

Self-Aligning Ball Bearings



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.

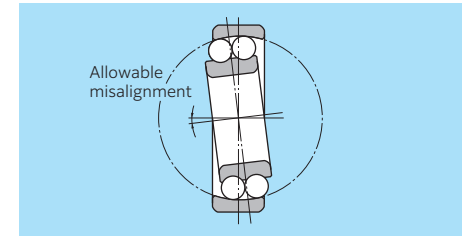
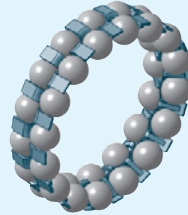
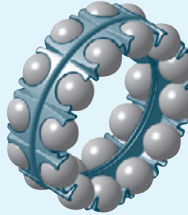
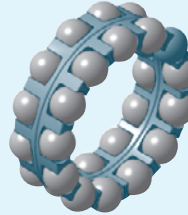


Fig. 1

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**.

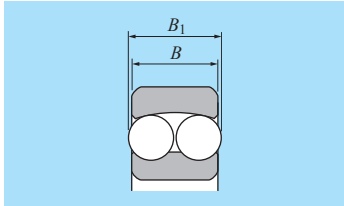


Fig. 2

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.

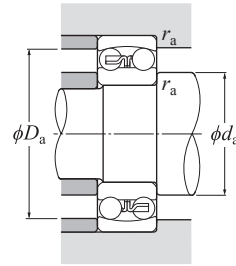
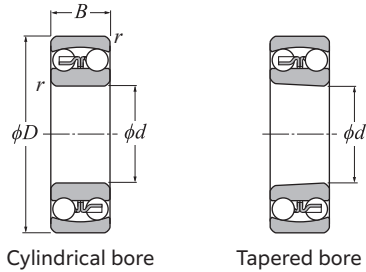
Normal load 1/15

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.

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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

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

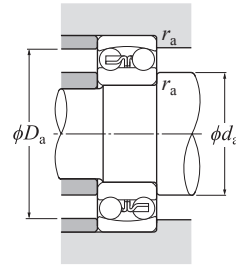
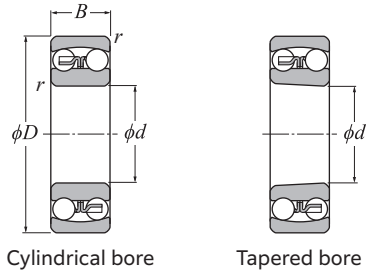
For values of e, Y_1, Y_2 and Y_0 see the table below.

d 10–35 mm

Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing numbers		Installation-related dimensions					
	dynamic	static		Grease lubrication	Oil lubrication	Cylindrical bore	Tapered bore ²⁾	d_a Min.	D_a Max.	r_{as} Max.			
mm	kN		kN	min^{-1}				mm					
d	D	B	$r_{s, \text{min}}^{1)}$	C_r	C_{0r}	C_u							
10	30	9	0.6	5.55	1.19	0.049	22 000	28 000	1200S	—	14.0	26.0	0.6
	30	14	0.6	7.45	1.59	0.067	24 000	28 000	2200S	—	14.0	26.0	0.6
	35	11	0.6	7.35	1.62	0.074	20 000	24 000	1300S	—	14.0	31.0	0.6
	35	17	0.6	9.20	2.01	0.096	18 000	22 000	2300S	—	14.0	31.0	0.6
12	32	10	0.6	5.70	1.27	0.053	22 000	26 000	1201S	—	16.0	28.0	0.6
	32	14	0.6	7.75	1.73	0.089	22 000	26 000	2201S	—	16.0	28.0	0.6
	37	12	1	9.65	2.16	0.078	18 000	22 000	1301S	—	17.0	32.0	1
	37	17	1	12.1	2.73	0.120	17 000	22 000	2301S	—	17.0	32.0	1
15	35	11	0.6	7.60	1.75	0.072	18 000	22 000	1202S	—	19.0	31.0	0.6
	35	14	0.6	7.80	1.85	0.095	18 000	22 000	2202S	—	19.0	31.0	0.6
	42	13	1	9.70	2.29	0.081	16 000	20 000	1302S	—	20.0	37.0	1
	42	17	1	12.3	2.91	0.130	14 000	18 000	2302S	—	20.0	37.0	1
17	40	12	0.6	8.00	2.01	0.083	16 000	20 000	1203S	—	21.0	36.0	0.6
	40	16	0.6	9.95	2.42	0.130	16 000	20 000	2203S	—	21.0	36.0	0.6
	47	14	1	12.7	3.20	0.110	14 000	17 000	1303S	—	22.0	42.0	1
	47	19	1	14.7	3.55	0.160	13 000	16 000	2303S	—	22.0	42.0	1
20	47	14	1	10.0	2.61	0.110	14 000	17 000	1204S	1204SK	25.0	42.0	1
	47	18	1	12.8	3.30	0.140	14 000	17 000	2204S	2204SK	25.0	42.0	1
	52	15	1.1	12.6	3.35	0.140	12 000	15 000	1304S	1304SK	26.5	45.5	1
	52	21	1.1	18.5	4.70	0.210	11 000	14 000	2304S	2304SK	26.5	45.5	1
25	52	15	1	12.2	3.30	0.130	12 000	14 000	1205S	1205SK	30.0	47.0	1
	52	18	1	12.4	3.45	0.200	12 000	14 000	2205S	2205SK	30.0	47.0	1
	62	17	1.1	18.2	5.00	0.150	10 000	13 000	1305S	1305SK	31.5	55.5	1
	62	24	1.1	24.9	6.60	0.290	9 500	12 000	2305S	2305SK	31.5	55.5	1
30	62	16	1	15.8	4.65	0.190	10 000	12 000	1206S	1206SK	35.0	57.0	1
	62	20	1	15.3	4.55	0.260	10 000	12 000	2206S	2206SK	35.0	57.0	1
	72	19	1.1	21.4	6.30	0.190	8 500	11 000	1306S	1306SK	36.5	65.5	1
	72	27	1.1	32.0	8.75	0.380	8 000	10 000	2306S	2306SK	36.5	65.5	1
35	72	17	1.1	15.9	5.10	0.210	8 500	10 000	1207S	1207SK	41.5	65.5	1
	72	23	1.1	21.7	6.60	0.320	8 500	10 000	2207S	2207SK	41.5	65.5	1
	80	21	1.5	25.3	7.85	0.280	7 500	9 500	1307S	1307SK	43.0	72.0	1.5
	80	31	1.5	40.0	11.3	0.480	7 100	9 000	2307S	2307SK	43.0	72.0	1.5

