

7. HIWIN Rolled Ballscrews

7.1 Introduction

HIWIN Rolled Ballscrews are made by the rolling process of the screw spindle instead of the grinding process. Rolled ballscrews not only have the benefit of low friction and smooth running for the linear feed system compared with traditional screws, but also can be supplied by quick stock delivery and lower production price.

HIWIN uses the most advanced technology in the ballscrew rolling process. By maintaining the homogeneous manufacturing procedure of selecting materials, rolling, heat treating, machining and assembling.

HIWIN rolled ballscrews can be classified into two grades. They are :

- Precision rolled grade (PR)
- High precision rolled grade (HR)

In general, both grades use the same preload method as the precision ground ballscrews, except that there are some differences in the lead error definition and the geometric tolerance. Each grade of the rolled ballscrews can be ordered according to the same nut dimension of the precision ground ballscrew. The dimensions of general type rolled ballscrews are listed in section 7.4. The geometric tolerances are shown in Table 7.4 and Table 7.6. If the ends of the spindle are unmachined, the geometric tolerance does not apply. The production scale of each type of the ballscrews and the accuracy classification are described in the following sections (the unit of length used is in mm).

7.2 Precision Rolled Ballscrews

Table 7.1 gives the lead accuracy of the precision rolled ballscrews. The lead accuracy is measured by the accumulated lead error of any portion of 300 mm in length. The maximum axial plays of the precision rolled ballscrews are shown in Table 7.2. These ballscrews can be preloaded as the precision ground ones. The categories of the precision rolled ballscrews are listed in Table 7.3.

Fig. 7.1 and Table 7.4 show the geometric tolerance of the general rolled ballscrews. has a variety of the precision rolled ballscrews for our customers' urgent requirement.

Table 7.1 Accuracy grade of precision rolled ballscrew

Unit: mm

Cumulative lead	PR1	PR2	PR3	PR4
error / 300 mm	±0.023	±0.05	±0.1	±0.21

Table 7.2 Maximum axial play of precision rolled ballscrew

Unit: mm

Ball diameter	≤2	2.381 3.175	3.969	4.763	6.35	7.144	7.938	9.525
Axial play	0.06	0.07	0.10	0.12	0.15	0.16	0.17	0.18

7.3 High Precision Rolled Ballscrews

The lead accuracy of the high precision rolled ballscrew is shown in table 7.5.

Fig. 7.2 and Table 7.6 show the geometric tolerances of preloaded high precision rolled ballscrews. Since the spindles of these ballscrews are made according to the accuracy tolerances, the geometric tolerances can be maintained at the highest precision level. Preload method of this type is the same as that of the precision ground type. Thus, they are comparable to the relative grade precision ground ballscrews, with lower price and shorter delivery period.

Table 7.7 gives the axial backlash of standard non-preloaded high precision rolled ballscrews. Table 7.8 shows the dimensions of the high precision rolled ballscrews. Since the rolled ballscrews have a different heat treatment process, they are hard to machine by regular machine tools. Hence, we provide the service of machining the journal ends to satisfy your requirements.

Table 7.3 Category of HIWIN precision rolled ballscrew

Unit: mm

Nominal diameter do (mm)	Lead																Max. screw length
	2	2.5	3	4	5	5.08	6	8	10	12	16	20	25	32	40	50	
8	●	■	●														800
10	●	■	●	●	●												1000
12	●	■	●	■	●	●				●							1200
14		■	●	●	●												1400
15					●				●			●					1500
16	■	■		●	■	■			■		●						1600
20		■		●	■	■	●	●	●			●					2000
25				●	■	■		●	■				●				2500
28					●		●							●			2500
32				●	■	■	●	●	●			●					3200
36					●	●	●	●	●	●		●					3600
40					■	■	●	●	●	●		●			●		4000
45									●	●		●					4600
50					●		●		●	●	●	●			●	●	5000
55									●								5500
63									■		●	■			●		5750

