

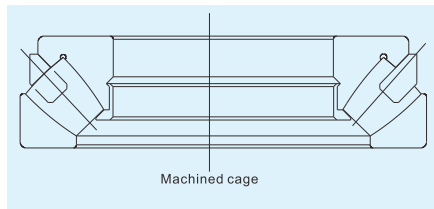
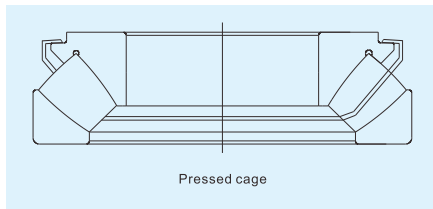
## Spherical thrust roller bearing

Spherical thrust roller bearings are separable type bearings. Components with roller cages and housing washers can be mounted respectively. They can be used under extremely heavy load and allow high rotation speed. The axial carrying capacity is large. They can also take certain radial load while taking axial load. But the radial load must be less than the 55 % of the axial load.

These bearings have slantingly arranged spherical rollers in spherical raceway, and have self-aligning capacity, which can compensate misalignment and shaft deflection. Roller end face and inner ring rib, cage and guide sleeve is sliding contact, where grease lubrication is not easy to reach, therefore, oil lubrication shall be adopted even for low speed rotation condition. Mainly used to hydro generator, vertical type motor, vessel use propeller shaft, whirl crane, machine tool banding wheel, reducer for rolling mill and rolling screw, shaper, etc.

### 1. Basic types

C&U provide reinforced spherical thrust roller bearings. Bearings' serial numbers are 292, 293 and 294 can take large allowable load. According to actual requirements, these cages are generally steel sheet pressed cages and machined solid cages.



### 2. Allowable misalignment angle

The allowable self-aligning angle of thrust spherical roller bearings is changeable according to the bearing dimension series. When load P and P<sub>s</sub> do not exceed 0.05C<sub>30</sub>, and shaft washer is rotating, their allowable misalignment angles are shown in the right table.

Small values are applicable for large bearings, furthermore, the allowable self-aligning angle decreases as the actual load applied to the bearing increases.

Bearing diameter series	Spherical angle
200 series	1° ~ 1.5°
300 series	1.5° ~ 2°
400 series	2° ~ 3°

### 3. Tolerance

The manufacturing tolerance of spherical thrust roller bearings is ordinary tolerance. See the explanation section Page A45.

### 4. Minimum axial load

For high-speed bearings, if axial load does not reach a specified minimum value, the running of the bearing will be slowed down by the inertial force of the rollers. The minimum axial load F<sub>amin</sub> is calculated by the following formula:

$$F_{amin} = \frac{C_{30}}{1400} + A_{s1} \left( \frac{D_s T_s n}{10^6} \right)^2$$

In the equations

C<sub>30</sub>: Static load rating KN (see bearing specification table)

A: Series related coefficients

292 series A=0.0027

293 series A=0.0031

294 series A=0.0021

D: Housing washer outer diameter mm

T: Total height mm

n: Maximum rotation speed r/min

If the external force and the weight of the supported machine part are smaller than the minimum load, the additional load must be applied to the bearing, for example by using spring.

### 5. Dynamic equivalent load

When  $F_r \leq 0.55F_s$ ,  $P = F_s + 0.2F_r$  (KN)

### 6. Static equivalent load

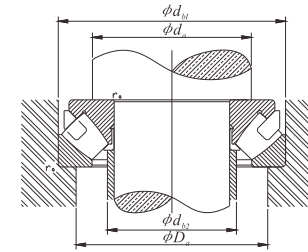
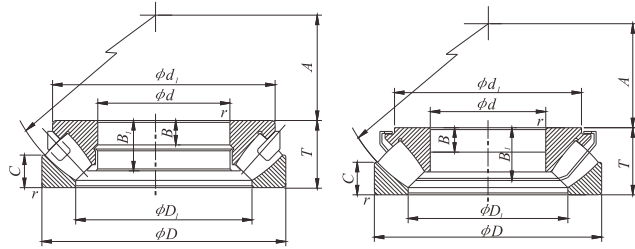
When  $F_r \leq 0.55F_s$ ,  $P = F_s + 2.7F_r$  (KN)

Thrust spherical roller bearing's static load coefficient f<sub>s</sub> is selected according to the following conditions:

$F_s \geq 8$  Supported by shaft shoulder in axial direction, mounting dimension follow the value in Page B178 (d. and D<sub>s</sub>)

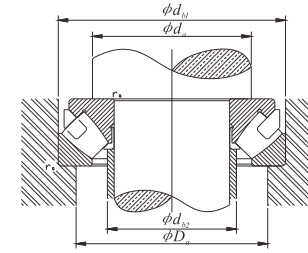
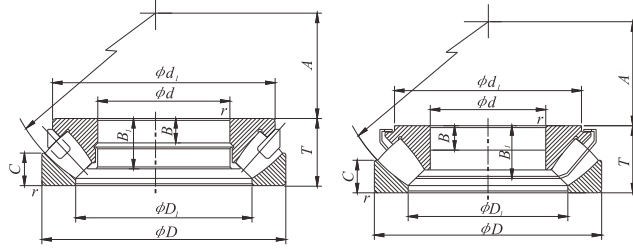
$F_s \geq 6$  The axial support of housing washer and shaft washer is supported completely by the entire matching surface (D<sub>1</sub> and D<sub>1</sub>)

$F_s \geq 4$  Complete axial direction support (d. and D<sub>1</sub>), simultaneously with sufficient radial support from housing washer (bearing housing tolerance k<sub>r</sub>)



d 60~170 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)	Nominal numbers	Nominal numbers (old)	Reference dimensions						Mounting dimensions (mm)					Reference mass (kg)
d	D	T	r (Min)	C <sub>o</sub>	C <sub>or</sub>	Oil			d <sub>1</sub>	D <sub>1</sub>	B	B <sub>1</sub>	C	A	d <sub>o</sub> Min	D <sub>o</sub> Max	d <sub>oi</sub> Min	d <sub>o2</sub> Max	r <sub>o</sub> Max	
<b>60</b>	130	42	1.5	335	900	2,600	<b>29412</b>	<b>9039412</b>	115	88	15	36	20	38	90	107	133	70	1.5	2.400
<b>65</b>	140	45	2.0	380	1020	2,400	<b>29413</b>	<b>9039413</b>	125	94	16	38	21	42	100	115	143	73	2.0	3.030
<b>70</b>	150	48	2.0	430	1200	2,400	<b>29414</b>	<b>9039414</b>	135	102	17	40	23	44	105	124	153	80	2.0	3.710
<b>75</b>	160	51	2.0	490	1370	2,200	<b>29415</b>	<b>9039415</b>	140	108	18	43	24	47	115	132	163	86	2.0	4.400
<b>80</b>	170	54	2.1	550	1560	2,000	<b>29416</b>	<b>9039416</b>	150	116	19	45	26	50	120	141	173	91	2.1	5.280
<b>85</b>	150 180	39 58	1.5 2.1	345 600	1060 1730	2,400 1,900	<b>29317</b> <b>29417</b>	<b>9039317</b> <b>9039417</b>	135 160	111 123	14 21	33 48	19 28	50 54	115 130	129 150	153 183	93 97	1.5 2.1	2.540 5.890
<b>90</b>	155 190	39 60	1.5 2.1	355 670	1100 1930	2,200 1,800	<b>29318</b> <b>29418</b>	<b>9039318</b> <b>9039418</b>	140 170	115 130	14 22	33 50	19 29	52 56	118 135	135 158	158 193	99 103	1.5 2.1	2.650 7.380
<b>100</b>	170 210	42 67	1.5 3.0	415 830	1370 2450	2,000 1,600	<b>29320</b> <b>29420</b>	<b>9039320</b> <b>9039420</b>	155 185	129 142	15 24	36 55	20.8 32	58 62	132 150	148 175	173 214	109 112	1.5 2.5	3.380 10.000
<b>110</b>	190 230	48 73	2.0 3.0	530 950	1700 2800	1,800 1,500	<b>29322</b> <b>29422</b>	<b>9039322</b> <b>9039422</b>	175 205	142 158	17 26	41 60	23 35	64 69	145 165	165 192	193 234	119 125	2.0 2.5	5.040 13.100
<b>120</b>	210 250	54 78	2.1 4.0	640 1120	2080 3350	1,600 1,400	<b>29324</b> <b>29424</b>	<b>9039324</b> <b>9039424</b>	190 220	158 172	19 28	46 64	26 37	70 74	160 180	182 210	213 254	132 135	2.1 3.0	6.900 16.300
<b>130</b>	225 270	58 85	2.1 4.0	720 1250	2360 3900	1,500 1,200	<b>29326</b> <b>29426</b>	<b>9039326</b> <b>9039426</b>	205 240	169 187	21 31	49 69	28 41	76 81	170 195	195 227	228 275	141 151	2.1 3.0	8.490 12.900
<b>140</b>	240 280	60 85	2.1 4.0	800 1290	2700 4050	1,400 1,200	<b>29328</b> <b>29428</b>	<b>9039328</b> <b>9039428</b>	220 250	181 194	22 31	51 69	29 41	82 86	185 205	208 237	244 285	152 158	2.1 3.0	9.870 21.900
<b>150</b>	250 300	60 90	2.1 4.0	815 1460	2850 4800	1,400 1,100	<b>29330</b> <b>29430</b>	<b>9039330</b> <b>9039430</b>	230 270	192 211	22 32	51 74	29 44	87 92	195 220	220 253	254 306	163 171	2.1 3.0	10.500 26.900
<b>160</b>	270 320	67 95	3.0 5.0	965 1660	3350 5300	1,300 1,100	<b>29332</b> <b>29432</b>	<b>9039322</b> <b>9039432</b>	245 285	206 224	24 34	56 78	32 45	92 99	210 230	236 271	274 326	174 181	2.5 4.0	13.600 31.600
<b>170</b>	280 340	67 103	3.0 5.0	1000 1860	3450 6000	1,200 1,000	<b>29334</b> <b>29434</b>	<b>9039334</b> <b>9039434</b>	255 305	215 239	24 37	57 84	32 50	96 104	220 245	247 288	284 346	184 191	2.5 4.0	14.200 39.200



