





## 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 a 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.

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

Furthermore, if an adapter is used on the tapered bore of the inner diameter, installation and disassembly are much simpler and for this reason adapters are often used on equipment with drive shafts.

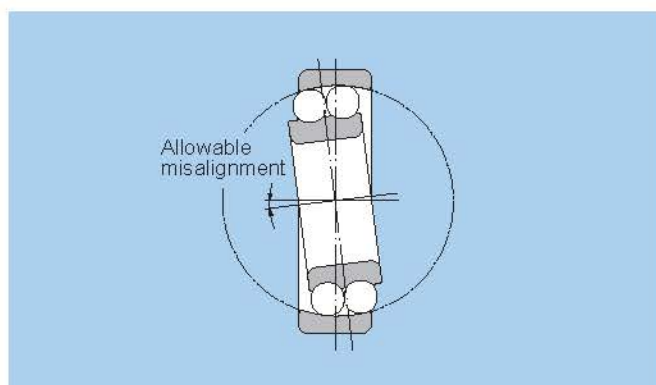


Fig. 1

## 2. Standard cage types

All bearing series are equipped with a pressed cage, except 2322S, which is equipped with a machined cage.

## 3. Ball protrusion

Bearings with part numbers listed in Fig. 2 below have balls which protrude slightly from the bearing face.

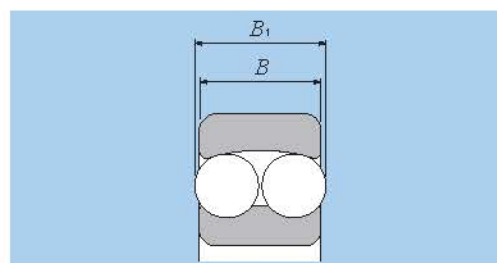


Fig. 2

their degree of protrusion is listed below

Units mm

Bearing number	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

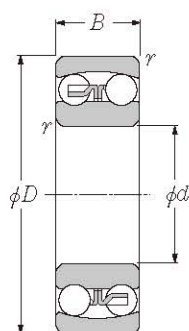
## 4. Allowable misalignment angle

Listed below are the allowable misalignment angles for bearings with self-aligning characteristics when placed under normal load conditions. This degree of allowable misalignment may be limited by the design of structures around the bearing.

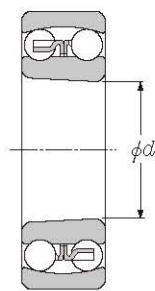
Allowable misalignment under normal loads (loads equivalent to  $0.09 C_r$ ): 0.07 rad ( $4^\circ$ )



