

B-3-2.5 Accessories

Accessories to use with ball screw are available in stock.

Table 1 Support unit categories

Application	Shape	Support side	Bearing in use	Bearing bore seat diameter	Page
Small equipment, light load	Square	Fixed support side	Angular contact ball bearing	$\phi 6 - \phi 25$	B439 -
			Deep groove ball bearing	$\phi 6 - \phi 25$	B443 -
		side	Deep groove ball bearing	$\phi 12, \phi 15$ (Exclusive for VFA Type)	B446

① Classification

Ball screw support units are classified into categories by their shape (Table 1). Select the type that is appropriate for you to use.

Application	Shape	Support side	Bearing in use	Bearing bore seat diameter	Page
Small equipment, light load	Round	Fixed support	Deep groove ball bearing (arranged to have angular contact)	$\phi 4, \phi 6$ (Exclusive for RMA and RMS Type)	B445
		side	Angular contact ball bearing	$\phi 6 - \phi 25$	B441 -
Machine tools, heavy load	Round	Fixed support side	Thrust angular contact ball bearing	$\phi 17 - \phi 40$	B451 -

② Features

- Short delivery time: Standardized items in stock
- Bearings and seal
  - On the fixed support side, the angular contact ball bearing is used. It has great rigidity and low friction torque which match the rigidity of the ball screw. The thrust angular contact ball bearing with high precision and great rigidity is another choice for the fixed support side.
  - An oil seal is installed on fixed support side used with an angular contact ball bearing. The seal may have fine clearance.
  - A deep-groove ball bearing with a shield on both sides is used on the simple support side.

- Lock nut is provided.
  - A lock nut of fine grade finish is provided to fix the bearing with high precision.

③ Reference number coding

(For light load)

Example : **WBK 08 S - 01 A**

Product code for support unit

Nominal size code\*

Mounting code

No code: Fixed support unit

S: Simple support unit

SF: Simple support unit (for VFA)

R: Fixed support unit (support kit for miniature ball screws)

No code or A: For general use

C: For clean environment use

01: Square type

11: Round type

\* In case of simple support unit, be careful that 12 or less size codes do not represent internal bores of bearing. Please refer to the dimensional table for internal bore of bearing.

(For heavy load)

Example : **WBK 25 DF - 31**

Product code for support unit

Nominal size code (internal bore of bearing)

Bearing combination code

DF : Face to face duplex combination

DFD : Face to face triplex combination

DFF : Face to face quadruplex combination

(1) Support Units for Light Load and Small Equipment

Support units for light load and small equipment provide both fixed and support side bearing assemblies to support screw shafts. They provide all required parts such as bearing locknuts so that you can mount them directly to NSK standard ball screws, of which shaft ends are machined.

Please refer to the dimensions listed on the dimension table for configuration of standard screw shaft ends for NSK standard ball screws with blank shaft ends. For transporting ball screws, you require optional spacers when mounting fixed support side support units.

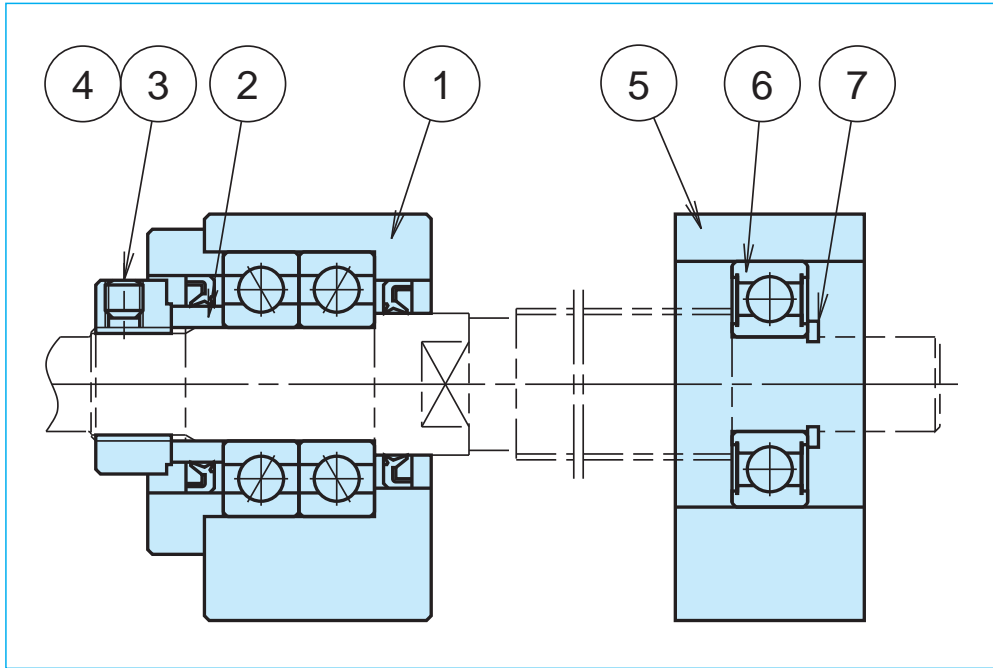
① Features

- Prompt delivery  
All support units are standard stocked items.
- Best selection of bearings for your application  
General use support units for fixed support side are equipped with highly rigid angular contact ball bearings that have been assembled with proper preload, and packed with the appropriate volume of grease. On the other hand, clean support units for fixed support side uses low dust emission grease, and low torque special bearings. Sealed deep groove ball bearings are used for simple support side units for both general and clean environment use.

●Accessories

Support units provide everything necessary for mounting ball screws to machines. (Please refer to the table below.)

\* Do not disassemble fixed support side units as they are equipped with bearings and oil seals.



●Antirust treatment

The table on the right shows the surface treatment for the bearing housing, and material of small parts.

Fixed support side		Simple support side	
Part no.	Name of parts	Part no.	Name of parts
①	Bearing housing	⑤	Bearing housing
②	Spacer	⑥	Bearing
③	Locknut	⑦	Snap ring
④	Set screw with set piece		

	General support unit
Bearings and grease	Angular contact ball bearings, PS2
Surface treatment	Black oxide
Screws and snap rings	Standard material

⑥Features of Clean Support Unit

●Outstanding low dust emission

Clean support unit uses "NSK clean grease LG2" which has a proven feature of low dust emission. It reduces dust emission to 1/10 of general support units.

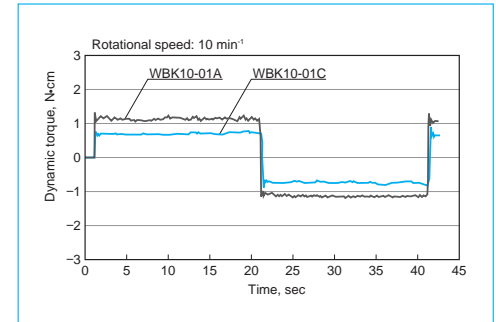
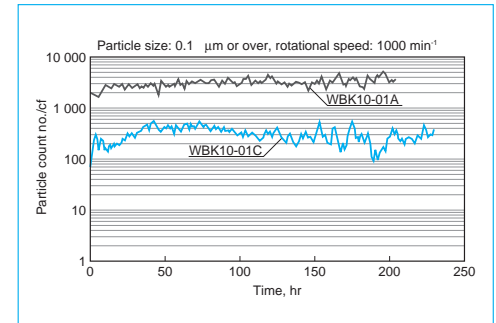
●Low torque

It features low torque characteristics because of special bearings. (50% lower than general support unit.)

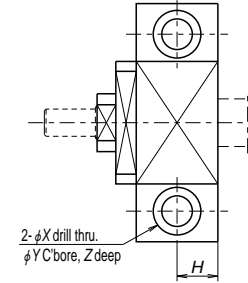
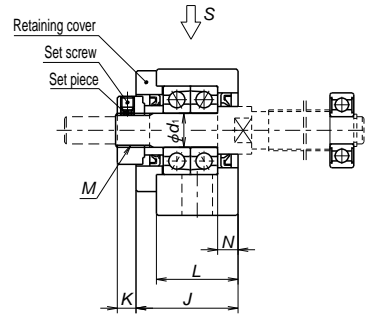
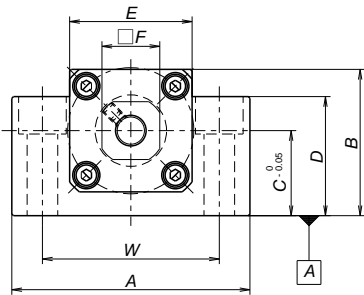
●High antirust specification

Low temperature chrome plating is applied to bearing housings, retaining plates, locknuts and spacers to improve antirust properties. Moreover, bolts and snap rings are made of stainless steel. The table below shows the surface treatment of the bearing housing and material of small parts.

