



MOTION & CONTROL  
**NSK**

# NSK ROLLED BALL SCREWS AND SUPPORT UNITS





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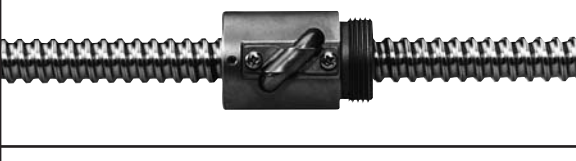


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# Rolled Ball Screw R Series

## (1) Product classification

NSK rolled ball screws are classified by nut model as shown in Table 1.

**Table 1 Classification of rolled ball screws**

Nut model	Nut shape	Recirculation system	Lead classification	Page
RNFTL		Flanged, Tube projecting type	Return tube type	6
			High helix lead	8
RNFBL		Flanged Circular	Return tube type	10
RNCT		V-thread (no flange) Projecting tube type	Return tube type	12
RNSTL		Square type	Return tube type	14
RNFCL		Flanged Circular	End cap type	16
			High helix lead  Ultra high helix lead	18

## (2) Features

- Short delivery time: R Series is standardized, and available in stock.
- Interchangeable screw shaft and ball nut: Screw shaft and nut assembly components are sold separately, and randomly-matched. The maximum axial play after assembly is shown in the dimension tables (from Page 6 ~ 8).
- Low prices: Screw shaft is processed by rolling. This is why prices are lower than those of precision types.
- Abundant series: There are 128 types of nut assembly combinations in the series. Each combination has two to three different lengths in screw shaft.

## (3) Accuracy

- Lead accuracy: Ct10 grade ( $v_{300}=0.210$ ).
- Axial play: Varies with internal specification. Refer to the dimension tables (Page 6).
- Run out of screw shaft center: Ct10 grade.

## (4) Inserting Ball Nut into Rolled Screw Shaft

Refer to "Technical Description: Installation" (Page 36).

## (5) Shaft end machining

It is necessary to machine screw shaft end of the rolled ball screw.

Refer to "Configuration of rolled ball screw shaft end" (Page 20) if you use standard support unit. Refer to "Technical Description: Shaft end machining" (Page 36) for procedures and precautions.

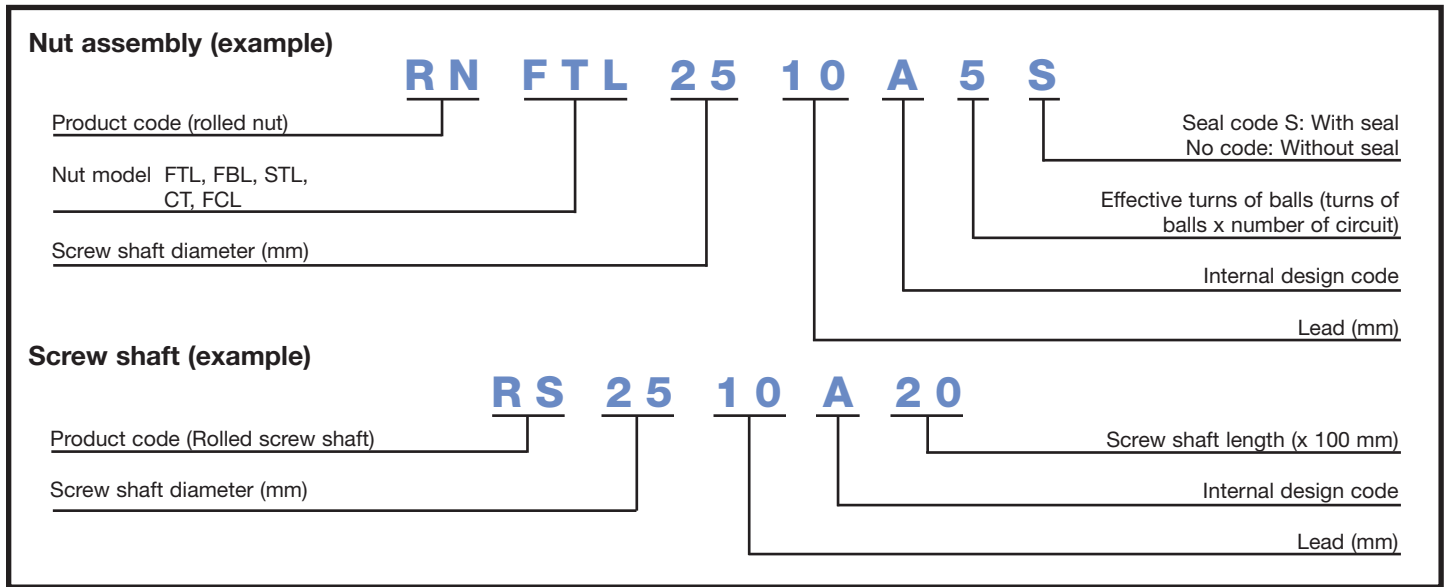
## (6) Rust prevention

Rust prevention agent is applied at time of delivery but special surface treatment is not given to these ball screws. NSK offers treatment such as phosphate coating or electrolysis low temperature chrome plating on request.

# Rolled Ball Screws

## (7) Reference number

Reference number of rolled ball screw is described below.  
Please use reference number to order, or for a price inquiry.



## (8) Combinations of shaft diameter/lead

Combinations are shown below in Table 2. The table also indicates nut model codes and page numbers to refer to.

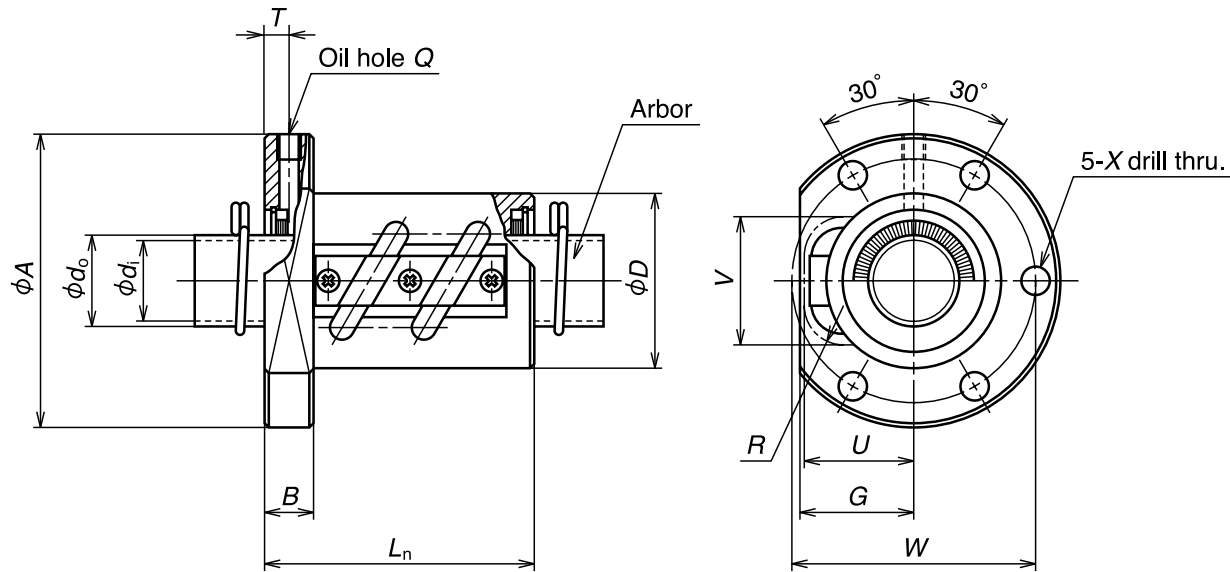
**Table 2 Combinations of shaft diameter/lead**

Screw shaft diameter (mm)	Lead (mm)														
	3	4	5	6	8	10	12	16	20	25	32	40	50	64	80
10	○ 6 △ 12			○ 6 ● 10											
12					○ 6 ● 10		○ 8 ◎ 14								
14		○ 6 ● 10 △ 12 □ 14	○ 6 ● 10 △ 12 □ 14												
15									◎ 14						
16						○ 6		○ 8 ◎ 14		◎ 18					
18					○ 6 ● 10 △ 12 □ 14										
20			○ 6 ● 10 △ 12 □ 14			○ 6 ● 10 □ 14			○ 8 ◎ 14		◎ 18				
25			○ 6 ● 10 △ 12 □ 14			○ 6 ● 10 △ 12 □ 14				○ 8 ◎ 14			◎ 18		
28				○ 4 ● 10 △ 12 □ 14											
32						○ 4 ● 10 △ 12 □ 14				○ 8 ◎ 14				◎ 18	
36						○ 4 ● 10 △ 12 □ 14									
40						○ 4 △ 12 ● 10						○ 8 ◎ 14			◎ 18
45							○ 4 △ 12 □ 14								
50						○ 4 △ 12		○ 4 △ 12					◎ 14		

○ : RNFTL ● : RNFBFL △ : RNCT □ : RNSTL ◎ : RNFCFL

# R Series: Rolled Ball Screws

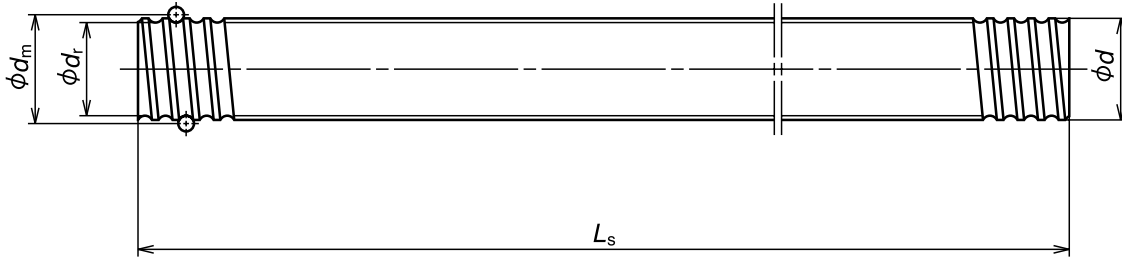
Tube type: Flanged nut (fine, medium lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNFTL 1003A3.5	10	3	2.381	10.65	8.1	3.5 x 1	3780	6730	0.10	20
RNFTL 1006A2.5S	10	6	2.381	10.65	8.1	2.5 x 1	2830	4810	0.10	20
RNFTL 1208A2.5S	12	8	2.778	12.65	9.6	2.5 x 1	3730	6560	0.10	25
RNFTL 1404A3.5S	14	4	2.778	14.5	11.5	3.5 x 1	5370	10800	0.10	25
RNFTL 1405A2.5S	14	5	3.175	14.5	11.0	2.5 x 1	5260	9720	0.10	30
RNFTL 1610A2.5	16	10	3.175	16.75	13.3	2.5 x 1	5660	11500	0.10	30
RNFTL 1610A2.5S										
RNFTL 1808A3.5	18	8	4.762	18.5	13.6	3.5 x 1	13200	25800	0.15	34
RNFTL 1808A3.5S										
RNFTL 2005A2.5	20	5	3.175	20.5	17.0	2.5 x 1	6360	14200	0.10	40
RNFTL 2005A2.5S										
RNFTL 2010A2.5	20	10	4.762	21.25	16.2	2.5 x 1	10900	21800	0.15	40
RNFTL 2010A2.5S										
RNFTL 2505A5	25	5	3.175	25.5	22.0	2.5 x 2	12800	36300	0.10	42
RNFTL 2505A5S										
RNFTL 2510A2.5	25	10	6.35	26	19.0	2.5 x 1	17500	35200	0.20	44
RNFTL 2510A2.5S						2.5 x 2	31800	70300		
RNFTL 2510A5										
RNFTL 2510A5S										

- Remarks
1. Protruding portion of the tube does not have any interference with the ball nut housing if its dimensions corresponding to U and V are large enough.
  2. The actual screw shaft length may become slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  3. Seals are provided in the nut. Therefore, the external dimensions of those with the seals are the same as those without.  
In the side view drawing of the ball nut, above the center line is with seal, and beneath is without seal.  
Seals for ball nuts with the shaft diameter of 14 mm or less are made of synthetic resin. Seals for those of 16 mm or over are "Brush-seal."

# Nut Model: RNFTL



Unit: mm

Ball nut dimensions											Nut Mass (kg)	Arbor		Screw shaft			Shaft mass/m (kg)	
Flange			Length $L_n$	Bolt hole		Oil hole		Projecting tube				Outside dia. $d_o$	Bore $d_i$	Standard length				Screw shaft No.
A	G	B		W	X	Q	T	U	V	R				$L_s$				
40	15	6	34	30	4.5	M3 x 0.5	3.0	15	15	7	0.092	8.1	6.1	400	800	–	RS1003A**	0.50
40	15	6	36	30	4.5	M3 x 0.5	3.5	15	15	5	0.095	8.1	6.1	400	800	–	RS1006A**	0.56
45	19	8	46	35	4.5	M3 x 0.5	5.5	19	18	7	0.18	9.6	7.6	400	800	–	RS1208A**	0.74
50	19	10	43	40	4.5	M6 x 1	5.0	19	20	7	0.20	11.5	9.5	500	1000	–	RS1404A**	1.02
50	22	10	45	40	4.5	M6 x 1	5.0	22	21	8	0.26	11.0	9.0	500	1000	–	RS1405A**	1.00
53	23	10	54	41	5.5	M6 x 1	5.5	23	22.5	8	0.28	13.3	11.3	500	1000	1500	RS1610A**	1.37
63	27	12	58	49	6.6	M6 x 1	6.0	27	27	8	0.43	13.6	11.6	500	1000	1500	RS1808A**	1.60
60	28	10	46	50	4.5	M6 x 1	5.0	28	27	10	0.42	17.0	14.6	500	1000	2000	RS2005A**	2.17
67	30	12	59	53	6.6	M6 x 1	6.0	30	29	12	0.55	16.2	13.8	500	1000	2000	RS2010A**	2.18
71	28	12	66	57	6.6	M6 x 1	6.0	28	31	10	0.62	22.0	19.6	1000	2000	2500	RS2505A**	3.47
80	34	15	62	62	9	M6 x 1	7.5	34	37	17	0.75	19.0	16.6	1000	2000	2500	RS2510A**	3.13
80	34	15	92	62	9	M6 x 1	7.5	34	37	17								

Remarks 4. Nut assembly with arbor and the screw shaft are separated at time of delivery.

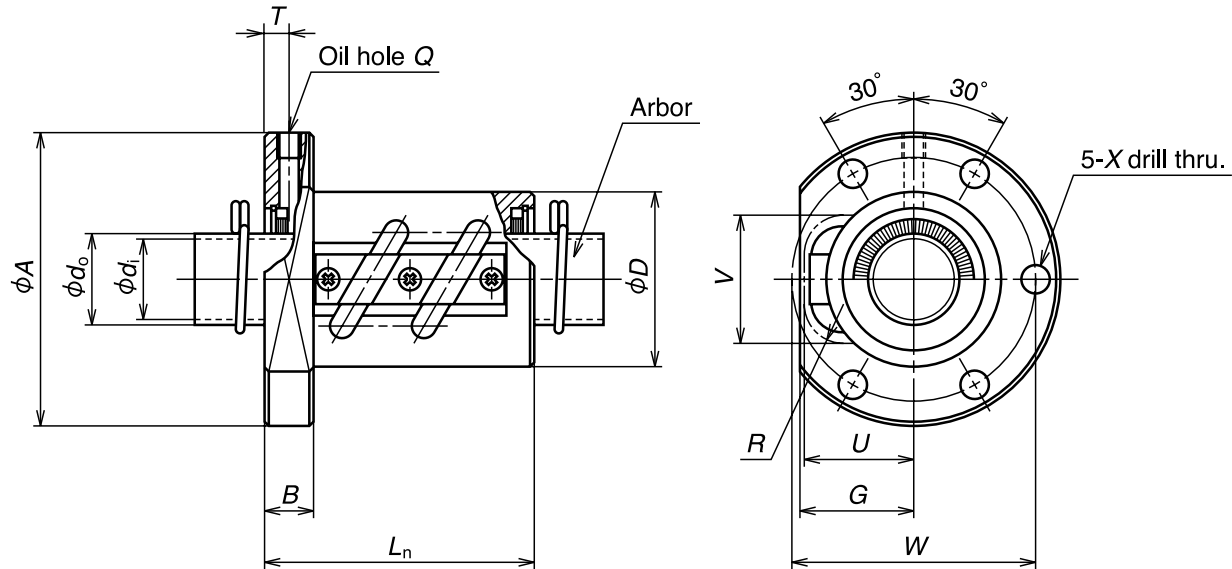
5. At the end of the screw shaft reference number where marked with "\*\*", fill with the value obtained by dividing the standard screw shaft length by 100 mm.

6. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.



# R Series: Rolled Ball Screws

## Tube type: Flanged nut (fine, medium lead)

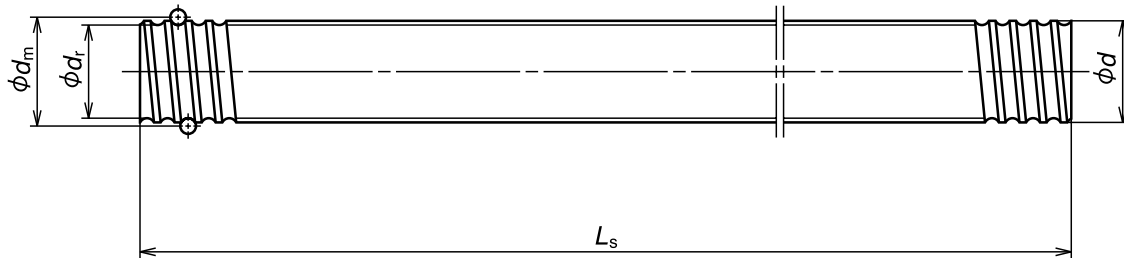


Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNFTL 2806A2.5 RNFTL 2806A2.5S	28	6	3.175	28.5	25.0	2.5 x 1	7430	20300	0.10	50
RNFTL 2806A5 RNFTL 2806A5S						2.5 x 2	13500	40600		50
RNFTL 3210A5 RNFTL 3210A5S	32	10	6.35	33.75	27.0	2.5 x 2	35700	92200	0.20	55
RNFTL 3610A2.5 RNFTL 3610A2.5S	36	10	6.35	37	30.0	2.5 x 1	21000	51000	0.20	60
RNFTL 3610A5 RNFTL 3610A5S						2.5 x 2	38100	102000		60
RNFTL 4010A7 RNFTL 4010A7S	40	10	6.35	41.75	35.0	3.5 x 2	53500	164000	0.20	65
RNFTL 4512A5 RNFTL 4512A5S	45	12	7.144	46.5	39.0	2.5 x 2	49600	147000	0.23	70
RNFTL 5010A7 RNFTL 5010A7S	50	10	6.35	51.75	45.0	3.5 x 2	59500	205000	0.20	80
RNFTL 5016A5 RNFTL 5016A5S	50	16	9.525	52	42.0	2.5 x 2	99900	293000	0.23	85

- Remarks
1. The protruding portion of the tube does not interfere with nut housing if its dimensions corresponding to  $U$  and  $V$  are large enough.
  2. The actual screw shaft length may become slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  3. Seals are provided in the nut. Therefore, the external dimensions of those with the seals are the same as those without.  
In the side view drawing of the nut, above the center line is with seal, and beneath is without seal.  
Seal is "Brush-seal".



# Nut Model: RNFTL



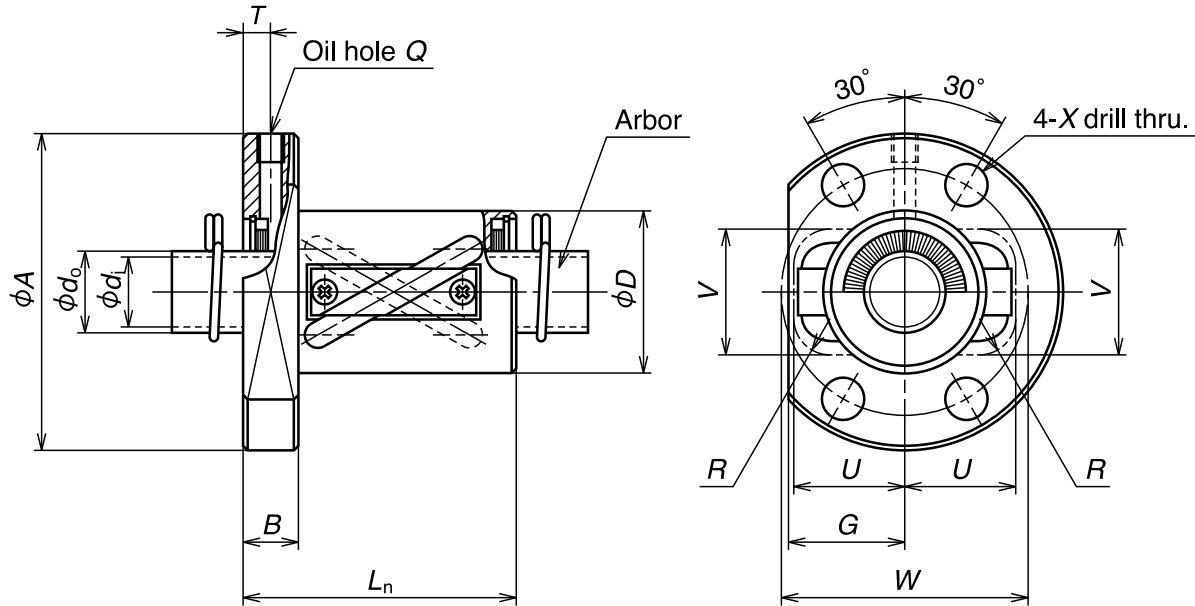
Unit: mm

Ball nut dimensions											Nut Mass (kg)	Arbor		Screw shaft				Shaft mass/m (kg)
Flange			Length	Bolt hole		Oil hole		Projecting tube				Outside dia.	Bore	Standard length			Screw shaft	
A	G	B	$L_n$	W	X	Q	T	U	V	R		$d_o$	$d_i$	$L_s$			No.	
79	33	15	55	65	6.6	M6 x 1	7.5	33	34	10	0.85	25.0	22.6	1000	2000	2500	RS2806A**	4.47
79	33	15	79	65	6.6	M6 x 1	7.5	33	34	10	1.07							
97	39	18	97	75	11	M6 x 1	9.0	39	42	17	1.55	27.0	24.6	1000	2000	3000	RS3210A**	5.53
102	42	18	68	80	11	M6 x 1	9.0	42	46	17	1.47	30.0	27.6	1000	2000	3000	RS3610A**	6.91
102	42	18	98	80	11	M6 x 1	9.0	42	46	17	1.80							
114	44	20	120	90	14	M6 x 1	10.0	44	50	20	2.49	35.0	31.8	2000	3000	4000	RS4010A**	8.87
130	47	22	116	100	18	M6 x 1	11.0	47	55	20	3.07	39.0	35.8	2000	3000	4000	RS4512A**	11.16
140	52	22	122	110	18	M6 x 1	11.0	52	59	20	4.06	45.0	41.8	2000	3000	4000	RS5010A**	14.15
163	57	28	146	125	22	M6 x 1	14.0	57	63	25	6.42	42.0	38.8	2000	3000	4000	RS5016A**	13.48

- Remarks
- Nut assembly with arbor and the screw shaft are separated at time of delivery.
  - At the end of the screw shaft reference number where marked with "\*\*", fill with the value obtained by dividing the standard screw shaft length by 100 mm.
  - Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.

# R Series: Rolled Ball Screws

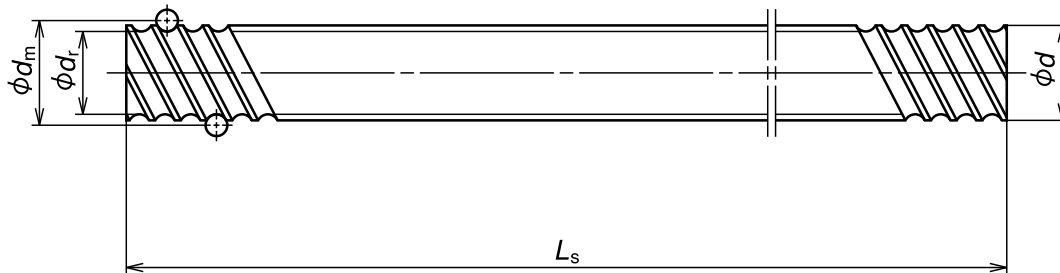
## Tube type: Flanged nut (high helix lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNFTL 1212A3	12	12	2.381	12.65	10.1	1.5 x 2	3360	6270	0.10	24
RNFTL 1616A3 RNFTL 1616A3S	16	16	2.778	16.65	13.6	1.5 x 2	4880	9650	0.10	30
RNFTL 2020A3 RNFTL 2020A3S	20	20	3.175	20.75	17.3	1.5 x 2	7010	15400	0.10	35
RNFTL 2525A3 RNFTL 2525A3S	25	25	3.969	26	22.0	1.5 x 2	10500	24100	0.12	45
RNFTL 3232A3 RNFTL 3232A3S	32	32	4.762	33.25	28.0	1.5 x 2	15300	37100	0.15	55
RNFTL 4040A3 RNFTL 4040A3S	40	40	6.35	41.75	35.0	1.5 x 2	24400	61600	0.20	70

- Remarks
1. Protruding portion of the tube does not have any interference with the ball nut housing if its dimensions corresponding to U and V are large enough.
  2. The actual screw shaft length may become slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  3. Seals are provided in the nut. Therefore, the external dimensions of those with the seals are the same as those without.  
In the side view drawing of the ball nut, above the center line is with seal, and beneath is without seal.  
Seals for ball nuts with the shaft diameter of 14 mm or less are made of synthetic resin. Seals for those of 16 mm or over are "Brush-seal."

# Nut Model: RNFTL



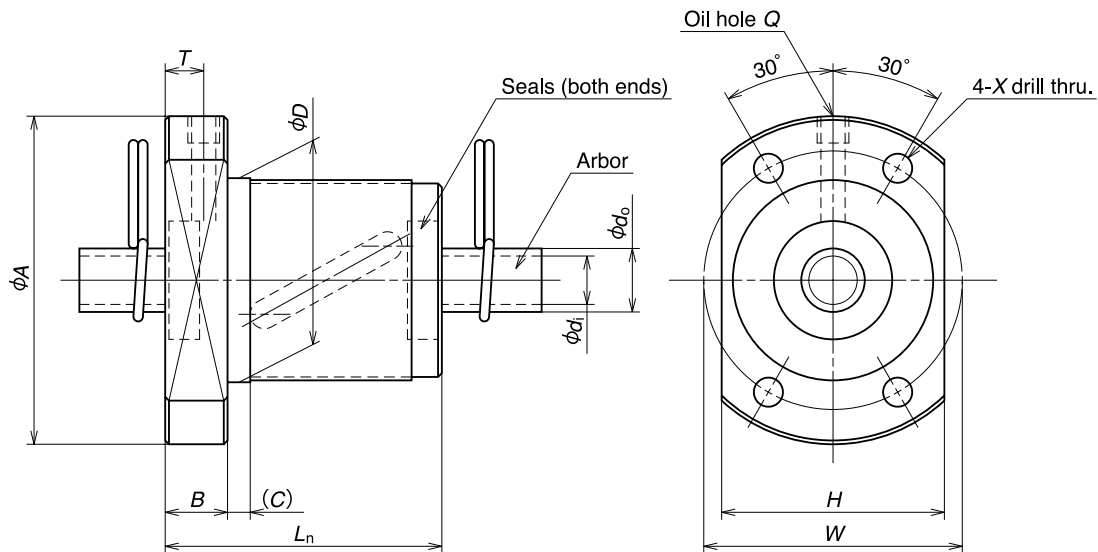
Unit: mm

Ball nut dimensions											Nut Mass (kg)	Arbor		Screw shaft			Shaft mass/m (kg)	
Flange			Length	Bolt hole		Oil hole		Projecting tube				Outside dia.	Bore	Standard length		Screw shaft		
A	G	B	$L_n$	W	X	Q	T	U	V	R		$d_o$	$d_i$	$L_s$				No.
44	17	8	44	34	4.5	M3 x 0.5	4.0	17	16	5	0.16	10.1	8.1	400	800	-	RS1212A**	0.74
55	22	10	50	43	6.6	M6 x 1	5.0	22	22	7	0.29	13.6	11.6	500	1000	1500	RS1616A**	1.37
68	25	12	59	52	9	M6 x 1	6.0	25	27	8	0.49	17.3	14.9	500	1000	2000	RS2020A**	2.19
80	31	12	69	63	9	M6 x 1	6.0	31	32	10	0.80	22.0	19.6	1000	2000	2500	RS2525A**	3.43
100	37	15	84	80	11	M6 x 1	7.5	37	40	12	1.46	28.0	25.6	1000	2000	3000	RS3232A**	5.71
120	46	18	103	95	14	M6 x 1	9.0	46	49	15	2.69	35.0	31.8	2000	3000	4000	RS4040A**	8.82

- Remarks
- Nut assembly with arbor and the screw shaft are separated at time of delivery.
  - At the end of the screw shaft reference number where marked with "\*\*", fill with the value obtained by dividing the standard screw shaft length by 100 mm.
  - Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.

# R Series: Rolled Ball Screws

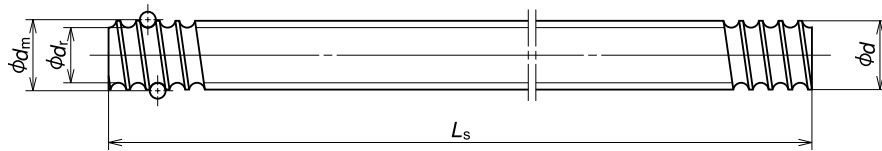
Return tube type, embedded-tube, flanged (fine, medium lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNFBL 1006A2.5S	10	6	2.381	10.65	8.1	2.5 x 1	2830	4810	0.10	26
RNFBL 1208A2.5S	12	8	2.778	12.65	9.6	2.5 x 1	3730	6560	0.10	29
RNFBL 1404A3.5S	14	4	2.778	14.5	11.5	3.5 x 1	5370	10800	0.10	31
RNFBL 1405A2.5S	14	5	3.175	14.5	11.0	2.5 x 1	5260	9720	0.10	32
RNFBL 1808A3.5S	18	8	4.762	18.5	13.6	3.5 x 1	13200	25800	0.15	50
RNFBL 2005A2.5S	20	5	3.175	20.5	17.0	2.5 x 1	6360	14200	0.10	40
RNFBL 2010A2.5S	20	10	4.762	21.25	16.2	2.5 x 1	10900	21800	0.15	52
RNFBL 2505A2.5S	25	5	3.175	25.5	22.0	2.5 x 1	7070	18200	0.10	43
RNFBL 2505A5S						2.5 x 2	12800	36300		
RNFBL 2510A2.5S	25	10	6.35	26	19.0	2.5 x 1	17500	35200	0.20	60
RNFBL 2510A5S						2.5 x 2	31800	70300		
RNFBL 2806A2.5S	28	6	3.175	28.5	25.0	2.5 x 1	7430	20300	0.10	50
RNFBL 2806A5S						2.5 x 2	13500	40600		
RNFBL 3210A2.5S	32	10	6.35	33.75	27.0	2.5 x 1	19700	46100	0.20	67
RNFBL 3210A5S						2.5 x 2	35700	92200		
RNFBL 3610A2.5S	36	10	6.35	37	30.0	2.5 x 1	21000	51000	0.20	70
RNFBL 3610A5S						2.5 x 2	38100	102000		
RNFBL 4010A5S	40	10	6.35	41.75	35.0	2.5 x 2	40100	116000	0.20	76

- Remarks
1. The actual screw shaft length may be slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  2. Nut assembly with arbor and screw shaft are separated at time of delivery.
  3. The value obtained by dividing the standard screw length by 100 mm will be entered at the end of the reference number where marked with "\*\*".

