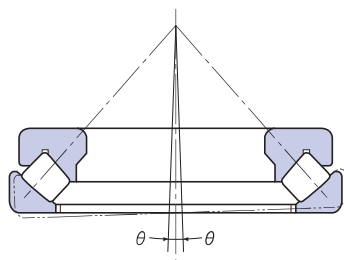


Spherical Roller Thrust Bearings

Aligning angle

Maximum permissible misalignment angle is about 2° under general service conditions. If the aligning advantages of this bearing type are to be realized, care must be taken to provide clearance for parts in the surrounding structure.



Minimum axial load

To prevent damage caused by sliding motion between the rollers and raceway, spherical roller thrust bearings must be subjected to a load more than the minimum load, $F_{a \min}$.

$$F_{a \min} = \frac{C_{0a}}{1000}$$

Lubrication

Because there are many sliding surfaces in E type Spherical Roller Thrust Bearings (cage-to-guide-sleeve and roller-ends-to-rib), oil lubricant (not grease) should be applied.

Safety-factor

The safety-factor "So" must be over 4.

Tolerance Values of Spherical Roller Thrust Bearings (Class 0)

Tolerance Values of Inner Rings

Unit: μm

Nominal bearing bore diameter d (mm)		Single plane mean bore diameter deviation Δd_{mp}		Bore diameter variation, in a single radial plane Vd_p	References			
					Inner ring reference face runout with bore S_d		Deviation of single height, ΔI_s	
Over	Incl.	High	Low	High	Low	High	Low	
50	80	0	-15	11	25	+150	-150	
80	120	0	-20	15	25	+200	-200	
120	180	0	-25	19	30	+250	-250	
180	250	0	-30	23	30	+300	-300	
250	315	0	-35	26	35	+350	-350	
315	400	0	-40	30	40	+400	-400	
400	500	0	-45	34	45	+450	-450	

Tolerance Values of Outer Rings

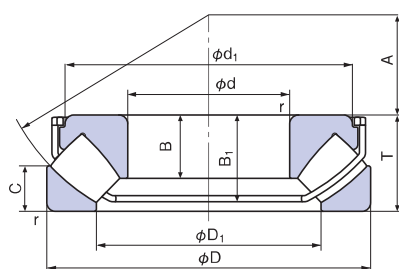
Unit: μm

Nominal bearing outside diameter D (mm)		Outside diameter deviation ΔD_{mp}	
		High	Low
Over	Incl.	High	Low
120	180	0	-25
180	250	0	-30
250	315	0	-35
315	400	0	-40
400	500	0	-45
500	630	0	-50
630	800	0	-75
800	1000	0	-100

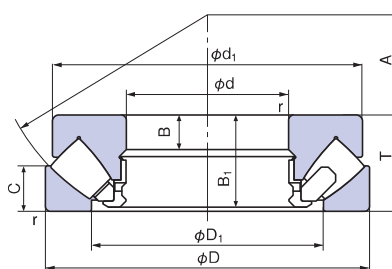
Remarks: The high deviation of bearing bore diameter specified in this table does not apply within a distance of $1.2 \times r$ (max) from the ring face.
The low deviation of bearing outside diameter specified in this table does not apply within a distance of $1.2 \times r$ (max) from the ring face.

Spherical Roller Thrust Bearings

Bore Diameter : 60 ~ 180mm



Type EX

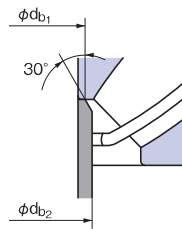
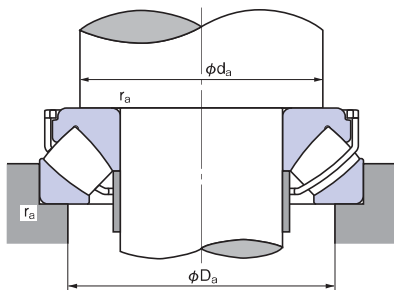


