

**B-3-2.4 End Cap Type Ball Screws**

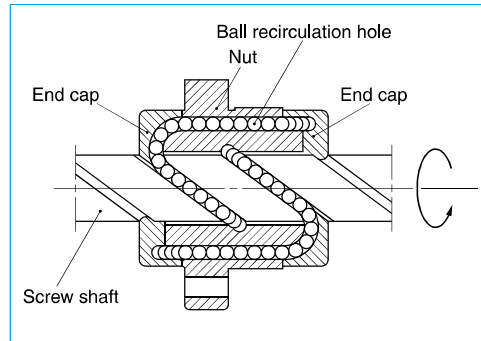
**1. Features**

The end cap recirculation system is suitable for high-helix lead and multiple start threads. Since the leads are 1 to 3 times larger than their screw shaft diameter, it makes them more suitable for high-speed operation.

**2. Specifications**

**(1) Ball recirculation system**

The structure of end cap recirculation system is shown in Fig. 1.



**Fig. 1 Structure of end cap recirculation system**

**(2) Accuracy grade and axial play**

The available standard accuracy grade and axial play are shown in Table 1. Please consult NSK for other grades.

**Table 1 Accuracy grade and axial play**

Accuracy grade	LSFC, LPFC: C1, C2, C3, C5, Ct7 USFC, UPFC: C3, C5, Ct7 (Three times lead or over are 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.**

The allowable d·n value and criterion of maximum rotational speed are shown below. Please consult NSK for high-speed specification. Basic measure must be taken for the high speed ball screws respectively.

Allowable d·n value:

Standard specification ; 80 000 or less

High-speed specification; 100 000 or less

Standard of rotational speed : 3 000 min<sup>-1</sup>

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

**(4) Other specifications**

Please consult NSK for other specifications not listed in the dimension tables.

**3. Product categories**

There are two different preload systems with several models (Table 2).

**Table 2 End cap type ball screws product categories**

Nut model	Shape	Flange shape	Nut shape	Preload system
LSFC		Flanged Circular III	Circular	Non-preload, Slight axial play
LPFC			Circular	P-preload (light preload) no spacer ball
USFC		Flanged Rectangular	Circular	Non-preload, Slight axial play
UPFC			Circular	P-preload (light preload) no spacer ball

**4. Design Precautions**

When designing the screw shaft end, 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.

Special bearings which have higher-load carrying capacity are available.

For general precautions regarding ball screws, refer to "Design Precautions" (page B83) and "Handling Precautions" (page B103).

**5. Example of model number in dimension tables**

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

◇Model number

**UPFC 25 25 - 3**

Nut model:  
LSFC, LPFC,  
USFC, UPFC

Screw shaft diameter (mm)

Effective turns of balls

Lead (mm)

◇Reference number for ball screw

**W 25 09 - \*\* P G X - C3 Z 25**

Product code

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 (page B5)

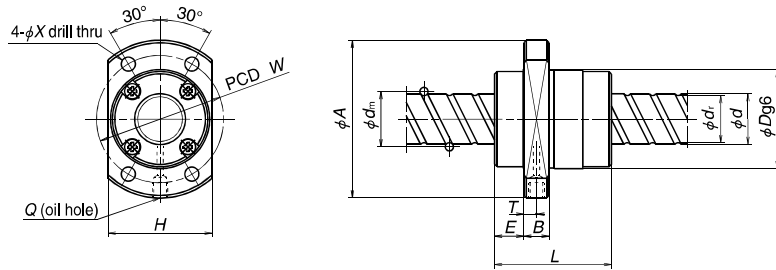
Lead (mm)

Axial play code:  
Z, T, S, N (page B20)

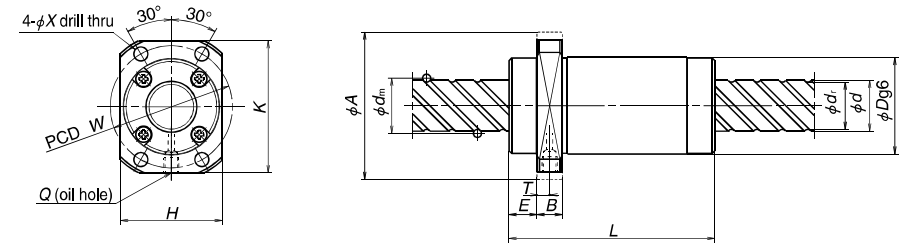
Accuracy grade code:  
C1, C2, C3, C5, C7 (Ct7) (page B37 to B42)

