Lead Screws, Ball Screws and Ball Splines

THOMSON™

Linear Motion. **Optimized.**

A DANAHER MOTION COMPANY

THOMSON™

Linear Motion. **Optimized.**

Thomson
Linear Motion. *Optimized.*

Often the ideal motion control solution for machine builders is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the *optimal balance of performance, life and cost*. Thomson is best positioned to help you most quickly configure the optimal solution for your application.

- **Thomson invented anti-friction linear technology. We own the broadest standard product offering of mechanical motion control technologies in the industry.**
- **Modified versions of standard product are routine. White sheet design solutions are available across our entire product portfolio.**
- **Choose Thomson and gain access to over 70 years of global application experience in diverse industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.**
- **As part of Danaher Motion, we are unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.**

Thomson is the name you can trust for quality, innovation, on-time delivery, controlled costs, and reduced risk.

In addition to the information contained in this document, a wealth of product and application information is available online at www.thomsonlinear.com. Also online are downloadable 3D models, software tools, our distributor locator and global contact information for Thomson. For immediate assistance in North America contact us at 1-540-633-3549 or email us at Thomson@danahermotion.com.

Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

The Danaher Business System
Building sustainable competitive advantage into your business

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe

A World Class Heritage Serves as Our Foundation

The very best of the Thomson, Warner, BSA and Neff ball and lead screw lines are now combined to form the most complete product offering in the industry

Thomson has a long history of manufacturing quality lead screws and ball screws. Our roots are planted in four separate companies that held strong and definitive footholds in the market. Those companies — **Ball Screws & Actuators Co, Warner Linear, Thomson Industries, and Neff Automation** — now form the nucleus of the Thomson ball screw and lead screw business.

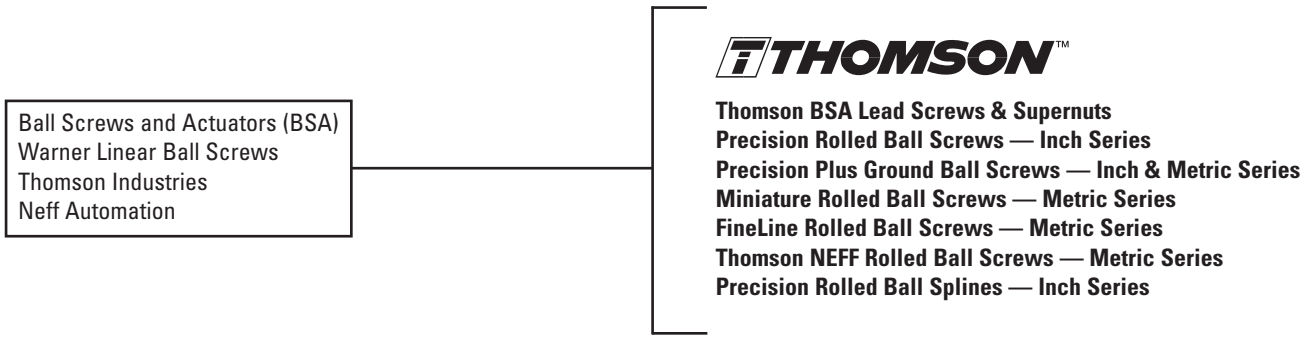
Founded in 1971, the **Ball Screws & Actuators Co. (BSA)** was a pioneer and leader in precision plastic nut, lead screw and ball screw technologies for linear motion applications. Their custom and off-the-shelf solutions featured many patented products, including their ActiveCAM technology for eliminating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

Tollo Linear was founded in 1982 and manufactured linear actuators, linear drive units and handling components under a variety of trademarked product names. Its products were sold to direct customers, OEM manufacturers, and system houses throughout the world. In 1989, Tollo Linear was purchased by Warner Electric and the new division became known as **Warner Linear**. After substantial growth in the industry, Warner Linear, including its superior ball screw product line, was acquired by Danaher Motion in 2000.

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

Neff Automation was founded in 1905 and has since been a leading manufacturer of industrial products for linear motion applications. In the past four decades Neff has become a market leader in high precision rolled ball screws, providing solutions for customers all across the globe. In 2004 Neff Automation joined Danaher Motion, bringing high quality products, manufacturing expertise, and deep application knowledge to the ball and lead screw team.

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



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Product Overview

THOMSON BSA PRECISION LEAD SCREWS AND SUPERNUTS®

Offering smooth, precise, cost effective positioning, this is the "just right" solution for your application.

Thomson BSA precision lead screws are an excellent economical solution for your linear motion requirements. For more than 30 years, Thomson BSA has designed and manufactured the highest quality lead screw assemblies in the industry. Our precision rolling machines ensure accurate positioning to 0.003 in/ft and our PTFE coating process produces assemblies that have less drag torque and last longer. All of our standard plastic nut assemblies use an internally lubricated Acetal — providing excellent lubricity and wear resistance with or without additional lubrication. With the introduction of our new unique patent pending zero backlash designs, Thomson BSA provides assemblies with high axial stiffness, zero backlash and the absolute minimum drag torque to reduce motor requirements. These designs produce products that cost less, perform better and last longer. Both designs automatically adjust for wear insuring zero backlash for the life of the nut. For significantly higher loads, standard bronze nuts are available.

THOMSON BALL SCREWS — INCH SERIES

The most comprehensive imperial-based ball screw product offering in the industry.

Thomson is the market leader in inch-dimensioned ball screws, featuring the very best of the ball screw product offerings of BSA, Warner Linear, and Thomson Industries, integrated into a single, comprehensive product offering. Our ***Precision Rolled Ball Screws*** come in a full range of diameters, leads, and ball nut configurations, in either preloaded or non-preloaded types, all in industry-standard envelopes. They provide dependable accuracy and repeatability at an economical price. Thomson also offers inch-based ***Precision Plus Ground Ball Screws***, which provide higher-level precision for immediate improvement in machine performance. All Thomson ball screws feature a Gothic arch ball groove geometry that extends service life, reduces lash, and optimizes stiffness in preloaded assemblies. This unique design feature also eliminates skidding, increases positioning accuracy, and maximizes travel life.

THOMSON BALL SCREWS — METRIC SERIES

Superior performance for today's most stringent positioning requirements.

Thomson offers a full range of internal return metric ball screw products, featuring four distinct product families. ***Miniature Rolled Ball Screw Assemblies*** are an efficient, cost-effective solution in a small envelope. Ball screw assemblies range from 4mm to 14mm in diameter, with standard lead accuracies of 52 microns/300mm. ***FineLine Rolled Ball Screw Assemblies*** are designed and manufactured to provide high level performance at an affordable price. Ball screws are manufactured using Thomson's patented, German-engineered Precision Screw Forming (PSF) Technology, which provides high accuracy (23 microns/300mm standard) with the manufacturing efficiency of rolled processes. ***NEFF Rolled Ball Screw Assemblies*** are available in a wide range of diameters, leads and nut styles — all designed to provide quiet, smooth running, efficient performance. Ball nuts include one of three unique ball return systems providing perfect guidance, low wear, and smooth running performance. ***Precision Plus Ground Ball Screw Assemblies*** are our highest precision product, with standard lead accuracies of 12 microns/300mm. These ball screw assemblies feature our FL-style ball nut, designed to provide high repeatability and high stiffness for the most demanding ball screw applications.

THOMSON PRECISION BALL SPLINES

High reliability, speed, and versatility for tough applications with torque loads.

Thomson precision ball splines provide high speed, anti-friction linear motion under high torsional loads. They have high reliability under varying operating conditions and predictable life expectancy. They resist radial displacement resulting from torque loads, and require smaller forces to achieve axial displacement of the spline member while transmitting torque. Ball splines have application versatility such as helicopter rotor couplings; translating drive shaft couplings, non-swiveling telescoping struts; honing machine and drill press spindles, workhead and table ways, and remote and robot handling machines.

Date: _____ / _____ / _____

Request for Quote

Use this form if you have already selected a product. We will respond within four hours.

1. Information

Name		**Title/Dept.**	
Company Name			
Address			
Phone		**Fax**	
Email			

Note: If this product or assembly has been quoted or ordered before, please provide the quote number or order number.			
Quote No.		**Order No.**	

2. Screw and Nut Part Numbers

Qty.		**Lead Error**	0.004"/ft ☐	0.005"/ft ☐	50µ/300mm ☐	23µ/300mm ☐	12µ/300mm ☐
Diameter		**Lead**					
Screw P/N		**Overall Length***					
Ball Nut P/N		**Flange P/N**		**Wiper P/N**			

3. Bearing Supports

Right End	☐ None	☐ Floating	☐ Quick Mount
Left End	☐ None	☐ Floating	☐ Quick Mount

4. End Machining*

Right End	☐ BK	☐ BF	☐ FK	☐ FF	☐ QK	☐ QF	☐ Cut to Length Only
	☐ BK1	☐ BF1	☐ FK1	☐ FF1	☐ QK1	☐ QF1	☐ Annealed _____ (specify length annealed)

Left End	☐ BK	☐ BF	☐ FK	☐ FF	☐ QK	☐ QF	☐ Cut to Length Only
	☐ BK1	☐ BF1	☐ FK1	☐ FF1	☐ QK1	☐ QF1	☐ Annealed _____ (specify length annealed)

5. Configuration*

☐ Ball Nut (V-Thread/Flange) Facing Left End	☐ Ball Nut (V-Thread/Flange) Facing Right End	☐ Modified Flange (Attach Print)

* Customer print will take precedence if provided.

Need a quote or have a question about an application?
Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Date: _____ / _____ / _____

Application Data Sheet

Use this form if you need assistance selecting a product. We will respond within four hours.

1. Information

Name		**Title/Dept.**	
Company Name			
Address			
Phone		**Fax**	
Email			

2. Application Requirements

What is your LOAD?		☐ lbs	☐ kg
		☐ N	☐ Other (please specify)

What is your MOTION?		☐ Vertical	☐ Horizontal
		☐ Other (please specify)	

What is your length of STROKE?		☐ inch	☐ foot
		☐ mm	☐ Other (please specify)

What is your required TRAVEL LIFE?		☐ inch	☐ foot
		☐ mm	☐ Other (please specify)

What is your SPEED?		☐ inch	PER	☐ minute
		☐ mm		☐ second
		☐ foot		☐ Other (please specify)

Accuracy Requirements	0.004"/ft ☐	0.005"/ft ☐	52µ/300mm ☐	23µ/300mm ☐	12µ/300mm ☐	Other (please specify)

Backlash Requirements	0.000" ☐	0.002" ☐	0.010" ☐	0.05mm ☐	0.2mm ☐	Other (please specify)

Bearing Supports?	☐ Fixed/Fixed	☐ Fixed/Free	☐ Fixed/Simple
	☐ Other (please specify)		

Motor Cube Required?	☐ NEMA 17	☐ NEMA 23	☐ Other (please specify)
	☐ NEMA 42	☐ NEMA 34	

Quantity Required?		☐ per Week	☐ per Month
		☐ per Year	☐ Other (please specify)

Additional Information/Comments

Technology Comparison

Thomson Ball Screws and Lead Screws Are Your Best Choice for Linear Actuation

Thomson ball screws outperform other actuation methods.

Compared to bulky, noisy, and expensive hydraulic or pneumatic actuator systems, Thomson ball screws and lead screws are compact, quiet, and very affordable. In addition, there's no need for pumps, hoses, fluids, or shop air. This eliminates fire, safety, and health hazards due to leaking fluid or other contaminants typically associated with these types of actuation methods.

Belt, cable, and chain-drive mechanisms are relatively inexpensive. However, they aren't as precise, repeatable, or as safe to use as ball screws and lead screws. Their failure mode is either excessive wear or stretching, resulting in positioning inaccuracies during operation. These types of systems also have low load capacities.

Rack and pinion gear systems can be made to close tolerances, but lose precision as they wear and don't function as smoothly as ball screws, even when new. Because the force is supported by a few pinion teeth at any given time, the system also is limited in terms of load capacity.

Offset cam rollers rely on the tractive force between the rollers and the shaft to create linear motion, and therefore can handle only moderate loads. The higher the load, the more likely it is that the system will slip, reducing repeatability.

In summary, when compared to other types of mechanical actuation methods, Thomson ball screws and lead screws provide the most cost-effective combination of speed, accuracy, efficiency, repeatability, quiet operation, lubrication retention, load capacity, and compactness.

Thomson precision ball screw and lead screw assemblies are the first choice in precise, reliable, cost-effective linear actuation.

Thomson lead screws excel in applications which require the "just right" solution. They are easily customized to provide compact, quiet and accurate positioning in light to medium load applications. Materials are inert as a standard and allow use in applications ranging from clean room to marine. Best of all, the value is high as you don't pay for processes and features not required in your application.

Let Thomson engineer your positioning screw today.

Ball and Lead Screw vs. Other Actuation Methods

	Thomson Lead Screws	Thomson Ball Screws	Fluid Power	Belt, Cable, and Chain-Drive Mechanisms	Rack & Pinion	Offset Cam Rollers	Pneumatic Cylinders
Inexpensive	●	●	○	●		●	
Low Power Consumption		●		●	●	●	
Low Maintenance	●	●		○	○	○	●
High Accuracy		●					
High Repeatability	○	●					
High Efficiency		●			○	○	
High Load Capacity		●	●				○
Compact Size	●	●			●		○
Speed	●	●		●	●		●
Low Noise	●	○		○		○	
Design Flexibility	●	●			○		
Contamination Tolerance	●	○	●				

● = always
○ = in most cases

Technology Comparison

Design Considerations for Choosing Screw Type

	Thomson Lead Screw	Thomson Ball Screw
Load	Typically light (<100 lbs.)	Usually heavy (>100 lbs.)
Cost	Low cost $$	Higher cost $$$
Anti-backlash	Available — but has low stiffness	Available
Self-locking	Yes — but depends on lead and lubrication	Fail safe brake locking option
Efficiency	Generally ranges from 30% to 70%	Generally ranges from 85% to 95%
Duty Cycle	Limited to plastic heat transfer properties	Unlimited
Corrosion Resistance	Available in stainless steel as a standard	Wide range of available sizes in stainless steel, as well as coating and plating options
Lubrication	Can operate with or without lubrication depending on application	Must have lubrication Wide range of lubricants
Operating Temperature	Limited to expansion differences between the screw and the nut	Wide temperature range
Travel Speed	Available in wide range of leads	Typically mid-range leads
Vibration and Noise	Typically quiet, high leads are best	Ball re-circulation
Custom Availability	Great flexibility in customizing materials and geometry	Great flexibility in customizing materials and geometry — limited by ball path envelope
Catalog Page	9	37

NOTES:

Lead Screws

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Need a quote or have a question about an application? Contact us in North America at:

Phone: 800-882-8857
Email: thomsonbsa@danahermotion.com
Web: www.thomsonbsa.com

Lead Screws Product Overview

Offering smooth, precise, cost effective positioning, this is the “just right” solution for your application.

Thomson BSA precision lead screws are an excellent economical solution for your linear motion requirements. For more than 25 years, Thomson BSA has designed and manufactured the highest quality lead screw assemblies in the industry. Our precision rolling machines ensure accurate positioning to 0.003 in/ft and our PTFE coating process produces assemblies that have less drag torque and last longer.

Thomson BSA provides a large array of standard plastic nut assemblies in anti-backlash or standard Supernut® designs. All of our standard plastic nut assemblies use an internally lubricated Acetal — providing excellent lubricity and wear resistance with or without additional lubrication. With the introduction of our new unique patent pending zero backlash designs, Thomson BSA provides assemblies with high axial stiffness, zero backlash and the absolute minimum drag torque to reduce motor requirements. These designs produce products that cost less, perform better and last longer. Both designs automatically adjust for wear, insuring zero backlash for the life of the nut.

For significantly higher loads, standard bronze nuts are available. Thomson BSA uses SAE 660 bearing bronze, which provides high load capacity with good PV performance. We also offer end machining to your specification or can provide you with stock bearing mounts or motor mounts. Available from over 1800 distributors worldwide.

Thomson BSA also provides engineering design services to aid in your design requirements, producing a lead screw assembly to your specifications. Call the factory today to discuss your application with one of our experienced application engineers, 800-882-8857.

