4. BALL SCREW SUPPORT BEARINGS

Angular Contact Thrust Ball Bearings for Ball Screw Support

Features

High precision angular contact thrust ball bearings to support precision ball screws, have better performance than earlier combinations of angular contact ball bearings or combinations using thrust bearings. They are especially suitable for high precision machine-tool feeding mechanisms and similar applications.

TAC B Series (Machine Tool Applications)

The axial rigidity is high because of a large number of balls and a contact angle of 60°. Compared with tapered roller bearings of cylindrical roller bearings, this type has lower starting torque; so smoother rotation is possible with less driving force.

TAC B series bearings incorporate NSK's recently developed molded polyamide resin cage. In addition, using extra-pure (EP) steel for the inner and outer rings has further enhanced service life. Our EP steel is manufactured by controlling the amount of harmful oxide inclusions, which eliminates large size inclusions and enjoys higher purity than vacuum arc remelted (VAR) steel.
This series with "DG" seal, low torque contact seal, with "WPH" grease, an waterproof grease, increase the reliability and provide for easy handling.

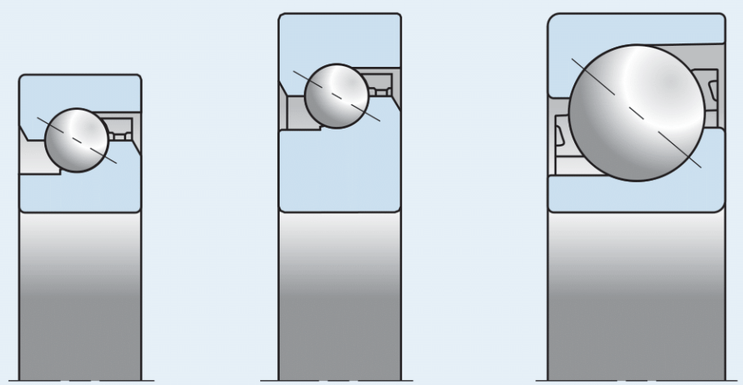
TAC02 and 03 Series (Electric Injection Molding Machines)

TAC02 and 03 series are angular contact ball bearings that provide support for large size ball screws operating under a heavy load from the driving mechanism of electric injection molding machines. Low torque is achieved by optimum design of the ball bearings. Users can significantly reduce bearing torque by replacing their roller bearings with these series.

TAC B and TAC02, 03 Differences

Electric injection molding machines produce a heavier load on ball screw support bearings than that of machine tools. TAC02 and 03 bearings are designed to operate under such heavy load conditions. Conversely, TAC B bearings are designed for increased permissible load by increasing the number of balls and bearing width.

Fig. 4.1



55TAC100B (TAC B series) | 55TAC120B (TAC B series) | 55TAC03A (TAC02, 03 series)

Numbering System of Angular Contact Thrust Ball Bearings for Ball Screw Support (Machine Tool Applications)

(Bearing number example) 30 TAC 62 B DF C10 PN7A

- 30: Nominal bore diameter
- TAC: Bearing type symbol
- 62: Nominal outer diameter
- B: Internal design symbol
- DF: Arrangement symbol
- C10: Preload symbol
- PN7A: Accuracy symbol

			Reference pages
30	Nominal bore diameter	Bore diameter (mm)	110-111
TAC	Bearing type	Angular contact thrust ball bearing; 60° contact angle	30, 108
62	Nominal outer diameter	Outer diameter (mm)	110-111
B	Internal design		–
	Seal	No symbol: open type DDG: contact rubber seal (1)	30
DF	Arrangement	SU: universal arrangement (single row) DU: universal arrangement (double row) DB: Back-to-back arrangement DF: Face-to-face arrangement DT: tandem arrangement DBD, DFD, DTD: triplex set arrangement DBB, DFF, DBT, DFT, DTT: quadruplex set arrangement	148-151
C10	Preload	C10: standard preload C9: light preload (low torque specification)	152-155, 168
PN7A	Accuracy	PN7A: standard accuracy (Equivalent to ISO Class 4) PN7B: special accuracy (Bore diameter and outside diameter are exclusive to NSK. Equivalent to ISO Class 4. For SU arrangement only.)	183

(1) Sealed angular contact ball bearings for ball screw support are standardized for SU arrangement and PN7B accuracy.

