

# STANDARD BALL SCREWS

2004 Release

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In addition, Danaher Motion, through Motion Engineering (MEI), offers powerful integrated motion control solutions with its industry-leading, multi-axis motion platforms and SynqNet® communications network for ultra-reliable machine performance. From software and controller, through the communications network to drives and I/O devices, to mechanical and electro-mechanical products, Danaher Motion differentiates itself in the marketplace by designing standard and custom solutions to satisfy the most demanding application requirements.

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## Danaher Motion Values

- Application Expertise
- Broad & Innovative Motion Control Products and Systems
- Customer Focus
- Customisable Products and Services
- Motion Control Pioneers with Global Staying Power
- Operational Excellence



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**Portescap**™

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## P3 Ball Screw shafts with lead accuracy 0,012/300mm

FK type nuts, flanged single with standard leads



General Details		
Nom Dia (mm)	Nom Lead (mm)	Ball Size (mm)
16	5	3,500
20	5	3,500
25	5	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144

Shaft Details			
Outside Dia d <sub>1</sub> (mm)	Root Dia d <sub>3</sub> (mm)	Std Shaft Length (mm)	Max Shaft Length (mm)
15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000

FH type nuts, flanged single with high leads



20	20	3,500
25	10	3,500
25	25	3,500
32	20	5,556
32	32	5,556
40	20	5,556
50	20	6,350
63	20	7,144

19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	27,1	3000	6000
31,6	28,5	3000	6000
39,6	35,2	3000	6000
49,5	44,6	3000	6000
62,5	56,9	3000	6000

FL type nuts, flanged single with integral preload



16	5	3,50
20	5	3,50
25	5	3,50
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144

15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000

ZG type nuts, cylindrical single with external threads



*12	4	1,984
16	5	3,500
20	5	3,500
25	5	3,500
25	10	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144

11,6	9,7	1500	3000
15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000

\*without wiper

## P3 Ball Screw nuts with axial play or light / medium preload

Key to nut dimensions on fold out page 16

Nut Dimensions									
D <sub>1</sub> g6 (mm)	D <sub>4</sub> (mm)	D <sub>5</sub> (mm)	D <sub>6</sub> h13 (mm)	L ±1 (mm)	L <sub>m</sub> +1 (mm)	L <sub>1</sub> +2 (mm)	L <sub>3</sub> (mm)	L <sub>7</sub> h13 (mm)	L <sub>8</sub> h13 (mm)
28	38	5,5	48	48,5	33,0	10	5,5	10	40
36	47	6,6	58	48,5	33,0	10	5,5	10	44
40	51	6,6	62	49,0	33,0	10	6,0	10	48
50	65	9,0	80	57,0	39,0	10	6,0	12	62
50	65	9,0	80	73,0	55,0	16	6,0	12	62
63	78	9,0	93	66,0	45,0	10	7,0	14	70
63	78	9,0	93	88,5	67,5	16	7,0	14	70
75	93	11,0	110	92,0	69,0	16	7,0	16	85
90	108	11,0	125	103,5	78,5	16	7,0	18	95

Technical Specification				
No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)	Max Preload Torque (Nm)
3,0	9,5	10,9	0,09	0,05
3,0	11,5	15,5	0,09	0,07
3,0	13,1	20,2	0,09	0,09
4,0	19,3	36,3	0,09	0,16
3,0	26,4	39,0	0,15	0,21
5,0	26,3	59,2	0,09	0,26
4,0	64,9	109,0	0,18	0,61
4,0	66,4	134,3	0,18	0,85
5,0	93,8	229,7	0,18	1,43

Light preload limits - between zero backlash to maximum preload torque figure

36	47	6,6	58	59,0	35,0	20	14,0	10	44
40	51	6,6	62	51,0	25,0	9	16,0	10	48
40	51	6,6	62	71,0	45,5	20	15,5	10	48
56	71	9,0	86	83,0	52,0	25	19,0	12	68
56	71	9,0	86	85,5	57,5	25	14,0	12	68
63	78	9,0	93	83,0	49,5	25	19,5	14	70
75	93	11,0	110	85,0	47,0	16	22,0	16	85
95	115	13,5	135	86,0	42,0	18	24,0	20	100

3,6	11,5	17,5	0,09	0,07
5,6	22,9	41,2	0,09	0,13
3,6	13,0	22,6	0,09	0,09
5,6	47,2	83,2	0,15	0,35
3,6	20,0	39,0	0,15	0,17
5,6	52,2	103,6	0,15	0,43
5,6	78,8	188,7	0,16	0,85
5,6	103,1	270,8	0,18	1,40

Medium preload limits - within the indicated torque band

28	38	5,5	48	55,0	39,5	10	5,5	10	40
36	47	6,6	58	68,5	53,0	10	5,5	10	44
40	51	6,6	62	69,5	53,5	10	6,0	10	48
50	65	9,0	80	83,0	65,0	10	6,0	12	62
50	65	9,0	80	105,5	87,5	16	6,0	12	62
63	78	9,0	93	97,0	76,0	10	7,0	14	70
63	78	9,0	93	142,0	121,0	16	7,0	14	70
75	93	11,0	110	144,0	121,0	16	7,0	16	85
90	108	11,0	125	166,0	141,0	16	7,0	18	95

Torque Band (Nm)			
2+2	6,7	7,2	0,03-0,09
3+3	11,5	15,5	0,07-0,13
3+3	12,6	19,1	0,12-0,18
4+4	19,3	36,4	0,21-0,32
3+3	19,3	36,3	0,27-0,41
5+5	26,3	59,2	0,34-0,51
4+4	64,9	109,0	0,81-1,22
4+4	66,4	134,3	1,13-1,70
5+5	93,8	229,7	1,90-2,85

Nut Dimensions							
D <sub>1</sub> h12 (mm)	D <sub>11</sub> (mm)	D <sub>12</sub> (mm)	D <sub>13</sub> ±0.1 (mm)	L ±1 (mm)	L <sub>11</sub> ±0.5 (mm)	L <sub>12</sub> ±2 (mm)	L <sub>13</sub> ±2 (mm)
25	M20x1	M6x1	n/a	34,0	10,0	5	n/a
32	M30x1,5	M6x1	4	57,5	16,5	10,5	22,0
38	M35x1,5	M6x1	4	57,5	16,5	10,5	22,0
42	M40x1,5	M6x1	4	63,5	17,0	10,5	23,0
42	M40x1,5	M6x1	4	61,0	17,0	10,0	21,0
52	M48x1,5	M6x1	5	65,5	19,0	10,5	23,0
52	M48x1,5	M6x1	5	85,0	19,0	12,0	43,0
58	M56x1,5	M8x1	5	67,5	19,0	12,0	22,5
65	M60x2,0	M8x1	6	105,5	27,0	13,0	43,0
78	M72x2,0	M8x1	6	118,0	29,0	13,0	53,0
92	M85x2,0	M8x1	6	118,0	29,0	13,0	53,0