Lead Screws Product Overview

Lead Screw Product Summary

Series	Thomson BSA Precision Lead Screw	
	Inch	Metric
Lead accuracy	.010"/ft. for standard .003"/ft. for precision	250 micron/300mm for standard 75 micron/300mm for precision
Dia. x Lead	3/16" x .05" to 3" x 1/4"	10 x 2mm to 24 x 5mm
Backlash	zero to .010"	zero to .25mm
Dynamic Load	Up to 400 lbs	Up to 750N
Max. Static Load	Up to 115,000 lbs	Up to 500 kN
Catalog Pages	12 - 35	12 - 35

Lead Screw Product Availability

	Inch	Lead (in.)													
		0.050	0.063	0.083	0.100	0.125	0.167	0.200	0.250	0.375	0.500	0.800	1.000	1.200	2.000
Dia. (in.)	3/16	●													
	1/4	●	●						●		●				
	5/16			●			●		●		●				
	3/8		●	●	●	●	●	●	●	●	●		●	●	
	7/16					●			●		●				
	1/2		●		●			●	●		●	●	●		
	5/8				●	●		●	●		●				
	3/4				●	●	●	●			●		●		●
	1				●	●		●	●		●		●		
	1-1/4							●	●						
	1-1/2							●	●	●	●				
	2								●						
	2-1/4								●						
	2-1/2								●						
	2-3/4								●						
	3								●						

	Metric	Lead (mm)													
		2	3	4	5	6	8	10	12	15	16	20	25	35	45
Dia. (mm)	10	●	●		●	●		●				●		●	
	12		●	●	●	●		●		●			●		●
	16			●	●		●				●		●	●	
	20			●			●		●		●	●			●
	24				●										

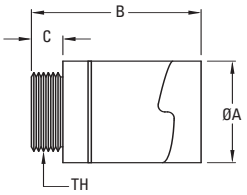
Advanced Anti-Backlash Supernuts®

XCM 1800

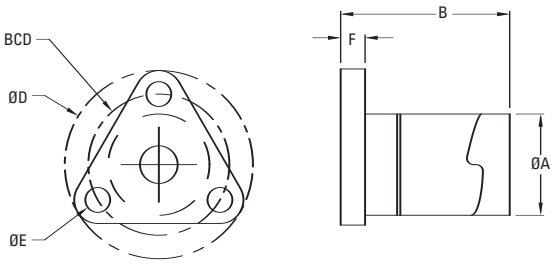
Our smallest anti-backlash nut design ever. The XCM 1800 uses the same patented† ActiveCAM™ mechanism as its larger siblings in a miniaturized package. This allows backlash free operation in space critical applications requiring high accuracy and low drag torque. This cost effective solution is available in either flanged or threaded versions. TriCoat® PTFE dry film lubricant is available as an option on most screws.

Note: See Screw Section on page 32. Specify XCMT or XCMF when ordering, see drawings at right.

XCMT 1800



XCMF 1800



Dia.	Lead	Part No.	Supernut® Dimensions								Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	BCD	TH			
3/16"	0.050	**XCM_1820**	0.50	0.90 (max)	0.200	1.00	0.143	0.18	0.750	7/16"-20	5 lbs	49	< 1
6mm*	1mm	**XCM_6x1**										29	
1/4"*	0.0125	**XCM_2580**										13	
	0.0208	**XCM_2548**										20	
	0.0250	**XCM_2540**										23	
	0.0278	**XCM_2536**										25	
	0.0313	**XCM_2532**										28	
	0.0357	**XCM_2528**										30	
	0.0417	**XCM_2524**										34	
1/4"	0.050	**XCM_2520**										41	
	0.063	**XCM_2516**										48	
	0.250	**XCM_4-2516**										76	
	0.500	**XCM_7-2514**										81	

* V-Thread screws, see page 35.
† Patent No. 5839321

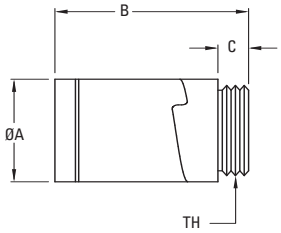
Advanced Anti-Backlash Supernuts®

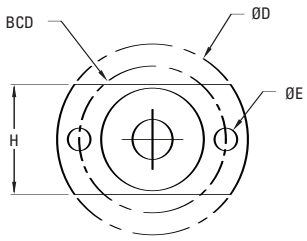
XC 2500

The XC Model Anti-Backlash assembly is the most advanced Anti-Backlash nut design. The unique patented† ActiveCAM™ accomplishes high axial stiffness, zero backlash and the absolute minimum drag torque. This advantage produces assemblies that cost less, perform better and last longer. The ActiveCAM™ automatically adjusts for wear insuring zero backlash for the life of the nut.

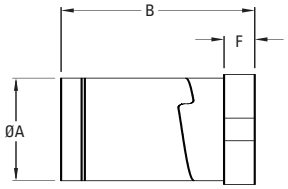
Note: See Screw Section on page 32. Specify XCT or XCF when ordering, see drawings at right.

XCT 2500





XCF 2500



Dia.	Lead	Part No.	Supernut® Dimensions									Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	H	BCD	TH			
3/16"	0.050	**XC_1820**	0.64	1.18 (max)	0.187	1.19	0.141	0.16	0.66	0.900	9/16"-18	10 lbs	49	< 1
6mm*	1mm	**XC_6x1**											29	
1/4"*	0.0125	**XC_2580**											13	
	0.0208	**XC_2548**											20	
	0.0250	**XC_2540**											23	
	0.0278	**XC_2536**											25	
	0.0313	**XC_2532**											28	
	0.0357	**XC_2528**											30	
	0.0417	**XC_2524**											34	
1/4"	0.050	**XC_2520**											41	
	0.063	**XC_2516**											48	
	0.250	**XC_4-2516**											76	
	0.500	**XC_7-2514**											81	

* V-Thread screws, see page 35.
† Patent No. 5839321

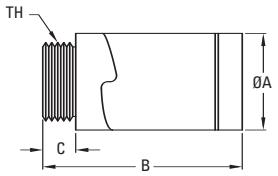
Advanced Anti-Backlash Supernuts®

XC 3700

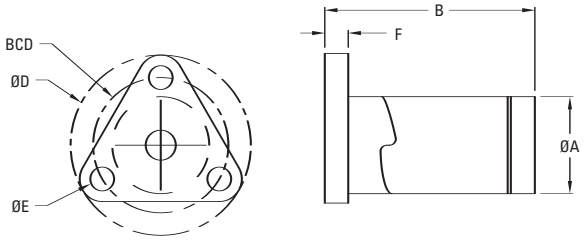
The XC Model Anti-Backlash assembly is the most advanced Anti-Backlash nut design. The unique patented† ActiveCAM™ accomplishes high axial stiffness, zero backlash and the absolute minimum drag torque. This advantage produces assemblies that cost less, perform better and last longer. The ActiveCAM™ automatically adjusts for wear insuring zero backlash for the life of the nut.

Note: See Screw Section on page 32. Specify XCT or XCF when ordering, see drawings at right.

XCT 3700



XCF 3700



Dia.	Lead	Part No.	Supernut® Dimensions								Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	BCD	TH			
5/16"	0.083	**XC_3112**	0.82	1.875 (max)	0.25	1.5	0.2	0.2	1.125	5/8"-18	25 lbs	49	1 - 3
	0.167	**XC_2-3112**										65	
	0.250	**XC_2-3108**										72	
	0.500	**XC_4-3108**										80	
3/8"	0.063	**XC_3716**										36	
	2mm	**XC_37x2M**										42	
	0.083	**XC_3712**										44	
	0.100	**XC_3710**										49	
	0.125	**XC_3708**										53	
	0.167	**XC_2-3712**										60	
	0.200	**XC_2-3710**										65	
	0.250	**XC_2-3708**										68	
	0.375	**XC_4-3711**										75	
	0.500	**XC_4-3708**										79	
10mm	2mm	**XC_10x2M**										41	
	3mm	**XC_10x3M**										53	
	5mm	**XC_2-10x2.5M**										64	
	6mm	**XC_4-10x1.5M**										67	
	10mm	**XC_5-10x2M**										76	
	20mm	**XC_6-10x3.3M**										81	
	35mm	**XC_10-10x3.5M**										81	

† Patent No. 5839321

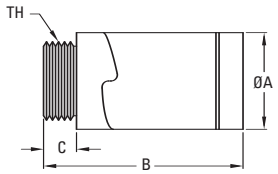
Advanced Anti-Backlash Supernuts®

XC 5000

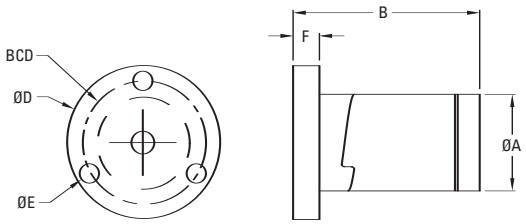
The XC 5000 utilizes the same patented† ActiveCAM™ as found in the XC 3700 model. Along with the very low drag torque and high axial stiffness advantages, the XC 5000 has greater load capacity.

Note: See Screw Section on page 32. Specify XCT or XCF when ordering, see drawings at right.

XCT 5000



XCF 5000



Dia.	Lead	Part No.	Supernut® Dimensions								Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	BCD	TH			
7/16"	0.125	**XC_2-4316**	1.12	2.25 (max)	0.375	1.75	0.2	0.3	15/16-16	1.406	125 lbs	55	1 - 3
	0.250	**XC_2-4308**										65	
	0.500	**XC_4-4308**										76	
12mm	3mm	**XC_12x3M**										48	
	4mm	**XC_2-12x2M**										54	
	5mm	**XC_2-12x2.5M**										59	
	6mm	**XC_3-12x2M**										63	
	10mm	**XC_4-12x2.5M**										73	
	15mm	**XC_6-12x2.5M**										78	
	25mm	**XC_10-12x2.5M**										82	
	45mm	**XC_15-12x3M**										81	
1/2"	.0625	**XC_5016**										30	
	0.100	**XC_5010**										41	
	0.200	**XC_2-5010**										57	
	0.250	**XC_2-5008**										62	
	0.500	**XC_4-5008**										75	
	0.800	**XC_8-5010**										80	
	1.000	**XC_8-5008**										81	

† Patent No. 5839321

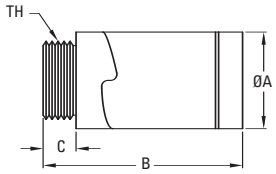
Advanced Anti-Backlash Supernuts®

XC 6200

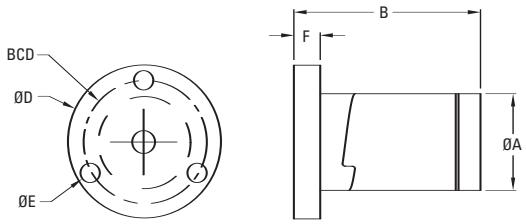
The XC 6200 utilizes the same patented† ActiveCAM™ as found in the XC 5000 model. Along with the very low drag torque and high axial stiffness advantages, the XC 6200 has greater load capacity.

Note: See Screw Section on page 32. Specify XCT or XCF when ordering, see drawings at right.

XCT 6200



XCF 6200



Dia.	Lead	Part No.	Supernut® Dimensions								Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	BCD	TH			
5/8"	0.100	**XC_6210**	1.40	2.60 (max)	0.5	2.13	0.22	0.5	1.688	1.25-16	175 lbs	35	2 - 6
	0.125	**XC_6208**										40	
	4mm	**XC_62x4M**										46	
	0.200	**XC_2-6210**										51	
	0.250	**XC_2-6208**										57	
	0.500	**XC_4-6208**										71	
16mm	4mm	**XC_16x4M**										47	
	5mm	**XC_2-16x2.5M**										52	
	8mm	**XC_4-16x2M**										63	
	16mm	**XC_7-16x2.3M**										75	
	25mm	**XC_5-16x5M**										80	
	35mm	**XC_7-16x5M**										82	

† Patent No. 5839321

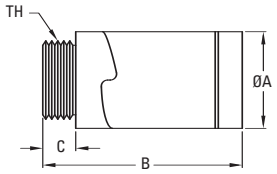
Advanced Anti-Backlash Supernuts®

XC 7500

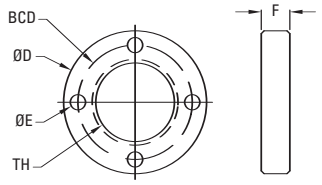
The XC 7500 utilizes the same patented† ActiveCAM™ as found in the XC 5000 model. Along with the very low drag torque and high axial stiffness advantages, the XC 7500 has greater load capacity.

Note: See Screw Section on page 32.

XCT 7500



Flange F75



Dia.	Lead	Part No.	Nut Dimensions			TH	Flange Dimensions (Optional)				Design Load	Efficiency %	Drag Torque oz-in
			A	B	C		D	E	F	BCD			
3/4"	0.100	**XCT7510**	1.63	2.9 (max)	0.5	1 3/8 - 16	2.5	0.27	0.50	2.00	250 lbs	31	3 - 10
	0.125	**XCT7508**										36	
	0.167	**XCT7506**										44	
	0.200	**XCT7505**										49	
	0.500	**XCT5-7510**										69	
	1.000	**XCT8-7508**										79	
	2.000	**XCT10-7505**										82	
20mm	4mm	**XCT20x4M**										41	
	8mm	**XCT2-20x4M**										59	
	12mm	**XCT3-20x4M**										67	
	16mm	**XCT4-20x4M**										72	
	20mm	**XCT5-20x4M**										76	
	45mm	**XCT9-20x5M**										82	

† Patent No. 5839321

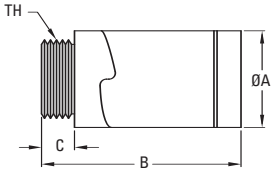
Advanced Anti-Backlash Supernuts®

XC 10000

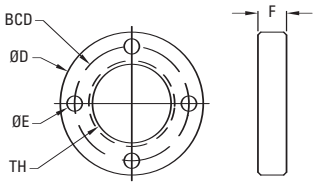
The XC 10000 utilizes Thomson BSA's patented† ActiveCAM™ technology to provide very low drag torque, high axial stiffness and maximum wear life. This self compensating design produces excellent positional repeatability while insuring consistent performance for the long run.

Note: See Screw Section on page 32.

XCT 1000



Flange F100



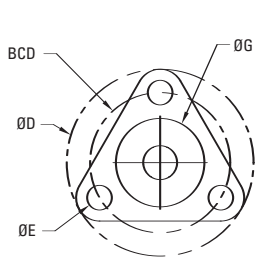
Dia.	Lead	Part No.	Nut Dimensions			TH	Flange Dimensions (Optional)				Design Load	Efficiency %	Drag Torque oz-in
			A	B	C		D	E	F	BCD			
24mm	5mm	**XCT24x5M**	1.88	3.0 (max)	0.60	1 9/16-18	3.0	0.27	0.60	2.37	350 lbs	42	5-15
1"	0.100	**XCT1010**										25	
	0.125	**XCT1008**										29	
	0.200	**XCT1005**										41	
	0.250	**XCT1004**										47	
	0.500	**XCT5-1010**										61	
	1.000	**XCT10-1010**										74	

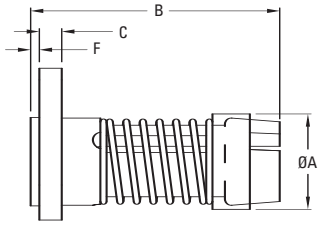
† Patent No. 5839321

Advanced Anti-Backlash Supernuts®

AFT

The low cost AFT Supernut is designed for light load OEM applications and offers smooth movement and low drag torque for axial loads up to 10 pounds. The AFT anti-backlash collar automatically adjusts for wear for the life of the nut.



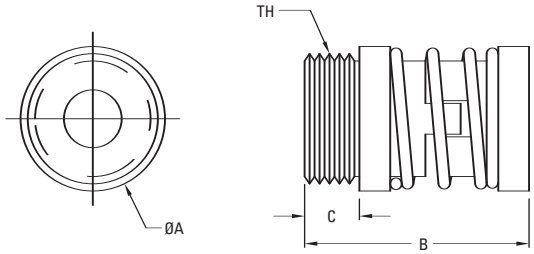


Dia.	Lead	Part No.	Supernut® Dimensions								Design Load	Efficiency %	Drag Torque oz-in
			A	B	C	D	E	F	G	BCD			
3/8"	0.063	**AFT3716**	0.77	2.00	0.20	1.50	0.20	0.06	0.71	1.125	10 lbs	36	2 - 5
	2mm	**AFT37x2M**										42	
	0.083	**AFT3712**										44	
	0.100	**AFT3710**										49	
	0.125	**AFT3708**										53	
	0.167	**AFT2-3712**										60	
	0.200	**AFT2-3710**										65	
	0.250	**AFT2-3708**										68	
	0.375	**AFT4-3711**										75	
	0.500	**AFT4-3708**										79	
	1.000	**AFT5-3705**										82	
	1.200	**AFT5-3704**										82	
10mm	2mm	**AFT10x2M**										41	
	3mm	**AFT10x3M**										53	
	5mm	**AFT2-10x2.5M**										64	
	6mm	**AFT4-10x1.5M**										67	
	10mm	**AFT5-10x2M**										76	
	20mm	**AFT6-10x3.3M**										81	
	35mm	**AFT10-10x3.5M**										81	
7/16	0.125	**AFT2-4316**										55	
	0.250	**AFT2-4308**										65	
	0.500	**AFT4-4308**										76	

Anti-Backlash Supernuts®

SNAB Thread Mount Style

Our SNAB Model has the greatest design flexibility allowing anti-backlash assemblies through 1" diameters. All SNABs are made from our internally lubricated Acetal providing excellent lubricity and very low wear.



