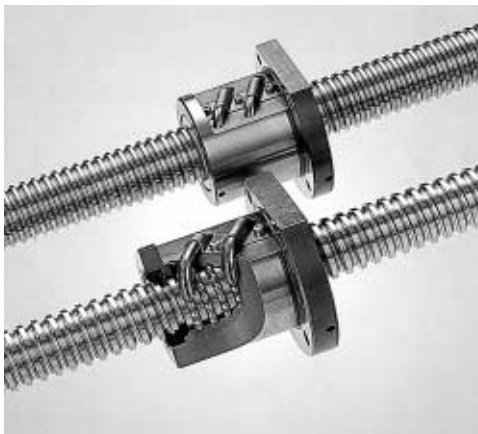


B-I-8.2 NSK S1™ Series Precision Ball Screw

NSK S1™ Series ball screws improve the level of softness in noise tone of driving mechanism. Quieter and smoother operation provides the machines that are both environmentally friendly and compatible with a variety of working environments.

Patent pending

NSK S1™ Series ball screws are one of epoch making products that have attained low noise, softer noise tone and smooth operation by incorporating resin retaining pieces between balls to avert their jamming.

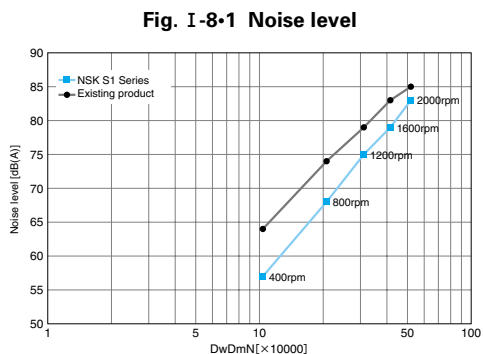


(1) Features

① Low noise • Softer noise tone

Incorporating the retaining pieces avoids collision between balls and thus, it lowers noise level and attains improvement on noise tone (softer to human ears) and low vibration.

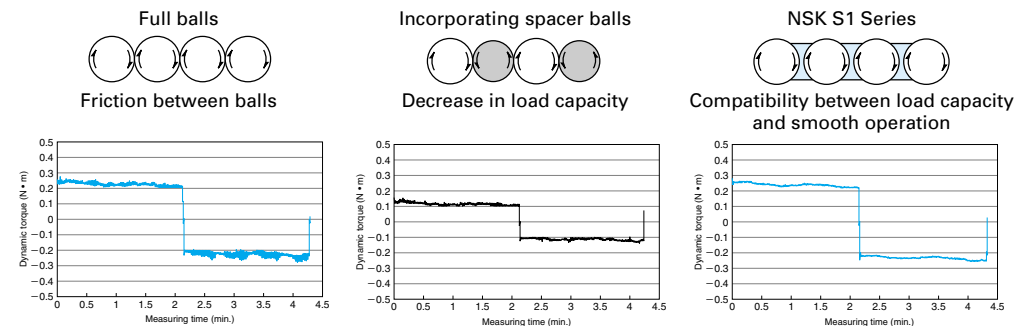
Test sample	Shaft diameter : ϕ 40 mm
	Lead : 10 mm
	Ball diameter : 6.35 mm
Test conditions	Oil lubrication (ISO VG68)
	Set the microphone 400 mm above the ball screw.



② Smooth operation

Suppression of jamming of balls improves dynamic torque characteristics and thereby, smoother and more stable operation of machine is possible. This feature is especially beneficial to very slow or oscillating operation.

Fig. I-8-2 Smooth operational characteristics



③ High load capacity • High rigidity

Conventionally, for fields requiring smooth operation, spacer balls were inserted among load carrying balls at a certain rate. However, this method results in a decrease of the load rating and rigidity due to the decrease in the number of steel balls that carry the load. Decrease in number of load balls due to insertion of retaining pieces are kept in 10 % approximately and thus, load capacity and rigidity of S1 Series ball screws are higher than the ball screws that incorporate spacer balls.