Technical Specification				
No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)	Max Preload Torque (Nm)
3,0	3,5	4,0	0,07	0,03
4,0	12,1	14,5	0,09	0,06
4,0	14,8	20,7	0,09	0,07
5,0	20,4	33,7	0,09	0,10
6,0	19,9	31,8	0,09	0,14
5,0	23,3	45,5	0,09	0,18
4,0	33,8	52,0	0,15	0,25
5,0	26,3	59,2	0,09	0,25
5,0	78,6	136,2	0,18	0,75
6,0	97,8	213,2	0,18	0,95
6,0	109,7	275,6	0,18	1,60

## P5/T5 Ball Screw shafts with lead accuracy 0,023/300mm



General Details		
Nom Dia (mm)	Nom Dia (mm)	Ball Size (mm)
16	5	3,500
20	5	3,500
25	5	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144

Shaft Details			
Outside Dia d <sub>1</sub> (mm)	Root Dia d <sub>3</sub> (mm)	Std Shaft Length (mm)	Max Shaft Length (mm)
15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000



20	20	3,500
25	10	3,500
25	25	3,500
32	20	5,556
32	32	5,556
40	20	5,556
50	20	6,350
63	20	7,144

19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	27,1	3000	6000
31,6	28,5	3000	6000
39,6	35,2	3000	6000
49,5	44,6	3000	6000
62,5	56,9	3000	6000

\* Nut style UF with a 5 bolt hole pattern is still available. Please contact factory for availability.



*12	4	1,984
16	5	3,500
20	5	3,500
25	5	3,500
25	10	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144

11,6	9,7	1500	3000
15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000

\*without wiper

## P5/T5 Ball Screw nuts with axial play or light preload

Key to nut dimensions on fold out page 16

Nut Dimensions										Technical Specification				
D <sub>1</sub> g6 (mm)	D <sub>4</sub> (mm)	D <sub>5</sub> (mm)	D <sub>6</sub> h13 (mm)	L ±1 (mm)	L <sub>m</sub> +1 (mm)	L <sub>1</sub> +2 (mm)	L <sub>3</sub> (mm)	L <sub>7</sub> h13 (mm)	L <sub>8</sub> h13 (mm)	No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)	Max Preload Torque (Nm)
28	38	5,5	48	48,5	33,0	10	5,5	10	40	3,0	9,5	10,9	0,09	0,05
36	47	6,6	58	48,5	33,0	10	5,5	10	44	3,0	11,5	15,5	0,09	0,07
40	51	6,6	62	49,0	33,0	10	6,0	10	48	3,0	13,1	20,2	0,09	0,09
50	65	9,0	80	57,0	39,0	10	6,0	12	62	4,0	19,3	36,3	0,09	0,16
50	65	9,0	80	73,0	55,0	16	6,0	12	62	3,0	26,4	39,0	0,15	0,21
63	78	9,0	93	66,0	45,0	10	7,0	14	70	5,0	26,3	59,2	0,09	0,26
63	78	9,0	93	88,5	67,5	16	7,0	14	70	4,0	64,9	109,0	0,18	0,61
75	93	11,0	110	92,0	69,0	16	7,0	16	85	4,0	66,4	134,3	0,18	0,85
90	108	11,0	125	103,5	78,5	16	7,0	18	95	5,0	93,8	229,7	0,18	1,43

Light preload limits - between zero backlash to maximum preload torque figure

36	47	6,6	58	59,0	35,0	20	14,0	10	44	3,6	11,5	17,5	0,09	0,07
40	51	6,6	62	51,0	25,0	9	16,0	10	48	5,6	22,9	41,2	0,09	0,13
40	51	6,6	62	71,0	45,5	20	15,5	10	48	3,6	13,0	22,6	0,09	0,09
56	71	9,0	86	83,0	52,0	25	19,0	12	68	5,6	47,2	83,2	0,15	0,35
56	71	9,0	86	85,5	57,5	25	14,0	12	68	3,6	20,0	39,0	0,15	0,17
63	78	9,0	93	83,0	49,5	25	19,5	14	70	5,6	52,2	103,6	0,15	0,43
75	93	11,0	110	85,0	47,0	16	22,0	16	85	5,6	78,8	188,7	0,16	0,85
95	115	13,5	135	86,0	42,0	18	24,0	20	100	5,6	103,1	270,8	0,18	1,40

Nut Dimensions								Technical Specification				
D <sub>1</sub> h12 (mm)	D <sub>11</sub> (mm)	D <sub>12</sub> (mm)	D <sub>13</sub> ±0.1 (mm)	L ±1 (mm)	L <sub>11</sub> ±0.5 (mm)	L <sub>12</sub> ±2 (mm)	L <sub>13</sub> ±2 (mm)	No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)	Max Preload Torque (Nm)
25	M20x1	M6x1	n/a	34,0	10,0	5	n/a	3,0	3,5	4,0	0,07	0,03
32	M30x1,5	M6x1	4	57,5	16,5	10,5	22,0	4,0	12,1	14,5	0,09	0,06
38	M35x1,5	M6x1	4	57,5	16,5	10,5	22,0	4,0	14,8	20,7	0,09	0,07
42	M40x1,5	M6x1	4	63,5	17,0	10,5	23,0	5,0	20,4	33,7	0,09	0,10
42	M40x1,5	M6x1	4	61,0	17,0	10,0	21,0	6,0	19,9	31,8	0,09	0,14
52	M48x1,5	M6x1	5	65,5	19,0	10,5	23,0	5,0	23,3	45,5	0,09	0,18
52	M48x1,5	M6x1	5	85,0	19,0	12,0	43,0	4,0	33,8	52,0	0,15	0,25
58	M56x1,5	M8x1	5	67,5	19,0	12,0	22,5	5,0	26,3	59,2	0,09	0,25
65	M60x2,0	M8x1	6	105,5	27,0	13,0	43,0	5,0	78,6	136,2	0,18	0,75
78	M72x2,0	M8x1	6	118,0	29,0	13,0	53,0	6,0	97,8	213,2	0,18	0,95
92	M85x2,0	M8x1	6	118,0	29,0	13,0	53,0	6,0	109,7	275,6	0,18	1,60

