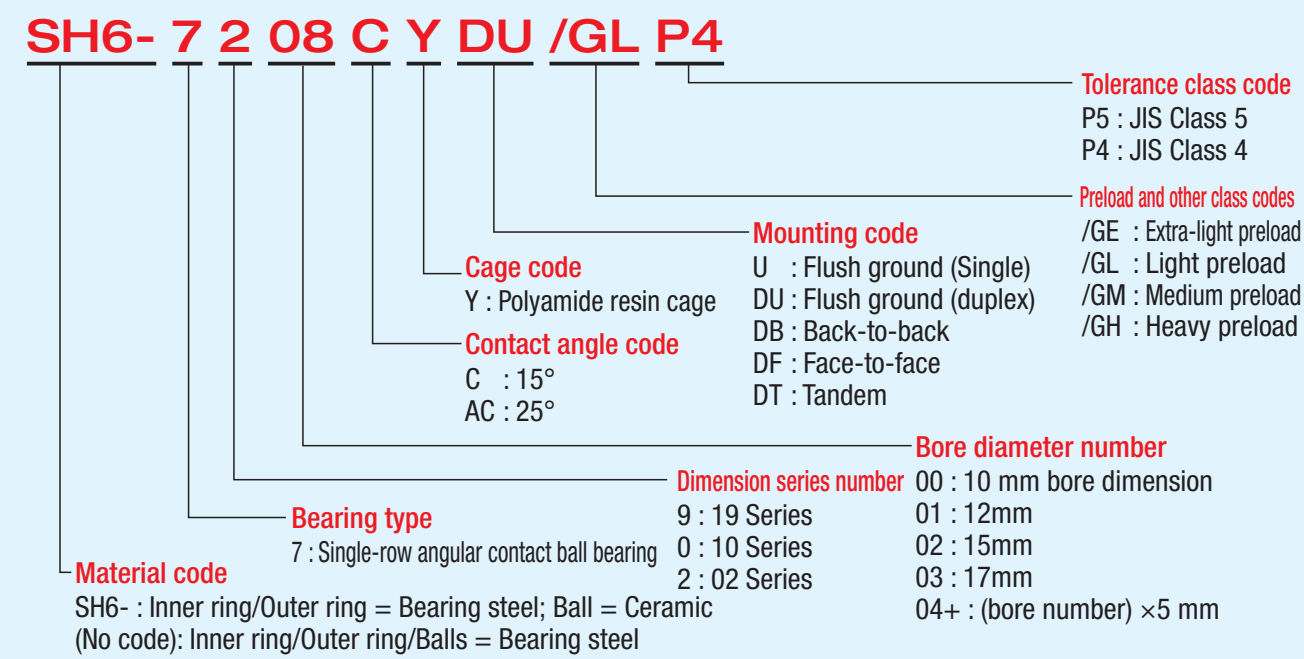
Angular Contact Ball Bearings

Precision Type

Nomenclature of Bearing Numbers



Features

- With angular contact ball bearings, the balls and the inner ring and outer ring raceways form a specific angle of contact. When used in a single configuration, axial load is limited to a single direction, this type of bearing is suitable for bearing composite loads made up of axial and radial loads.
- Since this type of bearing has a contact angle, axial components are generated when a radial load is applied. Because of this, this type of bearing is normally used in pairs at either end of a shaft.
- Ceramic ball type also available.

Contact Angle

Two contact angles are available: 15° and 25°. 15° is for high-speed applications. 25° is for applications requiring high axial rigidity.

Cage

A ball guide polyamide cage is provided as standard. The polyamide cage should be used under temperatures lower than 120°.

Dimensional Accuracy, Rotational Accuracy

Conforms to JIS Class 5 or Class 4. See page 7 for details.

Preload

- Four types of standard preload settings are available. Use the nearby table to select the preload that meets your criteria.
- See page 16 through 18 for standard preloads available for each series and size.

Preload Selection Criteria

Preload code	Selection criteria
E (extra-light preload)	Prevents mechanical vibration and increases accuracy.
L (light preload)	Provides rigidity at high-speed (dmn value = 500,000) operation.
M (medium preload)	Provides higher than light preload rigidity at standard-speed operation.
H (heavy preload)	Provides maximum rigidity at low-speed operation.

