1		380	485	46.5	2 400	2 900		NU1036	NJ	NUP	N	—
	320	52	4	4		550	675	62.5	2 000	2 400		NU236	NJ	NUP	N	NF
	320	52	4	4		695	850	78.5	1 800	2 200		NU236E	NJ	NUP	—	—
	320	86	4	4		825	1 140	106	1 800	2 200		NU2236	NJ	NUP	N	—
	320	86	4	4		1 120	1 510	139	1 600	1 900		NU2236E	NJ	NUP	—	—
	380	75	4	4		1 000	1 150	103	1 700	2 000		NU336	NJ	NUP	N	NF
	380	126	4	4		1 530	1 990	179	1 500	1 800		NU2336	NJ	NUP	N	—
190	290	46	2.1	2.1		390	510	48.0	2 300	2 700		NU1038	NJ	NUP	N	—
	340	55	4	4		615	770	70.0	1 900	2 200		NU238	NJ	NUP	N	NF
	340	55	4	4		770	955	86.5	1 700	2 000		NU238E	NJ	NUP	—	—
	340	92	4	4		920	1 290	117	1 700	2 000		NU2238	NJ	NUP	N	—
	340	92	4	4		1 220	1 670	152	1 500	1 800		NU2238E	NJ	NUP	—	—
	400	78	5	5		1 080	1 260	111	1 600	1 900		NU338	NJ	NUP	N	NF
	400	132	5	5		1 680	2 220	196	1 400	1 700		NU2338	NJ	NUP	N	—
200	310	51	2.1	2.1		430	580	53.5	2 200	2 600		NU1040	NJ	NUP	N	—
	360	58	4	4		690	865	77.5	1 800	2 100		NU240	NJ	NUP	N	NF
	360	58	4	4		850	1 060	95.0	1 600	1 900		NU240E	NJ	NUP	—	—
	360	98	4	4		1 020	1 440	129	1 600	1 900		NU2240	NJ	NUP	N	—
	360	98	4	4		1 350	1 870	167	1 500	1 700		NU2240E	NJ	NUP	—	—
	420	80	5	5		1 080	1 270	111	1 500	1 800		NU340	NJ	NUP	N	NF
	420	138	5	5		1 680	2 240	195	1 400	1 600		NU2340	NJ	NUP	N	—
220	340	56	3	3		555	750	67.0	2 000	2 300		NU1044	NJ	NUP	N	—
	400	65	4	4		845	1 080	94.0	1 600	1 900		NU244	NJ	NUP	N	NF
	400	108	4	4		1 260	1 810	157	1 500	1 700		NU2244	NJ	NUP	N	—
	460	88	5	5		1 320	1 570	133	1 400	1 600		NU344	NJ	NUP	N	NF
	460	145	5	5		1 970	2 620	222	1 200	1 400		NU2344	NJ	NUP	N	—

1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

Cylindrical Roller Bearings

NTN



Dynamic equivalent radial load
 $P_r = F_r$

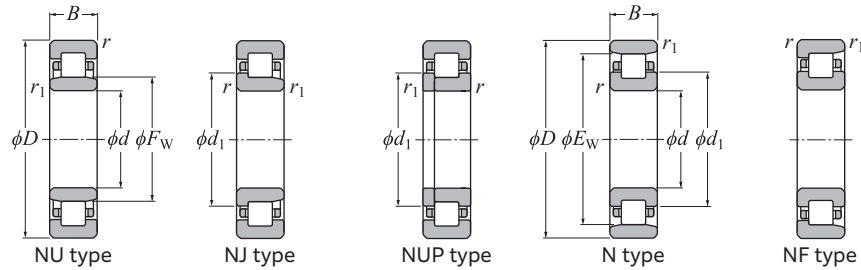
Static equivalent radial load
 $P_{0r} = F_r$

Dimension		Installation-related dimensions										Mass	
mm		mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	r_{as} Min. ³⁾	r_{1as} Max.	NU type (approx.)	N type
193	237	201.8	181	181	190	197	203	249	249	239	2	7.88	7.76
208	272	220.5	186	186	204	211	223	294	294	277	3	17	16.7
207	—	221.4	186	—	204	211	223	294	—	—	3	19.6	—
208	272	220.5	186	186	204	211	223	294	294	277	3	27.2	26.7
205	—	220.2	186	—	204	211	223	294	—	—	3	31	—
220	310	238	186	186	216	223	241	344	344	315	3	37	36.1
220	310	238	186	186	216	223	241	344	344	315	3	59.5	58.3
205	255	215	191	191	203	209	216	269	269	257	2	10.3	10.1
218	282	230.5	196	196	214	221	233	304	304	287	3	17.7	17.3
217	—	231.4	196	—	214	221	233	304	—	—	3	20.4	—
218	282	230.5	196	196	214	221	233	304	304	287	3	28.4	27.8
215	—	230.2	196	—	214	221	233	304	—	—	3	31.9	—
232	328	252	196	196	227	235	255	364	364	333	3	44.2	43.2
232	328	252	196	196	227	235	255	364	364	333	3	69.5	68.1
215	265	225	201	201	213	219	226	279	279	267	2	10.7	10.5
231	299	244.5	206	206	227	234	247	324	324	304	3	21.3	20.8
230	—	245.2	206	—	227	234	247	324	—	—	3	24.2	—
231	299	244.5	206	206	227	234	247	324	324	304	3	34.4	33.7
228	—	244	206	—	227	234	247	324	—	—	3	39.5	—
245	345	265	210	210	240	248	268	380	380	351	4	49.4	48.3
245	345	265	210	210	240	248	268	380	380	351	4	80.5	78.9
229	281	239.4	211	211	226	233	241	299	299	283	2	13.9	13.7
244	316	258	216	216	240	247	261	344	344	321	3	25.3	24.8
243	—	259	216	—	240	247	261	344	—	—	3	28.1	—
244	316	258	216	216	240	247	261	344	344	321	3	41.3	40.5
241	—	257.8	216	—	240	247	261	344	—	—	3	47.8	—
260	360	280	220	220	254	263	283	400	400	366	4	55.8	54.5
260	360	280	220	220	254	263	283	400	400	366	4	92.6	90.7
250	310	262	233	233	248	254	264	327	327	313	2.5	18.2	17.9
270	350	286	236	236	266	273	289	384	384	355	3	37.7	37
270	350	286	236	236	266	273	289	384	384	355	3	59	57.8
284	396	307	240	240	279	287	307	440	440	402	4	73.4	71.7
284	396	307	240	240	279	287	307	440	440	402	4	116	114

3) Does not apply to the sides of the outer ring rib of type NF bearings.

