Miniature Components and Systems

Superior Performance, Precision and Reliability – in Miniature Form

www.thomsonlinear.com

THOMSON®
A REGAL REXNORD BRAND

Miniature Machine Components Engineered to Work Together

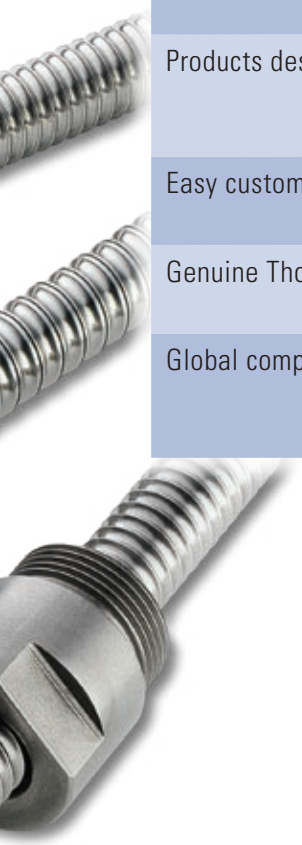
Thomson produces the widest selection of miniature linear motion components that are engineered to work side by side seamlessly. This cohesive approach equates to faster design times, less installation problems, and higher performance and reliability.

The Thomson family of miniature products provides linear thrust and guidance motion control in the smallest packages available. They all benefit from our vast experience in motion control engineering, and have all the advantages and features offered for standard-sized products.

Thomson also provides customized solutions. Whether you need alternative materials, nut geometry, configured bearings, special end machining or mounting features, we have the solution.

The Thomson Advantage

Smaller components enable designers to reduce the size and weight of their end product, resulting in products that are smaller, lighter and less expensive to produce. A smaller product will also reduce packaging and transportation cost, while lessening the overall environmental impact of the equipment. Choosing Thomson as your supplier carries additional advantages as well.

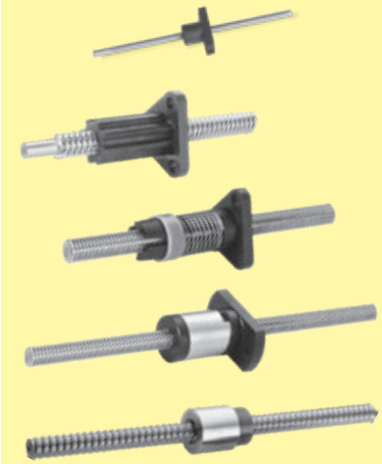
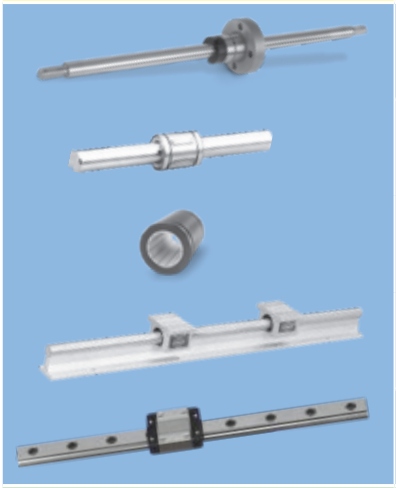
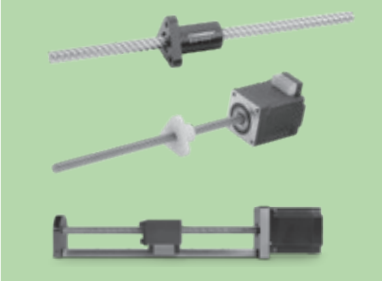


Thomson Advantages	
Advantage	**Benefits**
Widest variety of miniature linear products on the market	• Expedited design time • Single source of engineering support • Consolidated supply base
Products designed to work together	• Online sizing and selection tools for easy design • Fewer installation problems • Higher-performance equipment
Easy customization	• Custom sizes, finishes, materials and more • Optimized cost, size and performance
Genuine Thomson quality	• Fewer defects and field failures • Lower overall cost of ownership
Global company	• Sales and support around the globe • Safe partner with proven track record • Knowledge about local standards and preferences