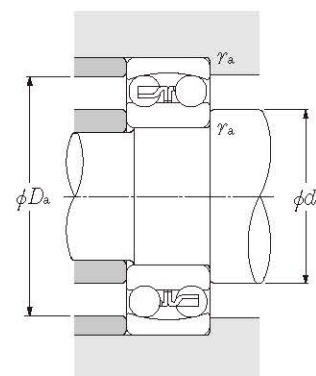
# Self-Aligning Ball Bearings



Cylindrical bore



Tapered bore



**d** 10 ~ 35mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers		Abutment and fillet dimensions		
	mm				dynamic	static	dynamic	static	$\text{min}^{-1}$		cylindrical	tapered <sup>2)</sup>	$d_a$	$D_a$	$r_{as}$
<i>d</i>	<i>D</i>	<i>B</i>	$r_{s\text{min}}^{1)}$	$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil			min	max	max	
<b>10</b>	30	9	0.6	5.55	1.19	570	121	22 000	28 000	<b>1200S</b>	—	14.0	26.0	0.6	
	30	14	0.6	7.45	1.59	760	162	24 000	28 000	<b>2200S</b>	—	14.0	26.0	0.6	
	35	11	0.6	7.35	1.62	750	165	20 000	24 000	<b>1300S</b>	—	14.0	31.0	0.6	
	35	17	0.6	9.20	2.01	935	205	18 000	22 000	<b>2300S</b>	—	14.0	31.0	0.6	
<b>12</b>	32	10	0.6	5.70	1.27	580	130	22 000	26 000	<b>1201S</b>	—	16.0	28.0	0.6	
	32	14	0.6	7.75	1.73	790	177	22 000	26 000	<b>2201S</b>	—	16.0	28.0	0.6	
	37	12	1	9.65	2.16	985	221	18 000	22 000	<b>1301S</b>	—	17.0	32.0	1	
	37	17	1	12.1	2.73	1 240	278	17 000	22 000	<b>2301S</b>	—	17.0	32.0	1	
<b>15</b>	35	11	0.6	7.60	1.75	775	179	18 000	22 000	<b>1202S</b>	—	19.0	31.0	0.6	
	35	14	0.6	7.80	1.85	795	188	18 000	22 000	<b>2202S</b>	—	19.0	31.0	0.6	
	42	13	1	9.70	2.29	990	234	16 000	20 000	<b>1302S</b>	—	20.0	37.0	1	
	42	17	1	12.3	2.91	1 250	296	14 000	18 000	<b>2302S</b>	—	20.0	37.0	1	
<b>17</b>	40	12	0.6	8.00	2.01	815	205	16 000	20 000	<b>1203S</b>	—	21.0	36.0	0.6	
	40	16	0.6	9.95	2.42	1 010	247	16 000	20 000	<b>2203S</b>	—	21.0	36.0	0.6	
	47	14	1	12.7	3.20	1 300	325	14 000	17 000	<b>1303S</b>	—	22.0	42.0	1	
	47	19	1	14.7	3.55	1 500	365	13 000	16 000	<b>2303S</b>	—	22.0	42.0	1	
<b>20</b>	47	14	1	10.0	2.61	1 020	266	14 000	17 000	<b>1204S</b>	<b>1204SK</b>	25.0	42.0	1	
	47	18	1	12.8	3.30	1 310	340	14 000	17 000	<b>2204S</b>	<b>2204SK</b>	25.0	42.0	1	
	52	15	1.1	12.6	3.35	1 280	340	12 000	15 000	<b>1304S</b>	<b>1304SK</b>	26.5	45.5	1	
	52	21	1.1	18.5	4.70	1 880	480	11 000	14 000	<b>2304S</b>	<b>2304SK</b>	26.5	45.5	1	
<b>25</b>	52	15	1	12.2	3.30	1 250	335	12 000	14 000	<b>1205S</b>	<b>1205SK</b>	30.0	47.0	1	
	52	18	1	12.4	3.45	1 270	350	12 000	14 000	<b>2205S</b>	<b>2205SK</b>	30.0	47.0	1	
	62	17	1.1	18.2	5.00	1 850	510	10 000	13 000	<b>1305S</b>	<b>1305SK</b>	31.5	55.5	1	
	62	24	1.1	24.9	6.60	2 530	675	9 500	12 000	<b>2305S</b>	<b>2305SK</b>	31.5	55.5	1	
<b>30</b>	62	16	1	15.8	4.65	1 610	475	10 000	12 000	<b>1206S</b>	<b>1206SK</b>	35.0	57.0	1	
	62	20	1	15.3	4.55	1 560	460	10 000	12 000	<b>2206S</b>	<b>2206SK</b>	35.0	57.0	1	
	72	19	1.1	21.4	6.30	2 190	645	8 500	11 000	<b>1306S</b>	<b>1306SK</b>	36.5	65.5	1	
	72	27	1.1	32.0	8.75	3 250	895	8 000	10 000	<b>2306S</b>	<b>2306SK</b>	36.5	65.5	1	
<b>35</b>	72	17	1.1	15.9	5.10	1 620	520	8 500	10 000	<b>1207S</b>	<b>1207SK</b>	41.5	65.5	1	
	72	23	1.1	21.7	6.60	2 210	675	8 500	10 000	<b>2207S</b>	<b>2207SK</b>	41.5	65.5	1	
	80	21	1.5	25.3	7.85	2 580	800	7 500	9 500	<b>1307S</b>	<b>1307SK</b>	43.0	72.0	1.5	
	80	31	1.5	40.0	11.3	4 100	1 150	7 100	9 000	<b>2307S</b>	<b>2307SK</b>	43.0	72.0	1.5	

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

# ● Self-Aligning Ball Bearings



## Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

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

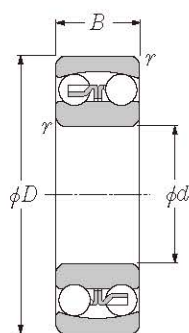
## static

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

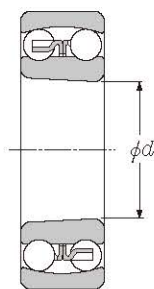
For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$   
see the table below.

