

Brief introduction of Precision Miniature Ball Screw

Precision Miniature ball screw assemblies are conventionally understood to be systems with a nominal diameter of 16mm or less. Their miniaturized nut geometries are achieved through the use of optimized recirculation systems with very small balls. These ball screws are usually not preloaded or only slightly preloaded to ensure the smoothest possible travel. Miniature Ball Screw is normally used in high precision equipments and apparatus.

We developed a special metal deflector to replace the plastic deflector. The metal deflector can increase the serving life, stability and smoothness. If the metal deflector is assembled together with the stainless steel screw shaft, nut and ball, the miniature ball screw can be used in the environment of high-temperature and corrosion.



Application of Miniature Ball Screw

- ◇ CNC machines: CNC machine, CNC milling machine, milling machine, EDM machines, grinding machine, wire cut EDM machine, CNC boring machine.
- ◇ Industrial equipment: printing equipment, automation machinery, textile machine, drawing machine, injection molding machine, paper processing equipment.
- ◇ Electronic machines: measuring robot, XY working table, medical equipment, SMT Equipment, semiconductor equipment, other automation equipments.
- ◇ Transport machinery: material handling equipment, elevated actuator.
- ◇ Others: antenna leg actuator, valve operator etc.

Features of Miniature Ball Screws

•High mechanical efficiency

Miniature ball Screws are fitted with steel Balls, providing rolling contact between the Nut and Screw Shaft, allowing for mechanical efficiency of over 90% and reducing the required Torque to less than one-third that of conventional Lead Screws. The design of the Ball Screws also allows linear motion to be converted into rotary motion easily (Fig. 1).

•Axial play

With conventional Triangular and Trapezoidal Screw threads, reducing the Axial play increases the rotational Torque due to the sliding friction. Screwtech Ball Screws, on the other hand, are very easily rotated, even with no axial play. The use of Double Nuts also provides increased Rigidity.

•High precision

Screwtech Ball Screws are machined, assembled, and inspected using the technology of ultra-precision Lead Screw and Screw Gauge machining, under the temperature controlled room. High precision and accurate positioning ensure high reliability in use.

•Long service life

The Ball Screw movement results in virtually no wear, as the rolling-contact design, combined with the use of carefully selected heat-treated materials, results in an extremely low friction. This is the reason that high precision can be kept over long period.

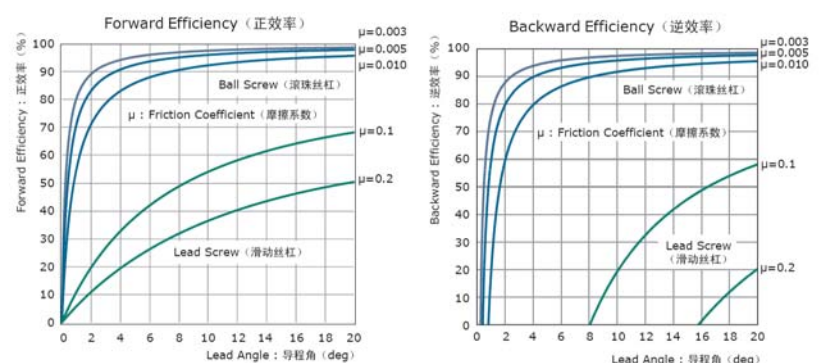


Fig. 1 Mechanical Efficiency

The range of Miniature Ball Screw

The range of our miniature Ball Screws is from $\phi 4\text{mm}$ to $\phi 16\text{mm}$ as shaft nominal diameter. Maximum limit of overall lengths are shown below. Maximum limit of overall lengths will vary depending on the shaft end configuration, materials. Please inquire Screwtech for details.

Shaft nominal diameter	Accuracy Grade				
	C0	C1	C3	C5	C7
4	90	120	160	170	240
6	140	180	240	250	350
8	200	250	330	350	450
10	260	320	420	450	650
12	320	390	510	550	700
14	380	460	600	660	700
16	450	540	700	770	1000

Note: if required length exceeds the number in table above, please ask Screwtech representative.