■ : Right and left hand ballscrews ● : Right hand ballscrews only

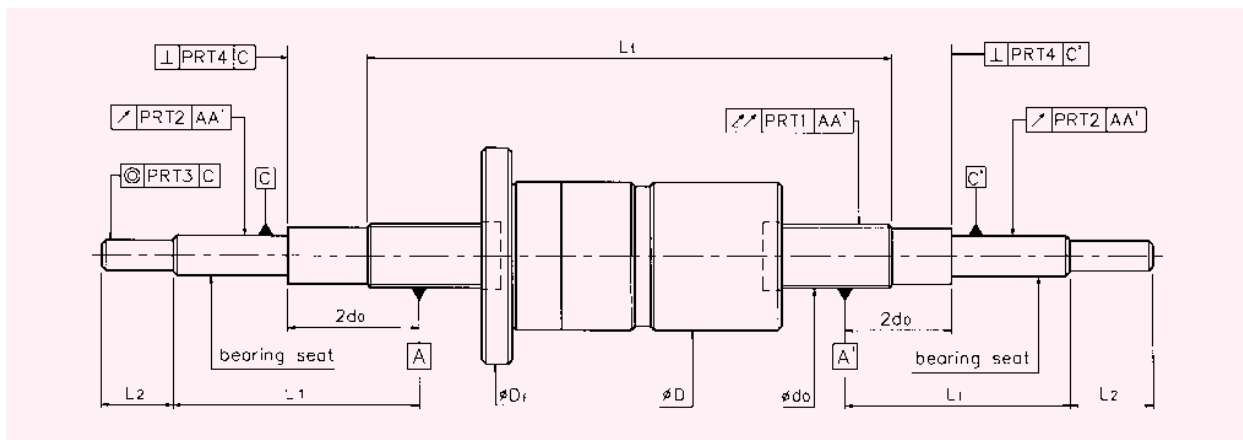


Fig. 7.1 Geometric tolerance of HIWIN precision rolled ballscrew

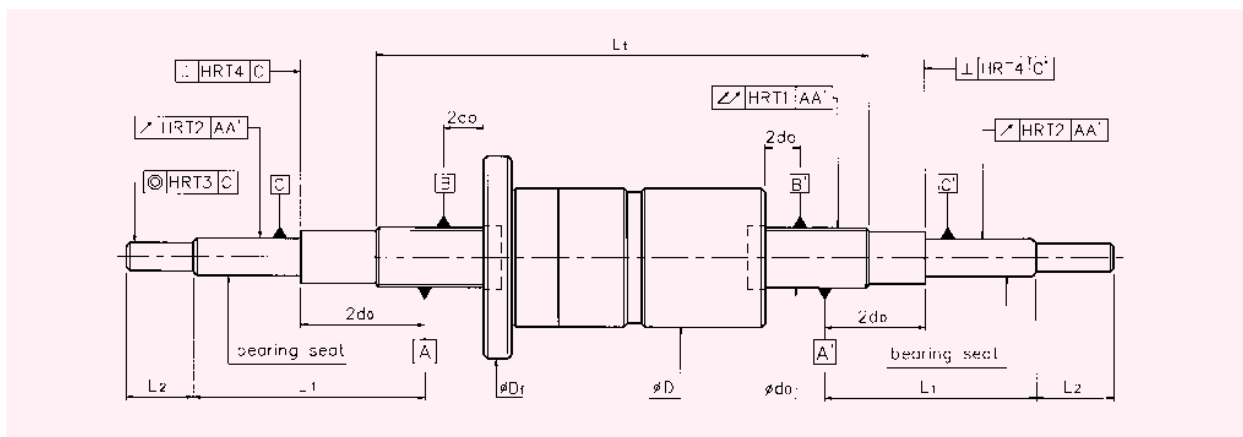


Fig. 7.2 Geometric tolerance of HIWIN high precision rolled ballscrew

Table : 7.4 Geometric tolerance range of HIWIN precision rolled ballscrew

unit: μm

Nominal diameter d_0 (mm)	PRT1					PRT2			PRT3			PRT4
	Lt/ d_0					L1			L2			
	≤ 20	≤ 40	≤ 60	≤ 80	≤ 100	< 50	< 125	< 200	< 50	< 125	< 200	
12 / 14	60	80	120	200	320	40	–	–	12	–	–	6
16	60	80	120	200	320	40	–	–	12	–	–	6
20	60	80	120	200	320	40	50	–	–	16	–	6
25 / 28	60	80	120	200	320	40	50	–	–	16	–	6
32 / 36	60	80	120	200	320	40	50	–	–	16	–	6
40 / 45	60	80	120	200	320	40	50	–	–	16	–	6
50	60	80	120	200	320	40	50	63	–	–	20	6
63	60	80	120	200	320	40	50	63	–	–	20	8

* Note: The geometric tolerance of grade PR4 is not included.

Fig 7.6 Geometric tolerance range of HIWIN high precision rolled ballscrew

unit: μm

Nominal diameter d_0 (mm)	HRT1		HRT2			HRT3			HRT4
	Lt/ d_0		L1			L2			
	≤ 20	≤ 40	< 50	< 125	< 200	< 50	< 125	< 200	
16	50	64	25	–	–	10	–	–	5
20	50	64	25	32	–	–	12	–	5
25	50	64	25	32	–	–	12	–	5
32	50	64	25	32	–	–	12	–	5
40	50	64	25	32	–	–	12	–	5
50	50	64	25	32	40	–	–	16	5