Cylindrical Roller Bearings

NTN



d 240–440 mm

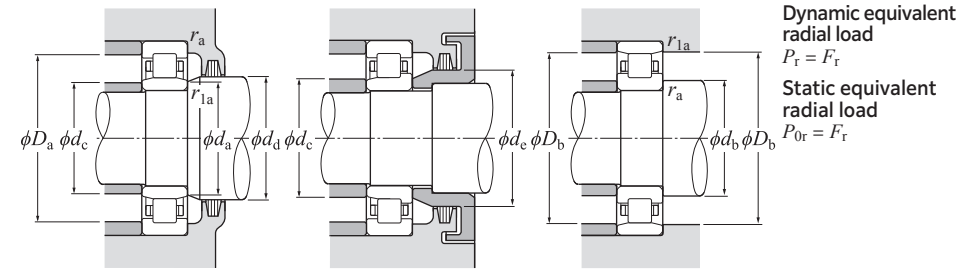
Boundary dimensions					Basic load rating		Fatigue load limit kN <i>C</i> _u	Allowable speed ²⁾		Bearing number				
mm					dynamic	static		Grease lubrication	min ⁻¹ Oil lubrication	NU type	NJ type	NUP type	N type	NF type
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> _{s min⁻¹}	<i>r</i> _{1s min⁻¹}	<i>C</i> _r	<i>C</i> _{0r}								
240	360	56	3	3	585	820	72.0	1 800	2 100	NU1048	NJ	NUP	N	—
	440	72	4	4	1 040	1 340	113	1 500	1 700	NU248	NJ	NUP	N	NF
	440	120	4	4	1 590	2 320	196	1 300	1 600	NU2248	NJ	NUP	N	—
	500	95	5	5	1 590	1 950	160	1 300	1 500	NU348	NJ	NUP	N	NF
	500	155	5	5	2 330	3 200	262	1 100	1 300	NU2348	NJ	NUP	N	—
260	400	65	4	4	715	1 000	85.0	1 600	1 900	NU1052	NJ	NUP	N	—
	480	80	5	5	1 270	1 660	137	1 300	1 600	NU252	NJ	NUP	N	NF
	480	130	5	5	1 980	2 930	241	1 200	1 400	NU2252	NJ	NUP	N	—
	540	102	6	6	1 790	2 230	180	1 200	1 400	NU352	NJ	NUP	N	NF
	540	165	6	6	2 600	3 600	289	1 000	1 200	NU2352	NJ	NUP	N	—
280	420	65	4	4	730	1 050	88.0	1 500	1 800	NU1056	NJ	NUP	N	—
	500	80	5	5	1 320	1 760	143	1 200	1 400	NU256	NJ	NUP	N	NF
	500	130	5	5	2 050	3 100	252	1 100	1 300	NU2256	NJ	NUP	N	—
	580	108	6	6	2 010	2 540	200	1 100	1 200	NU356	NJ	NUP	N	NF
	580	175	6	6	3 000	4 250	335	920	1 100	NU2356	NJ	NUP	N	—
300	460	74	4	4	950	1 340	109	1 400	1 600	NU1060	NJ	NUP	N	—
	540	85	5	5	1 560	2 070	164	1 100	1 300	NU260	NJ	NUP	N	NF
	540	140	5	5	2 420	3 650	290	1 000	1 200	NU2260	NJ	NUP	N	—
320	480	74	4	4	970	1 410	113	1 300	1 500	NU1064	NJ	NUP	N	—
	580	92	5	5	1 780	2 390	186	1 000	1 200	NU264	NJ	NUP	N	NF
	580	150	5	5	2 830	4 350	340	950	1 100	NU2264	NJ	NUP	N	—
340	520	82	5	5	1 160	1 670	132	1 200	1 400	NU1068	NJ	NUP	N	—
360	540	82	5	5	1 190	1 750	136	1 100	1 300	NU1072	NJ	NUP	N	—
380	560	82	5	5	1 220	1 840	141	1 100	1 200	NU1076	NJ	NUP	N	—
400	600	90	5	5	1 460	2 190	164	990	1 200	NU1080	NJ	NUP	N	—
420	620	90	5	5	1 500	2 290	170	950	1 100	NU1084	NJ	NUP	N	—
440	650	94	6	6	1 590	2 430	178	900	1 100	NU1088	NJ	NUP	N	—

