



Miniature Lead Screws

Precise Linear Motion Components for Small-Scale Applications

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+420 547 125 300
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Lead Screws to Meet Today's Design Challenges

As the demand for increasingly compact devices grows within various industries, the need for ever smaller components has grown with it. To help engineers meet these stringent design requirements, the Thomson line of miniature lead screws delivers the linear motion precision you've come to know from our lead screws with diameters as small as two millimeters.

Big Precision in a Little Package

With these miniature lead screws, Thomson enables engineers to achieve designs once considered impossible. Devices that traditionally could not be made portable or mobile can now be reduced in size and weight without having to compromise precision, life or function.

In addition to being small, Thomson miniature lead screws are configurable, customizable and lean. They are part of an extensive product offering of standard screws and nuts that allow for an easily configurable

solution for many small-scale or space-constrained applications. Miniature lead screws are customizable in that Thomson can create unique designs outside of the standard offering. Finally, their smaller footprint helps reduce the environmental impact of the end product simply due to the removal of every unnecessary gram of mass.



MINI. PRECISE.
CONFIGURABLE.

Revolutionary Anti-Backlash Design

Thomson miniature lead screws offer the option of one of the world's smallest anti-backlash nuts, which is designed to add minimal size and weight to the overall lead screw assembly. The anti-backlash nut is specifically designed for optimal performance at a miniature scale. This technology eliminates any clearance between the lead screw and lead nut threads while also compensating for thread wear developed via normal operation.



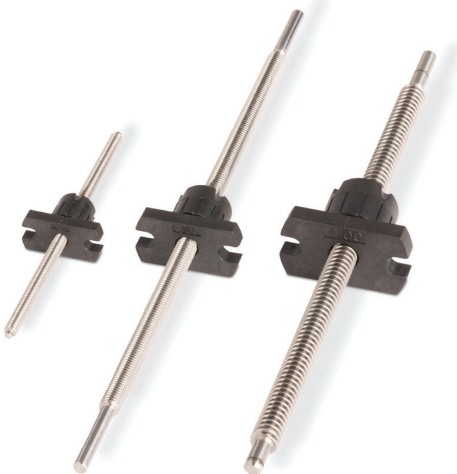
Quick-Mounting Integrated Coupler

The all-new integrated coupler design allows end-users to easily mount their Thomson miniature lead screw using only basic hand tools. Simply insert the required mating shaft in the coupler and torque down the lock nut for a secure and accurate connection.



Configurability

Thomson offers the industry's most comprehensive small-scale lead screw product line, consisting of various lead screw diameter and lead options, lead nut geometries and backlash types, as well as many standard lead screw end configurations.



Customization

Whether a custom lead nut, modified lead screw or a completely new, complex modification is required, Thomson engineers can work with you to provide a solution that is tailor-made to your design needs. Common customization options include end machining, special coatings, unique nut design and end configurations, and more.



Miniature Lead Screws at a Glance

When it comes to your small-scale linear motion applications, choosing the ideal miniature lead screw can help optimize performance and life expectancy. That's why Thomson offers several configuration options. Which miniature lead screw is best for your next design?

1

LEAD SCREWS

Diameters

2 mm
3 mm
4 mm

Leads

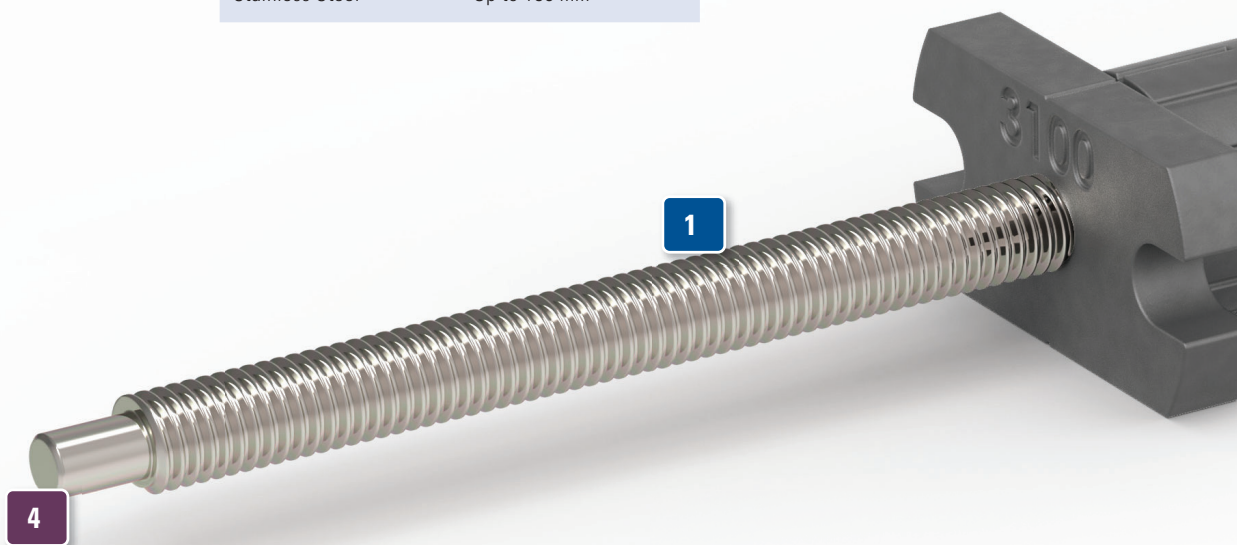
0.375 mm
0.5 mm
0.75 mm
1.5 mm
3 mm
4 mm