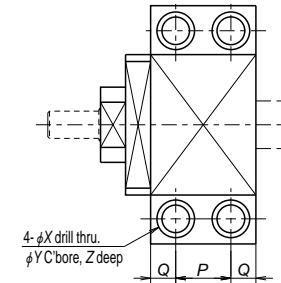
	Clean support unit
Bearing • grease	Special bearings, LG2
Surface treatment	Low temperature chrome plating
Set screw and snap ring material	Stainless steel



Support Units for Light Load and Small Equipment



View S (WBK06 - 15)



View S (WBK17 - 25)

Reference no.	Tightening torque (reference) [N · cm]	
	Locknut	Set screw
WBK06-**	190	69 (M3)
WBK08-**	230	69 (M3)
WBK10-**	280	147 (M4)
WBK12-**	630	147 (M4)
WBK15-**	790	147 (M4)
WBK17-**	910	147 (M4)
WBK20-**	1670	147 (M4)
WBK25-**	2060	490 (M6)

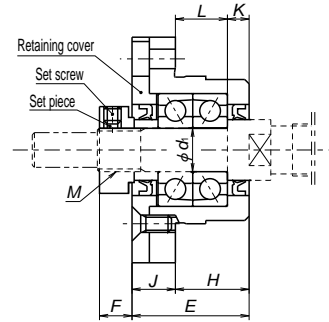
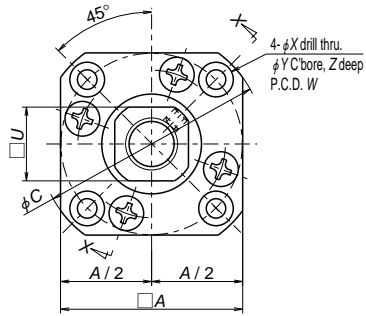
Fixed support side support unit (square type)

Units: mm

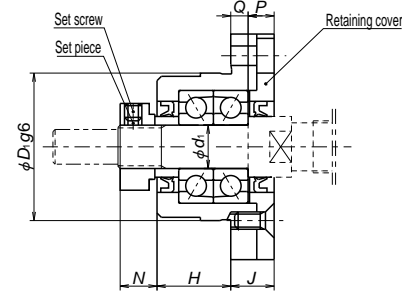
Reference no.	Use	$d_1$	A	B	C	D	E	F	L	J	K
WBK06-01A*	General	6	42	25	13	20	18	12	20	20	5.5
WBK08-01A*	General	8	52	32	17	26	25	14	23	23	7
WBK08-01B	Low type		62	31	15.5	31	—		21.5	25.5	4.5
WBK08-01C*	Clean environment		52	32	17	26	25		23	23	7
WBK10-01A	General	10	70	43	25	35	36	17	24	30	5.5
WBK10-01B	Low type			38	20	38	—				
WBK10-01C	Clean environment			43	25	35	36				
WBK12-01A	General	12	70	43	25	35	36	19	24	30	5.5
WBK12-01B	Low type			38	20	38	—				
WBK12-01C	Clean environment			43	25	35	36				
WBK15-01A	General	15	80	50	30	40	41	22	25	31	12
WBK15-01B	Low type			42	22	42	—				
WBK15-01C	Clean environment			50	30	40	41				
WBK17-01A	General	17	86	64	39	55	50	24	35	44	7
WBK20-01	General	20	95	58	30	45	56	30	42	52	10
WBK25-01	General	25	105	68	35	25	66	36	48	61	13

- Notes:
1. Use datum face A for mounting to the machine base.
  2. Tighten the set screw after the locknut has been adjusted and tightened.
  3. The brass pad (set piece), provided with the unit, is inserted into locknut set screw hole, then set screw is inserted and tightened over it.
  4. A deep groove ball bearing and a snap ring are attached.
- \*There are no seals for the retaining cover side of WBK06-01A, WBK08-01A, and WBK08-01C.

N	Counter bore dimensions							Mass (kg)	Locknut screw M	Attached bearing for support side
	H	P	Q	W	X	Y	Z			
3.5	10	—	—	30	5.5	9.5	11	0.15	M6×0.75	—
4	11.5	—	—	38	6.6	11	12	0.25	M8×1	606ZZ
3.5	11	—	—	46	9	14	18	0.3		606VV
4	11.5	—	—	38	6.6	11	12	0.25	M10×1	608ZZ
6	12	—	—	52	9	14	11	0.5		608ZZ
		—	—				19	0.45		608VV
6	12	—	—	52	9	14	11	0.5	M12×1	6000ZZ
		—	—				19	0.4		6000ZZ
		—	—				11	0.5		6000VV
5	12.5	—	—	60	11	17	15	0.7	M15×1	6002ZZ
		—	—				23	0.6		6002ZZ
		—	—				15	0.7		6002VV
7	—	19	8	68	9	14	11	1.3	M17×1	6203ZZ
10	—	22	10	75	11	17	15	1.4	M20×1	6204ZZ
14	—	30	9	85	11	—	—	1.9	M25×1.5	6205ZZ



View X-X (Example 1)



View X-X (Example 2)

Reference no.	Tightening torque (reference) [N · cm]	
	Locknut	Set screw
WBK06.**	190	69 (M3)
WBK08.**	230	69 (M3)
WBK10.**	280	147 (M4)
WBK12.**	630	147 (M4)
WBK15.**	790	147 (M4)
WBK17.**	910	147 (M4)
WBK20.**	1670	147 (M4)
WBK25.**	2060	490 (M6)

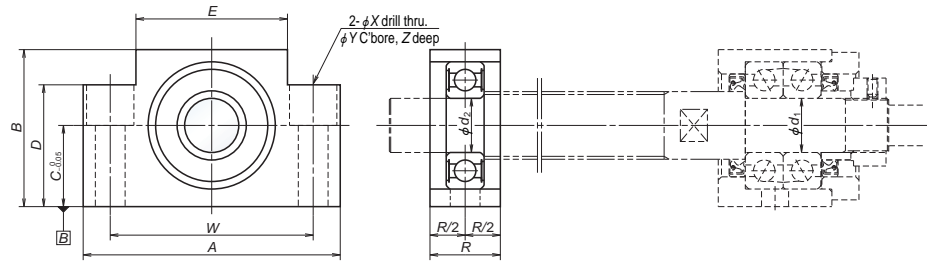
Fixed support side support unit (round type)

Units: mm

Reference no.	Use	d <sub>1</sub>	A	C	D <sub>1</sub>	E	H	L	K	F	N
WBK06-11*	General	6	28	35	22	20	13	9.5	3.5	5.5	6.5
WBK08-11*	General	8	35	43	28	23	14	10	4	7	8
WBK08-11B	Low type		42	52	34	25.5	15.5	12	3.5	4.5	7
WBK08-11C*	Clean environment		35	43	28	23	14	10	4	7	8
WBK10-11	General	10	42	52	34	27	17	12	5	7.5	8.5
WBK10-11C	Clean environment		42	52	34	27	17	12	5	7.5	8.5
WBK12-11	General	12	44	54	36	27	17	12	5	7.5	8.5
WBK12-11C	Clean environment		44	54	36	27	17	12	5	7.5	8.5
WBK15-11	General	15	52	63	40	32	17	11	6	12	14
WBK15-11C	Clean environment		52	63	40	32	17	11	6	12	14
WBK20-11	General	20	68	85	57	52	30	20	10	10	14
WBK25-11	General	25	79	98	63	57	30	20	10	13	20

U	P	Q	Counter bore dimensions					Mass (kg)	Locknut screw M	Attached bearing for support side
			J	W	X	Y	Z			
12	4.5	2.5	7	28	2.9	5.5	3.5	0.1	M6×0.75	—
14	5	4	9	35	3.4	6.5	4	0.15	M8×1	606ZZ
	6		10	42	4.5	8	4	0.2		608ZZ
	5		9	35	3.4	6.5	4	0.15		606VV
17	6	4	10	42	4.5	8	4	0.2	M10×1	608ZZ 608VV
19	6	4	10	44	4.5	8	4	0.25	M12×1	6000ZZ 6000VV
22	8	7	15	50	5.5	9.5	6	0.4	M15×1	6002ZZ 6002VV
30	14	8	22	70	6.6	11	10	1.1	M20×1	6204ZZ
36	17	10	27	80	9	15	13	1.5	M25×1.5	6205ZZ

- Notes:
1. Tighten the set screw after the locknut has been adjusted and tightened.
  2. The brass pad (set piece), provided with the unit, is inserted into locknut set screw hole, then set screw is inserted and tightened over it.
  3. A deep groove ball bearing and a snap ring are attached.
- \*There are no seals for the retaining cover side of WBK06-01A, WBK08-01A, and WBK08-01C.



