

B-3-2.1 End Deflector Type Ball Screws

This product is being applied for a patent.

1. Features

● **Low and less offensive noise**

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

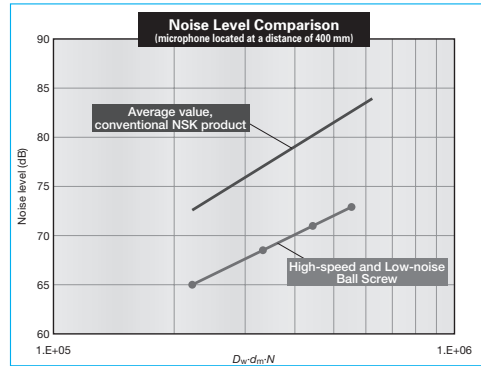


Fig. 1 Comparison of noise level

● **High-speed operation**

Realizes the d-n of 180 000, outstanding for ball screws and far surpassing the 100 000 d-n performance of existing return tube type products. For high-lead ball screws, high-speed operation at over 200 m/min is also possible.

● **Compact**

The external diameter of the ball nut is 30% smaller than our existing 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 equal to or less than $\phi 25$ are equipped with a grease fitting (M5 \times 0.8) as a standard. Lubrication ports are provided in 2 places for ease of maintenance. The ball screws can be easily connected to an integrated lubrication system.

2. Specifications

(1) Ball recirculation system

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

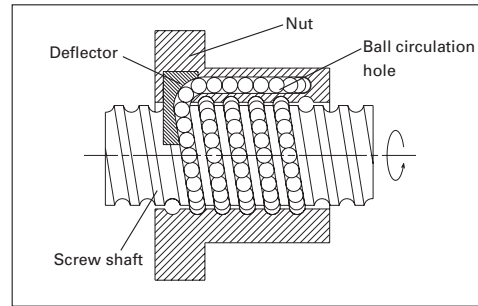


Fig. 2 Structure of end-deflector recirculation system

(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 (preloaded); 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 : 180 000 or less
Standard of rotational speed: 5 000 min⁻¹

Note: Please also review the critical speed. See "Technical Description: Permissible Rotational Speed" (page B47) for details.

(4) Seal

A compact and thin plastic seal is used. 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 B83) and "Handling Precautions"(page B103).

4. Product categories

End deflector type ball screws have the model as follows.

Table 2 End-deflector type ball screw product categories

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

5. Structure of model number and reference number

The following describe the structure of "Model number" and "Reference number for ball screw".

◇ Model number

BSS 10 10 - 2E

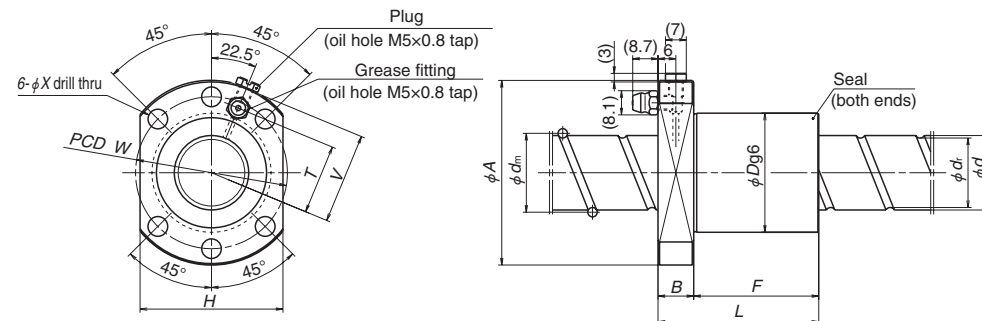
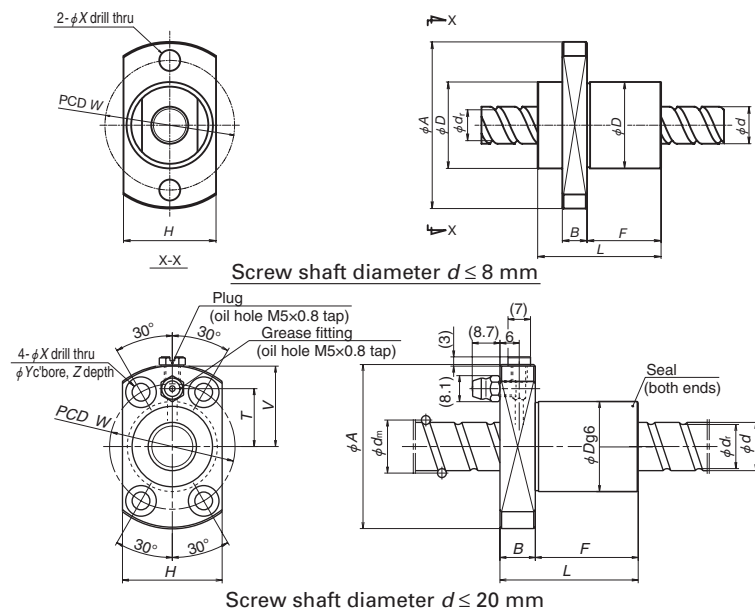
Nut model: BSS Effective turns of balls
Screw shaft diameter (mm) Lead (mm)