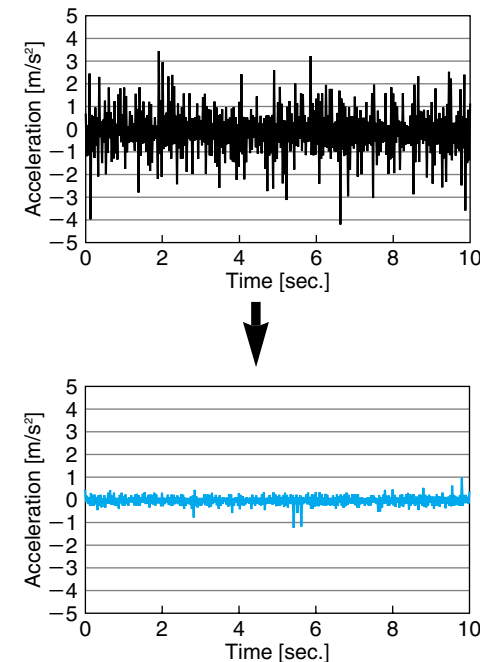
④ Superb vibration characteristics

Test sample	Shaft diameter : ϕ 40 mm
	Lead : 10 mm
	Ball diameter : 6.35 mm
Test conditions	Oil lubrication (VG68)

⑤ Dimensional interchangeability

S1 Series ball screws have interchangeability in installation with the existing Series because their ball nuts have the same external dimensions.

Fig. I-8-3 Comparison of vibration



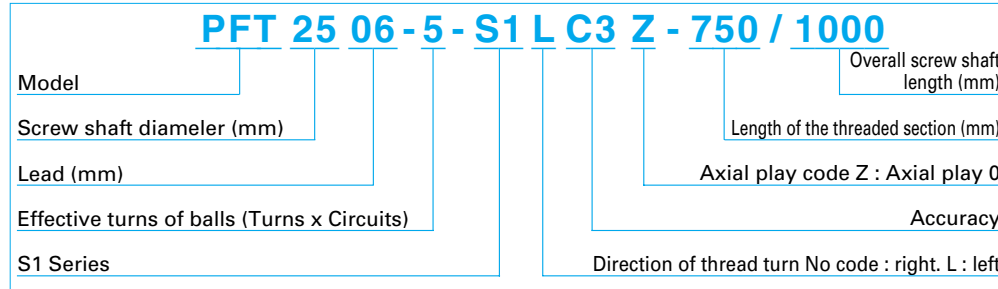
(2) Specifications

- Accuracy
Applicable accuracy grades are the C5 or better that are specified.
- Axial play
Zero axial play, which is equivalent specification to the oversize ball preload, is the standard.

- Method of ball recirculation
Ball recirculation method is ball return tube type.
* Options
Please consult with NSK if you require a ball screw that is out of the size of the S1 Series or installation of NSK K1 lubrication unit.

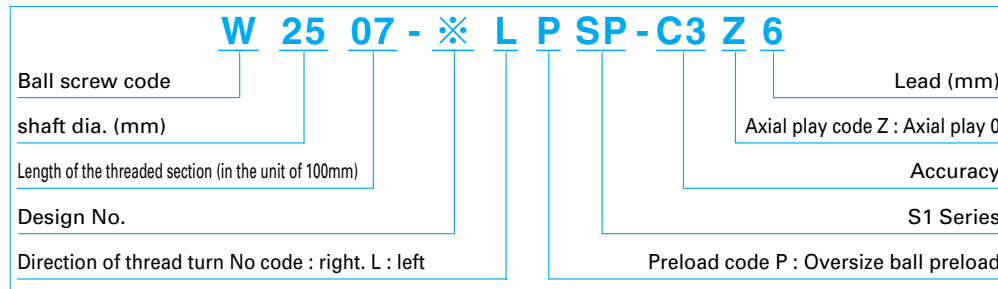
(3) Specification number

Specification number consists of code and number fields, which represent main specifications, and this is used for communication between a user and NSK prior to finalize the specifications.



(4) Reference number

Reference number shall be set to individual NSK ball screws when its specifications are finalized, and it is indicated on its specification drawing. Please specify the number for identification of the product when ordering.