Table 7.5 Lead accuracy of HIWIN high precision rolled ballscrew

Accuracy Grade		HR1	
Thread length (mm)	Item	$\pm E$	e
	above		
–	315	23	23
315	400	25	25
400	500	27	26
500	630	30	29
630	800	35	31
800	1000	40	35
1000	1250	46	39
1250	1600	54	44
1600	2000	65	51
2000	2500	77	59
2500	2800	93	69

Table 7.7 Axial play of standard non-preloaded high precision rolled ballscrews

unit: mm

Accuracy grade	HR1
Max. axial play	0.02

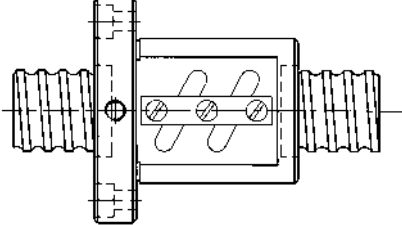
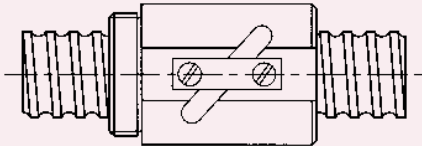
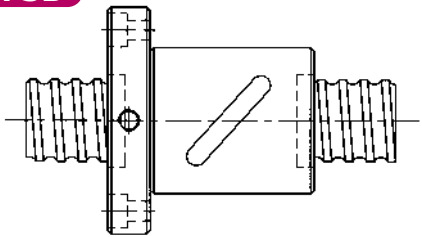
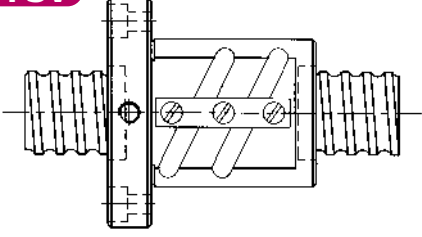
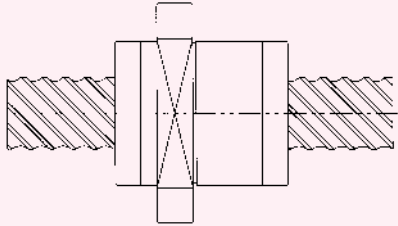
Table 7.8 Category of the high precision rolled ballscrews

unit: mm

Nominal diameter d_0 (mm)	Lead		Max. screw length
	5	10	
16	■		640
20	■		800
25	■	●	1000
32	■	●	1200
40	■	●	1600
50		●	3000

■ : Right and left hand ballscrews ● : Right hand ballscrews only

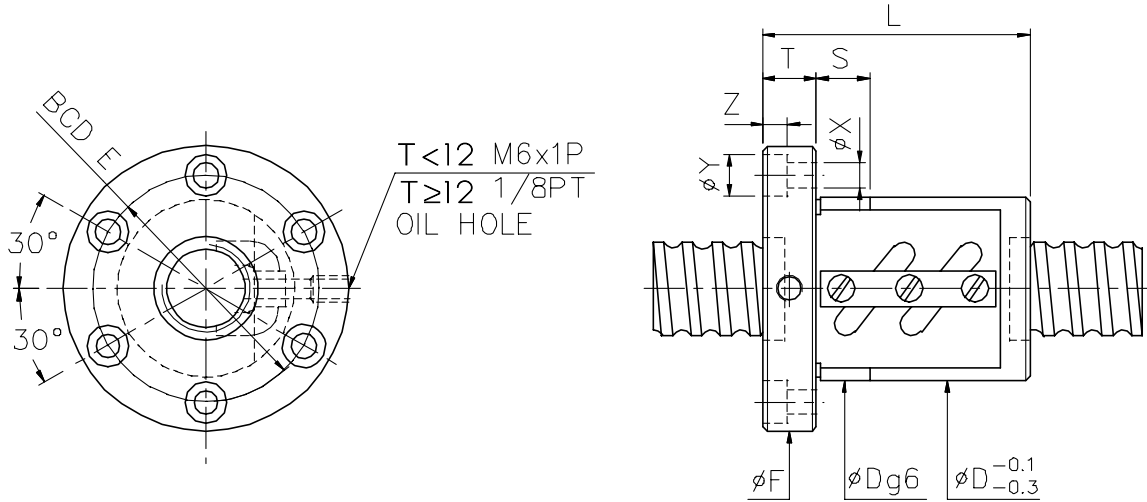
7.4 General Type of Rolled Ballscrews

page	General Type	page
94	<p>★ ★ FSW</p>  <p>Flange end, Single nut, Tube within the nut diameter</p>	94
95	<p>RSV</p>  <p>Round, Single nut, Tube above the nut diameter</p>	96
97	<p>★ ★ FSB</p>  <p>Flange end, Single nut, Bonded return tube</p>	98
98	<p>★ ★ FSV</p>  <p>Flange end, Single nut, Tube above the nut diameter</p>	98
page	High Lead Type	page
99	<p>★ ★ FSH</p>  <p>Large lead, Flange mounted, Single nut, End cap</p>	99

* Double asterisks(★★): Self-Lubricating Ballscrew E1 design is available, except the shaft diameter under 16mm or ball diameter under 2.381mm.

