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Технические характеристики

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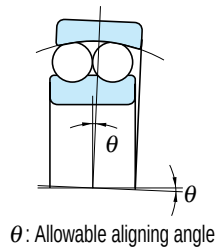
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Томск (3822)98-41-53
Тула (4872)33-79-87
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Self-aligning ball bearings

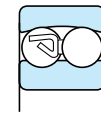
Self-aligning ball bearings have a spherical outer ring raceway, the center of whose curvature meets that of the bearing itself, so that the inner ring, balls and cage continue to rotate, aligning themselves if they have become misaligned within design limits.

This type of bearing is suitable when the displacement of the centers around which the shaft and housing rotate and shaft deflection are likely to occur.

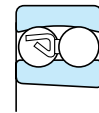
Bearings with a tapered bore can easily be fit to the shaft with an adapter assembly.



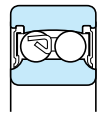
Self-aligning ball bearings



Cylindrical bore



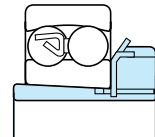
Tapered bore



Sealed bore

Bore diameter **10 – 100 mm**

Adapter assemblies



Bore diameter **17 – 90 mm**

Boundary dimensions	The dimensions of standard series are as specified in JIS B 1512.
Tolerances	As specified in JIS B 1514, class 0.
Radial internal clearance	As specified in JIS B 1520. (refer to Table 2-5 on p. A 14.)
Standard cages	- Staggered type pressed steel cage [application : all dimensional range of 12, 13, 22...2RS and 23...2RS series] - Snap type pressed steel cage [application : all dimensional range of 22 series and those of No. 2300 thru 2316] - Copper alloy machined cage (application : bearings of No. 2317 thru 2320)
Allowable aligning angle	12 and 22 series 0.044 rad (2.5°) 13 and 23 series 0.052 rad (3°) 22...2RS and 23...2RS series.. 0.026 rad (1.5°)

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

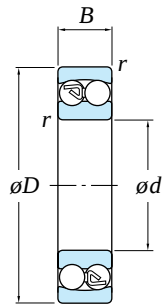
Static equivalent radial load

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

Self-aligning ball bearings

d 10 – 35 mm

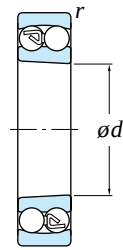
[Note] Protruding distance of balls



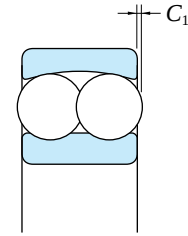
Cylindrical bore



Sealed



Tapered bore



Balls of the following bearing protrude by C_1 from the bearing side.

Bearing No.	C_1 (mm)
2216	0.2 (approx.)