Simple support side support unit (square type)

Units: mm

Reference no.	Use	d <sub>2</sub>	A	B	C	D	E	R	Counter bore dimensions				Mass (kg)
									W	X	Y	Z	
WBK08S-01	General	6	52	32	17	26	25	15	38	6.6	11	12	0.15
WBK08S-01B	Low type		62	31	15.5	31	—	16	46	9	14	18	0.2
WBK08S-01C	Clean environment		52	32	17	26	25	15	38	6.6	11	12	0.15
WBK10S-01	General	8	70	43	25	35	36	20	52	9	14	11	0.4
WBK10S-01C	Clean environment												
WBK12S-01	General	10	70	43	25	35	36	20	52	9	14	11	0.35
WBK12S-01B	Low type			38	20	38	—					19	0.4
WBK12S-01C	Clean environment			43	25	35	36					11	0.35
WBK15S-01	General	15	80	50	30	40	41	20	60	9	14	11	0.45
WBK15S-01B	Low type			42	22	42	—					23	0.4
WBK15S-01C	Clean environment			50	30	40	41					11	0.45
WBK17S-01	General	17	86	64	39	55	50	23	68	9	14	11	0.8
WBK20S-01	General	20	95	58	30	45	56	26	75	11	17	15	0.8
WBK25S-01	General	25	105	68	35	25	66	30	85	11	—	—	0.9

Notes: 1. Use datum face B for mounting to the machine base.

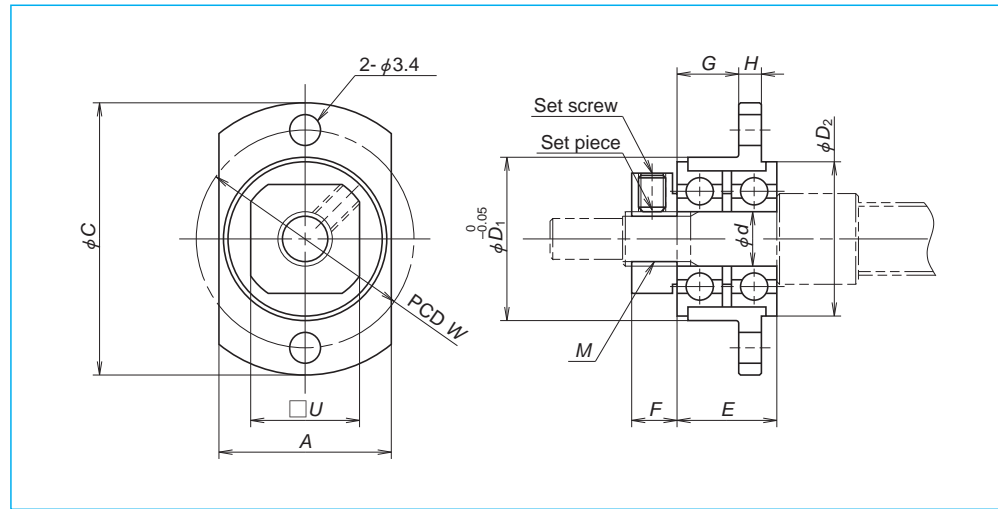
Specifications of support unit

Reference no.	Use	Fixed support side support unit				Simple support side support unit		
		Basic dynamic load rating Ca [N]	Load limit [N]	Stiffness [N / μm]	Maximum starting torque [N · cm]	Reference no.	Bearing reference no.	Radial direction Basic dynamic load rating C [N]
WBK06-01A	General	2670	1040	28	0.49	—	—	—
WBK06-11	General	2670	1040	28	0.49	—	—	—
WBK08-01A	General	4400	1450	49	0.88	WBK08S-01	606ZZ	2260
WBK08-01B	Low type	6600	2730	94	1.9	WBK08S-01B	606ZZ	2260
WBK08-01C	Clean environment	3100	1100	36	0.52	WBK08S-01C	606VV	2260
WBK08-11	General	4400	1450	49	0.88	WBK08S-01	606ZZ	2260
WBK08-11B	Low type	6600	2730	94	1.9	—	606ZZ	2260
WBK08-11C	Clean environment	3100	1100	36	0.52	WBK08S-01C	606VV	2260
WBK10-01A	General	6600	2730	94	1.9	WBK10S-01	608ZZ	3300
WBK10-01B	Low type	6600	2730	94	1.9	—	608ZZ	3300
WBK10-01C	Clean environment	4250	1364	50	1.1	WBK10S-01C	608VV	3300
WBK10-11	General	6600	2730	94	1.9	WBK10S-01	608ZZ	3300
WBK10-11C	Clean environment	4250	1364	50	1.1	WBK10S-01C	608VV	3300
WBK12-01A	General	7100	3040	104	2.1	WBK12S-01	6000ZZ	4550
WBK12-01B	Low type	7100	3040	104	2.1	WBK12S-01B	6000ZZ	4550
WBK12-01C	Clean environment	4700	2443	57	1.2	WBK12S-01C	6000VV	4550
WBK12-11	General	7100	3040	104	2.1	WBK12S-01	6000ZZ	4550
WBK12-11C	Clean environment	4700	2443	57	1.2	WBK12S-01C	6000VV	4550
WBK15-01A	General	7600	3380	113	2.4	WBK15S-01	6002ZZ	5600
WBK15-01B	Low type	7600	3380	113	2.4	WBK15S-01B	6002ZZ	5600
WBK15-01C	Clean environment	5100	2757	63	1.3	WBK15S-01C	6002VV	5600
WBK15-11	General	7600	3380	113	2.4	WBK15S-01	6002ZZ	5600
WBK15-11C	Clean environment	5100	2757	63	1.3	WBK15S-01C	6002VV	5600
WBK17-01A	General	13400	5800	120	3.5	WBK17S-01	6203ZZ	9550
WBK20-01	General	17900	8240	155	6.2	WBK20S-01	6204ZZ	12800
WBK20-11	General	17900	8240	155	6.2	WBK20S-01	6204ZZ	12800
WBK25-01	General	20200	10000	192	7.2	WBK25S-01	6205ZZ	14000
WBK25-11	General	20200	10000	192	7.2	WBK25S-01	6205ZZ	14000
WBK04R-11	General	615	490	6.5	0.59	—	—	—
WBK06R-11	General	1280	930	9	0.59	—	—	—

Support kits for ball screws for transfer equipment

Support kits are for the RMS type ball screw.

However, please use support units for general use in case of RMA1002 or larger rolled ball screws.