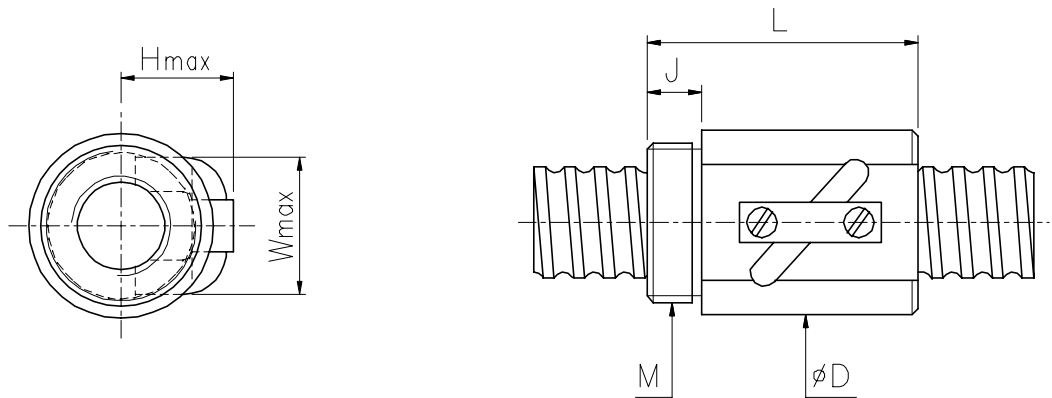
7.5 Dimensions for Rolled Ballscrews

F S W Type



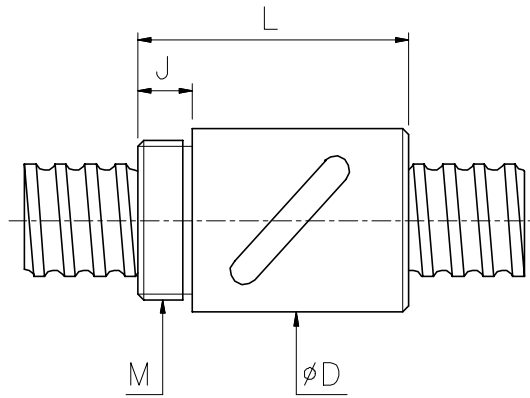
Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Flange					Fit	
	Nominal Dia.	Lead					L	D	F	BCD-E	Thickness		Bolt		
										T	X	Y	Z	S	
8-2.5B1	8	2.5	2.000	2.5x1	218	317	34	22	43	31	8	5.5	9.5	5.5	8
10-2.5B1	10	2.5	2.000	2.5x1	252	405	34	24	46	34	8	5.5	9.5	5.5	8
10-4B1	10	4	2.381	2.5x1	304	466	41	26	49	37	10	5.5	9.5	5.5	10
12-4B1	12	4	2.381	2.5x1	344	574	41	30	50	40	10	5.5	9.5	5.5	12
16-5B1	16	5	3.175	2.5x1	679	1226	43	40	64	51	10	5.5	9.5	5.5	12
20-5C1	20	5	3.175	3.5x1	1001	2149	50	44	68	55	12	5.5	9.5	5.5	12
25-5B2	25	5	3.175	2.5x2	1534	3975	60	50	74	62	12	5.5	9.5	5.5	12
25-10B1	25	10	4.763	2.5x1	1459	2983	65	60	86	73	16	6.6	11	6.5	12
32-5B2	32	5	3.175	2.5x2	1702	5098	60	58	84	71	12	6.6	11	6.5	12
32-10B2	32	10	6.350	2.5x2	4379	10345	98	74	108	90	16	9	14	8.5	15
40-10B2	40	10	6.350	2.5x2	4812	12732	102	84	125	104	18	11	17.5	11	15
50-10C2	50	10	6.350	3.5x2	7146	22477	126	94	135	114	18	11	17.5	11	20
63-10C2	63	10	6.350	3.5x2	7869	28290	128	110	152	130	20	11	17.5	11	20

