

B-3-3.1 End Deflector Type Ball Screw

NSK has a patent for this product.

1. Features

●Silent and high quality of sound

The average noise level is reduced by more than 6 dB compared with our conventional products. At low-speed rotation, the ball screws are nearly silent, while the lowest noise level is achieved at high-speed rotation.

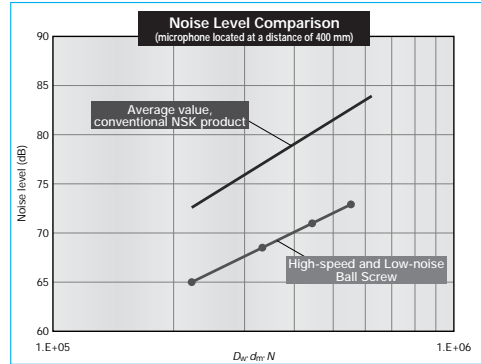


Fig. 1 Comparison of noise level

●High-speed operation

Realizes at d·n 180000 outstanding for ball screws and far surpassing the 100000 d·n performance of conventional return tube type products. For high lead ball screws, high-speed operation at over 200m/min is also possible.

●Compact

The external diameter of the ball nut is 30% smaller than our conventional models. Compact configurations are possible for low-profile XY tables as well as for other devices and equipment.

●Grease fitting provided as standard equipment

The ball screws with shaft diameters of less than ø25 are standardly equipped with a grease fitting (M5 × 0.8). Lubrication ports are provided in 2 places to facilitate maintenance. The ball screws can be easily connected to an integrated lubrication system.

2. Specifications

(1) Recirculation system

Fig. 2 shows the structure of the end-deflector recirculation system.

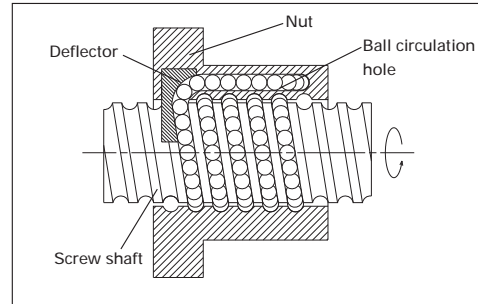


Fig. 2 Structure of end-deflector recirculation system

(2) Accuracy grade and axial play

The available standard accuracy grade and axial play are as follows. Please consult NSK for other grades.

Table 1 Accuracy grade and axial play

Accuracy grade	C0, C1, C2, C3, C5, Ct7
Axial play	Z, 0 mm (Preload); T, 0.005 mm or less S, 0.020 mm or less; N, 0.050 mm or less

(3) Allowable d·n value and the criterion of maximum rotational speed

Allowable d·n value and the criterion of maximum rotational speed are shown below. Please consult NSK if the rotational speed exceeds the permissible range below.

Allowable d·n value : 180000 or less

Standard of rotational speed: 5000 min⁻¹

Note: Please also review the critical speed. See "Technical Description: Permissible rotational speed" (Page B51) for details.

(4) Seal

Compact, thin plastic seal is available. Nut outside diameter is compact compare with the return tube recirculation system.

(5) Option

Optional NSK K1 lubrication unit, molded from resin and impregnated with lubrication oil, supplies fresh oil onto ball rolling surfaces, ensuring long-term, maintenance-free operation. Please contact NSK when using NSK K1.

3. Design precautions

When designing the shaft end of a ball screw which diameter is 25 mm or less, or 32 mm or over, and the lead is the same as its shaft diameter, one end of the screw must meet either one of the following conditions. If not, we

cannot install the ball nut on the screw shaft.

- Cut the ball groove through to the shaft end.
- The diameters of bearing journals and the gear or pulley seat must be less than the root diameter of ball groove "dr" specified on the dimension table.

For general precautions regarding ball screws, refer to "Design Precautions"(Page B84) and "Handling Precautions"(Page B103).

4. Product categories

End deflector type has a model as follows.

Table 2 End-deflector type ball screw product categories

Nut model	Shape	Flange shape	Nut shape	Preload system
BSS		Circular II, III	Circular	Non-preload, Slight axial play
				P preload (light preload)

5. Example of model number in dimension tables

A structure of "Model number" and "Reference number for ball screw" are as follows.

◇Model number

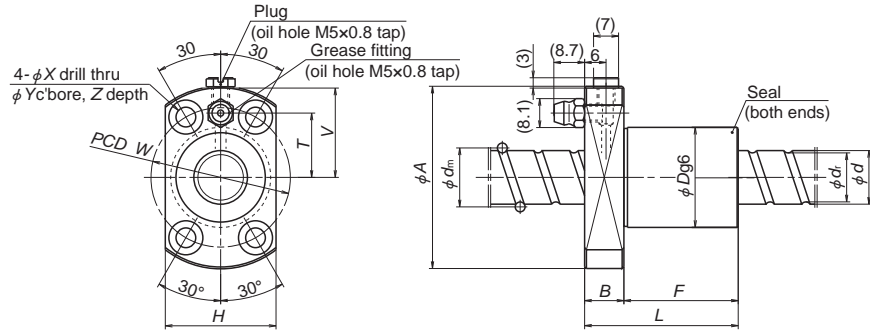
BSS 10 10 - 2E

Nut model: BSS Effective turns of balls
Screw shaft diameter (mm) Lead (mm)