Type E

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min ⁻¹)	
d	D	T	r (min)				Grease lubrication	Oil lubrication
60	130	42	1.5	29412E	299000	890000	—	2800
	130	42	1.5	29412EX	350000	915000	1800	2800
65	140	45	2	29413E	345000	1040000	—	2700
	140	45	2	29413EX	410000	1110000	1700	2700
70	150	48	2	29414E	375000	1110000	—	2400
	150	48	2	29414EX	490000	1350000	1600	2400
75	160	51	2	29415E	445000	1380000	—	2300
	160	51	2	29415EX	525000	1470000	1600	2300
80	170	54	2.1	29416E	480000	1490000	—	2100
	170	54	2.1	29416EX	580000	1630000	1500	2100
85	150	39	1.5	29317E	293000	990000	—	2700
	150	39	1.5	29317EX	365000	1060000	1600	2700
	180	58	2.1	29417E	540000	1720000	—	2000
	180	58	2.1	29417EX	640000	1810000	1300	2000
90	155	39	1.5	29318E	300000	1040000	—	2700
	155	39	1.5	29318EX	355000	1070000	1600	2700
	190	60	2.1	29418E	620000	2020000	—	1900
	190	60	2.1	29418EX	710000	2080000	1300	1900
100	170	42	1.5	29320E	355000	1260000	—	2500
	170	42	1.5	29320EX	435000	1400000	1500	2500
	210	67	3	29420E	690000	2230000	—	1700
	210	67	3	29420EX	870000	2530000	1100	1700
110	190	48	2	29322E	470000	1680000	—	2100
	190	48	2	29322EX	550000	1730000	1300	2100
	230	73	3	29422E	845000	2820000	—	1500
	230	73	3	29422EX	1060000	3150000	950	1500
120	210	54	2.1	29324E	565000	2030000	—	1900
	210	54	2.1	29324EX	670000	2160000	1100	1900
	250	78	4	29424E	1030000	3450000	—	1400
	250	78	4	29424EX	1210000	3750000	900	1400
130	225	58	2.1	29326E	665000	2420000	—	1800
	225	58	2.1	29326EX	770000	2440000	1000	1800
	270	85	4	29426E	1140000	3850000	—	1200
	270	85	4	29426EX	1400000	4300000	850	1200
140	240	60	2.1	29328E	700000	2560000	—	1600
	240	60	2.1	29328EX	860000	2840000	950	1600
	280	85	4	29428E	1200000	4050000	—	1200
	280	85	4	29428EX	1410000	4350000	850	1200
150	215	39	1.5	29230E	335000	1390000	—	2100
	250	60	2.1	29330E	735000	2840000	—	1600
	300	90	4	29430E	1330000	4600000	—	1100
	300	90	4	29430EX	1630000	5150000	800	1100
160	225	39	1.5	29232E	345000	1470000	—	2100
	270	67	3	29332E	880000	3400000	—	1400
	270	67	3	29332EX	1040000	3500000	850	1400
	320	95	5	29432E	1510000	5350000	—	1000
170	320	95	5	29432EX	1820000	5750000	750	1000
	240	42	1.5	29234E	390000	1700000	—	1900
	280	67	3	29334E	900000	3550000	—	1400
	340	103	5	29434E	1670000	5900000	—	950
180	250	42	1.5	29236E	420000	1900000	—	1900
	300	73	3	29336E	1020000	3950000	—	1300
	360	109	5	29436E	1950000	7000000	—	860

Note: For heavy load application, d_s should be large enough to support the shaft washer rib.