R S V Type



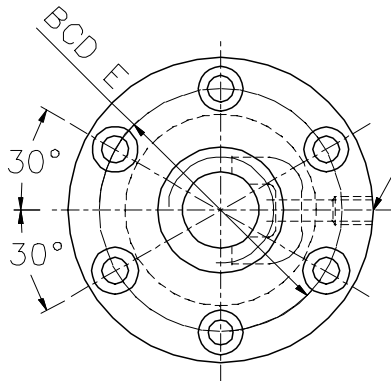
Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Mounting Thread	Mounting Thread length	Return Tube width	Return Tube height
	Nominal Dia.	Lead					L	D				
									M	J	W	H
8-2.5B1	8	2.5	2.000	2.5x1	218	317	28	18	M18x1P	10	15	15
10-2.5B1	10	2.5	2.000	2.5x1	252	405	30	20	M18x1P	10	17	17
10-4B1	10	4	2.381	2.5x1	305	466	32	23	M22x1P	10	20	20
12-4B1	12	4	2.381	2.5x1	344	574	32	25	M24x1P	10	22	21
16-5B1	16	5	3.175	2.5x1	679	1226	40	31	M28x1.5P	10	23	25
20-5C1	20	5	3.175	3.5x1	1001	2149	45	35	M32x1.5P	12	27	22
25-5B2	25	5	3.175	2.5x2	1534	3975	58	40	M38x1.5P	16	31	25
25-10B2	25	10	4.763	2.5x2	2663	6123	94	45	M38x1.5P	16	38	32
32-5B2	32	5	3.175	2.5x2	1702	5098	60	54	M50x2P	18	38	29
32-10B2	32	10	6.350	2.5x2	4379	10345	95	58	M52x2P	18	44	36
40-10B2	40	10	6.350	2.5x1	4812	12732	102	65	M60x2P	25	52	41
50-10C2	50	10	6.350	3.5x2	7146	22477	130	80	M75x2P	30	62	46
63-10C2	63	10	6.350	3.5x2	7869	28290	132	95	M90x2P	40	74	52

R S B Type

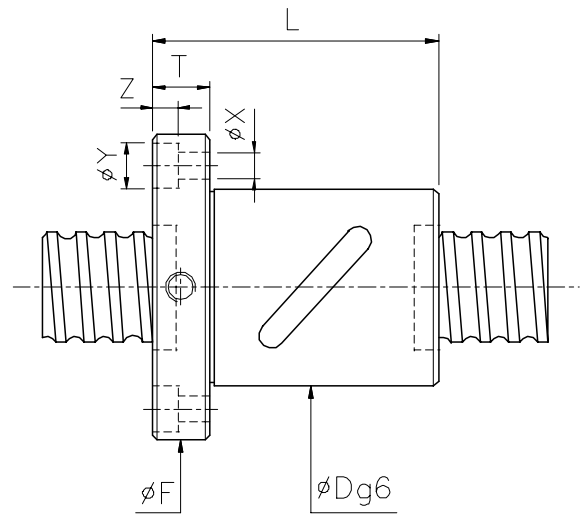


Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Mounting Thread M	Mounting Thread length J
	Nominal Dia.	Lead					L	D		
8-2.5B1	8	2.5	2.000	2.5x1	218	317	24	22	M18x1P	7.5
10-2.5B1	10	2.5	2.000	2.5x1	252	405	24	24	M20x1P	7.5
10-4B1	10	4	2.381	2.5x1	304	466	34	26	M22x1P	10
12-4B1	12	4	2.381	2.5x1	344	574	34	28	M25x1.5P	10
16-5B1	16	5	3.175	2.5x1	679	1226	42	36	M30x1.5P	12
20-5C1	20	5	3.175	3.5x1	1001	2149	54	40	M36x1.5P	14
25-5B2	25	5	3.175	2.5x2	1534	3975	69	46	M42x1.5P	19
32-5B2	32	5	3.175	2.5x2	1702	5098	69	54	M50x2P	19
32-10B2	32	10	6.350	2.5x2	4379	10345	105	68	M62x2P	19
40-10B2	40	10	6.350	2.5x2	4812	12732	110	76	M70x2P	24
50-10C2	50	10	6.350	3.5x2	7146	22477	135	88	M82x2P	29
63-10C2	63	10	6.350	3.5x2	7869	28290	135	104	M95x2P	29