◇ Reference number for ball screw

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

Product code Lead (mm)
Screw shaft diameter (mm) Axial play code:
Effective threaded length (in the unit of 100 mm) Z, T, S, N (page B20)
NSK design serial number Accuracy grade:
Preload code: No code, non-preload; P, P-preload (page B5) C0, C1, C2, C3, C5, C7 (Ct7) (page B37 to B42)
End-deflector recirculation system

End deflector type

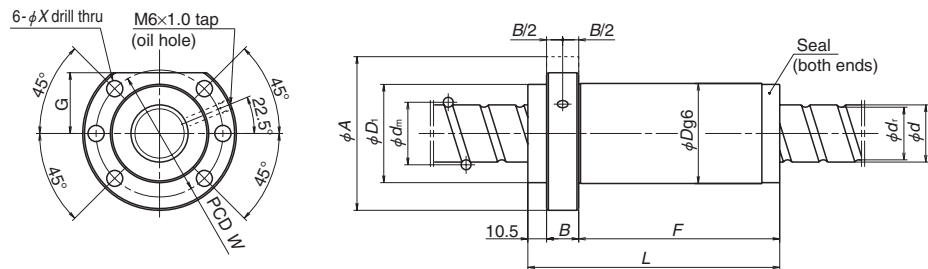


Model No.	Shaft dia. d	Lead l	Ball dia. D_w	Ball circle dia. d_m	Root dia. d_r	Effective turns of balls	Basic load rating (N)		Axial rigidity K (N/ μ m)
							Dynamic	Static	
							C_d	C_s	
BSS0608-2E	6	8	1.2	6.2	4.9	2	550	715	24
BSS0608-4E		8				1 180	1 760	55	
BSS0612-2E		12				2	550	715	22
BSS0612-4E		12				4	1 180	1 760	51
BSS0810-2E	8	10	1.588	8.3	6.6	2	910	1 260	31
BSS0810-4E		10				1 950	3 080	72	
BSS0815-2E		15				2	910	1 260	29
BSS0815-4E		15				4	1 950	3 080	68
BSS1005-3E	10	5	2.000	10.3	8.2	3	2 930	4 790	126
BSS1010-2E		10				2	1 970	3 010	77
BSS1205-3E		5				3	3 200	5 860	146
BSS1210-3E		10				3	3 200	5 860	142
BSS1220-2E	12	20	2.000	12.3	10.2	2	2 150	3 610	83
BSS1230-2E		30				2	2 150	3 610	75
BSS1505-3E		5				3	5 460	10 200	183
BSS1510-3E	15	10	3.175	15.5	12.6	3	5 460	10 200	181
BSS1520-2E		20				2	5 070	8 730	127
BSS1530-2E		30				2	5 070	8 730	116
BSS2005-3E		5				3	8 790	18 500	268
BSS2010-3E	20	10	3.175	20.5	17.2	3	8 790	18 500	268
BSS2020-2E		20				2	5 900	11 700	167
BSS2030-2E		30				2	5 900	11 700	159
BSS2040-2E		40				2	5 900	11 700	147
BSS2060-2E	60	2	5 900	11 700	128				
BSS2505-3E	25	5	3.175	25.5	22.2	3	9 760	23 600	325
BSS2510-4E		10				4	12 800	32 300	437
BSS2520-2E		20				2	6 560	14 600	203
BSS2525-2E		25				2	6 560	14 600	197
BSS2530-2E		30				2	6 560	14 600	194
BSS2550-2E		50				2	6 560	14 600	177

Note: 1) The axial rigidity K 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 type can be available.

Nut entire length L	Nut diameter D	Flange diameter A	Flange width B	Nut length F	Flange dimension		Bolt hole PCD W	Bolt hole dimension			Oil hole distance T	
					H	V		X	Y	Z		
					Unit: mm							
16	14	27	4	8	15 (10)	—	21	3.4	—	—	—	
24												16
20												12
32												24
18	18	31	4	10	19 (13)	—	25	3.4	—	—		
28											20	
22											14	
37											29	
29	23	43	11	18	26	21	33	4.5	8	4.5	14	
32												21
30												19
43												32
50	24	44	11	32	27	21.5	34	4.5	8	4.5	14.5	
70												39
30												19
43												32
51	32	55	11	40	33	27	43	5.5	9.5	5.5	20	
71												60
31												18
45												32
54	36	62	13	41	38	30.5	49	6.6	11	6.5	23.5	
74												61
92												79
129												116
32	40	62	12	20	48	30.5	51	6.6	—	—	23.5	
56												44
54												42
63												51
74												62
114												102

