

MINIATURE BALL SCREWS

PRODUCT CATALOGUE





Miniature Ball Screws Division

| Divize miniaturních kuličkových šroubů |

We have been manufacturing ball screws since 1967 and we deliver them almost all over the world. To provide our customers with the highest quality of the products and co-operation, we keep investing a lot of effort in continuous improvement. Thanks to this effort, every year we fight for the top positions in the leading innovative competitions. A certificate of quality in compliance with ENISO 9001:2008 proves that our quality management system is at a high level. We also aim for maximum support of the industrial machinery development activities in our area, for which we participate in the following associations:



Association of
Engineering
Technology



CECIMO



Brno Regional
Chamber of
Commerce

OUR CUSTOMERS APPRECIATE ESPECIALLY THE FOLLOWING CHARACTERISTICS:



Quality

- We use new state-of-the-art technologies for manufacture and testing.
- Every ball screw undergoes substantial in-process and output inspection.
- We archive measured values for every product.



Development and courage

- We are not afraid of designing and implementing solutions for untypical applications.
- We take up full responsibility for our solutions.
- Thanks to our in-house development department we are very quick and flexible in this designing.



Customer orientation

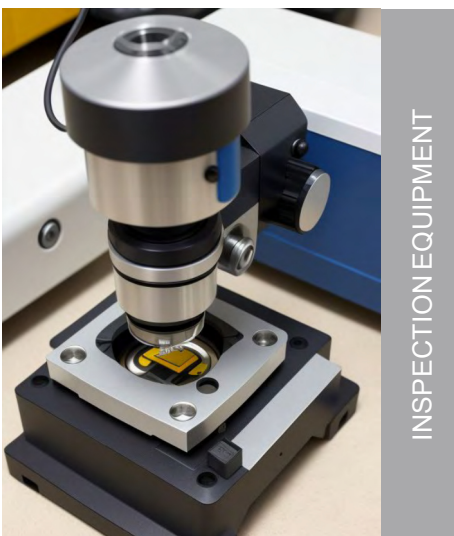
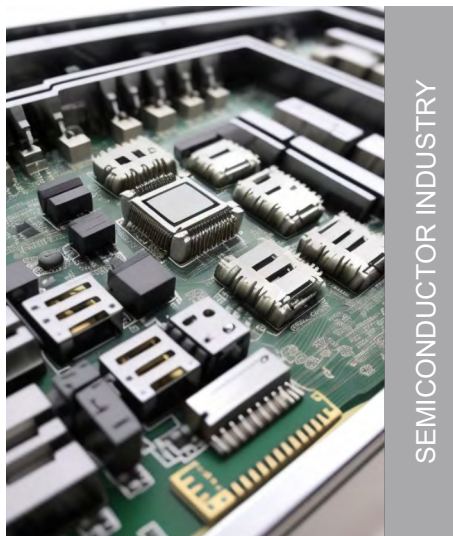
- We produce on the basis of client drawings.
- We are able to produce with smaller stop dimensions than required by ISO 3408.
- We like to actively engage in the proposed movement axes of our customers, helping them in correct dimensioning and cost-saving solutions.

Miniature ball screws (from diameter 5 mm with pitch 0,5 mm) are structural elements, which transmit rotary movement to straight movement with high efficiency (approximately 94 - 97%). They feature high rigidity, accuracy, durability and especially high precision positioning in compact dimensions. Micro ball screws consist of ball shaft, ball nut both with ground thread, and its recirculation system as the standard ball screws.

Characteristics of the Micro Screws:

- High precision positioning screws
- Very high running smoothness
- Delivered with required preloading
- Longest service life due to corresponding use of materials, custom engineering and the quality promise of a highly sophisticated production

Miniature ball screws applications:



Please contact us with your applications to find all possibilities with our Miniature Ball Screws.

1. Application and use

Ground miniature ball screws are used where high accuracy and precision are required, e.g. in robotic surgery, medical devices and the aerospace industry –see table of Application and use below:

APPLicAtion induStry	APPLicAtion exAMPLe	PreciSionGrAde		
		P0	P1	P3
MicroSCOpeS	Positioning tables	●	●	
	Measuring stages	●		
	Microscope stages		●	●
	Automated Sample Handling	●	●	
SeMiconductor induStry	Wafer systems and drives	●		
	Production of printed circuit board (PCB)	●		
	Production of integrated circuits (IC)		●	
	PCB milling machines			●
	Tabletop units for panel production			●
	Device for transporting the glass substrate		●	●
AeronAuticSAnd defenSe	Aircraft flap actuators		●	●
	Brake system actuators		●	●
	Motion sensors	●	●	
	Spacecraft control systems	●	●	
	Missile and Rocket Systems		●	●
	Radar and Antenna Positioning		●	●
	Turrets and Weapon Systems	●	●	
	Unmanned Aerial Vehicles (UAVs)		●	●
	Satellite Mechanisms	●	●	
	Armored Vehicle Suspensions		●	●
inSPection equiPMent	Motorized Focus Drives		●	
	Operating Devices		●	●
	Automated Sample Handling			●
MedicineAnd diAgnoSticS	Computed tomography (CT) scanners	●	●	
	Magnetic resonance imaging (MRI)			●
	X-RAY equipment		●	●
	Ultrasound devices		●	●
	Surgical robots	●	●	
LABorAtory equiPMent	Desktop blood analyzers			●
	Automatic analyzers of laboratory samples		●	●
MicroMAniPulAtionS	Miniature robotics		●	●
	Compact actuators	●	●	
	3D printers		●	●
oPticS	Optics devices		●	●
	Precision Electro-Optical Systems	●	●	
	Laser surface scanning	●	●	

2. technical data

chArActeriSticS	Picture	deSciPtion	
ground BAIl Screw threAd		<p>Accuracy and quality of the miniature ball screws are largely dependent on the manufacturing technology. Miniature ball screws are produced by grinding technology only.</p>	
BAIl Screw Profile		<p>To achieve the maximum transmission efficiency, it is necessary to make an ideal profile of the ball screw thread. The profile is not made of one radius but two radii with offset (so called gothic arch, see picture on the left). This profile shape offers an ideal efficiency to load capacity (ratings) ratio of the ball screw.</p>	
BAIl Screw recirculation SySteM		Internal ball recirculation with beds	<p>Version marking: in</p>
			<p>Maximum speed coefficient: $n_{max} = \frac{50\,000}{d_0}$</p>
		External ball recirculation radially inserted	<p>Version marking: ex</p>
			<p>Maximum speed coefficient: $n_{max} = \frac{70\,000}{d_0}$</p>

chArActeriSticS	Picture	deSciPtion
BALL nut unit tyPe		<p>A PRELOADED NUT WITHOUT FLANGE</p>
		<p>AP PRELOADED NUT WITH FLANGE</p>
		<p>C PRELOADED NUT WITH METRIC THREAD</p>
		<p>SPeciAl PRELOADED NUT WITH PINS</p>
		<p>SPeciAl PRELOADED NUT WITH FLANGE AND METRIC THREAD</p>