Flanges

3/16" to 1/4"	F25
5/16" to 3/8" (10mm)	F37

Dimensions available on page 31.

SNAB*
3/16" to 3/8" (10mm) Diameter

Dia.	Lead	Part No.	Supernut® Dimensions					Preload Force (lbs)	Design Load	Max Static Load	Efficiency %	Drag Torque oz-in
			A	B (min)	B (max)	C	TH					
3/16"	0.050	**SNAB1820X**	0.625	1.125	1.250	0.187	9/16-18	1-3	10 lbs	150 lbs	49	2 - 4
1/4"	0.050	**SNAB2520X**	0.625	1.125	1.250	0.187	9/16-18	1-3	25 lbs	225 lbs	41	2 - 4
	0.063	**SNAB2516X**									48	
	0.250	**SNAB4-2516X**									76	
	0.500	**SNAB7-2514X**									81	
5/16"	0.083	**SNAB3112X**	0.750	1.160	1.340	0.250	5/8-18	2-5	50 lbs	350 lbs	49	2 - 4
	0.167	**SNAB2-3112X**									65	
	0.250	**SNAB2-3108X**									72	
	0.500	**SNAB4-3108X**									80	
3/8"	0.063	**SNAB3716X**	0.750	1.160	1.340	0.250	5/8-18	2-5	70 lbs	350 lbs	36	2 - 4
	2mm	**SNAB37x2M**									42	
	0.083	**SNAB3712X**									44	
	0.100	**SNAB710X**									49	
	0.125	**SNAB3708X**									53	
	0.167	**SNAB2-3712X**									60	
	0.200	**SNAB2-3710X**									65	
	0.250	**SNAB2-3708X**									68	
	0.375	**SNAB4-3711X**									75	
	0.500	**SNAB4-3708X**									79	
	1.000	**SNAB5-3705X**	0.720	1.750	2.000						82	
	1.200	**SNAB5-3704X**									82	
10mm	2mm	**SNAB10x2M**	0.750	1.160	1.340	0.250	5/8-18	2-5	70 lbs	350 lbs	41	2 - 4
	3mm	**SNAB10x3M**									53	
	5mm	**SNAB2-10x2.5M**									64	
	6mm	**SNAB4-10x1.5M**									67	
	10mm	**SNAB5-10x2M**									76	
	20mm	**SNAB6-10x3.3M**									81	
	35mm	**SNAB10-10x3.5M**									81	

* SNAB nuts are only as axially stiff as the spring force in one direction.

Anti-Backlash Supernuts®

SNAB Thread Mount Style

Flanges

7/16" to 5/8" (16mm)	F50

Dimensions available on page 31.

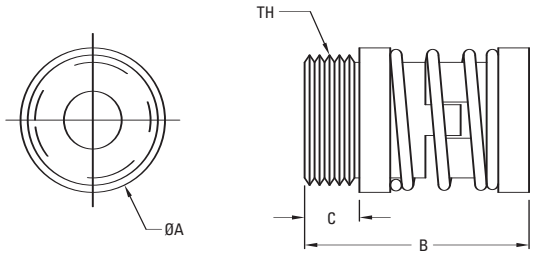
SNAB*
7/16" to 5/8" (16mm) Diameter

Dia.	Lead	Part No.	Supernut® Dimensions					Preload Force (lbs)	Design Load	Max Static Load	Efficiency %	Drag Torque oz-in
			A	B (min)	B (max)	C	TH					
7/16"	0.125	**SNAB2-4316X**	1.000	1.700	2.000	0.375	15/16-16	4-9	100 lbs	500 lbs	55	3 - 5
	0.250	**SNAB2-4308X**									65	
	0.500	**SNAB4-4308X**									76	
12mm	3mm	**SNAB12x3M**	1.000	1.700	2.000	0.375	15/16-16	4-9	100 lbs	500 lbs	48	3 - 5
	4mm	**SNAB2-12x2M**									54	
	5mm	**SNAB2-12x2.5M**									59	
	6mm	**SNAB3-12x2M**									63	
	10mm	**SNAB4-12x2.5M**									73	
	15mm	**SNAB6-12x2.5M**									78	
	25mm	**SNAB10-12x2.5M**									82	
	45mm	**SNAB15-12x3M**									81	
1/2"	0.0625	**SNAB5016**	1.000	1.700	2.000	0.375	15/16-16	4-9	150 lbs	750 lbs	30	5 - 8
	0.100	**SNAB5010X**									41	
	0.200	**SNAB2-5010X**									57	
	0.250	**SNAB2-5008X**									62	
	0.500	**SNAB4-5008X**									75	
	0.800	**SNAB8-5010X**									80	
	1.000	**SNAB8-5008X**									81	
5/8"	0.100	**SNAB6210X**	1.000	1.700	2.000	0.375	15/16-16	4-9	160 lbs	800 lbs	35	7 - 10
	0.125	**SNAB6208X**									40	
	4mm	**SNAB2-62x4M**									46	
	0.200	**SNAB2-6210X**									51	
	0.250	**SNAB2-6208X**									57	
	0.500	**SNAB4-6208X**									71	
16mm	4mm	**SNAB16x4M**	1.000	1.700	2.000	0.375	15/16-16	4-9	160 lbs	800 lbs	47	7 - 10
	5mm	**SNAB2-16x2.5M**									52	
	8mm	**SNAB4-16x2M**									63	
	16mm	**SNAB7-16x2.3M**									75	
	25mm	**SNAB5-16x5M**									80	
	35mm	**SNAB7-16x5M**									82	

* SNAB nuts are only as axially stiff as the spring force in one direction.

Anti-Backlash Supernuts®

SNAB Thread Mount Style



Flanges

3/4" to 1"	F100

Dimensions available on page 31.

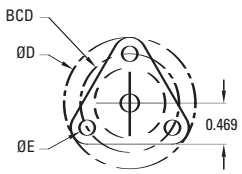
SNAB*
3/4" to 1" Diameter

Dia.	Lead	Part No.	Supernut® Dimensions					Preload Force (lbs)	Design Load	Max Static Load	Efficiency %	Drag Torque oz-in
			A	B (min)	B (max)	C	TH					
3/4"	0.100	**SNAB7510X**	1.750	2.500	3.000	0.600	1-9/16 - 18	10-20	300 lbs	1500 lbs	31	15 - 20
	0.125	**SNAB7508X**									36	
	0.167	**SNAB7506X**									44	
	0.200	**SNAB7505X**									49	
	0.500	**SNAB5-7510X**									69	
	1.000	**SNAB8-7508X**									79	
	2.000	**SNAB10-7505X**									82	
20mm	4mm	**SNAB20x4M**	1.750	2.500	3.000	0.600	1-9/16 - 18	10-20	300 lbs	1500 lbs	41	15 - 20
	8mm	**SNAB2-20x4M**									59	
	12mm	**SNAB3-20x4M**									67	
	16mm	**SNAB4-20x4M**									72	
	20mm	**SNAB5-20x4M**									76	
	45mm	**SNAB9-20x5M**									82	
24mm	5mm	**SNAB24x5M**	1.750	2.500	3.000	0.600	1-9/16 - 18	10-20	300 lbs	1500 lbs	42	15 - 20
1"	0.100	**SNAB1010X**	1.750	2.500	3.000	0.600	1-9/16 - 18	10-20	400 lbs	2000 lbs	25	15 - 20
	0.125	**SNAB1008X**									29	
	0.200	**SNAB1005X**									41	
	0.250	**SNAB1004X**									47	
	0.500	**SNAB5-1010X**									61	
	1.000	**SNAB10-1010X**									74	

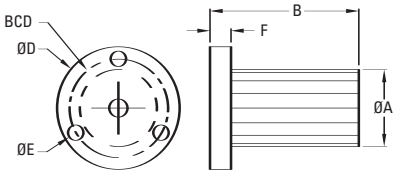
* SNAB nuts are only as axially stiff as the spring force in one direction.

Flange Mount Supernuts®

MTS



MTS 3/8" (10mm) Only



MTS 3/16" to 5/16"

Integral Flange Mount
The MTS models provide the excellent lubricity and dimensional stability of our proprietary Acetal with the convenience of an integral flange.

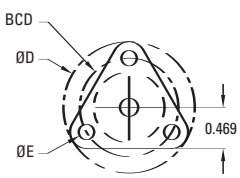
MTS
3/16" to 3/8" (10mm) Diameter

Dia.	Lead	Part No.	Supernut® Dimensions						Design Load	Efficiency %	Drag Torque oz-in
			A	B	D	E	F	BCD			
3/16"	0.050	**MTS1820**	0.50	0.75	1.00	0.14	0.15	0.75	10 lbs	49	Free Wheeling
1/4"	0.050	**MTS2520**	0.50	0.75	1.00	0.14	0.15	0.75	25 lbs	41	
	0.063	**MTS2516**								48	
	0.250	**MTS4-2516**								76	
	0.500	**MTS7-2514**								81	
5/16"	0.083	**MTS3112**	0.50	0.75	1.00	0.14	0.15	0.75	50 lbs	49	
	0.167	**MTS2-3112**								65	
	0.250	**MTS2-3108**								72	
	0.500	**MTS4-3108**								80	
3/8"*	0.063	**MTS3716**	0.71	1.50	1.5	0.20	0.20	1.125	60 lbs	36	
	2mm	**MTS37x2M**								42	
	0.083	**MTS3712**								44	
	0.100	**MTS3710**								49	
	0.125	**MTS3708**								53	
	0.167	**MTS2-3712**								60	
	0.200	**MTS2-3710**								65	
	0.250	**MTS2-3708**								68	
	0.375	**MTS4-3711**								75	
	0.500	**MTS4-3708**								79	
	1.000	**MTS5-3705**								82	
	1.200	**MTS5-3704**								82	
10mm*	2mm	**MTS10x2M**	0.71	1.50	1.5	0.2	0.200	1.125	75 lbs	41	
	3mm	**MTS10x3M**								53	
	5mm	**MTS2-10x2.5M**								64	
	6mm	**MTS4-10x1.5M**								67	
	10mm	**MTS5-10x2M**								76	
	20mm	**MTS6-10x3.3M**								81	
	35mm	**MTS10-10x3.5M**								81	

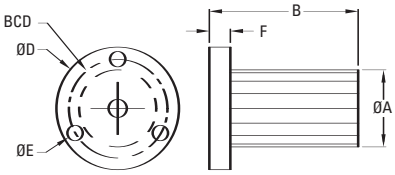
* 3/8" and 10mm with tri-flange

Flange Mount Supernuts®

MTS



MTS 7/16" Only



MTS 12mm to 5/8" (16mm)

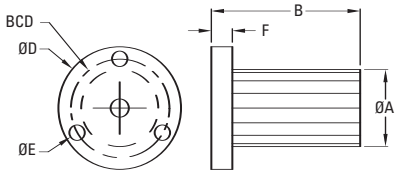
MTS
7/16" to 5/8" (16mm) Diameter

Dia.	Lead	Part No.	Supernut® Dimensions						Design Load	Efficiency %	Drag Torque oz-in
			A	B	D	E	F	BCD			
7/16"*	0.125	**MTS2-4316**	0.71	1.50	1.5	0.20	0.200	1.125	75 lbs	55	Free Wheeling
	0.250	**MTS2-4308**								65	
	0.500	**MTS4-4308**								76	
12mm	3mm	**MTS12x3M**	0.75	1.50	1.5	0.20	0.250	1.125	125 lbs	48	
	4mm	**MTS2-12x2M**								54	
	5mm	**MTS2-12x2.5M**								59	
	6mm	**MTS3-12x2M**								63	
	10mm	**MTS4-12x2.5M**								73	
	15mm	**MTS6-12x2.5M**								78	
	25mm	**MTS10-12x2.5M**								82	
	45mm	**MTS15-12x3M**								81	
1/2"	0.0625	**MTS5016**	0.75	1.50	1.5	0.20	0.250	1.125	125 lbs	30	
	0.100	**MTS5010**								41	
	0.200	**MTS2-5010**								57	
	0.250	**MTS2-5008**								62	
	0.500	**MTS4-5008**								75	
	0.800	**MTS8-5010**								80	
	1.000	**MTS8-5008**								81	
5/8"	0.100	**MTS6210**	0.88	1.63	1.5	0.20	0.300	1.188	175 lbs	35	
	0.125	**MTS6208**								40	
	4mm	**MTS62x4M**								46	
	0.200	**MTS2-6210**								51	
	0.250	**MTS2-6208**								57	
	0.500	**MTS4-6208**								71	
16mm	4mm	**MTS16x4M**	0.88	1.63	1.5	0.20	0.300	1.188	175 lbs	47	
	5mm	**MTS2-16x2.5M**								52	
	8mm	**MTS4-16x2M**								63	
	16mm	**MTS7-16x2.3M**								75	
	25mm	**MTS5-16x5M**								80	
	35mm	**MTS7-16x5M**								82	

* 7/16" with tri-flange

Flange Mount Supernuts®

MTS



MTS 3/4" (20mm)

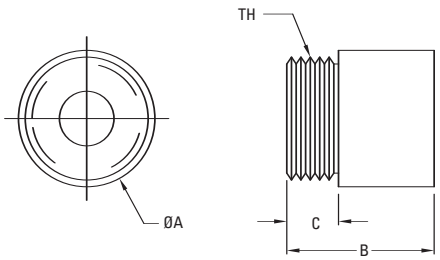
MTS
3/4" (20mm) Diameter

Dia.	Lead	Part No.	Supernut® Dimensions						Design Load	Efficiency %	Drag Torque oz-in
			A	B	D	E	F	BCD			
3/4"	0.100	**MTS7510**	1.125	1.75	2.0	0.20	0.300	1.438	275 lbs	31	Free Wheeling
	0.125	**MTS7508**								36	
	0.167	**MTS7506**								44	
	0.200	**MTS7505**								49	
	0.500	**MTS5-7510**								69	
	1.000	**MTS8-7508**								79	
	2.000	**MTS10-7505**								82	
20mm	4mm	**MTS20x4M**	1.125	1.75	2.0	0.20	0.300	1.438	275 lbs	42	
	8mm	**MTS2-20x4M**								59	
	12mm	**MTS3-20x4M**								67	
	16mm	**MTS4-20x4M**								72	
	20mm	**MTS5-20x4M**								76	
	45mm	**MTS9-20x5M**								82	

Thread Mount Supernuts®

SN

Our standard SN nuts have proven themselves for the past twenty years. Available in sizes from 3/16" to 1-1/2" with or without mounting flanges.



Flanges

3/16" to 1/4"	F25
5/16" to 10mm	F37
7/16" to 16mm	F50
3/4" to 1"	F75
1-1/4"	F100
1-1/2"	R54-3

Dimensions available on page 31 or online.