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

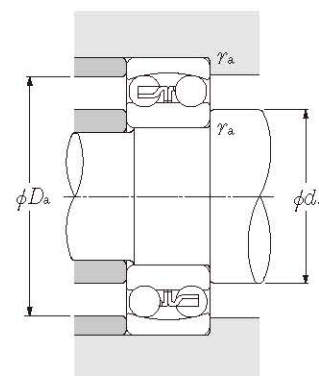
● Self-Aligning Ball Bearings



Cylindrical bore



Tapered bore



d 40 ~ 75mm

Boundary dimensions	Basic load ratings		Limiting speeds		Bearing numbers		Abutment and fillet dimensions											
	dynamic			static			min <sup>-1</sup>		mm									
mm				kN		kgf		grease		oil		cylindrical bore		tapered <sup>2)</sup> bore		d <sub>a</sub> min	D <sub>a</sub> max	r <sub>as</sub> max
d	D	B	r <sub>s min</sub> <sup>1)</sup>	C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil	cylindrical bore	tapered <sup>2)</sup> bore	d <sub>a</sub> min	D <sub>a</sub> max	r <sub>as</sub> max				
40	80	18	1.1	19.3	6.50	1 970	665	7 500	9 000	1208S	1208SK	46.5	73.5	1				
	80	23	1.1	22.4	7.35	2 290	750	7 500	9 000	2208S	2208SK	46.5	73.5	1				
	90	23	1.5	29.8	9.70	3 050	990	6 700	8 500	1308S	1308SK	48.0	82.0	1.5				
	90	33	1.5	45.5	13.5	4 650	1 380	6 300	8 000	2308S	2308SK	48.0	82.0	1.5				
45	85	19	1.1	22.0	7.35	2 240	750	7 100	8 500	1209S	1209SK	51.5	78.5	1				
	85	23	1.1	23.3	8.15	2 380	830	7 100	8 500	2209S	2209SK	51.5	78.5	1				
	100	25	1.5	38.5	12.7	3 900	1 300	6 000	7 500	1309S	1309SK	53.0	92.0	1.5				
	100	36	1.5	55.0	16.7	5 600	1 700	5 600	7 100	2309S	2309SK	53.0	92.0	1.5				
50	90	20	1.1	22.8	8.10	2 330	830	6 300	8 000	1210S	1210SK	56.5	83.5	1				
	90	23	1.1	23.3	8.45	2 380	865	6 300	8 000	2210S	2210SK	56.5	83.5	1				
	110	27	2	43.5	14.1	4 450	1 440	5 600	6 700	1310S	1310SK	59.0	101	2				
	110	40	2	65.0	20.2	6 650	2 060	5 000	6 300	2310S	2310SK	59.0	101	2				
55	100	21	1.5	26.9	10.0	2 750	1 020	6 000	7 100	1211S	1211SK	63.0	92.0	1.5				
	100	25	1.5	26.7	9.90	2 720	1 010	6 000	7 100	2211S	2211SK	63.0	92.0	1.5				
	120	29	2	51.5	17.9	5 250	1 820	5 000	6 300	1311S	1311SK	64.0	111	2				
	120	43	2	76.5	24.0	7 800	2 450	4 800	6 000	2311S	2311SK	64.0	111	2				
60	110	22	1.5	30.5	11.5	3 100	1 180	5 300	6 300	1212S	1212SK	68.0	102	1.5				
	110	28	1.5	34.0	12.6	3 500	1 290	5 300	6 300	2212S	2212SK	68.0	102	1.5				
	130	31	2.1	57.5	20.8	5 900	2 130	4 500	5 600	1312S	1312SK	71.0	119	2				
	130	46	2.1	88.5	28.3	9 000	2 880	4 300	5 300	2312S	2312SK	71.0	119	2				
65	120	23	1.5	31.0	12.5	3 150	1 280	4 800	6 000	1213S	1213SK	73.0	112	1.5				
	120	31	1.5	43.5	16.4	4 450	1 670	4 800	6 000	2213S	2213SK	73.0	112	1.5				
	140	33	2.1	62.5	22.9	6 350	2 330	4 300	5 300	1313S	1313SK	76.0	129	2				
	140	48	2.1	97.0	32.5	9 900	3 300	3 800	4 800	2313S	2313SK	76.0	129	2				
70	125	24	1.5	35.0	13.8	3 550	1 410	4 800	5 600	1214S	—	78.0	117	1.5				
	125	31	1.5	44.0	17.1	4 500	1 740	4 500	5 600	2214S	—	78.0	117	1.5				
	150	35	2.1	75.0	27.7	7 650	2 830	4 000	5 000	1314S	—	81.0	139	2				
	150	51	2.1	111	37.5	11 300	3 850	3 600	4 500	2314S	—	81.0	139	2				
75	130	25	1.5	39.0	15.7	4 000	1 600	4 300	5 300	1215S	1215SK	83.0	122	1.5				
	130	31	1.5	44.5	17.8	4 550	1 820	4 300	5 300	2215S	2215SK	83.0	122	1.5				
	160	37	2.1	80.0	30.0	8 150	3 050	3 800	4 500	1315S	1315SK	86.0	149	2				
	160	55	2.1	125	43.0	12 700	4 400	3 400	4 300	2315S	2315SK	86.0	149	2				