# Nut Model: RNFBL



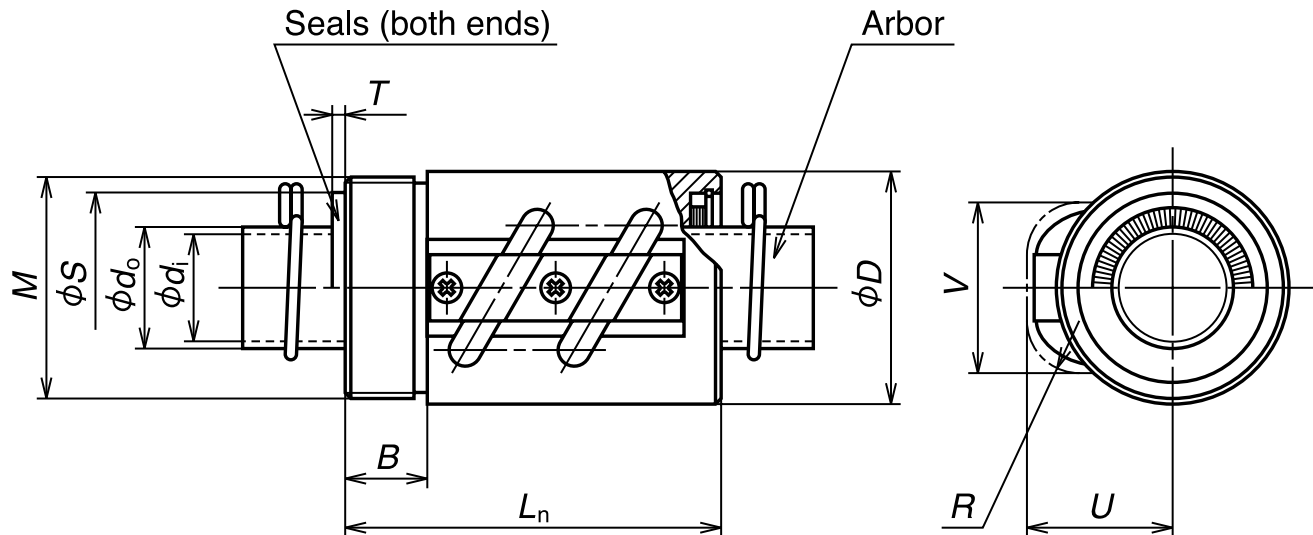
Unit: mm

Ball nut dimensions									Nut Mass (kg)	Arbor		Screw shaft				Shaft mass/m (kg)
Flange			Length		Bolt hole		Oil hole			Outside dia.	Bore	Standard length		Screw shaft		
A	H	B	Overall L <sub>n</sub>	(C)	W	X	Q	T		d <sub>o</sub>	d <sub>i</sub>	L <sub>s</sub>		No.		
42	29	8	36	3	34	4.5	M3 x 0.5	5.0	0.16	8.1	6.1	400	800	–	RS1006A**	0.56
45	32	8	44	3	37	4.5	M3 x 0.5	5.5	0.21	9.6	7.6	400	800	–	RS1208A**	0.81
50	37	10	40	4	40	4.5	M6 x 1	5.0	0.25	11.5	9.5	500	1000	–	RS1404A**	1.02
50	38	10	40	4	40	4.5	M6 x 1	5.0	0.26	11.0	9.0	500	1000	–	RS1405A**	1.00
80	60	12	61	4	65	6.6	M6 x 1	6.0	1.00	13.6	11.6	500	1000	1500	RS1808A**	1.60
60	46	10	40	4	50	4.5	M6 x 1	5.0	0.37	17.0	14.6	500	1000	2000	RS2005A**	2.17
82	64	12	61	5	67	6.6	M6 x 1	6.0	1.05	16.2	13.8	500	1000	2000	RS2010A**	2.18
67	50	10	40	4	55	5.5	M6 x 1	5.0	0.40	22.0	19.6	1000	2000	2500	RS2505A**	3.47
			0.50													
96	72	15	66	5	78	9.0	M6 x 1	7.5	1.52	19.0	16.6	1000	2000	2500	RS2510A**	3.13
			1.99													
80	60	12	47	5	65	6.6	M6 x 1	6.0	0.70	25.0	22.6	1000	2000	2500	RS2806A**	4.47
			0.87													
103	78	15	67	5	85	9.0	M6 x 1	7.5	1.72	27.0	24.6	1000	2000	3000	RS3210A**	5.53
			2.25													
110	82	17	69	5	90	11.0	M6 x 1	8.5	1.97	30.0	27.6	1000	2000	3000	RS3610A**	6.91
			2.53													
116	88	17	99	5	96	11.0	M6 x 1	8.5	2.86	35.0	31.8	2000	3000	4000	RS4010A**	8.87

Remarks 4. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.  
5. Seals for ball nuts with the shaft diameter of 14 mm or less are made of synthetic resin. Seals for those with 16 mm or larger are "Brush-seal."

# R Series: Rolled Ball Screws

## Return tube type, nut with V-thread (fine lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_t$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNCT 1003A3.5	10	3	2.381	10.65	8.1	3.5 x 1	3780	6730	0.10	20
RNCT 1404A3.5S	14	4	2.778	14.5	11.5	3.5 x 1	5370	10800	0.10	25
RNCT 1405A2.5S	14	5	3.175	14.5	11.0	2.5 x 1	5260	9720	0.10	30
RNCT 1808A3.5 RNCT 1808A3.5S	18	8	4.762	18.5	13.6	3.5 x 1	13200	25800	0.15	34
RNCT 2005A2.5 RNCT 2005A2.5S	20	5	3.175	20.5	17.0	2.5 x 1	6360	14200	0.10	40
RNCT 2505A5 RNCT 2505A5S	25	5	3.175	25.5	22.0	2.5 x 2	12800	36300	0.10	42
RNCT 2510A5 RNCT 2510A5S	25	10	6.35	26	19.0	2.5 x 2	31800	70300	0.20	44
RNCT 2806A5 RNCT 2806A5S	28	6	3.175	28.5	25.0	2.5 x 2	13500	40600	0.10	50
RNCT 3210A5 RNCT 3210A5S	32	10	6.35	33.75	27.0	2.5 x 2	35700	92200	0.20	55
RNCT 3610A5 RNCT 3610A5S	36	10	6.35	37	30.0	2.5 x 2	38100	102000	0.20	60
RNCT 4010A7 RNCT 4010A7S	40	10	6.35	41.75	35.0	3.5 x 2	53500	164000	0.20	65
RNCT 4512A5 RNCT 4512A5S	45	12	7.144	46.5	39.0	2.5 x 2	49600	147000	0.23	70
RNCT 5010A7 RNCT 5010A7S	50	10	6.35	51.75	45.0	3.5 x 2	59500	205000	0.20	80
RNCT 5016A5 RNCT 5016A5S	50	16	9.525	52	42.0	2.5 x 2	99900	293000	0.23	85

- Remarks
1. Protruding portion of the tube does not have any interference with the ball nut housing if its dimensions corresponding to U and V are large enough.
  2. The actual entire screw shaft length may become slightly longer than nominal length  $L_S$  due to manufacturing tolerance.
  3. A seal cannot be installed in the V thread side. It may be installed in the opposite side.

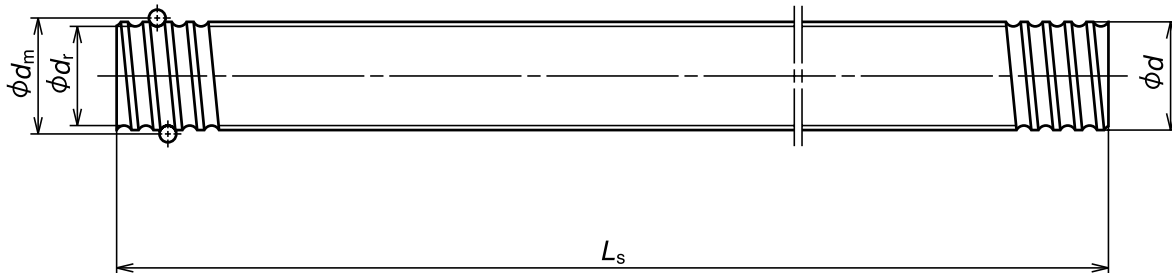
Seal is provided in the nut. Therefore, the external dimensions of those with a seal are the same as those without.

In the side view drawing of ball nut, above the center line is with seal, and beneath is without seal.

Seals for ball nuts with the shaft diameter of 14 mm or less are made of synthetic resin. Seals for those of 16 mm or over are "Brush-seals."

There is no seal on the V-thread side for RNCT1404A3.5S and RNCT1405A2.5S.

# Nut Model: RNCT



Unit: mm

Ball nut dimensions						Nut Mass (kg)	Seal dimensions		Arbor		Screw shaft			Shaft mass/m (kg)	
Flange		Length	Projecting tube				Diameter	Thickness	Outside dia.	Bore	Standard length		Screw shaft		
M	B	L <sub>n</sub>	U	V	R		S	T	d <sub>o</sub>	d <sub>i</sub>	L <sub>s</sub>		No.		
M18 x 1	10	38	15	15	7	0.049	-	-	8.1	6.1	400	800	-	RS1003A**	0.50
M24 x 1	10	43	19	20	7	0.083	-	-	11.5	9.5	500	1000	-	RS1404A**	1.02
M26 x 1.5	10	45	22	21	8	0.15	-	-	11.0	9.0	500	1000	-	RS1405A**	1.00
M32 x 1.5	12	58	27	27	8	0.21	28.5	2.5	13.6	11.6	500	1000	1500	RS1808A**	1.60
M36 x 1.5	12	48	28	27	10	0.28	29.5	2.5	17.0	14.6	500	1000	2000	RS2005A**	2.17
M40 x 1.5	15	69	28	31	10	0.38	34.5	2.5	22.0	19.6	1000	2000	2500	RS2505A**	3.47
M42 x 1.5	15	92	34	37	17	0.49	38.5	2.5	19.0	16.6	1000	2000	2500	RS2510A**	3.13
M45 x 1.5	15	79	33	34	10	0.68	37.5	2.5	25.0	22.6	1000	2000	2500	RS2806A**	4.47
M50 x 1.5	18	97	39	42	17	0.79	45.5	2.5	27.0	24.6	1000	2000	3000	RS3210A**	5.53
M55 x 2	18	98	42	46	17	0.97	50.5	3.0	30.0	27.6	1000	2000	3000	RS3610A**	6.91
M60 x 2	25	125	44	50	20	1.37	54.5	3.0	35.0	31.8	2000	3000	4000	RS4010A**	8.87
M65 x 2	30	124	47	55	20	1.42	60.5	3.0	39.0	35.8	2000	3000	4000	RS4512A**	11.16
M75 x 2	40	140	52	59	20	2.41	64.5	3.0	45.0	41.8	2000	3000	4000	RS5010A**	14.15
M80 x 2	40	158	57	63	25	3.14	68.5	3.0	42.0	38.8	2000	3000	4000	RS5016A**	13.48

4. Nut assembly with arbor and the screw shaft are separated at time of delivery.

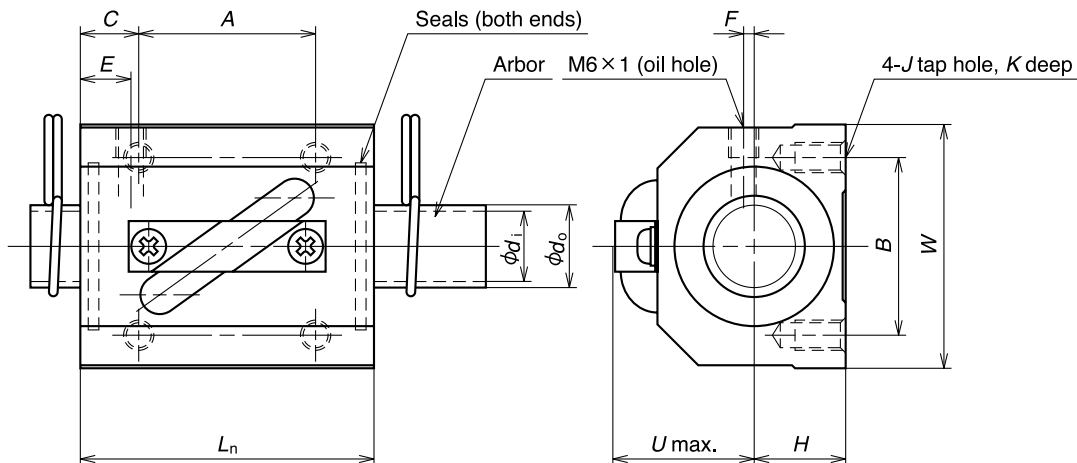
5. At the end of the screw shaft reference number where marked with "\*\*", fill with the value obtained by dividing the standard screw shaft length by 100 mm.

6. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.



# R Series: Rolled Ball Screws

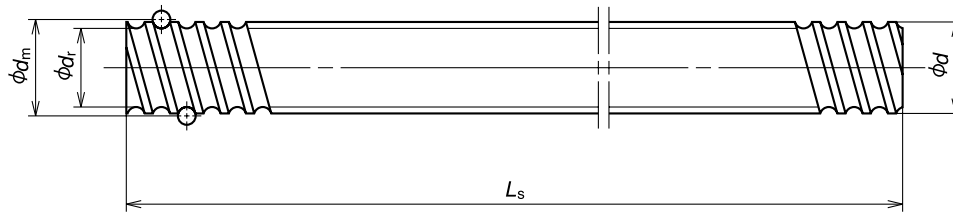
## Return tube type, square nut (fine, medium lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{0a}$		Outside dia. $D$
RNSTL 1404A3.5S	14	4	2.778	14.5	11.5	3.5 x 1	5370	10800	0.10	38
RNSTL 1405A2.5S	14	5	3.175	14.5	11.0	2.5 x 1	5260	9720	0.10	38
RNSTL 1808A3.5S	18	8	4.762	18.5	13.6	3.5 x 1	13200	25800	0.15	56
RNSTL 2005A2.5S	20	5	3.175	20.5	17.0	2.5 x 1	6360	14200	0.10	38
RNSTL 2010A2.5S	20	10	4.762	21.25	16.2	2.5 x 1	10900	21800	0.15	58
RNSTL 2505A2.5S	25	5	3.175	25.5	22.0	2.5 x 1	7070	18200	0.10	35
RNSTL 2510A5S	25	10	6.35	26	19.0	2.5 x 2	31800	70300	0.20	94
RNSTL 2806A2.5S	28	6	3.175	28.5	25.0	2.5 x 1	7430	20300	0.10	42
RNSTL 2806A5S						2.5 x 2	13500	40600		67
RNSTL 3210A2.5S	32	10	6.35	33.75	27.0	2.5 x 1	19700	46100	0.20	64
RNSTL 3210A5S						2.5 x 2	35700	92200		94
RNSTL 3610A2.5S	36	10	6.35	37	30.0	2.5 x 1	21000	51000	0.20	64
RNSTL 3610A5S						2.5 x 2	38100	102000		96
RNSTL 4512A5S	45	12	7.144	46.5	39.0	2.5 x 2	49600	147000	0.23	115

- Remarks
1. The actual screw shaft length may be slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  2. Nut assembly with arbor and screw shaft are separated at time of delivery.
  3. The value obtained by dividing the standard screw length by 100 mm will be entered at the end of the reference number where marked with " \* \* ".