Boundary dimensions (mm)				Basic load ratings (kN)				Limiting speeds (min ⁻¹)			Bearing No.			(Refer.) Mass(kg)	
d	D	B	$r_{min.}$	Open		Sealed type		Grease lub.		Oil lub.	Cylindrical bore	Sealed type	Tapered bore	Cylindrical bore	Tapered bore
				C_r	C_{0r}	C_r	C_{0r}	Open	2RS	Open	Open	2RS	Open		
10	30	9	0.6	5.50	1.20	—	—	23 000	—	28 000	1200	—	—	0.034	—
	30	14	0.6	7.40	1.60	5.40	1.20	23 000	15 000	29 000	2200	2RS	—	0.047	—
12	32	10	0.6	5.60	1.25	—	—	21 000	—	26 000	1201	—	—	0.040	—
	32	14	0.6	7.65	1.75	5.60	1.25	21 000	14 000	26 000	2201	2RS	—	0.053	—
	37	12	1	9.40	2.15	—	—	18 000	—	22 000	1301	—	—	0.067	—
	37	17	1	9.70	2.30	—	—	16 000	—	22 000	2301	—	—	0.095	—
15	35	11	0.6	7.45	1.75	—	—	18 000	—	22 000	1202	—	—	0.049	—
	35	14	0.6	7.70	1.85	7.45	1.75	18 000	12 000	22 000	2202	2RS	—	0.060	—
	42	13	1	9.55	2.30	—	—	16 000	—	20 000	1302	—	—	0.094	—
	42	17	1	12.1	2.90	9.55	2.30	14 000	11 000	20 000	2302	2RS	—	0.114	—
17	40	12	0.6	7.90	2.00	—	—	16 000	—	20 000	1203	—	—	0.073	—
	40	16	0.6	9.80	2.40	7.90	2.00	16 000	11 000	20 000	2203	2RS	—	0.088	—
	47	14	1	12.5	3.20	—	—	14 000	—	17 000	1303	—	—	0.130	—
	47	19	1	14.5	3.60	12.5	3.20	13 000	9 400	18 000	2303	2RS	—	0.158	—
20	47	14	1	9.90	2.60	—	—	14 000	—	17 000	1204	—	1204K	0.120	0.118
	47	18	1	12.6	3.30	9.90	2.60	14 000	9 100	17 000	2204	2RS	2204K	0.140	0.136
	52	15	1.1	12.4	3.30	—	—	13 000	—	15 000	1304	—	1304K	0.163	0.161
	52	21	1.1	18.0	4.70	12.4	3.35	11 000	8 300	15 000	2304	2RS	2304K	0.209	0.205
25	52	15	1	12.1	3.30	—	—	12 000	—	14 000	1205	—	1205K	0.141	0.138
	52	18	1	12.6	3.50	12.1	3.30	12 000	7 900	15 000	2205	2RS	2205K	0.163	0.158
	62	17	1.1	18.0	5.00	—	—	9 900	—	12 000	1305	—	1305K	0.257	0.252
	62	24	1.1	24.4	6.60	17.6	4.95	9 400	6 600	13 000	2305	2RS	2305K	0.335	0.327
30	62	16	1	15.6	4.65	—	—	9 900	—	12 000	1206	—	1206K	0.220	0.216
	62	20	1	15.6	4.65	15.6	4.65	10 000	6 600	12 000	2206	2RS	2206K	0.260	0.254
	72	19	1.1	21.3	6.30	—	—	8 700	—	11 000	1306	—	1306K	0.387	0.381
	72	27	1.1	31.4	8.75	21.3	6.30	8 000	5 800	11 000	2306	2RS	2306K	0.500	0.489
35	72	17	1.1	15.8	5.10	—	—	8 500	—	10 000	1207	—	1207K	0.323	0.317
	72	23	1.1	21.6	6.60	15.8	5.10	8 500	5 700	10 000	2207	2RS	2207K	0.403	0.396
	80	21	1.5	25.1	7.85	—	—	7 600	—	9 300	1307	—	1307K	0.510	0.502
	80	31	1.5	39.4	11.3	25.1	7.85	7 100	5 100	9 800	2307	2RS	2307K	0.675	0.657

Remark) Standard cage types used for the above bearings are described earlier in this section.