Units: mm

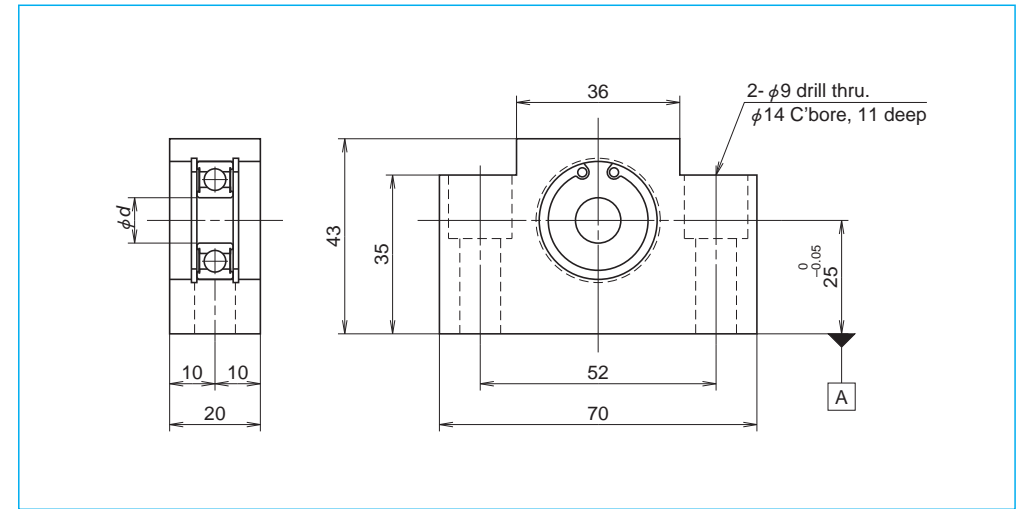
Reference no.	A	C	d	D <sub>1</sub>	D <sub>2</sub>	E	F	G	H	W	U	M
<b>WBK04R-11</b>	14	25	4	13	12.5	9	5	5	2.5	19	10	M4×0.5
<b>WBK06R-11</b>	19	30	6	18	17	11	5	6.8	2.5	24	12	M6×0.75

Reference no.	Applicable ball screw	Locknut tightening torque (reference) [N·cm]	Set screw tightening torque (reference) [N·cm]
<b>WBK04R-11</b>	RMA0601	100	38 (M2.5)
<b>WBK06R-11</b>	RMA0801 RMA0801.5 RMA0802	190	69 (M3)

Notes:

- Oscillate bearings slowly so that they fall into a place to make run-out of mounting face minimal, and then tighten a locknut.
- A support kit is put on a provisional shaft (bolt) for shipping.
- When securing support unit on the shaft, insert the set piece (brass pad) that is provided with the support unit into the lock nut screw hole, and then tighten the set screw.

Simple support side support units for VFA type ball screws



Units: mm

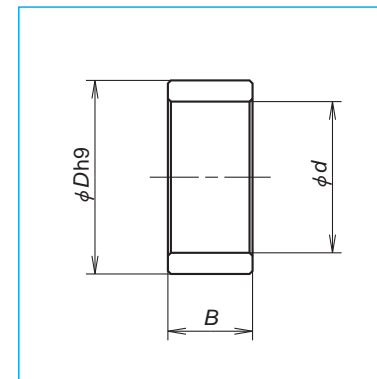
Reference no.	d	Applicable ball screw
<b>WBK12SF-01</b>	12	VFA1210
<b>WBK15SF-01</b>	15	VFA1510 VFA1520

Notes:

- Use datum face A for mounting to the machine base.
- This type of simple side support unit is made exclusively for NSK VFA ball screws. This unit supports the outer diameter of the screw shaft.

Spacer

The shaft requires an optional spacer on the journal where the ball thread is cut through the bearing shoulder. This is common for R series for transportation ball screw shaft, when mounting the support unit for fixed support side.



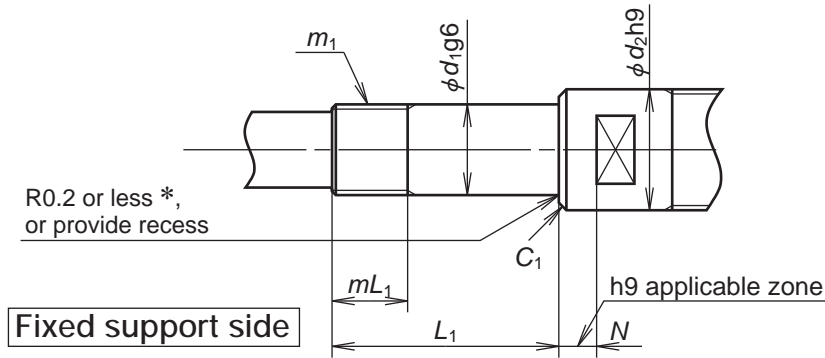
Units: mm

Reference no.	Internal diameter, d	Outside diameter, D	Width B	Applicable support unit
<b>WBK06K</b>	6	9.5	5.0	WBK06- **
<b>WBK08K</b>	8	11.5	5.5	WBK08- **
<b>WBK10K</b>	10	14.5	5.5	WBK10- **
<b>WBK12K</b>	12	15.0	5.6	WBK12- **
<b>WBK15K</b>	15	19.5	10.0	WBK15- **
<b>WBK17K</b>	17	24.4	7.0	WBK17- **
<b>WBK20K</b>	20	25.5	11.0	WBK20- **
<b>WBK25K</b>	25	32.0	14.0	WBK25- **

Screw shaft end configuration

Dimensions of the shaft end configurations for the light load and small equipment support units, are shown in the table below. When using a spacer

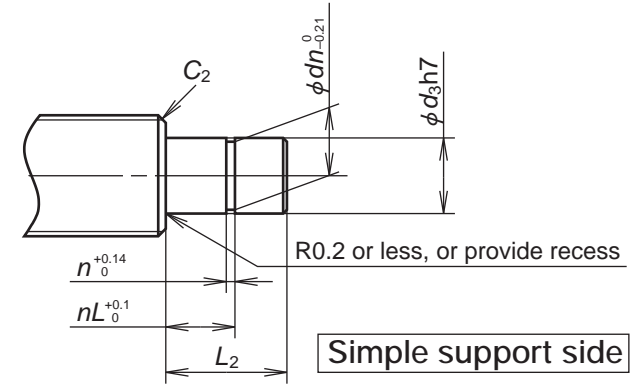
for a ball screw for transportation, add the width of the spacer (B from table of spacer dimensions on page B446) to the  $L_1$  dimension below.



Radius marked with \* above is 0.15 or less for WBK04R-11 and WBK06R-11.

Units: mm

Reference no.	Fixed support side						
	Bearing journal		Locknut thread		Sealing part		Chamfer
	$d_1$	$L_1$	$m_1$	$mL_1$	$d_2$	$N$	$C_1$
<b>WBK06- **</b>	6	22.5	M6x0.75	7	9.5	3.5	0.2
<b>WBK08- **</b>	8	27	M8x1	9	11.5	4	0.2
<b>WBK10- **</b>	10	30	M10x1	10	14	6	0.2
<b>WBK12- **</b>	12	30	M12x1	10	15	6	0.2
<b>WBK15- **</b>	15	40	M15x1	15	19.5	5	0.3
<b>WBK17- **</b>	17	46	M17x1	17	24	7	0.3
<b>WBK20- **</b>	20	53	M20x1	16	25	10	0.3
<b>WBK25- **</b>	25	62	M25x1.5	20	32	14	0.5
<b>WBK04R-11</b>	4	15	M4x0.5	7.5	—	—	0.3
<b>WBK06R-11</b>	6	17	M6x0.75	7.5	—	—	0.3



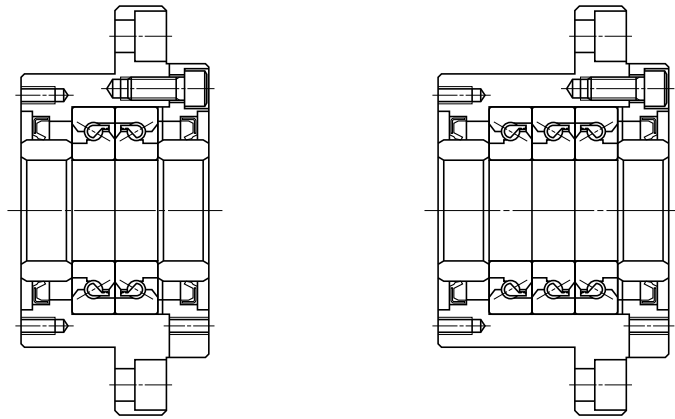
Units: mm

Reference no.	Simple support side					
	Bearing journal		Snap ring groove			Chamfer
	$d_3$	$L_2$	$n$	$dn$	$nL$	$C_2$
—	—	—	—	—	—	—
<b>WBK08S- **</b>	6	9	0.8	5.7	6.8	0.2
<b>WBK10S- **</b>	8	10	0.9	7.6	7.9	0.2
<b>WBK12S- **</b>	10	22	1.15	9.6	9.15	0.5
<b>WBK15S- **</b>	15	25	1.15	14.3	10.15	0.5
<b>WBK17S- **</b>	17	16	1.15	16.2	13.15	0.5
<b>WBK20S- **</b>	20	19	1.35	19	15.35	0.5
<b>WBK25S- **</b>	25	20	1.35	23.9	16.35	0.5

(2) Dimensions of support unit for ball screws for heavy-load/machine tools

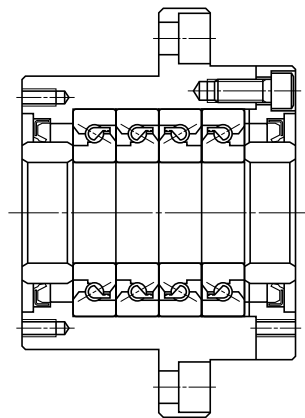
Support units for heavy-load/machine tools use a thrust angular contact ball bearing (TAC Series) with high rigidity and accuracy. The thrust angular contact ball bearing has very

suitable functions and structure as a ball screw support bearing. There are three combinations as shown below.