# Nut Model: RNSTL



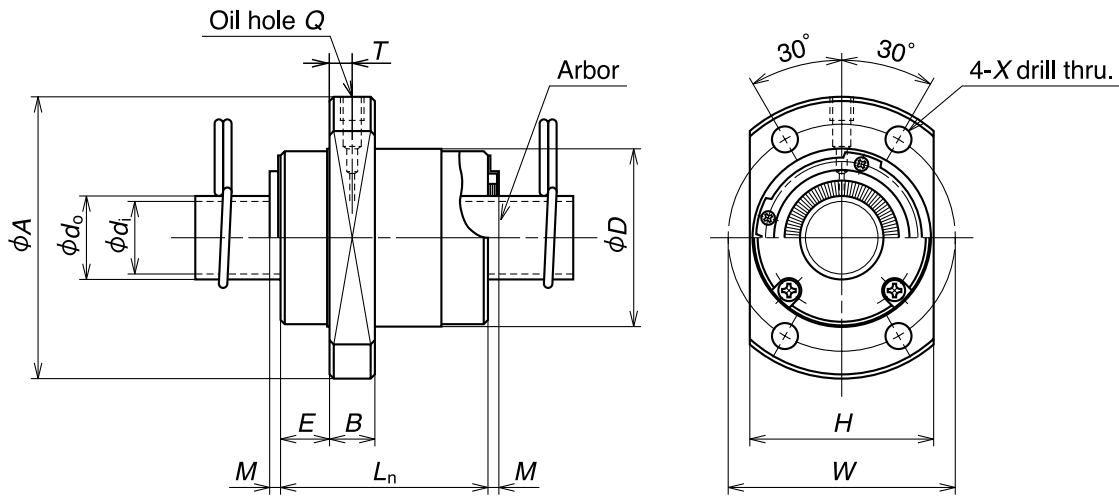
Unit: mm

Ball nut dimensions										Nut Mass (kg)	Arbor		Screw shaft				Shaft mass/m (kg)
Width	Center height	Bolt hole					Oil hole				Outside dia.	Bore	Standard length			Screw shaft	
<i>W</i>	<i>H</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>J</i>	<i>K</i>	<i>E</i>	<i>F</i>	<i>U</i>		<i>d<sub>e</sub></i>	<i>d<sub>i</sub></i>	<i>L<sub>s</sub></i>			No.	
34	13	22	26	8	M4	7	7	3	20	0.20	11.5	9.5	500	1000	-	RS1404A**	1.02
34	13	22	26	8	M4	7	7	3	21	0.20	11.0	9.0	500	1000	-	RS1405A**	1.00
48	17	35	35	10.5	M6	10	8	3	26	0.31	13.6	11.6	500	1000	1500	RS1808A**	1.60
48	17	22	35	8	M6	9	6	2	27	0.24	17.0	14.6	500	1000	2000	RS2005A**	2.17
48	18	35	35	11.5	M6	10	10	2	28	0.35	16.2	13.8	500	1000	2000	RS2010A**	2.18
60	20	22	40	6.5	M8	10	6	0	27	0.31	22.0	19.6	1000	2000	2500	RS2505A**	3.47
60	23	60	40	17	M8	12	10	0	32	1.32	19.0	16.6	1000	2000	2500	RS2510A**	3.13
60	22	18	40	12	M8	12	8	0	32	0.65	25.0	22.6	1000	2000	2500	RS2806A**	4.47
60	22	40	40	13.5						1.04							
70	26	45	50	9.5	M8	12	10	0	38	1.12	27.0	24.6	1000	2000	3000	RS3210A**	5.53
70	26	60	50	17						1.75							
86	29	45	60	9.5	M10	16	11	0	41	1.76	30.0	27.6	1000	2000	3000	RS3610A**	6.91
86	29	60	60	18						2.64							
100	36	75	75	20	M12	20	13	0	46	1.22	39.0	35.8	2000	3000	4000	RS4512A**	11.16

Remarks 4. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.  
5. Seals for ball nuts with the shaft diameter of 14 mm or less are made of synthetic resin. Seals for those with 18 mm or larger are "Brush-seals."

# R Series: Rolled Ball Screws

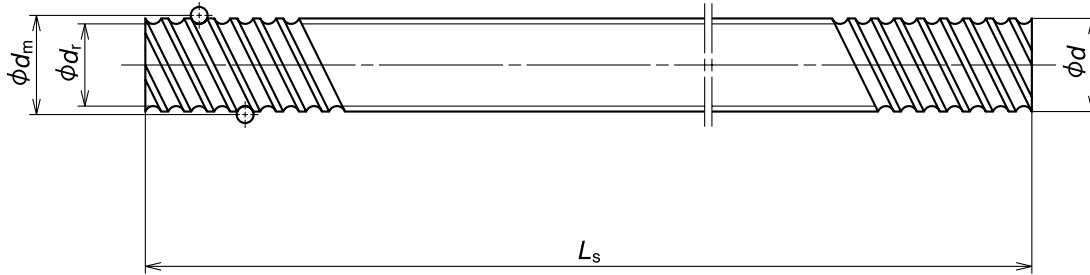
## End cap type, flanged nut (high helix lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{oa}$		Outside dia. $D$
RNFCL 1212A3 RNFCL 1212A6	12	12	2.381	12.65	10.1	1.7 x 2 1.7 x 4	3740 6780	6640 13300	0.10	26
RNFCL 1520A3 RNFCL 1520A3S	15	20	3.175	15.5	12.2	1.7 x 2	6730	12300	0.10	33
RNFCL 1616A3 RNFCL 1616A3S RNFCL 1616A6 RNFCL 1616A6S	16	16	2.778	16.65	13.5	1.7 x 2 1.7 x 4	5430 9860	10400 20800	0.10	32
RNFCL 2020A3 RNFCL 2020A3S RNFCL 2020A6 RNFCL 2020A6S	20	20	3.175	20.75	17.3	1.7 x 2 1.7 x 4	7810 14200	16500 33000	0.10	39
RNFCL 2525A3 RNFCL 2525A3S RNFCL 2525A6 RNFCL 2525A6S	25	25	3.969	26	22.0	1.7 x 2 1.7 x 4	11700 21200	25800 51500	0.12	47
RNFCL 3232A3 RNFCL 3232A3S RNFCL 3232A6 RNFCL 3232A6S	32	32	4.762	33.25	28.0	1.7 x 2 1.7 x 4	17100 31000	40500 81000	0.15	58
RNFCL 4040A3 RNFCL 4040A3S RNFCL 4040A6 RNFCL 4040A6S	40	40	6.35	41.75	35.0	1.7 x 2 1.7 x 4	27200 49300	67900 136000	0.20	73
RNFCL 5050A3 RNFCL 5050A3S RNFCL 5050A6 RNFCL 5050A6S	50	50	7.938	52.25	44.0	1.7 x 2 1.7 x 4	40600 73700	106000 212000	0.25	90

- Remarks
1. The actual screw shaft length may be slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  2. Nut assembly with arbor and screw shaft are separated at time of delivery.
  3. The value obtained by dividing the standard screw length by 100 mm will be entered at the end of the reference number where marked with "\*\*".

# Nut Model: RNFCL



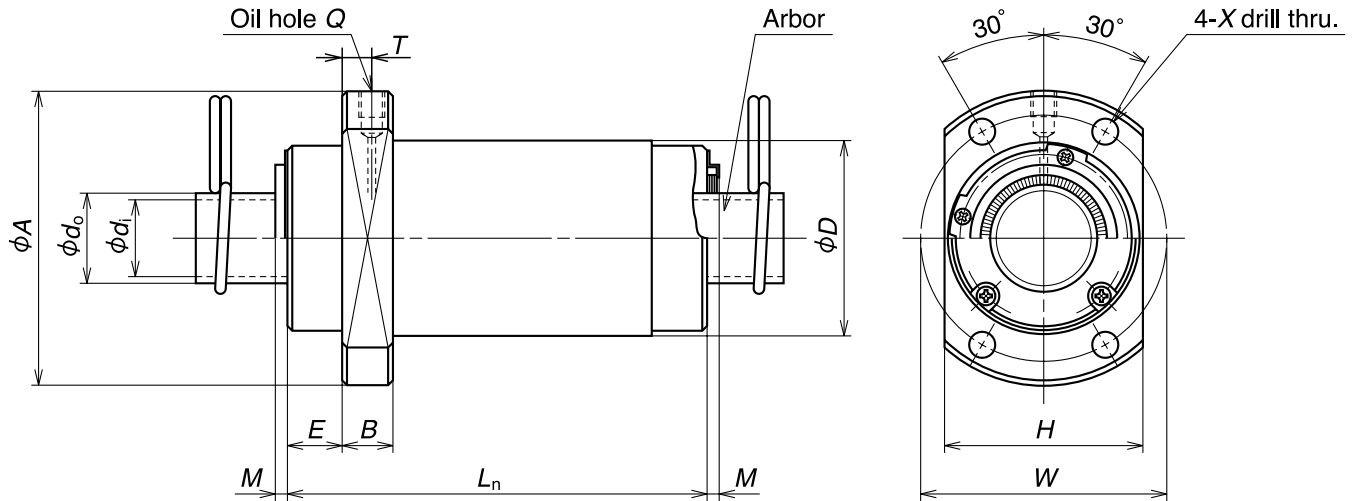
Unit: mm

Ball nut dimensions										Nut Mass (kg)	Arbor		Screw shaft			Shaft mass/m (kg)	
Flange			Length			Bolt hole		Oil hole			Outside dia.	Bore	Standard length		Screw shaft		
A	H	B	E	$L_n$	M	W	X	Q	T		$d_o$	$d_i$	$L_s$		No.		
44	28	6	9	30	-	35	4.5	M3 x 0.5	3.0	0.12	10.1	8.1	400	800	-	RS1212A**	0.74
51	35	10	11	45	-	42	4.5	M6 x 1	5.0	0.28	12.2	10.2	500	1000	1500	RS1520A**	1.15
					3												
53	34	10	10	38	-	42	4.5	M6 x 1	5.0	0.23	13.5	11.5	500	1000	1500	RS1616A**	1.37
					3												
					3												
62	41	10	11.5	46	-	50	5.5	M6 x 1	5.0	0.37	17.3	14.9	500	1000	2000	RS2020A**	2.19
					3												
					3												
74	49	12	13	55	-	60	6.6	M6 x 1	6.0	0.62	22.0	19.6	1000	2000	2500	RS2525A**	3.43
					3												
					3												
92	60	12	16	70	-	74	9	M6 x 1	5.5	1.10	28.0	25.6	1000	2000	3000	RS3232A**	5.71
					3												
					3												
114	75	15	19.5	85	-	93	11	M6 x 1	6.5	2.09	35.0	31.8	2000	3000	4000	RS4040A**	8.82
					3.5												
					3.5												
135	92	20	21.5	107	-	112	14	M6 x 1	7.0	3.90	44.0	40.8	2000	3000	4000	RS5050A**	13.81
					3.5												
					3.5												

Remarks 4. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.  
5. The entire length of the nut becomes longer by "2 x M" for those with a seal. The seal is "Brush-seal."

# R Series: Rolled Ball Screws

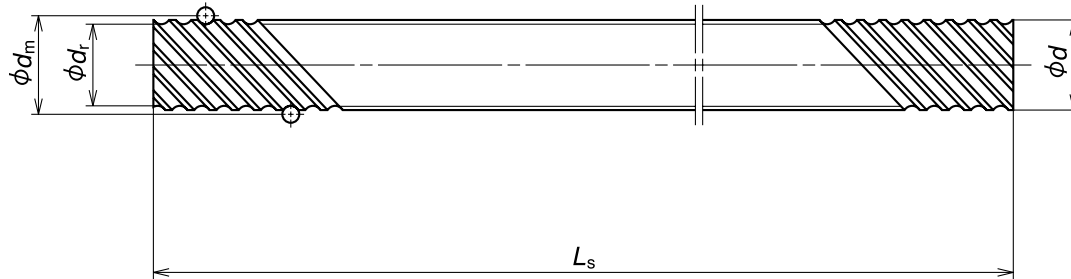
End cap type, flanged nut (ultra high helix lead)



Ball nut no.	Shaft diameter $d$	Lead $l$	Ball diameter $D_w$	Ball circle diameter $d_m$	Root diameter $d_r$	Effective turns of balls Turns x circuits	Basic load rating (N)		Axial play Max.	Ball nut dimensions
							Dynamic $C_a$	Static $C_{oa}$		Outside dia. $D$
RNFCL 1632A2 RNFCL 1632A2S	16	32	2.778	16.65	13.5	0.7 x 4	4600	8460	0.10	32
RNFCL 1632A3 RNFCL 1632A3S						1.7 x 2	5430	10400		
RNFCL 1632A6 RNFCL 1632A6S						1.7 x 4	9860	20800		
RNFCL 2040A2 RNFCL 2040A2S	20	40	3.175	20.75	17.3	0.7 x 4	6610	13600	0.10	38
RNFCL 2040A3 RNFCL 2040A3S						1.7 x 2	7810	16500		
RNFCL 2040A6 RNFCL 2040A6S						1.7 x 4	14200	33000		
RNFCL 2550A2 RNFCL 2550A2S	25	50	3.969	26	22.0	0.7 x 4	9870	21200	0.12	46
RNFCL 2550A3 RNFCL 2550A3S						1.7 x 2	11700	25800		
RNFCL 2550A6 RNFCL 2550A6S						1.7 x 4	21200	51500		
RNFCL 3264A3 RNFCL 3264A3S	32	64	4.762	33.25	28.0	1.7 x 2	17100	40500	0.15	58
RNFCL 3264A6 RNFCL 3264A6S						1.7 x 4	31000	81000		
RNFCL 4080A3 RNFCL 4080A3S	40	80	6.350	41.75	35.0	1.7 x 2	27200	67900	0.20	73
RNFCL 4080A6 RNFCL 4080A6S						1.7 x 4	49300	136000		

- Remarks
1. The actual screw shaft length may be slightly longer than nominal length  $L_n$  due to manufacturing tolerance.
  2. Nut assembly with arbor and screw shaft are separated at time of delivery.
  3. The value obtained by dividing the standard screw length by 100 mm will be entered at the end of the reference number where marked with "\*\*".

# Nut Model: RNFCL



Unit: mm

Ball nut dimensions										Nut Mass (kg)	Arbor		Screw shaft				Shaft mass/m (kg)	
Flange			Length			Bolt hole		Oil hole			Outside dia. $d_o$	Bore $d_i$	Standard length			Screw shaft		
A	H	B	E	$L_n$	M	W	X	Q	T				$L_s$					No.
50	34	10	10	34	-	41	4.5	M6 x 1	5.5	0.21	13.5	11.5	500	1000	1500	-	RS1632A**	1.34
				66	-					0.33								
				66	3					0.33								
58	40	10	11	41	-	48	5.5	M6 x 1	5.5	0.31	17.3	14.9	500	1000	1500	2000	RS2040A**	2.15
				81	-					0.53								
				81	3					0.53								
70	48	12	13	50	-	58	6.6	M6 x 1	7.0	0.53	22.0	19.6	1000	2000	2500	-	RS2550A**	3.37
				100	-					0.91								
				100	3					0.91								
92	60	12	15.5	126	-	74	9	M6 x 1	7.5	1.76	28.0	25.6	1000	2000	3000	4000	RS3264A**	5.63
				-	3													
				-	3													
114	75	15	19	158	-	93	11	M6 x 1	10	3.44	35.0	31.8	2000	3000	4000	5000	RS4080A**	8.69
				-	3.5													
				-	3.5													

Remarks 4. Items in stock are not provided with any special surface treatment. NSK provides treatment such as phosphate coating on request.  
5. The entire length of the nut becomes longer by "2 x M " for those with a seal. The seal is "Brush-seal."