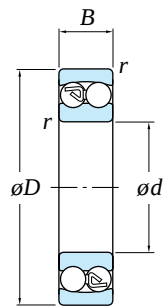
d 40 – 90 mm

Boundary dimensions (mm)				Basic load ratings (kN)				Limiting speeds (min ⁻¹)			Bearing No.			(Refer.) Mass(kg)	
d	D	B	r _{min.}	Open		Sealed type		Grease lub.		Oil lub.	Cylindrical bore Open	Sealed type 2RS	Tapered bore Open	Cylindrical bore	Tapered bore
				C _r	C _{0r}	C _r	C _{0r}	Open	2RS	Open					
40	80	18	1.1	19.2	6.50	—	—	7 500	—	9 200	1208	—	1208K	0.417	0.411
	80	23	1.1	22.4	7.40	19.2	6.50	7 600	5 000	9 300	2208	2RS	2208K	0.505	0.494
	90	23	1.5	29.5	9.70	—	—	6 900	—	8 400	1308	—	1308K	0.715	0.704
	90	33	1.5	44.9	13.5	29.5	9.70	6 200	4 600	8 600	2308	2RS	2308K	0.925	0.903
45	85	19	1.1	21.8	7.35	—	—	7 000	—	8 500	1209	—	1209K	0.465	0.459
	85	23	1.1	23.3	8.15	21.8	7.35	7 000	4 600	8 500	2209	2RS	2209K	0.545	0.533
	100	25	1.5	38.1	12.7	—	—	6 100	—	7 500	1309	—	1309K	0.957	0.942
	100	36	1.5	54.4	16.7	38.1	12.7	5 600	4 100	7 700	2309	2RS	2309K	1.23	1.20
50	90	20	1.1	22.7	8.10	—	—	6 500	—	7 900	1210	—	1210K	0.525	0.515
	90	23	1.1	23.3	8.50	22.7	8.10	6 500	4 300	7 900	2210	2RS	2210K	0.590	0.577
	110	27	2	43.4	14.1	—	—	5 600	—	6 800	1310	—	1310K	1.21	1.19
	110	40	2	64.6	20.3	43.4	14.1	5 100	3 700	7 000	2310	2RS	2310K	1.64	1.60
55	100	21	1.5	26.8	10.0	—	—	5 800	—	7 100	1211	—	1211K	0.705	0.693
	100	25	1.5	26.8	10.0	26.8	10.0	5 800	3 900	7 100	2211	2RS	2211K	0.810	0.792
	120	29	2	51.3	17.9	—	—	5 000	—	6 200	1311	—	1311K	1.58	1.56
	120	43	2	75.3	24.0	51.3	17.9	4 600	3 400	6 400	2311	2RS	2311K	2.10	2.05
60	110	22	1.5	30.2	11.5	—	—	5 200	—	6 400	1212	—	1212K	0.900	0.885
	110	28	1.5	34.1	12.6	30.2	11.5	5 300	3 500	6 500	2212	2RS	2212K	1.09	1.07
	130	31	2.1	57.2	20.8	—	—	4 500	—	5 500	1312	—	1312K	1.96	1.93
	130	46	2.1	87.2	28.3	57.1	20.8	4 200	3 000	5 800	2312	2RS	2312K	2.60	2.53
65	120	23	1.5	31.0	12.5	—	—	4 800	—	5 800	1213	—	1213K	1.15	1.13
	120	31	1.5	43.5	16.4	31.0	12.5	4 900	3 200	5 900	2213	2RS	2213K	1.46	1.43
	140	33	2.1	61.7	22.9	—	—	4 300	—	5 200	1313	—	1313K	2.45	2.41
	140	48	2.1	95.8	32.5	62.1	22.9	3 800	2 900	5 300	2313	2RS	2313K	3.23	3.15
70	125	24	1.5	34.6	13.8	—	—	4 600	—	5 700	1214	—	—	1.26	—
	125	31	1.5	43.9	17.1	34.6	13.8	4 600	3 100	5 600	2214	2RS	—	1.52	—
	150	35	2.1	74.0	27.7	—	—	4 000	—	4 900	1314	—	—	2.99	—
	150	51	2.1	89.6	31.7	74.1	27.7	3 600	2 600	4 900	2314	2RS	—	4.23	—
75	130	25	1.5	38.8	15.7	—	—	4 300	—	5 300	1215	—	1215K	1.36	1.34
	130	31	1.5	44.2	17.8	38.8	15.7	4 300	2 900	5 300	2215	2RS	2215K	1.62	1.58
	160	37	2.1	78.9	29.9	—	—	4 000	—	4 900	1315	—	1315K	3.56	3.51
	160	55	2.1	103	36.8	81.8	30.5	3 400	2 600	4 600	2315	2RS	2315K	5.13	5.01
80	140	26	2	39.8	17.0	—	—	4 000	—	4 900	1216	—	1216K	1.67	1.64
	140	33	2	49.0	19.9	39.8	17.0	4 100	2 700	5 000	2216	2RS	2216K	2.01	1.97
	170	39	2.1	88.1	33.1	—	—	3 500	—	4 300	1316	—	1316K	4.18	4.12
	170	58	2.1	129	45.7	88.4	33.1	3 100	2 300	4 300	2316	2RS	2316K	6.10	5.96
85	150	28	2	49.2	20.8	—	—	3 800	—	4 600	1217	—	1217K	2.07	2.04
	150	36	2	58.3	23.6	49.2	20.8	3 800	2 500	4 600	2217	2RS	2217K	2.52	2.46
	180	41	3	97.3	37.8	—	—	3 300	—	4 000	1317	—	1317K	4.98	4.91
	180	60	3	141	51.5	—	—	3 000	—	4 100	2317	—	2317K	7.05	6.89
90	160	30	2	56.8	23.4	—	—	3 500	—	4 300	1218	—	1218K	2.52	2.48
	160	40	2	67.7	27.2	54.1	23.1	3 500	2 400	4 300	2218	2RS	2218K	3.40	3.33
	190	43	3	116	44.4	—	—	3 100	—	3 800	1318	—	1318K	5.80	5.71
	190	64	3	153	57.9	—	—	2 800	—	3 900	2318	—	2318K	8.44	8.25