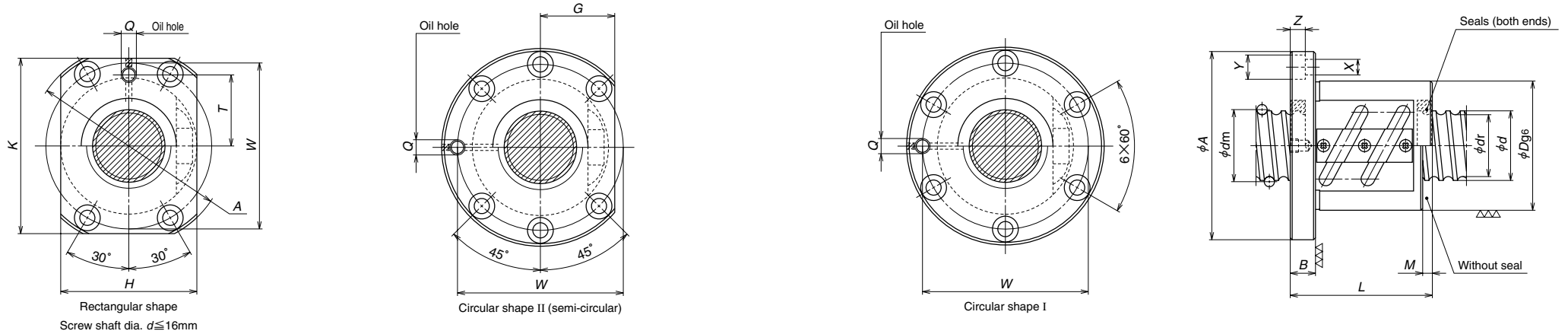
5) Application

- Application that requires low noise level and low vibration
Measuring equipment, pattern generator, medical equipment, office equipment, etc.
- Application that requires smooth motion
Electric wire cutting discharge machine, scanner, stepper, etc.
- Application that requires higher load carrying capacity and rigidity
Compact machinery that requires high load capacity and rigidity

Precautions for handling

- Temperature range for use..... Maximum temperature : 50°C.
..... Momentary maximum temperature in use : 80°C.
- Environment We recommend using NSK S1 Series in clean environment to demonstrate its performance fully.

6) S1™ Series dimensiontable.

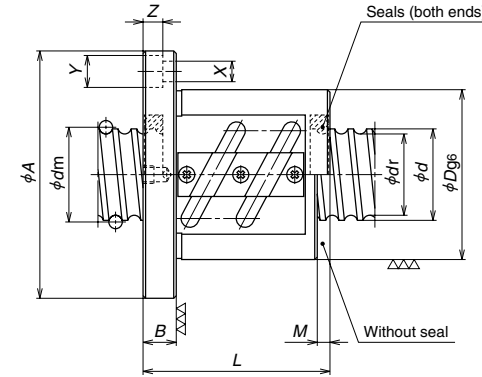
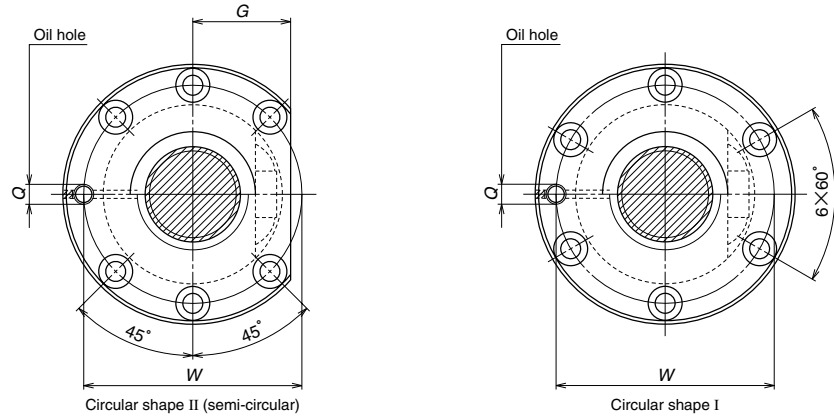


Model No.	Shaft dia.	Lead	Ball dia.	Ball circle dia.	Root dia.	Effective turns of balls Turns × Circuits	Basic load rating (N)	
	d	l	D_w	d_m	d_r		Dynamic C_d	Static C_{0s}
PFT 1605-3-S1	16	5	3.175	16.5	13.2	1.5×2	8210	14900
PFT 1605-5-S1		6	3.175	16.5	13.2	2.5×2	12700	25000
PFT 1606-2.5-S1	20	6	3.175	16.5	13.2	2.5×1	7020	12500
PFT 2005-3-S1		5	3.175	20.5	17.2	1.5×2	8970	18500
PFT 2005-5-S1		6	3.175	20.5	17.2	2.5×2	13900	31500
PFT 2006-2.5-S1		6	3.969	20.5	16.4	2.5×1	10500	19500
PFT 2006-3-S1		6	3.969	20.5	16.4	1.5×2	12300	23200
PFT 2008-2.5-S1	25	8	3.969	20.5	16.4	2.5×1	10500	19500
PFT 2505-3-S1		5	3.175	25.5	22.2	1.5×2	10100	23600
PFT 2505-5-S1		6	3.175	25.5	22.2	2.5×2	15700	39500
PFT 2506-3-S1		6	3.969	25.5	21.4	1.5×2	13400	28900
PFT 2506-5-S1	25	6	3.969	25.5	21.4	2.5×2	20800	48200