## T7 Ball Screw shafts with lead accuracy 0,052/300mm

FK type nuts, flanged single with standard leads



FH type nuts, flanged single with high leads



ZG type nuts, cylindrical single with external threads



General Details		
Nom Dia (mm)	Nom Lead (mm)	Ball Size (mm)

16	5	3,500
20	5	3,500
25	5	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144
80	10	7,144
80	20	12,700

Shaft Details			
Outside Dia d <sub>1</sub> (mm)	Root Dia d <sub>2</sub> (mm)	Std Shaft Length (mm)	Max Shaft Length (mm)

15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000
79,5	73,9	6000	6000
79,5	69,9	6000	6000

20	20	3,500
25	10	3,500
25	25	3,500
32	20	5,556
32	32	5,556
40	20	5,556
50	20	6,350
63	20	7,144

19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	27,1	3000	6000
31,6	28,5	3000	6000
39,6	35,2	3000	6000
49,5	44,6	3000	6000
62,5	56,9	3000	6000

*12	4	1,984
16	5	3,500
20	5	3,500
25	5	3,500
25	10	3,500
32	5	3,500
32	10	5,556
40	5	3,500
40	10	7,144
50	10	7,144
63	10	7,144
80	10	7,144
80	20	12,700

11,6	9,7	1500	3000
15,6	12,7	1500	3000
19,6	16,7	2000	4000
24,6	21,7	2500	5000
24,6	21,7	2500	5000
31,6	28,7	3000	6000
31,6	27,1	3000	6000
39,6	36,7	3000	6000
39,6	34,0	3000	6000
49,5	43,8	3000	6000
62,5	56,9	6000	6000
79,5	73,9	6000	6000
79,5	69,9	6000	6000

\*without wiper



## T7 Ball Screw nuts with axial play only

Key to nut dimensions on fold out page 16

Nut Dimensions									
D <sub>1</sub> g6 (mm)	D <sub>4</sub> (mm)	D <sub>5</sub> (mm)	D <sub>6</sub> h13 (mm)	L ±1 (mm)	L <sub>m</sub> +1 (mm)	L <sub>1</sub> +2 (mm)	L <sub>3</sub> (mm)	L <sub>7</sub> h13 (mm)	L <sub>8</sub> h13 (mm)
28	38	5,5	48	48,5	33,0	10	5,5	10	40
36	47	6,6	58	48,5	33,0	10	5,5	10	44
40	51	6,6	62	49,0	33,0	10	6,0	10	48
50	65	9,0	80	57,0	39,0	10	6,0	12	62
50	65	9,0	80	73,0	55,0	16	6,0	12	62
63	78	9,0	93	66,0	45,0	10	7,0	14	70
63	78	9,0	93	88,5	67,5	16	7,0	14	70
75	93	11,0	110	92,0	69,0	16	7,0	16	85
90	108	11,0	125	103,5	78,5	16	7,0	18	95
105	125	13,5	145	121,0	92,0	16	9,0	20	110
125	145	13,5	165	160,5	126,5	25	9,0	25	130

Technical Specification			
No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)
3,0	9,5	10,9	0,09
3,0	11,5	15,5	0,09
3,0	13,1	20,2	0,09
4,0	19,3	36,3	0,09
3,0	26,4	39,0	0,15
5,0	26,3	59,2	0,09
4,0	64,9	109,0	0,18
4,0	66,4	134,3	0,18
5,0	93,8	229,7	0,18
6,0	121,9	374,9	0,18
4,0	176,4	375,0	0,25

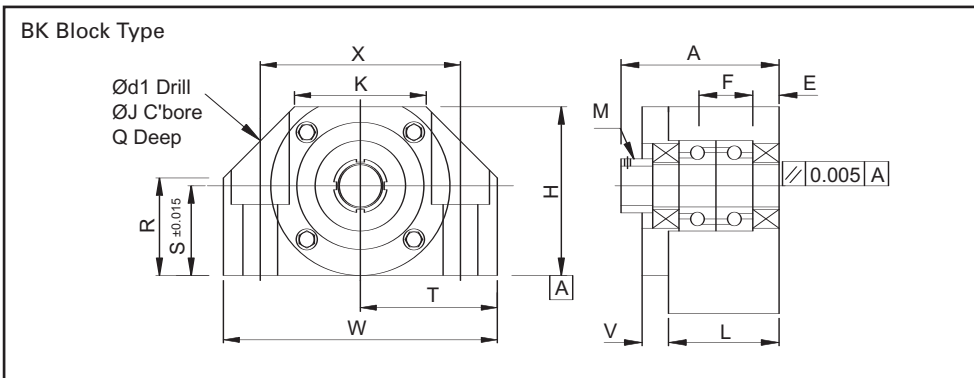
36	47	6,6	58	59,0	35,0	20	14,0	10	44
40	51	6,6	62	51,0	25,0	9	16,0	10	48
40	51	6,6	62	71,0	45,5	20	15,5	10	48
56	71	9,0	86	83,0	52,0	25	19,0	12	68
56	71	9,0	86	85,5	57,5	25	14,0	12	68
63	78	9,0	93	83,0	49,5	25	19,5	14	70
75	93	11,0	110	85,0	47,0	16	22,0	16	85
95	115	13,5	135	86,0	42,0	18	24,0	20	100

3,6	11,5	17,5	0,09
5,6	22,9	41,2	0,09
3,6	13,0	22,6	0,09
5,6	47,2	83,2	0,15
3,6	20,0	39,0	0,15
5,6	52,2	103,6	0,15
5,6	78,8	188,7	0,16
5,6	103,1	270,8	0,18