1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

Cylindrical Roller Bearings

NTN

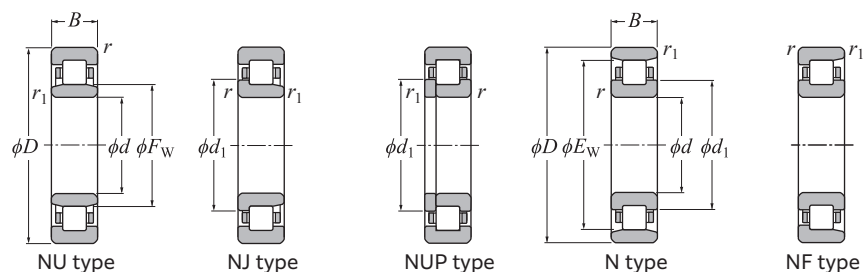


Dynamic equivalent radial load
 $P_r = F_r$

Static equivalent radial load
 $P_{0r} = F_r$

Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	D_b Max.	r_{as} Min. ³⁾	r_{as} Max.	r_{1as} Max.	NU type (approx.)	N type
270	330	282	253	253	268	275	284	347	347	333	2.5	2.5	19.6	19.3
295	385	313	256	256	293	298	316	424	424	390	3	3	50.2	49.2
295	385	313	256	256	293	298	316	424	424	390	3	3	80	78.4
310	430	335	260	260	305	313	333	480	480	436	4	4	93.4	91.3
310	430	335	260	260	305	313	333	480	480	436	4	4	147	144
296	364	309.6	276	276	292	300	312	384	384	367	3	3	29.1	28.7
320	420	340	280	280	318	323	343	460	460	426	4	4	66.9	65.6
320	420	340	280	280	318	323	343	460	460	426	4	4	104	102
336	464	362	284	284	331	339	359	516	516	471	5	5	117	114
336	464	362	284	284	331	339	359	516	516	471	5	5	182	178
316	384	329.6	296	296	312	320	332	404	404	387	3	3	30.9	30.4
340	440	360	300	300	336	343	365	480	480	446	4	4	70.8	69.4
340	440	360	300	300	336	343	365	480	480	446	4	4	109	107
362	498	390	304	304	356	366	386	556	556	505	5	5	142	139
362	498	390	304	304	356	366	386	556	556	505	5	5	222	218
340	420	356	316	316	336	344	358	444	444	423	3	3	43.6	42.9
364	476	387	320	320	361	368	392	520	520	482	4	4	88.2	86.4
364	476	387	320	320	361	368	392	520	520	482	4	4	138	135
360	440	376	336	336	356	364	378	464	464	443	3	3	46	45.3
390	510	415	340	340	386	393	419	560	560	516	4	4	111	109
390	510	415	340	340	386	393	419	560	560	516	4	4	172	168
385	475	403	360	360	381	390	405	500	500	479	4	4	61.8	60.8
405	495	423	380	380	401	410	425	520	520	499	4	4	64.7	63.7
425	515	443	400	400	421	430	445	540	540	519	4	4	67.5	66.5
450	550	470	420	420	446	455	473	580	580	554	4	4	87.6	86.3
470	570	490	440	440	466	475	493	600	600	574	4	4	91	89.6
493	597	513.8	464	464	488	499	517	626	626	602	5	5	105	103

3) Does not apply to the sides of the outer ring rib of type NF bearings.



d 460–500 mm

Boundary dimensions					Basic load rating		Fatigue load limit kN C_u	Allowable speed ²⁾		Bearing number				
mm					dynamic	static		Grease lubrication	min^{-1} Oil lubrication	NU type	NJ type	NUP type	N type	NF type
d	D	B	$r_{s \text{ min}}^{1)}$	$r_{Is \text{ min}}^{1)}$	kN C_r	kN C_{Or}								
460	680	100	6	6	1 710	2 630	191	850	1 000	NU1092	NJ	NUP	N	—
480	700	100	6	6	1 750	2 750	197	810	960	NU1096	NJ	NUP	N	—
500	720	100	6	6	1 790	2 870	203	770	910	NU10/500	NJ	NUP	N	—

1) Smallest allowable dimension for chamfer dimension r or r_1 .

2) This value is for machined cages; when pressed cages are used, 80 % of this value is acceptable.

Dynamic equivalent radial load
 $P_r = F_r$

Static equivalent radial load
 $P_{0r} = F_r$

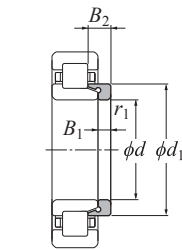
Dimension			Installation-related dimensions										Mass	
mm			mm										kg	
F_w	E_w	d_1	d_a Min.	d_b Min.	d_c Max.	d_d Min.	d_e Min.	D_a Max.	Max.	D_b Min. ³⁾	r_{as} Max.	r_{1as} Max.	NU type (approx.)	N type
516	624	537.6	484	484	511	522	541	656	656	629	5	5	122	120
536	644	557.6	504	504	531	542	561	676	676	649	5	5	126	124
556	664	577.6	524	524	551	562	581	696	696	669	5	5	130	128

3) Does not apply to the sides of the outer ring rib of type NF bearings.

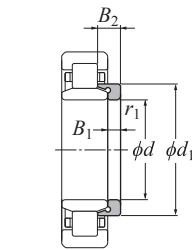
Cylindrical Roller Bearings

NTN

L type collar ring



NH = NJ + HJ



NUJ = NU + HJ

d 20–60 mm

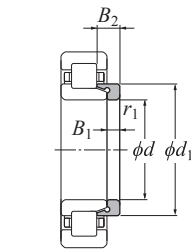
Dimension					L type collar ring number	Mass kg
mm						
<i>d</i>	<i>d</i> ₁	<i>B</i> ₁	<i>B</i> ₂	<i>r</i> _{1s min} ¹⁾		(approx.)
20	29.9	3	6.75	0.6	HJ204	0.012
	29.5	3	5.5	0.6	HJ204E	0.009
	29.9	3	7.5	0.6	HJ2204	0.013
	29.5	3	6.5	0.6	HJ2204E	0.01
	31.8	4	7.5	0.6	HJ304	0.017
	31.1	4	6.5	0.6	HJ304E	0.014
	31.8	4	8.5	0.6	HJ2304	0.018
	31.1	4	7.5	0.6	HJ2304E	0.015
25	34.8	3	7.25	0.6	HJ205	0.015
	34.5	3	6	0.6	HJ205E	0.012
	34.8	3	7.5	0.6	HJ2205	0.015
	34.5	3	6.5	0.6	HJ2205E	0.013
	39	4	8	1.1	HJ305	0.025
	38	4	7	1.1	HJ305E	0.021
	39	4	9	1.1	HJ2305	0.027
	38	4	8	1.1	HJ2305E	0.024
	43.6	6	10.5	1.5	HJ405	0.057
30	41.7	4	8.25	0.6	HJ206	0.025
	41.1	4	7	0.6	HJ206E	0.017
	41.7	4	8.5	0.6	HJ2206	0.025
	41.1	4	7.5	0.6	HJ2206E	0.02
	45.9	5	9.5	1.1	HJ306	0.039
	44.9	5	8.5	1.1	HJ306E	0.035
	45.9	5	11.5	1.1	HJ2306	0.043
	44.9	5	9.5	1.1	HJ2306E	0.035
	50.5	7	11.5	1.5	HJ406	0.08
35	47.6	4	8	0.6	HJ207	0.03
	48	4	7	0.6	HJ207E	0.027
	47.6	4	8.5	0.6	HJ2207	0.031
	48	4	8.5	0.6	HJ2207E	0.031
	50.8	6	11	1.1	HJ307	0.056
	51	6	9.5	1.1	HJ307E	0.048
	50.8	6	14	1.1	HJ2307	0.064
	51	6	11	1.1	HJ2307E	0.055
	59	8	13	1.5	HJ407	0.12