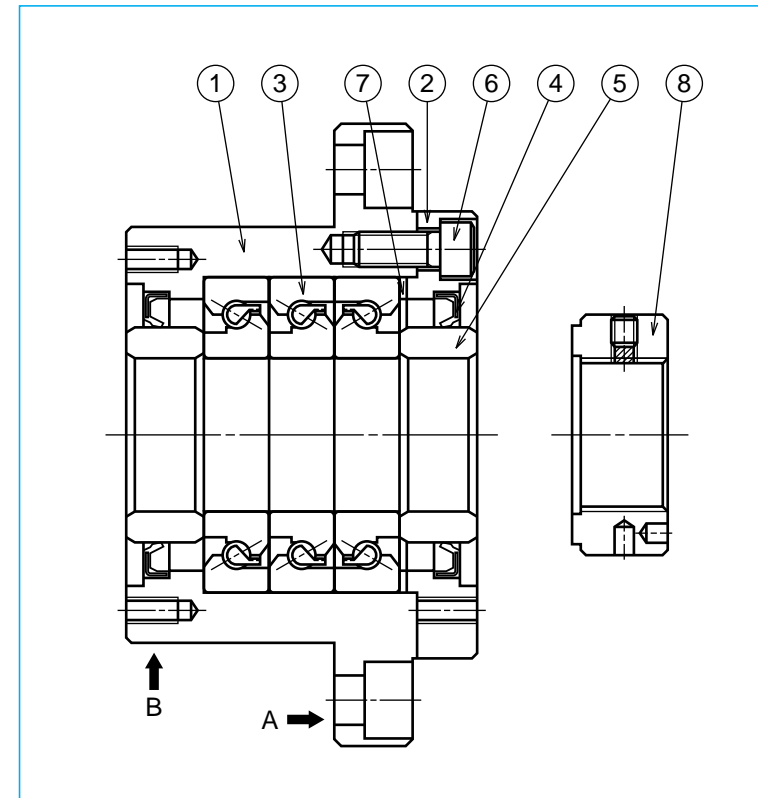


DF combination

DFD combination



DFF combination

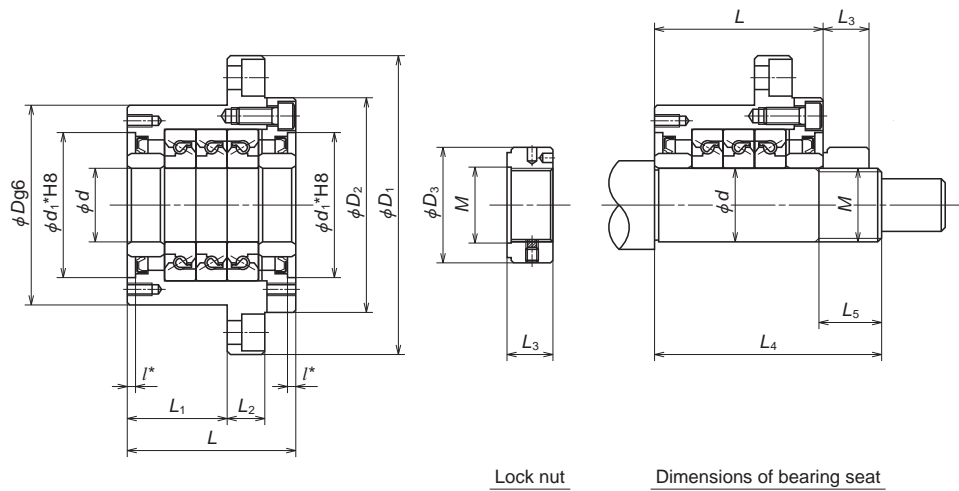


Parts list

Part number	Part name	Quantity
①	Housing	1
②	Retaining cover	1
③	High accuracy thrust angular contact ball bearing	One set
④	Dust seal	2
⑤	Collar	2
⑥	Preload bolt	6 or 8
⑦	Shim	One set
⑧	Lock nut	1

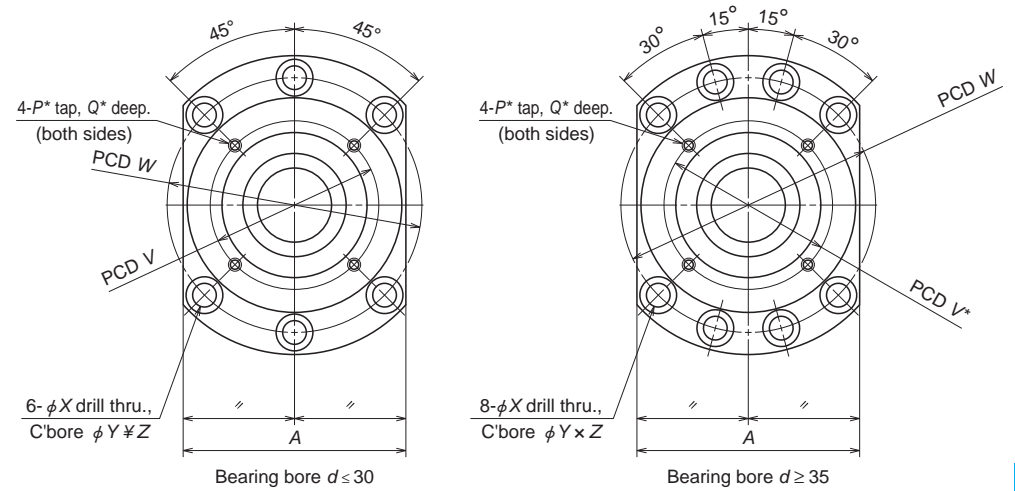
Remarks

1. Mount sections A and B to the machine base.
2. NSK support units are precisely preloaded and adjusted. Components ①, ②, ③, ④, ⑥, ⑦ are assembled into a unit. Do not disassemble.
3. Grease is packed into the bearings.
4. Lock nut ⑧ is exclusively prepared for ball screw. The end face of the nut is in strict control being precisely perpendicular to the V thread. Secure the lock nut using the set screw. Lock nut is also available as an accessory (See page B453). Refer to Page B457 as well for high-precision thrust angular contact ball bearing (TAC Series).



Lock nut

Dimensions of bearing seat



Bearing bore  $d \le 30$

Bearing bore  $d \ge 35$

Support unit No.	Support unit																
	d	D	D <sub>1</sub>	D <sub>2</sub>	L	L <sub>1</sub>	L <sub>2</sub>	A	W	X	Y	Z	d <sub>1</sub> *	I*	V*	P*	Q*
WBK 17DF-31	17	70	106	72	60	32	15	80	88	9	14	8.5	45	3	58	M5	10
WBK 20DF-31	20	70	106	72	60	32	15	80	88	9	14	8.5	45	3	58	M5	10
WBK 25DF-31	25	85	130	90	66	33	18	100	110	11	17.5	11	57	4	70	M6	12
WBK 25DFD-31					81	48											
WBK 30DF-31	30	85	130	90	66	33	18	100	110	11	17.5	11	57	4	70	M6	12
WBK 30DFD-31					81	48											
WBK 35DF-31	35	95	142	102	66	33	18	106	121	11	17.5	11	69	4	80	M6	12
WBK 35DFD-31					81	48											
WBK 35DF-31					96	48											
WBK 40DF-31	40	95	142	102	66	33	18	106	121	11	17.5	11	69	4	80	M6	12
WBK 40DFD-31					81	48											
WBK 40DF-31					96	48											

- Remarks**
- Rigidity  
Values in the Table are theoretical values obtained from the elastic deformation between the groove and the balls.
  - Starting torque  
Starting torque indicates torque due to the preload of the bearing. It does not include seal torque.
  - The tolerance of the shaft bearing seat  
We recommend h5 class of the fits tolerance.