# Shaft End Configuration of a Rolled Ball Screw

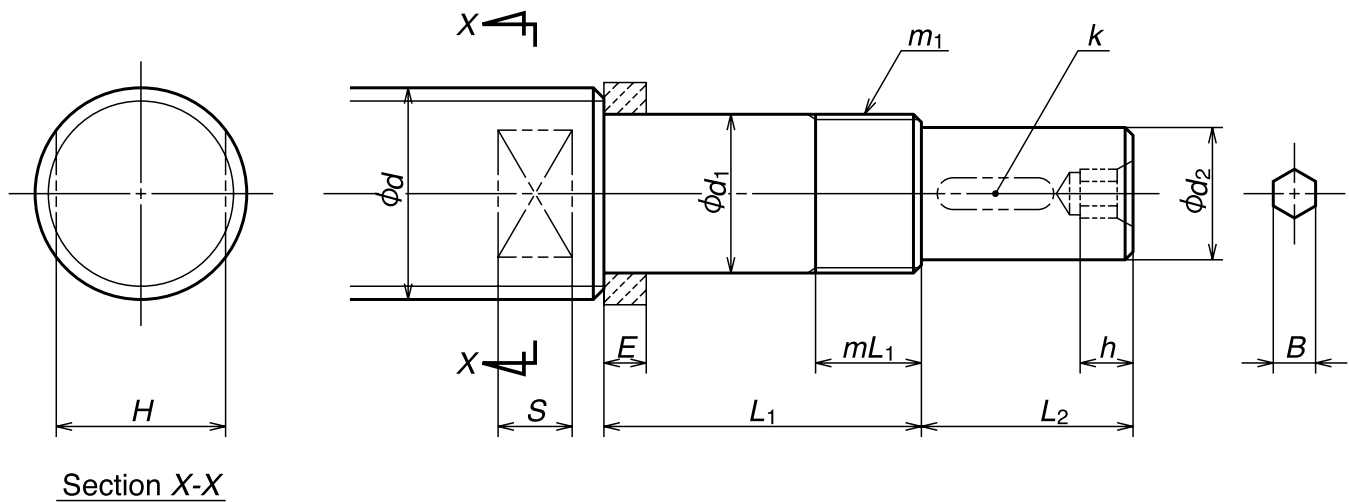


Figure 1 Rolled ball screw shaft end (drive side)

Table 3 Dimensions of rolled screw shaft ends (drive side)

Unit: mm

Screw shaft diameter $d$	Bearing journal		Thread for lock nut		Spacer*	Drive section			Hexagonal hole		Wrench flat		Support unit Reference No.	
	Outside diameter $d_1$	Length $L_1$	Nominal spec $m_1$	Length $mL_1$	Width $E$	Outside diameter $d_2$	Length $L_2$	Key width $K$	Width across flats $B$	Depth $h$	Width across flats $H$	Length $S$		
10	6	27	M6x0.75	7	5.0	4.5	7.5	–	–	–	8	4.5	WBK06-01A	WBK06-11
12	8	32	M8x1	9	5.5	6	10	–	–	–	10	5.5	WBK08-01A	WBK08-11
14	10	35	M10x1	10	5.5	8	15	–	–	–	12	6.5	WBK10-01A	WBK10-11
15	10	35	M10x1	10	5.5	8	15	–	–	–	12	6.5	WBK10-01A	WBK10-11
16	12	35	M12x1	10	5.5	10	15	3	4	6	12	6.5	WBK12-01A	WBK12-11
18	12	35	M12x1	10	5.5	10	15	3	4	6	12	6.5	WBK12-01A	WBK12-11
20	15	50	M15x1	15	10	12	20	4	5	7	17	8.5	WBK15-01A	WBK15-11
25	20	64	M20x1	16	11	15	27	5	6	8	22	10	WBK20-01	WBK20-11
28	20	64	M20x1	16	11	15	27	5	6	8	22	10	WBK20-01	WBK20-11
32	25	76	M25x1.5	20	14	20	33	6	8	10	27	12	WBK25-01	WBK25-11
36	25	76	M25x1.5	20	14	20	33	6	8	10	27	12	WBK25-01	WBK25-11
40	30	89	M30x1.5	26	–	25	61	8	10	12	–	–	WBK30DF-31	
45	35	92	M35x1.5	30	–	30	63	8	12	14	–	–	WBK35DF-31	
50	35	92	M35x1.5	30	–	30	63	8	12	14	–	–	WBK35DF-31	

Note : The dimension  $d_1$  shall be smaller enough than the minor diameter of the ball screw thread to provide sufficient shoulder surface for the spacer.

\* For spacer information please refer to page 31.



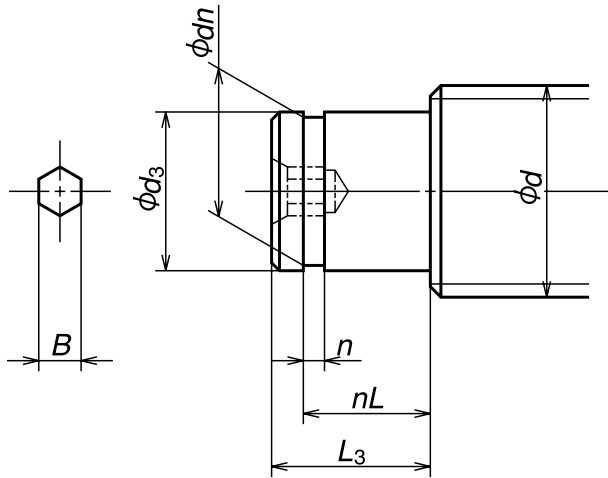


Figure 2 Shaft end configuration of rolled ball screw (opposite to the drive side)





Table 4 Dimensions of rolled ball screw shaft end (opposite to the drive side)

Unit: mm

Screw shaft diameter $d$	Bearing journal		Retaining ring groove			Hexagonal hole		Support unit Numbers in parentheses are bearing reference numbers.
	Outside diameter $d_3$	Length $L_3$	Width $n$	Groove diameter $dn$	Groove position $nL$	Width across flats $B$	Depth $h$	
10	6	9	0.8	5.7	6.8	–	–	WBK08S-01(606)
12	8	10	0.9	7.6	7.9	–	–	WBK10S-01(608)
14	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)
15	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)
16	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)
18	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)
20	15	13	1.15	14.3	10.15	5	7	WBK15S-01(6002)
25	20	19	1.35	19	15.35	6	8	WBK20S-01(6204)
28	20	19	1.35	19	15.35	6	8	WBK20S-01(6204)
32	25	20	1.35	23.9	16.35	8	10	WBK25S-01(6205)
36	25	20	1.35	23.9	16.35	8	10	WBK25S-01(6205)
40	30	22	1.75	28.6	17.75	10	12	(6206)
45	35	23	1.75	33	18.75	12	14	(6207)
50	35	23	1.75	33	18.75	12	14	(6207)

# Ball Screw Support Units - Classification

**Table 5 Support unit categories**

Application	Shape	Support side	Bearing in use	Bearing bore Bearing seat diameter	Page
Small equipment, light load	Square WBK**-01 	Fixed support side	Angular contact ball bearing	ø6~ø25	26
	Square WBK**S-01 	Simple support side	Deep groove ball bearing	ø6~ø25	28
Small equipment, light load	Round WBK**-11 	Fixed support side	Angular contact ball bearing	ø6~ø25	30
Machine tools, heavy load	Round WBK**DF*-31 	Fixed support side	Thrust angular contact ball bearing	ø17~ø40	32

## Features

- Short delivery time: Standardized items in stock.
  - Use most suitable bearings.
- 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.

- High dust prevention, and low friction torque.  
Oil seal is installed in small clearance on the fixed support side. A deep-groove ball bearing with a shield on both sides is used on the simple support side. This minimizes friction torque.
- Lock nut is provided.  
A lock nut of fine grade finish is provided to fix the bearing with high precision.

# Ball Screw Support Units - Reference Numbers

(For light load)

**Example: W B K 0 8 S - 0 1 A**

Product code for support unit

Nominal size code\*

Mounting code

No code: Fixed support unit

S: Simple support unit

No code or A: For general 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 (Page 29).

(For heavy load)

**Example: W B / B K 2 5 D F - 3 1**

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

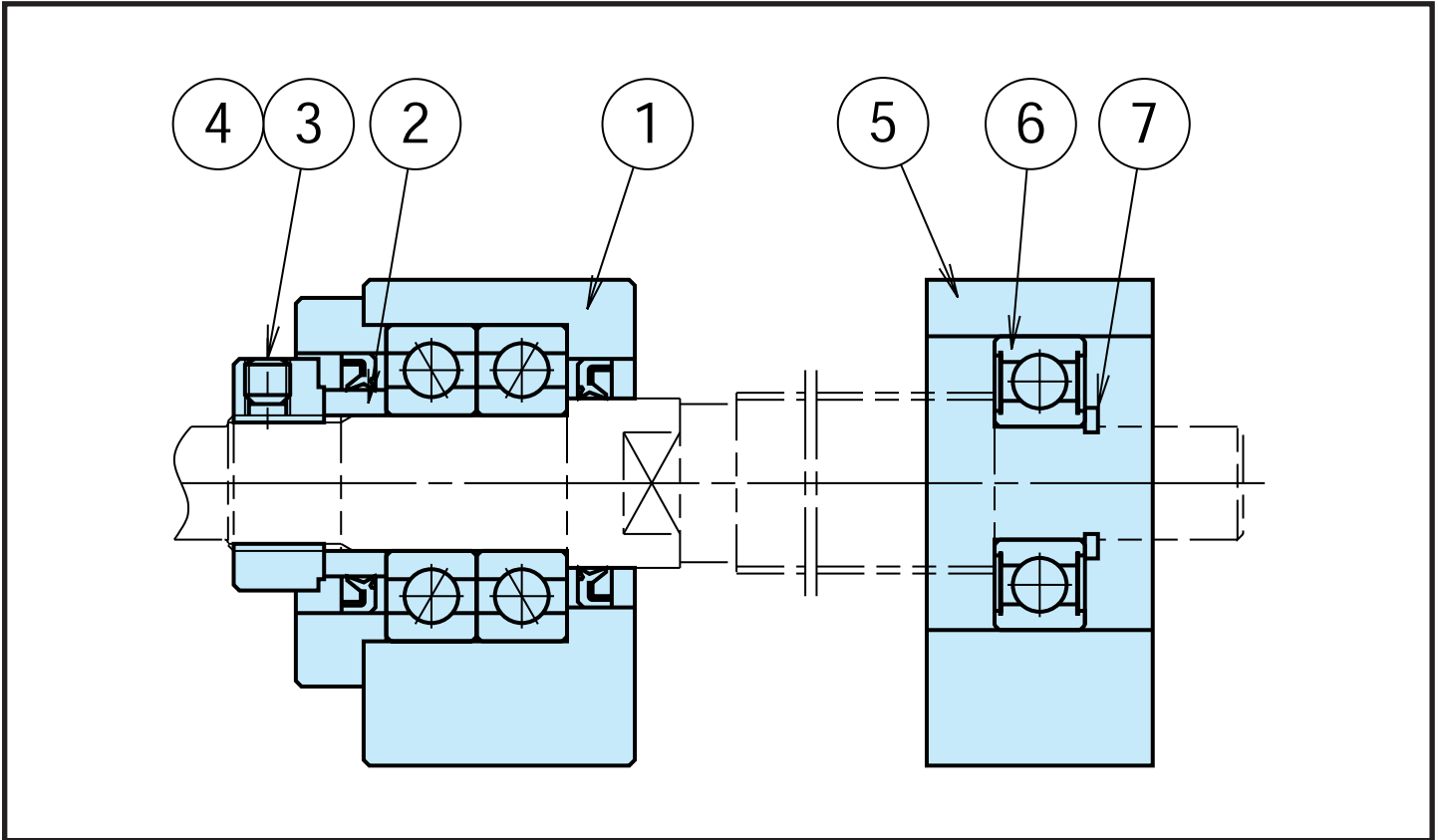
Design serial number

# Ball Screw Support Units - Components

Support units provide everything necessary for mounting ball screws to machines.

(Please refer to Table 6.)

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



## Antirust treatment

Table 7 shows the surface treatment for the bearing housing and material of small parts.

Table 6

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

Table 7

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

# Ball Screw Support Units - Light Loads

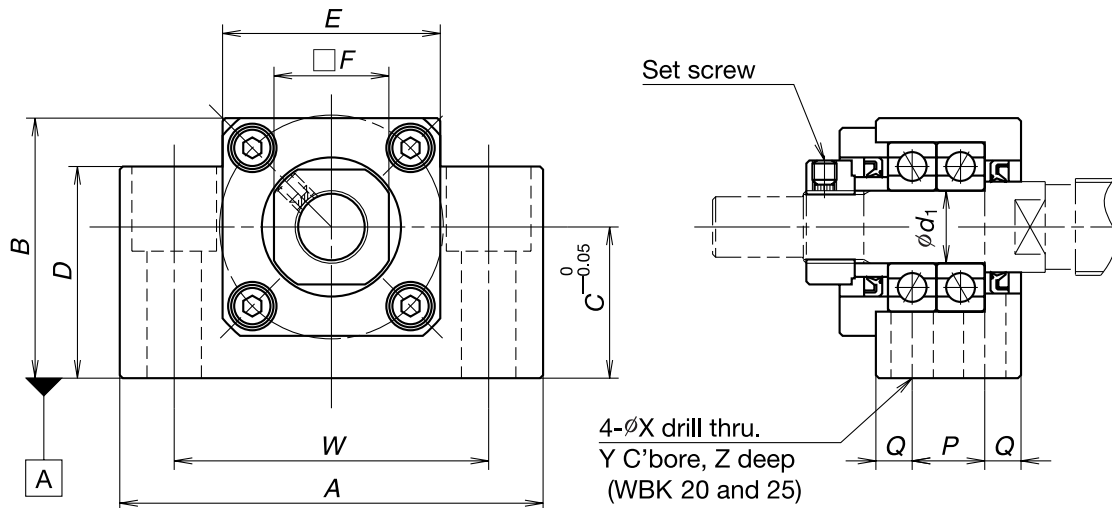
**Table 8 Specifications of support unit for general use**

Fixed support side support unit					Simple support side support unit		
Reference no.	Axial direction			Maximum starting torque [N·cm]	Reference no.	Bearing reference no.	Radial direction
	Basic dynamic load rating Ca [N]	Load limit [N]	Stiffness [N/μm]				Basic dynamic load rating C [N]
WBK06-01A (SQUARE) WBK06-11 (ROUND)	2 670	1 040	28	0.49	—	—	—
WBK08-01A (SQUARE) WBK08-11 (ROUND)	4 400	1 450	49	0.88	WBK08S-01 (SQUARE)	606ZZ	2 260
WBK10-01A (SQUARE) WBK10-11 (ROUND)	6 600	2 730	94	1.9	WBK10S-01 (SQUARE)	608ZZ	3 300
WBK12-01A (SQUARE) WBK12-11 (ROUND)	7 100	3 040	104	2.1	WBK12S-01 (SQUARE)	6000ZZ	4 550
WBK15-01A (SQUARE) WBK15-11 (ROUND)	7 600	3 380	113	2.4	WBK15S-01 (SQUARE)	6002ZZ	5 600
WBK20-01 (SQUARE) WBK20-11 (ROUND)	17 900	8 240	155	6.0	WBK20S-01 (SQUARE)	6204ZZ	12 800
WBK25-01 (SQUARE) WBK25-11 (ROUND)	20 200	10 000	192	7.2	WBK25S-01 (SQUARE)	6205ZZ	14 000

# Support Unit

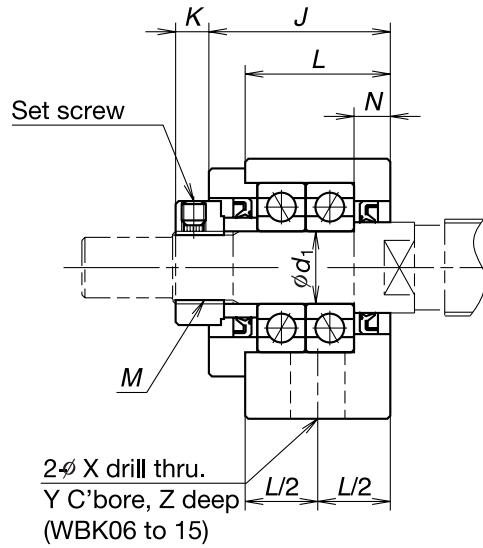
(Support units for light load and small equipment)

Fixed support side, support unit (square type)



Reference no.	Fixed support side support unit (square type)							
For general use	$d_1$	A	B	C	D	E	F	J
WBK06-01A	6	42	25	13	20	18	12	20
WBK08-01A	8	52	32	17	26	25	14	23
WBK10-01A	10	70	43	25	35	36	17	30
WBK12-01A	12	70	43	25	35	36	19	30
WBK15-01A	15	80	50	30	40	41	22	31
WBK20-01	20	95	58	30	45	56	30	52
WBK25-01	25	105	68	35	25	66	36	61

- Notes:
1. Use datum face A to mount a machine base.
  2. Tighten a set screw after a locknut is adjusted and tightened.
  3. Insert the set piece that is provided with support unit to a screw hole, and then tighten the set screw.