Material

Stainless Steel

Lengths

Up to 150 mm



4

SUPPORT END CONFIGURATIONS



Faced End



Standard Journal

2

DRIVE END CONFIGURATIONS



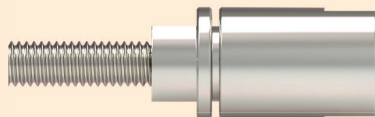
Faced End



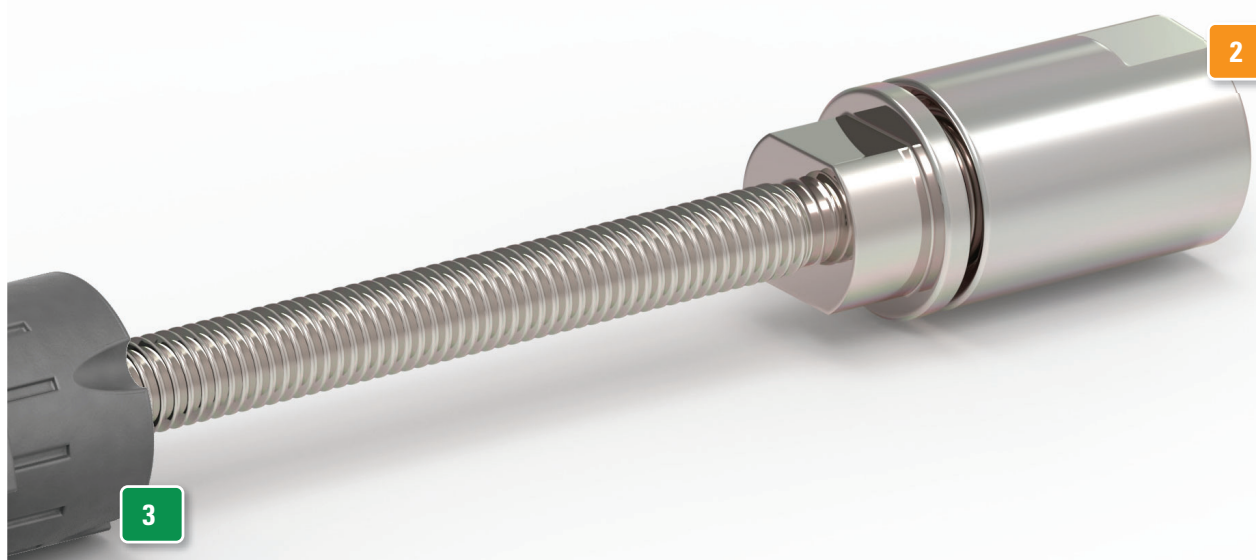
Oversized Journal



Standard Journal



Integrated Coupler

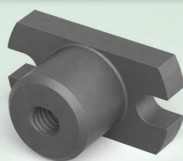


3

2

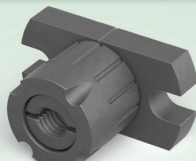
3

LEAD NUTS



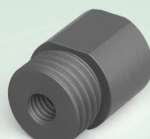
MSF

Flange Mount,
Standard Backlash



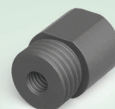
MAF

Flange Mount,
Anti-Backlash



MST

Thread Mount,
Standard Backlash



MSC

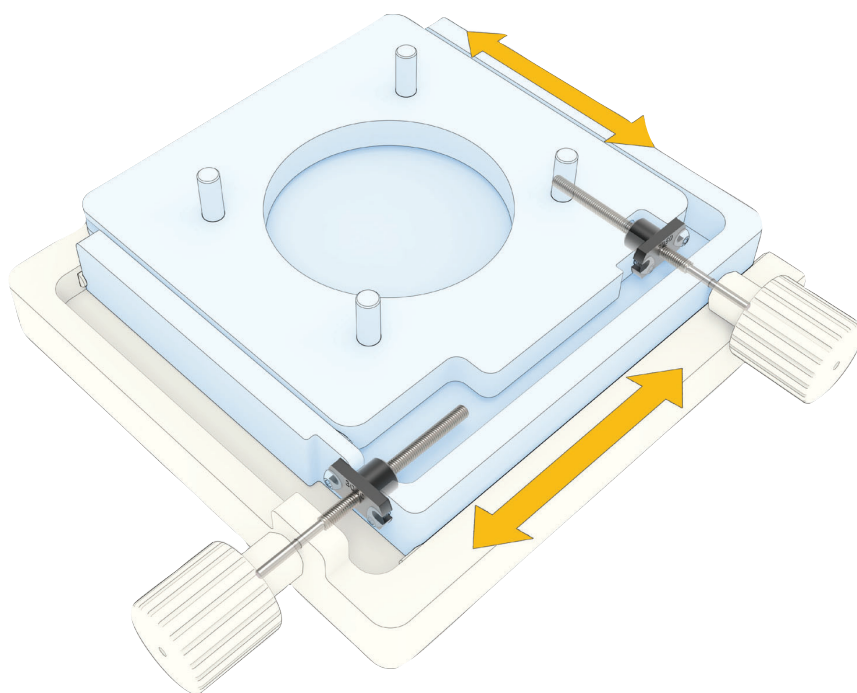
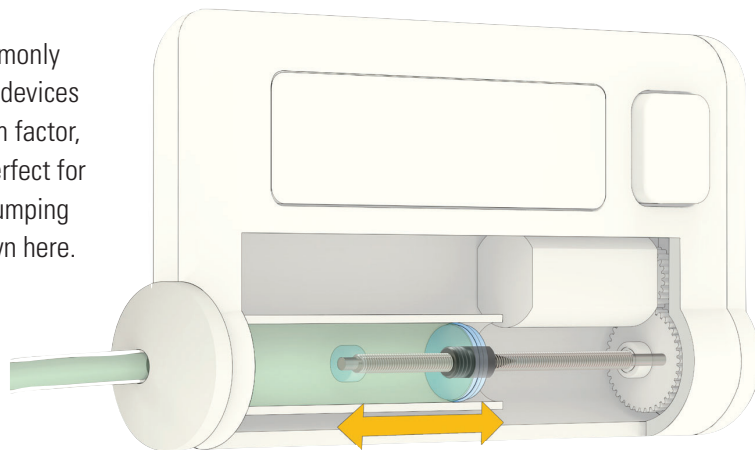
Compact Thread Mount,
Standard Backlash

Application Examples

Thomson miniature lead screws and nuts provide a high level of quality and precision in a compact envelope, affording engineers newfound flexibility when designing for a variety of applications.

Handheld Pumping Device

Precision lead screws are already commonly used as drive mechanisms in pumping devices today. However, due to their small form factor, Thomson miniature lead screws are perfect for incorporating into smaller, handheld pumping devices such as the insulin pump shown here.

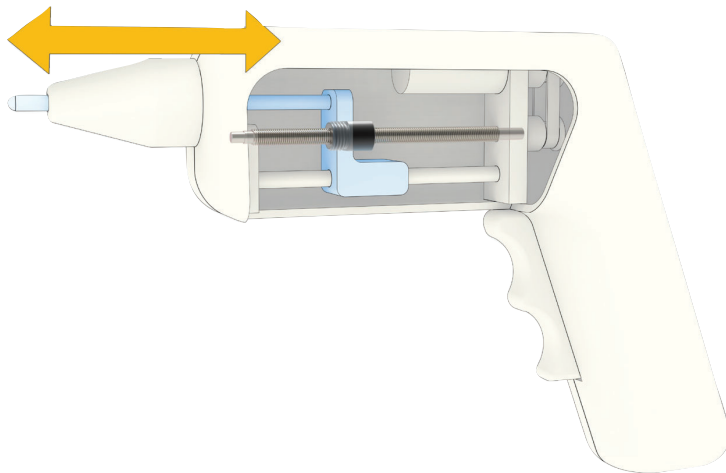
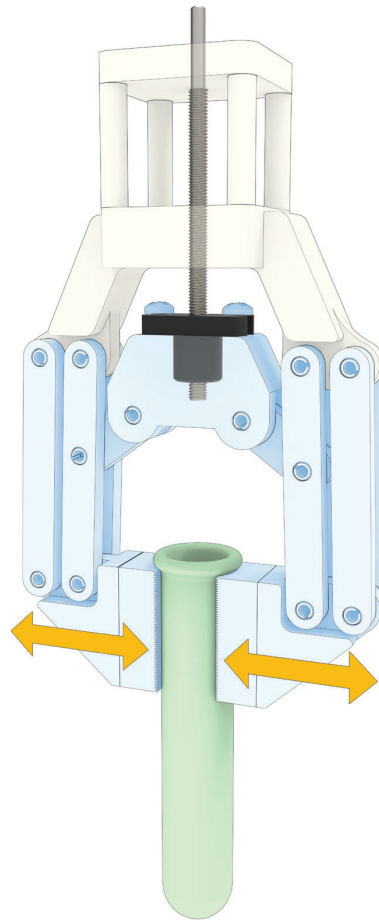


Microscope XY Stage

For optimal focus, microscope stages often require very small and precise planar movements. Miniature lead screws can aid in delivering these movements, while taking up minimal space thanks to their compact and unobtrusive form factor.

Micro Gripper

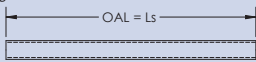


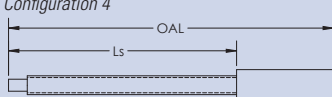
Robotic applications utilizing a gripper cater to many industrial tasks such as pick-and-place, material handling and test tube instrument holders. For smaller, precise micro-gripping mechanisms, Thomson miniature lead screws, in combination with a motor, can be the perfect linear drive mechanism.



Handheld Examination Device

Medical devices continue to improve over time. These design iterations allow for easier use, better quality and faster diagnoses. One example is a smaller footprint found in the handheld ear scanning device shown here. Smaller medical devices like this can benefit from Thomson miniature lead screws in their design application.