Mounting

See page 12 and 13 for multiple-row arrangements.

Ceramic Ball Types

Bearings with ceramic balls that are less dense than bearing steel balls also are available for lower centrifugal force when balls rotate at high speeds.

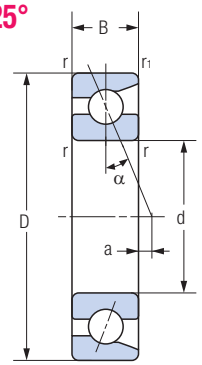
- The characteristics of ceramic and bearing steel are shown in the table below.
- The bearing number of a bearing that uses ceramic balls starts with "SH6-".
- Preload and axial rigidity is approximately 1.2 times that of bearing steel type bearings.

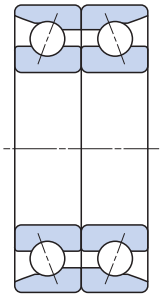
Comparison of Ceramic and Bearing Steel Characteristics

Features	Unit	Ceramic (Si_3N_4)	Bearing steels (SUJ2)
Heat resistance	°C	800	180
Density	g/cc	3.2	7.8
Linear expansion coefficient	1/°C	3.2×10^{-6}	12.5×10^{-6}
Hardness	Hv	1400~1700	700~800
Longitudinal elastic coefficient	GPa	314	206
Poisson's ratio	—	0.26	0.30
Corrosion resistance	—	Good	No good
Magnetism	—	Non-magnetic substance	Strongly magnetic substance
Conductivity	—	Insulator	Conductor
Crystal chemical bonding	—	Covalent	Metallic

Angular Contact Ball Bearings

7900C Series **Contact angle α = 15°**
7900AC Series **Contact angle α = 25°**

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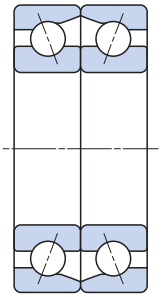
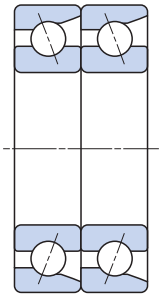
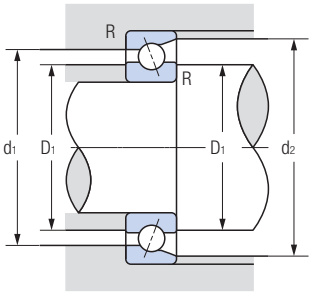

Face-to-face (DF)


Tandem (DT)

Bearing no.	Boundary dimensions (mm)					Load center a (mm)	Basic dynamic load rating Cr (kN)	Basic static load rating Cor (kN)
	d	D	B	r (Min)	r1 (Min)			
7900C	**10**	22	6	0.3	0.15	-0.9	3.00	1.52
7900AC	**10**	22	6	0.3	0.15	0.7	2.88	1.45
7901C	**12**	24	6	0.3	0.15	-0.6	3.20	1.72
7901AC	**12**	24	6	0.3	0.15	1.2	3.05	1.63
7902C	**15**	28	7	0.3	0.15	-0.6	4.75	2.64
7902AC	**15**	28	7	0.3	0.15	1.5	4.55	2.53
7903C	**17**	30	7	0.3	0.15	-0.3	5.00	2.95
7903AC	**17**	30	7	0.3	0.15	2.1	4.75	2.82
7904C	**20**	37	9	0.3	0.15	-0.7	7.30	4.55
7904AC	**20**	37	9	0.3	0.15	2.1	6.95	4.35
7905C	**25**	42	9	0.3	0.15	0.1	7.80	5.45
7905AC	**25**	42	9	0.3	0.15	3.5	7.40	5.15
7906C	**30**	47	9	0.3	0.15	0.7	8.30	6.25
7906AC	**30**	47	9	0.3	0.15	4.5	7.85	5.95
7907C	**35**	55	10	0.6	0.3	1.0	12.5	9.65
7907AC	**35**	55	10	0.6	0.3	5.5	11.9	9.20
7908C	**40**	62	12	0.6	0.3	0.8	15.7	12.4
7908AC	**40**	62	12	0.6	0.3	5.9	14.9	11.8
7909C	**45**	68	12	0.6	0.3	1.6	16.6	14.1
7909AC	**45**	68	12	0.6	0.3	7.2	15.7	13.3
7910C	**50**	72	12	0.6	0.3	2.2	17.7	15.5
7910AC	**50**	72	12	0.6	0.3	8.2	16.4	14.9