SN
3/16" to 7/16" Diameter*

Dia.	Lead	Part No.	Supernut® Dimensions				Design Load	Max. Static Load	Efficiency %	Flange
			A	B	C	TH				
3/16"	0.050	**SN1820X**	0.625	0.500	0.187	9/16-18	30 lbs	150 lbs	49	F25
1/4"	0.050	**SN2520X**	0.625	0.500	0.187	9/16-18	45 lbs	225 lbs	41	
	0.063	**SN2516X**							48	
	0.250	**SN4-2516X**							76	
	0.500	**SN7-2514X**							81	
5/16"	0.083	**SN3112X**	0.750	0.750	0.250	5/8-18	70 lbs	350 lbs	49	F37
	0.167	**SN2-3112X**							65	
	0.250	**SN2-3108X**							72	
	0.500	**SN4-3108X**							80	
3/8"	0.063	**SN3716X**	0.750	0.750	0.250	5/8-18	70 lbs	350 lbs	36	
	2mm	**SN37x2M**							42	
	0.083	**SN3712X**							44	
	0.100	**SN3710X**							49	
	0.125	**SN3708X**							53	
	0.167	**SN2-3712X**							60	
	0.200	**SN2-3710X**							65	
	0.250	**SN2-3708X**							68	
	0.375	**SN4-3711X**							75	
	0.500	**SN4-3708X**							79	
	1.000	**SN5-3705X**							82	
	1.200	**SN5-3704X**							82	
10mm	2mm	**SN10x2M**	0.750	0.750	0.250	5/8-18	70 lbs	350 lbs	41	
	3mm	**SN10x3M**							53	
	5mm	**SN2-10x2.5M**							64	
	6mm	**SN4-10x1.5M**							67	
	10mm	**SN5-10x2M**							76	
	20mm	**SN6-10x3.3M**							67	
	35mm	**SN10-10x3.5M**							81	
7/16"	0.125	**SN2-4316X**	1.000	1.000	0.375	15/16-16	100 lbs	500 lbs	55	F50
	0.250	**SN2-4308X**							65	
	0.500	**SN4-4308X**							76	

* For all sizes shown on this page Drag Torque = Free Wheeling

Thread Mount Supernuts®

SN

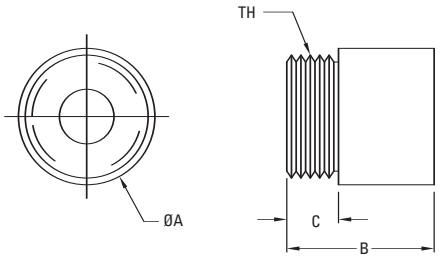
SN
1/2" (12mm) to 5/8" (16mm) Diameter*

Dia.	Lead	Part No.	Supernut® Dimensions				Design Load	Max. Static Load	Efficiency %	Flange
			A	B	C	TH				
12mm	3mm	**SN12x3M**	1.000	1.000	0.375	15/16-16	100 lbs	500 lbs	48	F50
	4mm	**SN2-12x2M**							54	
	5mm	**SN2-12x2.5M**							59	
	6mm	**SN3-12x2M**							63	
	10mm	**SN4-12x2.5M**							73	
	15mm	**SN6-12x2.5M**							78	
	25mm	**SN10-12x2.5M**							82	
	45mm	**SN15-12x3M**							81	
1/2"	0.0625	**SN5016X**	1.000	1.000	0.375	15/16-16	150 lbs	750 lbs	30	
	0.100	**SN5010X**							41	
	0.200	**SN2-5010X**							57	
	0.250	**SN2-5008X**							62	
	0.500	**SN4-5008X**							75	
	0.800	**SN8-5010X**							80	
	1.000	**SN8-5008X**							81	
5/8"	0.100	**SN6210X**	1.000	1.000	0.375	15/16-16	160 lbs	800 lbs	35	
	0.125	**SN6208X**							40	
	4mm	**SN62x4M**							46	
	0.200	**SN2-6210X**							51	
	0.250	**SN2-6208X**							57	
	0.500	**SN4-6208X**							71	
16mm	4mm	**SN16x4M**	1.000	1.000	0.375	15/16-16	160 lbs	800 lbs	47	
	5mm	**SN2-16x2.5M**							52	
	8mm	**SN4-16x2M**							63	
	16mm	**SN7-16x2.3M**							75	
	25mm	**SN5-16x5M**							80	
	35mm	**SN7-16x5M**							82	

* For all sizes shown on this page Drag Torque = Free Wheeling

Thread Mount Supernuts®

SN



Flanges

3/16" to 1/4"	F25
5/16" to 10mm	F37
7/16" to 16mm	F50
3/4" to 1"	F75
1-1/4"	F100
1-1/2"	R54-3

Dimensions available on page 31 or online.

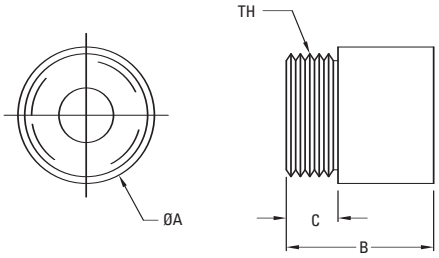
SN
3/4" to 1 1/2" Diameter*

Dia.	Lead	Part No.	Supernut® Dimensions				Design Load	Max. Static Load	Efficiency %	Flange
			A	B	C	TH				
3/4"	0.100	**SN7510X**	1.500	1.500	0.500	1 3/8-16	300 lbs	1500 lbs	31	F75
	0.125	**SN7508X**							36	
	0.167	**SN7506X**							44	
	0.200	**SN7505X**							49	
	0.500	**SN5-7510X**							69	
	1.000	**SN8-7508X**							79	
	2.000	**SN10-7505X**							82	
20mm	4mm	**SN20x4M**	1.500	1.500	0.500	1 3/8-16	300 lbs	1500 lbs	41	
	8mm	**SN2-20x4M**							59	
	12mm	**SN3-20x4M**							67	
	16mm	**SN4-20x4M**							72	
	20mm	**SN5-20x4M**							76	
	45mm	**SN9-20x5M**							82	
24mm	5mm	**SN24x5M**	1.500	1.500	0.500	1 3/8-16	300 lbs	1500 lbs	42	
1"	0.100	**SN1010X**	1.500	1.500	0.500	1 3/8-16	400 lbs	2000 lbs	25	
	0.125	**SN1008X**							29	
	0.200	**SN1005X**							41	
	0.250	**SN1004X**							47	
	0.500	**SN5-1010X**							61	
	1.000	**SN10-1010X**							74	
1 1/4"	0.200	**SN1205X**	2.000	2.000	0.600	1 9/16-18	400 lbs	2000 lbs	35	F100
	0.250	**SN1204X**							41	
1 1/2"	0.200	**SN1505X**	2.000	2.500	0.530	1.967-18	400 lbs	2000 lbs	31	R54-3
	0.250	**SN1504X**							36	
	0.375	**SN1503X**							47	
	0.500	**SN2-1504X**							52	

* For all sizes shown on this page Drag Torque = Free Wheeling

Thread Mount Bronze Nuts

For Acme Screws



For standard bronze nuts, Thomson BSA uses SAE 660 bearing bronze which provides excellent load carrying ability, good wear resistance and is less susceptible to damage from impact and shock loading. Custom bronzes can be selected if required.

Material Properties

Maximum Temperature	Friction Coefficient	Material*	Tensile Strength
max. 250°F	0.2 to 0.3	SAE 660	35,000 psi

* Other materials available on a custom basis.

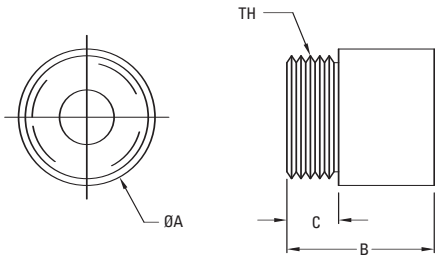
1/4" to 5/8" Diameter

Dia.	Lead	Nut Part No. for R.H. Screws	Nut Part No. for L.H. Screws	Bronze Nut Dimensions				Fits Flange No.	Design Load†	Maximum Static Load	Torque to Raise 1 Pound (in-oz)
				A	B	C	TH				
1/4"	.050	**BN2520**	**BN2520L**	0.625	0.625	0.187	9/16-18	F25	110 lbs	550 lbs	.41
	.0625	**BN2516**	—								.43
	.250	**BN4-2516**	—								1.00
3/8"	.0625	**BN3716**	—	0.750	0.750	0.250	5/8-18	F37	300 lbs	1,500 lbs	.61
	.083	**BN3712**	**BN3712L**								.64
	.100	**BN3710**	**BN3710L**								.67
	.125	**BN3708S**	—								.76
	.167	**BN2-3712S**	—								.86
1/2"	.100	**BN5010**	**BN5010L**	1.00	1.00	0.375	15/16-16	F50	620 lbs	3,100 lbs	.83
	.200	**BN2-5010**	—								1.10
5/8"	.100	**BN6210**	**BN6210L**	1.00	1.00	0.375	15/16-16	F50	860 lbs	4,300 lbs	.99
	.125	**BN6208S**	—								1.06
	.200	**BN2-6210**	—								1.26

† Load ratings based on using Thomson BSA grease. See page 211.

Thread Mount Bronze Nuts

For Acme Screws



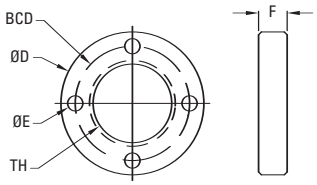
3/4" to 3" Diameter

Dia.	Lead	Nut Part No. for R.H. Screws	Nut Part No. for L.H. Screws	Bronze Nut Dimensions				Fits Flange No.	Design Load†	Maximum Static Load	Torque to Raise 1 Pound (in-oz)
				A	B	C	TH				
3/4"	.100	**BN7510**	**BN7510L**	1.50	1.50	0.500	1-3/8 - 16	F75	1,500 lbs	7,500 lbs	1.15
	.125	**BN7508**	—								1.21
	.167	**BN7506**	**BN7506L**								1.28
	.200	**BN7505**	**BN7505L**								1.35
1"	.100	**BN1010**	—	1.50	1.50	0.500	1-3/8 - 16	F75	1,900 lbs	9,500 lbs	1.47
	.125	**BN1008**	—								1.52
	.200	**BN1005**	—								1.67
	.250	**BN1004**	—								1.76
	.500	**BN5-1010**	—								2.55
	1.000	**BN10-1010**	—								3.91
1-1/4"	.200	**BN1205***	—	1.75	1.75	0.625	1-9/16 - 18	R1004-3	3,000 lbs	15,000 lbs	1.99
	.250	**BN1204***	—								2.09
1-1/2"	.200	**BN1505***	—	2.25	2.25	0.530	1.967-18	R54-3	4,600 lbs	23,000 lbs	2.31
	.250	**BN1504***	—								2.41
	.375	**BN1503***	—								2.56
	.500	**BN2-1504***	—								3.08
2"	.250	**BN2004***	—	2.75	3.50	0.780	2.548-18	R50-3	8,000 lbs	40,000 lbs	3.04
2-1/4"	.250	**BN2204***	—	3.37	3.00	1.56	3.137-12	R2202-3	12,800 lbs	64,000 lbs	3.70
2-1/2"	.250	**BN2504***	—	3.37	3.00	1.56	3.137-12	R2202-3	16,000 lbs	80,000 lbs	3.90
2-3/4"	.250	**BN2704***	—	4.00	4.00	1.75	3.625-12	R2501-3	20,000 lbs	100,000 lbs	4.20
3"	.250	**BN3004***	—	4.00	4.00	1.75	3.625-12	R2501-3	23,000 lbs	115,000 lbs	4.50

† Load ratings based on using Thomson BSA grease. See page 211.
* Non-stock item

Standard Mounting Flanges

For Bronze Nuts and Supernuts®



These mounting flanges are designed for easy mounting when fixed to a bronze nut or Supernut®.

Aluminum (6061-T6) Flanges for Bronze Nuts and Supernuts®

Part No.	Flange Dimensions				
	D	E	F	BCD	TH
F25	1.25	0.140 (4X)	0.187	1.00	9/16 - 18
F37	1.60	0.177 (4X)	0.250	1.24	5/8 - 18
F50	2.00	0.266 (4X)	0.375	1.50	15/16 - 16
F75	2.50	0.266 (4X)	0.500	2.00	1-3/8 - 16
F100	3.00	0.266 (4X)	0.600	2.37	1-9/16 - 18

Aluminum flanges do not have a set screw which could deform the Supernut® and possibly cause binding. Aluminum flanges should be pinned or bonded to Supernuts® to prevent unwanted disassembly during operation.

Lead Screws

Lead Screws — 3/16" to 7/16" Diameter

Nominal Major Diameter	Lead	Precision Prefix	Standard Prefix	BSA Part No.	Avail in Left Hand	Material	Root Diameter	Recommended Bearing
3/16"	0.050	SPR	SRA	**1820**	L	Stainless Steel	0.12	N/A
1/4"	0.050	SPR	SRA	**2520**	L	Stainless Steel	0.19	4mm
	0.063			**2516**	L		0.17	
	0.250			**4-2516**			0.17	
	0.500	N/A		**7-2514**			0.16	
5/16"	0.083	SPR	SRA	**3112**	L	Stainless Steel	0.22	4mm
	0.167			**2-3112**			0.20	
	0.250			**2-3108S**			0.22	
	0.500			**4-3108S**			0.21	
3/8"	0.0625	SPR	SRA	**3716**	L	Stainless Steel	0.30	4mm
	2mm			**37x2M**	L		0.28	
	0.083			**3712**	L		0.28	
	0.100			**3710**	L		0.26	
	0.125			**3708S**	L		0.29	
	0.167			**2-3712S**			0.31	
	0.200			**2-3710**			0.26	
	0.250			**2-3708S**	L		0.29	
	0.375			**4-3711**	L		0.27	
	0.500			**4-3708S**	L		0.27	
	1.00	N/A		**5-3705**			0.24	
	1.20			**5-3704**			0.24	
10mm	2mm	SPT	SRT	**10x2M**	L	Stainless Steel	0.31	4mm
	3mm			**10x3M**	L		0.25	
	5mm	SPR	SRA	**2-10x2.5M**			0.27	
	6mm			**4-10x1.5M**			0.31	
	10mm			**5-10x2M**			0.29	
	20mm			**6-10x3.3M**			0.30	
	35mm	N/A		**10-10x3.5M**			0.29	
7/16"	0.125	SPR	SRA	**2-4316**		Stainless Steel	0.35	6mm
	0.250			**2-4308S**			0.36	
	0.500			**4-4308S**			0.33	

Lead Screws

Lead Screws — 1/2" (12mm) to 3/4" (20mm) Diameter

Nominal Major Diameter	Lead	Precision Prefix	Standard Prefix	BSA Part No.	Avail in Left Hand	Material	Root Diameter	Recommended Bearing
12mm	3mm	SPT	SRT	**12x3M**		Stainless Steel	0.31	6mm
	4mm	SPR	SRA	**2-12x2M**			0.36	
	5mm	SPT	SRT	**2-12x2.5M**			0.35	
	6mm	SPR	SRA	**3-12x2M**			0.35	
	10mm	SPT	SRT	**4-12x2.5M**			0.35	
	15mm	SPR	SRA	**6-12x2.5M**			0.34	
	25mm	—	SRA	**10-12x2.5M**			0.36	
	45mm	—	SRA	**15-12x3M**			0.37	
1/2"	0.0625	SPR	SRA	**5016**		Stainless Steel	0.41	6mm
	0.100			**5010**	L		0.37	
	0.200			**2-5010**			0.39	
	0.250			**2-5008**			0.38	
	0.500			**4-5008**			0.36	
	0.800	N/A		**8-5010**			0.37	
	1.000			**8-5008**			0.39	
5/8"	0.100	SPR	SRA	**6210**	L	Stainless Steel	0.52	8 to 10mm
	0.125			**6208S**	L		0.52	
	0.200	SPR		**2-6210**			0.52	
	0.250			**2-6208S**			0.52	
	0.500			**4-6208**			0.48	
16mm	4mm	N/A	SRT	**16x4M**	L	Stainless Steel	0.45	8 to 10mm
	5mm	SPR	SRA	**2-16x2.5M**			0.48	
	8mm			**4-16x2M**			0.51	
	16mm			**7-16x2.3M**			0.49	
	25mm	N/A		**5-16x5M**			0.45	
	35mm			**7-16x5M**			0.48	
3/4"	0.100	SPR	SRA	**7510**	L	Stainless Steel	0.63	12mm
	0.125			**7508**	L		0.61	
	0.167			**7506**	L		0.56	
	0.200			**7505**	L		0.53	
	0.500	N/A		**5-7510**			0.62	
	1.000			**8-7508**			0.61	
	2.000			**10-7505†**	L		0.59	
20mm	4mm	SPT	SRT	**20x4M**	L	Stainless Steel	0.61	12mm
	8mm	SPR	SRA	**2-20x4M**			0.58	
	12mm			**3-20x4M**			0.59	
	16mm			**4-20x4M**			0.59	
	20mm	–		**5-20x4M**			0.59	
	45mm	–		**9-20x5M**			0.62	

† Nominal O.D. is .734"