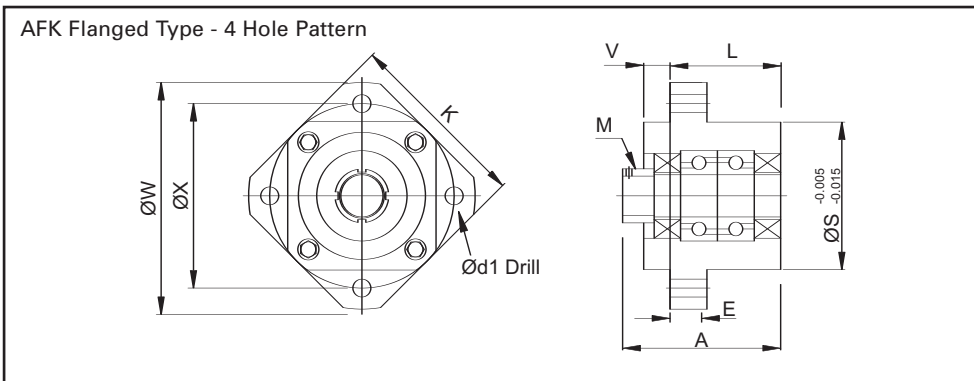
Nut Dimensions							
D <sub>1</sub> h12 (mm)	D <sub>11</sub> (mm)	D <sub>12</sub> (mm)	D <sub>13</sub> ±0.1 (mm)	L ±1 (mm)	L <sub>11</sub> ±0.5 (mm)	L <sub>12</sub> ±2 (mm)	L <sub>13</sub> ±2 (mm)
25	M20x1	M6x1	n/a	34,0	10,0	5	n/a
32	M30x1,5	M6x1	4	57,5	16,5	10,5	22,0
38	M35x1,5	M6x1	4	57,5	16,5	10,5	22,0
42	M40x1,5	M6x1	4	63,5	17,0	10,5	23,0
42	M40x1,5	M6x1	4	61,0	17,0	10,0	21,0
52	M48x1,5	M6x1	5	65,5	19,0	10,5	23,0
52	M48x1,5	M6x1	5	85,0	19,0	12,0	43,0
58	M56x1,5	M8x1	5	67,5	19,0	12,0	22,5
65	M60x2,0	M8x1	6	105,5	27,0	13,0	43,0
78	M72x2,0	M8x1	6	118,0	29,0	13,0	53,0
92	M85x2,0	M8x1	6	118,0	29,0	13,0	53,0
120	M110x2,0	M8x1	8	126,0	34,0	15,5	53,0
120	M110x2,0	M8x1	8	187,0	39,0	18,0	83,0

Technical Specification			
No Of Turns	Dynamic Load Rating (kN)	Static Load Rating (kN)	Max Axial Play (mm)
3,0	3,5	4,0	0,07
4,0	12,1	14,5	0,09
4,0	14,8	20,7	0,09
5,0	20,4	33,7	0,09
6,0	19,9	31,8	0,09
5,0	23,3	45,5	0,09
4,0	33,8	52,0	0,15
5,0	26,3	59,2	0,09
5,0	78,6	136,2	0,18
6,0	97,8	213,2	0,18
6,0	109,7	275,6	0,18
6,0	121,9	375,0	0,18
5,0	213,7	496,0	0,18

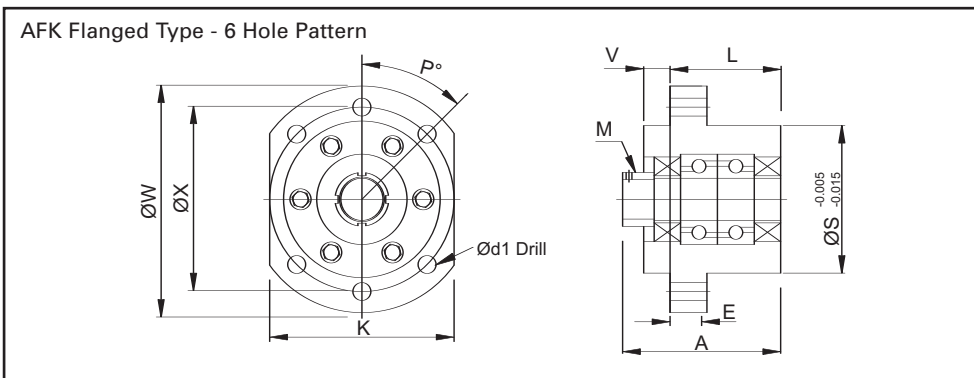
## Ball Screw Bearing Support Units - Fixed



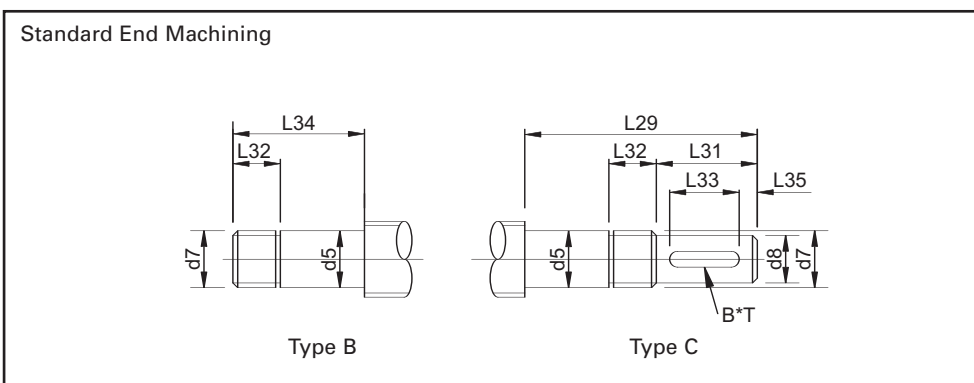
Part Number	W (mm)	H (mm)	S (mm)
BK 8	52	32	17
BK 10	60	39	22
BK 12	60	43	25
BK 15	70	48	28
BK 17	86	64	39
BK 20	88	60	34
BK 25	106	80	48
BK 30	128	89	51
BK 40	160	110	60



Part Number	W (mm)	X (mm)	S (mm)
AFK 8	43	35	28
AFK 10	52	42	34
AFK 12	54	44	36
AFK 15	63	50	40
AFK 20	85	70	57



Part Number	W (mm)	X (mm)	S (mm)
AFK 25	122	100	80
AFK 30	138	116	90
AFK 40	176	150	120



Part Number	$d_6$ (mm)	$d_5$ h6 (mm)	$d_7$ (mm)
B or C	12	8	M8x1,0
B or C	16	10	M10x1,0
B or C	16	12	M12x1,0
B or C	20	15	M15x1,0
B or C	25	17	M17x1,0
B or C	25	20	M20x1,0
B or C	32	25	M25x1,5
B or C	40	30	M30x1,5
B or C	50	40	M40x1,5