Reference no.	Locknut tightening torque (reference) [N•cm]	Set screw tightening torque (reference) [N•cm]
WBK06-**	245	69 (M3)
WBK08-**	490	69 (M3)
WBK10-**	930	147 (M4)
WBK12-**	1 370	147 (M4)
WBK15-**	2 350	147 (M4)
WBK20-**	4 700	147 (M4)
WBK25-**	8 400	490 (M6)

Unit: mm

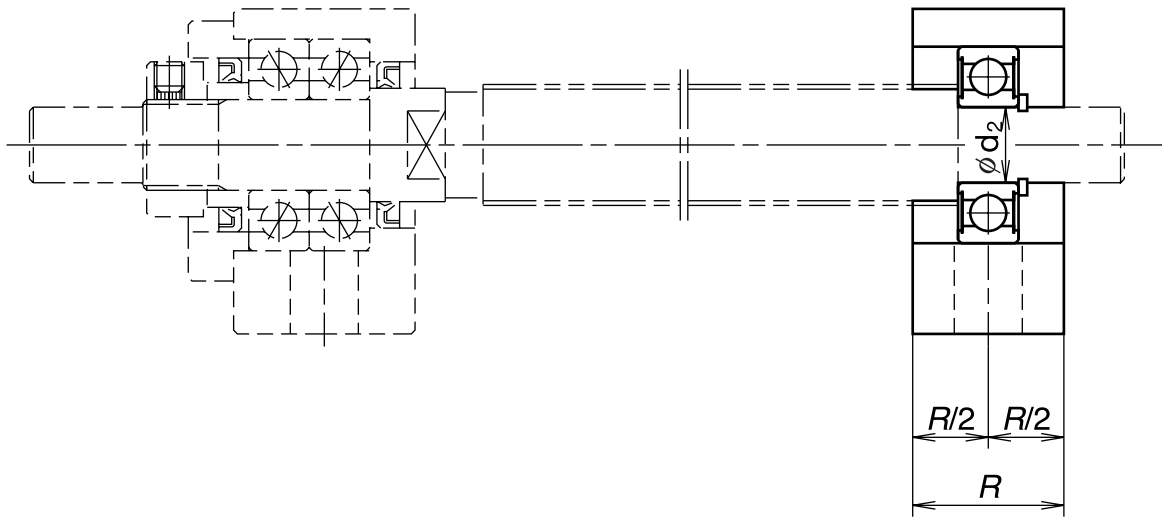
Fixed support side support unit (square type)									
$K$	$L$	$N$	$P$	$Q$	$W$	$X$	$Y$	$Z$	$M$
5.5	—	3.5	—	—	30	5.5	9.5	11	M6 x 0.75
7	—	4	—	—	38	6.6	11	12	M8 x 1
5.5	24	6	—	—	52	9	14	11	M10 x 1
5.5	24	6	—	—	52	9	14	11	M12 x 1
12	25	5	—	—	60	11	17	15	M15 x 1
10	42	10	22	10	75	11	17	15	M20 x 1
13	48	14	30	9	85	11	No counter bores		M25 x 1.5



# Support Unit

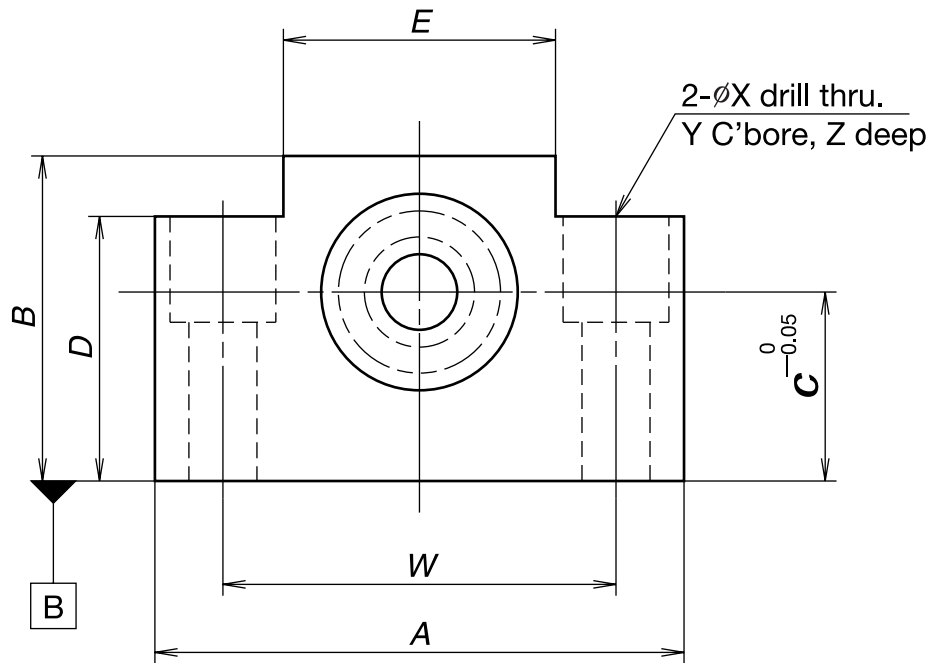
(Support units for light load and small equipment)

Simple support side, support unit (square type)



Reference no.	Simple support side support unit (square type)			
For general use	$d_2$	$R$	$A$	$B$
WBK08S-01	6	15	52	32
WBK10S-01	8	20	70	43
WBK12S-01	10	20	70	43
WBK15S-01	15	20	80	50
WBK20S-01	20	26	95	58
WBK25S-01	25	30	105	68

Notes: 1. Use datum face B to mount a machine base.



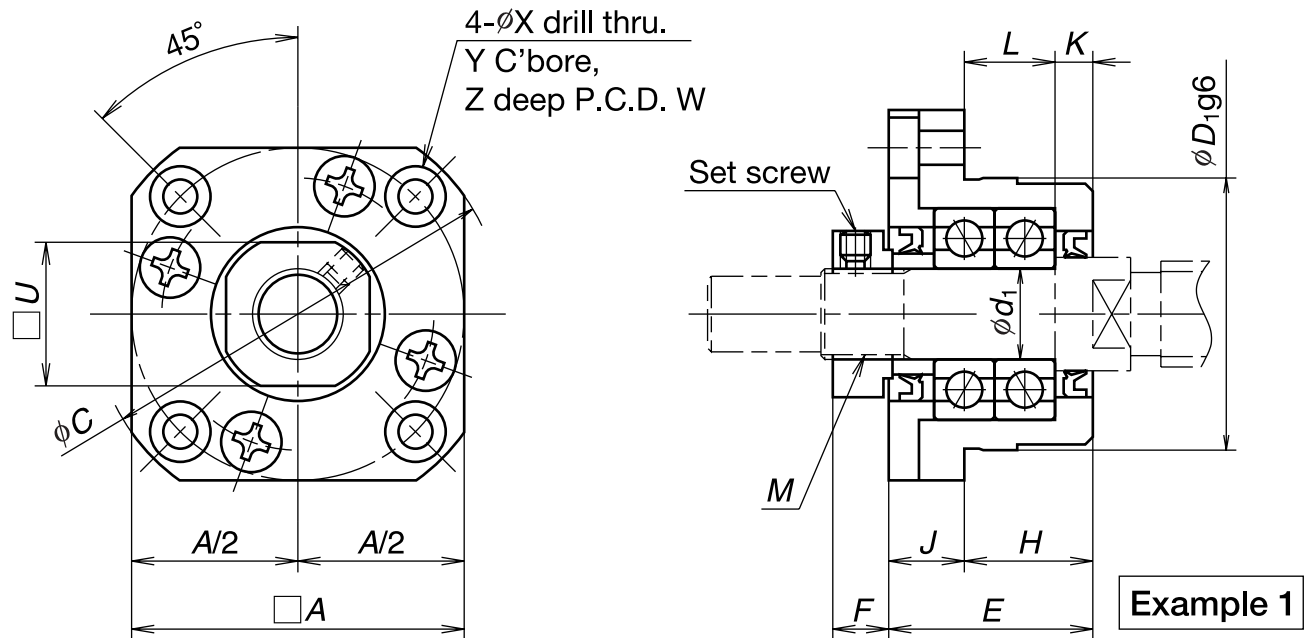
Unit: mm

Fixed support side support unit (square type)						
C	D	E	W	X	Y	Z
17	26	25	38	6.6	11	12
25	35	36	52	9	14	11
25	35	36	52	9	14	11
30	40	41	60	9	14	11
30	45	56	75	11	17	15
35	25	66	85	11	No counter bores	

# Support Unit

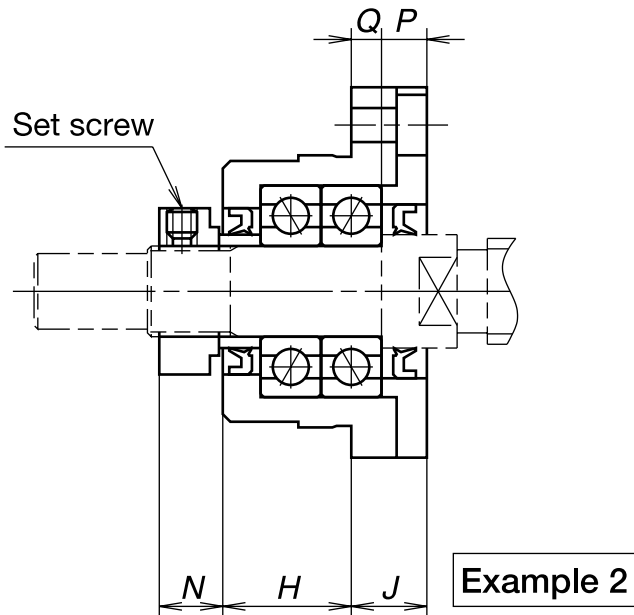
(Support units for light load and small equipment)

Fixed support side, support unit (round type)



Reference no.	Fixed support side support unit (square type)								
For general use	$d_1$	$A$	$C$	$D_1$	$E$	$F$	$H$	$J$	$K$
WBK06-11	6	28	35	22	20	5.5	13	7	3.5
WBK08-11	8	35	43	28	23	7	14	9	4
WBK10-11	10	42	52	34	27	7.5	17	10	5
WBK12-11	12	44	54	36	27	7.5	17	10	5
WBK15-11	15	52	63	40	32	12	17	15	6
WBK20-11	20	68	85	57	52	10	30	22	10
WBK25-11	25	79	98	63	57	13	30	27	10

- Notes:
1. Tighten a set screw after a locknut is adjusted and tightened.
  2. Insert the set piece that is provided with support unit to a screw hole, and then tighten the set screw.



Reference no.	Locknut tightening torque (reference) [N•cm]	Set screw tightening torque (reference) [N•cm]
WBK06-**	245	69 (M3)
WBK08-**	490	69 (M3)
WBK10-**	930	147 (M4)
WBK12-**	1 370	147 (M4)
WBK15-**	2 350	147 (M4)
WBK20-**	4 700	147 (M4)
WBK25-**	8 400	490 (M6)

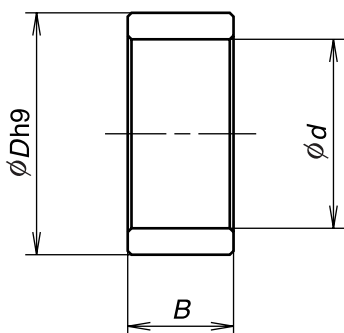
Unit: mm

Fixed support side support unit (square type)									
L	N	P	Q	U	W	X	Y	Z	M
9.5	6.5	4.5	2.5	12	28	2.9	5.5	3.5	M6 x 0.75
10	8	5	4	14	35	3.4	6.5	4	M8 x 1
12	8.5	6	4	17	42	4.5	8	4	M10 x 1
12	8.5	6	4	19	44	4.5	8	4	M12 x 1
11	14	8	7	22	50	5.5	9.5	6	M15 x 1
20	14	14	8	30	70	6.6	11	10	M20 x 1
20	20	17	10	36	80	9	15	13	M25 x 1.5

### Spacer

It requires an optional spacer to the side where ball thread is cut through, such as a rolled ball screw shaft when mounting the support unit for fixed support side.

Unit: mm



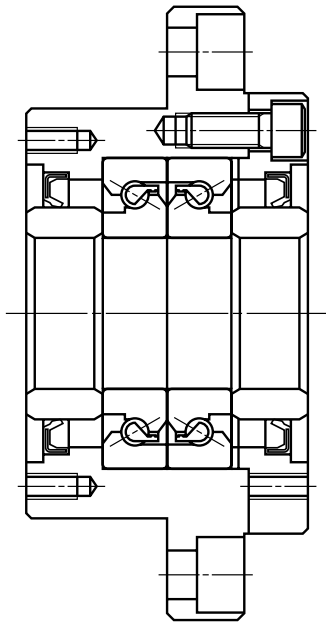
Reference no.	Internal diameter, d	Outside diameter, D	Width B	Applicable support unit
WBK06K	6	9.5	5.0	WBK06-**
WBK08K	8	11.5	5.5	WBK08-**
WBK10K	10	14.5	5.5	WBK10-**
WBK12K	12	15.0	5.6	WBK12-**
WBK15K	15	19.5	10.0	WBK15-**
WBK20K	20	25.5	11.0	WBK20-**
WBK25K	25	32.0	14.0	WBK25-**

Note: Refer to page 20 for spacer location.