Dust prevention

In Ball Screws, if dust or other contaminations intrude into the Ball Nut, wear is accelerated, the screw groove will be damaged, circulation will be obstructed due to Ball fracture, damage of recirculation parts and so on.

Eventually, the Ball Screws will cease to function. Where the possibility of dust or other contaminant exists, the screw thread section cannot be left exposed, and dust prevention measure such as a bellows or Telescopic pipe must be taken.

Screwtech Miniature Ball Screws are concentrated on compact design for a feature of Miniature Ball Screw. Therefore, all models in the catalogue are the dimension without seals. Please inquire Screwtech if seals are required. Please note that Nut dimension may change due to seal installation. Some models cannot install the seals.

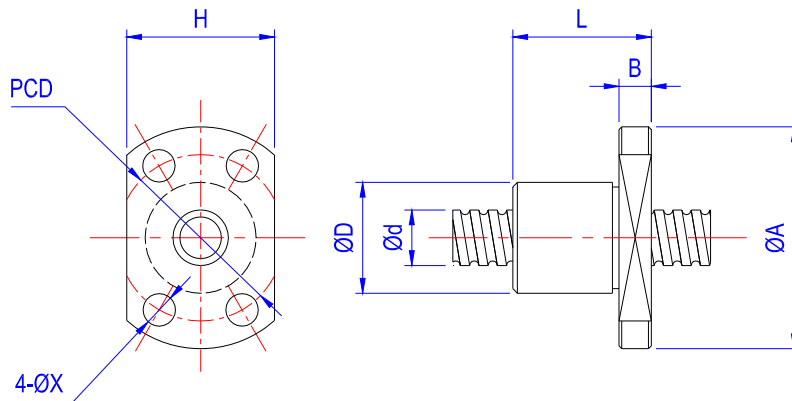
Special Surface treatment

Surface treatment can be possible for the purpose of rust prevention. Black Chrome treatment (BCr) is SCREWTECH standard surface treatment for the purpose of rust prevention. Please inquire SCREWTECH if other surface treatments are needed.

- Feature of SCREWTECH Ball Screws with Black Chrome (BCr) coating
 - Due to thin film thickness (2 to 3 μm), mating part can be applicable with BCr.
 - Due to strict production management, film thickness can be treated equally and smoothness is kept.
 - High anti-rust ability is possible.
 - The surface treatment is officially authorized by MIL standard (MIL-DTL-14538D)
 - To improve sliding characteristics, BCr+fluorine resin coating is also available.



Round Nut with Flange, Internal Deflector (M-ISNF)