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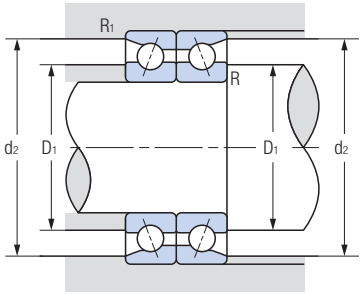

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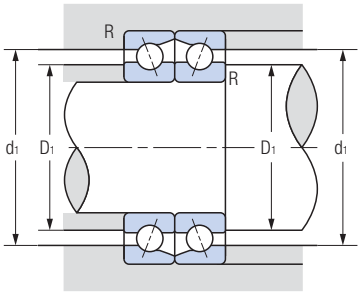
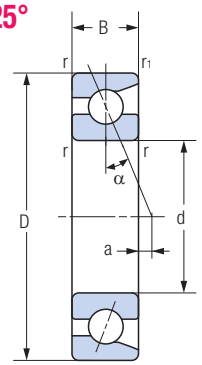


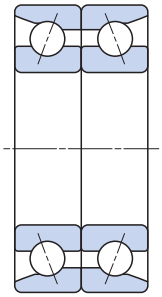
Face-to-face

Rotation speed limit (rpm)		Corner radius (mm)					Mass (kg) (Reference)	Bearing no.
Grease lubrication	Oil lubrication	D_1 (Min)	d_1 (Max)	d_2 (Max)	R (Max)	R_1 (Max)		
73000	100000	12.5	19.5	20.8	0.3	0.15	0.008	**7900C**
63500	85000	12.5	19.5	20.8	0.3	0.15	0.008	**7900AC**
64800	88800	14.5	21.5	22.8	0.3	0.15	0.010	**7901C**
56400	75500	14.5	21.5	22.8	0.3	0.15	0.010	**7901AC**
54300	74400	17.5	25.5	26.8	0.3	0.15	0.015	**7902C**
47200	63200	17.5	25.5	26.8	0.3	0.15	0.015	**7902AC**
49700	68000	19.5	27.5	28.8	0.3	0.15	0.016	**7903C**
43200	57800	19.5	27.5	28.8	0.3	0.15	0.016	**7903AC**
41000	56100	22.5	34.5	35.8	0.3	0.15	0.035	**7904C**
35600	47700	22.5	34.5	35.8	0.3	0.15	0.035	**7904AC**
34800	47700	27.5	39.5	40.8	0.3	0.15	0.041	**7905C**
30300	40600	27.5	39.5	40.8	0.3	0.15	0.041	**7905AC**
30300	41500	32.5	44.5	45.8	0.3	0.15	0.046	**7906C**
26300	35300	32.5	44.5	45.8	0.3	0.15	0.046	**7906AC**
25900	35500	39.5	50.5	52.5	0.6	0.3	0.074	**7907C**
22500	30200	39.5	50.5	52.5	0.6	0.3	0.074	**7907AC**
22900	31300	44.5	57.5	59.5	0.6	0.3	0.107	**7908C**
19900	26600	44.5	57.5	59.5	0.6	0.3	0.107	**7908AC**
20600	28300	49.5	63.5	65.5	0.6	0.3	0.127	**7909C**
18000	24000	49.5	63.5	65.5	0.6	0.3	0.127	**7909AC**
19100	26200	54.5	67.5	69.5	0.6	0.3	0.128	**7910C**
16600	22300	54.5	67.5	69.5	0.6	0.3	0.128	**7910AC**