Miniature Components and Systems Overview

Products providing thrust
Products providing guidance
Products providing both thrust and guidance

Linear Motion Miniature Products Overview*

Product Image	Product Group	Product Line Name (Product Suffix)	See Page	Basic Specifications	
	Lead Screws	Miniature Lead Screw	8	2 – 4 mm	
		Lead Screw and Flange Mount Supernut (MTS)	8	6 – 20 mm 3/16 – 3/4 in.	
		Lead Screw and Anti-Backlash Supernut (AFT)	8	10 mm 3/8 – 1/2 in.	
		Lead Screw and Anti-Backlash Supernut (XC)	8	6 – 24 mm 3/16 – 1 in.	
	Ball Screws	Miniature Metric - Flanged Miniature Metric - Threaded Miniature Metric - Cylindrical	9	8 – 12 mm	
	Ball Splines	Precision Ball Splines	10		
	Linear Bearings	60 Case® LinearRace® Shafting and Miniature Instrument Bearing (INST)	11	1/8 – 1/4 in.	
		60 Case LinearRace Shafting and Polymer Bushing Bearing (PL)	11		
		60 Case LinearRace Shafting and Super Ball Bushing Bearing (SP)	11	12 – 40 mm 1/2 – 1-1/2 in.	
	Profile Rail	Microguide™ (TSR)	12	5 – 15 mm	
	Glide Screws	Glide Screw™ (GS)	13	4 – 10 mm 3/16 – 3/8 in.	
	Stepper Motor Linear Actuators	Motorized Lead Screws (MLS) Motorized Lead Nuts (MLN)	14		
	Compact Linear Systems	Narrow/Vertical Configuration (CLSV) Wide/Horizontal Configuration (CLSH) Round Rail Configuration (CLSR)	15		

★ Good
★ ★ Better
★ ★ ★ Best

* These are a small selection from our standard product ranges. More product ranges are available, and most products also come in additional sizes and versions. Thomson specializes in making customized products to meet your exact specifications. See page 17 for more information.

	Unit of Measure		Anti-backlash or Preload Feature	No or Low Maintenance Required	Noise Level	Product Cost Level	Stiffness Properties	Accuracy Properties	Corrosion Resistance Properties	Thrust Capacity Level	Guidance Capacity Level
	Metric	Inch									
	•		•	•	★ ★ ★	★ ★ ★	★	★	★ ★ ★	★	
	•	•		•	★ ★ ★	★ ★ ★	★	★	★ ★ ★	★ ★	–
	•	•	•	•	★ ★ ★	★ ★	★	★ ★	★ ★ ★	★	–
	•	•	•	•	★ ★ ★	★ ★	★	★ ★	★ ★ ★	★ ★	–
	•		•		★	★ ★	★	★ ★ ★	★	★ ★ ★	–
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	•	•	•		★ ★	★ ★ ★	★	★ ★	★ ★	–	★ ★
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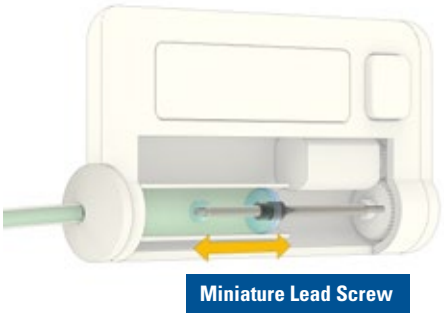
	•	•	•	•	★ ★	★ ★	★	★	★ ★	★ ★	–
	•		•	•	★ ★	★ ★	★	★ ★	★	★ ★	★ ★