*d* 180~240 mm

Boundary dimensions (mm)	Basic load ratings (kN)		Limiting speeds (r/min)	Nominal numbers	Nominal numbers (old)	Reference dimensions						Mounting dimensions (mm)					Reference mass (kg)	
	<i>d</i>	<i>D</i>				<i>T</i>	<i>r</i> (Min)	<i>C<sub>o</sub></i>	<i>C<sub>or</sub></i>	<i>d<sub>1</sub></i>	<i>D<sub>1</sub></i>	<i>B</i>	<i>B<sub>1</sub></i>	<i>C</i>	<i>A</i>	<i>d<sub>s</sub></i> Min		<i>D<sub>s</sub></i> Max
<b>180</b>	300	73	3.0			275	230	26	61	35	103		235	263	304	193	2.5	18.10
	360	109	5.0		<b>29336</b> <b>29436</b>	<b>9039366</b> <b>9039436</b>	320	253	39	89	52	110	260	305	366	202	4.0	46.20
<b>190</b>	320	78	4.0			295	243	28	66	38	110		250	281	325	206	3.0	22.80
	380	115	5.0		<b>29338</b> <b>29438</b>	<b>9039338</b> <b>9039438</b>	340	268	41	94	55	117	275	322	386	214	4.0	54.90
<b>200</b>	280	48	2.0			265	236	17	—	24	108		235	258	284	211	2.0	8.150
	340	85	4.0		<b>29240</b> <b>29340</b> <b>29440</b>	<b>9039240</b> <b>9039340</b> <b>9039440</b>	310	258	31	71	41	116	265	298	348	215	3.0	28.00
	400	122	5.0				360	282	44	99	59	122	290	338	406	225	4.0	64.70
<b>220</b>	300	48	2.0			285	254	17	—	24	117		260	277	304	229	2.0	9.180
	360	85	4.0		<b>29244</b> <b>29344</b> <b>29444</b>	<b>9039244</b> <b>9039344</b> <b>9039344</b>	330	279	—	71	41	125	285	316	368	235	3.0	29.90
	420	122	6.0				375	303	—	99	58	132	310	360	428	243	5.0	67.40
<b>240</b>	340	60	2.1			320	282	22	—	30	130		285	311	344	251	2.1	16.10
	380	85	4.0		<b>29248</b> <b>29348</b> <b>29448</b>	<b>9039248</b> <b>9039348</b> <b>9039448</b>	350	299	—	71	41	135	300	337	390	256	3.0	32.50
	440	122	6.0				400	321	—	99	59	142	330	381	448	265	5.0	73.50