Dimension					L type collar ring number	Mass kg
mm						
<i>d</i>	<i>d</i> ₁	<i>B</i> ₁	<i>B</i> ₂	<i>r</i> _{1s min} ¹⁾	(approx.)	
40	54.2	5	9	1.1	HJ208	0.046
	53.9	5	8.5	1.1	HJ208E	0.042
	54.2	5	9.5	1.1	HJ2208	0.047
	53.9	5	9	1.1	HJ2208E	0.045
	58.4	7	12.5	1.5	HJ308	0.083
	57.6	7	11	1.5	HJ308E	0.07
	58.4	7	14.5	1.5	HJ2308	0.09
	57.6	7	12.5	1.5	HJ2308E	0.08
64.8	8	13	2	HJ408	0.14	
45	59	5	9.5	1.1	*HJ209	0.053
	58.9	5	8.5	1.1	HJ209E	0.047
	58.9	5	9	1.1	HJ2209E	0.05
	64	7	12.5	1.5	HJ309	0.099
	64.5	7	11.5	1.5	HJ309E	0.093
	64	7	15	1.5	HJ2309	0.109
	64.5	7	13	1.5	HJ2309E	0.103
71.8	8	13.5	2	HJ409	0.175	
50	64.6	5	10	1.1	HJ210	0.063
	63.9	5	9	1.1	*HJ210E	0.055
	64.6	5	9.5	1.1	HJ2210	0.061
	71	8	14	2	HJ310	0.142
	71.4	8	13	2	HJ310E	0.134
	71	8	17	2	HJ2310	0.157
	71.4	8	14.5	2	HJ2310E	0.15
	78.8	9	14.5	2.1	HJ410	0.23
55	70.8	6	11	1.1	*HJ211	0.084
	70.8	6	9.5	1.1	HJ211E	0.072
	70.8	6	10	1.1	HJ2211E	0.076
	77.2	9	15	2	HJ311	0.182
	77.7	9	14	2	HJ311E	0.168
	77.2	9	18.5	2	HJ2311	0.203
	77.7	9	15.5	2	HJ2311E	0.185
	85.2	10	16.5	2.1	HJ411	0.29
60	78.4	6	11	1.5	*HJ212	0.108
	77.6	6	10	1.5	*HJ212E	0.094

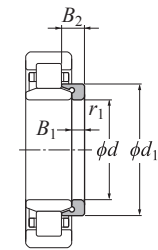
1) Smallest allowable dimension for chamfer dimension r. Note: 1 This L type collar ring is used with NU type cylindrical roller bearings; in duplex arrangements with NJ or NU type bearing numbers, they become NH type and NUJ type respectively. Refer to page B-98 through page B-101 for bearing dimensions, allowable speed, and mass. 2. "*" indicates L type collar rings that can also be used with dimension series 22 bearings.

Cylindrical Roller Bearings

NTN



NH = NJ + HJ



NUJ = NU + HJ

d 60–105 mm

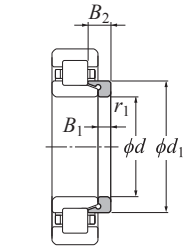
Dimension					L type collar ring number	Mass kg
mm						
d	d ₁	B ₁	B ₂	r _{1s min} ¹⁾	(approx.)	
60	84.2	9	15.5	2.1	HJ312	0.22
	84.6	9	14.5	2.1	HJ312E	0.205
	84.2	9	19	2.1	HJ2312	0.245
	84.6	9	16	2.1	HJ2312E	0.23
	91.8	10	16.5	2.1	HJ412	0.34
65	84.8	6	11	1.5	HJ213	0.123
	84.5	6	10	1.5	HJ213E	0.111
	84.8	6	11.5	1.5	HJ2213	0.126
	84.5	6	10.5	1.5	HJ2213E	0.118
	91	10	17	2.1	HJ313	0.28
	91	10	15.5	2.1	HJ313E	0.25
	91	10	20	2.1	HJ2313	0.304
	91	10	18	2.1	HJ2313E	0.29
98.5	11	18	2.1	HJ413	0.42	
70	89.6	7	12.5	1.5	*HJ214	0.15
	89.5	7	11	1.5	HJ214E	0.13
	89.5	7	11.5	1.5	HJ2214E	0.138
	98	10	17.5	2.1	HJ314	0.33
	98	10	15.5	2.1	HJ314E	0.293
	98	10	20.5	2.1	HJ2314	0.358
	98	10	18.5	2.1	HJ2314E	0.35
110.5	12	20	3	HJ414	0.605	
75	94	7	12.5	1.5	*HJ215	0.156
	94.5	7	11	1.5	HJ215E	0.141
	94.5	7	11.5	1.5	HJ2215E	0.164
	104.2	11	18.5	2.1	HJ315	0.4
	104.6	11	16.5	2.1	HJ315E	0.35
	104.2	11	21.5	2.1	HJ2315	0.432
	104.6	11	19.5	2.1	HJ2315E	0.41
116	13	21.5	3	HJ415	0.71	
80	101.2	8	13.5	2	*HJ216	0.207
	101.7	8	12.5	2	*HJ216E	0.193
	111.8	11	19.5	2.1	HJ316	0.47
	111	11	17	2.1	HJ316E	0.405
	111.8	11	23	2.1	HJ2316	0.511

1) Smallest allowable dimension for chamfer dimension r. Note: 1 This L type collar ring is used with NU type cylindrical roller bearings; in duplex arrangements with NJ or NU type bearing numbers, they become NH type and NUJ type respectively. Refer to page B-102 through page B-107 for bearing dimensions, allowable speed, and mass. 2. "*" indicates L type collar rings that can also be used with dimension series 22 bearings.