Ordering Key

Miniature Lead Screw													
1	2	3		4	5		6	7		8	9		10
CM	3	100	–	0450	N	–	C15	J10	–	SF	D	–	0001
1. Series CM = CM-Series Miniature Lead Screws					5. Screw Coating N = None					8. Lead Nut SF = MSF Standard backlash, flanged mount AF = MAF Anti-backlash, flanged mount ST = MST Standard backlash, thread mount SC = MSC Standard backlash, thread mount (compact configuration) XX = Custom lead nut ⁽²⁾ 00 = No lead nut			
2. Diameter 2 = 2 mm 3 = 3 mm 4 = 4 mm					6. Drive End Configuration A00 = No machining (faced end) XXX = Custom machining ⁽²⁾								
3. Lead (Linear Travel/Rev) 038 = 0.375 mm 050 = 0.50 mm 075 = 0.75 mm 100 = 1.00 mm 150 = 1.50 mm 300 = 3.00 mm 400 = 4.00 mm 600 = 6.00 mm 800 = 8.00 mm					<i>Integrated Coupler</i> C15 = for Ø 1.5 mm shaft C20 = for Ø 2.0 mm shaft C30 = for Ø 3.0 mm shaft C40 = for Ø 4.0 mm shaft C50 = for Ø 5.0 mm shaft					9. Nut Direction D = Flange or thread mount facing "Drive Side" S = Flange or thread mount facing "Supported Side" M = Symmetrical end configurations ⁽⁶⁾ X = Custom/see print ⁽²⁾ 0 = No lead nut			
4. Overall Length (OAL) (see diagrams below) <i>Screw only (config 1 and 2 below)</i> OAL = 0250 to 1500 (25.0 to 150.0 mm) <i>Screw + oversized journal or coupler (config 3 and 4) ⁽¹⁾</i> OAL = 0400 to 1700 (40.0 to 170.0 mm)					<i>Standard Journal</i> ⁽³⁾ J10 = Ø 1.0 mm x 1.0 mm J20 = Ø 2.0 mm x 3.0 mm J25 = Ø 2.5 mm x 3.0 mm					10. Custom Designation (blank) = Standard configuration 0000-9999 = Custom configuration ⁽²⁾ <i>(When custom property is required - to be assigned by Thomson)</i>			
					<i>Oversized Journal</i> ⁽⁴⁾ K30 = Ø 3.0 mm x 25.0 mm K40 = Ø 4.0 mm x 25.0 mm K50 = Ø 5.0 mm x 25.0 mm K60 = Ø 6.0 mm x 25.0 mm K70 = Ø 7.0 mm x 25.0 mm								
Configuration 1 					7. Support End Configuration ⁽⁵⁾ A00 = No machining (faced end) XXX = Custom machining ⁽²⁾								
Configuration 2 					<i>Standard Journal</i> J10 = Ø1.0 mm x 1.0 mm J20 = Ø2.0 mm x 3.0 mm J25 = Ø2.5 mm x 3.0 mm								
Configuration 3 													
Configuration 4 													

(1) For screw configurations with oversized journals or couplers, lead screw portion (Ls) must not exceed 150 mm.

(2) All custom designations to be assigned by Thomson.

(3) Standard journal diameter to be smaller than selected lead screw diameter.

(4) Oversized journal diameter to be greater than selected lead screw diameter.

(5) Oversized or integrated coupler end configurations not available on "support" end of lead screw.

(6) Symmetrical (M) nut direction to be selected only when drive end configuration = support end configuration.

Lead Screws Product Availability

Diameter [mm]	Lead [mm]							
	0.375	0.5	0.75	1	1.5	3	4	6
2	●		●		●	●		
3		●		●		●		●
4				●			●	●

For all other lead screw availability, please see standard lead screw catalog. For any custom diameter and/or leads, please contact Thomson customer support for more information.

Specifications

Basic Specifications			
Lead Screw	2 mm	3 mm	4 mm
Major diameter [mm]	2	3	4
Lead accuracy [mm/mm (in/in)]	0.0005 (0.0005)		
Straightness [mm (in)]	0.05 (0.002)		
Thread direction	right hand		
Max. screw length ⁽¹⁾ [mm (in)]	150 (5.9)		
Max. speed ⁽²⁾ [RPM]	1000		
Max. input torque integrated coupler [N-m (oz-in)]	1.1 (150)		
Material	stainless steel		
Weight [mg/mm (oz/in)]	26 (0.02)	40 (0.04)	70 (0.06)
Lead Nut	2 mm	3 mm	4 mm
Drag torque for standard nut [mN-m (oz-in)]	free wheeling		
Drag torque for anti-backlash nut [mN-m (oz-in)]	3.5 (0.5)		
Dynamic load capacity for standard nut [N (lbf)]	8.9 (2)	22.2 (5)	44.5 (10)
Dynamic load capacity for anti-backlash nut [N (lbf)]	4.4 (1)	11.1 (2.5)	22.2 (5)
Min. life for standard nut ⁽³⁾ [revs]	200 Million		
Min. life for anti-backlash nut ⁽⁴⁾ [revs]	100 Million		
Max. temperature [°C (°F)]	82 (180)		
Coefficient of friction ⁽⁵⁾	0.10 – 0.15		
Efficiency %	41 to 82 ⁽⁶⁾		
Max. axial backlash for standard nut [mm (in)]	0.058 (0.0023)	0.058 (0.0023)	0.064 (0.0025)
Max. axial backlash for anti-backlash nut [mm (in)]	0		
Positional repeatability for standard nut [mm (in)]	0.013 – 0.058 (0.0005 – 0.0023)	0.013 – 0.058 (0.0005 – 0.0023)	0.013 – 0.064 (0.0005 – 0.0025)
Positional repeatability for anti-backlash nut [mm (in)]	< 0.013 (0.0005)		
Material	bearing grade PEEK		

1. Max screw length does not include oversized journal or coupler.

2. Faster speeds can be achieved but is not recommended. For optimal performance, speed should be under 500 RPM.

3. Under nominal loads and speeds.

4. Life of anti-backlash nut is number of cycles until mechanism no longer fully takes up clearance between lead screw and nut threads.

5. With dry lead screw. A lower coefficient of friction can be achieved by using grease or lubricants.

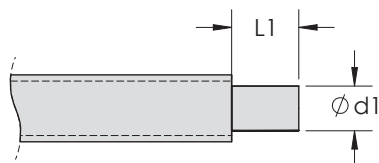
6. Efficiency calculated assuming COF = 0.1.

Standard End Configurations

Faced End (A00)

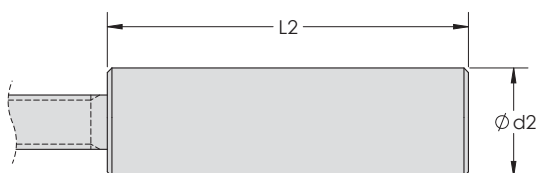


Standard Journal (Jxx)



P/N Code	Dimensions [mm (in)]		Compatible Screws [mm]
	d1	L1	
J10	1.00/0.99 (0.0394/0.0390)	1.00 (0.039)	2, 3, 4
J20	2.00/1.99 (0.0787/0.0783)	3.00 (0.118)	3, 4
J25	2.50/2.49 (0.0984/0.0980)	3.00 (0.118)	4

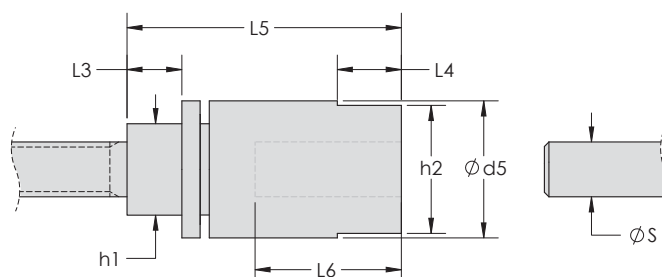
Oversized Journal (Kxx)



P/N Code	Dimensions [mm (in)]		Compatible Screws [mm]
	d2	L2	
K30	3.00/2.97 (0.118/0.117)	25.0 (0.98)	2
K40	4.00/3.97 (0.157/0.156)	25.0 (0.98)	2, 3
K50	5.00/4.97 (0.197/0.196)	25.0 (0.98)	2, 3, 4
K60	6.00/5.97 (0.236/0.235)	25.0 (0.98)	2, 3, 4
K70	7.00/6.97 (0.276/0.275)	25.0 (0.98)	2, 3, 4

For custom end machining or end configurations, please contact Thomson Customer Support.