Dimensions												
R (mm)	T (mm)	X (mm)	K (mm)	d <sub>i</sub> (mm)	J (mm)	Q (mm)	M (mm)	L (mm)	A (mm)	E (mm)	F (mm)	V (mm)
18,5	26	38	25	6,6	11	6,5	M8x1,0	23	33	11,5		5
26	30	46	34	6,6	11	6,5	M10x1,0	25	38	6	13	6
30	30	46	34	6,6	11	6,5	M12x1,0	25	38	6	13	6
33	35	54	40	6,6	11	6,5	M15x1,0	27	40	6	15	7
46	43	68	50	9	14	8,5	M15x1,0	35	52	8	19	9
42	44	70	52	9	14	8,5	M20x1,0	35	52	8	19	9
59	53	85	64	11	17,5	11	M25x1,5	42	65	10	22	11
63	64	102	76	14	20	13	M30x1,5	45	74	11	23	12
80	80	130	100	18	26	17,5	M40x1,5	61	93	14	33	14

Technical Specification		
Bearing Type	Axial Load Rating (kN)	MaxPerm Load (kN)
EN8	1,64	1,48
7000A	6,70	2,78
7001A	7,25	3,10
7002A	7,75	4,07
7203A	14,00	5,95
7004A	12,95	9,70
7205A	20,60	11,70
7206B	28,60	16,60
7208B	45,00	27,70

Dimensions							
K (mm)	L (mm)	A (mm)	E (mm)	V (mm)	d <sub>i</sub> (mm)	P° (mm)	M (mm)
35	21	30	7	5	3,4	90	M8x1,0
42	25	38	7	6	4,5	90	M10x1,0
44	25	38	8	6	4,5	90	M12x1,0
52	27	40	10	7	5,5	90	M15x1,0
68	37	52	15	7	6,6	90	M20x1,0

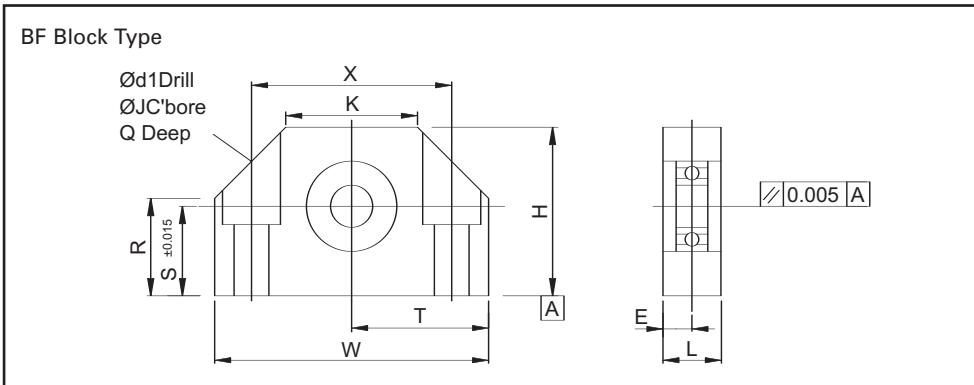
Technical Specification		
Bearing Type	Axial Load Rating (kN)	MaxPerm Load (kN)
608	1,64	3,35
7000A	6,70	2,78
7001A	7,25	3,10
7002A	7,75	4,07
7204B	18,30	9,70

Dimensions							
K (mm)	L (mm)	A (mm)	E (mm)	V (mm)	d <sub>i</sub> (mm)	P° (mm)	M (mm)
92	42	65	15	11	11	45	M25x1,5
106	45	74	16	12	11	45	M30x1,5
128	61	93	19	15	14	45	M40x1,5

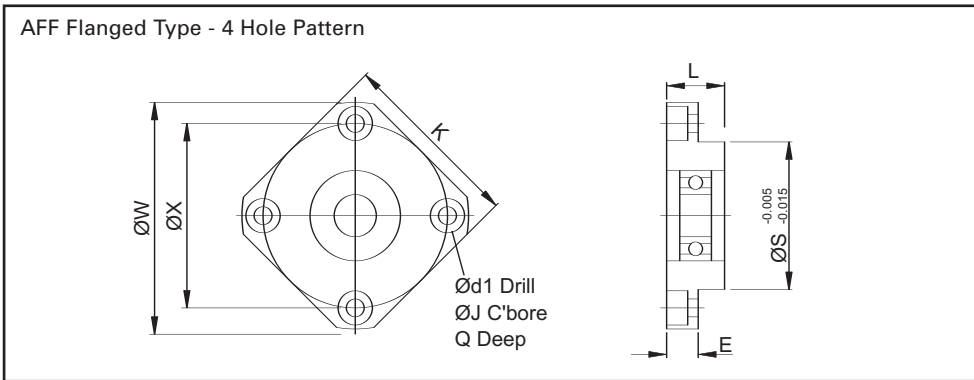
Technical Specification		
Bearing Type	Axial Load Rating (kN)	MaxPerm Load (kN)
7205B	20,60	11,70
7206B	28,60	16,60
7208B	45,00	27,70

Dimensions									
d <sub>8</sub> h7 (mm)	L <sub>29</sub> (mm)	L <sub>31</sub> (mm)	L <sub>32</sub> (mm)	L <sub>34</sub> (mm)	B P9 (mm)	T (mm)	L <sub>33</sub> (mm)	L <sub>35</sub> (mm)	Notes
6	47/45	15	8	32/30	2	2,2	10	2,5	BK/AFK
8	65	20	10	40	3	1,8	15	2,5	
10	65	25	10	40	3	1,8	18	3,5	
14	79	35	12	44	4	2,5	27	4	
15	101	40	14	56	5	3	32	4,5	Only BK
16	101	45	14	56	5	3	36	4,5	
20	122	55	17	67	6	3,5	45	5	
25	135	64	17	71	8	4	50	7	
36	167	78	21	89	10	5	63	7,5	