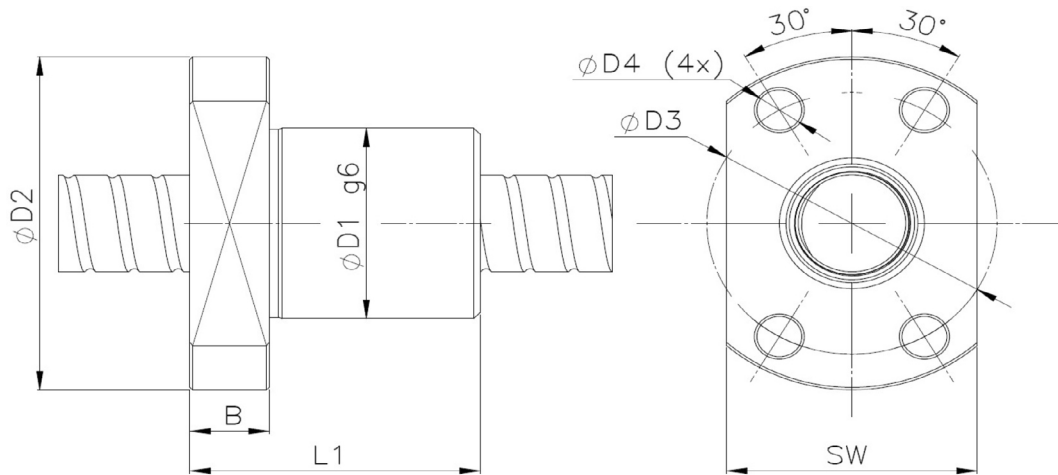
chArActeristIcS	Picture	deSciPtIOn
grAde of rAw MAteriAlS	Stainlesssteel: 1.4112	<p>Nuts and the shaft are hardened to 50-60 HRC. Minimum shaft strength $R_m = 800 \text{ MPa}$.</p> <p>The final quality is tested by long term durability tests followed by the analysis of the functional parts of the transmission assembly when the specified wear limits are achieved.</p>
	Steel: Cf53	
threAd Pitch AccurAcY cLASS SPecificAtIOn	P0	<p>3,5</p> <p>Pitch tolerance on the thread length of 300 mm</p> <p>$v_{300p} [\mu\text{m}]$</p>
	P1	
	P3	
SurfAcetreAtMent - electropoliShing		<p>Superior surface finishing of ball screws improving mechanical properties, lifespan and corrosion resistance.</p> <p>A smooth finish cuts down on friction loss, improving the bearing ratio, optimizing wear and tear and minimizing energy consumption and noise.</p> <p>Remove burrs from sharp or fragile parts that are not suitable for traditional finishing techniques without rounding edges or damaging the part.</p>
PASSivAtIOn - StAinleSSSteel		<p>Corrosion resistance - removes free iron particles from the surface.</p> <p>Long-term surface stability - forms a protective layer of chromium oxide -> protects in aggressive environments (moisture, chemicals).</p> <p>Reduced risk of microcracks - a cleaner, dirt-free surface minimizes the formation of cracks that could lead to material fatigue.</p>
coAtIng - tungsten diSulfide		<p>Tungsten disulfide (WS₂) solid lubricant coating. Extremely thin (max. 0,5 μm) film coating provides friction and sliding wear reduction that improves performance.</p> <p>Properties</p> <ul style="list-style-type: none"> • To reduce energy lost to friction • To minimize excessive heat from friction • As lubrication for tight tolerances <ul style="list-style-type: none"> • Wear reduction • Thermal stability

3. Main dimensions

Miniature ball screws are produced from diameter 5 mm, length 60 mm, pitch 0,5 mm up to diameter 16 mm, length 1000 mm and pitch 10 mm. All variants are listed in the table below:

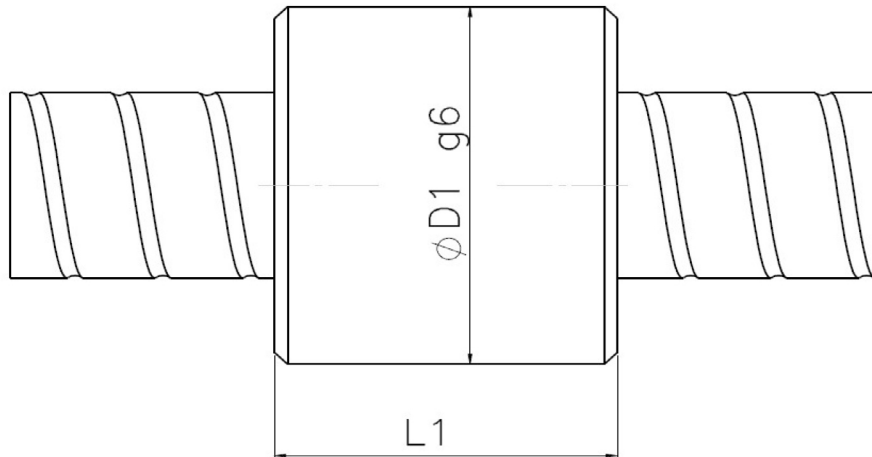
ShAft diAMeter [mm]	Pitch [mm]	BALL diAMeter [mm]	ShAft MAXiMuMlength [mm]		
			P0	P1	P3
d_0	P_H	D_W			
5	0,5	0,6	120	160	170
	1	0,8			
	2	0,8			
	3	0,8			
	4	0,8			
6	0,5	0,6	180	240	250
	1	0,8			
	1,25	0,8			
	1,5	0,8			
	2	1,5875			
	2,5	1,5875			
	6	1,5875			
8	1,5875				
8	0,5	0,6	250	330	350
	1	0,8			
	1,5	0,8			
	2	1,5875			
	2,5	1,5875			
	3	1,5875			
	4	1,5875			
	5	1,5875			
8	1,5875				
10	0,5	0,8	260	320	420
	1	0,8			
	1,5	0,8			
	2	1,5875			
	2,5	2			
	3	2			
	4	2			
	5	2			
	6	2			
10	2				
12	1	0,8	320	390	510
	2	1,5875			
	2,5	2			
	3	2			
	4	2			
	5	2			
	8	2			
10	2				
14	1	0,8	380	460	600
	2	1,5875			
	2,5	1,5875			
	3	2			
	4	2			
	5	3,175			
8	3,175				
16	2	1,5875	450	540	890
	2,5	1,5875			
	3	2			
	4	3,5			
	5	3,5			
	6	3,5			
	8	3,5			
10	3,5				

nut type AP



diAMeter D_0	Pitch	Ball diAMeter	nuMber of effective turns	wiPerS	nut length	„flAnge width“	„Pitch circle“	Ball nut diAMeter	flAnge diAMeter	hole diAMeter	flAtte-ning	StAndArd Steel dynAMic loAd	StAndArd Steel StAtic loAd	StAinleSS Steel dynAMic loAd	StAinleSS Steel StAtic loAd
	Ph	D_w	i	-	L1	B	D3	D1	D2	D4	Sw	C_{am}	C_{om}	C_{am}	C_{om}
	[mm]	[mm]	-	-	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[N]	[N]	[N]	[N]
6	1	0,8	3	no	15	3,5	18	12	24	3,4	16	597	784	494	590
	2	0,8	2	no	18	4	18	12	24	3,4	16	392	471	325	355
8	1	0,8	3	no	16	4	21	14	27	3,4	18	695	1 096	575	825
	2	1,6	2	no	16	4	21	14	27	3,4	18	1 459	1 702	1 207	1 282
	2,5	1,6	3	yes	26	4	23	16	29	3,4	20	2 063	2 548	1 707	1 919
	3	1,6	3	yes	26	4	23	16	29	3,4	20	1 950	2 347	1 614	1 767
	4	1,6	3	yes	31	4	23	16	29	3,4	20	1 828	2 141	1 513	1 612
10	5	1,6	3	yes	32	6	23	16	29	3,4	20	1 813	2 127	1 501	1 602
	2	1,6	3	yes	28	5	27	18	35	4,5	22	2 396	3 392	1 983	2 554
	2,5	1,6	3	yes	28	5	27	18	35	4,5	22	2 393	3 388	1 981	2 551
12	4	2	3	yes	36	6	29	22	37	4,5	24	4 052	5 477	3 354	4 124
	1	0,8	3	yes	25	8	29	20	37	4,5	24	837	1 722	693	1 297
	2	1,6	3	yes	28	5	29	20	37	4,5	24	2 665	4 234	2 206	3 188
	2,5	1,6	3	yes	32	5	30	21	38	4,5	25	2 663	4 231	2 204	3 186
12	3	1,6	3	yes	37	8	29	22	37	4,5	24	2 574	4 026	2 131	3 032
	4	2	3	yes	36	8	29	22	37	4,5	24	4 594	6 948	3 802	5 232

nut type A



diAMeter D_0	Pitch	BALL diAMeter	numBer of effective turns	wiPerS	BALL nut length	BALL nut diAMeter	StAndArd Steel dynAMic loAd	StAndArd Steel StAt ic loAd	StAinleSS Steel dynAMic loAd	StAinleSS Steel StAt ic loAd
	Ph	D_w	-	-	$L1$	$D1$	C_{dm}	C_{sm}	C_{dm}	C_{sm}
	[mm]	[mm]	i	-	[mm]	[mm]	[n]	[n]	[n]	[n]
5	0,5	0,6	3	no	13	12	255	304	211	228
6	2	0,8	3	no	16	12	556	706	460	532
8	1	0,8	3	no	14	15	695	1 096	575	825
	2	1,6	3	no	18	14	2 067	2 552	1 711	1 922
	2,5	1,6	3	no	21	15	2 063	2 548	1 707	1 919
	3	1,6	3	no	21	15	1 950	2 347	1 614	1 767
	4	1,6	3	no	22	15	1 828	2 141	1 513	1 612
10	5	1,6	3	no	22,5	15	1 813	2 127	1 501	1 602
	2	1,6	3	yes	23	20	2 396	3 392	1 983	2 554
	2,5	1,6	3	yes	24	20	2 393	3 388	1 981	2 551
12	4	2	3	yes	34	26	4 052	5 477	3 354	4 124
	1	0,8	3	yes	17	20	837	1 722	693	1 297
	2	1,6	3	yes	23	22	2 665	4 234	2 206	3 188
	2,5	1,6	3	yes	28	22	2 663	4 231	2 204	3 186
	3	1,6	3	yes	23	22	2 574	4 026	2 131	3 032
	4	2	3	yes	30	22	4 594	6 948	3 802	5 232

4. Accuracy class Specification

Miniature ball screws are produced according to the ISO 3408 standard. Below you can find basic permissible deviations and geometric tolerances in accordance with standard tolerance grade P0, P1 and P3.

