

Thrust ball bearing



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Thrust ball bearings are separated bearings, with contact angle of 90°. It can only bear axial load and limit speed is low.

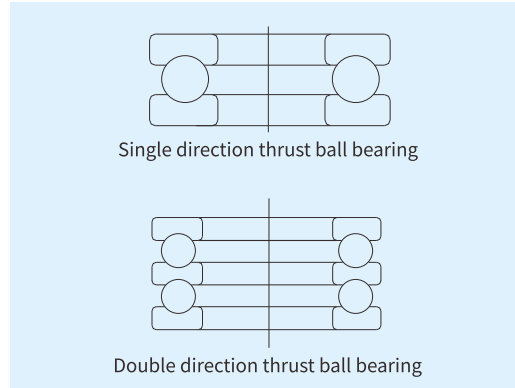
1. Main structure

(1) Single direction thrust ball bearing 51000 type

This type of bearings can only bear the axial load from one direction, and it can limit the displacement of shaft and housing in single direction.

(2) Double direction thrust ball bearing 52000 type

This type of bearings can bear the axial load from two directions, and can limit the axial displacement of shaft and housing in two directions.



2. Cage material

When the outer diameter is less than 250mm, generally steel sheet (or metal strip) is used; when outer diameter is greater than 250mm, solid cage is usually used. See the following table for details.

Bearing series	Molded cage	Pressed cage	Machined cage
511	51100~51106	51107~51152	51156~511/530
512	—	51200~51224	51226~51260
513	—	51305~51320	51322~51340
514	—	51405~51415	51416~51420
522	—	52202~52224	52226, 52228
523	—	52305~52320	52322, 52324
524	—	52405~52415	52416~52426

3. Minimum axial load

When the thrust ball bearing is in operation, if the bearing is not tightly pressed due to too small axial load, the steel balls will generate slippage and thus damage the normal running of bearings due to the inertia force thereof. Therefore, certain axial load must be applied to the bearing during operation.

4. Allowable misalignment angle

The two supporting surfaces of thrust ball bearings must be parallel and no deviation is allowed. The shaft axis must be vertical to the housing supporting surface. If this cannot be guaranteed, spherical seat washer and aligning washer may be adopted to compensate. In case of any question, please contact C&U.

5. Tolerance

See more details in Section 5 for the tolerances of thrust ball bearings.

6. Dynamic equivalent axial load

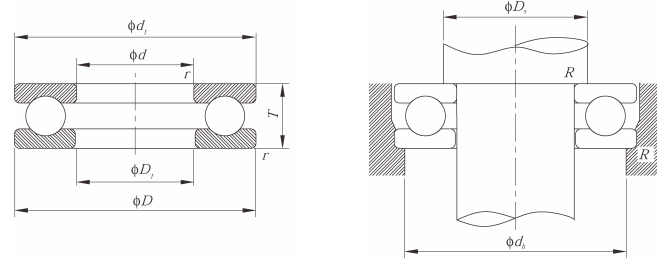
Thrust ball bearing can only take axial load and its axial direction dynamic equivalent load is:

$$P_a = F_a$$

7. Static equivalent axial load

The axial direction static equivalent load of thrust ball bearing is:

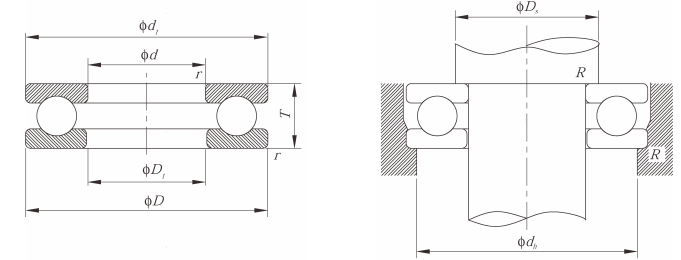
$$P_{0a} = F_a$$



d 90~170 mm

Boundary dimensions (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions (mm)			Reference mass (kg)			
	d	D	T	r ¹⁾ (Min)		C _a	C _{0a}	Grease	Oil	d _{1s max} ²⁾		D _{1s min} ³⁾	D _s Max	d _h Max
90	120	22	1.0	59.5	190.0	1,900	2,700	51118	120	92	108	102	1.0	0.680
	135	35	1.1	117.0	325.0	1,400	2,000	51218	135	93	117	108	1.0	1.702
	155	50	1.5	198.0	490.0	1,100	1,600	51318	155	93	129	116	1.5	3.732
	190	77	2.1	305.0	750.0	790	1,100	*51418	187	93	149	131	2.0	11.01
100	135	25	1.0	85.0	268.0	1,700	2,400	51120	135	102	121	114	1.0	0.986
	150	38	1.1	147.0	410.0	1,300	1,800	51220	150	103	130	120	1.0	2.288
	170	55	1.5	237.0	595.0	990	1,400	51320	170	103	142	128	1.5	4.870
	210	85	3.0	370.0	970.0	710	1,000	*51420	205	103	165	145	2.5	14.66
110	145	25	1.0	87.0	288.0	1,600	2,300	51122	145	112	131	124	1.0	1.074
	160	38	1.1	153.0	450.0	1,200	1,800	51222	160	113	140	130	1.0	2.458
	190	63	2.0	267.0	750.0	870	1,200	*51322	187	113	158	142	2.0	7.670
120	155	25	1.0	89.0	310.0	1,500	2,200	51124	155	122	141	134	1.0	1.108
	170	39	1.1	154.0	470.0	1,200	1,700	51224	170	123	150	140	1.0	2.703
	210	70	2.1	296.0	805.0	780	1,100	*51324	205	123	173	157	2.0	10.80
130	170	30	1.0	104.0	350.0	1,300	1,900	51126	170	132	154	146	1.0	1.733
	190	45	1.5	191.0	565.0	1,000	1,500	*51226	187	133	166	154	1.5	4.200
	225	75	2.1	330.0	960.0	720	1,000	*51326	220	134	186	169	2.0	12.70
140	180	31	1.0	107.0	375.0	1,300	1,800	*51128	178	142	164	156	1.0	1.910
	200	46	1.5	193.0	595.0	980	1,400	*51228	197	143	176	164	1.5	4.765
	240	80	2.1	350.0	1050.0	670	960	*51328	235	144	199	181	2.0	15.30
150	190	31	1.0	109.0	400.0	1,200	1,800	*51130	188	152	174	166	1.0	2.011
	215	50	1.5	220.0	685.0	900	1,300	*51230	212	153	189	176	1.5	5.800
	250	80	2.1	360.0	1130.0	660	940	*51330	245	154	209	191	2.0	16.10
160	200	31	1.0	112.0	425.0	1,200	1,700	*51132	198	162	184	176	1.0	2.100
	225	51	1.5	223.0	720.0	870	1,200	*51232	222	163	199	186	1.5	6.320
	270	87	3.0	450.0	1470.0	600	860	*51332	265	164	225	205	2.5	20.71
170	215	34	1.1	134.0	510.0	1,100	1,600	*51134	213	172	197	188	1.0	2.770
	240	55	1.5	261.0	835.0	810	1,200	*51234	237	173	212	198	1.5	7.802
	280	87	3.0	465.0	1570.0	590	840	*51334	275	174	235	215	2.5	21.59