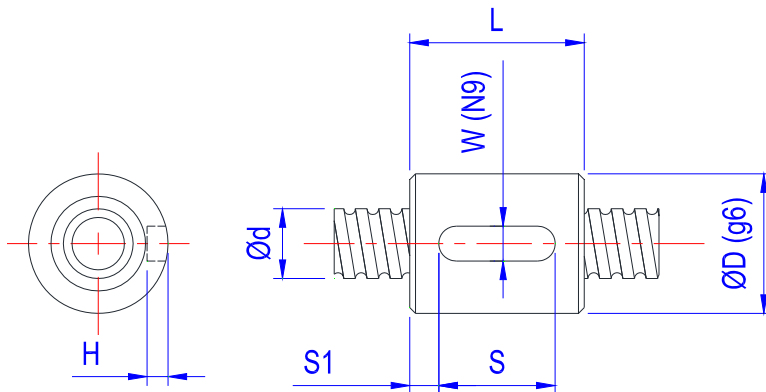


Code	d	P	Dw	n	Ca	Coa	K	Nut Dimension									
								D	A	B	L	PCD	H	X	Y	Z	Q
M-ISNF0401	4	1	0.8	2	40	51	2.8	10	20	3	12	15	14	2.9	/	/	/
M-ISNF0601	6	1	0.8	3	73	121	6.8	12	24	3.5	15	18	16	3.4	/	/	/
M-ISNF0602	6	2	1.2	3	73	121	6.8	12	24	3.5	15	18	16	3.4	/	/	/
M-ISNF0801	8	1	0.8	3	135	225	7.4	14	27	4	16	21	18	3.4	/	/	/
M-ISNF0802	8	2	1.2	3	135	225	7.4	14	27	4	16	21	18	3.4	/	/	/
M-ISNF0802.5	8	2.5	1.2	3	177	278	7.4	16	29	4	26	23	20	3.4	/	/	/
M-ISNF1002	10	2	1.588	3	185	305	9.0	18	35	5	28	27	22	4.5	/	/	/
M-ISNF1003	10	3	2.0	3	185	305	9.0	18	35	5	28	27	22	4.5	/	/	/
M-ISNF1004	10	4	2.381	3	395	590	9.0	26	46	10	34	36	28	4.5	/	/	/
M-ISNF1201	12	1	0.8	3	173	317	11	20	37	5	28	29	24	4.5	/	/	/
M-ISNF1202	12	2	1.588	3	173	317	11	20	37	5	28	29	24	4.5	/	/	/
M-ISNF1202.5	12	2.5	1.2	3	173	317	11	20	37	5	28	29	24	4.5	/	/	/
M-ISNF1203	12	3	3	3	173	317	11	20	37	5	28	29	24	4.5	/	/	/
M-ISNF1204	12	4	2.381	3	454	722	11	24	40	6	28	29	29	3.5	6	3.5	/
M-ISNF1205	12	5	2.5	3	619	883	17	22	40	8	38	32	24	4.5	/	/	/
M-ISNF1402	14	2	1.2	3	287	633	12	21	40	6	23	31	26	5.5	/	/	/
M-ISNF1602	16	2	1.588	3	253	670	12	25	43	10	40	35	29	5.5	/	/	/
M-ISNF1602.5	16	2.5	1.2	3	253	670	12	25	43	10	40	35	29	5.5	/	/	/
M-ISNF1603	16	3	2.0	3	253	670	12	25	43	10	40	35	29	5.5	/	/	/
M-ISNF1604	16	4	2.381	3	640	1340	16	28	48	10	42	39	34	4.5	8	4.5	M6

Not: the size and shape of the nut can be made as per customers' requirement.

P: lead . Dw: ball diameter n: number of ball recirculation. K: stiffness (Kgf/μm).
 Ca: basic dynamic rating load (Kgf). Coa: basic static rating load (Kgf).

Round Nut without Flange, Internal Deflector (M-ISNC)