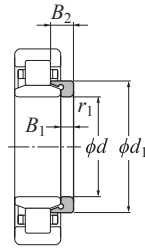
Cylindrical Roller Bearings

NTN

L type collar ring



NH = NJ + HJ



NUJ = NU + HJ

d 105–200 mm

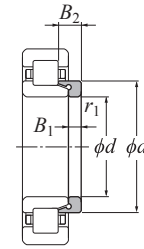
Dimension mm						L type collar ring number	Mass kg (approx.)
d	d ₁	B ₁	B ₂	r _{1s min} ¹⁾			
105	147	13	22.5	3		HJ321	0.97
	141.5	11	18.5	2.1		HJ222	0.615
	142.1	11	17	2.1		HJ222E	0.553
	141.5	11	20.5	2.1		HJ2222	0.645
110	142.1	11	19.5	2.1		HJ2222E	0.605
	155.5	14	23	3		HJ322	1.17
	156.6	14	22	3		HJ322E	1.09
	155.5	14	28	3		HJ2322	1.28
120	156.6	14	26.5	3		HJ2322E	1.25
	153	11	19	2.1		HJ224	0.715
	153.9	11	17	2.1		HJ224E	0.634
	153	11	22	2.1		HJ2244	0.767
130	153.9	11	20	2.1		HJ2244E	0.705
	168.5	14	23.5	3		HJ324	1.4
	169.2	14	22.5	3		HJ324E	1.28
	168.5	14	28	3		HJ2324	1.53
140	169.2	14	26	3		HJ2324E	1.42
	165.5	11	19	3		HJ226	0.84
	164.7	11	17	3		HJ226E	0.684
	165.5	11	25	3		HJ2266	0.953
150	164.7	11	21	3		HJ2266E	0.831
	182	14	24	4		HJ326	1.62
	183	14	23	4		HJ326E	1.53
	182	14	29.5	4		HJ2326	1.8
160	183	14	28	4		HJ2326E	1.75
	179.5	11	19	3		HJ228	1
	180.2	11	18	3		HJ228E	0.929
	179.5	11	25	3		HJ2288	1.14
170	180.2	11	23	3		HJ2288E	1.11
	196	15	26	4		HJ328	1.93
	196.8	15	25	4		HJ328E	1.91
	196	15	33.5	4		HJ2328	2.21
180	196.8	15	31	4		HJ2328E	2.3
	244.5	13	23.5	4		HJ238	2.2
	245.2	13	21.5	4		HJ238E	1.94
	244.5	13	31.5	4		HJ2238	2.52
190	244	13	26.5	4		HJ2238E	2.38
	265	18	32	5		HJ338	4.45
	265	18	41.5	5		HJ2338	5.05
	200	258	14	25	4	HJ240	2.6

1) Smallest allowable dimension for chamfer dimension r.

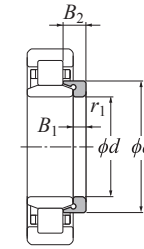
Note: 1 This L type collar ring is used with NU type cylindrical roller bearings; in duplex arrangements with NJ or NU type bearing numbers, they become NH type and NUJ type respectively. Refer to page B-106 through page B-111 for bearing dimensions, allowable speed, and mass.

Cylindrical Roller Bearings

NTN



NH = NJ + HJ



NUJ = NU + HJ

d 200–320 mm

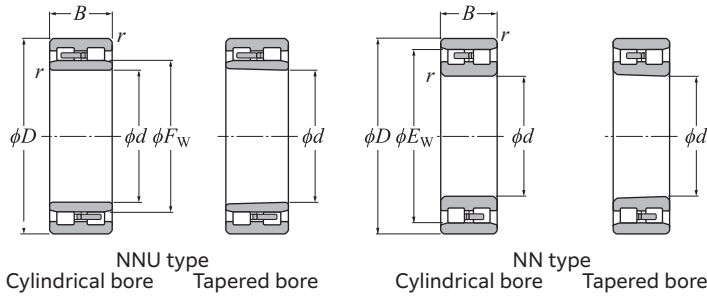
Dimension mm						L type collar ring number	Mass kg (approx.)
d	d ₁	B ₁	B ₂	r _{1s min} ¹⁾			
200	259	14	23	4		HJ240E	2.35
	258	14	34	4		HJ2240	2.99
	257.8	14	28	4		HJ2240E	2.86
	280	18	33	5		HJ340	5
220	280	18	44.5	5		HJ2340	5.76
	286	15	27.5	4		HJ244	3.55
	307	20	36	5		HJ344	7.05
	313	16	29.5	4		HJ248	4.65
240	335	22	39.5	5		HJ348	8.2
	340	18	33	5		HJ252	6.2
	362	24	43	6		HJ352	11.4
	360	18	33	5		HJ256	7.39
260	390	26	46	6		HJ356	13.9
	387	20	34.5	5		HJ260	9.14
	320	415	21	37	5	HJ264	11.3

1) Smallest allowable dimension for chamfer dimension r.

Note: 1 This L type collar ring is used with NU type cylindrical roller bearings; in duplex arrangements with NJ or NU type bearing numbers, they become NH type and NUJ type respectively. Refer to page B-110 through page B-113 for bearing dimensions, allowable speed, and mass.

● Double Row Cylindrical Roller Bearings

NTN



d 25–110 mm

Boundary dimensions				Basic load rating		Fatigue load limit kN C _u	Allowable speed		Bearing number ²⁾	
mm				dynamic	static		min ⁻¹		NNU type	
				kN C _r	C _{0r}		Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore
d	D	B	r _s min ¹⁾							
25	47	16	0.6	28.6	30.0	3.65	14 000	17 000	—	—
30	55	19	1	34.0	37.0	4.55	12 000	15 000	—	—
35	62	20	1	42.0	47.5	5.80	11 000	13 000	—	—
40	68	21	1	48.0	55.5	6.75	9 700	11 000	—	—
45	75	23	1	57.5	68.5	8.35	8 800	10 000	—	—
50	80	23	1	59.0	72.5	8.85	8 000	9 400	—	—
55	90	26	1.1	77.0	96.5	11.8	7 300	8 600	—	—
60	95	26	1.1	78.5	102	12.4	6 700	7 900	—	—
65	100	26	1.1	83.0	111	13.6	6 200	7 300	—	—
70	110	30	1.1	105	143	17.4	5 800	6 800	—	—
75	115	30	1.1	107	149	18.2	5 400	6 300	—	—
80	125	34	1.1	128	179	21.6	5 100	5 900	—	—
85	130	34	1.1	135	194	23.1	4 800	5 600	—	—
90	140	37	1.5	158	228	26.6	4 500	5 300	—	—
95	145	37	1.5	162	238	27.4	4 300	5 000	—	—
100	140	40	1.1	145	260	30.0	4 300	5 100	NNU4920	NNU4920K
	150	37	1.5	170	256	29.2	4 000	4 800	—	—
105	145	40	1.1	147	268	30.5	4 100	4 800	NNU4921	NNU4921K
	160	41	2	220	320	36.0	3 800	4 500	—	—
110	150	40	1.1	152	284	32.0	3 900	4 600	NNU4922	NNU4922K
	170	45	2	254	375	41.5	3 600	4 300	—	—

