

FAG Angular Contact Thrust Ball Bearings

single direction



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single direction · Basic design · Tolerances

Single direction angular contact thrust ball bearings are precision bearings with narrow tolerances and are intended for ball screw and nut assemblies for machine tool applications. The bearings are characterized by great rigidity, low friction, and suitability for high speeds at fast changes of position. They are not separable.

With a contact angle of 60° FAG single direction angular contact thrust ball bearings can transmit high axial loads. They can also accommodate low radial loads. Like all angular contact ball bearings, they can accommodate axial loads in only one direction.

Basic design

The boundary dimensions of single direction FAG angular contact thrust ball bearings are in accordance with the dimensional plan of DIN 616. They are made in series 7602 and 7603 for shaft diameters of 12 to 100 mm. FAG also supplies the narrow series BSB, see FAG publication no. AC 41 130.

Tolerances

The FAG single direction angular contact thrust ball bearings are machined to the close tolerances of ISO tolerance class P4. The diameter tolerances correspond to those of radial bearings, and the axial runout corresponds to the tolerance values for the wall thickness variations of thrust bearings. Recommendations for the machining tolerances of the bearing seats are given in the FAG publ. no. AC 41 130.



7602, 7603

▼ Tolerances of single direction angular contact thrust ball bearings, series 7602 and 7603

		Dimensions in mm						
Nominal bore diameter and nominal outside diameter	over to	30	30 50	50 80	80 120	120 150	150 180	180 250
		Values in μm						
Bore deviation	Δ_{dmp}	-5 0	-6 0	-7 0	-8 0			
O.D. deviation	Δ_{Dmp}		0 -6	0 -7	0 -8	0 -9	0 -10	0 -11
Width deviation (of the inner ring)	Δ_{Bs}	0 -250	0 -250	0 -250	0 -380			
Axial runout of the inner ring	S_{ia}	2	2	3	3			
Axial runout of the outer ring	S_{ea}		2	3	3	4	4	4

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single direction · Bearing arrangement · Rigidity and preload · Cage · Lubrication · Speed suitability · Friction

Bearing arrangement

Single direction angular contact thrust ball bearings are preferably mounted in pairs or in groups. The width tolerances of the bearing rings permit the matching of identically sized bearings directly side by side in pairs or groups (universal bearings). O and X arranged bearing pairs and groups have a defined preload.

Rigidity and preload

The rigidity incorporated in single direction angular contact thrust ball bearings is due to their internal design and preload. Two bearings mounted side by side in O arrangement or in X arrangement automatically have a defined high preload (preloading force F_p ; see dimension tables). The preload and rigidity of the bearing arrangement are increased by lining up several bearings at one bearing location.

Cage

The bearings have a ball-riding, moulded window-type cage of glass-fibre reinforced polyamide (suffix TVP). This cage allows a large number of balls to be fitted. The good sliding properties of the cage material and the shape of the cage pockets which favours lubrication, contribute to the low-friction running of the bearings. See page 85 for the temperature limits of application of the polyamide cage.

Lubrication

FAG single direction angular contact thrust ball bearings can be lubricated either with grease or with oil. Grease lubrication is preferred as it is more convenient and sealing is simpler. Lithium soap base greases with EP additives, e.g. the FAG grease Arcanol L135V have proven to be suitable.

Speed suitability

The speeds admissible for grease lubrication are listed in the tables. The indicated values apply to bearing pairs in O arrangement or X arrangement. If the bearings are mounted in groups of three or four the values must be reduced, see table below.

▼ Speed reduction at varying bearing arrangements	
Bearing arrangement	Speed reduction
	$0.7 \cdot n^*$
	$0.85 \cdot n^*$
	$0.65 \cdot n^*$

* attainable speeds from the dimension tables

Friction

FAG angular contact thrust ball bearings are low-friction bearings. Therefore, only little drive energy is required. The tables on pages 472 to 475 list recommended moments of friction. The values indicated apply to single bearings. The overall moment of friction of bearing groups is obtained by multiplying the frictional moment of the single bearing with the number of bearings of the group.

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single direction · Equivalent loads · Suffix · Abutment dimensions

Equivalent dynamic load

The equivalent dynamic load P is obtained by means of the axial force F_a from the equation

$$P = F_a \quad [\text{kN}]$$

The angular contact thrust ball bearings listed in this catalogue are not suitable for radial loads $F_r > 0,47 F_a$. Smaller radial loads F_r are not taken into account in determining the equivalent dynamic load.