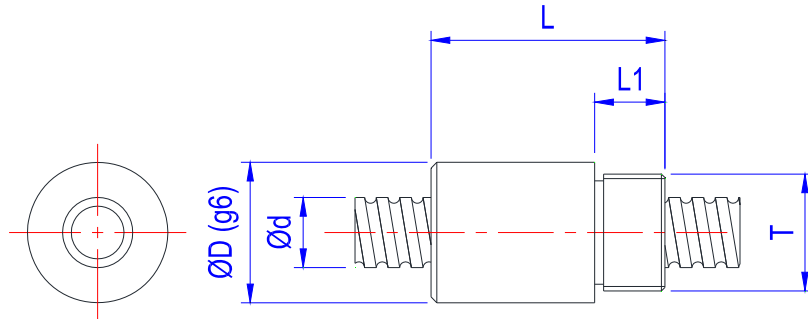


Code	d	P	Dw	n	Ca	Coa	K	Nut Dimension	
								D	L
M-ISNC0401	4	1	0.8	2	40	51	2.8	10	12
M-ISNC0601	6	1	0.8	3	73	121	6.8	12	15
M-ISNC0602	6	2	1.2	3	73	121	6.8	12	15
M-ISNC0801	8	1	0.8	3	135	225	7.4	14	16
M-ISNC0802	8	2	1.2	3	135	225	7.4	14	16
M-ISNC0802.5	8	2.5	1.2	3	177	278	7.4	16	26
M-ISNC1002	10	2	1.588	3	185	305	9.0	18	28
M-ISNC1003	10	3	2.0	3	185	305	9.0	18	28
M-ISNC1004	10	4	2.381	3	395	590	9.0	26	34
M-ISNC1201	12	1	0.8	3	173	317	11	20	28
M-ISNC1202	12	2	1.588	3	173	317	11	20	28
M-ISNC1202.5	12	2.5	1.2	3	173	317	11	20	28
M-ISNC1203	12	3	3	3	173	317	11	20	28
M-ISNC1204	12	4	2.381	3	454	722	11	24	28
M-ISNC1205	12	5	2.5	3	619	883	17	22	38
M-ISNC1402	14	2	1.2	3	287	633	12	21	23
M-ISNC1602	16	2	1.588	3	253	670	12	25	40
M-ISNC1602.5	16	2.5	1.2	3	253	670	12	25	40
M-ISNC1603	16	3	2.0	3	253	670	12	25	40
M-ISNC1604	16	4	2.381	3	640	1340	16	28	42

Not: the size and shape of the nut can be made as per customers' requirement.

P: lead . Dw: ball diameter n: number of ball recirculation. K: stiffness (Kgf/μm).
 Ca: basic dynamic rating load (Kgf). Coa: basic static rating load (Kgf).

Round Nut with Thread Mount, Internal Deflector (M-ISNA)