Remark) Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings

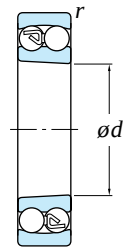
***d* 95 – 100 mm**



Cylindrical bore

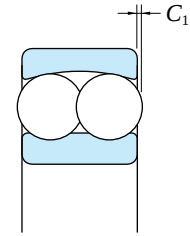


Sealed



Tapered bore

[Note] Protruding distance of balls



Balls of the following bearing protrude by C_1 from the bearing side.

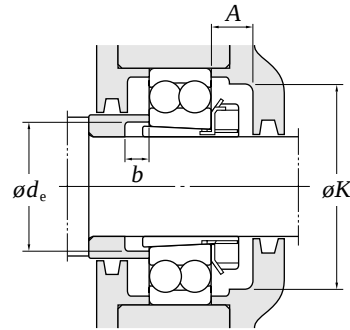
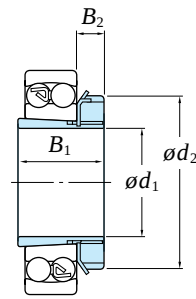
Bearing No.	C_1 (mm)
1319	1.6
1320	2.5 (approx.)

Boundary dimensions (mm)				Basic load ratings (kN)				Limiting speeds (min ⁻¹)			Bearing No.			(Refer.)Mass(kg)	
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> _{min.}	Open		Sealed type		Grease lub.		Oil lub.	Cylindrical bore	Sealed type	Tapered bore	Cylindrical bore	Tapered bore
				<i>C_r</i>	<i>C_{0r}</i>	<i>C_r</i>	<i>C_{0r}</i>	Open	2RS	Open	Open	2RS	Open		
95	170	32	2.1	57.0	24.3	—	—	3 300	—	4 000	1219	—	1219K	3.10	3.05
	170	43	2.1	82.7	34.3	60.8	26.8	3 300	2 200	4 000	2219	2RS	2219K	4.10	4.00
	200	45	3	132	50.8	—	—	2 900	—	3 600	1319	—	1319K	6.69	6.59
	200	67	3	166	64.8	—	—	2 700	—	3 700	2319	—	2319K	9.79	9.57
100	180	34	2.1	69.0	29.7	—	—	3 100	—	3 800	1220	—	1220K	3.70	3.64
	180	46	2.1	80.9	34.0	69.0	29.7	3 100	2 100	3 800	2220	2RS	2220K	4.98	4.87
	215	47	3	143	57.3	—	—	2 800	—	3 400	1320	—	1320K	8.30	8.19
	215	73	3	183	73.4	—	—	2 400	—	3 400	2320	—	2320K	12.4	12.1

Remark) Standard cage types used for the above bearings are described earlier in this section.