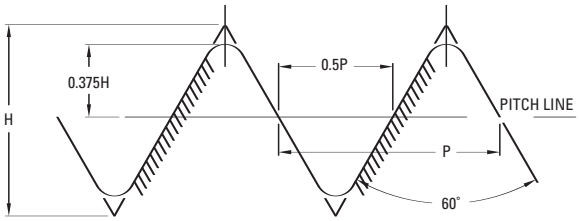
Lead Screws

Lead Screws — 1" (24mm) to 3" Diameter

Nominal Major Diameter	Lead	Precision Prefix	Standard Prefix	BSA Part No.	Avail in Left Hand	Material	Root Diameter	Recommended Bearing
24mm	5mm	SPT	SRT	**24x5M**	L	Stainless Steel	0.73	12 to 15mm
1"	0.100	SPR	SRA	**1010**	L	Stainless Steel	0.88	12 to 20mm
	0.125			**1008**	L		0.86	
	0.200			**1005**	L		0.78	12 to 15mm
	0.250	N/A	RA	**1004**	L	Carbon Steel	0.72	
	0.500		SRA	**5-1010**		Stainless Steel	0.88	12 to 20mm
	1.000			**10-1010**			0.88	
1-1/4"	0.200	N/A	RA	**1205**	L	Low Carbon Steel	1.03	20mm
	0.250			**1204**	L		0.98	
1-1/2"	0.200	N/A	RA	**1505**	L	Low Carbon Steel	1.28	25mm
	0.250			**1504**	L		1.23	
	0.375			**1503**			1.11	
	0.500			**2-1504**			1.23	
2"	0.250	N/A	RA	**2004**	L	Low Carbon Steel	1.73	*
2-1/4"	0.250	N/A	RA	**2204**	L		1.98	*
2-1/2"	0.250	N/A	RA	**2504**	L		2.23	*
2-3/4"	0.250	N/A	RA	**2704**	L		2.48	*
3"	0.250	N/A	RA	**3004**	L		2.73	*

V-Thread Screws

Burnished Finish 303 Stainless Steel



- Some sizes available in 1018 Steel
- Matching Supernuts and Left Hand Screws on special request
- Lead Accuracy is .015 in/ft

Diameter	Lead	Size	Part No.	Recommended Bearing
6mm	1mm	6 x 1	**SV6x1**	4mm
1/4"	0.0125	1/4-80	**SV2580**	4mm
	0.0208	1/4-48	**SV2548**	
	0.0250	1/4-40	**SV2540**	
	0.0278	1/4-36	**SV2536**	
	0.0313	1/4-32	**SV2532**	
	0.0357	1/4-28	**SV2528**	
	0.0417	1/4-24	**SV2524**	
	0.0500	1/4-20	**SV2520**	
3/8"	0.0250	3/8-40	**SV3740**	4 to 6mm
	0.0313	3/8-32	**SV3732**	
	0.0417	3/8-24	**SV3724**	
	0.0500	3/8-20	**SV3720**	
	0.0625	3/8-16	**SV3716**	
	0.0833	3/8-12	**SV3712**	
1/2"	0.0250	1/2-40	**SV5040**	6 to 8mm
	0.0333	1/2-30	**SV5030**	
	0.0500	1/2-20	**SV5020**	
	0.0625	1/2-16	**SV5016**	
	0.0769	1/2-13	**SV5013**	

NOTES:

Ball Screws — Inch Series

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Precision Plus Ground Ball Screws — Inch Series	97

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Ball Screws Product Overview

Thomson Advantages

Ball screws are not all alike. Differences in design, quality, materials, manufacturing, and application support are all factors that affect the performance and extend the life of your ball screw. That's why it's important to select your ball screw — and ball screw supplier — very carefully.

Design: Optimal solution for your application needs
The Thomson engineering team has painstakingly evaluated the breadth of ball screw products from BSA, Warner Linear, and Thomson Industries and integrated them into a single, comprehensive, product offering. Our new line of ball screws come in a full range of diameters, leads, and ball nut configurations, in either preloaded or non-preloaded types, all in industry-standard envelopes. They provide dependable accuracy and repeatability at an economical price.

Quality: Reliability and consistent performance
At Thomson, we pride ourselves in consistently providing high quality ball screws. Our background in flight critical aerospace and defense applications uniquely positions us to provide the highest levels of quality across all our ball screw products. Our fully equipped engineering laboratory performs qualification testing for mechanical performance, environmental effects, and structural integrity. Your ball screw is inspected every step of the way to ensure top quality and performance. The result, Thomson ball screws perform the way you expect them to perform — no surprises, no problems.

Materials: Just the right custom and standard offerings
The materials used to manufacture ball screws are critical to their performance. Our in-house metallurgists control and verify that the materials used are of the highest quality. They can also select and recommend materials best suited to your particular application. We have years of experience working with a wide range of standard and non-standard materials. Put our experience and expertise to work for you!

Manufacturing: Ensures consistent quality and delivery
Thomson maintains the most modern and complete ball screw manufacturing facilities in the industry. In-house manufacturing capabilities include our proprietary heat treating and plating processes. Expert manufacturing using the most modern equipment available provides ball screws that set the standards for performance, precision, and travel life.

Application Support: Over 70 years of experience at your disposal
Working with Thomson is like having your own staff of ball screw design engineers able to address application concerns and recommend solutions. Thomson field sales and applications engineering personnel have more ball screw expertise than any other group in the industry. They are skilled at evaluating your requirements and designing assemblies that fit your needs.

Catalog Standard Ball Screws feature a high luster polished and oil finish.

Inch Ball Screws Product Overview

Rolled Screws — Product Availability[1], Accuracy and Axial Play

Screw Diameter	Accuracy	Max. Axial Backlash (Non-preloaded)[2]
0.187" to 4.000"	± .004 in/ft	0.002 to 0.015"

	Inch	Lead (in.)												
		0.050	0.062	0.125	0.200	0.250	0.413	0.473	0.500	0.660	1.000	1.500	1.875	2.000
Dia. (in.)	0.187	●	●											
	0.375			●										
	0.500				●				●					
	0.631				●						●			
	0.750				●				●					
	0.875				●									
	1.000					●			●		●			
	1.150				●									
	1.171						●							
	1.500					●		●	●		●		●	●
	2.000								●		●			
	2.250								●		●			
	2.500					●			●		●			
	3.000									●		●		
	4.000										●			

Ground Screws — Product Availability[1], Accuracy and Axial Play

Screw Diameter	Accuracy	Max. Axial Backlash
0.500" to 2.500"	± .0005 in/ft	0"

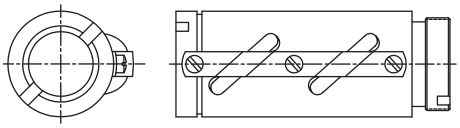
	Inch	Lead (in.)												
		0.050	0.062	0.125	0.200	0.250	0.413	0.473	0.500	0.660	1.000	1.500	1.875	2.000
Dia. (in.)	0.631				●									
	0.750				●									
	0.875				●									
	1.000				●	●								
	1.150				●									
	1.250				●				●					
	1.500				●	●			●					
	1.750				●									
	2.000				●									
	2.250								●					
	2.500					●								

(1) Additional sizes are available. See our comprehensive product reference section on page 87, or contact customer service for more details.

(2) Standard lash dependent on ball diameter. See page 237 as reference. Consult factory for special requirements.

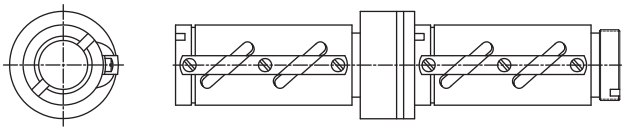
Precision Rolled Ball Screws Product Overview — Inch Series

Standard Non-Preloaded Ball Nuts



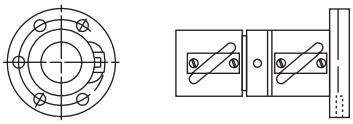
Standard Non-Preloaded Ball Nuts are a flexible, economical solution for use in industrial, transport grade applications. Both round and square models are available, with flange and wiper kits as accessories. Non-Preloaded Ball Nuts come standard with black-oxide coating (thin dense chrome is available upon request).

Preloaded Ball Nuts



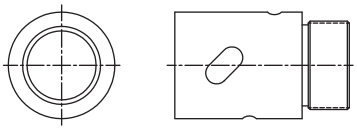
Preloaded Ball Nuts should be considered to eliminate backlash and increase system stiffness in applications where multi-directional positional accuracy and repeatability are required. Preloaded Ball Nuts consist of two non-preloaded ball nuts (round or square) joined by an adjustable preload package with springs. This design allows ease of setup and adjust of preload based on application requirements.

Preloaded Ball Nuts with Integral Flange



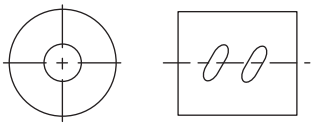
Preloaded Ball Nuts with Integral Flange provide higher-level positional accuracy and repeatability from a rolled screw assembly. These adjustable preload ball nuts feature precision ground internal threads, which enable smoother running, more consistent performance. The integral flange is held to high perpendicularity tolerances to ensure the load bearings are aligned to load to prevent unnecessary wear.

Internal Return Ball Nuts



Internal Return Ball Nuts feature an internal ball recirculation sytem, which allows higher speeds, and lower noise in a compact envelope. Each nut includes an integrated wiper as standard. These ball nuts come standard “as machined” with corrosion protective film applied prior to shipment. machined” with corrosion protective film applied prior to shipment. Please note, a full line of internal return ball nuts are featured as part of our metric series ball screws.

Cylindrical Ball Nuts



Cylindrical Ball Nuts are compact in size and ideal for constrained envelopes. These ball nuts come standard “as machined” with corrosion protective film applied prior to shipment. Please note, a full line of cylindrical ball nuts are featured as part of our metric series ball screws.

High Capacity Ball Nuts

High Capacity Ball Nuts provide higher static and dynamic load capacities than our standard nuts. These ball nuts are typically longer than standard nuts, allowing for more balls in contact with the screw. High capacity nuts may also include larger balls than those found in standard ball nuts.

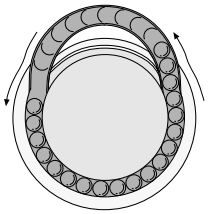
High Speed Ball Nuts

High Speed Ball Nuts are designed to permit higher linear speeds in applications where critical speed of the ball nut (DN value) limits performance in an application. These ball nuts feature solid deflectors and reinforced ball return guides to allow smooth, reliable transition of balls entering and exiting the return system at high speeds.

Precision Rolled Ball Screws Product Overview — Inch Series

Tangential Ball Return

A unique Thomson feature which minimizes recirculated bearing ball deflection, for smoother and quieter operation. The tangential circuit consists of a pick-up deflector finger and modified return tube which allows the bearing balls to enter and exit the load carrying portion of the ball screw circuit in a straight path. Standard on ball bearing screws with up to 10,000 pound dynamic load capabilities.



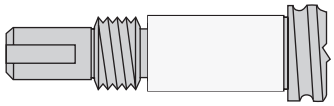
Load Locking Spring

The load locking spring is a coil turned into the inactive portion of the nut and conforms to the ball tract. In normal operation, the spring is inactive and not in contact with the screw. In the event the ball bearings are lost from the nut, the load locking spring will not allow the load carrying nut to free-fall down the screw.

End Journals and Bearing Supports

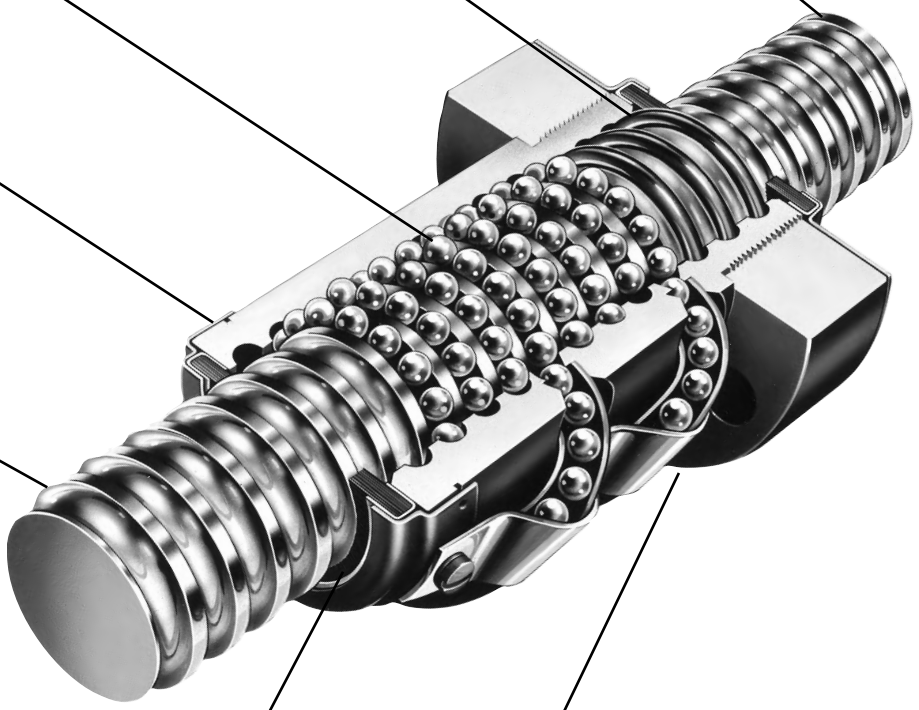
To assist the designer, standard end journals and bearing supports are included in this catalog. Ball screw assemblies, complete with end journals and bearing supports, may be ordered through a local Thomson distributor or directly from the factory.

Thomson welcomes the opportunity to custom machine end journals to unique customer designs.



Lube Holes

A standard 1/8-27 NPT tapped hole on ball nuts with a dynamic load capacity of 10,000 pounds or more provides easy access for continuing lubrication.

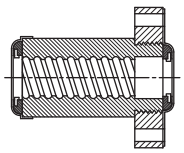


Coating

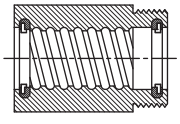
Our catalog standard ball screws feature a high luster polished and oiled finish, which provides superior surface finish, smoother operation, and a high quality look and feel which is consistent across our entire product line. Additional ball screw coatings (thin dense chrome, black oxide, manganese phosphate) are available upon request.

Wiper Kit

Wipers can increase the life and long-term performance of ball bearing screws by preventing most dirt and other foreign matter from entering the ball nut. Wipers are attached via two methods: Type A attaches directly to the ball nut body and flange; and Type B installs into the ends of the ball nut with easy-to-install snap rings kits. See our installation section on page 227 for more details.



Type A



Type B

Flanges

Standard flanges are offered for all ball nuts. Flanges provide an easy, low cost method to mount the load square and concentric to the ball screw.