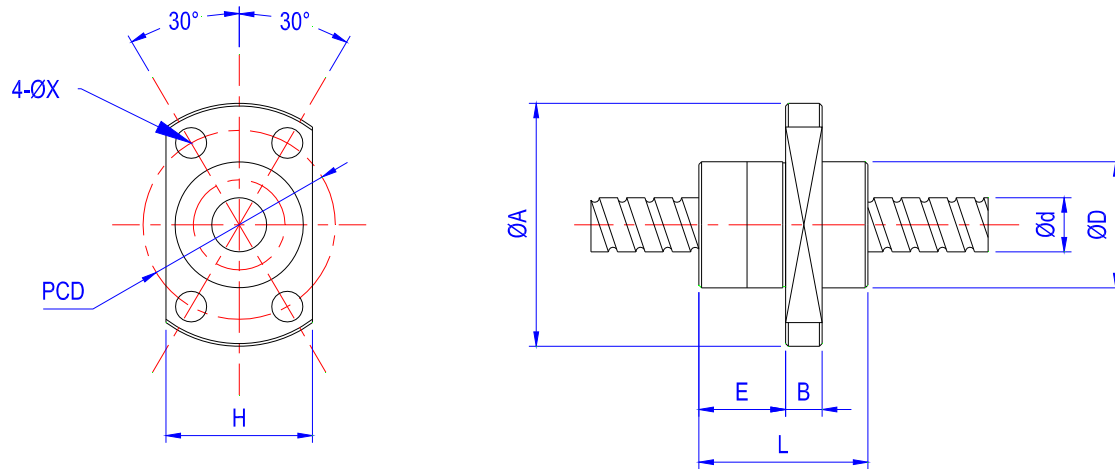


Code	d	P	Dw	n	Ca	Coa	K	Nut Dimension			
								D	L	L1	T
M-ISNA0401	4	1	0.8	2	40	51	2.8	10	15	5	M8x0.75
M-ISNA0601	6	1	0.8	2	73	121	6.8	12	15	5	M10x1
M-ISNA0602	6	2	1.2	3	73	121	6.8	12	20	6	M10x1
M-ISNA0801	8	1	0.8	3	135	225	7.4	16	22	8	M14x1
M-ISNA0802	8	2	1.2	3	135	225	7.4	16	27	8	M14x1
M-ISNA0802.5	8	2.5	1.2	3	177	278	7.4	16	29	8	M14x1
M-ISNA1002	10	2	1.588	3	185	305	9.0	18	28	7	M16x1
M-ISNA1003	10	3	2.0	3	185	305	9.0	18	28	7	M16x1
M-ISNA1004	10	4	2.381	3	395	590	9.0	26	34	10	M16x1
M-ISNA1201	12	1	0.8	3	173	317	11	20	39	10	M18x1
M-ISNA1202	12	2	1.588	3	173	317	11	20	28	10	M18x1
M-ISNA1202.5	12	2.5	1.2	3	173	317	11	20	28	10	M18x1
M-ISNA1203	12	3	2.0	3	173	317	11	20	33	10	M18x1
M-ISNA1204	12	4	2.381	3	454	722	11	24	28	10	M20x1
M-ISNA1205	12	5	2.5	3	619	883	17	24	38	10	M20x1
M-ISNA1402	14	2	1.2	3	287	633	12	24	38	10	M20x1
M-ISNA1602	16	2	1.588	3	253	670	12	25	44	10	M22x1
M-ISNA1602.5	16	2.5	1.2	3	253	670	12	25	44	10	M22x1
M-ISNA1603	16	3	2.0	3	253	670	12	25	44	10	M22x1
M-ISNA1604	16	4	2.381	3	640	1340	16	28	42	10	M24x1.5

Not: the size and shape of the nut can be made as per customers' requirement.

P: lead . Dw: ball diameter n: number of ball recirculation. K: stiffness (Kgf/μm).
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End Deflector of High Speed (M-CSNF)

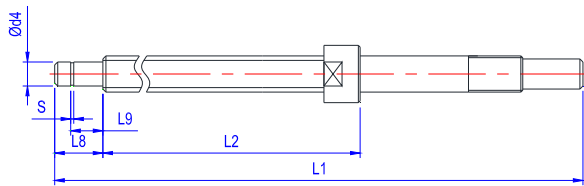
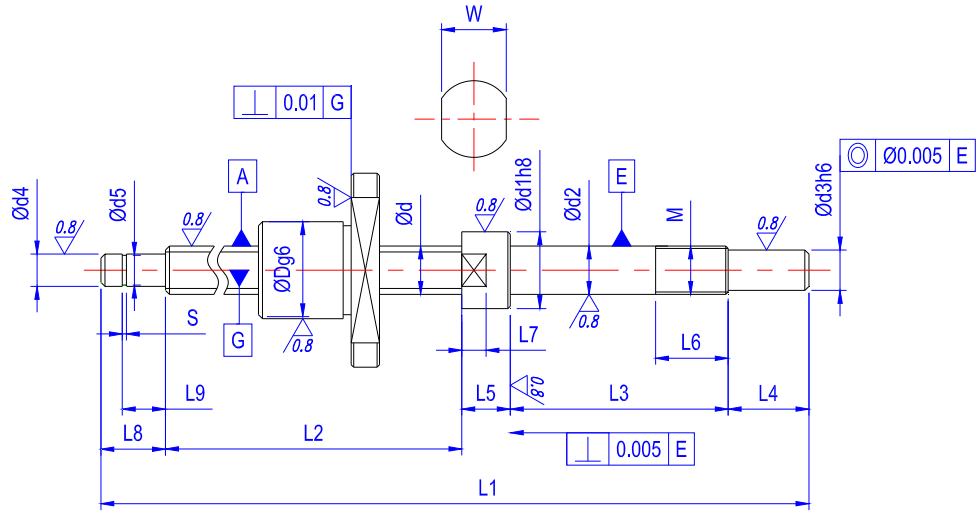