Adapter assemblies for self-aligning ball bearings

d_1 17 – 45 mm



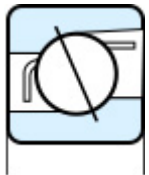
Boundary dimensions (mm)				Brg. bore (mm) d	Designations Bearing + adapter ass'y	Mounting dimensions (mm)				Mass Brg. + adapter ass'y (kg)	(Refer.)	
d_1	B_1	d_2	B_2			A min.	K min.	d_e min.	b min.		Adapter sleeve No.	Locknut No.
17	24	32	7	20	1204K+H204X	—	—	23	5	0.159	A204X	AN04
	28	32	7	20	2204K+H304X	—	—	24	5	0.181	A304X	AN04
	28	32	7	20	1304K+H304X	—	—	24	8	0.206	A304X	AN04
	31	32	7	20	2304K+H2304X	—	—	24	5	0.254	A2304X	AN04
20	26	38	8	25	1205K+H205X	15	45	28	5	0.208	A205X	AN05
	29	38	8	25	2205K+H305X	15	45	29	5	0.233	A305X	AN05
	29	38	8	25	1305K+H305X	15	45	29	6	0.327	A305X	AN05
	35	38	8	25	2305K+H2305X	15	45	29	5	0.414	A2305X	AN05
25	27	45	8	30	1206K+H206X	15	50	33	5	0.315	A206X	AN06
	31	45	8	30	2206K+H306X	15	50	34	5	0.363	A306X	AN06
	31	45	8	30	1306K+H306X	15	50	34	6	0.490	A306X	AN06
	38	45	8	30	2306K+H2306X	15	50	35	5	0.615	A2306X	AN06
30	29	52	9	35	1207K+H207X	17	58	38	5	0.442	A207X	AN07
	35	52	9	35	2207K+H307X	17	58	39	5	0.538	A307X	AN07
	35	52	9	35	1307K+H307X	17	58	39	7	0.644	A307X	AN07
	43	52	9	35	2307K+H2307X	17	58	40	5	0.822	A2307X	AN07
35	31	58	10	40	1208K+H208X	17	65	44	5	0.585	A208X	AN08
	36	58	10	40	2208K+H308X	17	65	44	5	0.683	A308X	AN08
	36	58	10	40	1308K+H308X	17	65	44	5	0.893	A308X	AN08
	46	58	10	40	2308K+H2308X	17	65	45	5	1.13	A2308X	AN08
40	33	65	11	45	1209K+H209X	17	72	49	5	0.686	A209X	AN09
	39	65	11	45	2209K+H309X	17	72	49	8	0.781	A309X	AN09
	39	65	11	45	1309K+H309X	17	72	49	5	1.19	A309X	AN09
	50	65	11	45	2309K+H2309X	17	72	50	5	1.48	A2309X	AN09
45	35	70	12	50	1210K+H210X	19	76	53	5	0.789	A210X	AN10
	42	70	12	50	2210K+H310X	19	76	54	10	0.880	A310X	AN10
	42	70	12	50	1310K+H310X	19	76	54	5	1.49	A310X	AN10
	55	70	12	50	2310K+H2310X	19	76	56	5	1.96	A2310X	AN10