Unit: mm

Basic dynamic load rating C <sub>0</sub> (N)	Permissible axial load (N)	Preload (N)	Axial rigidity (N/μm)	Maximum Starting torque (N · cm)	Lock nut			Mass (kg)	Bearing seat for unit		
					M	D <sub>3</sub>	L <sub>3</sub>		d	L <sub>4</sub>	L <sub>5</sub>
21900	26600	2150	750	19	M17×1	37	18	1.9	17	81	23
21900	26600	2150	750	19	M20×1	40	18	1.9	20	81	23
28500	40500	3150	1000	29	M25×1.5	45	20	3.1	25	89	26
46500	81500	4300	1470	39				3.4		104	
29200	43000	3350	1030	30	M30×1.5	50	20	3.0	30	89	26
47500	86000	4500	1520	40				3.3		104	
31000	50000	3800	1180	34	M35×1.5	55	22	3.4	35	92	30
50500	100000	5200	1710	45				4.3		107	
50500	100000	7650	2350	59	M40×1.5	60	22	5.0	40	122	30
31500	52000	3900	1230	36				3.6		92	
51500	104000	5300	1810	47				4.2		107	
51500	104000	7850	2400	61	4.7	122					

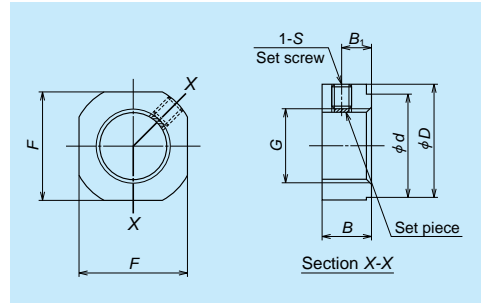
- Remarks**
- Dimensions with \* (asterisk) mark  
\*Pilot diameter and tapped screws marked with "asterisk \*\*" are used for seal unit installation for NSK standard hollow shaft ball screws. They also can be used for dust cover and damper installation.
  - Grease is packed into the bearing. It is not necessary to apply grease before use.

In addition to the support units, NSK has other components for the ball screw as shown below.

**(3) Lock nuts**

Ball screw support bearing must be installed

with minimum inclination. NSK lock nuts exclusive for ball screw help to reduce this inclination.



A Type Shapes and dimensions

A Type lock nuts

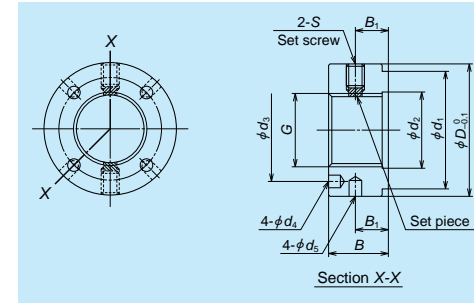
**A Type lock nuts**

Lock nut reference number	G	D	F	B	d
WBK06L-01	M6×0.75	14.5	12	5	10
WBK08L-01	M8×1	17	14	6.5	13
WBK10L-01	M10×1	20	17	8	16
WBK12L-01	M12×1	22	19	8	17
WBK15L-01	M15×1	25	22	10	21
WBK17L-01	M17×1	29	24	13	24
WBK20L-01	M20×1	35	30	13	26
WBK25L-01	M25×1.5	42	36	16	34

Remarks: Insert a set piece (brass pad) and tighten the securing set screw.

**S Type lock nuts**

Lock nut reference number	G	D <sub>3.1</sub>	B	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>
WBK17L-31	M17×1	37	18	30	18	27
WBK20L-31	M20×1	40	18	30	21	30
WBK25L-31	M25×1.5	45	20	40	26	35
WBK30L-31	M30×1.5	50	20	40	31	40
WBK35L-31	M35×1.5	55	22	50	36	45
WBK40L-31	M40×1.5	60	22	50	41	50



S Type Shapes and dimensions

S Type lock nuts

B <sub>1</sub>	S	Tightening torque (N · cm) (for reference)	Set screw tightening torque (reference) [N · cm]
2.75	M3, with brass made set piece	190	69 (M3)
4	M3, with brass made set piece	230	69 (M3)
5	M4, with brass made set piece	280	147 (M4)
5	M4, with brass made set piece	630	147 (M4)
6	M4, with brass made set piece	790	147 (M4)
8	M4, with brass made set piece	910	147 (M4)
8	M4, with brass made set piece	1670	147 (M4)
10	M6, with brass made set piece	2060	490 (M6)

d <sub>1</sub>	d <sub>2</sub>	B <sub>1</sub>	S	Tightening torque (N · cm) (for reference)	Set screw tightening torque (reference) [N · cm]
4.3	4	10	M6	4100	490 (M6)
4.3	4	10	M6	4500	490 (M6)
4.3	4	11	M6	8500	490 (M6)
4.3	5	11	M6	10100	490 (M6)
4.3	5	12	M6	13800	490 (M6)
4.3	5	12	M6	15500	490 (M6)

(4) Grease unit

NSK has numerous grease types that are exclusive for ball screw lubrication. They come in bellows-shaped tubes, that can be attached

to a grease gun quickly. For details of grease types, refer to Page D13 or for grease pump and nozzles, refer to Page D20.



NSK greases

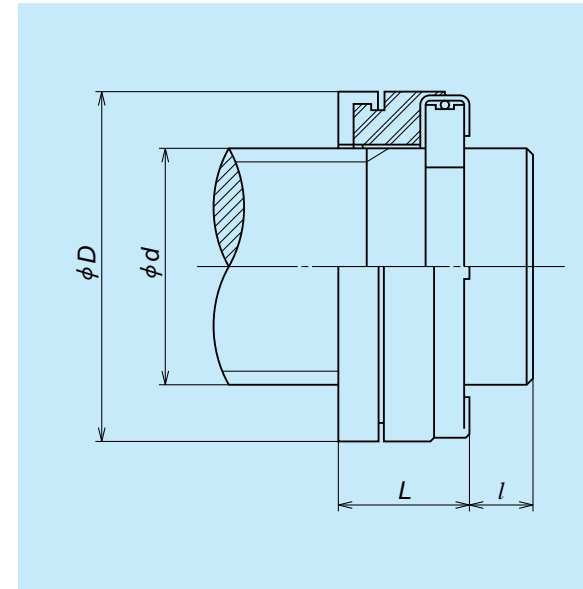
Lubricant greases

Name	Use	Base oil viscosity mm <sup>2</sup> /s (40°C)
NSK Grease AS2	For heavy load	130
NSK Grease PS2	High-speed, light load	15
NSK Grease LR3	High-speed, medium load	30
NSK Grease LG2	Clean environment	30
NSK Grease LGU	Clean environment	100

(5) Travel stopper (by order)

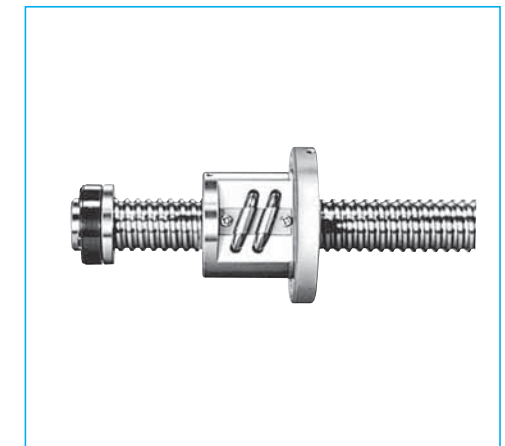
A travel stopper is installed in some cases to prevent the nut from overrunning due to the malfunction of the safety system of the equipment or by human error. NSK has several types of series of shock-absorbing travel stoppers. Please request NSK for installation.

The travel stopper is not sold as a single item since it does not have a general use. Also, a travel stopper cannot be used for end cap type recirculation system, because the stopper would come directly into contact with the ball recirculating portion.



stopper No.	Applicable shaft dia.	Outer dia.	Length	Shaft end width (Min.)
	<i>d</i>	<i>D</i>	<i>L</i>	<i>l</i>
BSR 20	20	32	16	5
BSR 25	25	38	16	5
BSR 32	32	46	20	6
BSR 40	40	60	22	6
BSR 50	50	72	24	7
BSR 63	63	85	25	7

Remarks: This stopper is patented by NSK Ltd.