Code	d	P	Dw	n	Ca	Coa	Nut Dimension							
							D	A	E	B	L	X	PCD	H
M-CSNF0606	6	6	1.0	1.6x2	87	145	14	27	8	4	17	3.4	21	16
M-CSNF0610	6	10	1.2	1.2x2	95	160	14	27	11.5	4	23	3.4	21	16
M-CSNF0808	8	8	1.5875	1.6x2	220	380	18	31	10	4	20	3.4	25	20
M-CSNF0812	8	12	1.5875	1.6x2	220	400	18	31	17	4	27	3.4	25	20
M-CSNF1010	10	10	2.0	1.6x2s	330	590	23	40	13	5	24	3.4	32	25
M-CSNF1015	10	15	2.0	1.6x2s	330	640	23	40	22	5	33	4.5	32	25
M-CSNF1210	12	10	2.381	1.7x2	510	980	24	41	14.5	6	30	4.5	33	26

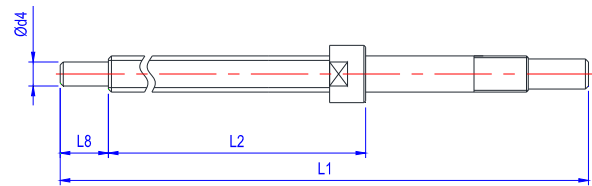
Not: the size and shape of the nut can be made as per customers' requirement.

P: lead . Dw: ball diameter n: number of ball recirculation. K: stiffness (Kgf/μm).
 Ca: basic dynamic rating load (Kgf). Coa: basic static rating load (Kgf).

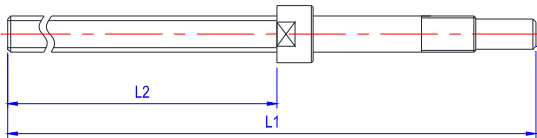
Suggested End Machining of Screw Shaft



A Type



B Type



C Type

Unit: mm

d	Fixed End											Support end			
												A type			
												B type			
	d1	L5	L7	W	d2	L3	M	L6	d3	L4	d4	L8	d5	S	L9
4	6 ⁰ _{-0.018}	6	2.5	5	4 ^{-0.001} _{-0.006}	18	M4x0.5	6.5	3 ⁰ _{-0.006}	5	3 ^{-0.002} _{-0.010}	7	2.7	0.5	4.35
6	8 ⁰ _{-0.022}	7	3	7	5 ^{-0.001} _{-0.006}	19	M5x0.5	6.5	4 ⁰ _{-0.008}	6	4 ^{-0.002} _{-0.012}	8	3.7	0.5	5.35
8	9.5 ⁰ _{-0.022}	7	3	8	6 ^{-0.001} _{-0.006}	22.5	M6x0.75	7	4.5 ⁰ _{-0.008}	7.5	6 ^{-0.002} _{-0.012}	9	5.7	0.8	6.8
10	11.5 ⁰ _{-0.027}	8	4	10	8 ^{-0.001} _{-0.006}	27	M8x1.0	9	6 ⁰ _{-0.008}	10	6 ^{-0.002} _{-0.012}	9	5.7	0.8	6.8
12	14 ⁰ _{-0.027}	10	5	12	10 ^{-0.002} _{-0.008}	30	M10x1.0	10	8 ⁰ _{-0.009}	15	8 ^{-0.004} _{-0.012}	10	7.6	0.9	7.9
14	15 ⁰ _{-0.027}	10	5	12	12 ^{-0.003} _{-0.011}	30	M12x1.0	10	10 ⁰ _{-0.009}	15	10 ^{-0.004} _{-0.012}	12	9.6	1.15	9.15
16	16 ⁰ _{-0.027}	10	5	12	12 ^{-0.003} _{-0.011}	30	M12x1.0	10	10 ⁰ _{-0.009}	15	10 ^{-0.004} _{-0.012}	12	9.6	1.15	9.15

Note: other customized end machining is available upon request.