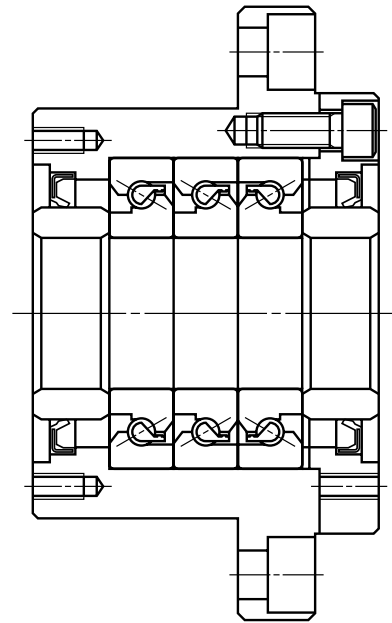
# Ball Screw Support Units - Heavy Loads

## Dimensions of support unit: heavy-load applications

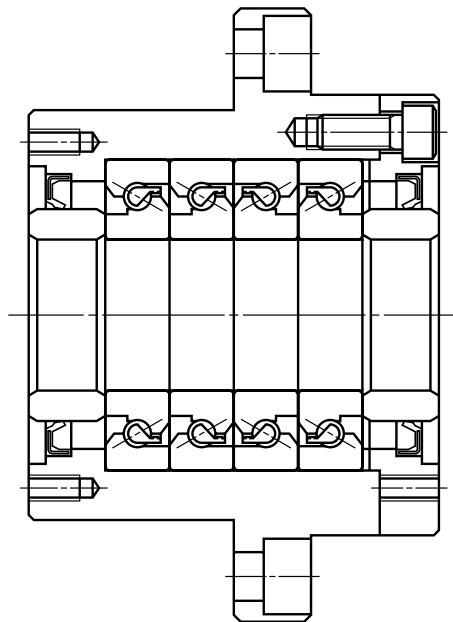
Support units for heavy-load / machine tools use a thrust angular contact ball bearing (TAC Series) with high rigidity and accuracy. The thrust angular contact ball bearing has very suitable functions and structure as a ball screw support bearing. There are three combinations as shown below.



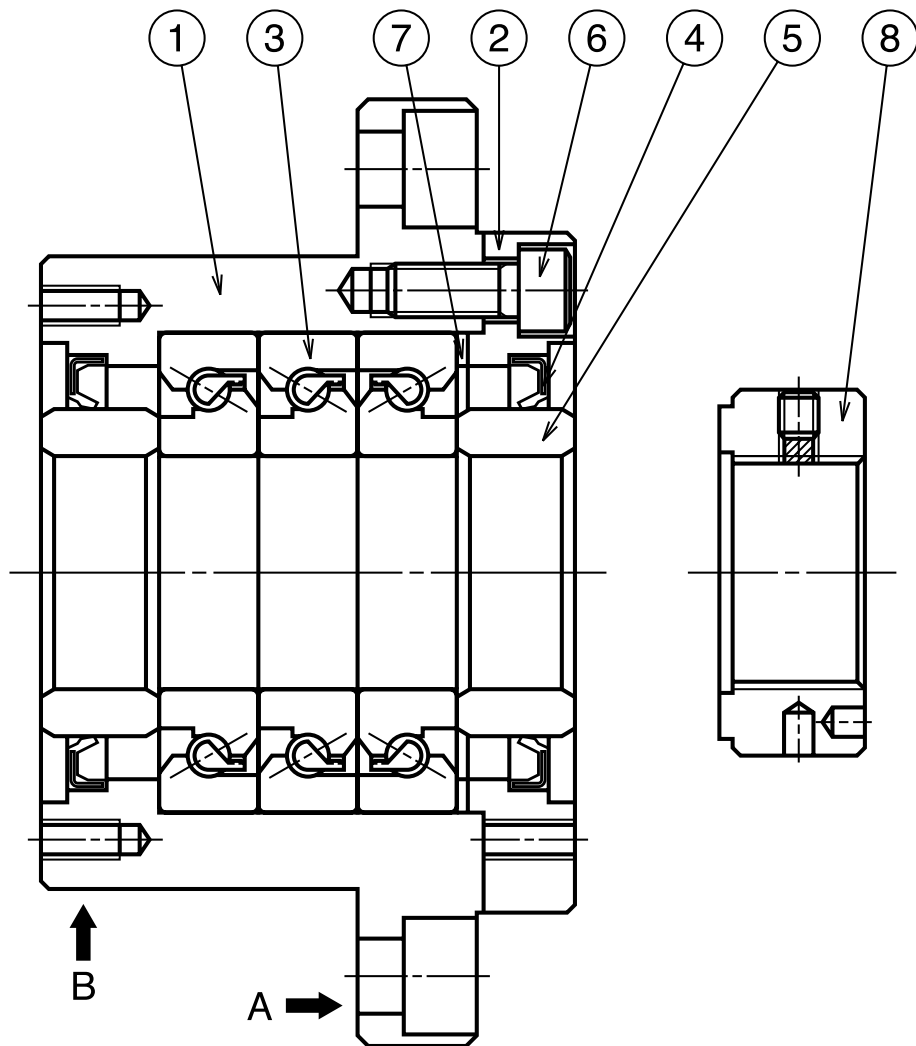
**DF combination**



**DFD combination**



**DFF combination**



### Parts list

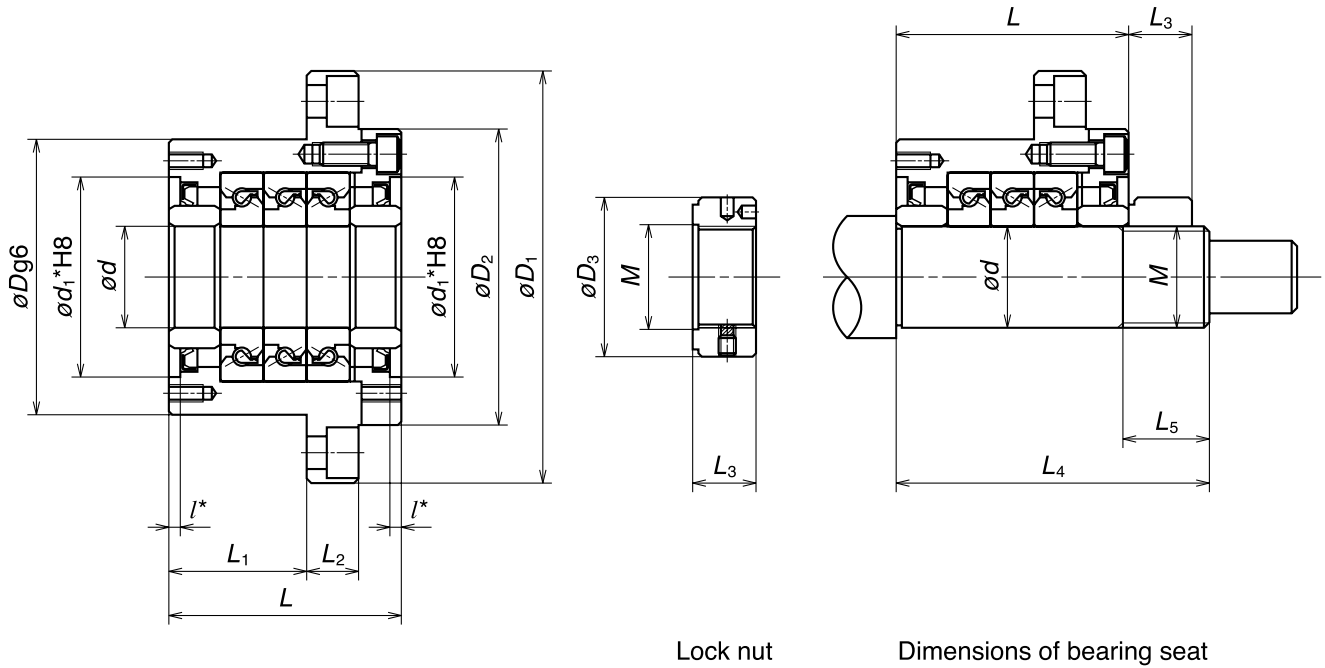
Part number	Part name	Quantity
①	Housing	1
②	Retaining cover	1
③	High accuracy thrust angular contact ball bearing	One set
④	Dust seal	2
⑤	Collar	2
⑥	Preload bolt	6 or 8
⑦	Shim	One set
⑧	Lock nut	1

### 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 and 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.

# Support Unit

## For heavy load applications



Lock nut

Dimensions of bearing seat

Support unit No.	Support unit																
	$d$	$D$	$D_1$	$D_2$	$L$	$L_1$	$L_2$	$A$	$W$	$X$	$Y$	$Z$	$d_1^*$	$l^*$	$V^*$	$P^*$	$Q^*$
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 1. Rigidity

Values in the Table are theoretical values obtained from the elastic deformation between the groove and the balls.

2. Starting torque

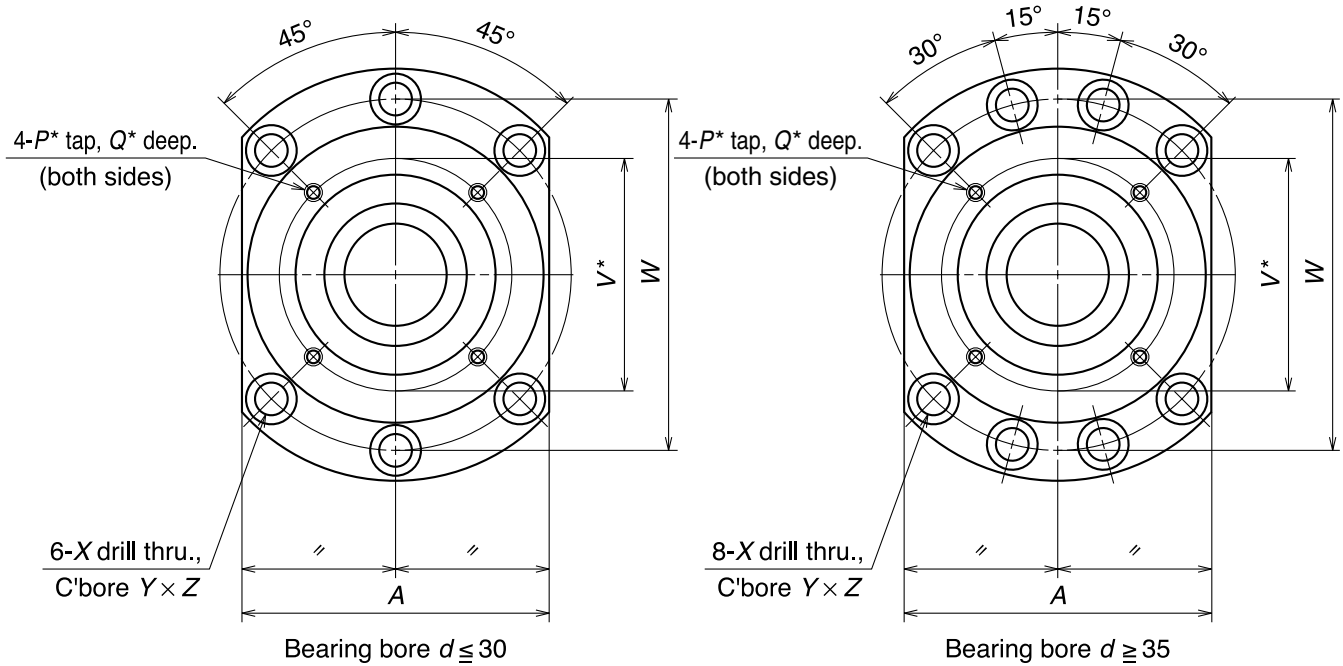
Starting torque indicates torque due to the preload of the bearing. It does not include seal torque.

3. The tolerance of the shaft bearing seat

We recommend h5 class of the fits tolerance.



# WBK\*\*DF, DFD, DFF



Unit: mm

Basic dynamic load rating $C_a$ (N)	Permissible axial load (N)	Preload (N)	Axial rigidity (N/μm)	Starting torque (N · cm)	Lock nut			Mass (kg)	Bearing seat for unit		
					M	$D_3$	$L_3$		d	$L_4$	$L_5$
21900	26600	2150	750	19	M17 x 1	37	18	1.9	17	81	23
21900	26600	2150	750	19	M20 x 1	40	18	1.9	20	81	23
28500	40500	3150	1000	29	M25 x 1.5	45	20	3.1	25	89	26
46500	81500	4300	1470	39				3.4		104	
29200	43000	3350	1030	30	M30 x 1.5	50	20	3.0	30	89	26
47500	86000	4500	1520	40				3.3		104	
31000	50000	3800	1180	34	M35 x 1.5	55	22	3.4	35	92	30
50500	100000	5200	1710	45				4.3		107	
50500	100000	7650	2350	59				5.0		122	
31500	52000	3900	1230	36	M40 x 1.5	60	22	3.6	40	92	30
51500	104000	5300	1810	47				4.2		107	
51500	104000	7850	2400	61				4.7		122	

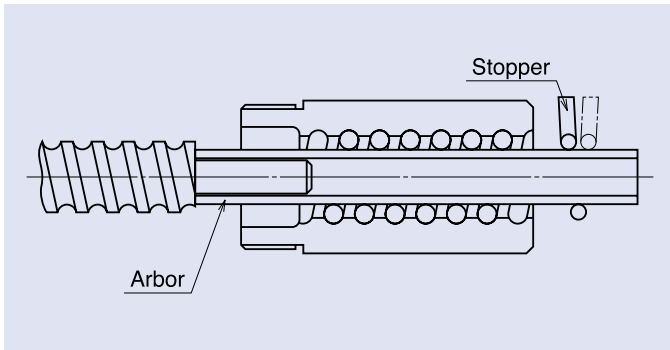
Remarks 4. Dimensions with \* (asterisk)

\*Pilot diameter and tapped screws marked with "\*" are used for seal unit installation for NSK standard hollow shaft ball screws.

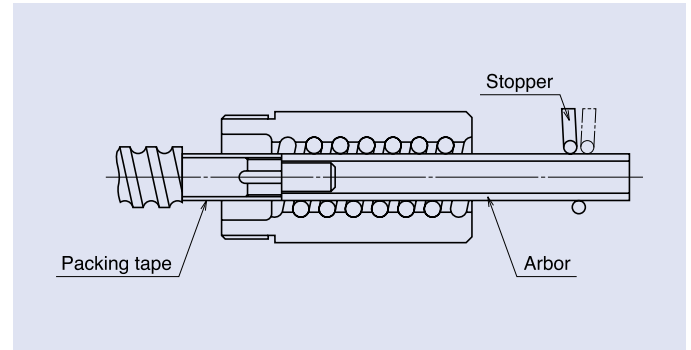
They also can be used for dust cover and damper installation.

5. Grease is packed into the bearing. It is not necessary to apply grease before use.

# Installation of Ball Nut on Rolled Screw Shaft



**Figure 3** Inserting nut into screwshaft



**Figure 4** Arbor and shaft end configuration

When delivered, the nut of rolled ball screw is separated from the screw shaft and inserted into an arbor shaft.

## (1) Consideration to end configuration of screw shaft

The balls may fall out while moving the assembled nut from the arbor to the screw shaft if the sizes and shapes of the arbor and the screw shaft are not appropriate.

If the end of the ball groove can touch the end of the arbor, connect both ends and move the assembled nut from the arbor to the screw shaft (Figure 5).

If the end face of the arbor cannot connect to the end face of the screw because of configuration of both ends of screw shaft, wrap a tape outside of the ball screw shaft so that the layers of tape is equal with the outside diameter of the arbor (Figure 4).

If there is a key way or a nick along the way, fill such gaps prior to moving the ball nut.

## (2) Installation of arbor

Confirm the correct nut orientation for installation. Remove the stop ring on the side from where the assembled nut is to be removed. Align the centers of the screw shaft and the arbor while pressing firmly the screw shaft end against the arbor.

## (3) Moving the nut

Slide the nut until it lightly touches the shoulder of the ball groove section, and stop it. Turn the ball nut slowly so that it moves to the ball grooves, while pressing the arbor to the screw shaft. Do not separate the arbor from the screw shaft until the ball groove end appears completely in the ball nut.