Table 1: Travel deviations per reference length

length [mm]		Permissible travel variation v_{pu} [μ m]			tolerance on specified travel e_p [μ m]		
>	\leq	P0	P1	P3	P0	P1	P3
0	315	3,5	6	12	4	6	12
315	400	3,5	6	12	5	7	13
400	500	4	7	13	6	8	15
500	630	4	7	14	6	9	16
630	800	5	8	16	7	10	18
800	1000	6	9	17	8	11	21

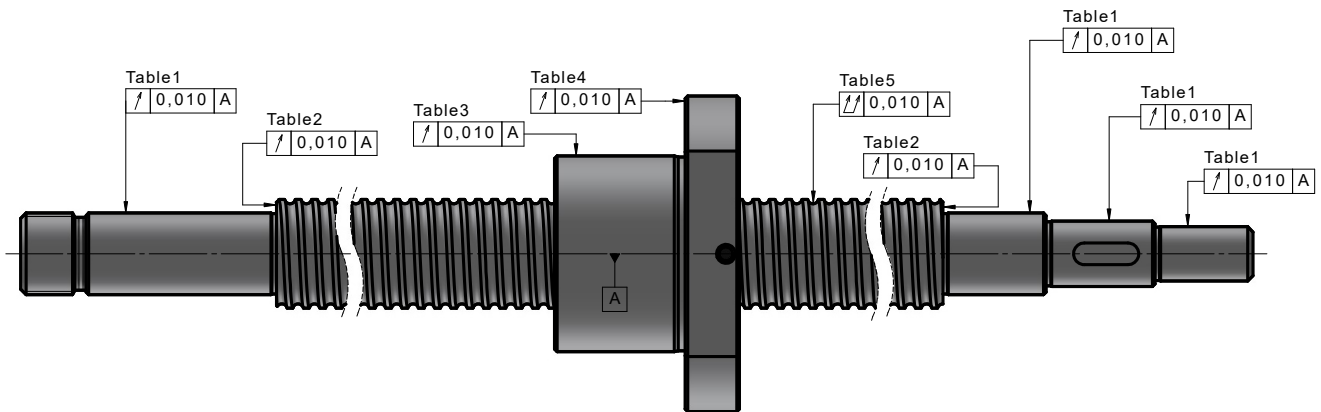


Table 2: Radial run-out bearing seat related to the centerline of screw groove and radial run-out of journal diameter related to the bearing seat.

Shaft nominal diameter [mm]		Permissible deviation of radial run-out [μ m]		
>	\leq	P0	P1	P3
0	8	5	8	10
8	12	5	8	11
12	20	6	9	12

Table 3: Axial run-out of shaft (bearing) face related to the centerline of the bearing seat.

Shaft nominal diameter [mm]		Permissible deviation of radial run-out [μm]		
>	≤	P0	P1	P3
0	8	5	8	10
8	12	5	8	11
12	20	6	9	12

Table 4: Axial run-out of ball nut location face related to the centerline of screw shaft.

nut nominal diameter [mm]		Permissible deviation of radial run-out [μm]		
>	≤	P0	P1	P3
0	20	6	8	10
20	32	6	8	10
32	50	7	8	11

Table 5: Radial run-out of ball nut location diameter related to the centerline of screw shaft.

nut nominal diameter [mm]		Permissible deviation of radial run-out [μm]		
>	≤	P0	P1	P3
0	20	6	9	12
20	32	7	10	12
32	50	8	12	15

5. rolled Miniature Ball Screws

Main information about rolled Miniature Ball Screws – these ball screws are mainly transport ball screws used for applications where a high precision of positioning is not needed, e.g. transport of lifting equipment, automation modules and small pick-and-place machines, textile and packaging machines (small positioning tasks), etc.

Category Characteristics

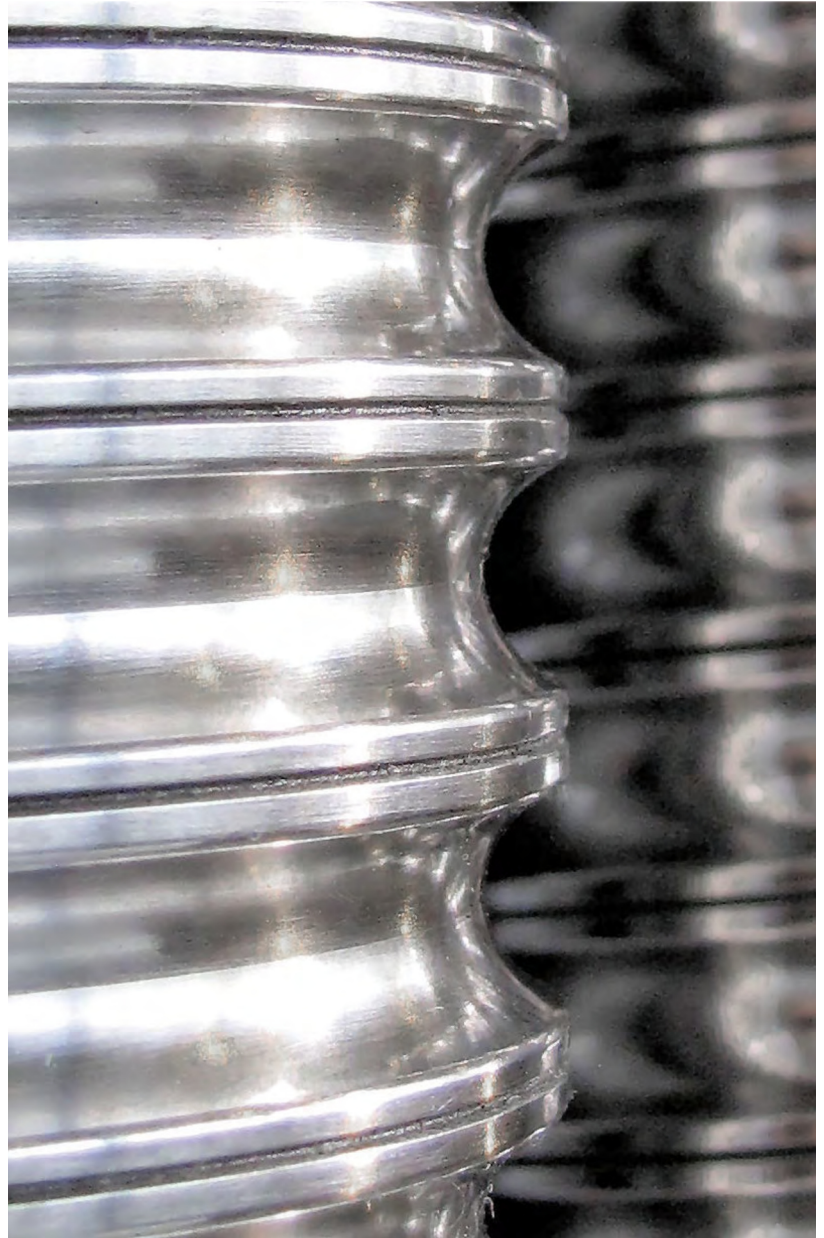
- very good quality / price ratio
- standard geometrical and working accuracy, lifetime and load ratings in accordance with ISO 3408 (DIN 69051)