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



# ● Self-Aligning Ball Bearings



## Equivalent bearing load

### dynamic

$$P_r = XF_r + YF_a$$

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

### static

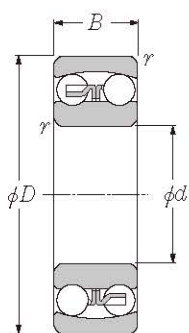
$$P_{0r} = F_r + Y_0 F_a$$

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

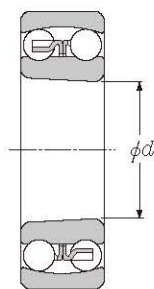
Constant $e$	Axial load factors			Mass kg (approx.)
	$Y_1$	$Y_2$	$Y_0$	
0.22	2.8	4.3	2.9	0.420
0.33	1.9	3.0	2.0	0.506
0.24	2.6	4.0	2.7	0.727
0.43	1.5	2.3	1.5	0.918
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0.21	3.0	4.7	3.1	0.470
0.30	2.1	3.2	2.2	0.556
0.25	2.6	4.0	2.7	0.971
0.41	1.5	2.4	1.6	1.200
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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
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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
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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
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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
<hr/>				
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
<hr/>				
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



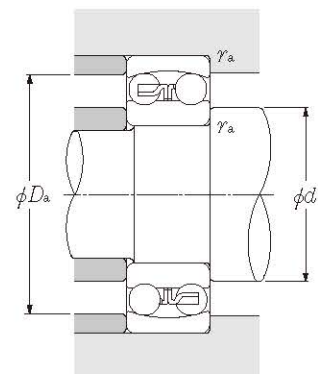
● Self-Aligning Ball Bearings



Cylindrical bore



Tapered bore



d 80 ~ 110mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers		Abutment and fillet dimensions		
	mm				dynamic	static	dynamic	static	$\text{min}^{-1}$		cylindrical bore	tapered <sup>2)</sup>	$d_a$	$D_a$	$r_{as}$
	$d$	$D$	$B$	$r_{s \min}$ <sup>1)</sup>	$C_T$	$C_{or}$	$C_T$	$C_{or}$	grease	oil			min	max	max
<b>80</b>	140	26	2		40.0	17.0	4 100	1 730	4 000	5 000	<b>1216S</b>	<b>1216SK</b>	89	131	2
	140	33	2		49.0	19.9	5 000	2 030	4 000	5 000	<b>2216S</b>	<b>2216SK</b>	89	131	2
	170	39	2.1		89.0	33.0	9 100	3 400	3 600	4 300	<b>1316S</b>	<b>1316SK</b>	91	159	2
	170	58	2.1		130	45.0	13 200	4 600	3 200	4 000	<b>2316S</b>	<b>2316SK</b>	91	159	2
<b>85</b>	150	28	2		49.5	20.8	5 050	2 120	3 800	4 500	<b>1217S</b>	<b>1217SK</b>	94	141	2