Numbering System of Angular Contact Thrust Ball Bearings for Ball Screw Support (Electric Injection Molding Machines)

(Bearing number example) 30 TAC 02 A T85 SU M PN5D

- 30: Nominal bore diameter
- TAC: Bearing type symbol
- 02: Dimension series symbol
- A: Internal design symbol
- T85: Cage symbol
- SU: Arrangement symbol
- M: Preload symbol
- PN5D: Accuracy symbol

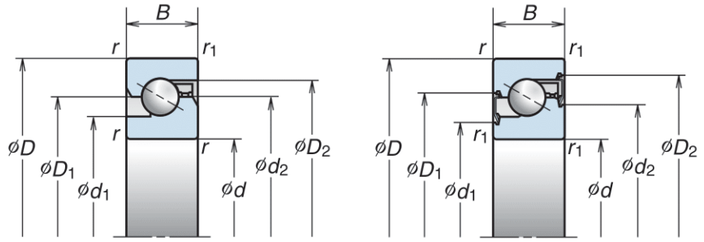
			Reference pages
30	Nominal bore diameter	Bore diameter (mm)	112-113
TAC	Bearing type	Angular contact thrust ball bearing; 60° contact angle	31, 108
02	Dimension series	02: 02 series, 03: 03 series	108
A	Internal design		–
T85	Cage	T85: polyamide resin cage M: machined brass cage	18-19
SU	Arrangement	SU: universal arrangement (single row)	148-151
M	Preload	M: standard preload	152-155, 168
PN5D	Accuracy	PN5D: standard accuracy (Equivalent to ISO Class 5)	183

4. BALL SCREW SUPPORT BEARINGS

For Machine Tool Applications

TAC B Series

Bore Diameter 15-60 mm



Open type

Sealed type DDG

(Open type)

Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)				Recommended Grease Quantities (cc)	Limiting Speeds (1) (min⁻¹)	
	d	*D*	*B*	*r* (min)	r_1 (min)	d_1	d_2	D_1	D_2		Grease	Oil
15 TAC 47B	**15**	**47**	**15**	1.0	0.6	27.2	34	34	39.6	2.2	6 000	8 000
17 TAC 47B	**17**	**47**	**15**	1.0	0.6	27.2	34	34	39.6	2.2	6 000	8 000
20 TAC 47B	**20**	**47**	**15**	1.0	0.6	27.2	34	34	39.6	2.2	6 000	8 000
25 TAC 62B	**25**	**62**	**15**	1.0	0.6	37	45	45	50.7	3.0	4 500	6 000
30 TAC 62B	**30**	**62**	**15**	1.0	0.6	39.5	47	47	53.2	3.2	4 300	5 600
35 TAC 72B	**35**	**72**	**15**	1.0	0.6	47	55	55	60.7	3.8	3 600	5 000
40 TAC 72B	**40**	**72**	**15**	1.0	0.6	49	57	57	62.7	3.9	3 600	4 800
40 TAC 90B	**40**	**90**	**20**	1.0	0.6	57	68	68	77.2	8.8	3 000	4 000
45 TAC 75B	**45**	**75**	**15**	1.0	0.6	54	62	62	67.7	4.2	3 200	4 300
45 TAC 100B	**45**	**100**	**20**	1.0	0.6	64	75	75	84.2	9.7	2 600	3 600
50 TAC 100B	**50**	**100**	**20**	1.0	0.6	67.5	79	79	87.7	10.2	2 600	3 400
55 TAC 100B	**55**	**100**	**20**	1.0	0.6	67.5	79	79	87.7	10.2	2 600	3 400
55 TAC 120B	**55**	**120**	**20**	1.0	0.6	82	93	93	102.2	12	2 200	3 000
60 TAC 120B	**60**	**120**	**20**	1.0	0.6	82	93	93	102.2	12	2 200	3 000

Basic Dynamic Load Rating C_a			Limiting Axial Load (2)			Mass (kg)
Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT	Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT	(approx)
(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	
21.9	35.5	47.5	26.6	53.0	79.5	0.144
21.9	35.5	47.5	26.6	53.0	79.5	0.144
21.9	35.5	47.5	26.6	53.0	79.5	0.135
28.5	46.5	61.5	40.5	81.5	122	0.252
29.2	47.5	63.0	43.0	86.0	129	0.224
31.0	50.5	67.0	50.0	100	150	0.310
31.5	51.5	68.5	52.0	104	157	0.275
59.0	95.5	127	89.5	179	269	0.674
33.0	53.5	71.0	57.0	114	170	0.270
61.5	100	133	99.0	198	298	0.842
63.0	102	136	104	208	310	0.778
63.0	102	136	104	208	310	0.714
67.5	109	145	123	246	370	1.230
67.5	109	145	123	246	370	1.160