0.187 x 0.050 Precision Rolled Ball Screws — Inch Series

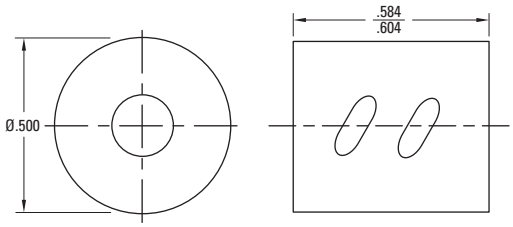
Diameter x Lead (in.)	0.187 x 0.050
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.1
Screw Root Diameter (in.)	0.14
Nominal Ball Diameter (in.)	0.039
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length			12"
Maximum Length			12"
Part Number			**7821634**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Cylindrical Ball Nut, Internal Return — Stainless Steel



Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)			20
Max. Static Load (lbs)			75
Torque to raise 1 lb (oz-in.)			0.14
Nut weight (lbs)			0.005
Ball Nut Part Number			**7821609**
Flange Part Number			**N/A**
Wiper Kit Part Number			**N/A**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.187 x 0.062 Precision Rolled Ball Screws — Inch Series

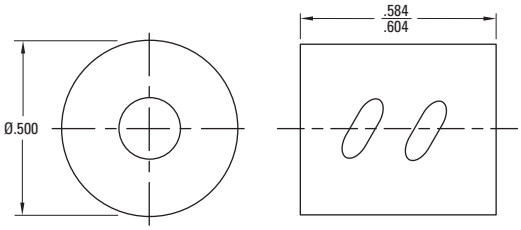
Diameter x Lead (in.)	0.187 x 0.062
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.1
Screw Root Diameter (in.)	0.14
Nominal Ball Diameter (in.)	0.039
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length			12"
Maximum Length			12"
Part Number			**7821633**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Cylindrical Ball Nut, Internal Return — Stainless Steel



Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)			20
Max. Static Load (lbs)			75
Torque to raise 1 lb (oz-in.)			0.18
Nut weight (lbs)			0.005
Ball Nut Part Number			**7821579**
Flange Part Number			**N/A**
Wiper Kit Part Number			**N/A**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.375 x 0.125 Precision Rolled Ball Screws — Inch Series

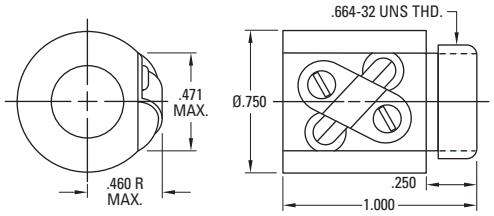
Diameter x Lead (in.)	0.375 x 0.125
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.3
Screw Root Diameter (in.)	0.30
Nominal Ball Diameter (in.)	0.063
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	48"	48"	48"
Maximum Length	48"	48"	48"
Part Number	**5707538**	**5708532**	**5706540**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Round Ball Nut

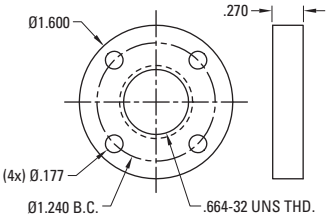


Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)	136	136	24
Max. Static Load (lbs)	1415	1415	255
Torque to raise 1 lb (oz-in.)	0.35	0.35	0.35
Nut weight (lbs)	0.13	0.13	0.13
Ball Nut Part Number	**5709574**	**5709576**	**5709578**
Flange Part Number	**5706751**	**5706751**	**N/A**
Wiper Kit Part Number	**N/A**	**N/A**	**N/A**

Flange Kit

Wiper Part Number	**N/A**	
Flange Part Number	**5706751**	

Flange



Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.375 x 0.125 Precision Rolled High Capacity Ball Screws — Inch Series

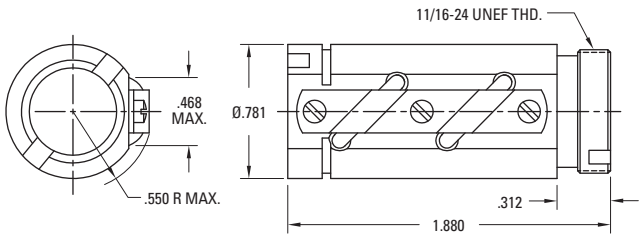
Diameter x Lead (in.)	0.375 x 0.125
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.3
Screw Root Diameter (in.)	0.31
Nominal Ball Diameter (in.)	0.078
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	72"		
Part Number	**190-9441**		

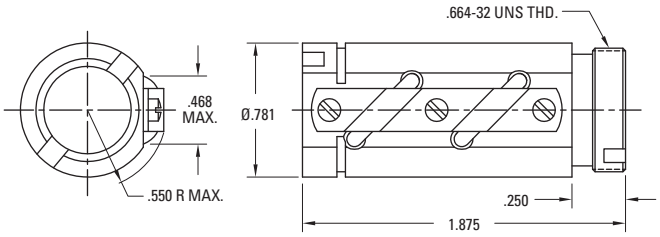
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock (11/16 - 24 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	500	
Max. Static Load (lbs)	4,250	
Torque to raise 1 lb (oz-in.)	0.35	
Nut weight (lbs)	0.16	
Ball Nut Part Number	**8103-448-003**	
Flange Part Number	**8103-448-002**	
Wiper Kit Part Number	**8103-101-002**	

Double Circuit, Round Ball Nut with Load Lock (.664 - 32 V-Thread)

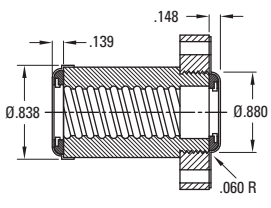


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	500	
Max. Static Load (lbs)	4,250	
Torque to raise 1 lb (oz-in.)	0.35	
Nut weight (lbs)	0.16	
Ball Nut Part Number	**8103-448-013**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**8103-101-002**	

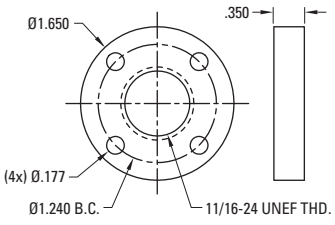
Wiper and Flange Kits

Wiper Part Number	**8103-101-002**	
Flange Part Number	**8103-448-002**	

Wiper



Flange



Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.500 x 0.200 Precision Rolled Ball Screws — Inch Series

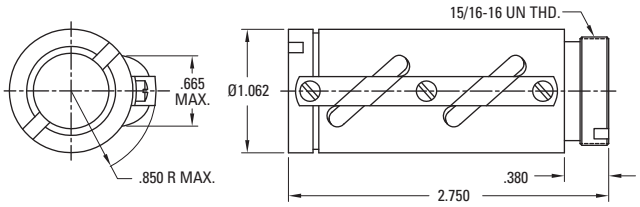
Diameter x Lead (in.)	0.500 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.7
Screw Root Diameter (in.)	0.41
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	72"		
Part Number	**190-9097**		

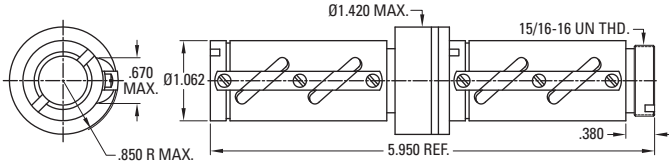
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,200	
Max. Static Load (lbs)	9,430	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.55	
Ball Nut Part Number	**8105-448-013**	
Flange Part Number	**8105-448-002**	
Wiper Kit Part Number	**8105-101-002**	

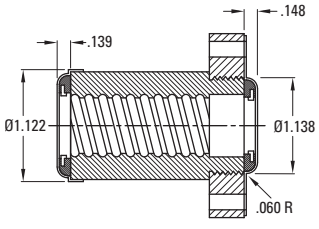
Preloaded, Double Circuit, Round Ball Nut with Load Lock



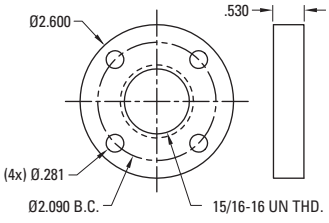
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,200	
Max. Static Load (lbs)	9,430	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.30	
Ball Nut Part Number	**8105-448-008**	
Flange Part Number	**8105-448-002**	
Wiper Kit Part Number	**8105-101-002**	

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8105-101-002**	
Flange Part Number	**8105-448-002**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.500 x 0.500 Precision Rolled Ball Screws — Inch Series

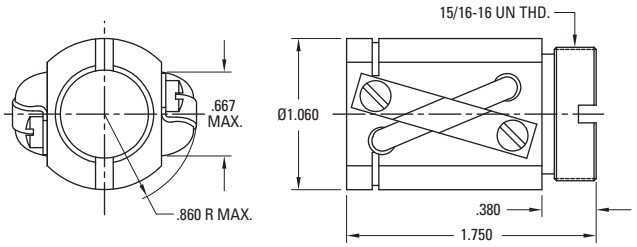
Diameter x Lead (in.)	0.500 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.7
Screw Root Diameter (in.)	0.41
Nominal Ball Diameter (in.)	0.125
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		72"
Maximum Length	72"		72"
Part Number	**190-9096**		**190-9010**

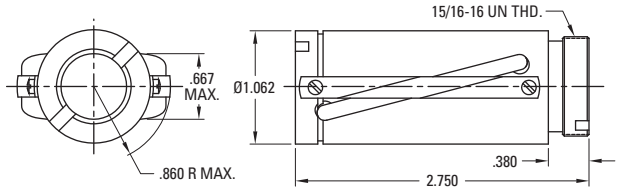
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	929	
Max. Static Load (lbs)	4,150	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	0.27	
Ball Nut Part Number	**8105-448-014**	
Flange Part Number	**8105-448-002**	
Wiper Kit Part Number	**8105-101-002**	

Double Circuit, Round Ball Nut with Load Lock — High Capacity

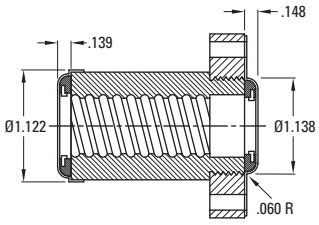


Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)	2,200		380
Max. Static Load (lbs)	13,350		1,950
Torque to raise 1 lb (oz-in.)	1.42		1.42
Nut weight (lbs)	0.40		0.40
Ball Nut Part Number	**8105-448-011**		**8105-448-016**(1)
Flange Part Number	**8105-448-002**		**8105-448-004**
Wiper Kit Part Number	**8105-101-002**		**8105-101-002**

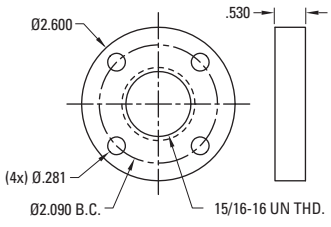
(1) Load Lock not available

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8105-101-002**		**8105-101-002**
Flange Part Number	**8105-448-002**		**8105-448-004**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.631 x 0.200 Precision Rolled Ball Screws — Inch Series

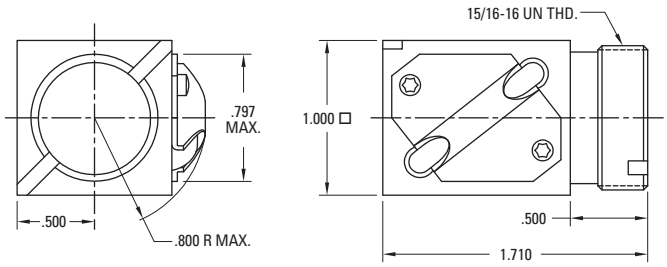
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"	72"	72"
Maximum Length	144"	144"	72"
Part Number	**190-9098**	**190-9099**	**5705378**

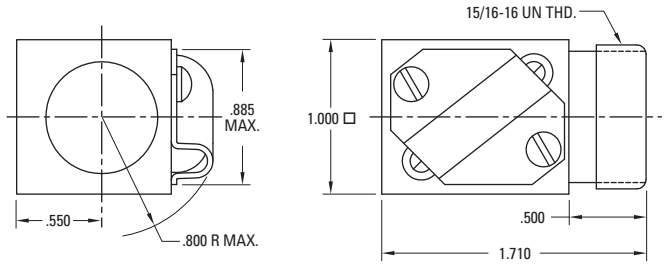
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Square Ball Nut with Load Lock



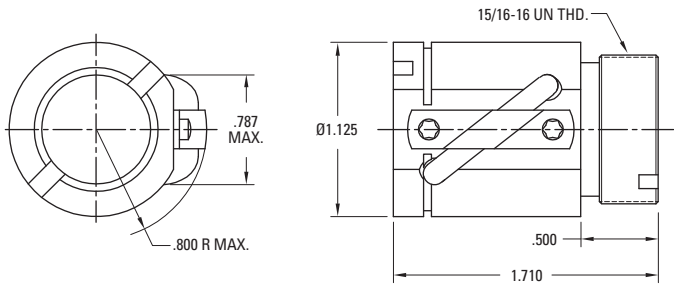
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	800
Max. Static Load (lbs)	6,384	6,384
Torque to raise 1 lb (oz-in.)	0.57	0.57
Nut weight (lbs)	0.27	0.27
Ball Nut Part Number	**8106-448-022**	**8106-448-026**
Flange Part Number	**8105-448-002**	**8105-448-002**
Wiper Kit Part Number	**N/A**	**N/A**

Single Circuit, Square Ball Nut – Stainless Steel



Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)			140
Max. Static Load (lbs)			1,149
Torque to raise 1 lb (oz-in.)			0.57
Nut weight (lbs)			0.27
Ball Nut Part Number			**5707645**
Flange Part Number			**N/A**
Wiper Kit Part Number			**5702647**

Single Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	800
Max. Static Load (lbs)	6,384	6,384
Torque to raise 1 lb (oz-in.)	0.57	0.57
Nut weight (lbs)	0.27	0.27
Ball Nut Part Number	**8106-448-009**	**8106-448-008** (1)
Flange Part Number	**8105-448-002**	**8105-448-002**
Wiper Kit Part Number	**8106-101-002**	**8106-101-002**

1) Load Lock not available

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.631 x 0.200 Precision Rolled Ball Screws — Inch Series

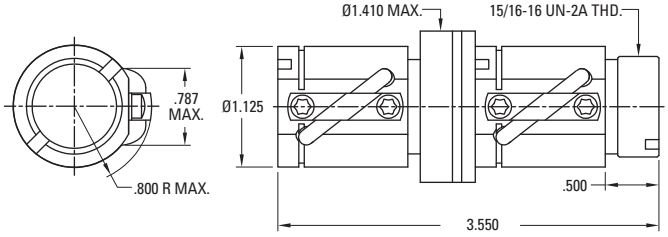
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"	72"	72"
Maximum Length	144"	144"	72"
Part Number	**190-9098**	**190-9099**	**5705378**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

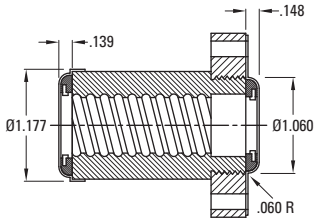
Preloaded, Single Circuit, Round Ball Nut



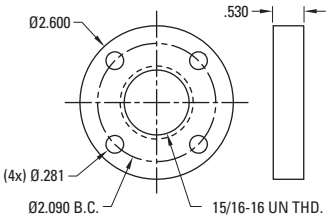
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	800
Max. Static Load (lbs)	6,384	6,384
Torque to raise 1 lb (oz-in.)	0.57	0.57
Nut weight (lbs)	0.79	0.79
Ball Nut Part Number	**8106-448-015**	**8106-448-019**
Flange Part Number	**8105-448-002**	**8105-448-002**
Wiper Kit Part Number	**8106-101-002**	**8106-101-002**

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8106-101-002**		**5702647**
Flange Part Number	**8105-448-002**		**N/A**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.631 x 0.200 Precision Rolled High Capacity Ball Screws — Inch Series

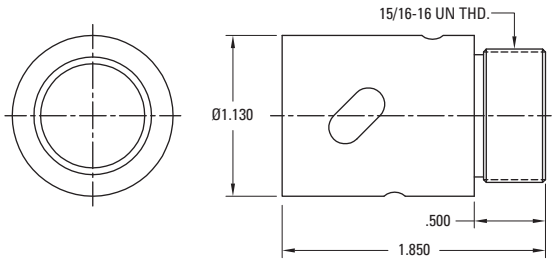
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.138
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	118"		
Maximum Length	118"		
Part Number	**7832873-T7**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

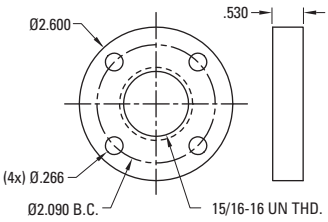
Triple Circuit, Internal Return, Round Ball Nut — High Capacity



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	650	
Max. Static Load (lbs)	4,950	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.27	
Ball Nut Part Number	**7832872**	
Flange Part Number	**5707570**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**N/A**	
Flange Part Number	**5707570**	

* Wiper Kit is included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.631 x 1.000 Precision Rolled Ball Screws — Inch Series

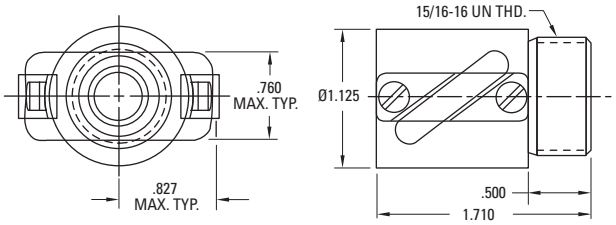
Diameter x Lead (in.)	0.631 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.8
Screw Root Diameter (in.)	0.48
Nominal Ball Diameter (in.)	0.125
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	96"		
Part Number	**7826712**		

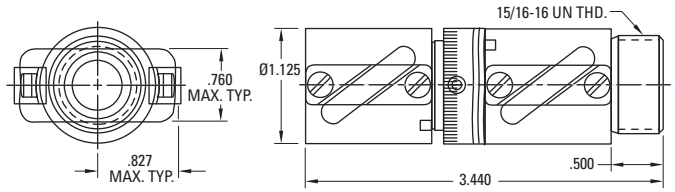
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	578	
Max. Static Load (lbs)	2,425	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	0.28	
Ball Nut Part Number	**7826713**	
Flange Part Number	**5707570**	
Wiper Kit Part Number	**7827527**	