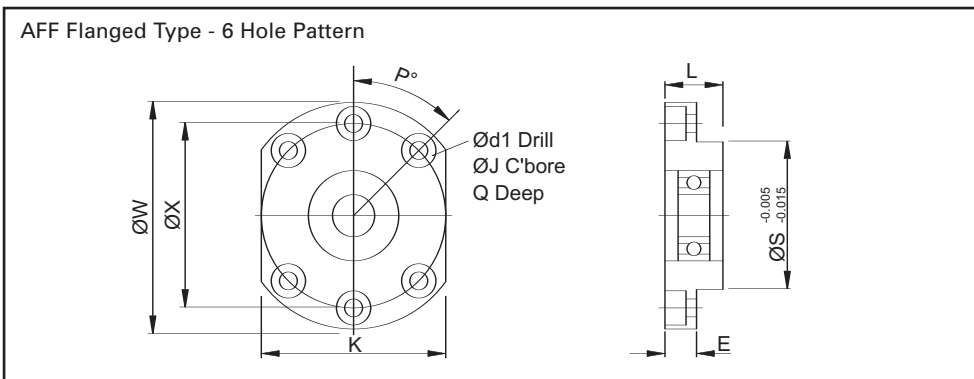
## Ball Screw Bearing Support Units - Simple Support



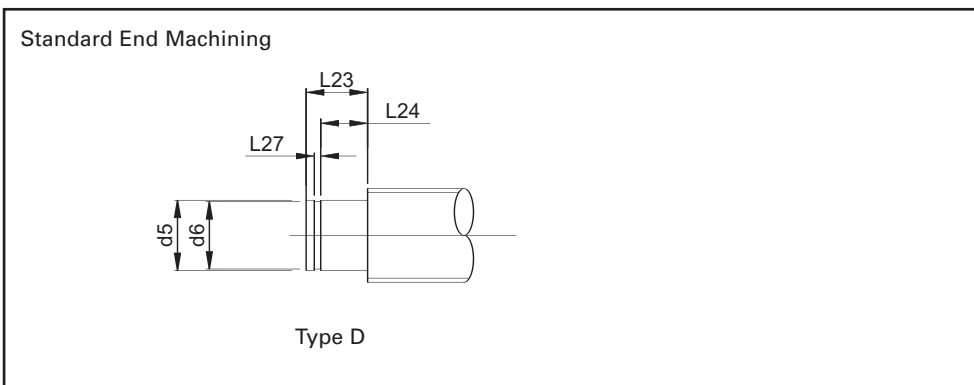
Part Number	W (mm)	H (mm)	S (mm)
BF 8	52	32	17
BF 10	60	39	22
BF 12	60	43	25
BF 15	70	48	28
BF 17	86	64	39
BF 20	88	60	34
BF 25	106	80	48
BF 30	128	89	51
BF 40	160	110	60



Part Number	W (mm)	X (mm)	S (mm)
AFF 8	43	35	28
AFF 10	52	42	34
AFF 12	54	44	36
AFF 15	63	50	40
AFF 20	85	70	57



Part Number	W (mm)	X (mm)	S (mm)
AFF 25	122	100	80
AFF 30	138	116	90
AFF 40	176	150	120



Part Number	$d_6$ (mm)	$d_5$ h6 (mm)	$d_6$ h12 (mm)
D	12	8	7,6
D	16	10	11,5
D	16	12	11,5
D	20	15	14,0
D	25	17	19,0
D	25	20	19,0
D	32	25	23,9
D	40	30	28,6
D	50	40	37,5

Dimensions									Technical Specification	
R (mm)	T (mm)	X (mm)	K (mm)	d <sub>i</sub> (mm)	J (mm)	Q (mm)	L (mm)	E (mm)	Bearing Type	Radial Load Rating (kN)
18,5	26	38	25	6,6	11	6,5	20	10	606	2,31
26	30	46	34	6,6	11	6,5	20	10	608	3,35
35	30	46	35	6,6	11	6,5	20	10	6001	4,65
38	35	54	40	6,6	11	6,5	20	10	6002	5,70
46	43	68	50	9	14	8,5	23	11,5	6203	9,75
50	44	70	52	9	14	8,5	26	13	6004	9,55
70	53	85	64	11	17,5	11	30	15	6205	14,30
78	64	102	76	14	20	13	32	16	6206	19,80
90	80	130	100	18	26	17,5	37	18,5	6208	29,70

Dimensions								Technical Specification	
K (mm)	L (mm)	E (mm)	N (mm)	d <sub>i</sub> (mm)	J (mm)	Q (mm)	P° (mm)	Bearing Type	Axial Load Rating (kN)
35	11	6	4	3,4	6,5	4	90	606	2,31
42	12	7	4	4,5	8	5	90	608	3,35
44	15	8	4	4,5	8	5	90	6001	4,65
52	17	9	4	5,5	9,5	6	90	6002	5,70
68	20	14	4	6,6	11	10	90	6204	13,00

Dimensions								Technical Specification	
K (mm)	L (mm)	E (mm)	N (mm)	d <sub>i</sub> (mm)	J (mm)	Q (mm)	P° (mm)	Bearing Type	Axial Load Rating (kN)
92	30	15	6	11	17,5	11	45	6205	14,30
106	32	15	6	11	17,5	11	45	6206	19,80
128	36	18	6	14	20	13	45	6208	29,70

Dimensions		
L <sub>23</sub> (mm)	L <sub>24</sub> (mm)	L <sub>27</sub> H13 (mm)
7,5	6	0,9
9	7	1,1
10,5	8	1,1
13	9	1,1
16	12	1,3
16	12	1,3
19	15	1,3
21	16	1,6
25	18	1,85

These notes are designed to assist in the specification and selection of a ball screw for a given application.

## Parameters

The **nominal diameter** is the dimension used when specifying the size of a ball screw. The **pitch circle diameter** (PCD) of the ball screw is the distance between centrelines of two exactly opposing recirculating balls. The **shaft outside** (d1) and **thread root** (d3) diameters determine the type and size of shaft end journals. The **lead** determines the distance travelled in one revolution of the shaft. All standard ball screws are **right handed**, however left handed threads are available upon request. The **accuracy** of the thread is defined by the deviation over a 300mm travel length, this figure also determines other parameters such as the overall lead deviation. The **travel length** determines the life of the ball screw, whether it is based on the life of the nut or the life of the shaft. **Axial play or backlash** is the free axial movement between the nut and screw. **Preloading** the ball screw eliminates this free axial movement, increases system stiffness and provides repeatable positioning. The **efficiency** of a precision ball screw is typically 90%. Express ball screws are manufactured from **standard materials** and therefore are not suitable for special applications eg vacuum, food or extreme temperature environments. Special materials are available upon request. The working **temperature range** for these products is between -30°C to 100°C.