Integrated Coupler (Cxx)



P/N Code	Bore Size [mm]	Lead Screw [mm]	Dimensions [mm (in)]							
			d5	h1	h2	L3	L4	L5	S ¹	L6 ² MAX
C15	Ø1.5	2	6.00 (0.236)	4.00 (0.157)	5.50 (0.217)	3.00 (0.118)	3.50 (0.138)	14.5 (0.57) MAX	1.500 / 1.490 (0.0591 / 0.0587)	9.00 (0.35)
		3	6.50 (0.256)	5.00 (0.197)	6.00 (0.236)					8.00 (0.31)
		4	7.00 (0.276)	5.50 (0.217)	6.50 (0.256)					7.00 (0.28)
C20	Ø2.0	2	6.50 (0.256)	4.00 (0.157)	6.00 (0.236)	3.00 (0.118)	3.50 (0.138)	15.0 (0.59) MAX	2.000 / 1.990 (0.0787 / 0.0783)	9.50 (0.37)
		3		5.00 (0.197)						8.50 (0.33)
		4		5.50 (0.217)						7.50 (0.3)
C30	Ø3.0	2	7.50 (0.295)	4.00 (0.157)	7.00 (0.276)	3.00 (0.118)	3.50 (0.138)	15.5 (0.61) MAX	3.000 / 2.990 (0.1181 / 0.1177)	10.00 (0.39)
		3		5.00 (0.197)						9.00 (0.35)
		4		5.50 (0.217)						8.00 (0.31)
C40	Ø4.0	2	8.50 (0.335)	4.00 (0.157)	8.00 (0.315)	3.00 (0.118)	3.50 (0.138)	15.5 (0.61) MAX	4.000 / 3.988 (0.1575 / 0.157)	10.00 (0.39)
		3		5.00 (0.197)						9.00 (0.35)
		4		5.50 (0.217)						8.00 (0.31)
C50	Ø5.0	4	9.50 (0.374)	6.00 (0.236)	9.00 (0.354)	3.00 (0.118)	3.50 (0.138)	15.5 (0.61) MAX	5.000 / 4.988 (0.1969 / 0.1964)	8.00 (0.31)

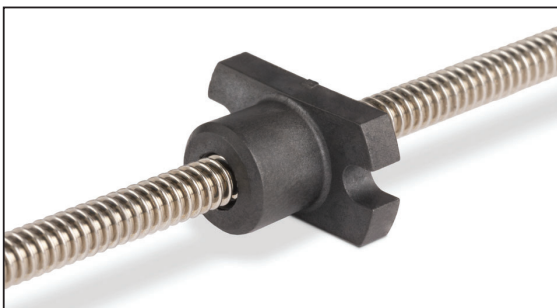
1. S = Recommended mating shaft diameter for optimal coupling. Recommended shaft diameter tolerance = h7.

2. L6 = Max insertion depth of shaft (S).

3. For required lock nut torques and installation instructions, see page 21.

Miniature Lead Nuts

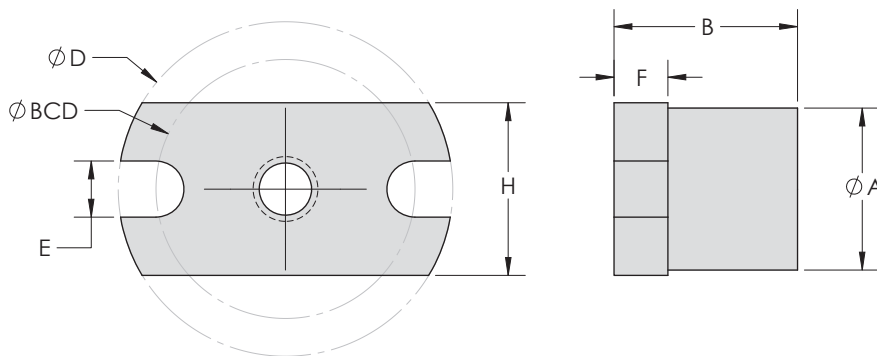
MSF Flange Mount / Standard Backlash



Features and Benefits

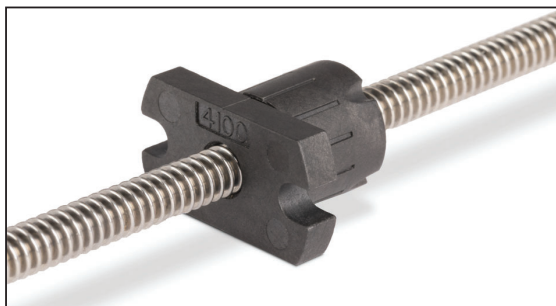
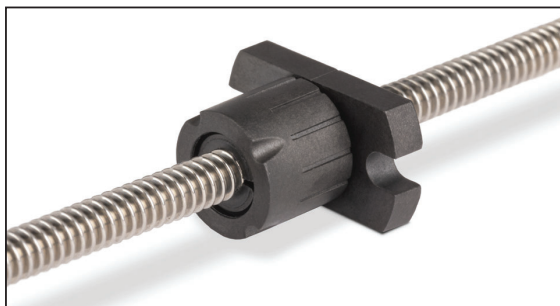
- The smallest Thomson flange mount nuts available.
- Injection-molded in a high-performance, bearing-grade material, specifically designed for demanding applications.
- For lead screw diameters of 2, 3 and 4 mm.
- Design loads of up to 10 lbf (44 N).