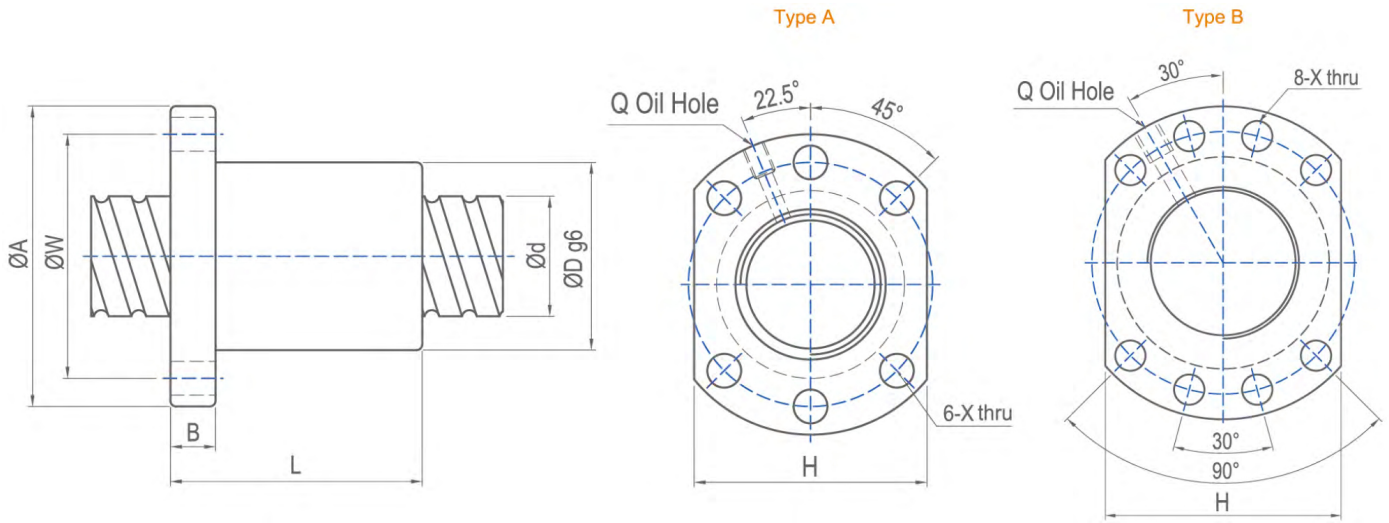
Basic Technical Parameters

- diameter from 6 mm
- lengths up to 900 mm
- accuracy classes T5, T7
- minimum strength of the shaft material $R_m=650$ MPa
- efficiency approx.: 93-95%
- operating temperature: -20°C to $+60^{\circ}\text{C}$ (according to the lubrication type)

Applications

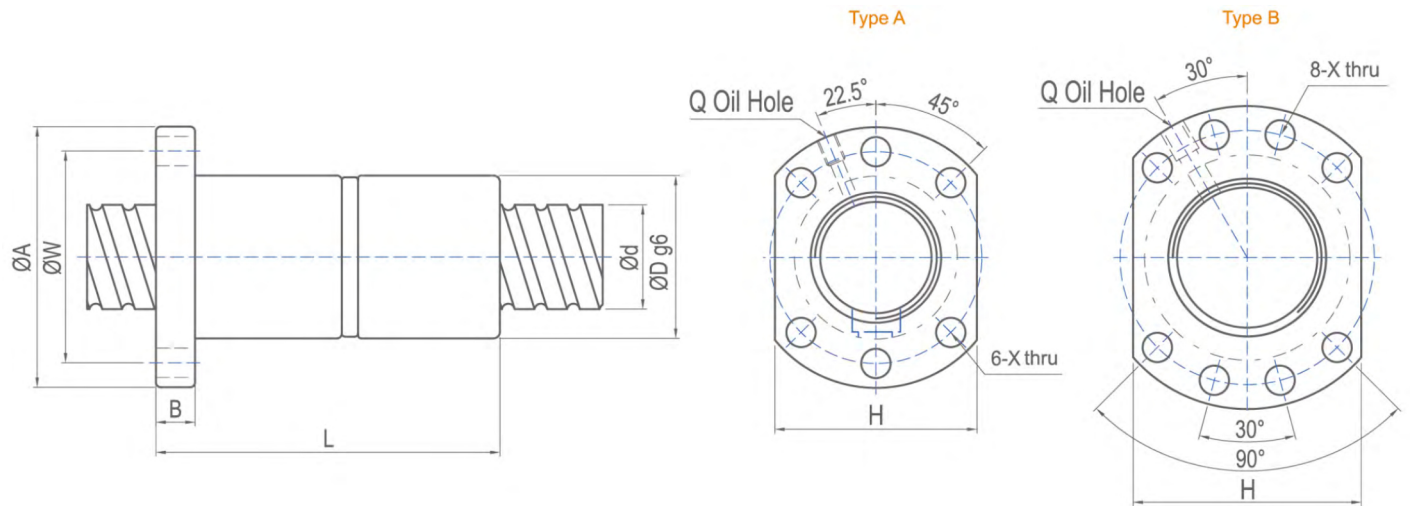
- Transport mechanism
- Automation modules and small pick-and-place machines
- textile and packaging machines
- CNC engraving machines and light milling machines (e.g. PCB, plastic, wood)





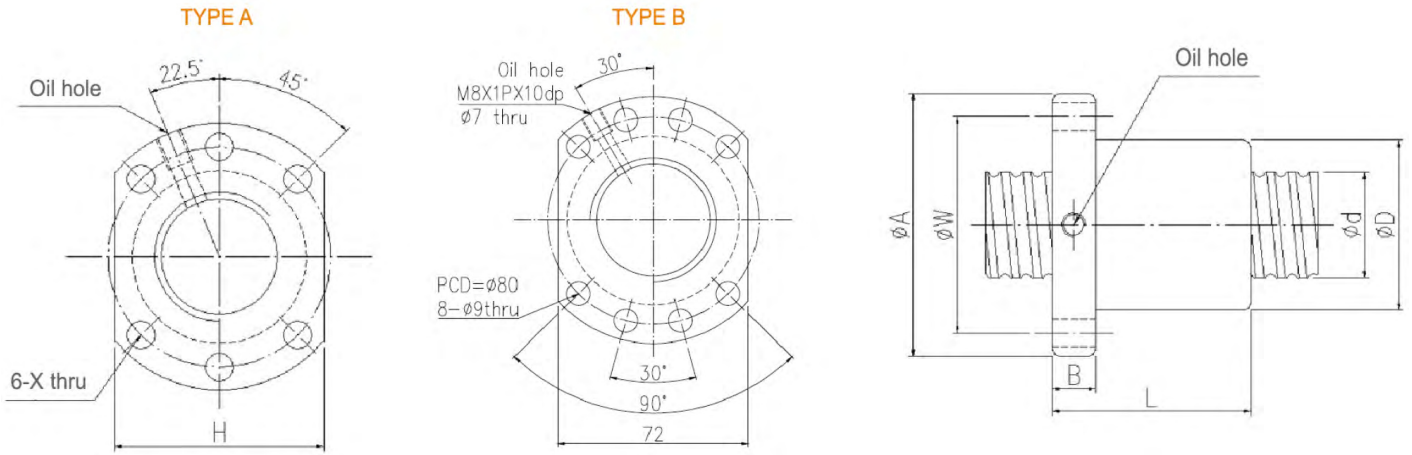
Note: with sign * can produce left helix

Model	diAMeter d_o	Pitch	BALL diAMeter D_w	$\varnothing D$	$\varnothing A$	B	L	$\varnothing w$	x	type	H	Q	i	Ca	Co
														mm	kn
1204-4	12	4	2,381	24	40	10	40	32	4,5	A	30	M6	T4	8,00	14,60
1604-4	16	4	2,381	28	48	10	45	38	5,5	A	40	M6	T4	9,21	20,08
1605-3 *	16	5	3,175	28	48	10	42	38	5,5	A	40	M6	T3	10,42	19,19
1605-4 *	16	5	3,175	28	48	10	50	38	5,5	A	40	M6	T4	13,35	25,56