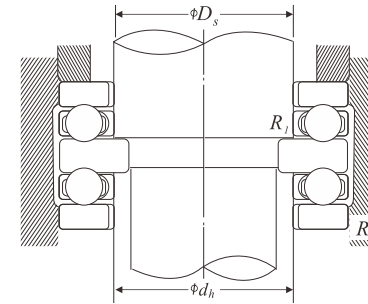
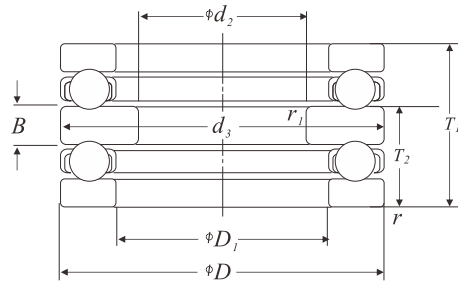
Note: 1) is the minimal permitted dimension of chamfer "r".
 2) is the maximal permitted dimension of shaft washer outer diameter "d_s".
 3) is the minimal permitted dimension of housing washer internal bore dimension "D₁".



d 180~200 mm

Boundary dimensions (mm)	Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers	Dimensions (mm)		Mounting dimensions (mm)			Reference mass (kg)			
	d	D	T	r ¹⁾ (Min)		C _a	C _{0a}	Grease	Oil	d _{1s max} ²⁾		D _{1s min} ³⁾	D _s Max	d _h Max
180	225	34	1.1	135.0	525.0	1,100	1,500	*51136	222	183	207	198	1.0	2.920
	250	56	1.5	266.0	875.0	780	1,100	*51236	247	183	222	208	1.5	8.338
	300	95	3.0	490.0	1700.0	540	780	*51336	295	184	251	229	2.5	27.46
190	240	37	1.1	170.0	655.0	980	1,400	*51138	237	193	220	210	1.0	3.750
	270	62	2.0	310.0	1060.0	710	1,000	*51238	267	194	238	222	2.0	11.31
	320	105	4.0	545.0	1950.0	500	710	*51338	315	195	266	244	3.0	34.89
200	250	37	1.1	172.0	675.0	960	1,400	*51140	247	203	230	220	1.0	3.922
	280	62	2.0	315.0	1110.0	700	990	*51240	277	204	248	232	2.0	11.78
	340	110	4.0	595.0	2220.0	470	670	*51340	335	205	282	258	3.0	41.79

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.