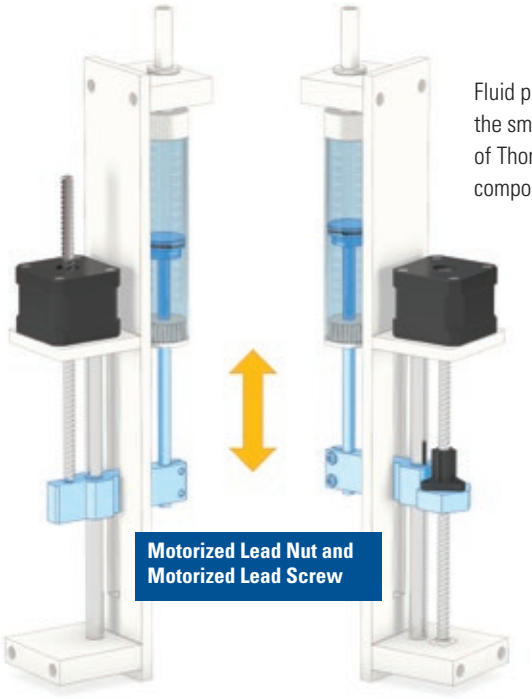
Applications

Miniature linear motion components are ideal for applications where precise movement of small loads is critical. In particular, they add value in instruments for medical diagnostics, test and measurement equipment, and engraving and printing, as well as a broad range of fluid pumping and pick-and-place applications.

Fluid Pumping

- Medical infusion pumps
- Industrial fluid pumps
- Lubrication pumps
- Syringe pumps

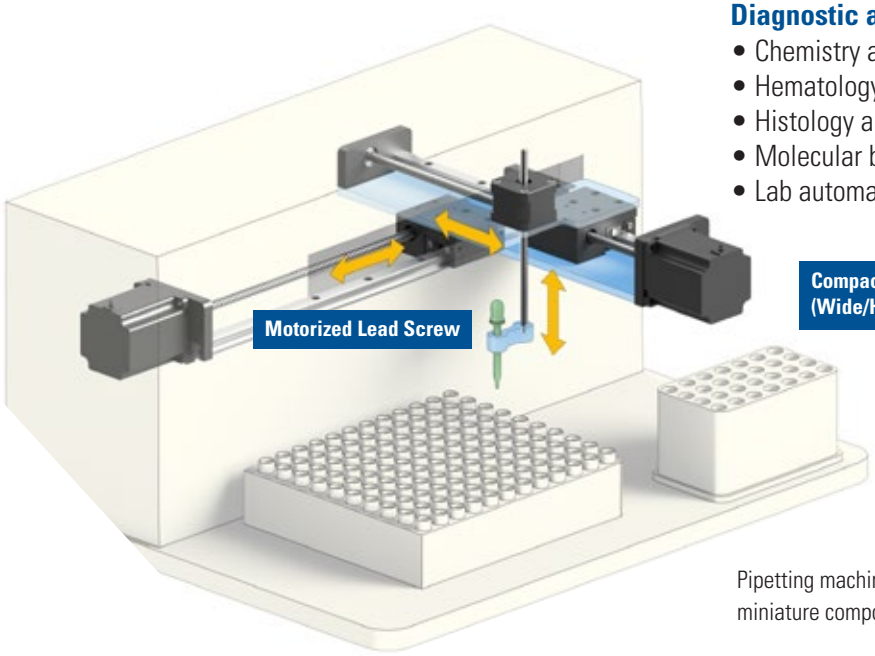




Fluid pumps benefit from the smooth, precise motion of Thomson miniature components.

Diagnostic and Life Science Instruments

- Chemistry analyzers
- Hematology instruments
- Histology and microscopy instruments
- Molecular biology instruments
- Lab automation



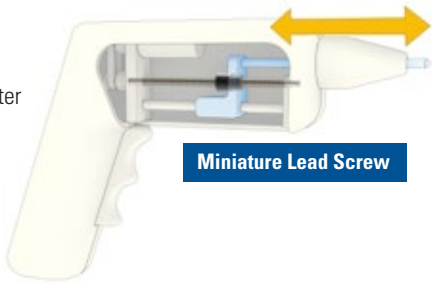
Pipetting machines can rely on Thomson miniature components for every axis of motion.