Remarks 1. Flanges for shaft diameter of 16 mm and smaller are rectangular. There are Circular I and Circular II for those with 20 mm and larger. Select a flange shape which is suitable for the nut installation space.
 2. If there is no seal, the nut length is shorter by the length of "M" than those with a seal.
 3. Right turn screw is standard. "L" is added to the end of the model code for left turn screw.

Axial rigidity K (N/ μm)	Ball nut dimensions													
	D	A	G	H	K	B	L	M	W	X	Y	Z	Q	T
271	40	63	—	40	55	11	52	—	51	5.5	9.5	5.5	M6×1	20
447	40	63	—	40	55	11	57	—	51	5.5	9.5	5.5	M6×1	20
229	40	63	—	40	55	11	44	—	51	5.5	9.5	5.5	M6×1	20
320	44	67	26	—	—	11	52	3	55	5.5	9.5	5.5	M6×1	—
532							56							
283	48	71	27	—	—	11	44	3	59	5.5	9.5	5.5	M6×1	—
335							56							
284	48	75	28	—	—	13	54	5	61	6.6	11	6.5	M6×1	—
389	50	73	28	—	—	11	52	3	61	5.5	9.5	5.5	M6×1	—
639							55							
396	53	76	29	—	—	11	56	3	64	5.5	9.5	5.5	M6×1	—
655							62							

4. Load balls and retaining pieces are installed at a ratio of 1:1. Therefore, the basic load rating differs from that of other series.
 5. Rigidity in the Table is theoretical value obtained from the elastic deformation between screw groove and ball when the preload is 5% of the basic dynamic load rating (C_d), and the axial load is applied to it. Refer to "Technical description" (Page B521) if preload differs from the conditions above, or when considering change in the deformation of the ball nut itself.



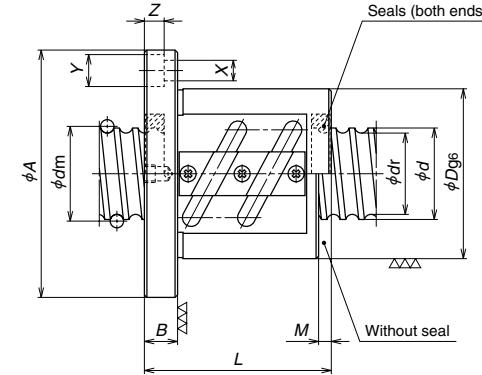
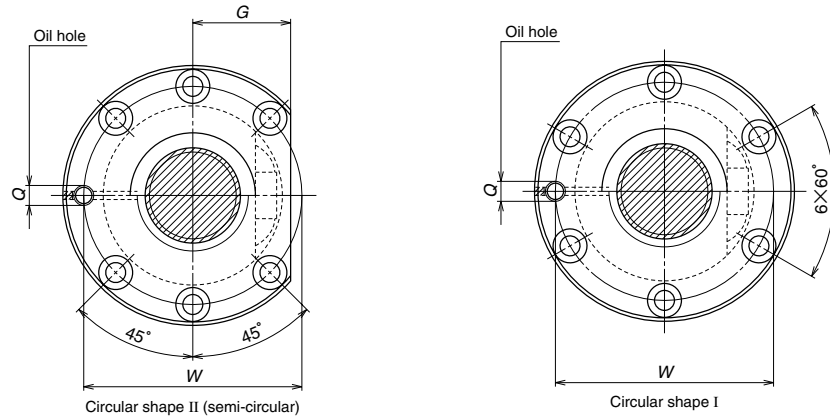
Model No.	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D_b</i>	Ball circle dia. <i>d_m</i>	Root dia. <i>d_r</i>	Effective turns of balls Turns × Circuits	Basic load rating (N)					
							Dynamic <i>C_a</i>	Static <i>C_{0a}</i>				
PFT 2508-2.5-S1	25	8	4.762	25.5	20.5	2.5×1	14500	28900				
PFT 2508-3-S1							17000	35000				
PFT 2510-2.5-S1		10	4.762	25.5	20.5	2.5×1	14500	28900				
PFT 2510-3-S1							17000	35000				
PFT 2805-5-S1	28	5	3.175	28.5	25.2	2.5×2	16200	43900				
PFT 2806-3-S1		6	3.175	28.5	25.2	1.5×2	10400	26500				
PFT 2806-5-S1							16200	43900				
PFT 2810-2.5-S1		10	4.762	28.5	23.5	1.5×2	15500	32200				
PFT 2810-3-S1	18100						38400					
PFT 3205-3-S1	32	5	3.175	32.5	29.2	1.5×2	11100	30100				
PFT 3205-5-S1						2.5×2	17300	50500				
PFT 3205-7.5-S1						2.5×3	24500	75700				
PFT 3206-3-S1		6	3.969	32.5	28.4	1.5×2	15000	38000				
PFT 3206-5-S1						2.5×2	23300	62900				
PFT 3208-3-S1		8	4.762	32.5	27.5	1.5×2	19100	44900				
PFT 3208-5-S1						2.5×2	29600	74300				
PFT 3210-2.5-S1						10	6.35	33.0	26.4	2.5×1	24400	50000
PFT 3210-3-S1										1.5×2	28600	59400
PFT 3210-5-S1		12	6.35	33.0	26.4	2.5×2	44400	99900				
PFT 3212-2.5-S1						2.5×1	24400	50000				
PFT 3212-3-S1		1.5×2	28600	59400								