Dimensions and Specifications

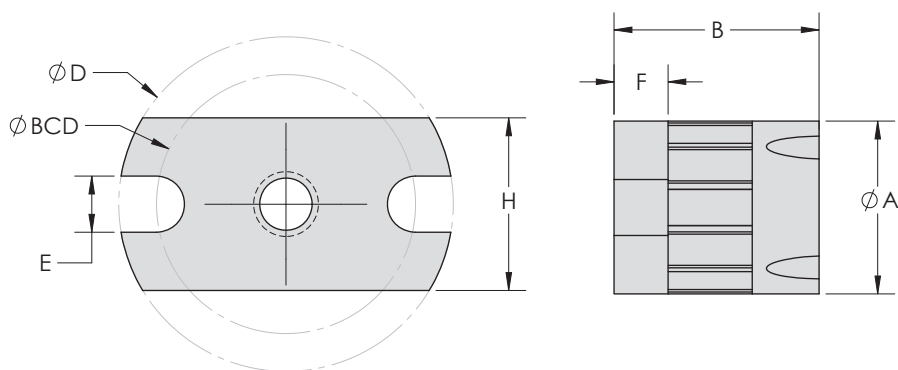


Full P/N	Dimensions [mm (in)]									Max. Dynamic Load [N (lbf)]	Max. Screw Speed [RPM]	Drag Torque [mN-m (oz-in)]	Efficiency ⁽²⁾ [%]
	Lead Screw Diameter	Lead	A	B	D	E	F	H	BCD				
MSF2038	2 (0.079)	0.375 (0.015)	5.3 (0.21)	7.0 (0.28)	11.9 (0.47)	1.93/1.80 (0.076/0.071)	2.0 (0.08)	5.8 (0.23)	8.89 (0.350)	8.9 (2)	1000 ⁽¹⁾	Free Wheeling	40.9
MSF2075		0.75 (0.030)											57.6
MSF2150		1.50 (0.059)											71.7
MSF2300		3.00 (0.118)											80.1
MSF3050	3 (0.118)	0.50 (0.020)	7.5 (0.30)	8.5 (0.34)	15.5 (0.61)	2.74/2.59 (0.108/0.102)	2.5 (0.10)	8.0 (0.32)	11.99 (0.472)	22.2 (5)	1000 ⁽¹⁾	Free Wheeling	37.6
MSF3100		1.00 (0.039)											54.2
MSF3300		3.00 (0.118)											75.6
MSF3600		6.00 (0.236)											81.5
MSF4100	4 (0.157)	1.00 (0.039)	9.0 (0.35)	10.3 (0.40)	19.0 (0.75)	3.05/2.90 (0.120/0.114)	3.0 (0.12)	10.3 (0.40)	15.24 (0.600)	44.5 (10)	1000 ⁽¹⁾	Free Wheeling	48.2
MSF4400		4.00 (0.157)											76.1
MSF4800		8.00 (0.315)											81.7

1. For optimal performance, speed should be limited to 500 RPM.
2. Efficiency calculated assuming a COF of 0.10.

MAF Flange Mount / Anti-Backlash**Features and Benefits**

- The smallest Thomson anti-backlash nuts available.
- Injection-molded in a high-performance, bearing-grade material, specifically designed for demanding applications.
- For lead screw diameters of 2, 3 and 4 mm.
- Design loads of up to 5 lbf (22 N).

Dimensions and Specifications

Full P/N	Dimensions [mm (in)]									Max. Dynamic Load [N (lbf)]	Max. Screw Speed [RPM]	Drag Torque [mN-m (oz-in)]	Efficiency ⁽²⁾ [%]
	Lead Screw Diameter	Lead	A	B	D	E	F	H	BCD				
MAF2038	2 (0.079)	0.375 (0.015)	5.8 (0.23)	7.8 (0.31) MAX	11.9 (0.47)	1.93/1.80 (0.076/0.071)	2.0 (0.08)	5.8 (0.23)	8.89 (0.350)	4.4 (1)	1000 ⁽¹⁾	3.5 (0.5) MAX	40.9
MAF2075		0.75 (0.030)											57.6
MAF2150		1.50 (0.059)											71.7
MAF2300		3.00 (0.118)											80.1
MAF3050	3 (0.118)	0.50 (0.020)	8.0 (0.32)	9.9 (0.39) MAX	15.5 (0.61)	2.74/2.59 (0.108/0.102)	2.5 (0.10)	8.0 (0.32)	11.99 (0.472)	11.1 (2.5)	1000 ⁽¹⁾	3.5 (0.5) MAX	37.6
MAF3100		1.00 (0.039)											54.2
MAF3300		3.00 (0.118)											75.6
MAF3600		6.00 (0.236)											81.5
MAF4100	4 (0.157)	1.00 (0.039)	10.3 (0.40)	12.4 (0.49) MAX	19.0 (0.75)	3.05/2.90 (0.120/0.114)	3.0 (0.12)	10.3 (0.40)	15.24 (0.600)	22.2 (5)	1000 ⁽¹⁾	3.5 (0.5) MAX	48.2
MAF4400		4.00 (0.157)											76.1
MAF4800		8.00 (0.315)											81.7

1. For optimal performance, speed should be limited to 500 RPM.
 2. Efficiency calculated assuming a COF of 0.10.

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Miniature Lead Nuts

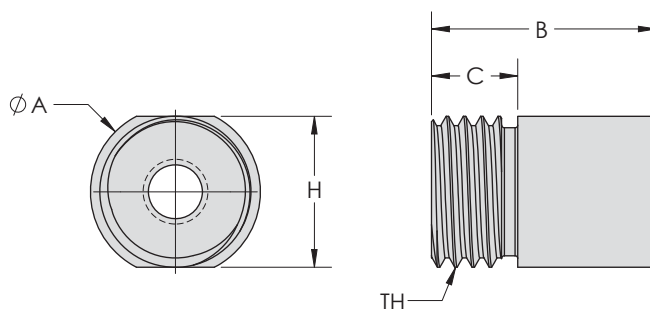
MST Thread Mount / Standard Backlash



Features and Benefits

- Metric thread mount lead nut.
- Manufactured from a high-performance, bearing-grade material, specifically designed for demanding applications.
- For lead screw diameters of 2, 3 and 4 mm.
- Design loads of up to 10 lbf (44 N).

Dimensions and Specifications

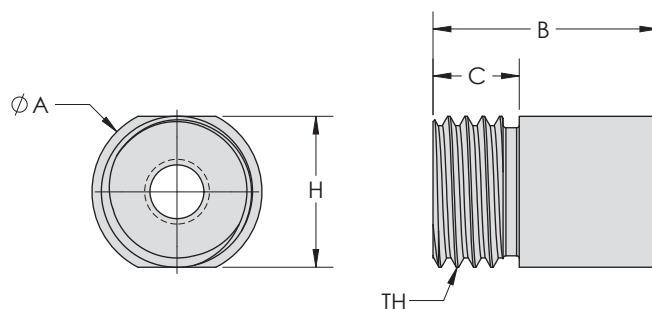


Full P/N	Dimensions [mm (in)]							Max. Dynamic Load [N (lbf)]	Max. Screw Speed [RPM]	Drag Torque [mN-m (oz-in)]	Efficiency ⁽²⁾ [%]
	Lead Screw Diameter	Lead	A	B	C	H	TH				
MST2038	2 (0.079)	0.375 (0.015)	5.6 (0.22)	8.1 (0.32)	3.50 (0.138)	5.0 (0.20)	M5x0.8 -6g	8.9 (2)	1000 ⁽¹⁾	Free Wheeling	40.9
MST2075		0.75 (0.030)									57.6
MST2150		1.50 (0.059)									71.7
MST2300		3.00 (0.118)									80.1
MST3050	3 (0.118)	0.50 (0.020)	7.9 (0.31)	10.4 (0.41)	4.00 (0.157)	7.0 (0.28)	M7x0.75 -6g	22.2 (5)	1000 ⁽¹⁾	Free Wheeling	37.6
MST3100		1.00 (0.039)									54.2
MST3300		3.00 (0.118)									75.6
MST4100	4 (0.157)	1.00 (0.039)	10.2 (0.10)	12.7 (0.50)	5.00 (0.197)	9.0 (0.36)	M9x1.0 -6g	44.5 (10)	1000 ⁽¹⁾	Free Wheeling	48.2
MST4400		4.00 (0.157)									76.1
MST4800		8.00 (0.315)									81.7

1. For optimal performance, speed should be limited to 500 RPM.
2. Efficiency calculated assuming a COF of 0.10.

MSC Compact Thread Mount / Standard Backlash**Features and Benefits**

- The smallest Thomson standard lead nut ever manufactured.
- Compact version of the MST nut.
- For lead screw diameters of 2, 3 and 4 mm.
- Manufactured from a high-performance, bearing-grade material, specifically designed for demanding applications.
- Design loads of up to 5 lbf (22 N).