Appearance/specification code

End cap recirculation system



LSFC, LPFC



USFC, UPFC

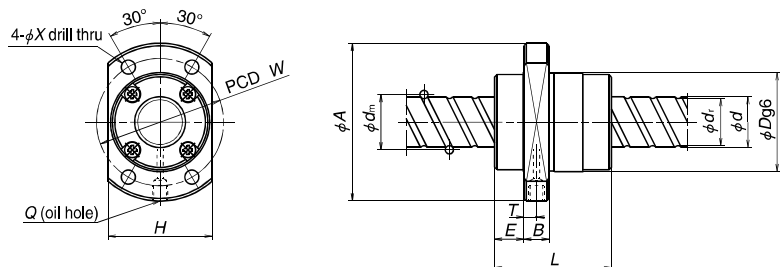
Unit: mm

Model No.	Preload system	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D<sub>v</sub></i>	Ball circle dia. <i>d<sub>m</sub></i>	Root dia. <i>d<sub>r</sub></i>	Effective turns of balls Turns × Circuits	Basic load rating (N)		Axial rigidity <i>K</i> (N/μm)
								Dynamic <i>C<sub>s</sub></i>	Static <i>C<sub>0s</sub></i>	
USFC 1220-1.5	Clearance P	12	20	2.381	12.5	9.9	1.7×1	2 690	4 420	66
UPFC 1220-1.5								103		
USFC 1520-1.5	Clearance P	15	20	3.175	15.5	12.2	1.7×1	5 070	8 730	97
UPFC 1520-1.5								151		
USFC 1540-1	Clearance P	15	40	3.175	15.75	12.2	0.7×2	3 860	6 050	62
UPFC 1540-1								97		
USFC 1540-2	Clearance P	15	40	3.175	15.75	12.2	0.7×4	7 000	12 100	121
UPFC 1540-2								188		
LSFC 1616-3	Clearance P	16	20	2.778	16.65	13.7	1.7×2	6 380	12 500	172
LPFC 1616-3								268		
LSFC 1616-6	Clearance P	16	20	2.778	16.65	13.7	1.7×4	11 600	25 000	334
LPFC 1616-6								520		
USFC 1632-1	Clearance P	16	32	3.175	16.75	13.4	0.7×2	4 000	6 690	74
UPFC 1632-1								116		
USFC 1632-3	Clearance P	16	32	3.175	16.75	13.4	1.7×2	8 580	17 000	176
UPFC 1632-3								273		
USFC 1632-6	Clearance P	16	32	3.175	16.75	13.4	1.7×4	15 600	34 100	340
UPFC 1632-6								530		
USFC 1650-1	Clearance P	16	50	3.175	16.75	13.4	0.7×2	4 000	6 690	65
UPFC 1650-1								102		
USFC 1650-2	Clearance P	16	50	3.175	16.75	13.4	0.7×4	7 260	13 400	126
UPFC 1650-2								197		
LSFC 2020-3	Clearance P	20	20	3.175	20.75	17.4	1.7×2	9 620	21 000	238
LPFC 2020-3								370		
LSFC 2020-6	Clearance P	20	20	3.175	20.75	17.4	1.7×4	17 500	42 000	462
LPFC 2020-6								718		
USFC 2040-1	Clearance P	20	40	3.175	20.75	17.4	0.7×2	4 490	8 640	89
UPFC 2040-1								138		
USFC 2040-3	Clearance P	20	40	3.175	20.75	17.4	1.7×2	9 620	21 000	211
UPFC 2040-3								328		
USFC 2040-6	Clearance P	20	40	3.175	20.75	17.4	1.7×4	17 500	42 000	409
UPFC 2040-6								636		
USFC 2060-1	Clearance P	20	60	3.175	20.75	17.4	0.7×2	4 490	8 640	78
UPFC 2060-1								121		
USFC 2060-2	Clearance P	20	60	3.175	20.75	17.4	0.7×4	8 140	17 300	151
UPFC 2060-2								235		