## Ball Screw Mounting

Ball screws are designed to operate with **axial loads** only, off-centre and radial loads will significantly reduce rated life and cause premature failure of the ball screw. The **plane** of operation will determine the magnitude of the loads being applied to the ball screw. Generally the shaft is the **driven** element, however in some cases, the nut is driven. Due to the high efficiency of a ball screw system, with the drive disconnected the nut may **backdrive**. The **shaft mounting configuration** is determined by the shaft diameter, unsupported length, maximum speed and maximum compressive load. A **fixed** bearing restrains the shaft both axially and radially, a **simple** bearing provides radial support only. The **critical speed** of the assembly is the point at which harmonic vibrations occur. The **buckling load** of the shaft is the point at which the shaft will fail under a compressive load.

## Load / Life

The **dynamic load rating** is the maximum constant axial load which can be applied for a life  $1 \times 10^6$  revs. The **static load** rating is the load that will cause permanent damage to the ball track while still allowing operation at a reduced speed. The **operating loads** are the forces applied during movement. The **travel rates** are the speeds at which the operating loads are being applied. The **period** is the percentage of the time at which the different loads and speeds are applied. The **utilisation** indicates the period that the ball screw operates as a percentage of the life of the machine. Ball screw **life** can be specified in terms of millions of revolutions, thousands of hours or a number of cycles.

## Assembly

Shaft ball tracks are induction **hardened** to 58-60HRC, the depth of case is dependant on lead and ball size. Shaft material can be supplied either in the hardened or **annealed** condition. Where shafts are supplied fully **machined**, shaft straightness, shaft and nut runouts etc. are derived from the **class** of the ball screw. Nuts are case **hardened** or through **hardened** to 58-60HRC and therefore are not suitable for modification. Nuts are supplied with a small amount of grease, assemblies must be **lubricated** before fitting to equipment and at regular intervals thereafter. Nuts with **axial play** can be supplied either fitted to shafts or supplied separately on sleeves, shafts and nuts are interchangeable. Nuts with **light or medium** preload must be supplied assembled to shafts as the fit up is determined by ball selection i.e they are not interchangeable. **Bearings** can be supplied either separately or fitted to finished machined shafts. Each **bearing kit** includes the necessary fixing to attach the bearing to the shaft i.e a precision ground locknut for the preloaded sets and a circlip for the radial bearings, all types include seals.

**Contact Details**

Company:

Address:

Contact:  Contact:

Tel:  Tel:

Fax:  Fax:

E-mail:  E-mail:

**Ball Screw Parameters**

Diameter:  mm    Lead:  mm    Lead Direction:  Right Hand     Left Hand

Accuracy:  /300mm    Nut Condition:  Backlash     Preload

Travel Length:  mm    Track Length:  mm    Overall Length:  mm

Application:

Environment:

Lubrication:  Oil     Grease

Quantity:  pcs per year                      Quantity:  pcs per consignment

**Ball Screw Mounting**

Driven Element:  Shaft     Nut    Mounting Plane:  Horizontal     Vertical     Diagonal

Maximum Speed:  rpm    Maximum Load:  kN

Mounting Configuration:

Fixed-Fixed                       Simple-Fixed                       Simple-Simple                       Free-Fixed

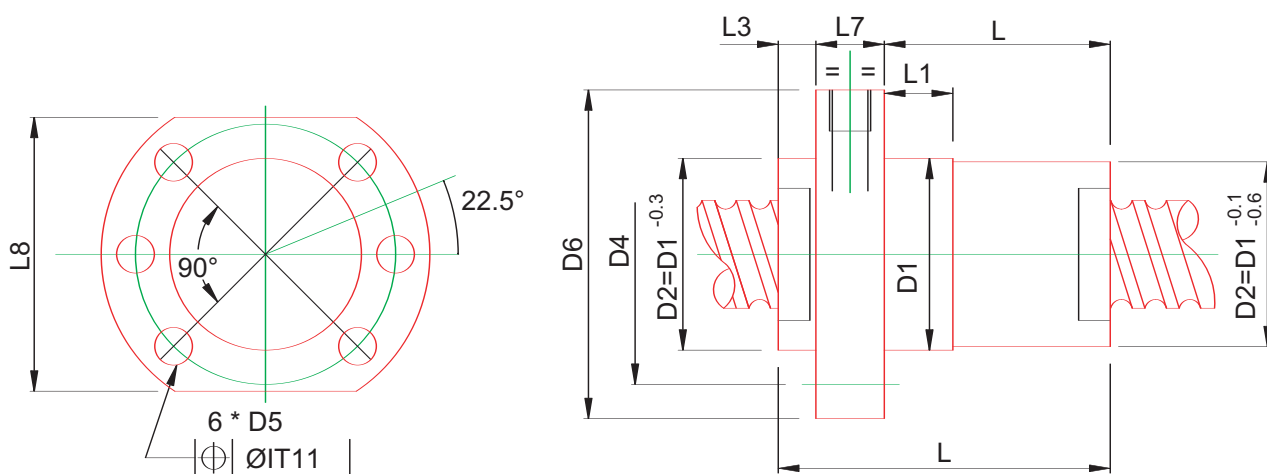
**Load/Life Data**

Utilisation: <input type="text"/> %		Load (N)	Speed (N)	Period (N)
Required Life: <input type="text"/> x10 <sup>6</sup> revs	F <sub>1</sub>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Required Life: <input type="text"/> hrs	F <sub>2</sub>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Minimum Dynamic Load: <input type="text"/> kN	F <sub>3</sub>	<input type="text"/>	<input type="text"/>	<input type="text"/>