(Sealed type)

Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)				Limiting Speeds (1) (min⁻¹)
	d	*D*	*B*	*r* (min)	r_1 (min)	d_1	d_2	D_1	D_2	Grease
15 TAC 47B DDG	**15**	**47**	**15**	1.0	0.6	25.1	30.8	36	41.8	6 000
17 TAC 47B DDG	**17**	**47**	**15**	1.0	0.6	25.1	30.8	36	41.8	6 000
20 TAC 47B DDG	**20**	**47**	**15**	1.0	0.6	25.1	30.8	36	41.8	6 000
25 TAC 62B DDG	**25**	**62**	**15**	1.0	0.6	34.3	40.5	46.5	52.9	4 500
30 TAC 62B DDG	**30**	**62**	**15**	1.0	0.6	36.8	43	49	55.4	4 300
35 TAC 72B DDG	**35**	**72**	**15**	1.0	0.6	44.3	50.5	56.5	62.9	3 600
40 TAC 72B DDG	**40**	**72**	**15**	1.0	0.6	46.3	52.5	58.5	64.9	3 600
40 TAC 90B DDG	**40**	**90**	**20**	1.0	0.6	54	64	70	79.4	3 000
45 TAC 100B DDG	**45**	**100**	**20**	1.0	0.6	61	71	77	86.4	2 600

Basic Dynamic Load Rating C_a			Limiting Axial Load (2)			Mass (kg)
Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT	Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT	(approx)
(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	
21.9	35.5	47.5	26.6	53.0	79.5	0.144
21.9	35.5	47.5	26.6	53.0	79.5	0.144
21.9	35.5	47.5	26.6	53.0	79.5	0.135
28.5	46.5	61.5	40.5	81.5	122	0.252
29.2	47.5	63.0	43.0	86.0	129	0.224
31.0	50.5	67.0	50.0	100	150	0.310
31.5	51.5	68.5	52.0	104	157	0.275
59.0	95.5	127	89.5	179	269	0.674
61.5	100	133	99.0	198	298	0.842

(1) Limiting speeds are based on C10 preload. In case of C9 preload, the figures become 1.3 times of the figures listed above. Also, the figures are free of the influence arrangement type.

Note: Bearing type TAC B: nominal contact angle 60°

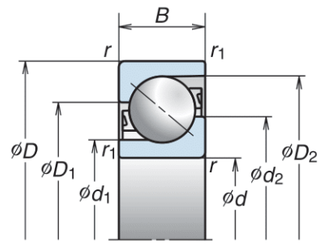
(2) Permissible axial load equals 0.7 times of limiting axial load.

4. BALL SCREW SUPPORT BEARINGS

For Electric Injection Molding Machines

TAC02 and 03 Series

Bore Diameter 15-120 mm



Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)				Recommended Grease Quantities (cc)	Contact angle (Degree)	Limiting Speeds (1) (min⁻¹)	
	d	*D*	*B*	*r* (min)	r_1 (min)	d_1	d_2	D_1	D_2			Grease	Oil
15TAC02AT85	**15**	**35**	**11**	0.6	0.3	19.5	23.5	26.5	31.9	0.98	50	8 000	10 000
25TAC02AT85	**25**	**52**	**15**	1.0	0.6	30.5	36.6	40.4	47.4	3	50	5 100	7 000
TAC35-2T85	**35**	**90**	**23**	1.5	1.0	49.7	61.4	68.6	81.9	15	50	3 000	4 100
40TAC03AT85	**40**	**90**	**23**	1.5	1.0	49.7	61.4	68.6	81.9	15	50	3 000	4 100
45TAC03AT85	**45**	**100**	**25**	1.5	1.0	55.8	68.6	76.4	91.0	19	50	2 700	3 700
TAC45-2T85	**45**	**110**	**27**	2.0	1.0	60.3	75.6	84.5	100.9	27	50	2 500	3 300
50TAC03AT85	**50**	**110**	**27**	2.0	1.0	60.3	75.6	84.5	100.9	27	50	2 500	3 300
55TAC03AT85	**55**	**120**	**29**	2.0	1.0	67.1	82.7	92.3	110.1	32	50	2 200	3 000
60TAC03AT85	**60**	**130**	**31**	2.1	1.1	72.1	89.8	100.2	119.4	54	50	2 100	2 800
80TAC03AM	**80**	**170**	**39**	2.1	1.1	94.0	118.5	131.5	152.5	82	50	1 500	2 100
100TAC03CMC	**100**	**215**	**47**	3.0	1.1	122.5	156.9	158.1	188.1	120	55	1 200	1 600
120TAC03CMC	**120**	**260**	**55**	3.0	1.1	153.0	189.3	190.7	223.5	170	55	1 000	1 300