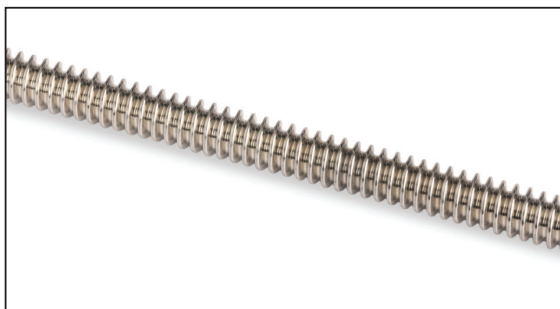
Dimensions and Specifications

Full P/N	Dimensions [mm (in)]							Max. Dynamic Load [N (lbf)]	Max. Screw Speed [RPM]	Drag Torque [mN-m (oz-in)]	Efficiency ⁽²⁾ [%]
	Lead Screw Diameter	Lead	A	B	C	H	TH				
MSC2038	2 (0.079)	0.375 (0.015)	4.0 (0.16)	6.0 (0.24)	3.00 (0.118)	3.5 (0.14)	M3.5x0.6 -6g	4.4 (1)	1000 ⁽¹⁾	Free Wheeling	40.9
MSC2075		0.75 (0.030)									57.6
MSC2150		1.50 (0.059)									71.7
MSC2300		3.00 (0.118)									80.1
MSC3050	3 (0.118)	0.50 (0.020)	5.6 (0.22)	8.1 (0.32)	3.50 (0.138)	5.0 (0.20)	M5x0.8 -6g	8.9 (2)	1000 ⁽¹⁾	Free Wheeling	37.6
MSC3100		1.00 (0.039)									54.2
MSC3300		3.00 (0.118)									75.6
MSC4100	4 (0.157)	1.00 (0.039)	7.9 (0.31)	10.4 (0.41)	4.00 (0.157)	7.0 (0.28)	M7x0.75 -6g	22.2 (5)	1000 ⁽¹⁾	Free Wheeling	48.2
MSC4400		4.00 (0.157)									76.1
MSC4800		8.00 (0.315)									81.7

1. For optimal performance, speed should be limited to 500 RPM.

2. Efficiency calculated assuming a COF of 0.10.

Miniature Lead Screws



Features and Benefits

- New precision-grade lead screw in 2, 3 and 4 mm diameters
- Various lead options available
- Up to 150 mm length

Dimensions and Specifications

Major Diameter [mm]	Lead [mm (in)]	Part Number	Pitch [mm (in)]	No. Of Thread Starts	Accuracy [mm/mm (in/in)]	Material	Thread Direc- tion
2	0.375 (0.015)	CM2038	0.375 (0.015)	1	0.0005 (0.0005)	Stainless Steel	Right Hand
	0.75 (0.030)	CM2075		2			
	1.50 (0.059)	CM2150		4			
	3.00 (0.118)	CM2300		8			
3	0.50 (0.020)	CM3050	0.5 (0.020)	1	0.0005 (0.0005)	Stainless Steel	Right Hand
	1.00 (0.039)	CM3100		2			
	3.00 (0.118)	CM3300		6			
	6.00 (0.236)	CM3600		12			
4	1.00 (0.039)	CM4100	1 (0.039)	1	0.0005 (0.0005)	Stainless Steel	Right Hand
	4.00 (0.157)	CM4400		4			
	8.00 (0.315)	CM4800		8			

For availability of all other lead screws, please see the standard Thomson lead screw catalog. For any custom diameter and/or leads, please contact Thomson customer support for more information.

Make it Yours – Customize Your Miniature Lead Screw

End Machining

Besides our standard end configurations, Thomson can machine many custom features onto our lead screws. Simply send over a drawing or provide guidance to one of our sizing specialists to review. Our machining options include flats, counterbores, internal /external hex, mounting threads and snap ring grooves.



Custom Lead Nuts and Assemblies

If our standard nut geometry or material is not suitable for your application, Thomson can custom manufacture a solution, specially catered to you. Thomson has decades of experience making the most complex nut geometries and working with many different materials.



Coatings & Surface Treatments

Thomson can also specially treat our lead screws with many different coating and surface treatment options such as low friction PTFE coating, Dicronite, passivation, electropolish, and heat treating.



Other possible customizations can include the following:

- Diameters and leads
- Thread forms
- Screw material and hardness
- End support and bearing assemblies
- Motorized assemblies

Start your custom solution journey now by contacting Thomson and we'll set you up with one of our experienced engineers.

www.thomsonlinear.com

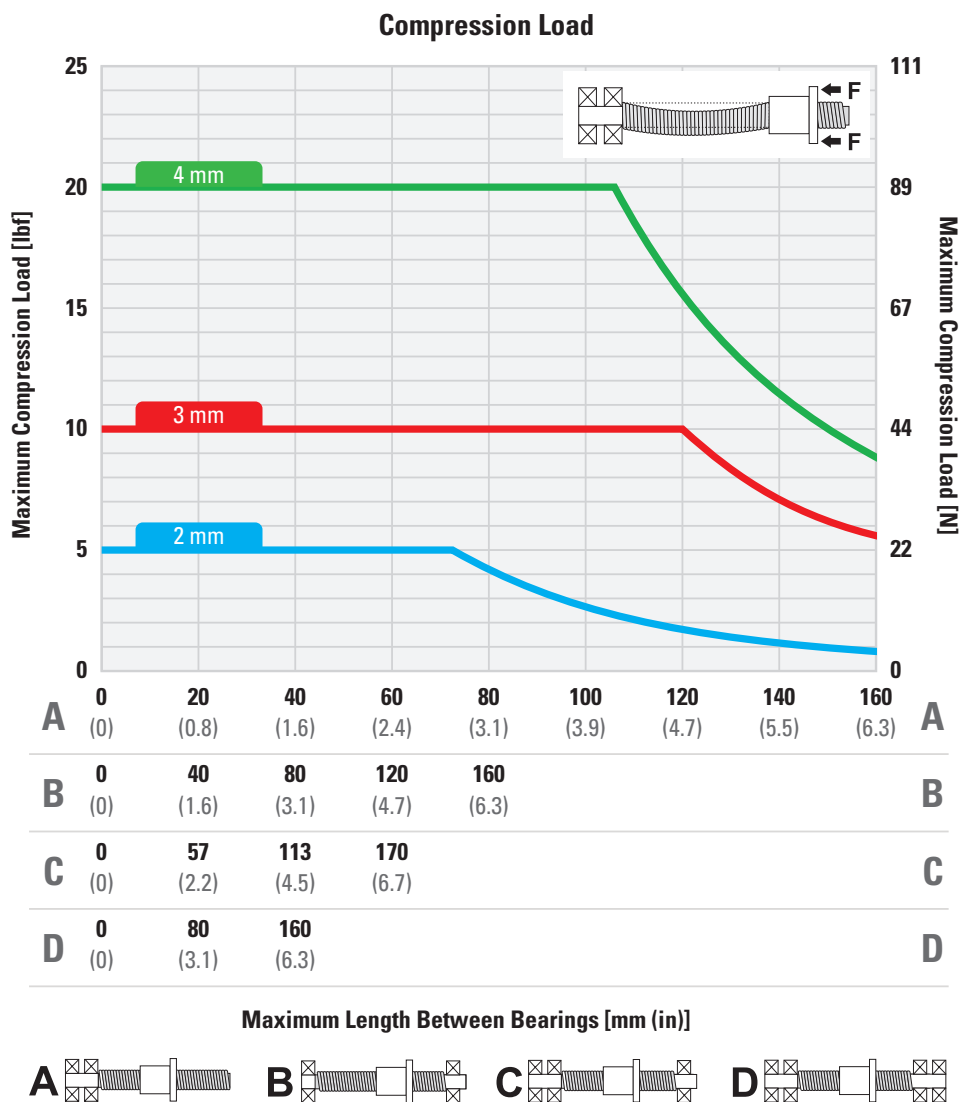
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Engineering Guidelines

Column Loading Capacities Chart for Miniature Lead Screws

Use the chart below to determine the maximum compression load for the lead screw. Usually, lead screws operated in tension can handle loads up to the rated capacity of the lead nut, provided the screw length is within standard lengths. However, end supports need to be accounted for as well because they can have an effect on the load capacity of the screw. The four most common loading variations are shown below with corresponding rating adjustments. Find the point of intersecting lines of load and length to determine the smallest screw diameter that would suffice in a given application.