	150	36	2		58.5	23.6	5 950	2 400	3 800	4 800	<b>2217S</b>	<b>2217SK</b>	94	141	2
	180	41	3		98.5	38.0	10 000	3 850	3 400	4 000	<b>1317S</b>	<b>1317SK</b>	98	167	2.5
	180	60	3		142	51.5	14 500	5 250	3 000	3 800	<b>2317S</b>	<b>2317SK</b>	98	167	2.5
<b>90</b>	160	30	2		57.5	23.5	5 850	2 400	3 600	4 300	<b>1218S</b>	<b>1218SK</b>	99	151	2
	160	40	2		70.5	28.7	7 200	2 930	3 600	4 300	<b>2218S</b>	<b>2218SK</b>	99	151	2
	190	43	3		117	44.5	12 000	4 550	3 200	3 800	<b>1318S</b>	<b>1318SK</b>	103	177	2.5
	190	64	3		154	57.5	15 700	5 850	2 800	3 600	<b>2318S</b>	<b>2318SK</b>	103	177	2.5
<b>95</b>	170	32	2.1		64.0	27.1	6 550	2 770	3 400	4 000	<b>1219S</b>	<b>1219SK</b>	106	159	2
	170	43	2.1		84.0	34.5	8 550	3 500	3 400	4 000	<b>2219S</b>	<b>2219SK</b>	106	159	2
	200	45	3		129	51.0	13 200	5 200	3 000	3 600	<b>1319S</b>	<b>1319SK</b>	108	187	2.5
	200	67	3		161	64.5	16 400	6 550	2 800	3 400	<b>2319S</b>	<b>2319SK</b>	108	187	2.5
<b>100</b>	180	34	2.1		69.5	29.7	7 100	3 050	3 200	3 800	<b>1220S</b>	<b>1220SK</b>	111	169	2
	180	46	2.1		94.5	38.5	9 650	3 900	3 200	3 800	<b>2220S</b>	<b>2220SK</b>	111	169	2
	215	47	3		140	57.5	14 300	5 850	2 800	3 400	<b>1320S</b>	<b>1320SK</b>	113	202	2.5
	215	73	3		187	79.0	19 100	8 050	2 400	3 200	<b>2320S</b>	<b>2320SK</b>	113	202	2.5
<b>105</b>	190	36	2.1		75.0	32.5	7 650	3 300	3 000	3 600	<b>1221S</b>	—	116	179	2
	190	50	2.1		109	45.0	11 100	4 550	3 000	3 600	<b>2221S</b>	—	116	179	2
	225	49	3		154	64.5	15 700	6 600	2 600	3 200	<b>1321S</b>	—	118	212	2.5
	225	77	3		200	87.0	20 400	8 850	2 400	3 000	<b>2321S</b> <sup>3)</sup>	—	118	212	2.5
<b>110</b>	200	38	2.1		87.0	38.5	8 900	3 950	2 800	3 400	<b>1222S</b>	<b>1222SK</b>	121	189	2
	200	53	2.1		122	51.5	12 500	5 250	2 800	3 400	<b>2222S</b>	<b>2222SK</b>	121	189	2
	240	50	3		161	72.5	16 400	7 300	2 400	3 000	<b>1322S</b>	<b>1322SK</b>	123	227	2.5
	240	80	3		211	94.5	21 600	9 650	2 200	2 800	<b>2322S</b> <sup>3)</sup>	<b>2322SK</b>	123	227	2.5

1) Smallest allowable dimension for chamfer dimension  $r$ . 2) "K" indicates bearings have tapered bore with a taper ratio of 1: 12. 3) Machined cage is standard for 2322S (K).