(1) Limiting speeds listed on this page are based on a standard preload (M).
Also, the figures are free of the influence arrangement type.

Dynamic Axial Load Rating C_a			Limiting Axial Load (2)		
Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT	Single Row Load DF, DB	Double Row Load DT, DFD, DBD, DFF, DBB	Triple Row Load DTD, DFT, DBT
(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
18.8	30.5	40.5	11.5	22.9	34.5
33.5	54.5	72.0	22.7	45.5	68.0
102	166	220	75.5	151	226
102	166	220	75.5	151	226
120	195	259	91.5	183	274
150	243	325	116	232	350
150	243	325	116	232	350
171	278	370	133	266	400
196	320	425	152	305	455
274	445	590	238	475	715
365	595	795	231	460	690
430	700	930	295	590	885

(2) Permissible axial load equals 0.7 times of limiting axial load.

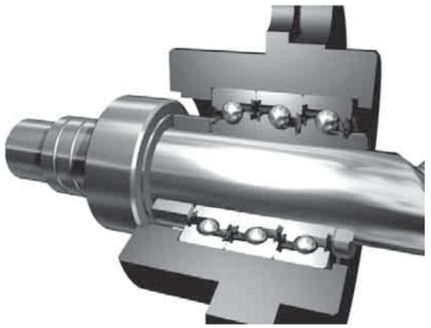
4. BALL SCREW SUPPORT BEARINGS

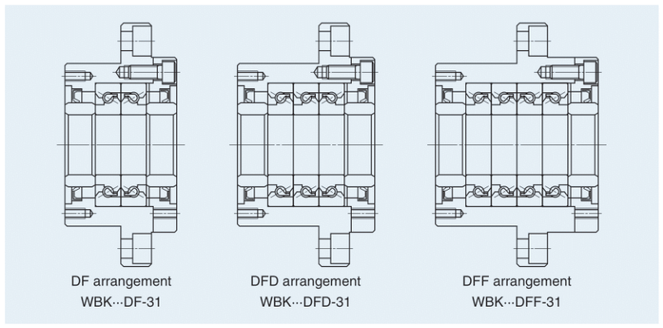
Units for Ball Screw Support

The support unit for heavy-load machine tools employs a high precision, high rigidity Angular contact thrust ball bearing for Ball Screw Support (TAC Series), which is structured to function optimally as a support bearing for a ball screw. Three types of arrangements are available, as described in the figure below:

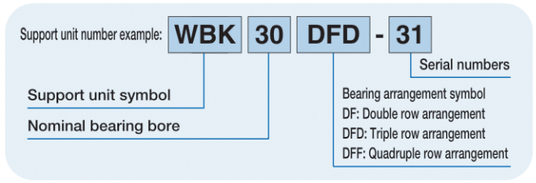
Features

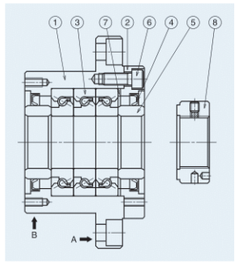
- The dust-resistant design allows a user to easily design support side of ball screw.
- Since a preload-controlled bearing is incorporated into the support unit, the process of mounting a bearing can be omitted.