Applications

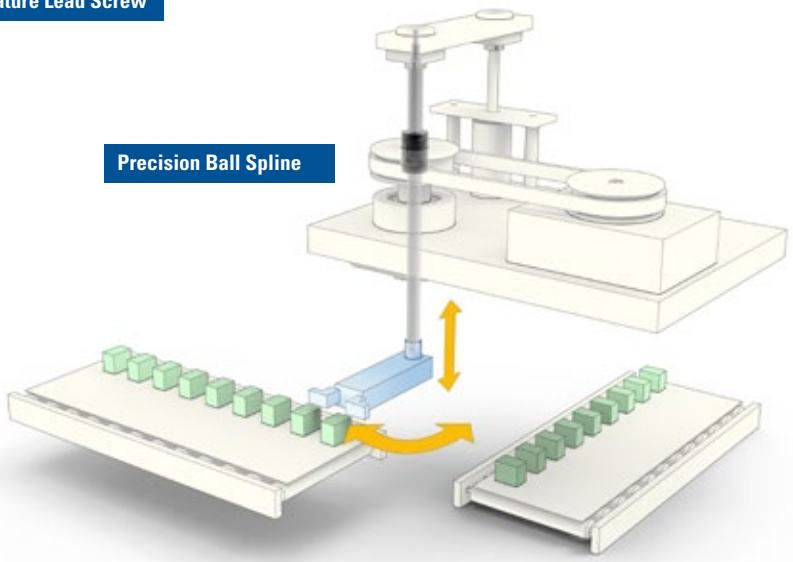
Test and Measurement Equipment

- Torque testers
- Load and pull testers
- Handheld devices

Design iterations for testing and measurement devices allow for easier use, better quality and faster results. One example is a smaller footprint found in the handheld ear scanning device shown here. Smaller devices like this can benefit from Thomson miniature lead screws in their design application.

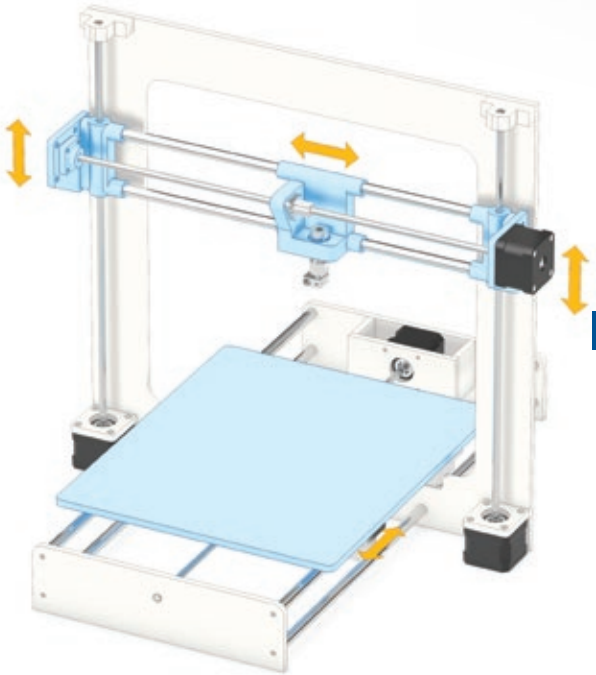


Thomson precision ball splines simplify XYZ movement into linear and rotary motion, thereby reducing the number of parts and complexity required for picking up an item and placing it in another location. Fewer components and simpler designs result in lower costs, higher efficiencies, less maintenance and quicker lead times.