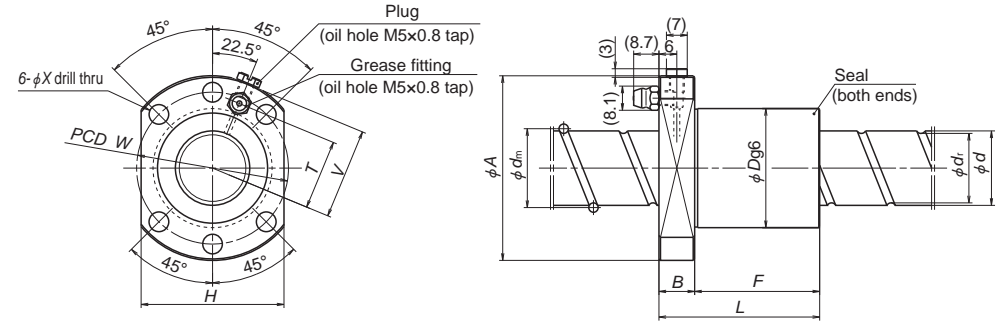
◇Reference number for ball screw

W 10 01 - ** P SS - C5 Z 10

Product code Lead (mm)
Screw shaft diameter (mm)
Effective threaded length (in the unit of 100 mm)
NSK design serial number
Preload code: No code, non-preload; P, P preload Axial play code: Z, T, S, N
Accuracy grade: C0, C1, C2, C3, C5, C7 (Ct7)
End-deflector recirculation system



Flange TYPE I



Flange TYPE II

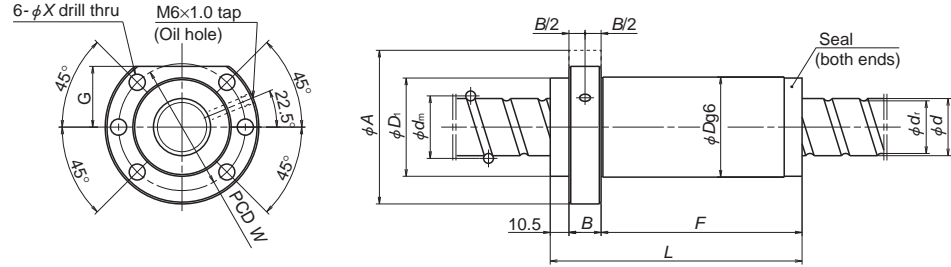
Unit: mm

Model No.	Shaft dia. d	Lead l	Ball dia. D_w	Ball circle dia. d_m	Root dia. d_r	Effective turns of balls	Basic load rating (N)		Axial rigidity K (N/ μ m)				
							Dynamic C_d	Static C_{st}					
BSS1005-3E	10	5	2.000	10.3	8.2	3	2930	4790	126				
BSS1010-2E		10				2	1970	3010	77				
BSS1205-3E	12	5	2.000	12.3	10.2	3	3200	5860	146				
BSS1210-3E		10				3	3200	5860	142				
BSS1220-2E		20				2	2150	3610	83				
BSS1230-2E		30				2	2150	3610	75				
BSS1505-3E	15	5	2.778	15.5	12.6	3	5460	10200	183				
BSS1510-3E		10				3	5460	10200	181				
BSS1520-2E		20	3.175	12.2	2	5070	8730	127					
BSS1530-2E		30				5070	8730	116					
BSS2005-3E	20	5	3.175	20.5	17.2	3	8790	18500	268				
BSS2010-3E		10				3	8790	18500	268				
BSS2020-2E		20				2	5900	11700	167				
BSS2030-2E		30				2	5900	11700	159				
BSS2040-2E		40				2	5900	11700	147				
BSS2060-2E		60				2	5900	11700	128				
BSS2505-3E		25				5	3.175	25.5	22.2	3	9760	23600	325
BSS2510-4E						10				4	12800	32300	437
BSS2520-2E	20		2	6560	14600	203							
BSS2525-2E	25		2	6560	14600	197							
BSS2530-2E	30		2	6560	14600	194							
BSS2550-2E	50		2	6560	14600	177							

Note: The axial rigidity in the table above is a theoretical value derived from elastic displacement between screw grooves and balls when axial load is applied to a ball nut for which preload is set at 3% of the basic dynamic load rating (C_d). For ball screws with shaft diameters less than $\phi 25$, the standard Compact FA PSS can be available.