1) Smallest allowable dimension for chamfer dimension r .
2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12

Constant	Axial load factors			Mass (approx.)
e	Y_1	Y_2	Y_0	kg 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



d 40–75 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	mm	mm			
d	D	B	r _{s,min} ¹⁾	C _r	C _{0r}	C _u	Grease lubrication	Oil lubrication	1208S	1208SK	d _a Min.	D _a Max.	r _{as} Max.
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

$$P_r = XF_r + YF_a$$

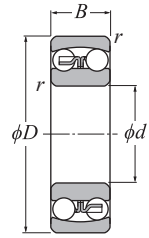
$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y ₁	0.65	Y ₂

Static equivalent radial load

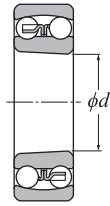
$$P_{0r} = F_r + Y_0 F_a$$

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

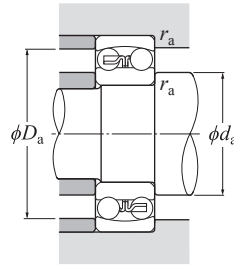
Constant	Axial load factors			Mass (approx.)
e	Y ₁	Y ₂	Y ₀	kg Cylindrical bore
0.22	2.8	4.3	2.9	0.420
0.33	1.9	3.0	2.0	0.506
0.24	2.6	4.0	2.7	0.727
0.43	1.5	2.3	1.5	0.918
0.21	3.0	4.7	3.1	0.470
0.30	2.1	3.2	2.2	0.556
0.25	2.6	4.0	2.7	0.971
0.41	1.5	2.4	1.6	1.200
0.21	3.1	4.7	3.2	0.535
0.28	2.2	3.4	2.3	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	mm	mm	mm		
<i>d</i>	<i>D</i>	<i>B</i>	<i>r_{s,min}</i> ¹⁾	<i>C_r</i>	<i>C_{0r}</i>	<i>C_u</i>	Grease lubrication	Oil lubrication	1216S	1216SK	<i>d_a</i> Min.	<i>D_a</i> Max.	<i>r_{as}</i> Max.
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	2321S ³⁾	—	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	2322S ³⁾	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

$$P_r = XF_r + YF_a$$

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

Static equivalent radial load

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

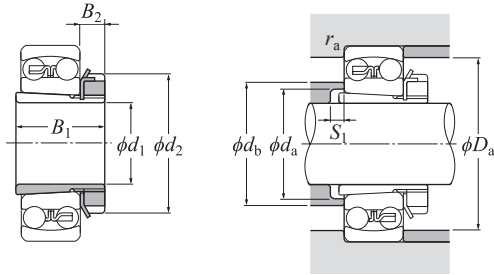
For values of *e*, *Y*₁, *Y*₂ and *Y*₀ see the table below.

Constant	Axial load factors			Mass (approx.)
<i>e</i>	<i>Y</i> ₁	<i>Y</i> ₂	<i>Y</i> ₀	kg Cylindrical bore
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



d_1 17–50 mm

d_1	Boundary dimensions				Numbers		Installation-related dimensions					Mass ¹⁾
	mm				Bearing	Adapter	d_a	d_b	mm	D_a	r_{as}	kg
	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 B_1 dimension of series H3 is longer than that of series H2.

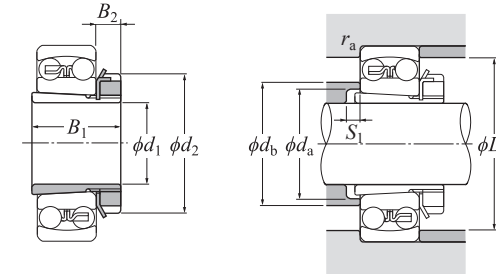
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washers with straight inner tabs.

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

(For self-aligning ball bearings)

NTN



d_1 50–85 mm

d_1	Boundary dimensions				Numbers		Installation-related dimensions					Mass ¹⁾
	mm				Bearing	Adapter	d_a	d_b	mm	D_a	r_{as}	kg
	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 B_1 dimension of series H3 is longer than that of series H2.

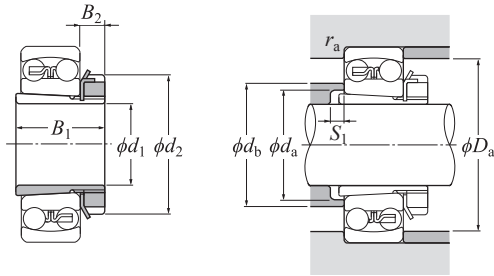
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washers with straight inner tabs.

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

(For self-aligning ball bearings)

NTN



d_1 85–100 mm

d_1	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.)
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