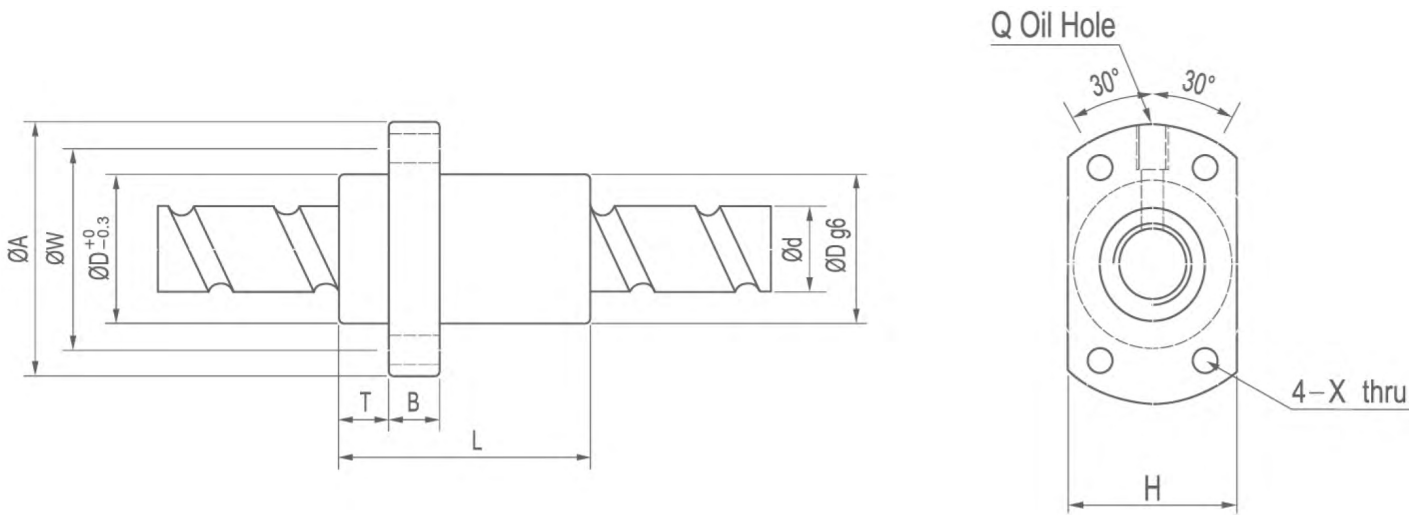


Note: with sign * can produce left helix

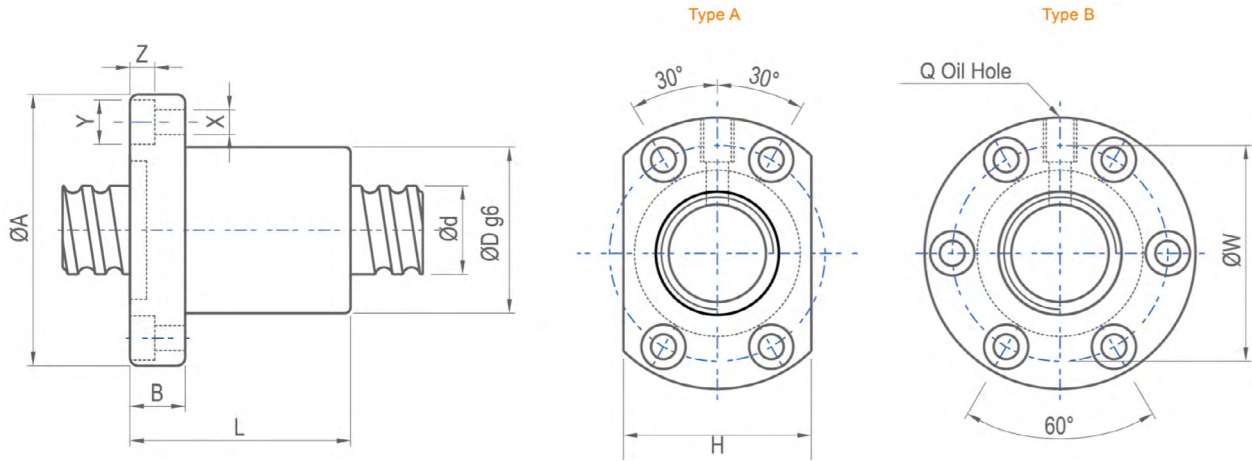
Model	diAMeter d_o	Pitch	BALL diAMeter D_w	$\varnothing D$	$\varnothing A$	B	L	$\varnothing w$	x	type	H	Q	i	Ca	Co
														mm	kn
1605-3 *	16	5	3,175	28	48	10	80	38	5,5	A	40	M6	T3	10,42	19,19



Model	diAMeter d _o	Pitch	BALL diAMeter Dw	ØD	ØA	B	L	Øw	x	type	H	Q	i	Ca Co	
	mm													kn	
1205-2.8	12	5	2	24	40	8	30	32	4,5	A	30	-	2,8	5,03	10,31
1210-1.8	12	10	2	24	40	8	34	32	4,5	A	30	-	1,8	3,40	6,44
1605-3.8	16	5	2,778	28	48	10	36	38	5,5	A	40	M6	3,8	11,37	24,65
1610-1.8	16	10	2,778	28	48	10	46	38	5,5	A	40	M6	1,8	8,74	18,16
1616-1.8	16	16	2,778	28	48	10	45	38	5,5	A	40	M6	1,8	5,97	11,68
1620-1.8	16	20	2,778	28	48	10	54	38	5,5	A	40	M6	1,8	5,97	11,68

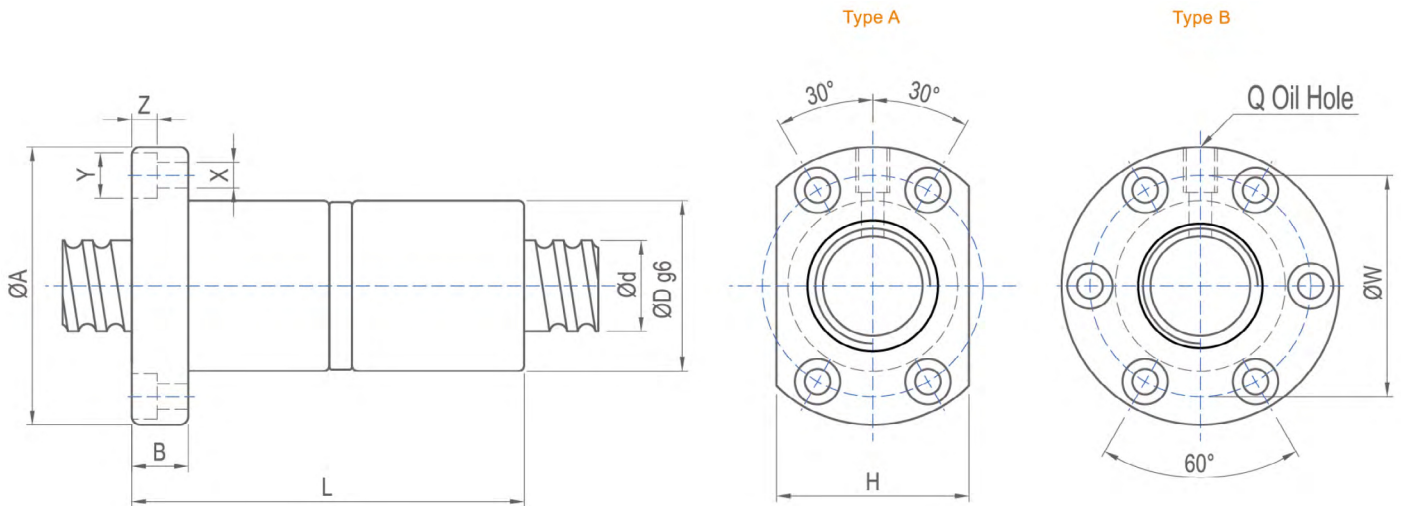


Model	diAMeter d _o	Pitch	BALL diAMeter Dw	ØD	ØA	B	L	Øw	x	type	H	Q	i	Ca Co	
	mm													kn	
1616-3.6	16	16	3,175	32	53	10	10,5	48	42,0	5	38	M6	3,6	13,35	28,30