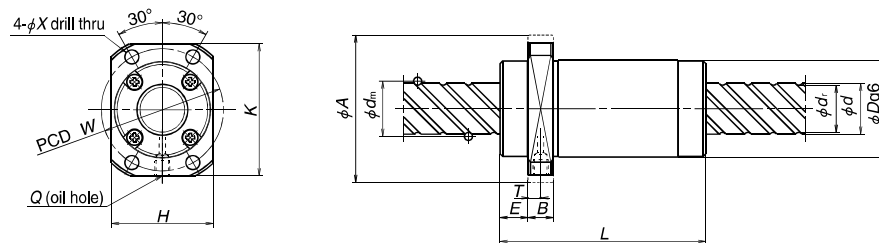
Notes: 1. For the LSFC and USFC type ball screws, the axial rigidity *K* in the table above is the theoretical values obtained from the elastic deformation between screw groove and ball when the axial load is 30% of the basic dynamic load rating (*C<sub>s</sub>*). For the LPFC and UPFC type, the rigidity is the theoretical value when the preload is 10% of the basic dynamic load rating (*C<sub>s</sub>*) and an axial load is applied to it. Refer to the "Technical Description" (page B37) if the rigidity and preload differ from the conditions above, or when the deformation of the ball nut body must be considered.

Nut entire length <i>L</i>	Nut diameter <i>D</i>	Flanged diameter <i>A</i>	Flanged width <i>B</i>	Ball nut dimensions		End cap dimension <i>E</i>	Bolt hole dimension <i>X</i>	Bolt hole PCD <i>W</i>	Oil hole <i>Q</i>	Oil hole position <i>T</i>
				Flanged dimension						
				<i>H</i>	<i>K</i>					
44	26	44	10	28	40	9	4.5	35	M6×1	5
45	34	55	10	36	50	11	5.5	45	M6×1	5
40	32	53	10	33	48	12	5.5	43	M6×1	5
38	32	53	10	34	—	10	4.5	42	M6×1	5
34	34	55	10	36	50	10.5	5.5	45	M6×1	5
34										
66										
66										
50	34	55	10	36	50	12	5.5	45	M6×1	5
46	39	62	10	41	—	11.5	5.5	50	M6×1	5
41	38	58	10	40	52	11	5.5	48	M6×1	5.5
41										
81										
81										
58	38	58	10	40	52	12.3	5.5	48	M6×1	5

2. The right turn screw is the standard. Please consult NSK for the left turn screw.  
 3. The models marked with \* (asterisk) are available in the FA type standard ball screws with finished shaft end.  
 4. Preload system: P; Oversize ball preload (See page B5.)