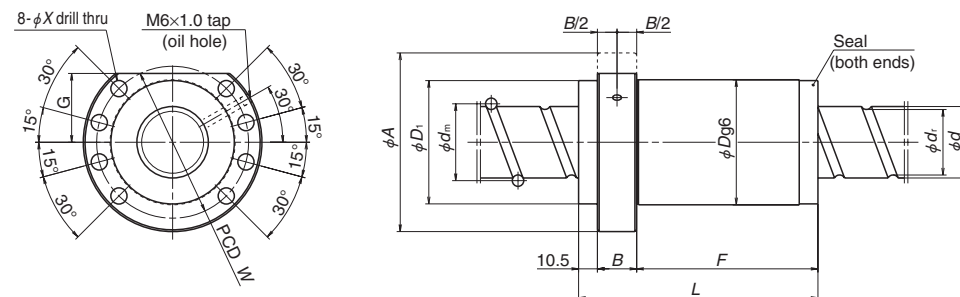
2) The axial play of $\phi 6$ mm and $\phi 8$ mm shaft diameter is only for $T=0.005$ mm max.
3) Dimensions in parentheses are for flat nut configurations.



Screw shaft diameter $d = 32$ 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_n	Static C_{0n}	
BSS3205-4E	32	5	3.175	32.5	29.2	4	14 200	41 400	534
BSS3210-6E		10	5.556	33	27.2	6	43 300	111 000	865
BSS3212-5E		12	5.556	33	27.2	5	36 700	90 800	716
BSS3216-5E		16	5.556	33	27.2	5	36 700	90 800	716
BSS3220-5E		20	5.556	33	27.2	5	36 700	90 800	708
BSS3232-2E		32	5.556	33	27.2	2	15 300	32 400	261
BSS3264-2E	64	5.556	33	27.2	2	15 300	32 400	232	
BSS3605-3E	36	5	3.175	36.5	33.2	3	11 400	34 100	433
BSS3610-6E		10	6.35	37	30.4	6	55 200	142 000	970
BSS3612-6E		12	6.35	37	30.4	6	55 200	142 000	967
BSS3616-6E		16	6.35	37	30.4	6	55 200	142 000	961
BSS3620-6E	20	6.35	37	30.4	6	55 200	142 000	959	
BSS4010-5E	40	10	6.35	41	34.4	5	49 300	130 000	875
BSS4012-5E		12				5	49 300	130 000	873
BSS4016-5E		16				5	49 300	130 000	875
BSS4020-5E		20				5	49 300	130 000	868
BSS4025-4E		25				4	40 100	103 000	686
BSS4030-3E		30				3	30 600	74 000	505
BSS4040-2E		40				2	20 600	46 600	319
BSS4080-2E		80				2	20 600	46 600	286
BSS4510-5E	45	10	6.35	46	39.4	5	51 400	146 000	961
BSS4512-5E		12				5	51 400	146 000	959
BSS4516-5E		16				5	51 400	146 000	955
BSS4520-5E		20				5	51 400	146 000	950
BSS4525-5E		25				5	51 400	146 000	954
BSS4530-4E		30				4	41 800	116 000	752
BSS5010-4E	50	10	6.35	51	44.4	4	44 600	129 000	836
BSS5012-4E		12				4	44 600	129 000	944
BSS5016-4E		16				4	44 600	129 000	832
BSS5020-4E		20				4	44 600	129 000	837
BSS5025-4E		25				4	44 600	129 000	828
BSS5030-4E		30				4	44 600	129 000	821
BSS5050-2E		50				2	22 800	58 300	383
BSS50100-2E		100				2	22 800	58 300	342

Note: The axial rigidity K 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_n).



Screw shaft diameter $d \geq 36$ mm

Unit: mm

Nut entire length L	Nut diameter D	Seal section diameter D_1	Flange diameter A	Flange width B	Nut length F	Notched flange G	Bolt hole PCD W	Bolt hole dimension X	
55	56	55	86	12	32.5	34	71	9	
104					18				75.5
103					18				74.5
122					18				93.5
141					18				112.5
94					18				65.5
153	18	124.5							
50	65	64	95	22	27.5	36	80	9	
109					22				76.5
120					22				87.5
143					22				110.5
166					22				133.5
99					22				66.5
108	70	69	100	22	66.5	38.5	85	9	
127					75.5				
146					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	93	11	
108					75.5				
127					94.5				
146					113.5				
146					113.5				
170					137.5				
164	131.5								
89	82	81	118	22	56.5	46	100	11	
96					63.5				
111					78.5				
126					93.5				
145					112.5				
164					131.5				
130	97.5								
224	191.5								

End deflector type