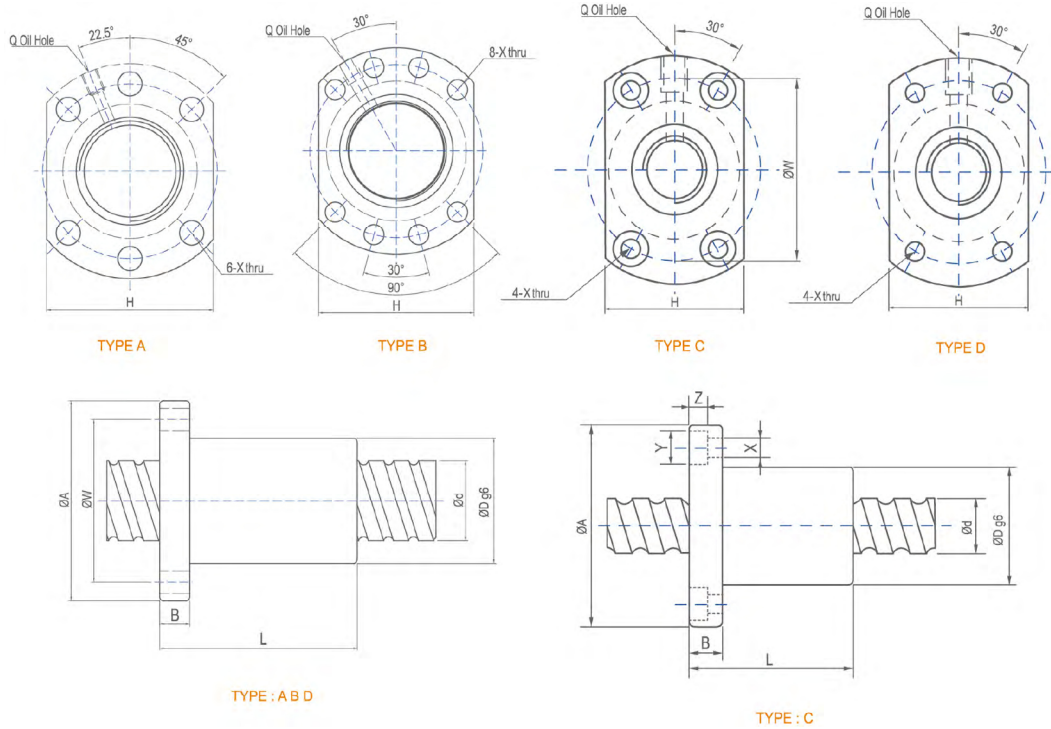
Note: with sign * can produce left helix

Model	diAMeter d _o	Pitch	Ball diAMeter Dw	ØD	ØA	B	L	Øw	x	y	Z	type	H	Q	i	Ca	Co
1404-4	14	4	2,381	26	46	10	47	36	4,5	8	4,5	A	34	M6	T4	8,63	17,35
1405-3	14	5	3,175	26	46	10	45	36	4,5	8	4,5	A	34	M6	T3	9,76	16,53
1604-4 *	16	4	2,381	30	49	10	45	39	4,5	8	4,5	A	34	M6	T4	9,21	20,08
1605-3	16	5	3,175	30	49	10	42	39	4,5	8	4,5	A/B	34	M6	T3	10,42	19,19
1605-4 *	16	5	3,175	30	49	10	50	39	4,5	8	4,5	A/B	34	M6	T4	13,35	25,56
1610-4	16	10	3,175	24	58	10	54,6	45	5,5	8	4,5	A	36	M6	T4	14,61	31,45

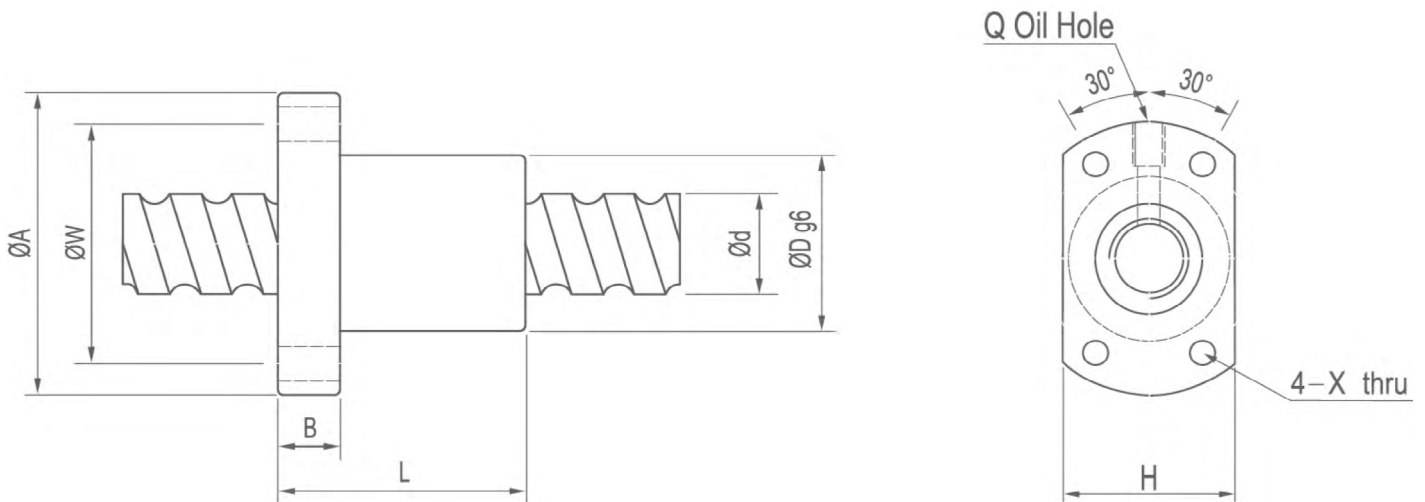


Note: with sign * can produce left helix

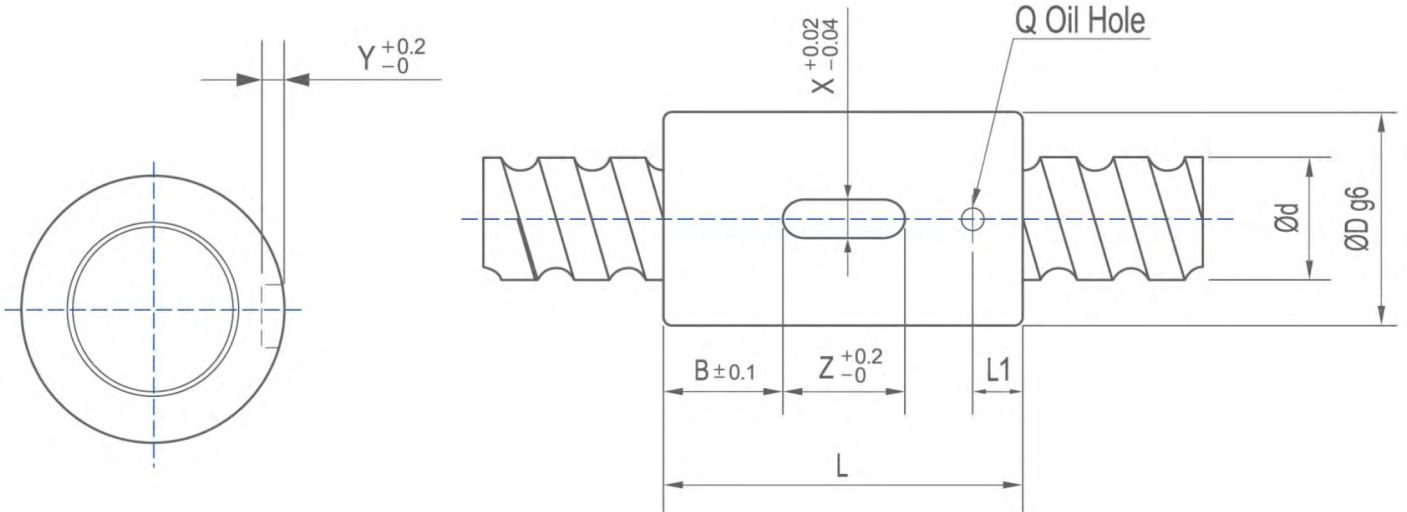
Model	diAMeter d _o	Pitch	Ball diAMeter Dw	ØD	ØA	B	L	Øw	x	y	Z	type	H	Q	i	Ca	Co
1605-3 *	16	5	3,175	30	49	10	80	39	4,5	8	4,5	A	34	M6	T3	10,42	19,19