# ● Self-Aligning Ball Bearings



## Equivalent bearing load

### dynamic

$$P_r = XF_r + YF_a$$

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

### static

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

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

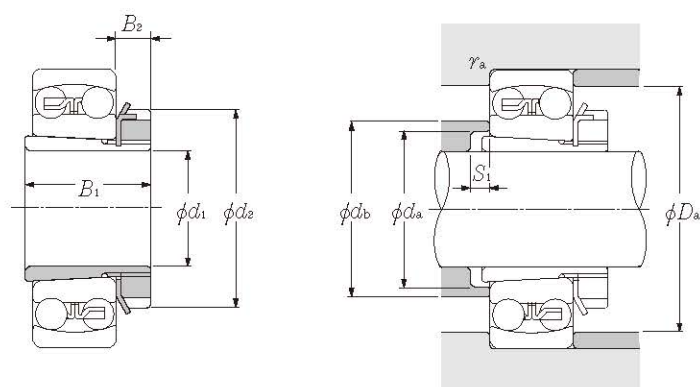
Constant $e$	Axial load factors			Mass kg (approx.)
	$Y_1$	$Y_2$	$Y_0$	
0.16	3.9	6.0	4.1	1.68
0.25	2.5	3.9	2.7	2.02
0.22	2.9	4.5	3.1	4.24
0.39	1.6	2.5	1.7	5.63
<hr/>				
0.17	3.7	5.7	3.8	2.10
0.25	2.5	3.9	2.6	2.56
0.21	2.9	4.6	3.1	5.03
0.37	1.7	2.6	1.8	6.56
<hr/>				
0.17	3.8	5.8	3.9	2.56
0.27	2.4	3.7	2.5	3.22
0.22	2.8	4.3	2.9	5.83
0.38	1.7	2.6	1.7	7.75
<hr/>				
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
<hr/>				
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
<hr/>				
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
<hr/>				
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)



$d$  17 ~ 50mm

	Boundary dimensions mm				Bearing numbers	Abutment and fillet dimensions mm					Mass <sup>1)</sup> kg (approx.)
	$d_1$	$B_1$	$d_2$	$B_2$		$d_a$ min	$d_b$ max	$S_1$ min	$D_a$ max	$r_{as}$ max	
<b>17</b>	24	32	7		1204SK; <b>H 204</b>	23	27	5	41	1	0.041
	28	32	7		2204SK; <b>H 304</b>	24	28	5	41	1	0.045
	28	32	7		1304SK; <b>H 304</b>	24	31	8	45	1	0.045
	31	32	7		2304SK; <b>H2304</b>	24	28	5	45	1	0.049
<b>20</b>	26	38	8		1205SK; <b>H 205X</b>	28	33	5	46	1	0.07
	29	38	8		2205SK; <b>H 305X</b>	29	33	5	46	1	0.075
	29	38	8		1305SK; <b>H 305X</b>	29	37	6	55	1	0.075
	35	38	8		2305SK; <b>H2305X</b>	29	34	5	55	1	0.087
<b>25</b>	27	45	8		1206SK; <b>H 206X</b>	33	39	5	56	1	0.099
	31	45	8		2206SK; <b>H 306X</b>	34	39	5	56	1	0.109
	31	45	8		1306SK; <b>H 306X</b>	34	44	6	65	1	0.109
	38	45	8		2306SK; <b>H2306X</b>	35	40	5	65	1	0.126
<b>30</b>	29	52	9		1207SK; <b>H 207X</b>	38	46	5	65	1	0.125
	35	52	9		2207SK; <b>H 307X</b>	39	45	5	65	1	0.142
	35	52	9		1307SK; <b>H 307X</b>	39	50	7	71.5	1.5	0.142
	43	52	9		2307SK; <b>H2307X</b>	40	46	5	71.5	1.5	0.165
<b>35</b>	31	58	10		1208SK; <b>H 208X</b>	44	52	5	73	1	0.174
	36	58	10		2208SK; <b>H 308X</b>	44	50	5	73	1	0.189
	36	58	10		1308SK; <b>H 308X</b>	44	56	5	81.5	1.5	0.189
	46	58	10		2308SK; <b>H2308X</b>	45	52	5	81.5	1.5	0.224
<b>40</b>	33	65	11		1209SK; <b>H 209X</b>	49	57	5	78	1	0.227
	39	65	11		2209SK; <b>H 309X</b>	49	57	8	78	1	0.248
	39	65	11		1309SK; <b>H 309X</b>	49	61	5	91.5	1.5	0.248
	50	65	11		2309SK; <b>H2309X</b>	50	58	5	91.5	1.5	0.28
<b>45</b>	35	70	12		1210SK; <b>H 210X</b>	53	62	5	83	1	0.274
	42	70	12		2210SK; <b>H 310X</b>	54	63	10	83	1	0.303
	42	70	12		1310SK; <b>H 310X</b>	54	67	5	100	2	0.303
	55	70	12		2310SK; <b>H2310X</b>	56	65	5	100	2	0.362
<b>50</b>	37	75	12		1211SK; <b>H 211X</b>	60	70	6	91.5	1.5	0.308

1) Refers to adapter mass.