Axial rigidity <i>K</i> (N/μm)	Ball nut dimensions										
	<i>D</i>	<i>A</i>	<i>G</i>	<i>B</i>	<i>L</i>	<i>M</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>Q</i>
343	58	85	32	13	56	5	71	6.6	11	6.5	M6×1
409					69						
343	58	85	32	15	67	8	71	6.6	11	6.5	M6×1
410					81						
696	55	85	31	12	56	3	69	6.6	11	6.5	M6×1
425					57						
696	55	85	31	12	63	3	69	6.6	11	6.5	M6×1
380					68						
454	60	94	36	15	82	7	76	9	14	8.5	M6×1
473					53						
770	58	85	32	12	56	3	71	6.6	11	6.5	M6×1
1130					71						
488	62	89	34	12	57	3	75	6.6	11	6.5	M6×1
794					63						
497	66	100	38	15	71	5	82	9	14	8.5	M6×1
806					82						
440	74	108	41	15	70	7	90	9	14	8.5	M6×1
521					87						
853	74	108	41	18	100	9	90	9	14	8.5	M6×1
440					81						
522	97										

Remarks 1. Circular shape I and II are provided for flange shape. Select one of them suites for nut installation space.
 2. If there is no seal, the nut length is shorter by the length of "M" than those with a seal.
 3. The right turn screw is standard. "L" is added to the end of the model code for left turn screw.

4. Load balls and retaining pieces are installed at a ratio of 1:1. Therefore, the basic load rating differs from that of other series.
 5. Rigidity in the Table is theoretical value obtained from the elastic deformation between screw groove and ball when the preload is 5% of the basic dynamic load rating (*C_a*), and the axial load is applied to it. Refer to "Technical description" (Page B521) if preload differs from the conditions above, or when considering change in the deformation of the ball nut itself.

B
462
Unit: mm



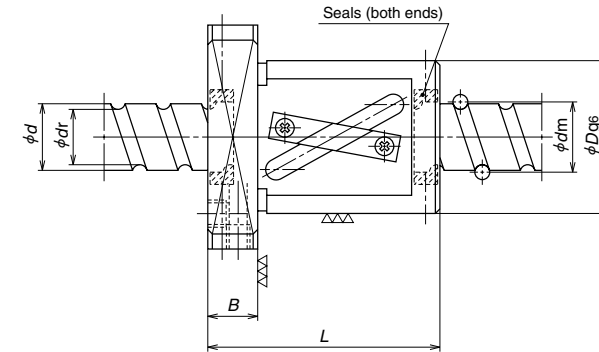
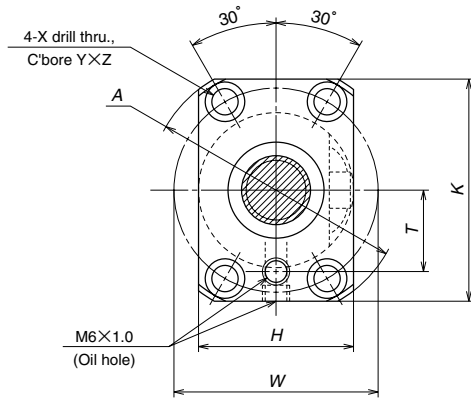
Unit: mm