LSFC, LPFC



USFC, UPFC

Unit: mm

Model No.	Preload system	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D<sub>v</sub></i>	Ball circle dia. <i>d<sub>m</sub></i>	Root dia. <i>d<sub>r</sub></i>	Effective turns of balls Turns × Circuits	Basic load rating (N)		Axial rigidity <i>K</i> (N/μm)
								Dynamic <i>C<sub>a</sub></i>	Static <i>C<sub>0a</sub></i>	
LSFC 2525-3	Clearance	25	25	3.969	26.0	21.9	1.7×2	14 400	32 800	293
LPFC 2525-3	P						1.7×2	14 400	32 800	456
LSFC 2525-6	Clearance	25	50	3.969	26.0	21.9	1.7×4	26 100	65 600	568
LPFC 2525-6	P						1.7×4	26 100	65 600	883
*USFC 2550-1	Clearance	25	80	3.969	26.0	21.9	0.7×2	6 700	13 500	109
UPFC 2550-1	P						0.7×2	6 700	13 500	170
USFC 2550-3	Clearance	25	50	3.969	26.0	21.9	1.7×2	14 400	32 800	264
UPFC 2550-3	P						1.7×2	14 400	32 800	412
USFC 2550-6	Clearance	25	50	3.969	26.0	21.9	1.7×4	26 100	65 600	512
UPFC 2550-6	P						1.7×4	26 100	65 600	796
USFC 2580-1	Clearance	25	80	3.969	26.0	21.9	0.7×2	6 700	13 500	94
UPFC 2580-1	P						0.7×2	6 700	13 500	147
USFC 2580-2	Clearance	25	50	3.969	26.0	21.9	0.7×4	12 200	27 000	184
UPFC 2580-2	P						0.7×4	12 200	27 000	285
LSFC 3232-3	Clearance	32	32	4.762	33.25	28.3	1.7×2	21 000	51 600	366
LPFC 3232-3	P						1.7×2	21 000	51 600	570
LSFC 3232-6	Clearance	32	64	4.762	33.25	28.3	1.7×4	38 100	103 000	709
LPFC 3232-6	P						1.7×4	38 100	103 000	1 104
USFC 3264-1	Clearance	32	32	4.762	33.25	28.3	0.7×2	9 800	20 900	143
UPFC 3264-1	P						0.7×2	9 800	20 900	222
USFC 3264-3	Clearance	32	64	4.762	33.25	28.3	1.7×2	21 000	51 600	329
UPFC 3264-3	P						1.7×2	21 000	51 600	512
USFC 3264-6	Clearance	32	64	4.762	33.25	28.3	1.7×4	38 100	103 000	636
UPFC 3264-6	P						1.7×4	38 100	103 000	991
LSFC 4040-3	Clearance	40	40	6.350	41.75	35.2	1.7×2	33 500	86 500	455
LPFC 4040-3	P						1.7×2	33 500	86 500	708
LSFC 4040-6	Clearance	40	80	6.350	41.75	35.2	1.7×4	60 800	173 000	880
LPFC 4040-6	P						1.7×4	60 800	173 000	1 370
LSFC 5050-3	Clearance	50	50	7.938	52.25	44.1	1.7×2	50 000	135 000	560
LPFC 5050-3	P						1.7×2	50 000	135 000	871
LSFC 5050-6	Clearance	50	100	7.938	52.25	44.1	1.7×4	90 800	270 000	1 084
LPFC 5050-6	P						1.7×4	90 800	270 000	1 688

Notes: 1. For the LSFC and USFC type ball screws, the axial rigidity *K* in the table above is the theoretical values obtained from the elastic deformation between screw groove and ball when the axial load is 30% of the basic dynamic load rating (*C<sub>a</sub>*). For the LPFC and UPFC type, the rigidity is the theoretical value when the preload is 10% of the basic dynamic load rating (*C<sub>a</sub>*) and an axial load is applied to it. Refer to the "Technical Description" (page B37) if the rigidity and preload differ from the conditions above, or when the deformation of the ball nut body must be considered.

Nut entire length <i>L</i>	Nut diameter <i>D</i>	Flanged diameter <i>A</i>	Flanged width <i>B</i>	Ball nut dimensions		End cap dimension <i>E</i>	Bolt hole dimension <i>X</i>	Bolt hole PCD <i>W</i>	Oil hole <i>Q</i>	Oil hole position <i>T</i>
				Flanged dimension						
				<i>H</i>	<i>K</i>					
55	47	74	12	49	—	13	6.6	60	M6×1	6
50	46	70	12	48	63	13	6.6	58	M6×1	7
50										
100										
100	46	70	12	48	63	14.5	6.6	58	M6×1	6
75										
100										
70	58	92	12	60	—	16	9	74	M6×1	5.5
62	58	92	12	60	82	15.5	9	74	M6×1	7.5
62										
126										
126	58	92	12	60	82	15.5	9	74	M6×1	7.5
126										
126										
85	73	114	15	75	—	19.5	11	93	M6×1	6.5
107	90	135	20	92	—	21.5	14	112	M6×1	7

2. The right turn screw is the standard. Please consult NSK for the left turn screw.  
 3. The models marked with \* (asterisk) are available in the FA type standard ball screws with finished shaft end.  
 4. Preload system: P; Oversize ball preload (See page B5.)