Note: 1. For bearing dimensions, basic rated loads, and mass, refer to pages B-82 to B-84.

2. Adapters for series 12 bearings can also be used with H2 and H3 series bearings.

Caution: the  $B_1$  dimension of H3 series bearings is longer than that of H2 series bearings.

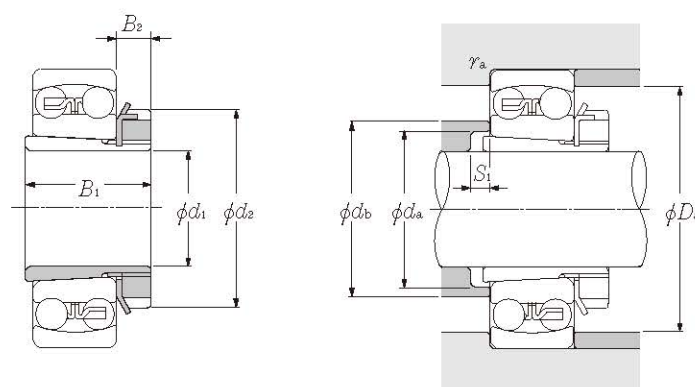
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washer with straight inner tabs.

4. For adapter locknut and washer dimensions, please refer to pages C-2 to C-7, and C-12 to C-14.

# Adapters



(for self-aligning ball bearings)



d 50 ~ 85mm

Boundary dimensions mm				Bearing numbers	Abutment and fillet dimensions mm					Mass <sup>1)</sup> kg (approx.)
$d_1$	$B_1$	$d_2$	$B_2$		$d_a$ min	$d_b$ max	$S_1$ min	$D_a$ max	$r_{as}$ max	
<b>50</b>	45	75	12	2211SK; <b>H311X</b>	60	69	11	91.5	1.5	0.345
	45	75	12	1311SK; <b>H311X</b>	60	73	6	110	2	0.345
	59	75	12	2311SK; <b>H2311X</b>	61	71	6	110	2	0.42
<b>55</b>	38	80	13	1212SK; <b>H212X</b>	64	76	5	101.5	1.5	0.346
	47	80	13	2212SK; <b>H312X</b>	65	75	9	101.5	1.5	0.394
	47	80	13	1312SK; <b>H312X</b>	65	79	5	118	2	0.394
	62	80	13	2312SK; <b>H2312X</b>	66	77	5	118	2	0.481
<b>60</b>	40	85	14	1213SK; <b>H213X</b>	70	83	5	111.5	1.5	0.401
	50	85	14	2213SK; <b>H313X</b>	70	81	8	111.5	1.5	0.458
	50	85	14	1313SK; <b>H313X</b>	70	85	5	128	2	0.458
	65	85	14	2313SK; <b>H2313X</b>	72	84	5	128	2	0.557
<b>65</b>	43	98	15	1215SK; <b>H215X</b>	80	93	5	121.5	1.5	0.707
	55	98	15	2215SK; <b>H315X</b>	80	93	12	121.5	1.5	0.831
	55	98	15	1315SK; <b>H315X</b>	80	97	5	148	2	0.831
	73	98	15	2315SK; <b>H2315X</b>	82	96	5	148	2	1.05
<b>70</b>	46	105	17	1216SK; <b>H216X</b>	85	100	5	130	2	0.882
	59	105	17	2216SK; <b>H316X</b>	86	98	12	130	2	1.03
	59	105	17	1316SK; <b>H316X</b>	86	103	5	158	2	1.03
	78	105	17	2316SK; <b>H2316X</b>	87	103	5	158	2	1.28
<b>75</b>	50	110	18	1217SK; <b>H217X</b>	90	106	6	140	2	1.02
	63	110	18	2217SK; <b>H317X</b>	91	104	12	140	2	1.18
	63	110	18	1317SK; <b>H317X</b>	91	110	6	166	2.5	1.18
	82	110	18	2317SK; <b>H2317X</b>	94	110	6	166	2.5	1.45
<b>80</b>	52	120	18	1218SK; <b>H218X</b>	95	111	6	150	2	1.19
	65	120	18	2218SK; <b>H318X</b>	96	112	10	150	2	1.37
	65	120	18	1318SK; <b>H318X</b>	96	116	6	176	2.5	1.37
	86	120	18	2318SK; <b>H2318X</b>	99	117	6	176	2.5	1.69
<b>85</b>	55	125	19	1219SK; <b>H219X</b>	101	118	7	158	2	1.37
	68	125	19	2219SK; <b>H319X</b>	102	117	9	158	2	1.56