Angular Contact Ball Bearings

7000C Series **Contact angle α = 15°**
7000AC Series **Contact angle α = 25°**

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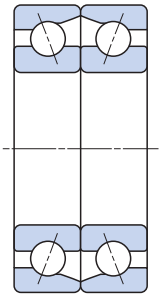
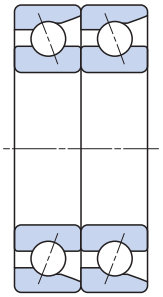
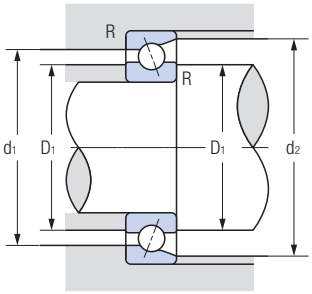

Face-to-face (DF)


Tandem (DT)

Bearing no.	Boundary dimensions (mm)					Load center a (mm)	Basic dynamic load rating Cr (kN)	Basic static load rating Cor (kN)
	d	D	B	r (Min)	r1 (Min)			
7000C	**10**	26	8	0.3	0.15	-1.9	5.35	2.50
7000AC	**10**	26	8	0.3	0.15	0.2	5.15	2.41
7001C	**12**	28	8	0.3	0.15	-1.7	5.80	2.91
7001AC	**12**	28	8	0.3	0.15	0.7	5.60	2.79
7002C	**15**	32	9	0.3	0.15	-1.8	6.65	3.70
7002AC	**15**	32	9	0.3	0.15	1.0	6.30	3.55
7003C	**17**	35	10	0.3	0.15	-2.0	7.00	4.15
7003AC	**17**	35	10	0.3	0.15	1.1	6.65	3.95
7004C	**20**	42	12	0.6	0.3	-2.4	11.2	6.60
7004AC	**20**	42	12	0.6	0.3	1.2	10.6	6.25
7005C	**25**	47	12	0.6	0.3	-1.8	12.9	8.65
7005AC	**25**	47	12	0.6	0.3	2.4	11.7	7.60
7006C	**30**	55	13	1	0.6	-1.6	16.0	11.1
7006AC	**30**	55	13	1	0.6	3.4	15.1	10.5
7007C	**35**	62	14	1	0.6	-1.4	19.3	13.7
7007AC	**35**	62	14	1	0.6	4.3	18.2	13.0
7008C	**40**	68	15	1	0.6	-1.3	20.7	16.0
7008AC	**40**	68	15	1	0.6	5.1	19.5	15.1
7009C	**45**	75	16	1	0.6	-1.1	24.6	19.4
7009AC	**45**	75	16	1	0.6	6.0	23.1	18.3
7010C	**50**	80	16	1	0.6	-0.5	26.2	22.0
7010AC	**50**	80	16	1	0.6	7.2	23.7	19.7
7011C	**55**	90	18	1.1	0.6	-0.6	34.5	28.8
7011AC	**55**	90	18	1.1	0.6	7.9	31.0	25.6
7012C	**60**	95	18	1.1	0.6	-0.1	35.5	30.5
7012AC	**60**	95	18	1.1	0.6	9.1	32.0	27.6
7013C	**65**	100	18	1.1	0.6	0.5	37.5	34.5
7013AC	**65**	100	18	1.1	0.6	10.2	34.0	31.0
7014C	**70**	110	20	1.1	0.6	0.4	47.0	43.0
7014AC	**70**	110	20	1.1	0.6	11.0	44.5	41.0
7015C	**75**	115	20	1.1	0.6	1.0	48.5	46.0
7015AC	**75**	115	20	1.1	0.6	12.2	45.5	43.0
7016C	**80**	125	22	1.1	0.6	0.8	59.0	55.5
7016AC	**80**	125	22	1.1	0.6	12.9	55.5	52.5
7017C	**85**	130	22	1.1	0.6	1.4	60.5	59.0
7017AC	**85**	130	22	1.1	0.6	14.1	57.0	55.5
7018C	**90**	140	24	1.5	1	1.3	72.0	69.5
7018AC	**90**	140	24	1.5	1	14.8	68.0	65.5
7019C	**95**	145	24	1.5	1	1.9	74.0	73.5
7019AC	**95**	145	24	1.5	1	16.0	69.5	69.5
7020C	**100**	150	24	1.5	1	2.4	76.0	77.5
7020AC	**100**	150	24	1.5	1	17.2	71.0	73.0