Model	diAMeter d _e	Pitch	Ball diAMeter Dw	ØD	ØA	B	L	Øw	x	y	Z	type	H	Q	i	Ca	Co
	mm													kn			
1205-3	12	5	2	24	40	8	30	32	3,6	-	-	D	25	-	T3	5,03	10,31
1210-2	12	10	2	30	46	10	34	40	4,5	8	4,5	C	32	M6	T2	3,40	6,44
1520-2	15	20	3,175	34	49	12	57	45	6,0	-	-	D	34	M6	T2	7,15	13,27
1610-3	16	10	3,175	28	49	12	43	38	5,5	-	-	A	40	M6	T3	10,58	22,02
1616-4	16	16	3,175	28	49	12	48	38	5,5	-	-	A	40	M6	T4	13,35	28,30

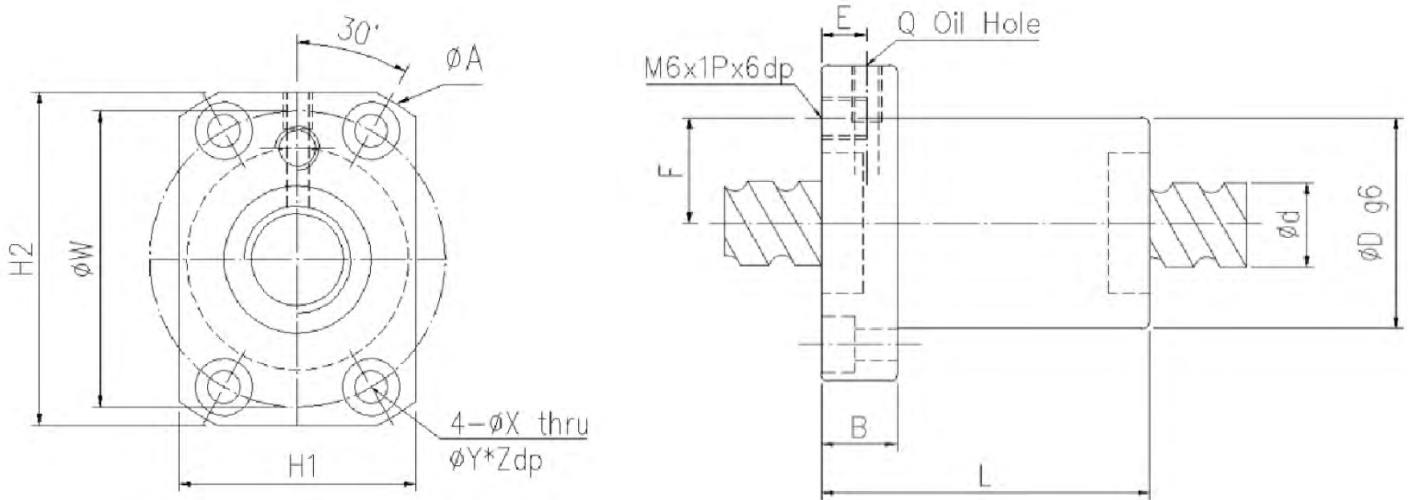


Model	diAMeter d _e	Pitch	Ball diAMeter Dw	ØD	ØA	B	L	Øw	x	H	Q	i	Ca	Co
	mm											kn		
1404-3	14	4	2,381	31	50	10	40	40	4,5	37	M6	T3	6,74	13,01
1405-3	14	5	3,175	32	50	10	45	40	4,5	38	M6	T3	9,76	16,53
1605-3	16	5	3,175	34	54	10	42	44	4,5	40	M6	T3	10,43	19,19

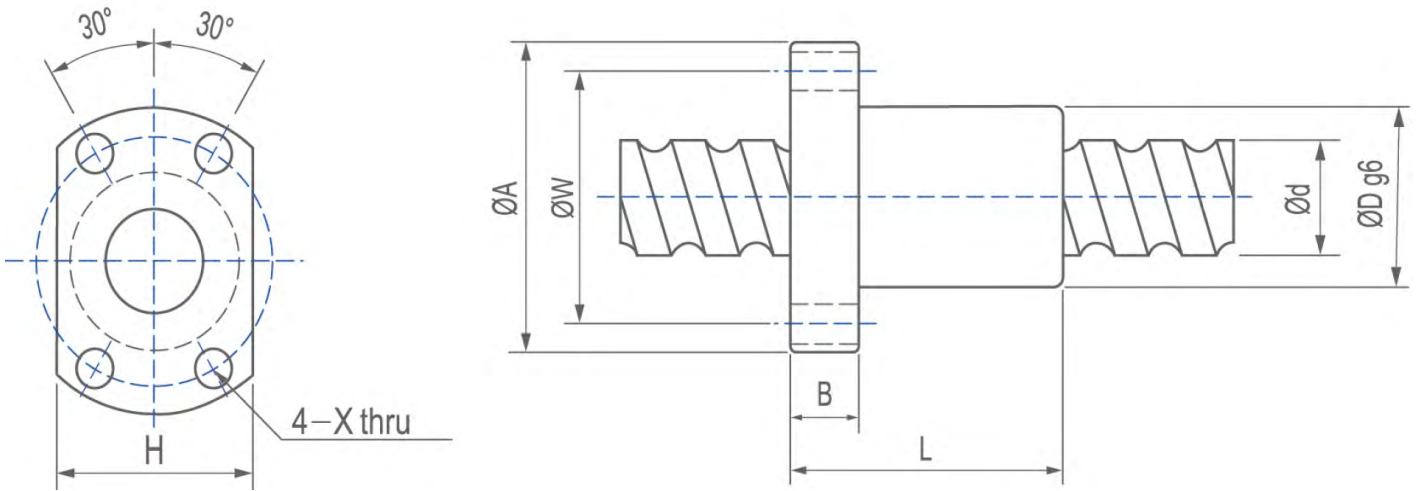


Note: with sign * can produce left helix

Model	diAMeter d_o	Pitch	BALL diAMeter Dw	ØD	L	B	x	y	Z	Q	L1	i	Ca Co	
													mm	
1202-3	12	2	1,2	24	30	9	3	1,5	12,0	Ø3	4	T3	2,28	6,05
1204-3	12	4	2,381	24	35	11,5	3	1,5	12,0	Ø3	5	T3	6,25	10,95
1205-3	12	5	2	24	40	14	3	1,5	12,0	Ø3	5	T3	4,96	9,34
1205-4	12	5	2	24	36	10	3	1,5	12,0	Ø3	5	T4	6,54	13,98
1210-2	12	10	2	24	40	14	3	1,5	12,0	Ø3	5	T2	3,73	7,16
1602-3	16	2	1,2	28	40	10	5	2	20,0	Ø3	5	T3	2,95	8,21
1604-4	16	4	2,381	28	45	12,5	5	2	20,0	Ø3	7	T4	9,21	20,08
1605-3	16	5	3,175	28	45	12,5	5	2	20,0	Ø3	7	T3	10,42	19,19
1605-4 *	16	5	3,175	28	50	5	5	2	20,0	Ø3	7	T4	13,35	25,59
1610-3	16	10	3,175	28	45	12,5	5	2	20,0	Ø3	7	T3	11,41	23,58
1616-2	16	16	3,175	28	45	12,5	5	2	20,0	Ø3	7	T2	8,05	15,72