- Dynamic equivalent axial load

$$P_a = F_a + 1.2 F_r$$

- Static equivalent axial load

$$P_{0a} = F_a + 2.7 F_r$$

where, F_a : Axial load

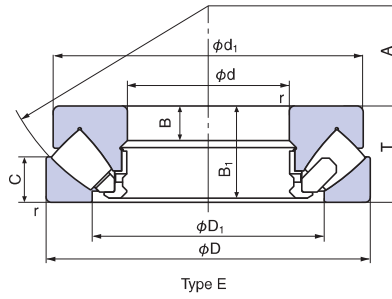
F_r : Radial load

However $F_r/F_a \leq 0.55$ must be satisfied

Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d_1	D_1	B	B_1	C	A	d_a (min)	D_a (max)	r_a (max)	db_1 (max)	db_2 (max)		
123	89	15	39.5	20	38	91	108	1.5	—	—	2.75	29412E
113	87	27	37.1	20	38	91	108	1.5	66.0	66.0	2.50	29412EX
133	96	16	42.5	21	42	99	115	2.0	—	—	3.41	29413E
123	93.5	29.5	40	21	42	99	115	2.0	72.0	72.0	3.20	29413EX
142	103	17	45.5	23	44	106	125	2.0	—	—	4.16	29414E
128.3	98.4	32	42.7	23	44	106	125	2.0	75.5	77.5	3.82	29414EX
152	109	18	48	24	47	113	132	2.0	—	—	4.98	29415E
140	105.6	34.5	45.6	24	47	113	132	2.0	82.5	82.5	4.70	29415EX
162	117	19	51	26	50	120	140	2.0	—	—	5.95	29416E
149	113	36	48.2	26	50	120	140	2.0	88.0	88.0	5.60	29416EX
143.5	114	13	37	19	50	115	135	1.5	—	—	2.87	29317E
134	110.5	25	35	19	50	115	135	1.5	90.0	90.0	2.67	29317EX
170	125	21	55	28	54	130	150	2.0	—	—	7.19	29417E
158.2	120.5	37	50.6	28	54	130	150	2.0	94.0	94.0	6.69	29417EX
148.5	117	13	37	19	52	120	140	1.5	—	—	3.06	29318E
135.2	116	23.8	35.1	19	52	120	140	1.5	95.0	95.0	2.75	29318EX
180	132	22	57	29	56	135	157	2.0	—	—	8.28	29418E
162	127	40.5	53	29	56	135	157	2.0	99.0	99.0	7.83	29418EX
163	129	14	40	20.8	58	130	150	1.5	—	—	3.91	29320E
146.9	126	27	38.2	20.8	58	130	150	1.5	105.0	107.0	3.61	29320EX
200	146	24	64	32	62	150	175	2.5	—	—	11.2	29420E
181	139	44.5	59.6	32	62	150	175	2.5	108.0	110.0	10.6	29420EX
182	143	16	45.5	23	64	145	165	2.0	—	—	5.67	29322E
165.1	140.6	30.9	44	23	64	145	165	2.0	116.0	117.0	5.22	29322EX
220	162	26	69	35	69	165	190	2.5	—	—	14.7	29422E
199.6	153.4	48	64.4	35	69	165	190	2.5	119.5	120.0	14.0	29422EX
200	159	18	51	26	70	160	180	2.0	—	—	7.90	29324E
184.5	155	34.5	48.7	26	70	160	180	2.0	127.0	128.0	7.30	29324EX
236	174	29	74	37	74	180	205	3.0	—	—	18.5	29424E
218	166.5	54	70.9	37	74	180	205	3.0	131.0	132.0	17.6	29424EX
215	171	19	55	28	76	170	195	2.0	—	—	9.45	29326E
197.4	165.8	36.8	52.7	28	76	170	195	2.0	136.0	138.0	8.82	29326EX
255	189	31	81	41	81	195	225	3.0	—	—	23.5	29426E
236.4	181	56	75	41	81	195	225	3.0	141.5	143.0	22.3	29426EX
230	183	20	57	29	82	185	205	2.0	—	—	11.2	29328E
218.4	179	38.5	54.8	29	82	185	205	2.0	147.5	149.0	10.5	29328EX
268	199	31	81	41	86	205	235	3.0	—	—	24.6	29428E
246	196	53.6	74.4	41	86	205	235	3.0	153.0	160.0	22.8	29428EX
208	178	14	37	19	82	179	196	1.5	—	—	4.60	29230E
240	194	20	57	29	87	195	215	2.0	—	—	11.7	29330E
285	214	32	86	44	92	220	250	3.0	—	—	29.6	29430E
264.4	207.5	58.5	80.8	44	92	220	250	3.0	163.0	169.0	27.8	29430EX
219	188	14	37	19	85	189	206	1.5	—	—	4.70	29232E
260	208	23	64	32	92	210	235	2.5	—	—	15.5	29332E
243.4	199.8	44	61.4	32	92	210	235	2.5	166.0	174.0	14.5	29332EX
306	229	34	91	45	99	230	265	4.0	—	—	35.9	29432E
283.8	222	62.5	85.7	45	99	230	265	4.0	174.5	181.0	33.4	29432EX
233	198	15	40	20	92	201	218	1.5	—	—	6.00	29234E
270	216	23	64	32	96	220	245	2.5	—	—	16.3	29334E
324	243	37	99	50	104	245	285	4.0	—	—	44.0	29434E
243	208	15	40	21	95	211	228	1.5	—	—	6.30	29236E
290	232	25	69	35	103	235	260	2.5	—	—	20.7	29336E
342	255	39	105	52	110	260	300	4.0	—	—	52.2	29436E