## (4) Machining of R Series rolled ball screw shaft end

### Annealing the shaft end

Heat the section of the shaft end to be machined with an acetylene torch. Then gradually cool it in ambient atmosphere.

\* The area not machined loses hardness if exposed to heat. This shortens ball screw life. Cool with water the areas that should not be heated to avoid heat conduction.

# Installation of Ball Screw

## Installation

### (1) Centering of the units

Align the centers of housings for the ball nut and the support bearing to which a ball screw is fixed. The centering is critical for life, smooth operation, and positioning accuracy of a ball screw.

We generally recommend the centering accuracy as follows for a precision grade ball screw.

- Inclination of center line: 1/2,000 or less  
(Target: 1/5,000 or less)

- Eccentricity: 0.020 mm or less

Follow the flowchart in Figure 5 for installation procedures.

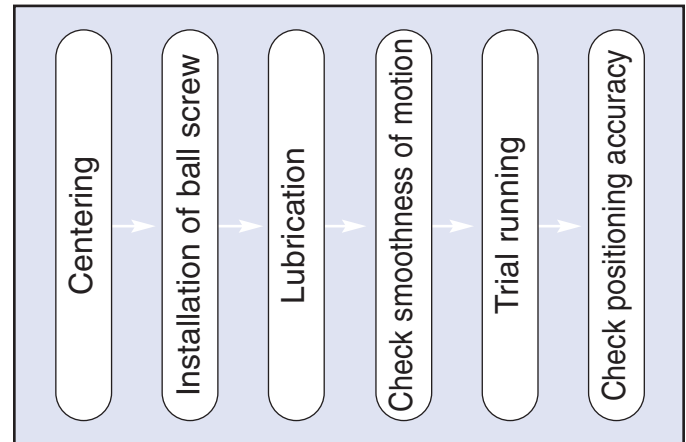


Figure 5 Flowchart of ball screw installation

### (2) Centering of ball nut housing

Photo 1 shows a centering procedure of the ball nut housing. Insert a jig (test bar) that has close fit clearance to a bore of the ball nut housing. Check vertical and horizontal parallelism of the test bar against the guide way (such as linear guides) with the dial indicator that is fixed on the guide way bearing, and adjust the position of the housing so that the inclination of the center sets in 1/2,000 or less. Then fix the housing to the table base.



Photo 1

### (3) Centering of the housing of a support bearing

Photo 2 shows a centering procedure of the housing of a support bearing. Following the procedure similar to the ball nut housing, set the jig (test bar) that has close fit clearance to bore of the housing and adjust the position of the housing so that the aligning inclination sets in 1/2,000 or less, then fix the housing to the table temporarily.

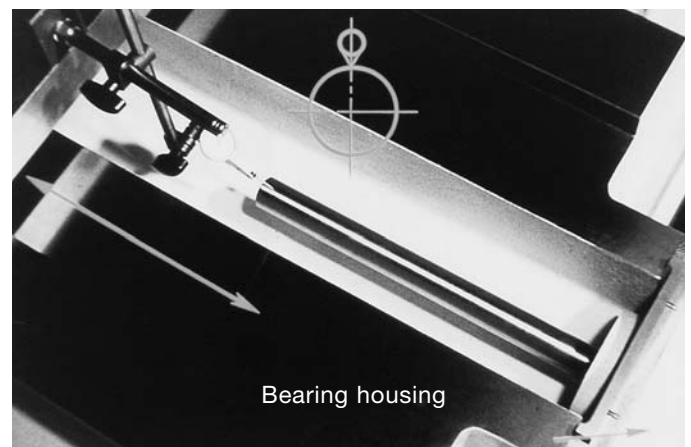


Photo 2

#### (4) Eccentricity of the housings

Measuring method of eccentricity between the two housings is shown in Photo 3. Set the table on the guide way (such as linear guides, etc), and fix a dial indicator on it. Check eccentricity of the test bar of support bearing housing against the test bar of ball nut housing. Adjust position of support unit housing so that the eccentricity gets in 0.020 mm or less, then fix the housing of support bearing.

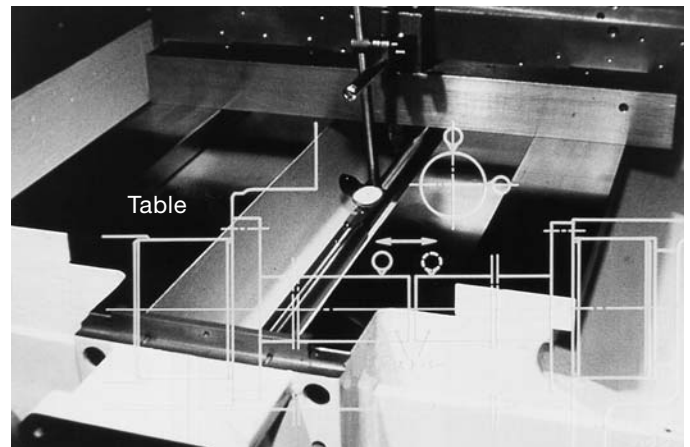


Photo 3

#### (5) Installation of ball nut

Photo 4 shows a procedure for installation of the ball nut to the housing. Wipe off the outside of the ball nut and bore of the housing with thin rags. (Applying a small amount of machine oil with low viscosity to both parts is effective in rust prevention.) Insert the ball nut to the housing while holding the ball screw in horizontal position and fix it. Do not handle the ball screw roughly, like hammering ends of the ball screw, as it may induce failure of the ball screw.

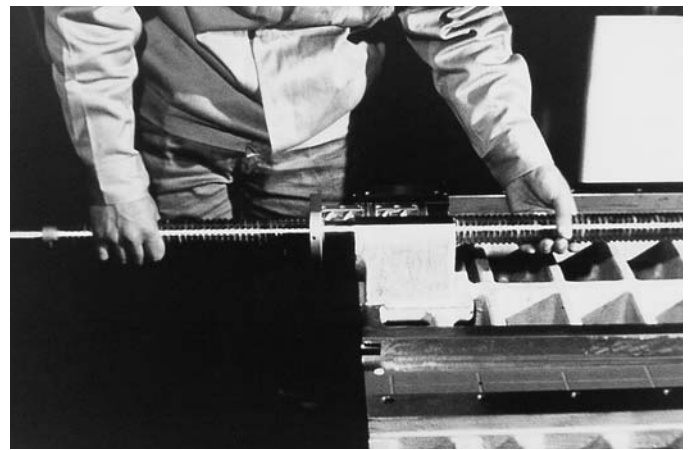


Photo 4

#### (6) Installation of support bearings in ball screw

Photo 5 shows a procedure for installation of support bearings. Select bearings that have appropriate fitting tolerance to the screw shaft, then install them. We recommend using a special sleeve as shown in the photo not to apply direct impact to the bearings.

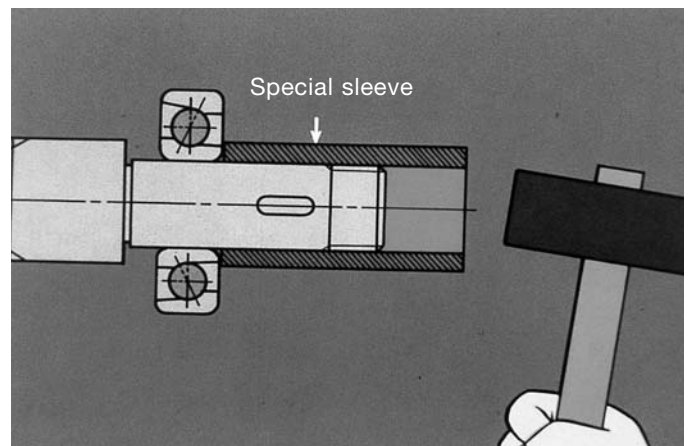


Photo 5

### (7) Installation of bearings in the housing

Photo 6 shows the procedure for installing the support bearings to the bearing housing. When fixing the bearing with a lock nut, tighten the lock nut with specified tightening torque while checking run-out of screw shaft end. Take measures against loose lock nut.

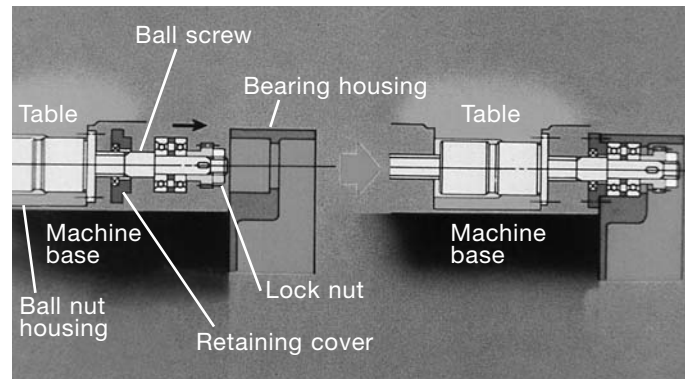


Photo 6

### (8) Replenish lubrication grease

Photo 7 shows the replenishing procedure of lubrication grease. Applying grease prior to its operation is not necessary when the grease is packed into the ball nut. Confirm presence of grease in the ball nut.

If grease is not used, NSK applies antirust oil to ball screws when shipping. Wipe off the oil and pack the grease fully into the ball nut as shown in the photo.

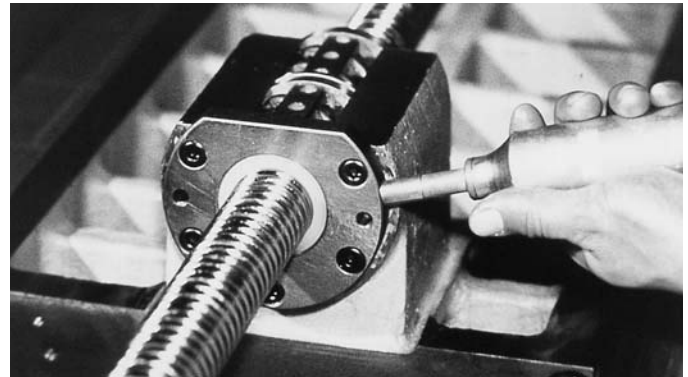


Photo 7

### (9) Check motion smoothness

Photo 8 shows a checking procedure for motion smoothness. This is to confirm that the table is assembled accurately. Use a torque wrench to measure starting torque of the ball screw for full stroke of the table. Check for abnormality in starting torque as well as unevenness of rotation.



Photo 8

### (10) Trial operation

Photo 9 shows a scene of trial operation. Firstly, operate the machine slowly and check for noise and vibration, then do the same at medium and high speeds. Operate the machine continuously for approximately 2 hours as a running in, and check for abnormality meanwhile. Remove over flown grease from the ball nut after a running in.

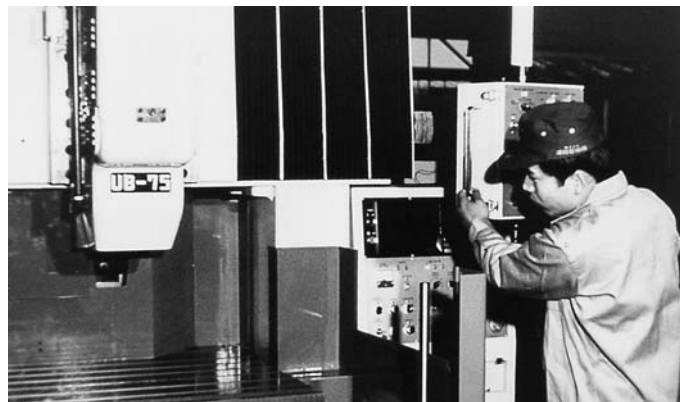


Photo 9



# Lubrication

There are two types of lubricating methods – grease and oil – for ball screws and linear guides.

Use a lubricant agent and method most suitable to condition requirements and purpose to optimize functions of the ball screws and linear guides.

In general, lubricants with low base oil kinematic viscosity are used for high speed operation.

Lubrication with high base oil kinematic viscosity is used for oscillating operations, low speed and high temperature.

The following are lubrication methods by grease and by oil.

## Grease Lubrication

Grease lubrication is widely used because it does not require special oil supply system or piping. Grease lubricants made by NSK are:

- Various types of grease in bellowed container which can be instantly attached to the grease pump;
- NSK Grease Unit which comprises a hand grease pump and various nozzles. The units are compact and easy to use.

## NSK grease lubricants

Table 9 shows the marketed general grease widely used for linear guides and ball screws for various applications, conditions and purposes.

**Table 9 Grease lubricant for linear guides and ball screws**

Type	Thickener	Base oil	Base oil kinematic viscosity mm <sup>2</sup> /s (40°C)	Range of use temperature (°C)	Purpose
AS2	Lithium type	Mineral oil	130	-10~110	For ball screws and linear guides for general use at high load.
PS2	Lithium type	Synthetic oil + mineral oil	15	-50~110	For ball screws and linear guides for low temperature and high frequency operation.
LR3	Lithium type	Synthetic oil	30	-30~130	For ball screws at high speed, medium load.
LG2	Lithium type	Synthetic oil + synthetic hydrocarbon oil	30	-10~80	For ball screws and linear guides for clean environment.
LGU	Diurea	Synthetic	100	-30~120	For ball screws and linear guides for clean environment.
NF2	Urea composite type	Synthetic oil	27	-40~100	For fretting resistant ball screws and linear guides.

## Intervals of checks and replenishments for grease lubrication

Intervals of checks	Items to check	Intervals of replenishment
3-6 months	Dirt, foreign matters such as cutting chip	Usually once per year. Every 3000 km for material handling system which travels more than 3000 km per year. Replenish if checking results warrant it.

Note: Please consult NSK Engineering for grease replenishment interval.

# Other Products

## Precision Ball Screws

Available with clearance and preload type, blank and finished shaft ends, and optional K1 Lubrication Unit for maintenance-free operation.

## Rolled Precision Ball Screws

High lead, zero backlash, finished shaft ends, and optional K1 Lubrication Unit for maintenance-free operation.

## Linear Guides

Also called profile rails, NSK manufactures various types with sizes ranging from 7mm to 65mm.

## Linear Bushings

Inch and metric linear bushings and 60 case shafting.

## Monocarriers

Integrating linear guides and a ball screw, Monocarriers are a compact precision actuator.

## Megatorque Motor

Precision indexing, repeatability and high torque.



# Unit Conversions

## To convert

From	To	Multiply By
daN	N	10.000
kgf	N	9.81
kgf	lbf	2.205
kgf.cm	lbf.in	0.868
kgf.cm	ozf.in	13.890
kgf.m	lbf.ft	7.234
kgf.m	lbf.in	86.811
N.m	lbf.ft	0.738
mm	inch	0.03937
inch	mm	25.4

For more information, visit  
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## Worldwide Sales Offices

<b>NSK Ltd.–Headquarters, Tokyo, Japan</b>	<b>www.nsk.com</b>	<b>Philippines:</b>	
Americas & Europe Department	tel: 03-3779-7120	NSK representative office	
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<b>Africa</b>		<b>Singapore:</b>	
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NSK representative office		<b>(European Headquarters)</b>	<b>www.eu.nsk.com</b>
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<b>Indonesia:</b>		NSK Italia S.P.A.	
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<b>New Zealand:</b>	<b>www.nsk-rhp.co.nz</b>		
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		<b>North and South America</b>	
		<b>NSK Americas, Inc. (American Headquarters)</b>	
		Ann Arbor, Michigan, U.S.A.	tel: 734-913-7500
		<b>Argentina:</b>	
		NSK Argentina SRL	
		Buenos Aires	tel: 011-4762-6556
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		Mexico City	tel: (55) 5301-3115
		<b>United States of America:</b>	<b>www.us.nsk.com</b>
		NSK Corporation	
		Ann Arbor, Michigan	tel: 734-913-7500
		Sales Offices:	
		Ann Arbor, Michigan	tel: 734-913-7500
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