d 10~50 mm

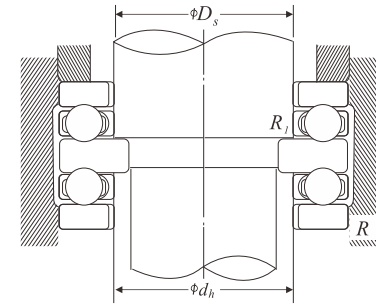
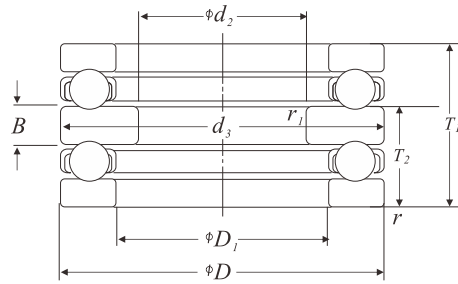
Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal type	Dimensions (mm)				Mounting dimensions (mm)				Reference mass (kg)
d ₂	D	T ₁	r _{smin} ¹⁾	r _{1smin} ²⁾	C _a	C _{0a}	Grease	Oil		d _{3smax} ²⁾	D _{1smin} ³⁾	B	T ₂	D _s Max	d _h Max	R Max	R ₁ Max	
10	32	22	0.6	0.3	16.6	24.8	5,000	7,100	52202	32	17	5	13.5	15	22	0.6	0.3	0.085
15	40	26	0.6	0.3	22.3	37.5	4,100	5,900	52204 52405	40	22	6	16.0	20	28	0.6	0.3	0.149 0.630
	60	45	1	0.6	55.5	89.5	2,600	3,700		60	27	11	28.0	25	39	1	0.6	
20	47	28	0.6	0.3	27.8	50.5	3,700	5,300	52205 52305 52406	47	27	7	17.5	25	34	0.6	0.3	0.212 0.327 1.01
	52	34	1	0.3	35.5	61.5	3,200	4,600		52	27	8	21.0	25	36	1	0.3	
	70	52	1	0.6	72.5	126.0	2,200	3,200		70	32	12	32.0	30	46	1	0.6	
25	52	29	0.6	0.3	29.3	58.0	3,400	4,900	52206 52306 52407	52	32	7	18.0	30	39	0.6	0.3	0.252 0.488 1.44
	60	38	1	0.3	43	78.5	2,800	3,900		60	32	9	23.5	30	42	1	0.3	
	80	59	1.1	0.6	87	155.0	1,900	2,800		80	37	14	36.5	35	53	1	0.6	
30	62	34	1	0.3	39	78.0	2,900	4,200	52207 52208 52307 52308 52408	62	37	8	21.0	35	46	1	0.3	0.418 0.559 0.678 1.06 2.03
	68	36	1	0.6	47	98.5	2,700	3,900		68	42	9	22.5	40	51	1	0.6	
	68	44	1	0.3	55.5	105	2,400	3,500		68	37	10	27.0	35	48	1	0.3	
	78	49	1	0.6	69.0	135	2,200	3,100		78	42	12	30.5	40	55	1	0.6	
	90	65	1.1	0.6	112	205	1,700	2,500		90	42	15	40.0	40	60	1	0.6	
35	73	37	1	0.6	48	105	2,600	3,700	52209 52309 52409	73	47	9	23.0	45	56	1	0.6	0.634 1.34 2.71
	85	52	1	0.6	80	163	2,000	2,900		85	47	12	32.0	45	61	1	0.6	
	100	72	1.1	0.6	130	242	1,600	2,200		100	47	17	44.5	45	67	1	0.6	
40	78	39	1	0.6	48.5	111	2,400	3,400	52210 52310 52410	78	52	9	24.0	50	61	1	0.6	0.730 1.80 3.56
	95	58	1.1	0.6	96.5	202	1,800	2,600		95	52	14	36.0	50	68	1	0.6	
	110	78	1.5	0.6	158	310	1,400	2,000		110	52	18	48.0	50	74	1.5	0.6	
45	90	45	1	0.6	69.5	159	2,100	3,000	52211 52311 52411	90	57	10	27.5	55	69	1	0.6	1.14 2.41 4.70
	105	64	1.1	0.6	119	246	1,600	2,300		105	57	15	39.5	55	75	1	0.6	
	120	87	1.5	0.6	178	360	1,300	1,800		120	57	20	53.5	55	81	1.5	0.6	
50	95	46	1	0.6	73.5	179	2,000	2,800	52212 52312 52412 52413	95	62	10	28.0	60	74	1	0.6	1.25 2.56 6.33 8.03
	110	64	1.1	0.6	123	267	1,600	2,300		110	62	15	39.5	60	80	1	0.6	
	130	93	1.5	0.6	214	435	1,200	1,700		130	62	21	57.0	60	88	1.5	0.6	
	140	101	2	1	232	495	1,100	1,600		140	68	23	62.0	65	95	2	1	

Note: 1) is the minimal permitted dimension of chamfer "r".

2) is the maximal permitted dimension of shaft washer outer diameter "d₁".

3) is the minimal permitted dimension of housing washer internal bore dimension "D₁".

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.