Model No.	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D_b</i>	Ball circle dia. <i>d_m</i>	Root dia. <i>d_r</i>	Effective turns of balls Turns × Circuits	Basic load rating (N)	
							Dynamic <i>C_d</i>	Static <i>C_s</i>
PFT 3605-5-S1	36	5	3.175	36.5	33.2	2.5×2	18300	57000
PFT 3605-7.5-S1							25900	85500
PFT 3606-5-S1		6	3.969	36.5	32.4	2.5×2	24700	70900
PFT 3606-7.5-S1							34900	106000
PFT 3610-2.5-S1		10	6.35	37.0	30.4	2.5×1	25100	55800
PFT 3610-3-S1						1.5×2	29400	68100
PFT 3610-5-S1	2.5×2					45600	112000	
PFT 4005-3-S1	1.5×2					12200	38100	
PFT 4005-5-S1	40	5	3.175	40.5	37.2	2.5×2	18900	63500
PFT 4005-7.5-S1						2.5×3	26700	95300
PFT 4006-5-S1		6	3.969	40.5	36.4	2.5×2	25900	78800
PFT 4006-7.5-S1						2.5×3	36600	118000
PFT 4008-3-S1		8	4.762	40.5	35.5	1.5×2	21300	56300
PFT 4008-5-S1						2.5×2	33000	93900
PFT 4010-2.5-S1	10	6.35	41.0	34.4	2.5×1	26700	63100	
PFT 4010-3-S1					1.5×2	31200	74000	
PFT 4010-5-S1					2.5×2	48500	126000	
PFT 4510-2.5-S1					2.5×1	28000	70400	
PFT 4510-5-S1	45	10	6.35	46.0	39.4	2.5×2	50900	141000
PFT 4510-7.5-S1						2.5×3	72100	211000
PFT 5005-3-S1						1.5×2	13300	47600
PFT 5005-4.5-S1	50	5	3.175	50.5	47.2	1.5×3	18800	71400
PFT 5006-5-S1						2.5×2	28200	99300
PFT 5006-7.5-S		6	3.969	50.5	46.4	2.5×3	40000	149000
PFT 5008-5-S1						2.5×2	36400	118000
PFT 5008-7.5-S1		8	4.762	50.5	45.5	2.5×3	51500	178000
PFT 5010-2.5-S1						2.5×1	30100	79100
PFT 5010-5-S1	10	6.35	51.0	44.4	2.5×2	54600	158000	
PFT 5010-7.5-S1					2.5×3	77400	237000	

Axial rigidity <i>K</i> (N/μm)	Ball nut dimensions										
	<i>D</i>	<i>A</i>	<i>G</i>	<i>B</i>	<i>L</i>	<i>M</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>Q</i>
849	65	100	38	15	59	3	82	9	14	8.5	M6×1
1250					74	82	9	14	8.5	M6×1	
871	65	100	38	15	66	3	82	9	14	8.5	M6×1
1280					84	82	9	14	8.5	M6×1	
476	75	120	45	18	73						
573					90	7	98	11	17.5	11	M6×1
921					103						
566								56			
920	67	101	39	15	59	3	83	9	14	8.5	Rc1/8
1350					74	83	9	14	8.5	Rc1/8	
950	70	104	40	15	66	3	86	9	14	8.5	Rc1/8
1390					84	86	9	14	8.5	Rc1/8	
595	74	108	41	15	71	5	90	9	14	8.5	Rc1/8
969					82	90	9	14	8.5	Rc1/8	
524	82	124	47	18	73						
615					90	7	102	11	17.5	11	Rc1/8
1010					103						
571								73			
1100	88	132	50	18	103	7	110	11	17.5	11	Rc1/8
1620					133	110	11	17.5	11	Rc1/8	
670	80	114	43	15	58	3	96	9	14	8.5	Rc1/8
990					68	96	9	14	8.5	Rc1/8	
1130	84	118	45	15	68	3	100	9	14	8.5	Rc1/8
1670					86	100	9	14	8.5	Rc1/8	
1160	87	129	49	18	85	5	107	11	17.5	11	Rc1/8
1700					109	107	11	17.5	11	Rc1/8	
629	93	135	51	18	73						
1210					103	7	113	11	17.5	11	Rc1/8
1790					133						