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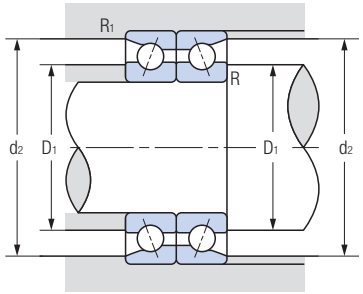

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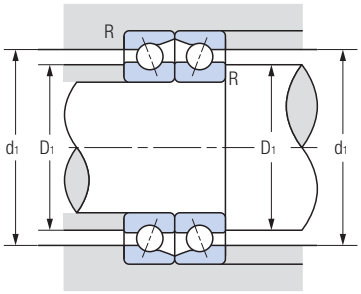
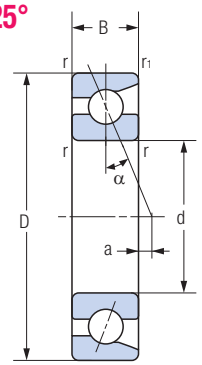


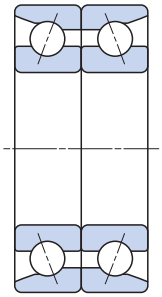
Face-to-face

Rotation speed limit (rpm)		Corner radius (mm)					Mass (kg) (Reference)	Bearing no.
Grease lubrication	Oil lubrication	D_1 (Min)	d_1 (Max)	d_2 (Max)	R (Max)	R_1 (Max)		
65000	89000	12	24	25	0.3	0.15	0.022	7000C
56500	75500	12	24	25	0.3	0.15	0.022	7000AC
58500	80000	14	26	27	0.3	0.15	0.024	7001C
51000	68000	14	26	27	0.3	0.15	0.026	7001AC
49500	68000	17	30	31	0.3	0.15	0.035	7002C
43000	58000	17	30	31	0.3	0.15	0.035	7002AC
45000	61500	19	33	34	0.3	0.15	0.045	7003C
39000	52500	19	33	34	0.3	0.15	0.045	7003AC
37500	51500	24	38	40	0.6	0.3	0.079	7004C
32500	44000	24	38	40	0.6	0.3	0.079	7004AC
32500	44500	29	43	45	0.6	0.3	0.091	7005C
28200	37500	29	43	45	0.6	0.3	0.091	7005AC
27400	37500	35	50	52	1	0.6	0.135	7006C
23900	32000	35	50	52	1	0.6	0.135	7006AC
24100	33000	40	57	59	1	0.6	0.170	7007C
21000	28000	40	57	59	1	0.6	0.170	7007AC
21600	29600	45	63	65	1	0.6	0.210	7008C
18800	25200	45	63	65	1	0.6	0.210	7008AC
19500	26700	50	70	72	1	0.6	0.265	7009C
16900	22700	50	70	72	1	0.6	0.265	7009AC
18000	24600	55	75	77	1	0.6	0.285	7010C
15600	20900	55	75	77	1	0.6	0.285	7010AC
16100	22100	61	84	86	1	0.6	0.420	7011C
14000	18800	61	84	86	1	0.6	0.420	7011AC
15000	20600	66	89	91	1	0.6	0.450	7012C
13100	17500	66	89	91	1	0.6	0.450	7012AC
14200	19400	71	94	96	1	0.6	0.470	7013C
12300	16500	71	94	96	1	0.6	0.470	7013AC
13000	17800	76	104	106	1	0.6	0.660	7014C
11300	15100	76	104	106	1	0.6	0.660	7014AC
12300	16800	81	109	111	1	0.6	0.695	7015C
10700	14300	81	109	111	1	0.6	0.695	7015AC
11400	15600	86	119	121	1	0.6	0.925	7016C
9900	13300	86	119	121	1	0.6	0.925	7016AC
10900	14900	91	124	126	1	0.6	0.960	7017C
9400	12700	91	124	126	1	0.6	0.960	7017AC
10100	13900	97	133	135.6	1.5	1	1.26	7018C
8800	11800	97	133	135.6	1.5	1	1.26	7018AC
9700	13300	102	138	140.6	1.5	1	1.36	7019C
8400	11300	102	138	140.6	1.5	1	1.36	7019AC
9300	12800	107	143	145.6	1.5	1	1.37	7020C
8100	10900	107	143	145.6	1.5	1	1.37	7020AC