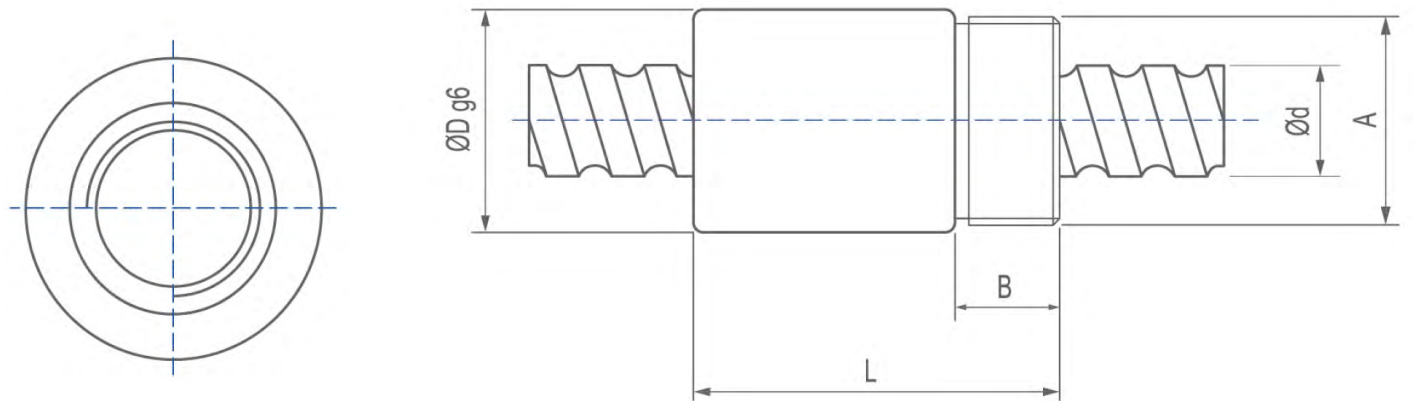


Model	diAMeter d_o	Pitch	BALL diAMeter Dw	ØD	ØA	B	e	f	L	w	x	y	Z	H1	H2	Q	i	Ca Co	
																		mm	
1605-3 *	12	5	2	30	50	10	6	15	43	40	4,5	8	4,4	32	45	M4	T4	6,54	13,98
1605-3 *	12	10	2	30	50	10	6	15	44	40	5,5	8	4,4	32	45	M4	T3	4,97	10,02
1605-3 *	15	20	3,175	34	57	12	6	17	57	45	6	9,5	5,4	34	50	M6	T2	7,15	13,27
1605-3 *	16	5	3,175	34	57	10	6	17	42	45	5,5	9,5	5,4	34	50	M6	T3	10,42	19,19
1605-3 *	16	10	3,175	34	57	11	6	17	44	45	5,5	9,5	5,4	34	50	M6	T3	10,76	22,02



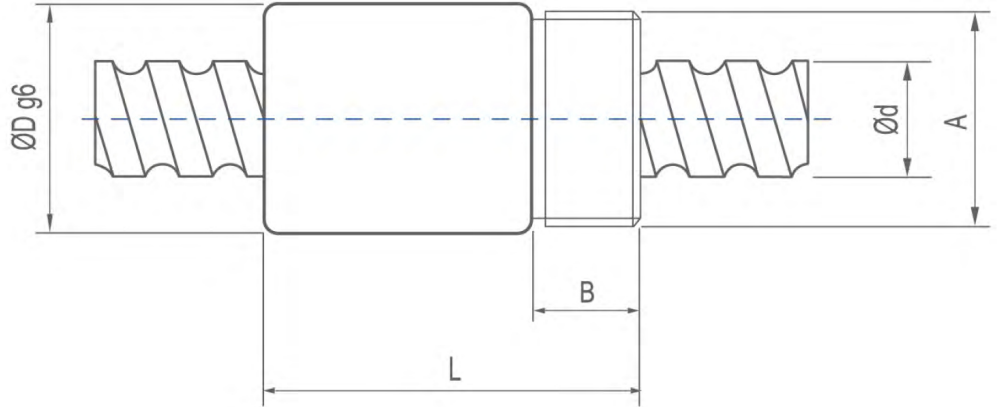
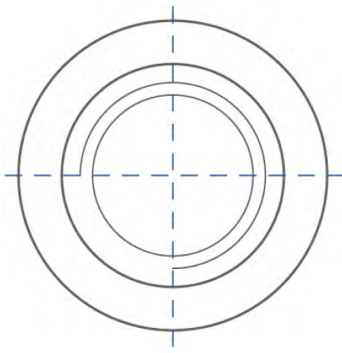
Note: with sign * without wipers

Model	diAMeter d _o	Pitch	BALL diAMeter Dw	ØD	ØA	B	L	Øw	x	H	i	Ca	Co
	mm											kn	
0601-3	6	1	0,8	12	24	3,5	18	18	3,4	16	T3	1,09	1,97
0801-3	8	1	0,8	14	27	4	20	21	3,4	18	T3	1,24	2,67
0802-3	8	2	1,2	16	29	4	26	23	3,4	20	T3	2,11	3,90
0825-3	8	2,5	1,2	16	29	4	26	23	3,4	20	T3	2,11	3,89
1002-3	10	2	1,2	18	35	5	28	27	4,5	22	T3	2,36	4,98
1003-3*	10	3	1,8	24	44	8	32	34	4,5	27	T3	3,93	6,86
1004-3	10	4	2	26	46	10	35	36	4,5	28	T3	4,59	7,83
1202-3	12	2	1,2	20	37	5	28	29	4,5	24	T3	2,58	6,05
1204-3	12	4	2,381	28	48	6	35	39	5,5	30	T3	6,25	10,95
1205-3	12	5	2	28	48	6	35	39	5,5	30	T3	4,96	9,34
1402-3	14	2	1,2	21	40	6	28	31	5,5	26	T3	2,77	7,10
1602-3	16	2	1,2	25	43	10	32	35	5,5	29	T3	2,95	8,21

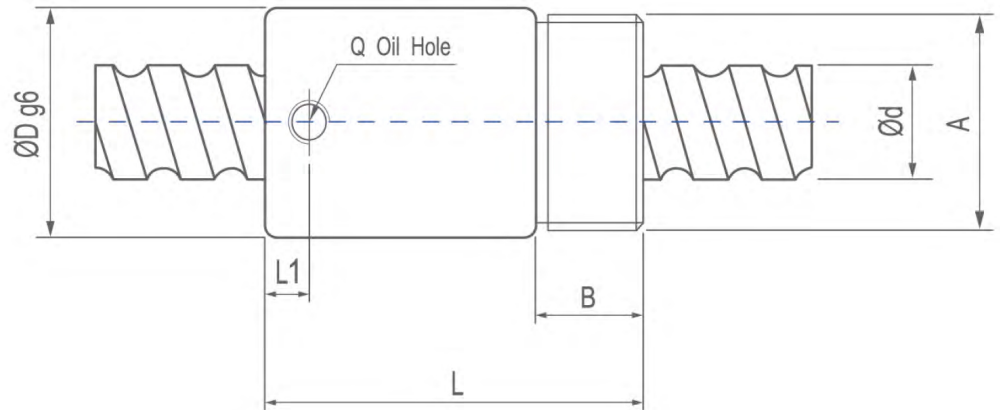
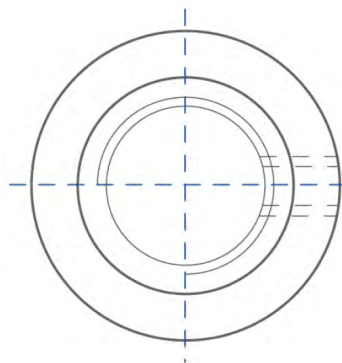


Note: without wipers

Model	diAMeter d _o	Pitch	BALL diAMeter Dw	ØD	ØA	B	L	i	Ca	Co
	mm								kn	
0825-3	8	2,5	1,2	17,5	M15x1	8	23,5	T3	2,11	3,89
1003-3	10	3	1,2	21	M18x1	9	29	T3	3,93	6,86
1204-3	12	4	2,381	25,5	M20x1	10	34	T3	6,25	10,95
1205-3	12	5	2	25,5	M20x1	10	39	T3	4,96	9,34
1605-3	16	5	3,175	32,5	M26x1,5	12	42	T3	10,42	19,19



Model	diAMeter d_o	Pitch	Ball diAMeter D_w	$\varnothing D$	$\varnothing A$	B	L	i	Ca	Co
	mm								kn	
12h2-1.5	12	12,7	2,381	29,5	M25x1,5	12	50	1,5	3,83	6,97
16h5-3.5	16	5,08	3,175	25,4	15/16"x16un	12,7	43,43	3,5	13,02	27,51



Model	diAMeter d_o	Pitch	Ball diAMeter D_w	$\varnothing D$	$\varnothing A$	B	L	Q	L1	i	Ca	Co
	mm								kn			
0601-3	16	4	2,381	29	M22x1,5	8	32	-	-	T3	7,19	15,06
0801-3	16	5	3,175	32	M230x1,5	16	56	M6	6,5	T4	13,35	25,56



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