Remarks 1. Circular shape I and II are provided for flange shape. Select one of them suits for nut installation space.
 2. If there is no seal, the nut length is shorter by the length of "M" than those with a seal.
 3. The right turn screw is standard. "L" is added to the end of the model code for left turn screw.

4. Load balls and retaining pieces are installed at a ratio of 1:1. Therefore, the basic load rating differs from that of other series.
 5. Rigidity in the Table is theoretical value obtained from the elastic deformation between screw groove and ball when the preload is 5% of the basic dynamic load rating (*C_d*), and the axial load is applied to it. Refer to "Technical description" (Page B521) if preload differs from the conditions above, or when considering change in the deformation of the ball nut itself.



Model No.	Shaft dia.	Lead	Ball dia.	Ball circle dia.	Root dia.	Effective turns of balls Turns × Circuits	Basic load rating (N)	
	<i>d</i>	<i>l</i>	<i>D_w</i>	<i>d_m</i>	<i>d_r</i>		Dynamic <i>C_d</i>	Static <i>C_{0s}</i>
LPFT 1616-1.5-S1	16	16	3.175	16.75	13.4	1.5×1	4520	7440
LPFT 2010-2.5-S1	20	10	3.969	21.0	16.9	2.5×1	10500	19500
LPFT 2016-2.5-S1		16	3.969	21.0	16.9	2.5×1	10500	19500
LPFT 2020-1.5-S1		20	3.969	21.0	16.9	1.5×1	6750	11600

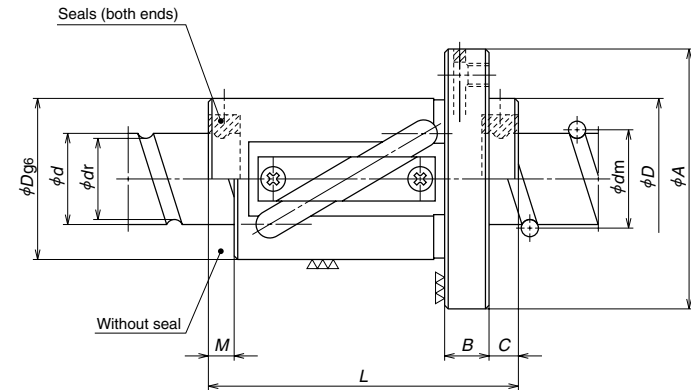
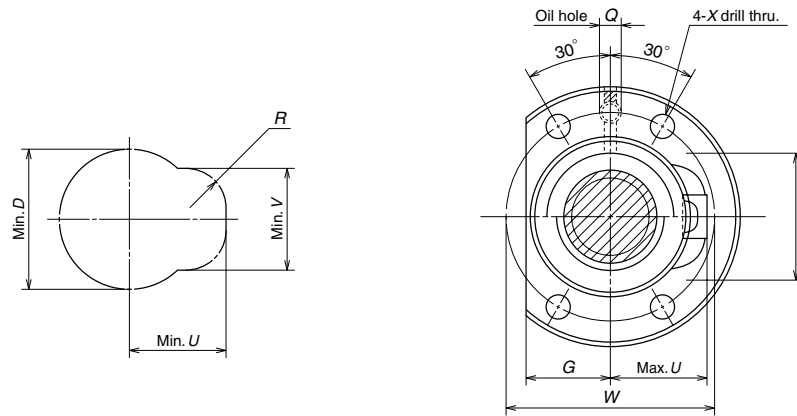
Remarks 1. The ball nut is equipped with seals as the standard feature. Removing the seals does not change external dimensions of ball nut.