Angular Contact Ball Bearings

7200C Series Contact angle α = 15°
7200AC Series Contact angle α = 25°

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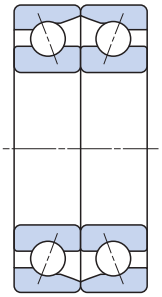
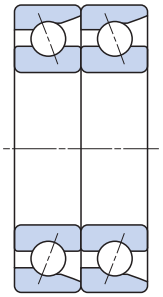
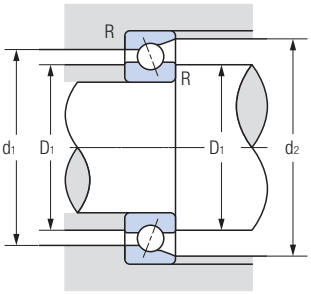
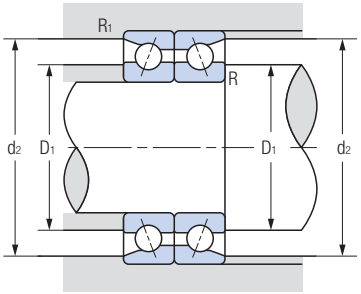

Face-to-face (DF)


Tandem (DT)

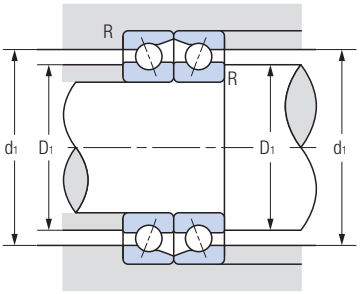
Bearing no.	Boundary dimensions (mm)					Load center a (mm)	Basic dynamic load rating Cr (kN)	Basic static load rating Cor (kN)
	d	D	B	r (Min)	r1 (Min)			
7200C	**10**	30	9	0.6	0.3	-2.2	6.95	3.30
7200AC	**10**	30	9	0.6	0.3	0.2	6.75	3.20
7201C	**12**	32	10	0.6	0.3	-2.5	7.95	3.90
7201AC	**12**	32	10	0.6	0.3	0.2	7.65	3.75
7202C	**15**	35	11	0.6	0.3	-2.6	8.70	4.55
7202AC	**15**	35	11	0.6	0.3	0.4	8.35	4.40
7203C	**17**	40	12	0.6	0.3	-2.7	10.9	5.90
7203AC	**17**	40	12	0.6	0.3	0.8	10.5	5.65
7204C	**20**	47	14	1	0.6	-3.1	14.7	8.15
7204AC	**20**	47	14	1	0.6	0.9	14.0	7.80
7205C	**25**	52	15	1	0.6	-3.1	16.7	10.3
7205AC	**25**	52	15	1	0.6	1.6	15.9	9.80
7206C	**30**	62	16	1	0.6	-2.7	23.2	14.9
7206AC	**30**	62	16	1	0.6	2.8	22.0	14.1
7207C	**35**	72	17	1.1	0.6	-2.3	30.5	20.1
7207AC	**35**	72	17	1.1	0.6	4	29.1	19.1
7208C	**40**	80	18	1.1	0.6	-2.1	36.5	25.4
7208AC	**40**	80	18	1.1	0.6	5	34.5	24.1
7209C	**45**	85	19	1.1	0.6	-2.0	41.0	29.0
7209AC	**45**	85	19	1.1	0.6	5.7	39.0	27.5
7210C	**50**	90	20	1.1	0.6	-1.9	43.0	32.0
7210AC	**50**	90	20	1.1	0.6	6.3	41.0	30.5
7211C	**55**	100	21	1.5	1	-1.6	53.0	40.0
7211AC	**55**	100	21	1.5	1	7.6	50.5	38.0
7212C	**60**	110	22	1.5	1	-1.2	64.5	49.5
7212AC	**60**	110	22	1.5	1	8.8	58.0	43.5
7213C	**65**	120	23	1.5	1	-0.8	73.5	59.0
7213AC	**65**	120	23	1.5	1	10.1	66.5	52.0
7214C	**70**	125	24	1.5	1	-0.7	80.0	65.0
7214AC	**70**	125	24	1.5	1	10.7	72.5	57.5
7215C	**75**	130	25	1.5	1	-0.7	83.5	70.0
7215AC	**75**	130	25	1.5	1	11.4	75.5	62.5
7216C	**80**	140	26	2	1	-0.3	93.5	78.0
7216AC	**80**	140	26	2	1	12.7	88.5	74.0
7217C	**85**	150	28	2	1	-0.4	100	85.0
7217AC	**85**	150	28	2	1	13.4	95.0	81.0
7218C	**90**	160	30	2	1	-0.6	124	105
7218AC	**90**	160	30	2	1	14.2	112	93.0
7219C	**95**	170	32	2.1	1.1	-0.7	133	115
7219AC	**95**	170	32	2.1	1.1	14.9	126	107
7220C	**100**	180	34	2.1	1.1	-0.8	150	128
7220AC	**100**	180	34	2.1	1.1	15.7	142	121