F S B Type

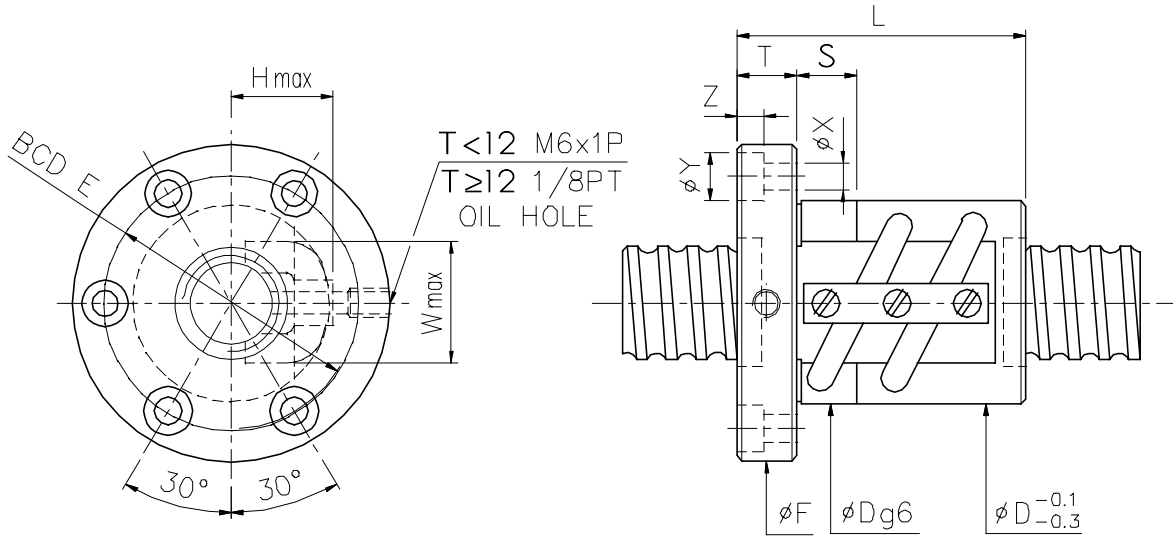


T < 12 M6x1P
T ≥ 12 1/8PT
OIL HOLE



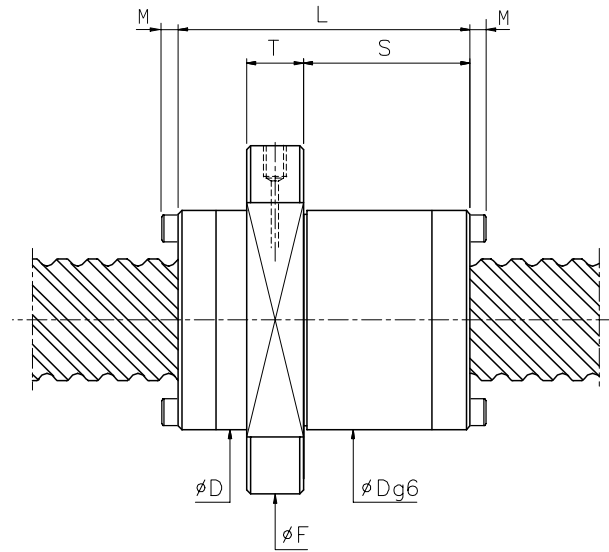
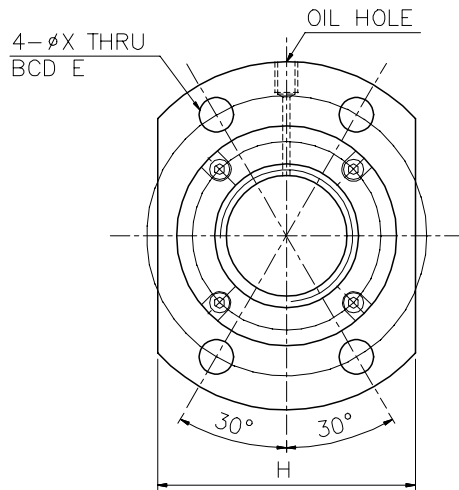
Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Flange			Bolt		
	Nominal Dia.	Lead					L	D	F	BCD-E	T	X	Y	Z
8-2.5B1	8	2.5	2.000	2.5x1	218	317	34	22	43	31	8	5.5	9.5	5.5
10-2.5B1	10	2.5	2.000	2.5x1	252	405	34	24	46	34	8	5.5	9.5	5.5
10-4B1	10	4	2.381	2.5x1	304	466	41	26	49	37	10	5.5	9.5	5.5
12-4B1	12	4	2.381	2.5x1	344	574	41	28	51	39	10	5.5	9.5	5.5
16-5B1	16	5	3.175	2.5x1	679	1226	43	36	60	47	10	5.5	9.5	5.5
20-5C1	20	5	3.175	3.5x1	1001	2149	50	40	64	51	12	5.5	9.5	5.5
25-5B2	25	5	3.175	2.5x2	1534	3975	60	46	70	58	12	5.5	9.5	5.5
32-5B2	32	5	3.175	2.5x2	1702	5098	60	54	80	67	12	6.6	11	6.5
32-10B2	32	10	6.350	2.5x2	4379	10345	98	68	102	84	16	9	14	8.5
40-10B2	40	10	6.350	2.5x2	4812	12732	102	76	117	96	18	11	17.5	11
50-10C2	50	10	6.350	3.5x2	7146	22477	126	88	129	108	18	11	17.5	11
63-10C2	63	10	6.350	3.5x2	7869	28290	128	104	146	124	20	11	17.5	11