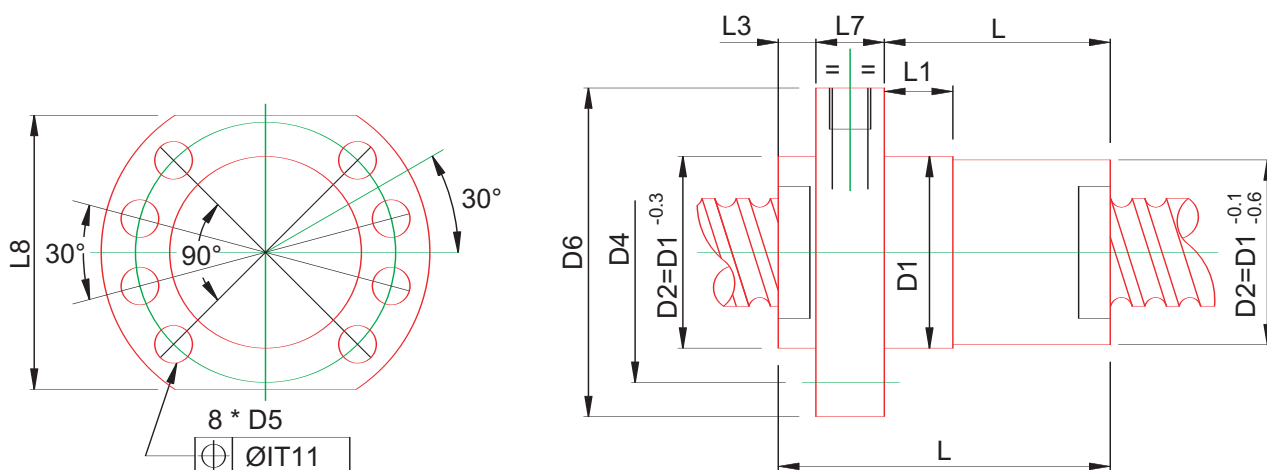
**Assembly Options**

- Cut to length shafts with nuts fitted
- Cut to length shafts with nuts supplied separately
- Shafts with annealed ends with nuts fitted
- Shafts with annealed ends with nuts supplied separately
- Fully machined shafts with nuts fitted
- Fully machined shafts with nuts and support bearings fitted

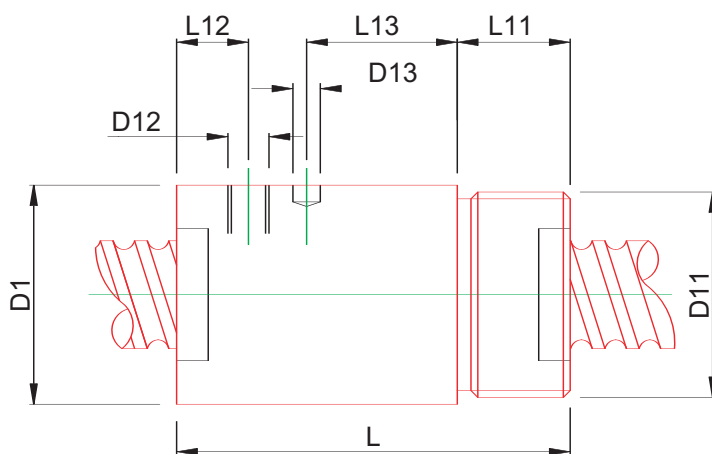
**FK, FH and FL types with diameters up to 40mm i.e. with 6 hole pattern and M6x1 lubrication point**



**FK, FH and FL types with diameters 40mm and above i.e. with 8 hole pattern and M8x1 lubrication point**



**ZG type**





Danaher Motion is the world's leading manufacturer of ball and lead screws. Our products are widely used in the most exacting applications in some of the world's most demanding industries, including high performance machine tools, industrial machinery, medical equipment and aerospace and defence.

Our product capabilities range from miniature custom lead screws for highly sensitive medical equipment to ball screws with the highest speed and stiffness capability for the world's highest performance machine tools. We specialise in providing our customers with the exact product for their application needs, whatever the demands in terms of load, speed, stiffness, precision, life and durability.

Danaher Motion has a long history of manufacturing quality ball screws and lead screws. Our roots are planted in three separate companies that held strong and definitive footholds in the market. Those companies – Thomson Industries, Warner Electric GmbH and Ball Screws & Actuators Co., Inc (BSA) – now form the nucleus of Danaher Motion's ball screw and lead screw business.

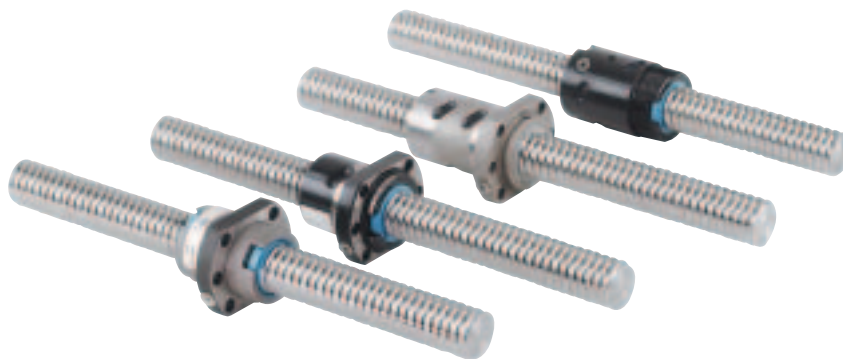
Thomson Industries was a leading U.S. producer of linear motion and control products, including linear actuators, ball screws, linear bearings, rails and precision gearboxes. Its products were found in a range of precision motion applications in the medical, industrial, aerospace and mobile off-highway markets. In October 2002, Danaher Motion acquired Thomson Industries and retained the strong Thomson brand name.

Warner Electric GmbH was founded in 1961 and started manufacturing ball screws in 1967 in Wolfschlugen, Germany. This plant specialises in the production of custom high precision, high performance ball screws for machine tool and high performance machinery manufacturers. The facility is DIN EN ISO 9001 certified and is also approved by the German Federal Aviation Board to manufacture and refurbish aviation equipment.

Founded in 1971, the Ball Screws & Actuators Co. was pioneer and leader in precision plastic nut, lead screw and ball screw technologies for linear motion applications. Their custom and off-the-shelf solutions featured many patented products, including their ActiveCAM technology for eliminating backlash while increasing performance and wear life. BSA joined Danaher Motion in 1996 and brought a wealth of experience and knowledge to the ball and lead screw team.

The current ball screw and lead screw offerings of Danaher Motion combine the quality, strength and expertise of the distinct products and professionals at these three companies under the Thomson brand. The products set the solid foundation for the broad range of standard and custom ball and lead screws currently available. If past history and experience is an indication of what the future holds, Danaher Motion is significantly poised to remain a prominent leader and pioneer in the ball screw and lead screw industry.

Thomson Industries  
Thomson IBL Company  
Warner Electric GmbH  
Ball Screws and Actuators (BSA)

This catalogue features the most commonly used standard products from our range, if you do not find the ball screw that you need here, please contact our customer service or technical support teams.



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