Robotics and Pick & Place Equipment

- Engraving, scanning and printing machines
- Electronics manufacturing equipment
- Medical surgery manipulators/robots
- Manipulators for use in hazardous areas
- Camera inspection equipment



Thomson provides custom sizes, finishes and materials for engraving/printing machines to deliver an optimized solution. In this example, utilizing a stepper motor linear actuator on a 3D printer eliminates the need for couplings, bearings and supports while increasing stroke length and print volume.

Other Applications

- Portable installations (e.g. bedside scanner)
- Portable ventilators
- Dosage equipment
- Electronics manufacturing equipment
- Inspection, scanning and printing equipment
- Packaging and dispensing equipment
- Aerospace and defense applications
- Vending machines

Lead Screws

Lead Screws and Supernuts (MTS, AFT and XC)
Miniature Lead Screws and Nuts

Main Features

Lead Screws
- Lead accuracy up to 0.003 in./ft. (75 µm/300 mm)
- Highly customizable solutions for OEM applications
- Precision screw machining
- Optional materials and coatings available

Supernut MTS
- Excellent lubricity and dimensional stability
- Cost-effective manufacturing, including integral flange

Supernut AFT
- Designed for light-load applications
- Offers smooth movement and low drag torque
- Anti-backlash adjusts for wear for the life of the nut

Supernut XC
- Utilizes Thomson patented ActiveCAM technology
- Offers low drag torque and high axial stiffness
- Anti-backlash ensures consistent performance and repeatability

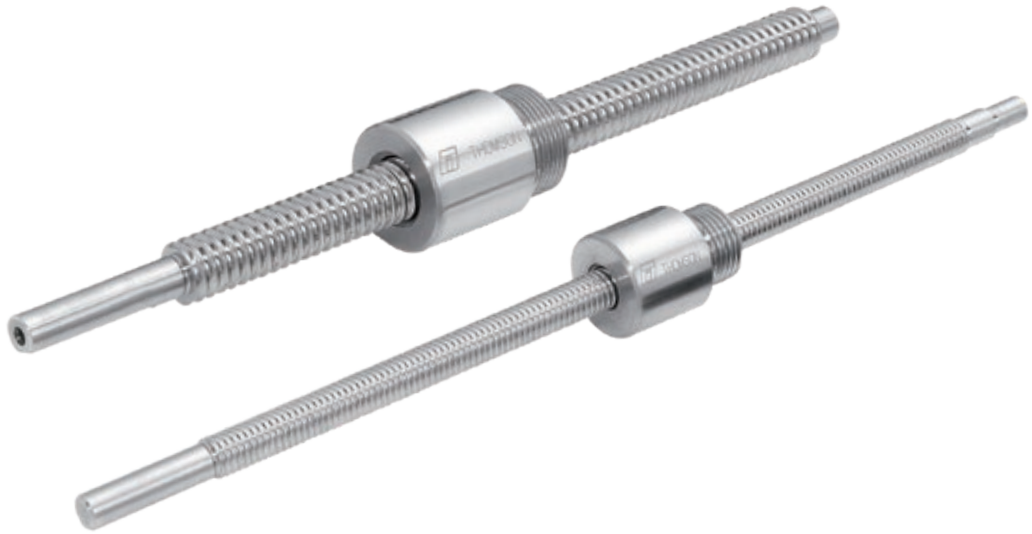
Miniature Lead Screws
- Diameters as small as 2 mm
- Optional anti-backlash design
- Customizable end machining, special coatings, unique nut design and end configurations
- Patent-pending integrated coupler for easy mounting