2. The right turn screw is standard. "L" is added to the end of the model code for left turn screw.

Axial rigidity <i>K</i> (N/μm)	Ball nut dimensions										
	<i>D</i>	<i>A</i>	<i>H</i>	<i>K</i>	<i>B</i>	<i>L</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>T</i>
147	40	63	40	55	12	56	51	5.5	9.5	5.5	17
289	46	74	46	66	13	54	59	6.6	11	6.5	24
291	46	74	46	66	13	72	59	6.6	11	6.5	24
180	46	74	46	66	13	63	59	6.6	11	6.5	24

- Load balls and retaining pieces are installed at a ratio of 1:1. Therefore, the basic load rating differs from that of other series.
- Rigidity in the Table is theoretical value obtained from the elastic deformation between screw groove and ball when the preload is 5% of the basic dynamic load rating (*C_d*), and the axial load is applied to it. Refer to "Technical description" (Page B521) if preload differs from the conditions above, or when considering change in the deformation of the ball nut itself.

Unit: mm



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 Turns × Circuits	Basic load rating (N)	
							Dynamic <i>C_d</i>	Static <i>C_s</i>
LPFT 2516-2.5-S1	25	16	4.762	26.25	21.3	2.5×1	15100	29800
LPFT 2516-3-S1						1.5×2	17600	35100
LPFT 2520-2.5-S1		20	4.762	26.25	21.3	2.5×1	15100	29800
LPFT 2520-3-S1						1.5×2	17600	35100
LPFT 2525-1.5-S1	25	4.762	26.25	21.3	1.5×1	9720	17500	
LPFT 3220-2.5-S1	32	20	4.762	33.25	28.3	2.5×1	16800	38000
LPFT 3220-3-S1						1.5×2	19700	46500
LPFT 3225-2.5-S1		25	4.762	33.25	28.3	2.5×1	16800	38000
LPFT 3225-3-S1						1.5×2	19700	46500
LPFT 3232-1.5-S1	32	4.762	33.25	28.3	1.5×1	10800	23200	
LPFT 4020-2.5-S1	40	20	6.35	41.75	35.1	2.5×1	27600	63100
LPFT 4020-3-S1						1.5×2	32300	76900
LPFT 4025-2.5-S1		25	6.35	41.75	35.1	2.5×1	27600	63100
LPFT 4025-3-S1						1.5×2	32300	76900
LPFT 4032-2.5-S1	32	6.35	41.75	35.1	2.5×1	27600	63100	

Remarks 1. The ball nut is equipped with seals as the standard feature. Removing the seals does not change external dimensions of ball nut.
2. The right turn screw is standard. "L" is added to the end of the model code for left turn screw.

Axial rigidity <i>K</i> (N/μm)	Ball nut dimensions												
	<i>D</i>	<i>A</i>	<i>G</i>	<i>B</i>	<i>C</i>	<i>L</i>	<i>M</i>	<i>W</i>	<i>X</i>	<i>U</i>	<i>V</i>	<i>R</i>	<i>Q</i>
361	44	71	23	12	8	84	6	57	6.6	31	35	12	M6×1
429	44	71	23	12	8	100	7	57	6.6	31	35	12	M6×1
362	44	71	23	12	8	96	7	57	6.6	31	35	12	M6×1
431	44	71	23	12	8	116	7	57	6.6	31	35	12	M6×1
223	44	71	23	12	10	90	10	57	6.6	32	34	12	M6×1
433	51	85	26	15	8	99	7	67	9	34	42	12	M6×1
516	51	85	26	15	8	119	7	67	9	34	42	12	M6×1
440	51	85	26	15	10	117	10	67	9	34	42	12	M6×1
518	51	85	26	15	10	142	10	67	9	34	42	12	M6×1
275	51	85	26	15	12	109	13	67	9	34	42	12	M6×1
539	64	106	33	18	10	99	10	84	11	42	52	15	Rc1/8
638	64	106	33	18	10	119	10	84	11	42	52	15	Rc1/8
540	64	106	33	18	10	123	10	84	11	42	52	15	Rc1/8
640	64	106	33	18	10	148	10	84	11	42	52	15	Rc1/8
550	64	106	33	18	12	146	13	84	11	42	52	15	Rc1/8

4. Load balls and retaining pieces are installed at a ratio of 1:1. Therefore, the basic load rating differs from that of other series.
5. Rigidity in the Table is theoretical value obtained from the elastic deformation between screw groove and ball when the preload is 5% of the basic dynamic load rating (*C_d*), and the axial load is applied to it. Refer to "Technical description" (Page B521) if preload differs from the conditions above, or when considering change in the deformation of the ball nut itself.