Single row



Back-to-back



Face-to-face

Rotation speed limit (rpm)		Corner radius (mm)					Mass (kg) (Reference)	Bearing no.
Grease lubrication	Oil lubrication	D_1 (Min)	d_1 (Max)	d_2 (Max)	R (Max)	R_1 (Max)		
58500	80000	15	25	27.4	0.6	0.3	0.034	7200C
51000	68000	15	25	27.4	0.6	0.3	0.034	7200AC
53000	72500	17	27	29.4	0.6	0.3	0.040	7201C
46000	62000	17	27	29.4	0.6	0.3	0.040	7201AC
46500	64000	20	30	32.4	0.6	0.3	0.048	7202C
40500	54500	20	30	32.4	0.6	0.3	0.048	7202AC
41000	56000	22	35	37.4	0.6	0.3	0.070	7203C
35500	47500	22	35	37.4	0.6	0.3	0.070	7203AC
34500	47500	26	41	43.4	1	0.6	0.110	7204C
30500	40500	26	41	43.4	1	0.6	0.110	7204AC
30000	41500	31	46	48.4	1	0.6	0.135	7205C
26400	35500	31	46	48.4	1	0.6	0.135	7205AC
25200	34500	36	56	58.4	1	0.6	0.210	7206C
22000	29600	36	56	58.4	1	0.6	0.210	7206AC
21800	29900	42	65	67	1	0.6	0.295	7207C
19000	25400	42	65	67	1	0.6	0.295	7207AC
19500	26700	47	73	75	1	0.6	0.380	7208C
16900	22700	47	73	75	1	0.6	0.380	7208AC
18000	24600	52	78	80	1	0.6	0.430	7209C
15600	20900	52	78	80	1	0.6	0.430	7209AC
16700	22900	57	83	85	1	0.6	0.485	7210C
14500	19400	57	83	85	1	0.6	0.485	7210AC
15000	20600	64	91	94.6	1.5	1	0.635	7211C
13100	17500	64	91	94.6	1.5	1	0.635	7211AC
13700	18800	69	101	104.6	1.5	1	0.820	7212C
12000	16000	69	101	104.6	1.5	1	0.820	7212AC
12600	17300	74	111	114.6	1.5	1	1.02	7213C
11000	14700	74	111	114.6	1.5	1	1.02	7213AC
12000	16400	79	116	119.6	1.5	0.8	1.12	7214C
10400	13900	79	116	119.6	1.5	0.8	1.12	7214AC
11400	15600	84	121	124.6	1.5	1	1.23	7215C
9900	13300	84	121	124.6	1.5	1	1.23	7215AC
10600	14500	90	130	134	2	1	1.50	7216C
9200	12400	90	130	134	2	1	1.50	7216AC
9900	13600	95	140	144	2	1	1.87	7217C
8600	11600	95	140	144	2	1	1.87	7217AC
9300	12800	100	150	154	2	1	2.30	7218C
8100	10900	100	150	154	2	1	2.30	7218AC
8800	12100	107	158	163	2	1	2.78	7219C
7700	10300	107	158	163	2	1	2.78	7219AC
8300	11400	112	168	173	2	1	3.32	7220C
7200	9700	112	168	173	2	1	3.32	7220AC

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