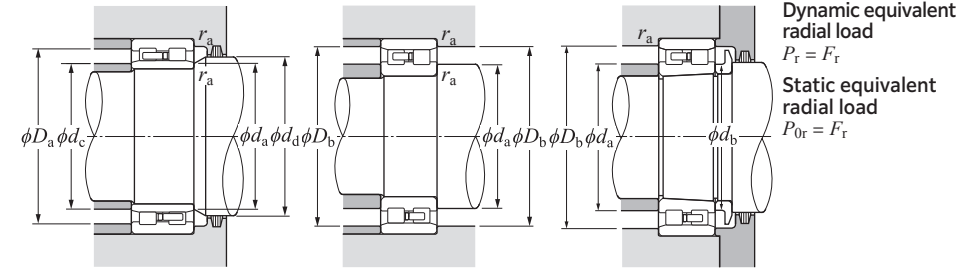
1) Smallest allowable dimension for chamfer dimension r .

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12.

B-120

● Double Row Cylindrical Roller Bearings

NTN

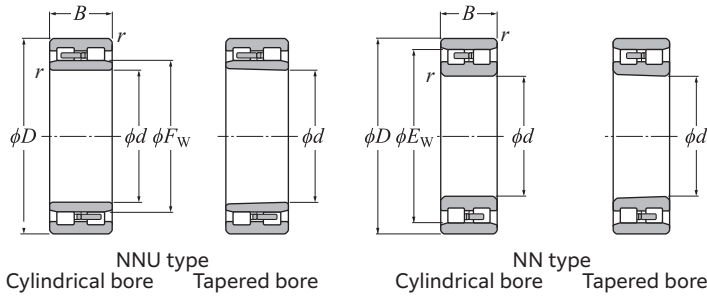


Bearing number ²⁾		Dimension		Installation-related dimensions									Mass (approx.) kg			
NN type		mm		mm									NNU type		NN type	
Cylindrical bore	Tapered bore	<i>F</i> _w	<i>E</i> _w	<i>d</i> _a Min.	<i>d</i> _b Min.	<i>d</i> _c Max.	<i>d</i> _d Min.	<i>D</i> _a Max.	<i>D</i> _b Max.	<i>D</i> _b Min.	<i>r</i> _{as} Max.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	
NN3005	NN3005K	—	41.3	29	30	—	—	—	43	42	0.6	—	—	0.124	0.121	
NN3006	NN3006K	—	48.5	35	36.5	—	—	—	50	49	1	—	—	0.199	0.193	
NN3007	NN3007K	—	55	40	41.5	—	—	—	57	56	1	—	—	0.242	0.235	
NN3008	NN3008K	—	61	45	47	—	—	—	63	62	1	—	—	0.312	0.303	
NN3009	NN3009K	—	67.5	50	52	—	—	—	70	69	1	—	—	0.405	0.393	
NN3010	NN3010K	—	72.5	55	57	—	—	—	75	74	1	—	—	0.433	0.419	
NN3011	NN3011K	—	81	61.5	63.5	—	—	—	83.5	82	1	—	—	0.651	0.631	
NN3012	NN3012K	—	86.1	66.5	68.5	—	—	—	88.5	87	1	—	—	0.704	0.683	
NN3013	NN3013K	—	91	71.5	73.5	—	—	—	93.5	92	1	—	—	0.758	0.735	
NN3014	NN3014K	—	100	76.5	79	—	—	—	103.5	101	1	—	—	1.04	1.01	
NN3015	NN3015K	—	105	81.5	84	—	—	—	108.5	106	1	—	—	1.14	1.11	
NN3016	NN3016K	—	113	86.5	89.5	—	—	—	118.5	114	1	—	—	1.52	1.47	
NN3017	NN3017K	—	118	91.5	94.5	—	—	—	123.5	119	1	—	—	1.61	1.56	
NN3018	NN3018K	—	127	98	101	—	—	—	132	129	1.5	—	—	2.07	2.01	
NN3019	NN3019K	—	132	103	106	—	—	—	137	134	1.5	—	—	2.17	2.1	
NN4920	NN4920K	113	129	106.5	110	111	115	133.5	133.5	131	1	1.83	1.75	1.75	1.67	
NN3020	NN3020K	—	137	108	111	—	—	—	142	139	1.5	—	—	2.26	2.19	
NN4921	NN4921K	118	134	111.5	115	116	120	138.5	138.5	136	1	1.91	1.82	1.82	1.73	
NN3021	NN3021K	—	146	114	117	—	—	—	151	148	2	—	—	2.89	2.8	
NN4922	NN4922K	123	139	116.5	120	121	125	143.5	143.5	141	1	1.99	1.9	1.9	1.81	
NN3022	NN3022K	—	155	119	123	—	—	—	161	157	2	—	—	3.69	3.56	