d_1 50 – 90 mm

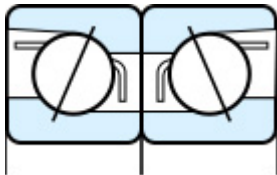
Boundary dimensions (mm)				Brg. bore (mm) d	Designations Bearing + adapter ass'y	Mounting dimensions (mm)				Mass Brg. + adapter ass'y (kg)	(Refer.)	
d_1	B_1	d_2	B_2			A min.	K min.	d_e min.	b min.		Adapter sleeve No.	Locknut No.
50	37	75	12	55	1211K+H211X	19	85	60	6	1.00	A211X	AN11
	45	75	12	55	2211K+H311X	19	85	60	11	1.14	A311X	AN11
	45	75	12	55	1311K+H311X	19	85	60	6	1.91	A311X	AN11
	59	75	12	55	2311K+H2311X	19	85	61	6	2.47	A2311X	AN11
55	38	80	13	60	1212K+H212X	20	90	61	5	1.23	A212X	AN12
	47	80	13	60	2212K+H312X	20	90	65	9	1.46	A312X	AN12
	47	80	13	60	1312K+H312X	20	90	65	5	2.32	A312X	AN12
	62	80	13	60	2312K+H2312X	20	90	66	5	3.01	A2312X	AN12
60	40	85	14	65	1213K+H213X	21	96	70	5	1.53	A213X	AN13
	50	85	14	65	2213K+H313X	21	96	70	8	1.89	A313X	AN13
	50	85	14	65	1313K+H313X	21	96	70	5	2.87	A313X	AN13
	65	85	14	65	2313K+H2313X	21	96	72	5	3.71	A2313X	AN13
65	43	98	15	75	1215K+H215X	23	110	80	5	2.05	A215X	AN15
	55	98	15	75	2215K+H315X	23	110	80	12	2.41	A315X	AN15
	55	98	15	75	1315K+H315X	23	110	80	5	4.34	A315X	AN15
	73	98	15	75	2315K+H2315X	23	110	82	5	6.06	A2315X	AN15
70	46	105	17	80	1216K+H216X	25	120	85	5	2.52	A216X	AN16
	59	105	17	80	2216K+H316X	25	120	86	12	3.00	A316X	AN16
	59	105	17	80	1316K+H316X	25	120	86	5	5.15	A316X	AN16
	78	105	17	80	2316K+H2316X	25	120	87	5	7.24	A2316X	AN16
75	50	110	18	85	1217K+H217X	27	128	90	6	3.06	A217X	AN17
	63	110	18	85	2217K+H317X	27	128	91	12	3.64	A317X	AN17
	63	110	18	85	1317K+H317X	27	128	91	6	6.09	A317X	AN17
	82	110	18	85	2317K+H2317X	27	128	94	6	8.34	A2317X	AN17
80	52	120	18	90	1218K+H218X	28	139	95	6	3.67	A218X	AN18
	65	120	18	90	2218K+H318X	28	139	96	10	4.70	A318X	AN18
	65	120	18	90	1318K+H318X	28	139	96	6	7.08	A318X	AN18
	86	120	18	90	2318K+H2318X	28	139	99	6	9.94	A2318X	AN18
85	55	125	19	95	1219K+H219X	29	145	101	7	4.42	A219X	AN19
	68	125	19	95	2219K+H319X	29	145	102	9	5.56	A319X	AN19
	68	125	19	95	1319K+H319X	29	145	102	7	8.15	A319X	AN19
	90	125	19	95	2319K+H2319X	29	145	105	7	11.5	A2319X	AN19
90	58	130	20	100	1220K+H220X	30	150	106	7	5.13	A220X	AN20
	71	130	20	100	2220K+H320X	30	150	107	8	6.56	A320X	AN20
	71	130	20	100	1320K+H320X	30	150	107	7	9.88	A320X	AN20
	97	130	20	100	2320K+H2320X	30	150	110	7	14.2	A2320X	AN20

Due to having contact angles, the angular contact ball bearing is suitable for applications demanding high accuracy and high rotational speed and is capable of withstanding combined radial and axial loads.

Single-row



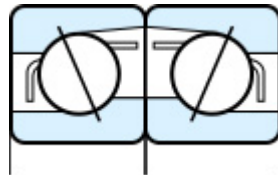
Back-to-back (DB)



DB

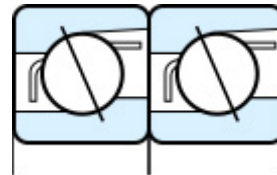
7000 , 7200 , 7300 , 7400 ... Contact angles 30°
 7000B , 7200B , 7300B , 7400B ... Contact angles 40°
 7900C , 7000C , 7200C , 7300C ... Contact angles 15°
 HAR900C , HAR000C ... Contact angles 15°

Face-to-face (DF)



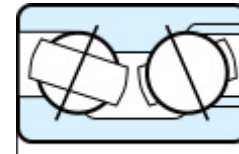
DF

Tandem (DT)



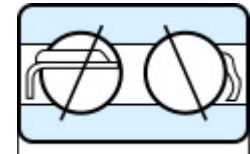
DT

Double-row



With filling slot

3200
 3300
 Contact angles 32°



5200
 5300
 Contact angles 24°

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