Nut entire length L	Nut diameter D	Flange diameter A	Flange width B	Nut length F	Flange dimension		Flange TYPE	Bolt hole PCD W	Bolt hole dimension				Oil hole distance T					
					H	V			X	Y	Z							
29	23	43	11	18	26	21	I	33	4.5	8	4.5	14						
32				21														
30	24	44	11	19	27	21.5	I	34	4.5	8	4.5	14.5						
43				32														
50				39														
70				59														
30				28									51	11	19	31	25	I
43	32																	
51	32	55	40		33	27	43	20										
71									60									
31	36	62	13	18	38	30.5	I	49	6.6	11	6.5	23.5						
45				32														
54				41														
74				61														
92				79														
129				116														
32				40									62	12	20	48	30.5	II
56	44																	
54	42																	
63	51																	
74	62																	
114	102																	

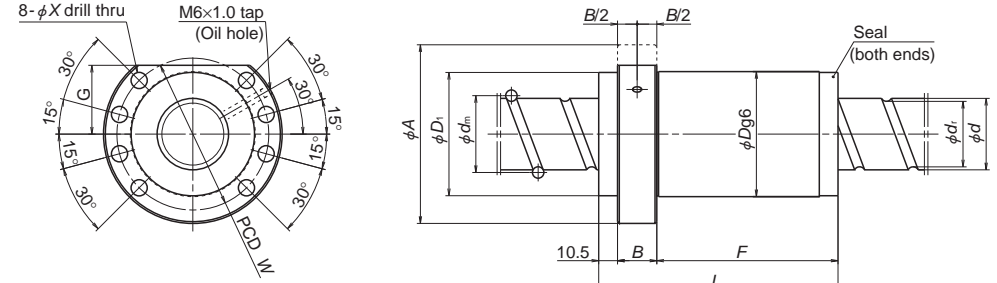
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Flange TYPE III

Model No.	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D_w</i>	Ball circle dia. <i>d_m</i>	Root dia. <i>d_r</i>	Effective turns of balls	Basic load rating (N)		Axial rigidity <i>K</i> (N/μm)				
							Dynamic <i>C_n</i>	Static <i>C_{0n}</i>					
BSS3205-4E	32	5	3.175	32.5	29.2	4	14200	41400	534				
BSS3210-6E		10				6	43300	111000	865				
BSS3212-5E		12				5	36700	90800	716				
BSS3216-5E		16				5	36700	90800	716				
BSS3220-5E		20				5	36700	90800	708				
BSS3232-2E		32				2	15300	32400	261				
BSS3264-2E	64	2	15300	32400	232								
BSS3605-3E	36	5	3.175	36.5	33.2	3	11400	34100	433				
BSS3610-6E		10				6	55200	142000	970				
BSS3612-6E		12				6	55200	142000	967				
BSS3616-6E		16				6	55200	142000	961				
BSS3620-6E		20				6	55200	142000	959				
BSS4010-5E		40				10	6.35	41	34.4	5	49300	130000	875
BSS4012-5E	12		5	49300	130000	873							
BSS4016-5E	16		5	49300	130000	875							
BSS4020-5E	20		5	49300	130000	868							
BSS4025-4E	25		4	40100	103000	686							
BSS4030-3E	30		3	30600	74000	505							
BSS4040-2E	40		2	20600	46600	319							
BSS4080-2E	80		2	20600	46600	286							
BSS4510-5E	45		10	6.35	46	39.4				5	51400	146000	961
BSS4512-5E			12							5	51400	146000	959
BSS4516-5E		16	5				51400	146000	955				
BSS4520-5E		20	5				51400	146000	950				
BSS4525-5E		25	5				51400	146000	954				
BSS4530-4E		30	4				41800	116000	752				
BSS5010-4E		50	10				6.35	51	44.4	4	44600	129000	836
BSS5012-4E			12							4	44600	129000	944
BSS5016-4E	16		4	44600	129000	832							
BSS5020-4E	20		4	44600	129000	837							
BSS5025-4E	25		4	44600	129000	828							
BSS5030-4E	30		4	44600	129000	821							
BSS5050-2E	50		2	22800	58300	383							
BSS50100-2E	100		2	22800	58300	342							

Note: The axial rigidity in the table above is a theoretical value derived from elastic displacement between screw grooves and balls when axial load is applied to a ball nut for which preload is set at 3% of the basic dynamic load rating (*C*).



Flange TYPE IV

Unit: mm

Nut entire length <i>L</i>	Nut diameter <i>D</i>	Seal section diameter <i>D_s</i>	Flange diameter <i>A</i>	Flange width <i>B</i>	Nut length <i>F</i>	Notched flange <i>G</i>	Flange <i>TYPE</i>	Bolt hole PCD <i>W</i>	Bolt hole dimension <i>X</i>
55	56	55	86	12	32.5	34	III	71	9
104					75.5				
103					74.5				
122					93.5				
141					112.5				
94					65.5				
153	124.5								
50	65	64	95	18	27.5	36	IV	80	9
109					76.5				
120					87.5				
143					110.5				
166					133.5				
99					66.5				
108	75.5								
127	94.5								
146	113.5								
145	112.5								
134	101.5								
110	77.5								
184	151.5								
99	75	74	110	22	66.5	43	IV	93	11
108					75.5				
127					94.5				
146					113.5				
146					113.5				
170					137.5				
164					131.5				
89					56.5				
96	63.5								
111	78.5								
126	93.5								
145	112.5								
164	131.5								
130	97.5								
224	191.5								