Spherical Roller Thrust Bearings

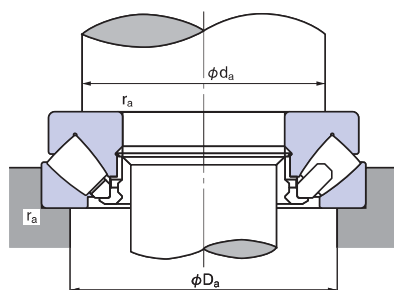
Bore Diameter : 190 ~ 530mm



1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min ⁻¹)	
d	D	T	r (min)				Grease lubrication	Oil lubrication
190	270	48	2	29238E	540000	2300000	—	1800
	320	78	4	29338E	1170000	4550000	—	1100
	380	115	5	29438E	2120000	7750000	—	800
200	280	48	2	29240E	550000	2410000	—	1800
	340	85	4	29340E	1350000	5250000	—	1000
	400	122	5	29440E	2350000	8450000	—	740
220	300	48	2	29244E	595000	2750000	—	1600
	360	85	4	29344E	1410000	5750000	—	1000
	420	122	6	29444E	2410000	8950000	—	720
240	340	60	2.1	29248E	890000	4000000	—	1300
	380	85	4	29348E	1410000	5850000	—	980
	440	122	6	29448E	2480000	9450000	—	720
260	360	60	2.1	29252E	915000	4250000	—	1300
	420	95	5	29352E	1810000	7500000	—	860
	480	132	6	29452E	2940000	11600000	—	640
280	380	60	2.1	29256E	935000	4500000	—	1200
	440	95	5	29356E	1850000	7950000	—	840
	520	145	6	29456E	3450000	13500000	—	580
300	420	73	3	29260E	1220000	5850000	—	1000
	480	109	5	29360E	2310000	10000000	—	720
	540	145	6	29460E	3650000	14800000	—	540
320	440	73	3	29264E	1270000	6150000	—	980
	500	109	5	29364E	2370000	10600000	—	720
	580	155	7.5	29464E	4050000	16800000	—	480
340	460	73	3	29268E	1290000	6350000	—	950
	540	122	5	29368E	2850000	12400000	—	630
	620	170	7.5	29468E	4750000	19300000	—	430
360	500	85	4	29272E	1650000	8050000	—	830
	560	122	5	29372E	2900000	12900000	—	600
	640	170	7.5	29472E	4900000	20500000	—	410
380	520	85	4	29276E	1780000	8800000	—	800
	600	132	6	29376E	3400000	15300000	—	540
	670	175	7.5	29476E	5200000	22000000	—	400
400	540	85	4	29280E	1840000	9250000	—	800
	620	132	6	29380E	3550000	16300000	—	530
	710	185	7.5	29480E	5850000	25000000	—	360
420	580	95	5	29284E	2260000	11300000	—	700
	650	140	6	29384E	3900000	17900000	—	480
	730	185	7.5	29484E	6050000	26000000	—	360
440	600	95	5	29288E	2290000	11800000	—	660
	680	145	6	29388E	4050000	19000000	—	450
	780	206	9.5	29488E	6950000	30000000	—	300
460	620	95	5	29292E	2290000	11900000	—	660
	710	150	6	29392E	4600000	21700000	—	430
	800	206	9.5	29492E	7150000	31500000	—	290
480	650	103	5	29296E	2530000	13200000	—	600
	730	150	6	29396E	4630000	21900000	—	410
	850	224	9.5	29496E	8250000	36000000	—	260
500	670	103	5	292500E	2590000	13800000	—	600
	750	150	6	293500E	4700000	22600000	—	410
	870	224	9.5	294500E	8250000	35000000	—	250
530	710	109	5	292530E	2820000	15100000	—	540

Note: For heavy load application, d_s should be large enough to support the shaft washer rib.