F S V Type



Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Flange			Return Tube		Bolt			Fit
	Nominal Dia.	Lead					L	D	F	BCD-E	T	W	H	X	Y	Z	
8-2.5B1	8	2.5	2.000	2.5x1	218	317	34	18	41	29	8	15	15	5.5	9.5	5.5	8
10-2.5B1	10	2.5	2.000	2.5x1	252	405	34	20	43	31	8	17	17	5.5	9.5	5.5	8
10-4B1	10	4	2.381	2.5x1	304	466	41	23	46	34	10	20	20	5.5	9.5	5.5	10
12-4B1	12	4	2.381	2.5x1	344	574	41	25	48	36	10	22	21	5.5	9.5	5.5	12
16-5B1	16	5	3.175	2.5x1	679	1226	43	31	55	42	10	23	25	5.5	9.5	5.5	12
20-5C1	20	5	3.175	3.5x1	1001	2149	50	35	59	46	12	27	22	5.5	9.5	5.5	12
25-5B2	25	5	3.175	2.5x2	1534	3975	60	40	64	52	12	31	25	5.5	9.5	5.5	12
32-5B2	32	5	3.175	2.5x2	1702	5098	60	54	80	67	12	38	29	6.6	11	6.5	12
32-10B2	32	10	6.350	2.5x2	4379	10345	98	58	92	74	16	44	36	9	14	8.5	15
40-10B2	40	10	6.350	2.5x2	4812	12732	102	65	106	85	18	52	41	11	17.5	11	15
50-10C2	50	10	6.350	3.5x2	7146	22477	126	80	121	100	18	62	46	11	17.5	11	20
63-10C2	63	10	6.350	3.5x2	7869	28290	128	95	137	115	20	74	52	11	17.5	11	20

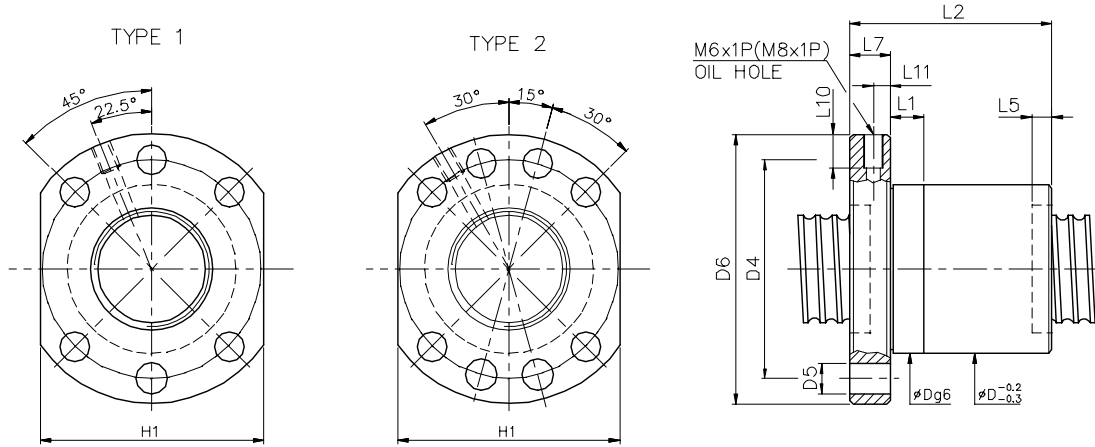
F S H Type



Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	Nut		Flange			Bolt	Fit											
	Nominal Dia.	Lead					D	L	F	T	BCD-E	H	X	S	M									
16-16S2	16	16	3.175	1.8x2	710	1380	32	48	53	10	42	38	4.5	26	0									
16-16S4				1.8x4	1290	2760																		
16-16S2	16	16	3.175	1.8x2	710	1380	33	48	58	10	45	38	6.6	26	0									
16-16S4				1.8x4	1290	2760																		
20-20S2	20	20	3.175	1.8x2	800	1740	39	48	62	10	50	46	5.5	27.5	0									
20-20S2				1.8x2	800	1740										38	58	62	10	50	46	5.5	32.5	3
20-20S4				1.8x4	1450	3480																		
25-25S2	25	25	3.969	1.8x2	1210	2800	47	67	74	12	60	56	6.6	39.5	3									
25-25S4				1.8x4	2190	5600																		
32-32S2	32	32	4.762	1.8x2	1720	4280	58	85	92	15	74	68	9	48	0									
32-32S4				1.8x4	3110	8530																		
40-40S2	40	40	6.35	1.8x2	2810	7170	72	102	114	17	93	84	11	60	0									
40-40S4				1.8x4	5100	14330																		
50-50S2	50	50	7.938	1.8x2	4120	10890	90	125	135	20	112	104	14	83.5	0									
50-50S4				1.8x4	7470	21780																		