Performance Specifications

Product Line		Supernut			Lead Screws
Model		MTS	AFT	XC	Miniature
Screw diameter range metric version inch version	 [mm] [in.]	 6 – 20 3/16 – 3/4	 10 3/8 – 1/2	 6 – 24 3/16 – 1	 2 – 4
Lead range metric version inch version	 [mm] [in.]	 1 – 50 0.031 – 2.000	 2 – 20 0.050 – 1.200	 1 – 50 0.050 – 2.000	 0.375 – 8
Backlash	[mm]	< 0.254	0	0	0.064 max / 0.0 min
Axial design load, maximum	[N]	1225	110	1560	44
Accuracy, standard rolled (precision rolled)	Supernut: [µm/300 mm] Lead Screws: [mm/mm]	250 (75)			0.0005
Maintenance		Designed to minimize preventative maintenance			

Ball Screws

Miniature Metric Ball Screws (Rolled/Ground)



Main Features

- Design maximizes load capacity
- Quiet and smooth performance
- Flexible ball nut mounting configurations and rapid prototyping
- Exceeds 100% more capacity than competition in most sizes
- Higher load capacity equates to longer life
- Precision ball screws to P5 accuracy class

Performance Specifications

Product Line		Miniature, metric, rolled/ground				
Screw diameter, nominal	[mm]	8	8	10	10	12
Lead	[mm]	2,5	5	2	3	2
Nut size (diameter × length)	[mm]	ø 16 x 18	ø 16 x 23	ø 19 × 24	ø 19 × 29	ø 24 × 34
Dynamic load capacity (1)*	[kN]	2.1	2.5	3.7	5.2	5.9
Static load capacity*	[kN]	2.2	2.8	4.6	6.9	8.9
Ball diameter	[mm]	1.588	1.588	1.588	1.588	1.588
Length of screw, maximum	[mm]	280	280	3000	3000	3000
Axial backlash, maximum	[mm]	0.05	0.05	0.05	0.05	0.05
Material		Carbon Steel - AISI 1566		Carbon Steel - CF53		
Maintenance		High load density ensures maximum life				

(1) Based on one million revolutions.
* Load rating calculations comply with ISO 3408-5.

Ball Splines

Precision Ball Splines

Main Features

- Nearly friction-free linear and rotary motion integrated on a single shaft
- Wide, precision-ground grooves allow for increased load-carrying capabilities
- Improved rigidity and stiffness for handling larger moment loads
- Groove design similar to Gothic arches allows for zero angular clearance and backlash
- A 40° angular contact allows grooves to operate with minimal friction, while achieving optimal sensitivity
- Simple, ball-retaining design allows for mess-free removal of the spline nut

Performance Specifications

Product Line		Precision Ball Splines		
Spline diameter, nominal*	[mm]	6	8	10
Overall length	[mm]	500		3000
Accuracy		Normal		
Precision	[µm]	136		
Mounting		Flanged, Round		
Shaft type		Solid		
Spline material		S55C/SUJ2		
Nut material		SCM415H		
Number of grooves		2		

* Larger diameter sizes are available.

Linear Bearings

60 Case® LinearRace® Shafting and Linear Ball Bushing® Bearings (INST, SP and PL)

Main Features

60 Case LinearRace Shafting
- Manufactured to the highest quality standards
- Different materials, surface treatments and special machining available

Miniature Instrument Bearing (INST)
- High accuracy and responsiveness
- For smaller loads

Super Ball Bushing Bearing (SP)
- Low cost, easy to install and long life
- Industry standard for self-aligning linear bearings

Polymer Bushing Bearing (PL)
- Maintenance-free operation
- Polymer liners reduce noise
- Dirt and dust resistant
- Anodized aluminum adapter

Performance Specifications

Product Line		Miniature Instrument (INST)	Super Bushing Bearing (SP)		Polymer Bushing Bearing (PL)
Unit of measure version		Inch	Metric	Inch	Metric
Shafting size range metric version inch version	 [mm] [in.]	 - 1/8 – 1/4	 12 – 40 -	 - 1/2 – 1-1/2	 6 – 50 (closed) -
Dynamic bearing load, maximum metric version inch version	 [N] [lbf]	 84	 14700 -	 - 3000	 9000 -
Linear speed, maximum	[m/s]	3			8
Friction coefficient		0.001 - 0.004			
Bearing material (standard configuration)		440 stainless steel	Carbon steel and delrin		Anodized aluminum
Maintenance		Light lubrication			