Shock-absorbing travel stopper

Thrust Angular Contact Ball Bearing for Ball Screw

(1) Features

This is highly rigid and accurate ball screw support bearing often used for the machine tool driving mechanism.

- ① High axial rigidity  
Uses many balls, and set high contact angle at 60 degrees.
- ② Small friction torque  
Friction torque is smaller than that of tapered or cylindrical roller bearing. This contributes to accurate rotation by a small driving power.
- ③ Axial play is pre-adjusted  
Combination bearings are already adjusted to a suitable preload. Universal combination bearing (SU) furnishes certain preload for all combinations (DB, DF, and other).
- ④ Simple mounting structure  
A duplex combination of bearings can receive axial and radial loads. Therefore, the installation structure is simpler than when both a thrust bearing and a radial bearing are used.
- ⑤ Easy handling  
Inner and outer rings are inseparable, and are easy to handle.
- ⑥ Superb polyamide resin retainer  
Uses polyamide resin retainer which is superb to friction and furnishes high precision rotations.

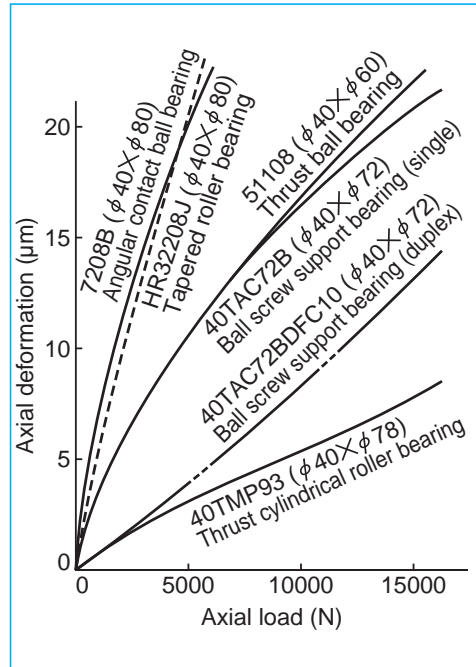


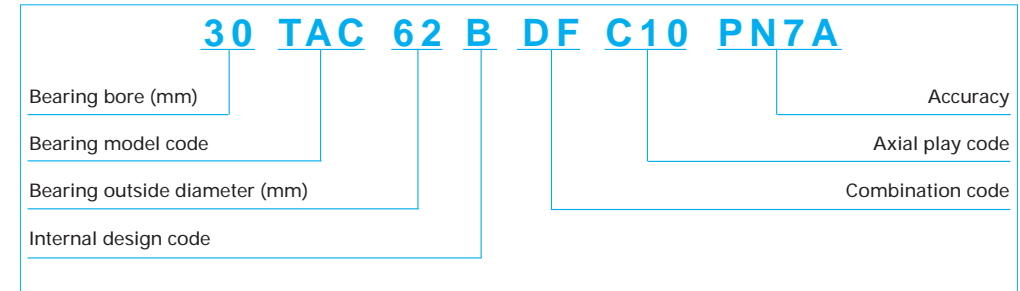
Fig. 1 Axial rigidity of various bearings

Table 2 Comparison with other types of bearings

Bearing type	Bearing rigidity (See Fig. 1)	Starting torque	Preload adjustment	Installation structure
Thrust angular contact ball bearing for NSK precision ball screw support unit	High	Low	Not required	Simple
Combined angular contact ball bearing	Low	Low	Not required	Simple
Combination of tapered roller bearings	Low	High	Complicated	Simple
Thrust ball bearing and radial bearing	High	Low	Complicated	Complicated
Thrust cylindrical roller bearing and radial bearing	Extremely high	Extremely high	Complicated	Complicated

Note : Consult NSK when you use these bearings other than the purpose of ball screw support.

(2) Composition of reference number



Remark : As "30 TAC 62 B," any part of the first half of the reference number is referred to as "nominal size" in this catalog.

### (3) Bearing combinations

Generally, a set uses more than two pieces (referred to as 'two rows') of bearings and, thus the preload is applied.

There are two types of combination:

#### ● Bearing combination

Bearings are adjusted as a single combined set. Since the bearing alignment is pre-set, there is no interchangeability;

#### ● Universal combination bearing (SU)

A combination of independent bearings, which is manufactured as a single bearing. Bearings are randomly-matched to obtain required preload by more than one of randomly picked up bearings.

#### ① Bearing combination

- Figure 2 shows examples of combinations. There is "V" mark on the outside surface of the bearing to avoid misarrangement. A complete letter "V" should be formed when all bearings align correctly to form a set.
- DF combination which easily absorbs misalignment with the ball screw nut is used in general.

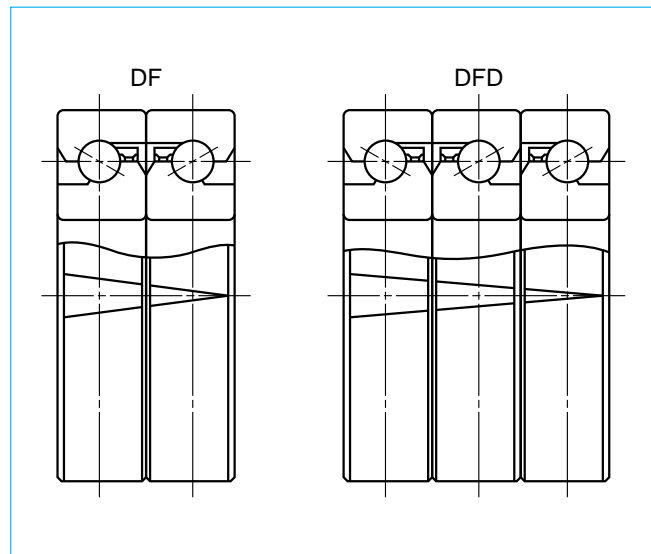


Fig. 2 Examples of combination and "V" mark

#### ② Universal combination bearing (SU)

- Unlike the above case, marks on the bearing outside surface do not form a letter "V." The tip of the "V" on each bearing simply indicates the direction to which axial load can be applied.

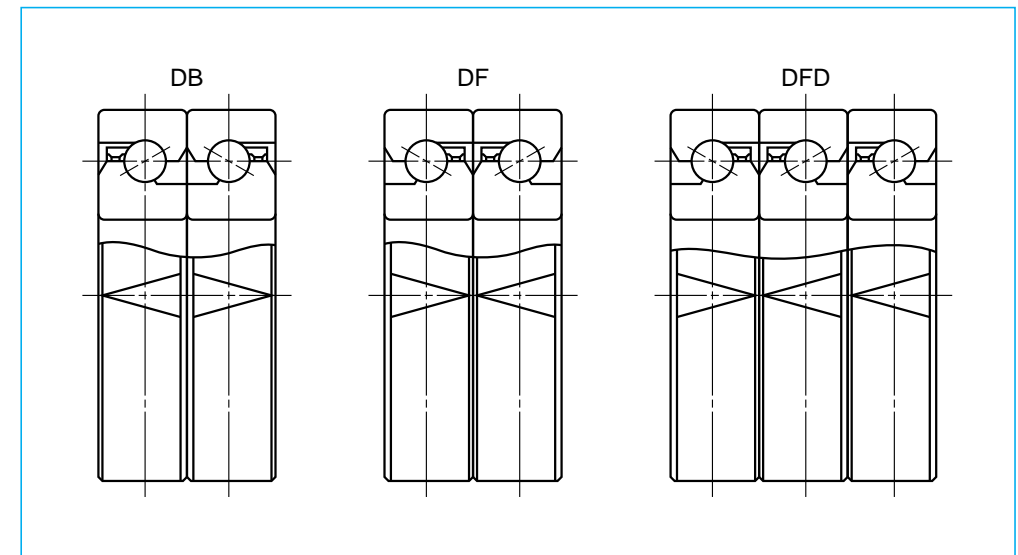


Fig. 3 Example of universal combination (SU) and "V" mark

**(4) Preload, rigidity, and starting torque**

The table 3 shows preload, rigidity (spring modulus), and starting torque with grease lubrication. (The starting torque should be 1.4 times higher when oil is used as a lubricant.) Consult NSK for the bearing combinations not included in the Table below.