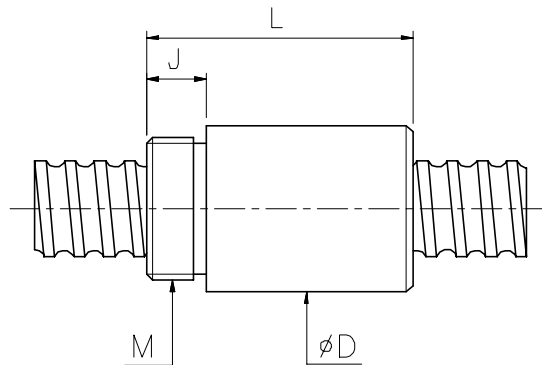
7.6 Dimensions for Stock Rolled Ballscrews

FSI Type (DIN 69051 part 5 form B)



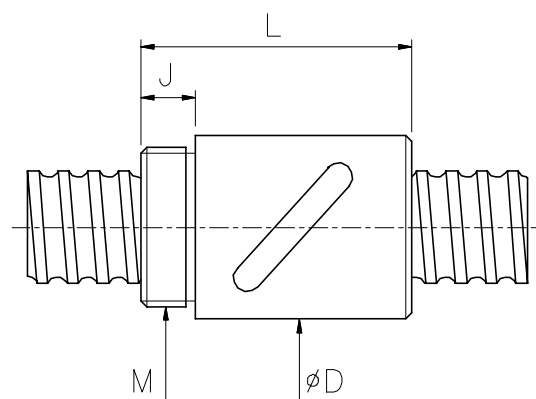
Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	D	D4	Flange Hole No.	D5	D6	H1	L1	L2	L7	L11	M-Oil Hole
	Nominal Dia.	Lead															
16-5T3	16	5	3.175	3	664	1196	28	38	6	5.5	48	40	10	44	10	5	M6x1P
20-5T3	20	5	3.175	3	733	1495	36	47	6	6.6	58	44	10	44	10	5	M6x1P
20-5T4		5	3.175	4	939	1993	36	47	6	6.6	58	44	10	52	10	5	M6x1P
25-5T3	25	5	3.175	3	880	2082	40	51	6	6.6	62	48	10	44	10	5	M6x1P
25-5T4		5	3.175	4	1127	2776	40	51	6	6.6	62	48	12	52	10	5	M6x1P
25-10T3		10	4.763	3	1430	2914	40	51	6	6.6	62	48	16	74	10	5	M6x1P
32-5T3	32	5	3.175	3	1008	2773	50	65	6	9	80	62	10	46	12	6	M6x1P
32-5T4		5	3.175	4	1291	3697	50	65	6	9	80	62	10	53	12	6	M6x1P
32-5T6		5	3.175	6	1830	5545	50	65	6	9	80	62	10	66	12	6	M6x1P
32-10T3		10	6.350	3	2264	4803	50	65	6	9	80	62	16	74	12	6	M6x1P
32-10T4	10	6.350	4	2900	6404	50	65	6	9	80	62	16	85	12	6	M6x1P	
40-5T4	40	5	3.175	4	1414	4621	63	78	8	9	93	70	10	53	14	7	M8x1P
40-5T6		5	3.175	6	2004	6932	63	78	8	9	93	70	10	66	14	7	M8x1P
40-10T3		10	6.350	3	2652	6367	63	78	8	9	93	70	16	74	14	7	M8x1P
40-10T4		10	6.350	4	3396	8489	63	78	8	9	93	70	16	87	14	7	M8x1P
50-5T4	50	5	3.175	4	1562	5940	75	93	8	11	110	85	10	57	16	8	M8x1P
50-5T6		5	3.175	6	2214	8910	75	93	8	11	110	85	10	70	16	8	M8x1P
50-10T3		10	6.350	3	3045	8334	75	93	8	11	110	85	16	78	16	8	M8x1P
50-10T4		10	6.350	4	3899	11112	75	93	8	11	110	85	16	89	16	8	M8x1P
50-10T6		10	6.350	6	5526	16668	75	93	8	11	110	85	16	112	16	8	M8x1P

RSI Type (with V-thread)



Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	L	D	M	J
	Nominal Dia.	Lead								
8-2.5T2	8	2.5	2	2	133	178	23.5	17.5	M15x1P	7.5
10-2.5T2	10	2.5	2	2	178	263	25	19.5	M17x1P	7.5
10-4T2	10	4	2.381	2	198	282	32	24	M22x1P	10

RSB Type (with V-thread)



Model	Size		Ball Dia.	Circuits	Dynamic Load 1x10 ⁶ revs C (kgf)	Static Load Co (kgf)	L	D	M	J
	Nominal Dia.	Lead								
12-4B1	12	4	2.381	2.5x1	344	574	34	25.5	M20x1P	10