- Dynamic equivalent axial load

$$P_a = F_a + 1.2 F_r$$

- Static equivalent axial load

$$P_{0a} = F_a + 2.7 F_r$$

where, F_a : Axial load

F_r : Radial load

However $F_r/F_a \leq 0.55$ must be satisfied

Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d_i	D_i	B	B_i	C	A	d_a (min)	D_a (max)	r_a (max)	db_1 (max)	db_2 (max)		
262	223	15	45	24	104	225	245	2.0	—	—	8.50	29238E
308	246	27	74	38	110	250	275	3.0	—	—	25.5	29338E
360	271	41	111	55	117	275	320	4.0	—	—	61.4	29438E
271	236	15	45	24	108	235	255	2.0	—	—	9.08	29240E
325	261	29	81	41	116	265	295	3.0	—	—	32.0	29340E
380	286	43	117	59	122	290	335	4.0	—	—	73.0	29440E
292	254	15	45	24	117	260	275	2.0	—	—	9.84	29244E
345	280	29	81	41	125	285	315	3.0	—	—	34.5	29344E
400	308	43	117	58	132	310	355	5.0	—	—	74.2	29444E
330	283	19	57	30	130	285	305	2.0	—	—	17.1	29248E
365	300	29	81	41	135	300	330	3.0	—	—	36.3	29348E
420	326	43	117	59	142	330	375	5.0	—	—	83.0	29448E
350	302	19	57	30	139	305	325	2.0	—	—	18.5	29252E
405	329	32	91	45	148	330	365	4.0	—	—	51.5	29352E
460	357	48	127	64	154	360	405	5.0	—	—	106	29452E
370	323	19	57	30	150	325	345	2.0	—	—	19.5	29256E
423	348	32	91	46	158	350	390	4.0	—	—	54.0	29356E
495	387	52	140	68	166	390	440	5.0	—	—	137	29456E
405	353	21	69	38	162	355	380	2.5	—	—	31.0	29260E
460	379	37	105	50	168	380	420	4.0	—	—	75.4	29360E
515	402	52	140	70	175	410	460	5.0	—	—	146	29460E
430	372	21	69	38	172	375	400	2.5	—	—	32.8	29264E
482	399	37	105	53	180	400	440	4.0	—	—	80.0	29364E
555	435	55	149	75	191	435	495	6.0	—	—	179	29464E
445	395	21	69	37	183	395	420	2.5	—	—	34.5	29268E
520	428	41	117	59	192	430	470	4.0	—	—	106	29368E
590	462	61	164	82	201	465	530	6.0	—	—	228	29468E
485	423	25	81	44	194	420	455	3.0	—	—	50.4	29272E
540	448	41	117	59	202	450	495	4.0	—	—	111	29372E
610	480	61	164	82	210	485	550	6.0	—	—	234	29472E
505	441	27	81	42	202	440	475	3.0	—	—	52.8	29276E
580	477	44	127	63	216	480	525	5.0	—	—	140	29376E
640	504	63	168	85	230	510	575	6.0	—	—	263	29476E
526	460	27	81	42	212	460	490	3.0	—	—	55.1	29280E
596	494	44	127	64	225	500	550	5.0	—	—	146	29380E
680	534	67	178	89	236	540	610	6.0	—	—	314	29480E
564	489	30	91	46	225	490	525	4.0	—	—	74.9	29284E
626	520	48	135	68	235	525	575	5.0	—	—	170	29384E
700	556	67	178	89	244	560	630	6.0	—	—	325	29484E
585	508	30	91	49	235	510	545	4.0	—	—	79.0	29288E
655	548	49	140	70	245	550	600	5.0	—	—	192	29388E
745	588	74	199	100	260	595	670	8.0	—	—	421	29488E
605	530	30	91	46	245	530	570	4.0	—	—	80.9	29292E
685	567	51	144	72	257	575	630	5.0	—	—	216	29392E
765	608	74	199	100	272	615	690	8.0	—	—	435	29492E
635	556	33	99	55	259	555	595	4.0	—	—	97.5	29296E
705	590	51	144	72	270	595	650	5.0	—	—	224	29396E
810	638	81	216	108	280	645	730	8.0	—	—	543	29496E
654	574	33	99	55	268	575	615	4.0	—	—	101	292/500E
725	611	51	144	74	280	615	670	5.0	—	—	231	293/500E
830	661	81	216	107	290	670	750	8.0	—	—	559	294/500E
692	612	35	105	57	288	615	653	4.0	—	—	106	292/530E