Profile Rail Guides

Microguide™ (TSR)

Main Features

- Low profile
- Available in standard and wide profile styles
- Available in H and P accuracy classes
- Quiet and smooth operation
- Low weight
- Industry standard, drop-in replacement
- High moment load capacity
- Two-track, gothic-arch ball groove geometry enables single rail application

Performance Specifications

Product Line		Microguide								
Model		TSR5Z	TSR7Z	TSR7ZW	TSR9Z	TSR9ZW	TSR12Z	TSR12ZW	TSR15Z	TSR15ZW
Size of carriage and rail (W × H)	[mm]	6 × 12	8 × 17	9 × 25	10 × 20	12 × 30	13 × 27	14 × 40	16 × 32	16 × 60
Rail length, minimum/maximum	[mm]	40/160	40/1000	50/1010	55/1015	50/1010	70/1020	70/1030	150/1030	110/1030
Dynamic load, maximum	[N]	336	924	1370	1544	2450	2780	4020	4410	6660
Linear speed, maximum	[m/s]	3								
Acceleration, maximum	[m/s^2]	50								
Accuracy	[± mm]	up to 0.01								
Material	[kg/m]	440 stainless steel								
Maintenance		Light lubrication								

Glide Screws

Glide Screw™ (GS)

Main Features

- Lead screw and linear bearing combined
- Patented design
- Aligned from factory
- Side load and moment load capable
- Integrated lubrication block - no maintenance requried
- Smooth and quiet motion
- Cylindrical or flanged nuts available
- Versions for high temperature, clean room and food grade applications available

Performance Specifications

Product Line		Glide Screw					
Model		GS4	GS6	GS10	GS18	GS25	GS37
Screw diameter							
metric version	[mm]	4	6	10	-	-	-
inch version	[in.]	-	-	-	0.188	0.250	0.375
Screw lead							
metric version	[mm]	1, 4, 8	1, 6, 12	2, 6, 12	-	-	-
inch version	[in.]	-	-	-	0.05, 0.125	0.05, 0.5, 0.75	0.063, 0.5, 1
Screw length, maximum							
metric version	[mm]	150	250	450	-	-	-
inch version	[in.]	-	-	-	6	10	18
Axial load, maximum							
metric version	[N]	89.0	133.4	311.4	-	-	-
inch version	[lbs]	-	-	-	30	45	70
Moment load, maximum							
metric version	[Nm]	2.3	5.4	15.5	-	-	-
inch version	[in-lbs]	-	-	-	20.5	47.5	137.5
Maintenance		Maintenance free					

Stepper Motor Linear Actuators

Motorized Lead Screw (MLS) and Motorized Lead Nut (MLN)

Main Features

- Increased torque density by up to 30% while maintaining the same motor footprint
- Improved efficiency with reduced power consumption, better battery life and decreased motor footprint
- Rotating screw or nut
- Custom sizes/leads available
- Taper-Lock design provides a secure, self-aligning connection between the lead screw and stepper motor
- Reduced noise
- Inch or metric versions

Performance Specifications

Lead Screw						
Material		300 Series Stainless Steel				
Standard lead accuracy	[in./ft. (µm/300 mm)]	0.010 (250)				
Precision lead accuracy	[in./ft. (µm/300 mm)]	0.003 (75)				
Lead Nut						
Standard material		Internally lubricated acetal (POM)				
Typical linear travel life	[in. (km)]	5×10^6 (125)				
Motor						
Frame size		NEMA 8	NEMA 11	NEMA 14	NEMA 17	NEMA 23
Step size	[°]	1.8				
Max. axial load	[lbs. (N)]	5 (22)	20 (89)	50 (222)	75 (334)	200 (890)
Axial pre-load	[lbs. (N)]	5 (22)	20 (89)	30 (133)	40 (178)	40 (178)