B-121

● Double Row Cylindrical Roller Bearings

NTN



d 120–280 mm

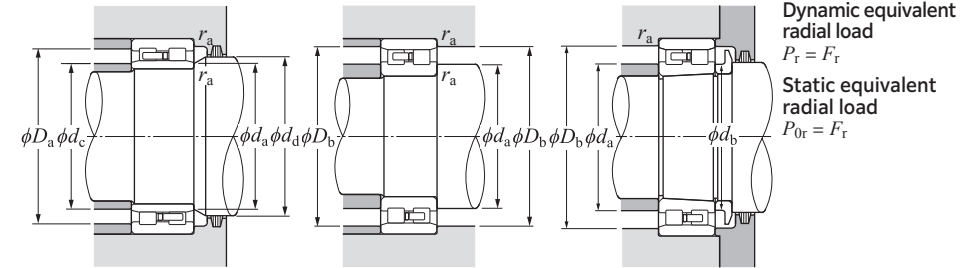
d	Boundary dimensions			Basic load rating		Fatigue load limit kN C _u	Allowable speed		Bearing number ²⁾	
	mm			dynamic kN C _r	static kN C _{0r}		min ⁻¹		NNU type	
	D	B	r _{s min} ¹⁾				Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore
120	165	45	1.1	203	360	39.5	3 600	4 200	NNU4924	NNU4924K
	180	46	2	258	390	42.5	3 300	3 900	—	—
130	180	50	1.5	244	440	47.0	3 300	3 900	NNU4926	NNU4926K
	200	52	2	315	475	50.0	3 100	3 600	—	—
140	190	50	1.5	251	470	49.0	3 000	3 600	NNU4928	NNU4928K
	210	53	2	330	515	53.0	2 800	3 300	—	—
150	210	60	2	380	690	70.5	2 800	3 300	NNU4930	NNU4930K
	225	56	2.1	370	585	59.0	2 600	3 100	—	—
160	220	60	2	395	740	74.0	2 600	3 100	NNU4932	NNU4932K
	240	60	2.1	415	660	65.5	2 500	2 900	—	—
170	230	60	2	400	765	75.5	2 500	2 900	NNU4934	NNU4934K
	260	67	2.1	490	775	75.0	2 300	2 700	—	—
180	250	69	2	510	965	93.0	2 300	2 700	NNU4936	NNU4936K
	280	74	2.1	630	995	94.5	2 200	2 600	—	—
190	260	69	2	525	1 030	98.0	2 200	2 600	NNU4938	NNU4938K
	290	75	2.1	640	1 040	97.0	2 000	2 400	—	—
200	280	80	2.1	615	1 180	110	2 100	2 400	NNU4940	NNU4940K
	310	82	2.1	725	1 170	107	1 900	2 300	—	—
220	300	80	2.1	650	1 300	118	1 900	2 200	NNU4944	NNU4944K
	340	90	3	905	1 480	132	1 700	2 100	—	—
240	320	80	2.1	680	1 410	126	1 700	2 000	NNU4948	NNU4948K
	360	92	3	945	1 600	140	1 600	1 900	—	—
260	360	100	2.1	1 000	2 070	179	1 600	1 800	NNU4952	NNU4952K
	400	104	4	1 180	1 990	170	1 500	1 700	—	—
280	380	100	2.1	1 030	2 200	187	1 400	1 700	NNU4956	NNU4956K
	420	106	4	1 200	2 080	174	1 300	1 600	—	—

1) Smallest allowable dimension for chamfer dimension r .

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12.

● Double Row Cylindrical Roller Bearings

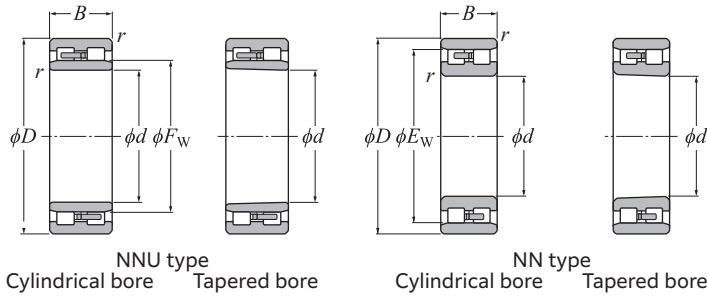
NTN



Bearing number ²⁾		Dimension		Installation-related dimensions									Mass (approx.) kg			
NN type		mm		mm									NNU type		NN type	
Cylindrical bore	Tapered bore	F_w	E_w	d_a Min.	d_b Min.	d_c Max.	d_d Min.	D_a Max.	D_b Max.	D_b Min.	r_{as} Max.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	
NN4924	NN4924K	134.5	154.5	126.5	130	133	137	158.5	158.5	156.5	1	2.75	2.63	2.63	2.51	
NN3024	NN3024K	—	165	129	133	—	—	—	171	167	2	—	—	3.98	3.83	
NN4926	NN4926K	146	168	138	142	144	148	172	172	170	1.5	3.69	3.52	3.52	3.35	
NN3026	NN3026K	—	182	139	143	—	—	—	191	183	2	—	—	5.92	5.71	
NN4928	NN4928K	156	178	148	152	154	158	182	182	180	1.5	3.94	3.76	3.76	3.58	
NN3028	NN3028K	—	192	149	153	—	—	—	201	194	2	—	—	6.44	6.21	
NN4930	NN4930K	168.5	196.5	159	164	166	171	201	201	198.5	2	6.18	5.9	5.9	5.62	
NN3030	NN3030K	—	206	161	166	—	—	—	214	208	2	—	—	7.81	7.53	
NN4932	NN4932K	178.5	206.5	169	174	176	182	211	211	208.5	2	6.53	6.23	6.24	5.94	
NN3032	NN3032K	—	219	171	176	—	—	—	229	221	2	—	—	8.92	8.59	
NN4934	NN4934K	188.5	216.5	179	184	186	192	221	221	218.5	2	6.87	6.55	6.56	6.24	
NN3034	NN3034K	—	236	181	187	—	—	—	249	238	2	—	—	12.6	12.2	
NN4936	NN4936K	202	234	189	195	199	205	241	241	236	2	9.9	9.46	9.45	9.01	
NN3036	NN3036K	—	255	191	197	—	—	—	269	257	2	—	—	16.6	16	
NN4938	NN4938K	212	244	199	205	209	215	251	251	246	2	10.4	9.94	9.93	9.47	
NN3038	NN3038K	—	265	201	207	—	—	—	279	267	2	—	—	18	17.4	
NN4940	NN4940K	225	261	211	218	222	228	269	269	264	2	14.7	14	14	13.3	
NN3040	NN3040K	—	282	211	218	—	—	—	299	285	2	—	—	21.6	20.8	
NN4944	NN4944K	245	281	231	238	242	248	289	289	284	2	15.9	15.2	15.2	14.5	
NN3044	NN3044K	—	310	233	240	—	—	—	327	313	2.5	—	—	29.3	28.2	
NN4948	NN4948K	265	301	251	258	262	269	309	309	304	2	17.2	16.4	16.4	15.6	
NN3048	NN3048K	—	330	253	261	—	—	—	347	333	2.5	—	—	32.8	31.6	
NN4952	NN4952K	292	336	271	279	288	296	349	349	339	2	29.6	28.3	28.3	27	
NN3052	NN3052K	—	364	276	285	—	—	—	384	367	3	—	—	47.4	45.8	
NN4956	NN4956K	312	356	291	299	308	316	369	369	359	2	31.6	30.2	30.2	28.8	
NN3056	NN3056K	—	384	296	305	—	—	—	404	387	3	—	—	51.1	49.3	