Numbering system of support units

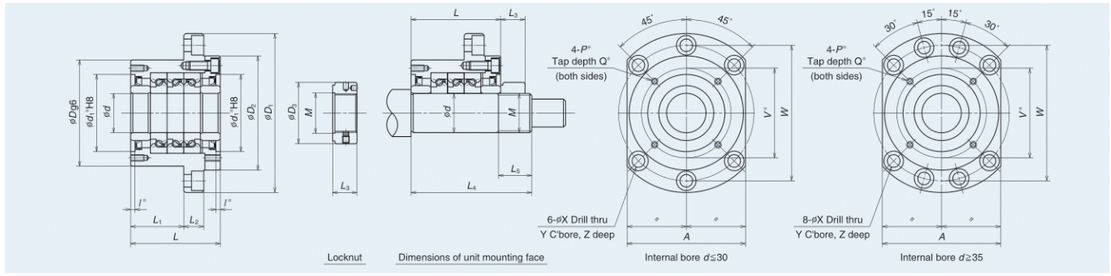




Components of support unit

Part No.	Name of Part	Quantities
①	Housing	1
②	Retaining cover	1
③	Angular contact thrust ball bearings for Ball Screw Support	1 set
④	Dust seal	2
⑤	Collar	2
⑥	Preload securing bolt	6 or 8
⑦	Shim	1 set
⑧	Locknut	1

1. Use datum faces A and B to mount the support unit to a machine base.
2. Do not try to disassemble the NSK Support Unit because its preload is adjusted with high precision and the components of numbers ①, ②, ③, ④, ⑥ and ⑦ are integrated into a single piece.
3. Grease is packed in the bearing.
4. Locknut ⑧ is designed specifically for ball screws with its perpendicularities controlled against the triangular thread of the screw.
   To prevent loosening, tighten the locknut using turn-preventive small screws.
   The locknut is also available separately. For Angular contact thrust ball bearings for Ball Screw Support, please refer to Page 110.



Unit: mm

Support Unit Numbers	Support Unit Parts																
	d	*D*	D_1	D_2	*L*	L_1	L_2	*A*	*W*	*X*	*Y*	*Z*	D_1*	*l* *	*V* *	*P* *	*Q* *
WBK17DF-31	17	70	106	72	60	32	15	80	88	9	14	8.5	45	3	58	M5	10
WBK20DF-31	20	70	106	72	60	32	15	80	88	9	14	8.5	45	3	58	M5	10
WBK25DF-31	25	85	130	90	66	33	18	100	110	11	17.5	11	57	4	70	M6	12
WBK25DFD-31					81	48											
WBK30DF-31	30	85	130	90	66	33	18	100	110	11	17.5	11	57	4	70	M6	12
WBK30DFD-31					81	48											
WBK35DF-31	35	95	142	102	66	33	18	106	121	11	17.5	11	69	4	80	M6	12
WBK35DFD-31					81	48											
WBK35DFF-31					96	48											
WBK40DF-31	40	95	142	102	66	33	18	106	121	11	17.5	11	69	4	80	M6	12
WBK40DFD-31					81	48											
WBK40DFF-31					96	48											

Basic dynamic load rating	Limiting Axial Load	Preload	Axial Rigidity	Starting torque	Locknut			Bearing seat for unit		
C_a (N)	(N)	(N)	(N/μm)	(N·cm)	*M*	D_3	L_3	*d*	L_4	L_5
21 900	26 600	2 150	750	14.0	M17×1	37	18	17	81	23
21 900	26 600	2 150	750	14.0	M20×1	40	18	20	81	23
28 500	40 500	3 150	1 000	23.0	M25×1.5	45	20	25	89	26
46 500	81 500	4 300	1 470	31.0					104	
29 200	43 000	3 350	1 030	24.0	M30×1.5	50	20	30	89	26
47 500	86 000	4 500	1 520	33.0					104	
31 000	50 000	3 800	1 180	28.0	M35×1.5	55	22	35	92	30
50 500	100 000	5 200	1 710	37.0					107	
50 500	100 000	7 650	2 350	55.0					122	
31 500	52 000	3 900	1 230	28.0	M40×1.5	60	22	40	92	30
51 500	104 000	5 300	1 810	38.0					107	
51 500	104 000	7 800	2 400	57.0					122	

Remarks: 1. Rigidity:
Rigidity values in the table show theoretical values calculated from elastic displacement between grooves and steel balls.
2. Starting torque:
Starting torque in the table shows starting torque necessary for a preloaded bearing, not including seal torque.
3. Tolerance of Shaft Outer Diameter at the bearing seat for unit:
h5 Class is recommended for the Shaft Outer Diameter at the bearing seat for unit.

Remarks: 4. Dimensions marked with *
The spigot and screw parts marked with * are used for mounting a seal unit for the NSK standard hollow ball screw shaft as well as for mounting a dust cover and damper.
5. Because grease is packed in the bearing, it can be used immediately as is.