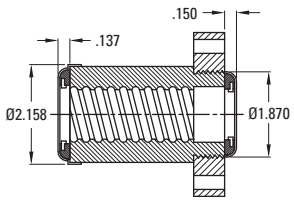
Preloaded, Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	578	
Max. Static Load (lbs)	2,425	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	0.67	
Ball Nut Part Number	**7827531**	
Flange Part Number	**5707570**	
Wiper Kit Part Number	**7827527**	

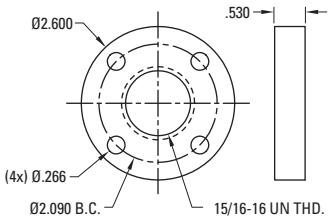
Wiper and Flange Kits

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number	**7827527**	
Flange Part Number	**5707570**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

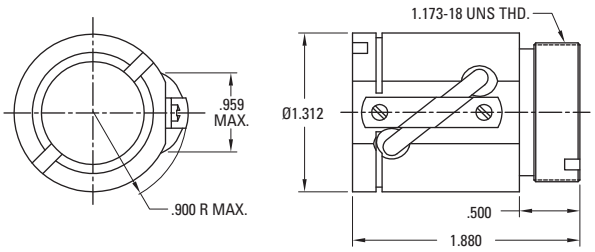
Diameter x Lead (in.)	0.750 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.66
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	144"		
Part Number	**190-9101**		

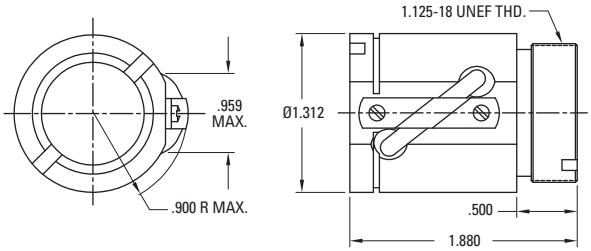
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



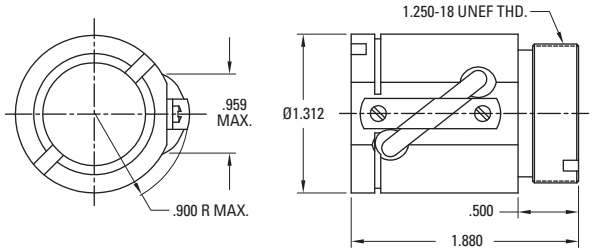
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	950	
Max. Static Load (lbs)	7,750	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.50	
Ball Nut Part Number	**8107-448-018**	
Flange Part Number	**8107-448-007**	
Wiper Kit Part Number	**8107-101-002**	

Single Circuit, Round Ball Nut (1.125 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	950	
Max. Static Load (lbs)	7,750	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.50	
Ball Nut Part Number	**8107-448-026**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Single Circuit, Round Ball Nut (1.250 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Carbon Steel	
Dynamic Load (lbs)	950	
Max. Static Load (lbs)	7,750	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.50	
Ball Nut Part Number	**8107-448-047**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

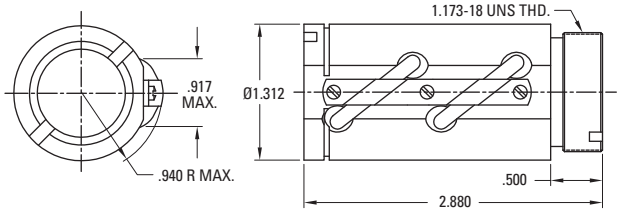
Diameter x Lead (in.)	0.750 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.66
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	144"		
Part Number	**190-9101**		

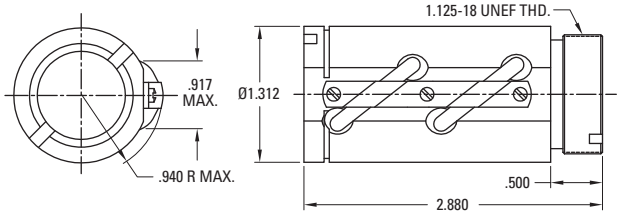
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



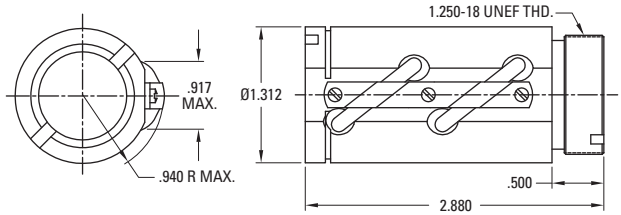
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,900	
Max. Static Load (lbs)	18,800	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.75	
Ball Nut Part Number	**8107-448-016**	
Flange Part Number	**8107-448-007**	
Wiper Kit Part Number	**8107-101-002**	

Double Circuit, Round Ball Nut with Load Lock (1.125 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,900	
Max. Static Load (lbs)	18,800	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.75	
Ball Nut Part Number	**8107-448-027**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Double Circuit, Round Ball Nut with Load Lock (1.250 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,900	
Max. Static Load (lbs)	18,800	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.75	
Ball Nut Part Number	**8107-448-046**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

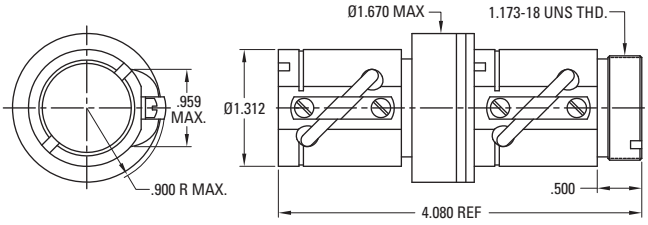
Diameter x Lead (in.)	0.750 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.66
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		
Maximum Length	144"		
Part Number	**190-9101**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Preloaded, Single Circuit, Round Ball Nut (1.173 - 18 V-Thread)

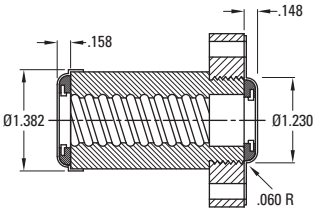


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	950	
Max. Static Load (lbs)	7,750	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.20	
Ball Nut Part Number	**8107-448-025**	
Flange Part Number	**8107-448-007**	
Wiper Kit Part Number	**8107-101-002**	

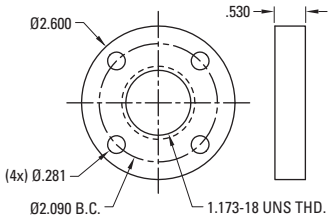
Wiper and Flange Kits

Wiper Part Number	**8107-101-002**	
Flange Part Number	**8107-448-007**	

Wiper



Flange



Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

NOTES:

0.750 x 0.500 Precision Rolled Ball Screws — Inch Series

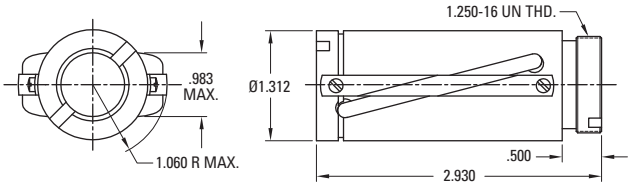
Diameter x Lead (in.)	0.750 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.63
Nominal Ball Diameter (in.)	0.156
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		72"
Maximum Length	144"		144"
Part Number	**190-9100**		**190-9006**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

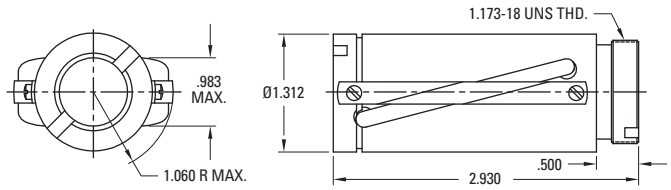
Double Circuit, Round Ball Nut with Load Lock (1.250 - 16 V-Thread)



Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)	3,450		600
Max. Static Load (lbs)	24,200		3,460
Torque to raise 1 lb (oz-in.)	1.42		1.42
Nut weight (lbs)	0.80		0.80
Ball Nut Part Number	**8107-448-014**		**8107-448-020** (1)
Flange Part Number	**8107-448-002**		**8107-448-004**
Wiper Kit Part Number	**8107-101-002**		**8107-101-002**

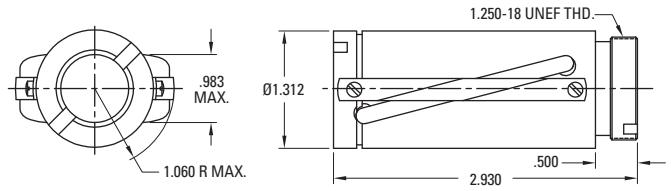
(1) Load Lock not available

Double Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,450	
Max. Static Load (lbs)	24,200	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	0.80	
Ball Nut Part Number	**8107-448-049**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Double Circuit, Round Ball Nut with Load Lock (1.250 - 18 V-Thread)



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,450	
Max. Static Load (lbs)	24,200	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	0.80	
Ball Nut Part Number	**8107-448-048**	
Flange Part Number	**N/A**	
Wiper Kit Part Number	**N/A**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.750 x 0.500 Precision Rolled Ball Screws — Inch Series

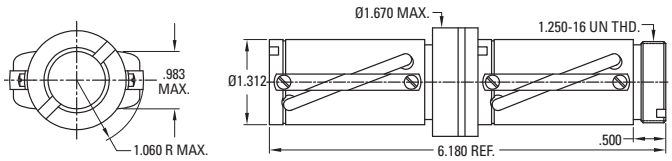
Diameter x Lead (in.)	0.750 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.63
Nominal Ball Diameter (in.)	0.156
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	72"		72"
Maximum Length	144"		144"
Part Number	**190-9100**		**190-9006**

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

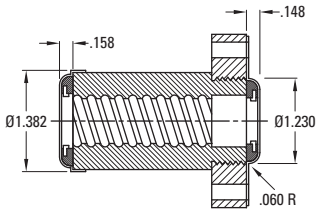
Preloaded, Double Circuit, Round Ball Nut with Load Lock (1.250 - 16 V-Thread)



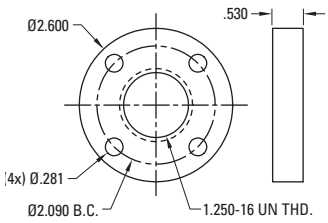
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,450	
Max. Static Load (lbs)	24,200	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	1.85	
Ball Nut Part Number	**8107-448-011**	
Flange Part Number	**8107-448-002**	
Wiper Kit Part Number	**8107-101-002**	

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8107-101-002**		
Flange Part Number	**8107-448-002**		**8107-448-004**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

0.875 x 0.200 Precision Rolled Ball Screws — Inch Series

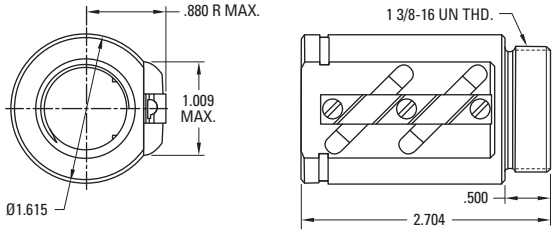
Diameter x Lead (in.)	0.875 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.8
Screw Root Diameter (in.)	0.74
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	144"		
Part Number	**5708859**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

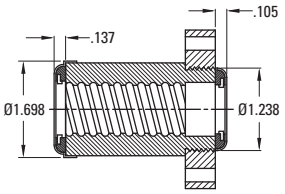
Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,942	
Max. Static Load (lbs)	18,063	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.69	
Ball Nut Part Number	**5708277**	
Flange Part Number	**5708281**	
Wiper Kit Part Number	**7831512**	

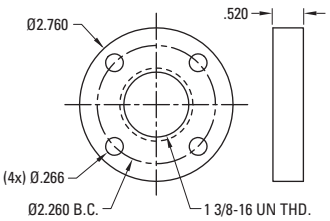
Wiper and Flange Kits

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number	**7831512**	
Flange Part Number	**5708281**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

NOTES:

1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

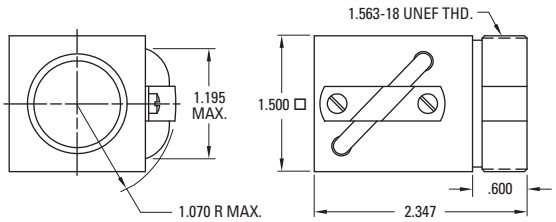
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	144"	
Maximum Length	288"	144"	
Part Number	**190-9104**	**190-9105**	

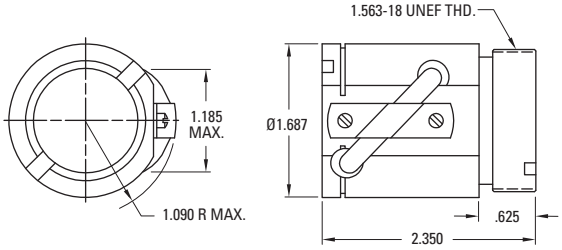
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Square Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,612	
Max. Static Load (lbs)	15,300	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	0.81	
Ball Nut Part Number	**8110-448-055**	
Flange Part Number	**8110-448-002**	
Wiper Kit Part Number	**N/A**	

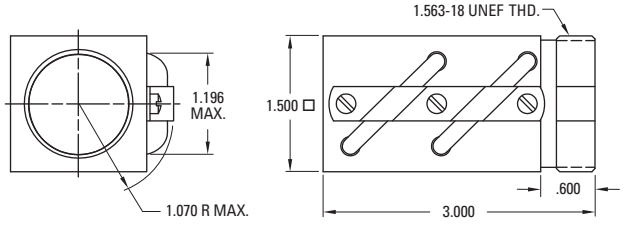
Single Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,612	1,612
Max. Static Load (lbs)	13,913	13,913
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	0.81	0.81
Ball Nut Part Number	**8110-448-032**	**8110-448-030**(1)
Flange Part Number	**8110-448-002**	**8110-448-002**
Wiper Kit Part Number	**8110-101-002**	**8110-101-002**

(1) Load Lock not available

Double Circuit, Square Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,350	
Max. Static Load (lbs)	30,750	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	1.25	
Ball Nut Part Number	**8110-448-056**	
Flange Part Number	**8110-448-002**	
Wiper Kit Part Number	**N/A**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

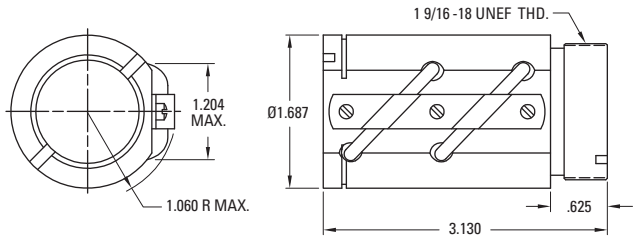
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	144"	
Maximum Length	288"	144"	
Part Number	**190-9104**	**190-9105**	

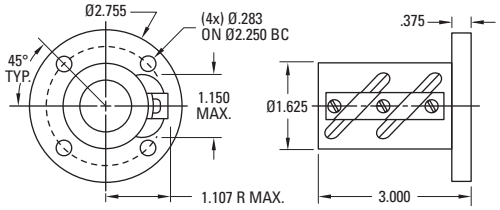
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



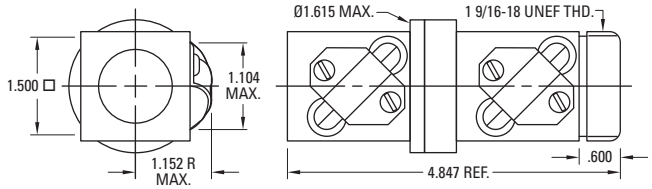
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,350	3,350
Max. Static Load (lbs)	30,750	30,750
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	1.25	1.25
Ball Nut Part Number	**8110-448-026**	**8110-448-024**
Flange Part Number	**8110-448-002**	**8110-448-002**
Wiper Kit Part Number	**8110-101-002**	**8110-101-002**

Double Circuit, Round Ball Nut with Integral Flange



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,350	3,350
Max. Static Load (lbs)	30,750	30,750
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	1.50	1.50
Ball Nut Part Number	**8110-448-087**	**8110-448-088**
Flange Part Number	**Integral**	**Integral**
Wiper Kit Part Number	**N/A**	**N/A**

Preloaded, Single Circuit, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,612	1,612
Max. Static Load (lbs)	13,913	13,913
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	1.90	1.90
Ball Nut Part Number	**8110-448-092**	**8110-448-089**
Flange Part Number	**8110-448-002**	**8110-448-002**
Wiper Kit Part Number	**N/A**	**N/A**