Equivalent static load

Under static operating conditions, i.e. when they are stationary, single direction angular contact thrust ball bearings can accommodate higher loads than under dynamic operating conditions. However, the static load must not be so high that plastic deformations result which would impair the quietness of running of the bearings. Therefore, the index of static stressing f_s should not be less than 2.5.

$$f_s = C_0 \cdot i / P_0$$

C_0 static load rating [kN]
see bearing tables

i number of bearings carrying the axial load

P_0 equivalent static load [kN]

$P_0 = F_a$ [kN]

Suffix

TVP solid window-type cage of glass-fibre reinforced polyamide, ball riding

Abutment dimensions

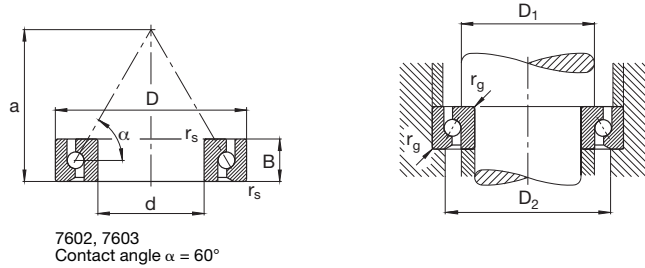
See page 123 for general information on the abutment dimensions.

The tables list the maximum fillet radius r_g and the diameters of the abutment shoulders.

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Rolling bearings can be fail-safe if $C_0/P_0 \geq 8$, see page 41.



Shaft	Dimensions					Mass ≈ kg	Load rating		Max. axial load dyn. kN	Attainable speed Grease min ⁻¹	Preload F _v kN	Frictional moment M _r Nmm	Code Bearing FAG	Abutment dimensions		
	d mm	D	B	r _s min	a ≈		dyn. C kN	stat. C ₀						D ₁ mm	D ₂ mm	r _g max
12	12	32	10	0.6	24	0.042	11.6	12.5	5.2	8000	1.4	15	7602012TVP	17	27	0.6
15	15	35	11	0.6	27.5	0.052	12.5	15	6.3	6700	1.3	20	7602015TVP	20.5	30	0.6
17	17	40	12	0.6	31	0.074	16.6	20	8.5	6000	1.7	30	7602017TVP	23	34.5	0.6
20	20	47	14	1	36	0.139	19.6	25.5	10.6	5000	2.3	50	7602020TVP	27.5	39.5	1
	20	52	15	1.1	39.5	0.17	24.5	32	14	4500	2.9	60	7603020TVP	30.5	43.5	1
25	25	52	15	1	41	0.147	22	30.5	13.2	4500	2.5	65	7602025TVP	32	45	1
	25	62	17	1.1	47.5	0.275	28.5	41.5	18	3800	3.3	85	7603025TVP	38	52	1
30	30	62	16	1	48	0.232	26	39	17	3800	2.9	85	7602030TVP	39.5	52.5	1
	30	72	19	1.1	55.5	0.409	34.5	55	23.6	3200	4.3	130	7603030TVP	45	61	1
35	35	72	17	1.1	55	0.339	30	50	21.2	3200	3.3	115	7602035TVP	46.5	60.5	1
	35	80	21	1.5	61.5	0.546	36.5	61	26.5	3000	4.8	170	7603035TVP	51	67	1.5
40	40	80	18	1.1	62.5	0.418	37.5	64	28	2800	4.3	170	7602040TVP	53.5	69.5	1
	40	90	23	1.5	68.5	0.751	50	83	35.5	2600	5.6	225	7603040TVP	56.5	75.5	1.5
45	45	85	19	1.1	66	0.488	38	68	28	2600	4.5	190	7602045TVP	57	73	1
	45	100	25	1.5	77.5	0.992	58.5	104	45	2200	7	300	7603045TVP	64.5	85.5	1.5
50	50	90	20	1.1	71.5	0.557	39	75	31.5	2400	4.9	230	7602050TVP	63	79	1
	50	110	27	2	85.5	1.29	69.5	127	53	2000	7.6	360	7603050TVP	72	94	2
55	55	100	21	1.5	77.5	0.74	40.5	81.5	33.5	2200	4.6	250	7602055TVP	69.5	85.5	1.5
	55	120	29	2	91.5	1.67	80	146	63	1900	8.8	460	7603055TVP	77	101	2
60	60	110	22	1.5	86	0.94	56	112	47.5	2000	6.5	350	7602060TVP	77	96	1.5
	60	130	31	2.1	98	2.08	88	166	75	1800	10	540	7603060TVP	82.5	107.5	2.1
65	65	120	23	1.5	92.5	1.19	57	122	50	1800	7	410	7602065TVP	84	103	1.5
	65	140	33	2.1	107.5	2.58	100	196	90	1600	12	700	7603065TVP	91.5	118.5	2.1
70	70	125	24	1.5	96.5	1.3	65.5	137	56	1800	7	440	7602070TVP	87	108	1.5
	70	150	35	2.1	113	3.16	110	220	95	1600	12	760	7603070TVP	95.5	124.5	2.1
75	75	130	25	1.5	102.5	1.42	67	150	63	1600	7.6	480	7602075TVP	93.5	114.5	1.5
	75	160	37	2.1	123	3.74	125	255	118	1400	15	920	7603075TVP	105.5	135.5	2.1