Warning: DO NOT EXCEED nut capacity. Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard screws within the nominal size range.



Lead Screw Formulas

TORQUE, ROTARY TO LINEAR

Rotating the lead screw to translate the nut or rotating the nut to translate the lead screw.

$$\text{Torque} = \frac{\text{Load} \times \text{Lead}}{2\pi \times \text{Efficiency}}$$

TORQUE, LINEAR TO ROTARY

Translating the lead screw to rotate the nut or translating the nut to rotate the screw.

$$\text{Torque} = \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

EFFICIENCY

$$\% \text{ Efficiency} = \frac{\tan(\text{Helix Angle})}{\tan(\text{Helix Angle} + \arctan f)} \times 100$$

f = coefficient of friction

Systems with an efficiency of 50% and greater are not self-locking. For efficiency, see appropriate lead nut sections on pages 12-15. The efficiencies listed in the brochure are calculated for a coefficient of friction of 0.1.

COLUMN LOAD STRENGTH* (Max compression load on screw)

$$P_{cr} = \frac{1.405 \times 10^7 \times F_c \times d^4}{L^2}$$

P_{cr} = maximum loads (lbs)

F_c = end support factor

0.25 one end fixed, other free

1.00 both ends supported

2.00 one end fixed, other supported

4.00 both ends fixed

d = root diameter of screw (in.)

L = distance between nut and load carrying bearing (in)

When possible, design for tension loads to eliminate the buckling factor and reduce the required screw size.

* Formula only valid if $L/d \geq 18.25$

CRITICAL SCREW SHAFT SPEED (Max rotational speed of screw)

$$C_s = F_c \times 4.76 \times 10^6 \times \frac{d}{L^3}$$

C_s = critical speed (rpm)

d = root diameter of screw (in.)

L = length between supports (in.)

F_c = end support factor

0.36 one end fixed, other free

1.00 both ends supported

1.47 one end fixed, other supported

2.23 both ends fixed

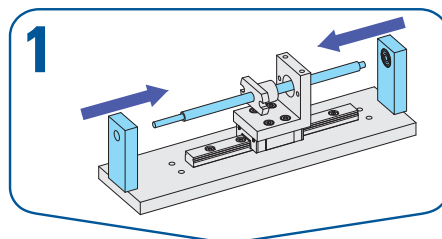
Critical shaft speed should be reduced to 80% to allow for other factors such as alignment and straightness.

Installation Overview

For optimal performance and component life, proper installation of miniature lead screw assemblies is required. Careful consideration must be taken when it comes to nut/end configuration selection, mounting supports and installation alignment. The following diagrams outline the general procedure for properly installing a miniature lead screw and nut assembly into your system. For more detailed instructions, please contact Thomson customer support.

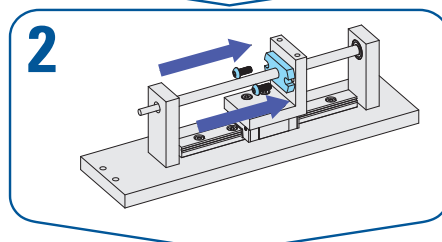
1. Mount Miniature Lead Screw

Install miniature lead screw onto end supports, ensuring good concentricity between machined surfaces on lead screw and support bearings.



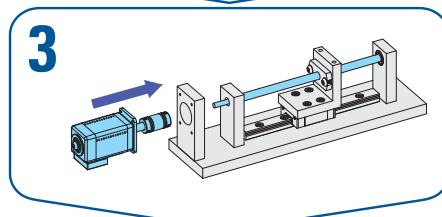
2. Mount Miniature Lead Nut

Install miniature lead nut onto guided carriage. Ensure that lead nut stays concentric to lead screw, and flange/thread mount faces remain perpendicular to lead screw when fastening down. Manually move carriage back and forth over the stroke of the lead screw to check for excessive resistance and confirm proper mounting.



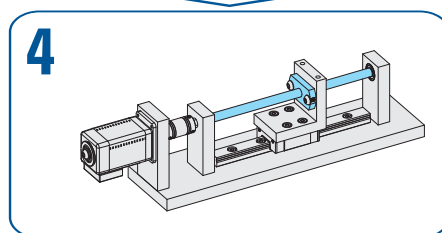
3. Install Motor or Drive Mechanism

Couple motor or other drive mechanism to lead screw. Ensure rotational axis is concentric to lead screw or coupler compensates for misalignment.



4. Complete Installation

Manually rotate screw and translate carriage throughout entire stroke length of screw to ensure everything is properly aligned and there are no areas with high amounts of resistance. Once confirmed, tighten down all fasteners to specification. Installation is complete.



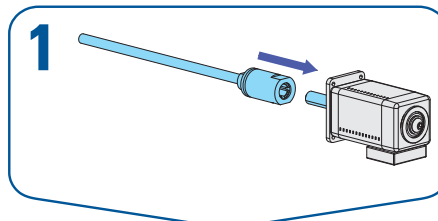
Integrated Coupler Installation

For customers requiring a quick, simple, and effective way of installing a miniature lead screw into their assembly, Thomson's new integrated coupler can be utilized. A basic installation guide and install specifications can be found in the following sections. For more detailed installation instructions, please contact Thomson.



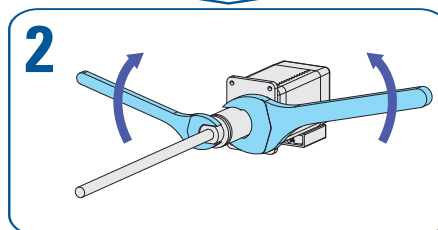
1. Mount Integrated Coupler

With lock nut loosened up, slide Integrated Coupler on to mating shaft. Ensure mating shaft is inserted in to integrated coupler to a depth of at least 2X the shaft diameter.

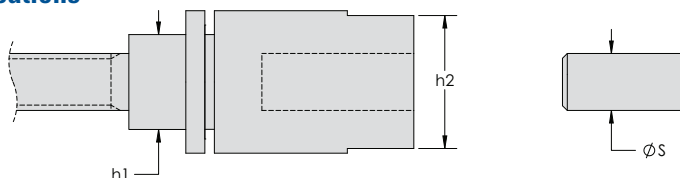


2. Tighten Lock Nut

With the two appropriate wrenches, tighten lock nut to appropriate torque specification as outlined in table below.



Installation Specifications



P/N Code	Bore Size [mm]	Lead Screw [mm]	Wrench Size [mm]		Mating Shaft Diameter [mm (in)]	Required Lock Nut Torque [N-m (in-lbf)]
			h1	h2	S	
C15	Ø1.5	2	4	5.5	1.500 / 1.490 (0.0591 / 0.0587)	4 (35)
		3	5	6		
		4	5.5	6.5		
C20	Ø2.0	2	4	6	2.000 / 1.990 (0.0787 / 0.0783)	4 (35)
		3	5			
		4	5.5			
C30	Ø3.0	2	4	7	3.000 / 2.990 (0.1181 / 0.1177)	4 (35)
		3	5			
		4	5.5			
C40	Ø4.0	2	4	8	4.000 / 3.988 (0.1575 / 0.157)	4 (35)
		3	5			
		4	5.5			
C50	Ø5.0	4	6	9	5.000 / 4.988 (0.1969 / 0.1964)	4 (35)

Lubrication



Overview

Thomson-branded Trigél 1200SC grease lubrication is ideal for applications requiring lower friction, higher efficiency, reduced noise or increased life. This high-quality lubricant was specially formulated to improve the overall performance of lead screw and nut assemblies as needed.