● Double Row Cylindrical Roller Bearings

NTN



d 300–500 mm

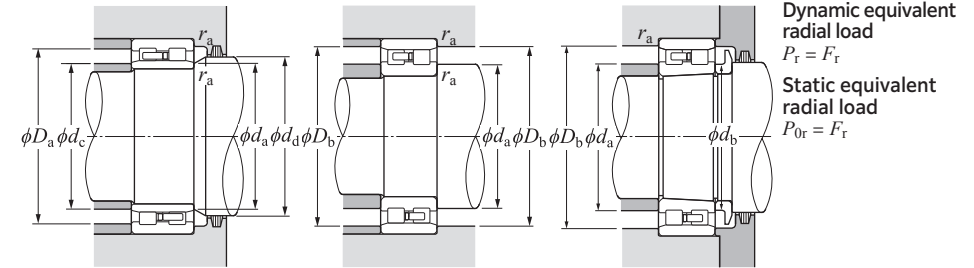
Boundary dimensions				Basic load rating		Fatigue load limit kN C_u	Allowable speed		Bearing number ²⁾	
mm				dynamic kN C_r	static kN C_{0r}		min ⁻¹ Grease lubrication	Oil lubrication	NNU type	
d	D	B	$r_{s \min}^{1)}$						Cylindrical bore	Tapered bore
300	420	118	3	1 330	2 800	231	1 300	1 500	NNU4960	NNU4960K
	460	118	4	1 470	2 560	209	1 200	1 500	—	—
320	440	118	3	1 370	2 970	242	1 200	1 400	NNU4964	NNU4964K
	480	121	4	1 500	2 670	214	1 100	1 300	—	—
340	460	118	3	1 410	3 150	252	1 100	1 300	NNU4968	NNU4968K
	520	133	5	1 800	3 200	251	1 100	1 300	—	—
360	480	118	3	1 430	3 250	255	1 100	1 300	NNU4972	NNU4972K
	540	134	5	1 830	3 300	258	1 000	1 200	—	—
380	520	140	4	1 810	4 050	315	1 000	1 200	NNU4976	NNU4976K
	560	135	5	1 870	3 450	265	940	1 100	—	—
400	540	140	4	1 870	4 300	325	940	1 100	NNU4980	NNU4980K
	600	148	5	2 260	4 150	310	880	1 000	—	—
420	560	140	4	1 930	4 500	340	900	1 100	NNU4984	NNU4984K
	620	150	5	2 300	4 300	320	840	990	—	—
440	600	160	4	2 380	5 550	410	850	1 000	NNU4988	NNU4988K
	650	157	6	2 680	5 100	370	800	940	—	—
460	620	160	4	2 460	5 850	430	800	950	NNU4992	NNU4992K
	680	163	6	2 830	5 350	385	750	890	—	—
480	650	170	5	2 530	5 900	425	770	910	NNU4996	NNU4996K
500	670	170	5	2 670	6 400	455	730	860	NNU49/500	NNU49/500K

1) Smallest allowable dimension for chamfer dimension r .

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12.

● Double Row Cylindrical Roller Bearings

NTN



Bearing number ²⁾		Dimension		Installation-related dimensions									Mass (approx.) kg			
NN type		mm		mm									NNU type		NN type	
Cylindrical bore	Tapered bore	F_w	E_w	d_a Min.	d_b Min.	d_c Max.	d_d Min.	D_a Max.	D_b Max.	D_b Min.	r_{as} Max.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	
NN4960	NN4960K	339	391	313	323	335	343	407	407	394	2.5	48.6	46.4	46.4	44.2	
NN3060	NN3060K	—	418	316	326	—	—	—	444	421	3	—	—	70.8	68.6	
NN4964	NN4964K	359	411	333	343	355	363	427	427	414	2.5	51.4	49.1	49	46.7	
NN3064	NN3064K	—	438	336	346	—	—	—	464	441	3	—	—	76.2	73.5	
—	—	379	—	353	363	375	383	447	—	—	2.5	54.2	51.7	—	—	
NN3068	NN3068K	—	473	360	371	—	—	—	500	477	4	—	—	102	98.5	
—	—	398	—	373	383	394	402	467	—	—	2.5	57	54.4	—	—	
NN3072	NN3072K	—	493	380	391	—	—	—	520	497	4	—	—	107	103	
—	—	425	—	396	408	420	430	504	—	—	3	84.5	80.6	—	—	
NN3076	NN3076K	—	512	400	411	—	—	—	540	516	4	—	—	113	109	
—	—	445	—	416	428	440	450	524	—	—	3	88.2	84.1	—	—	
NN3080	NN3080K	—	547	420	432	—	—	—	580	551	4	—	—	146	141	
—	—	465	—	436	448	460	470	544	—	—	3	92	87.7	—	—	
NN3084	NN3084K	—	567	440	452	—	—	—	600	571	4	—	—	154	148	
—	—	492	—	456	469	487	497	584	—	—	3	127	121	—	—	
NN3088	NN3088K	—	596	464	477	—	—	—	626	601	5	—	—	178	172	
—	—	512	—	476	489	507	517	604	—	—	3	132	126	—	—	
NN3092	NN3092K	—	622	484	498	—	—	—	656	627	5	—	—	202	195	
—	—	534	—	500	514	531	541	630	—	—	4	156	149	—	—	
—	—	556	—	520	534	551	561	650	—	—	4	162	155	—	—	