**(5) Accuracy**

① **Accuracy grades**  
 Uses NSK standard PN7A and PN7B which are equivalent to JIS4 grade of the radial ball bearing. Combined bearing ————— PN7A  
 Universal combination bearing — PN7B  
 However, PN7A is stricter than JIS4 grade regarding axial run out of inner and outer rings. PN7B is stricter regarding the tolerance of the bore and outside diameter (Table 4).

**Table 3 Preload, rigidity, and starting torque**

Reference number	Duplex combination DF				Triplex combination DFD	
	Axial play code	Preload (N)	Rigidity (N/μm)	Starting torque (N · m)	Axial play code	Preload (N)
15TAC 47B	C10	2150	750	0.14	C10	2950
17TAC 47B	C10	2150	750	0.14	C10	2950
20TAC 47B	C10	2150	750	0.14	C10	2950
25TAC 62B	C10	3150	1000	0.23	C10	4300
30TAC 62B	C10	3350	1030	0.24	C10	4500
35TAC 72B	C10	3800	1180	0.28	C10	5200
40TAC 72B	C10	3900	1230	0.28	C10	5300
40TAC 90B	C10	5000	1320	0.48	C10	6750
45TAC 75B	C10	4100	1270	0.29	C10	5600
45TAC 100B	C10	5900	1520	0.58	C10	8050
50TAC 100B	C10	6100	1570	0.60	C10	8250
55TAC 100B	C10	6100	1570	0.60	C10	8250
55TAC 120B	C10	6650	1810	0.64	C10	9100
60TAC 120B	C10	6650	1810	0.64	C10	9100

**Table 4 Tolerance: thrust angular contact ball bearing for ball screw support**

Unit: μm

Nominal size of bearing bore or outside diameter (mm)		Tolerance of bore				Tolerance of outside diameter				Tolerance of inner ring width		Axial run out of inner or outer ring
		Accuracy grade				Accuracy grade				Accuracy grade		Accuracy grade
		PN7A		PN7B		PN7A		PN7B		PN7A	PN7B	PN7A
over	or less	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	Maximum
10	18	0	-4	0	-4	-	-	-	-	0	-80	2.5
18	30	0	-5	0	-4	-	-	-	-	0	-120	2.5
30	50	0	-6	0	-4	0	-6	0	-4	0	-120	2.5
50	80	0	-7	0	-5	0	-7	0	-5	0	-150	2.5
80	120	0	-8	0	-6	0	-8	0	-6	0	-200	2.5

Remarks : The tolerance of the outer ring width is the same as that of the inner ring width of the same bearing.

② **Fits**

Table 5 shows recommended values of the tolerance of shaft and housing bore.

Rigidity (N/μm)		Starting torque (N · m)		Quadruplet combination DFF	
				Axial play code	Preload (N)
1080	0.20	C10	4300	1470	0.29
1080	0.20	C10	4300	1470	0.29
1080	0.20	C10	4300	1470	0.29
1470	0.31	C10	6250	1960	0.46
1520	0.33	C10	6650	2010	0.49
1710	0.37	C10	7650	2350	0.55
1810	0.38	C10	7850	2400	0.57
1960	0.65	C10	10300	2650	0.96
1910	0.40	C10	8250	2550	0.59
2210	0.78	C10	11800	3000	1.16
2300	0.80	C10	12300	3100	1.18
2300	0.80	C10	12300	3100	1.18
2650	0.86	C10	13200	3550	1.27
2650	0.86	C10	13200	3550	1.27

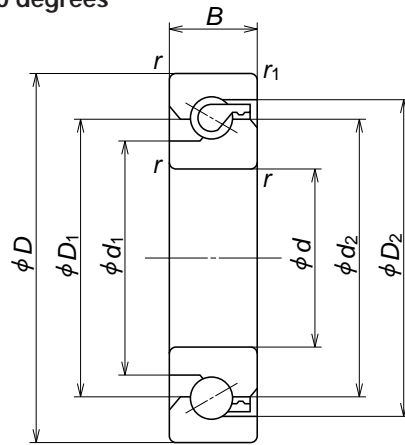
**Table 5 Tolerance of shaft bearing seat and housing bore**

Unit: μm

Size of shaft or housing bore (mm)		Tolerance of shaft bearing seat h5		Tolerance of housing hole H6	
		upper	lower	upper	lower
10	18	0	-8	-	-
18	30	0	-9	-	-
30	50	0	-11	+16	0
50	80	0	-13	+19	0
80	120	0	-15	+22	0

\*\*TAC\*\*B

Nominal contact angle 60 degrees



Dynamic equivalent load  $P_a = X F_r \times F_a$

Bearing configuration Combination code Number of the row that receives axial load	Duplex		Triplex			Quadruplet			
	DF	DT	DFD	DTD	DFT	DFF	DFT		
$e=2.17$	One row	Two rows	One row	Two rows	Three rows	One row	Two rows	Three rows	
$F_a/F_r \leq e$	X	1.9	-	1.43	2.33	-	1.17	2.33	2.53
	Y	0.54	-	0.77	0.35	-	0.89	0.35	0.26
$F_a/F_r > e$	X	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
	Y	1	1	1	1	1	1	1	1

External dimensions (mm)					Dimensions (mm)				Permissible rotational speed (min <sup>-1</sup> )		Bearing No.
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> Min.	<i>r</i> <sub>1</sub> Min.	<i>d</i> <sub>1</sub>	<i>d</i> <sub>2</sub>	<i>D</i> <sub>1</sub>	<i>D</i> <sub>2</sub>	Grease lubrication	Oil lubrication	
15	47	15	1	0.6	27.2	34	34	39.6	6000	8000	<b>15TAC 47B</b>
17	47	15	1	0.6	27.2	34	34	39.6	6000	8000	<b>17TAC 47B</b>
20	47	15	1	0.6	27.2	34	34	39.6	6000	8000	<b>20TAC 47B</b>
25	62	15	1	0.6	37	45	45	50.7	4500	6000	<b>25TAC 62B</b>
30	62	15	1	0.6	39.5	47	47	53.2	4300	5600	<b>30TAC 62B</b>
35	72	15	1	0.6	47	55	55	60.7	3600	5000	<b>35TAC 72B</b>
40	72	15	1	0.6	49	57	57	62.7	3600	4800	<b>40TAC 72B</b>
40	90	20	1	0.6	57	68	68	77.2	3000	4000	<b>40TAC 90B</b>
45	75	15	1	0.6	54	62	62	67.7	3200	4300	<b>45TAC 75B</b>
45	100	20	1	0.6	64	75	75	84.2	2600	3600	<b>45TAC 100B</b>
50	100	20	1	0.6	67.5	79	79	87.7	2600	3400	<b>50TAC 100B</b>
55	100	20	1	0.6	67.5	79	79	87.7	2600	3400	<b>55TAC 100B</b>
55	120	20	1	0.6	82	93	93	102.2	2200	3000	<b>55TAC 120B</b>
60	120	20	1	0.6	82	93	93	102.2	2200	3000	<b>60TAC 120B</b>

Note : (1) Values are based on a standard preload (C10).

Basic dynamic load rating $C_a$			Permissible axial load			Mass (kg) (Reference)
One row sustaining load DF (N)	Two rows sustaining load DT, DFD, DFF (N)	Three rows sustaining load DTD, DFT (N)	One row sustains load DF (N)	Two rows sustain load DT, DFD, DFF (N)	Three rows sustain load DTD, DFT (N)	
21900	35500	47500	26600	53000	79500	0.144
21900	35500	47500	26600	53000	79500	0.144
21900	35500	47500	26600	53000	79500	0.135
28500	46500	61500	40500	81500	122000	0.252
29200	47500	63000	43000	86000	129000	0.224
31000	50500	67000	50000	100000	150000	0.310
31500	51500	68500	52000	104000	157000	0.275
59000	95500	127000	89500	179000	269000	0.674
33000	53500	71000	57000	114000	170000	0.270
61500	100000	133000	99000	198000	298000	0.842
63000	102000	136000	104000	208000	310000	0.778
63000	102000	136000	104000	208000	310000	0.714
67500	109000	145000	123000	246000	370000	1.23
67500	109000	145000	123000	246000	370000	1.16

\* "Row" means the quantity of bearings that receive axial load.  
"Two rows" means two bearings are receiving axial load.