Specifications	
Part number	TRIGEL1200SC-1CC
Main components	Synthetic oil, PTFE
About	<ul style="list-style-type: none"> Increases lead nut efficiency and life Minimal friction change with increased temperature Lowers starting torque Compatible with reactive chemicals Compatible with clean room and high vacuum applications
Loaded material	Plastic nut on metal lead screw
Mechanical load	Light / Medium
Coefficient of friction	0.06 - 0.08
Max. temperature	250 °C (482 °F)
Vapor pressure	1 x 10 ⁻⁶ Pa
Relubrication frequency ⁽¹⁾	500,000 inches of travel or 3-4 months (whichever comes first)
Packaging ⁽²⁾	1 cc pipette

1. General guidance only. Re-lubrication intervals are highly dependent on application. Testing should be conducted to determine proper frequency. Screws may require lubrication frequently depending on both environmental and operating conditions. If the lubricant appears to be dispersed before this point or has become dry, the maintenance interval should be more frequent.

2. Other packaging sizes available - contact Thomson for more information.
Note: Other grease options available - contact Thomson for more information

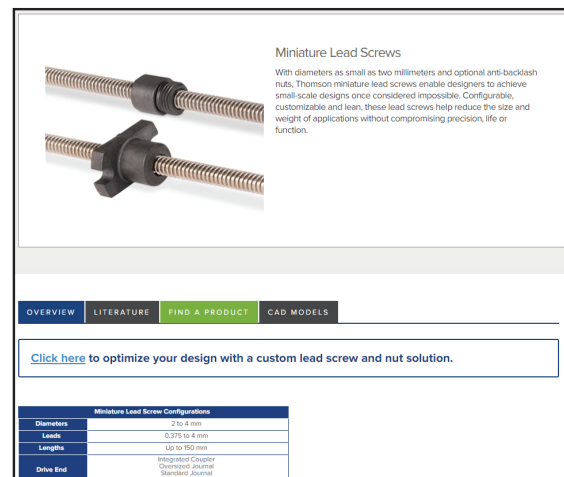
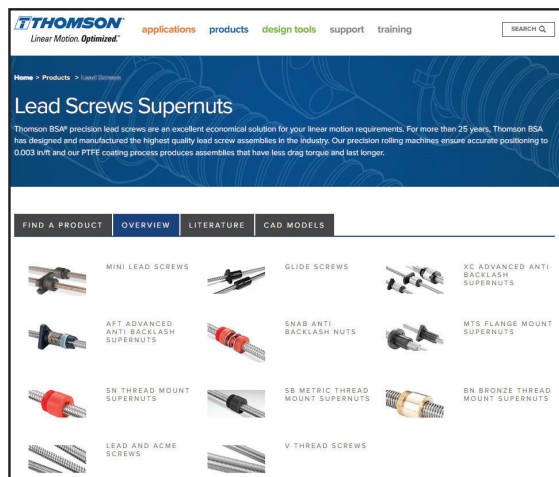
Online Resources

Thomson offers a wide variety of online application, selection and training tools to help you in the lead screw selection process. An experienced team of engineers is also available to help size and select a lead screw to best fit your application needs. To explore additional technical resources and options, contact customer support at www.thomsonlinear.com/cs.

Lead Screws on the Web

Find additional information and learn more about lead screws on this content-rich web page.

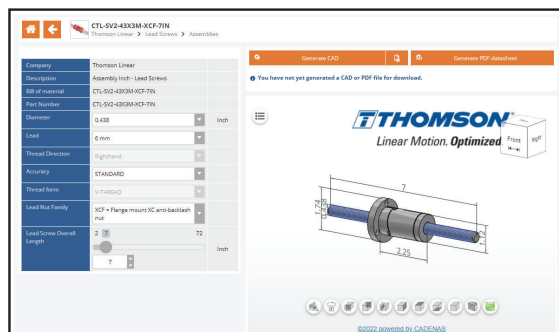
<https://www.thomsonlinear.com/en/products/lead-screws#overview>



Interactive 3D CAD Models

Download free interactive 3D CAD models in the most common CAD formats.

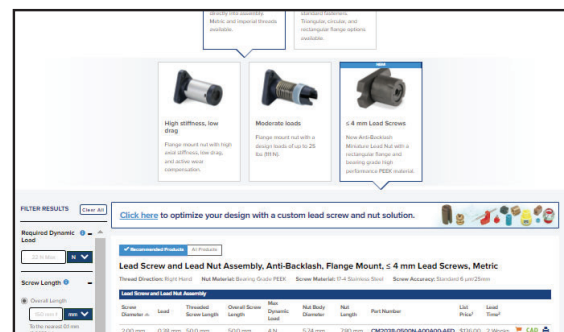
<https://www.thomsonlinear.com/en/products/lead-screws#drawings>



Selector Tool

This tool greatly simplifies the tasks of searching and selecting with a visual selection process that immediately narrows down your lead screw options.

<https://www.thomsonlinear.com/ls>



USA, CANADA and MEXICO

Thomson
203A West Rock Road
Radford, VA 24141, USA
Phone: 1-540-633-3549
Fax: 1-540-633-0294
E-mail: thomson@thomsonlinear.com
Literature: literature.thomsonlinear.com

EUROPE

United Kingdom

Thomson
Office 9, The Barns
Caddsdawn Business Park
Bideford, Devon, EX39 3BT
Phone: +44 1271 334 500
E-mail: sales.europe@thomsonlinear.com

Germany

Thomson
Nürtinger Straße 70
72649 Wolfschlugen
Phone: +49 7022 504 403
Fax: +49 7022 504 405
E-mail: sales.europe@thomsonlinear.com

France

Thomson
Phone: +33 243 50 03 30
E-mail: sales.europe@thomsonlinear.com

Italy

Thomson
Via per Cinisello 95/97
20834 Nova Milanese (MB)
Phone: +39 0362 366406
Fax: +39 0362 276790
E-mail: sales.italy@thomsonlinear.com

Sweden

Thomson
Estridsväg 10
29109 Kristianstad
Phone: +46 44 590 2400
Fax: +46 44 590 2585
E-mail: sales.europe@thomsonlinear.com

ASIA

Asia Pacific

Thomson
E-mail: sales.apac@thomsonlinear.com

China

Thomson
Rm 805, Scitech Tower
22 Jianguomen Wai Street
Beijing 100004
Phone: +86 400 606 1805
Fax: +86 10 6515 0263
E-mail: sales.china@thomsonlinear.com

India

Kollmorgen – Div. of Altra Industrial Motion
India Private Limited
Unit no. 304, Pride Gateway,
Opp. D-Mart,
Baner Road, Pune, 411045
Maharashtra
Phone: +91 20 67349500
E-mail: sales.india@kollmorgen.com

South Korea

Thomson
3033 ASEM Tower (Samsung-dong)
517 Yeongdong-daero
Gangnam-gu, Seoul, South Korea (06164)
Phone: + 82 2 6001 3223 & 3244
E-mail: sales.korea@thomsonlinear.com

SOUTH AMERICA

Brazil

Thomson
Av. João Paulo Ables, 2970
Jardim da Glória - Cotia SP - CEP: 06711-250
Phone: +55 11 4615 6300
E-mail: sales.brasil@thomsonlinear.com

www.thomsonlinear.com

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