1) Refers to adapter mass.

Note: 1. For bearing dimensions, basic rated loads, and mass, refer to pages B-82 to B-84.

2. Adapters for series 12 bearings can also be used with H2 and H3 series bearings.

Caution: the  $B_1$  dimension of H3 series bearings is longer than that of H2 series bearings.

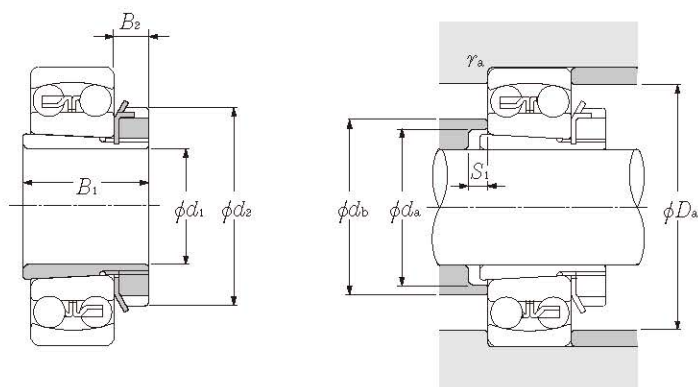
3. Adapter numbers which are appended with the code "X" indicate narrow slit type adapters which use washer with straight inner tabs.

4. For adapter locknut and washer dimensions, please refer to pages C-2 to C-7, and C-12 to C-14.

## Adapters



(for self-aligning ball bearings)



$d$  85 ~ 100mm

Boundary dimensions mm				Bearing numbers	Abutment and fillet dimensions mm					Mass <sup>1)</sup> kg (approx.)
$d_1$	$B_1$	$d_2$	$B_2$		$d_a$ min	$d_b$ max	$S_1$ min	$D_a$ max	$r_{as}$ max	
<b>85</b>	68	125	19	1319SK; <b>H 319X</b>	102	123	7	186	2.5	1.56
	90	125	19	2319SK; <b>H2319X</b>	105	123	7	186	2.5	1.92
<b>90</b>	58	130	20	1220SK; <b>H 220X</b>	106	125	7	168	2	1.49
	71	130	20	2220SK; <b>H 320X</b>	107	123	8	168	2	1.69
	71	130	20	1320SK; <b>H 320X</b>	107	130	7	201	2.5	1.69
	97	130	20	2320SK; <b>H2320X</b>	110	129	7	201	2.5	2.15
<b>100</b>	63	145	21	1222SK; <b>H 222X</b>	116	138	7	188	2	1.93
	77	145	21	2222SK; <b>H 322X</b>	117	137	6	188	2	2.18
	77	145	21	1322SK; <b>H 322X</b>	117	150	9	226	2.5	2.18
	105	145	21	2322SK; <b>H2322X</b>	121	142	7	226	2.5	2.74

1) Refers to adapter mass.

Note: 1. For bearing dimensions, basic rated loads, and mass, refer to pages B-82 to B-84.

2. Adapters for series 12 bearings can also be used with H2 and H3 series bearings.

Caution: the  $B_1$  dimension of H3 series bearings is longer than that of H2 series bearings.

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

4. For adapter locknut and washer dimensions, please refer to pages C-2 to C-7, and C-12 to C-14.