Compact Linear Systems

Narrow (CLSV), Wide (CLSH), Round Rail (CLSR)

Main Features

- Choose from three standard architectures or build a “from scratch” system
- Mounting blocks can be machined to virtually any shape or size
- Virtual design consultations are like having a linear motion expert by your side as you build your solution
- Systems can be produced and delivered quickly due to back-end modularity processes being automated
- A 3D model of your system is made available to you in real time or typically within one business day

Performance Specifications

Lead Screw				
Material		300 Series Stainless Steel		
Standard lead accuracy	[in./ft. (µm/300 mm)]	0.010 (250)		
Precision lead accuracy	[in./ft. (µm/300 mm)]	0.003 (75)		
Lead Nut				
Standard material		Internally lubricated acetal (POM)		
Typical linear travel life	[in. (km)]	10×10^6 (250)		
Motor				
Frame Size		NEMA 14	NEMA 17	NEMA 23
Step size	[°]	1.8		
Axial pre-load	[lbs. (N)]	30 (133)	40 (178)	40 (178)
Assembly				
Max. backlash with standard nut	[in. (mm)]	0.010 (0.25)		

Customization

Applications often have unique challenges that cannot always be solved by an off-the-shelf solution. Thomson specializes in providing custom-engineered solutions quickly and cost effectively to address these requirements.

Examples of custom stepper motor linear actuators

Thomson has proven that custom designs can offer optimum performance at a low overall cost. 3D CAD design, rapid prototyping and flexible manufacturing have made customization a faster process. Once the product is ready and approved, it will be manufactured and shipped as quickly as a standard product.

Selection of Customization Possibilities	
Type of customization	Examples
Custom materials	• Stainless steel bearings or an aluminium/plastic housing • Nuts or bushings made in a special metal, plastic, composite or ceramic material • Replacement of hardware to meet demands in special environments
Custom surface treatment	• Paint of different quality and/or color • Thicker anodization on aluminum parts • Specially coated screws or sliding surfaces (PTFE, chrome, black oxide, etc.)
Custom size or geometry	• Non-standard stroke lengths • Custom end machining or motor/mounting interfaces • Special nut, carriage or flange designs
Custom assemblies	• Product shipped with mounting brackets, gearboxes and/or motors mounted • Product shipped in parts or sub-assemblies for the customer to assemble • Product shipped mounted to the customer's equipment
Custom services	• Special lubrication • Special stocking or transportation program • Training of engineers, maintenance or other personnel • Special service, repair and/or maintenance program • Special packaging, testing, certification or quality control procedures • Engineering evaluation
New designs	• Change or combine one or several products into a new product • Clean sheet designs

Online Resources

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

Linear Components on the Web

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These tools greatly simplify the tasks of searching and selecting with a visual selection process that immediately narrows down your component options. www.thomsonlinear.com/en/design-tools/thomson-selectors

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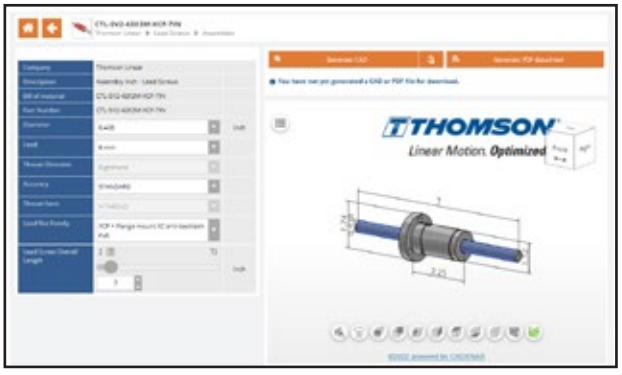

Notes

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