d 55~120 mm

Boundary dimensions (mm)					Basic load ratings (kN)		Limiting speeds (r/min)		Nominal type	Dimensions (mm)				Mounting dimensions (mm)				Reference mass (kg)
d ₂	D	T ₁	r _{smin} ¹⁾	r _{1smin} ¹⁾	C _a	C _{0a}	Grease	Oil		d _{3smax} ²⁾	D _{1smin} ³⁾	B	T ₂	D _s Max	d _h Max	R Max	R ₁ Max	
55	100	47	1	0.6	75.0	189	1,900	2,700	52213	100	67	10	28.5	65	79	1	0.6	1.37
	105	47	1	1	76.0	199	1,800	2,600		105	72	10	28.5	70	84	1	1	1.56
	115	65	1.1	0.6	128	287	1,500	2,200		115	67	15	40.0	65	85	1	0.6	2.76
	125	72	1.1	1	148	340	1,400	2,000	52314	125	72	16	44.0	70	92	1	1	3.75
	150	107	2	1	250	555	1,000	1,500		150	73	24	65.5	70	102	2	1	9.72
60	110	47	1	1	77.5	209	1,800	2,600	52215	110	77	10	28.5	75	89	1	1	1.67
	135	79	1.5	1	171	395	1,300	1,800		135	77	18	48.5	75	99	1.5	1	4.82
	160	115	2	1	269	615	940	1,400		160	78	26	70.5	75	110	2	1	11.80
65	115	48	1	1	78.5	218	1,700	2,400	52216	115	82	10	29.0	80	94	1	1	1.800
	140	79	1.5	1	176	425	1,200	1,800		140	82	18	48.5	80	104	1.5	1	5.070
	170	120	2.1	1	270	620	890	1,300		170	83	27	73.5	80	117	2	1	14.80
	180	128	2.1	1.1	288	685	840	1,200		179.5	88	29	78.5	85	124	2	1	18.60
70	125	55	1	1	95.5	264	1,600	2,200	52217	125	88	12	33.5	85	101	1	1	2.470
	150	87	1.5	1	201	490	1,100	1,600		150	88	19	53.0	85	111	1.5	1	6.390
	190	135	2.1	1.1	305	750	790	1,100		189.5	93	30	82.5	90	131	2	1	20.80
75	135	62	1.1	1	117	325	1,400	2,000	52218	135	93	14	38.0	90	108	1	1	3.260
	155	88	1.5	1	198	490	1,100	1,600		155	93	19	53.5	90	116	1.5	1	6.760
80	210	150	3	1.1	370	970	710	1,000	*52420	209.5	103	33	91.5	100	145	2.5	1	28.20
85	150	67	1.1	1	147	410	1,300	1,800	52220	150	103	15	41.0	100	120	1	1	4.270
	170	97	1.5	1	237	595	990	1,400		170	103	21	59.0	100	128	1.5	1	8.800
90	230	166	3	1.1	435	1,240	640	920	*52422	229	113	37	101.5	110	159	2.5	1	37.80
95	160	67	1.1	1	153	450	1,200	1,800	52222	160	113	15	41.0	110	130	1	1	4.630
	190	110	2	1	267	705	870	1,200		189.5	113	24	67.0	110	142	2	1	13.10
	250	177	4	1.5	455	1340	590	840		249	123	40	108.5	120	174	3	1.5	14.80
100	170	68	1.1	1.1	154	470	1,200	1,700	52224	170	123	15	41.5	120	140	1	1	5.360
	210	123	2.1	1.1	296	805	780	1,100		209.5	123	27	75.0	120	157	2	1	18.40
	270	192	4	2	520	1,590	540	770		269	134	42	117.0	130	188	3	2	60.10
110	190	80	1.5	1.1	191	565	1,000	1,500	*52226	189.5	133	18	49.0	130	154	1.5	1	8.400
120	200	81	1.5	1.1	193	595	980	1,400	*52228	199.5	143	18	49.5	140	164	1.5	1	9.050

Note: 1) is the minimal permitted dimension of chamfer "r".

2) is the maximal permitted dimension of shaft washer outer diameter "d₁".

3) is the minimal permitted dimension of housing washer internal bore dimension "D₁".

Remarks: Part number starting with the sign * represents its shaft washer outside diameter is smaller than housing washer outside diameter. Therefore, when using this type of bearings, the shape of the housing bore does not need to be the same as that shown in the Fig. If there is a withdrawal groove at the outer diameter of the inner ring, the housing can be made into cylindrical shape directly.