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

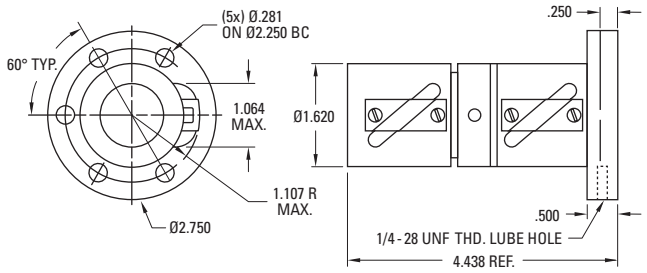
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	144"	
Maximum Length	288"	144"	
Part Number	**190-9104**	**190-9105**	

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Preloaded, Single Circuit, Round Ball Nut with Integral Flange

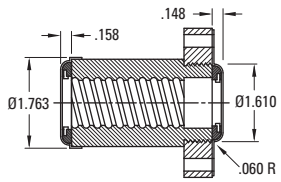


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,612	
Max. Static Load (lbs)	13,913	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	2.00	
Ball Nut Part Number	**8110-448-097**	
Flange Part Number	**Integral**	
Wiper Kit Part Number	**Internal**	

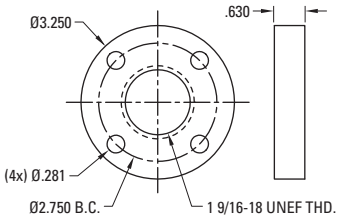
Wiper and Flange Kits

Wiper Part Number	**8110-101-002**	
Flange Part Number	**8110-448-002**	

Wiper



Flange



Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.000 x 0.500 Precision Rolled Ball Screws — Inch Series

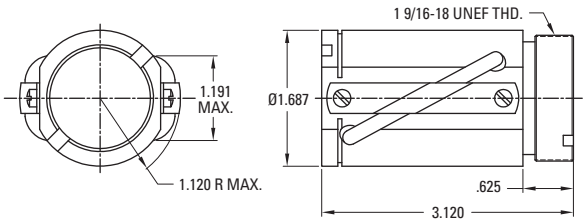
Diameter x Lead (in.)	1.000 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.6
Screw Root Diameter (in.)	0.88
Nominal Ball Diameter (in.)	0.156
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9103**		

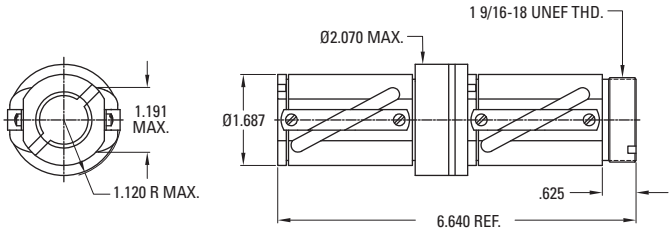
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,950	
Max. Static Load (lbs)	32,300	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	1.25	
Ball Nut Part Number	**8110-448-022**	
Flange Part Number	**8110-448-002**	
Wiper Kit Part Number	**8110-101-002**	

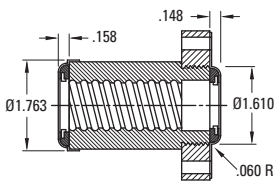
Preloaded, Double Circuit, Round Ball Nut with Load Lock



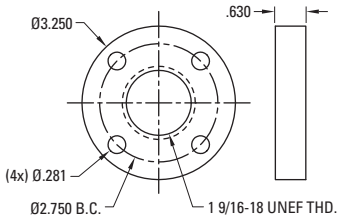
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,950	
Max. Static Load (lbs)	32,300	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	2.90	
Ball Nut Part Number	**8110-448-016**	
Flange Part Number	**8110-448-002**	
Wiper Kit Part Number	**8110-101-002**	

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8110-101-002**	
Flange Part Number	**8110-448-002**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.000 x 1.000 Precision Rolled Ball Screws — Inch Series

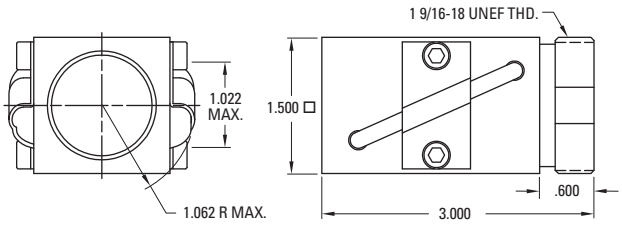
Diameter x Lead (in.)	1.000 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		144"
Maximum Length	288"		144"
Part Number	**190-9102**		**190-9150**

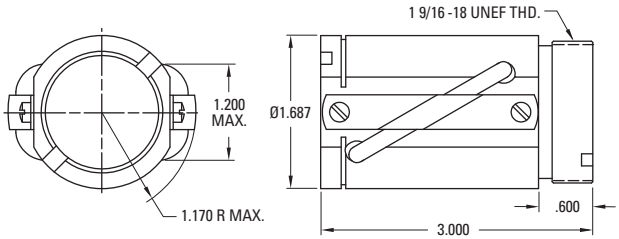
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Square Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	2,400	
Max. Static Load (lbs)	13,600	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	1.25	
Ball Nut Part Number	**8110-448-086**	
Flange Part Number	**8110-448-002**	
Wiper Kit Part Number	**N/A**	

Double Circuit, Round Ball Nut with Load Lock

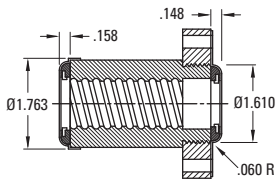


Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)	2,250		430
Max. Static Load (lbs)	13,750		2000
Torque to raise 1 lb (oz-in.)	2.83		2.83
Nut weight (lbs)	1.25		1.25
Ball Nut Part Number	**8110-448-020**		**8110-448-034** (1)
Flange Part Number	**8110-448-002**		**8110-448-037**
Wiper Kit Part Number	**8110-101-002**		**8110-101-002**

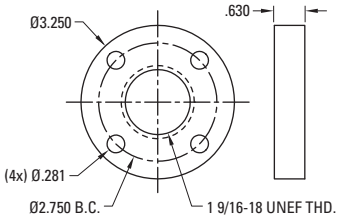
(1) Load Lock not available

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8110-101-002**	
Flange Part Number	**8110-448-002**	
Flange Part Number	**8110-448-037**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

NOTES:

1.150 x 0.200 Precision Rolled Ball Screws — Inch Series

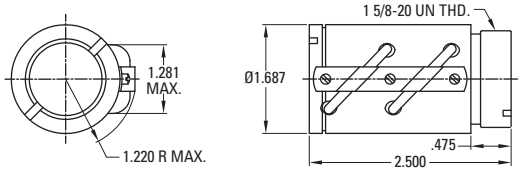
Diameter x Lead (in.)	1.150 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	3.2
Screw Root Diameter (in.)	1.02
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9106**		

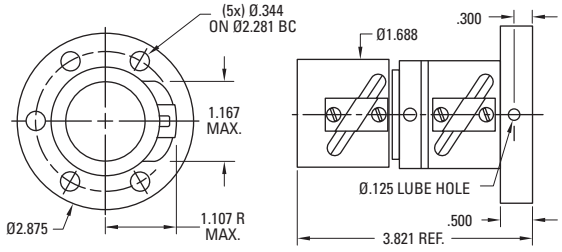
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	2,400	
Max. Static Load (lbs)	27,550	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.88	
Ball Nut Part Number	**8111-448-006**	
Flange Part Number	**8111-448-002**	
Wiper Kit Part Number	**8111-101-002**	

Preloaded, Single Circuit, Round Ball Nut with Integral Flange



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	1,185	
Max. Static Load (lbs)	13,090	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.75	
Ball Nut Part Number	**8111-448-014**	
Flange Part Number	**Integral**	
Wiper Kit Part Number	**Internal**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.150 x 0.200 Precision Rolled Ball Screws — Inch Series

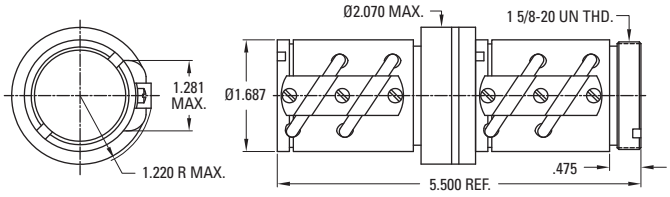
Diameter x Lead (in.)	1.150 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	3.2
Screw Root Diameter (in.)	1.02
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9106**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

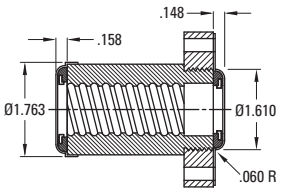
Preloaded, Double Circuit, Round Ball Nut with Load Lock



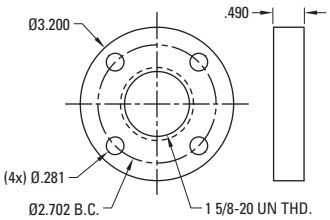
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	2,400	
Max. Static Load (lbs)	27,550	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	2.25	
Ball Nut Part Number	**8111-448-004**	
Flange Part Number	**8111-448-002**	
Wiper Kit Part Number	**8111-101-002**	

Wiper and Flange Kits

Wiper



Flange



Wiper Part Number	**8111-101-002**	
Flange Part Number	**8111-448-002**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.171 x 0.413 Precision Rolled Ball Screws — Inch Series

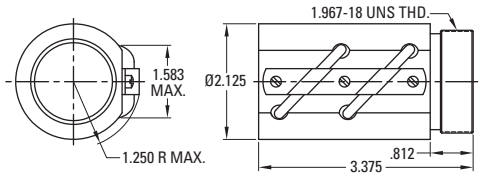
Diameter x Lead (in.)	1.171 x 0.413
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.8
Screw Root Diameter (in.)	0.87
Nominal Ball Diameter (in.)	0.281
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	192"		
Maximum Length	192"		
Part Number	**7820432**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

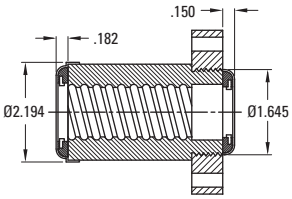
Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	3,894	
Max. Static Load (lbs)	22,917	
Torque to raise 1 lb (oz-in.)	1.17	
Nut weight (lbs)	1.94	
Ball Nut Part Number	**5707511**	
Flange Part Number	**5707572**	
Wiper Kit Part Number	**5702653**	

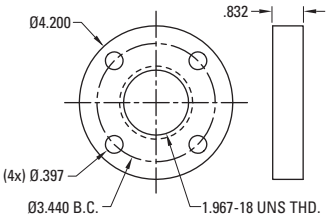
Wiper and Flange Kits

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number	**5702653**	
Flange Part Number	**5707572**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 0.250 Precision Rolled Ball Screws — Inch Series

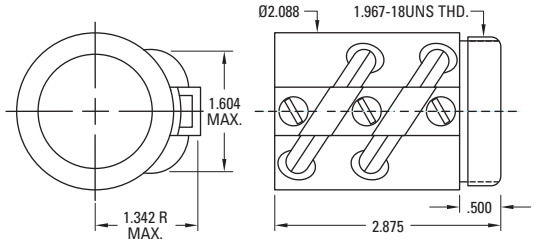
Diameter x Lead (in.)	1.500 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.2
Screw Root Diameter (in.)	1.32
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"	240"	
Maximum Length	240"	240"	
Part Number	**7820595**	**7820596**	

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

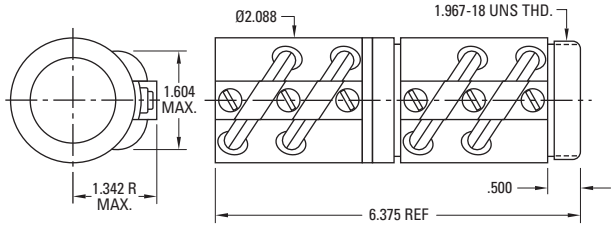
Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand (1)
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	4,198	4,198
Max. Static Load (lbs)	44,030	44,030
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	1.65	1.65
Ball Nut Part Number	**7833233**	**5701990** (1)
Flange Part Number	**5706754**	**5706754**
Wiper Kit Part Number	**5702654**	**5702654**

(1) Load Lock not available

Preloaded, Double Circuit, Round Ball Nut with Load Lock



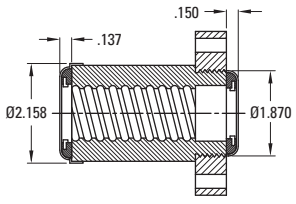
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	4,198	4,198
Max. Static Load (lbs)	44,030	44,030
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	3.80	3.80
Ball Nut Part Number	**7833234**	**5704573** (1)
Flange Part Number	**5706754**	**5706754**
Wiper Kit Part Number	**5702654**	**5702654**

(1) Load Lock not available

Wiper and Flange Kits

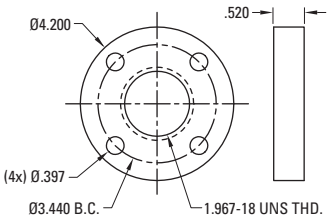
Wiper Part Number	**5702654**	
Flange Part Number	**5706754**	

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 0.473 Precision Rolled Ball Screws — Inch Series

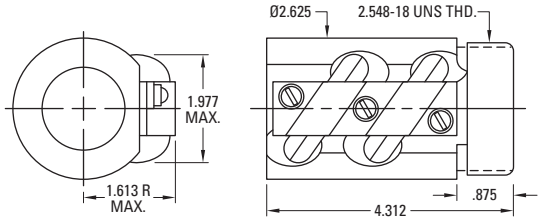
Diameter x Lead (in.)	1.500 x 0.473
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	4.5
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**7820597**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

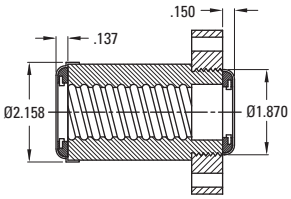
Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	10,050	
Max. Static Load (lbs)	57,770	
Torque to raise 1 lb (oz-in.)	1.34	
Nut weight (lbs)	3.94	
Ball Nut Part Number	**5707513**	
Flange Part Number	**5707573**	
Wiper Kit Part Number	**5702655**	

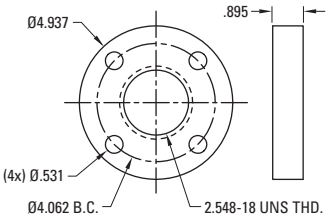
Wiper and Flange Kits

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number	**5702655**	
Flange Part Number	**5707573**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 0.500 Precision Rolled Ball Screws — Inch Series

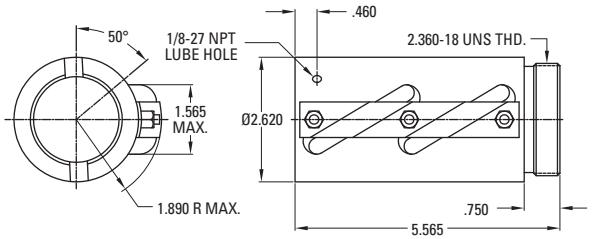
Diameter x Lead (in.)	1.500 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.27
Nominal Ball Diameter (in.)	0.312
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	144"	
Maximum Length	288"	144"	
Part Number	**190-9108**	**190-9109**	

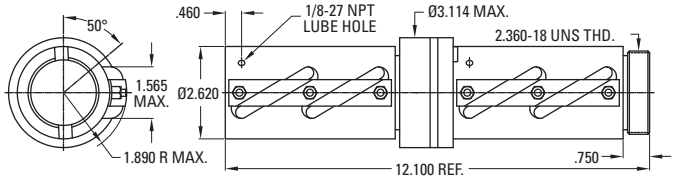
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	14,513	14,513
Max. Static Load (lbs)	102,300	102,300
Torque to raise 1 lb (oz-in.)	1.42	1.42
Nut weight (lbs)	5.70	5.70
Ball Nut Part Number	**8115-448-016**	**8115-448-018**
Flange Part Number	**8115-448-004**	**8115-448-004**
Wiper Kit Part Number*	**Internal**	**Internal**

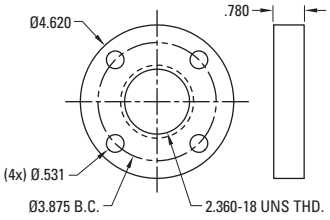
Preloaded, Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	14,513	
Max. Static Load (lbs)	102,300	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	12.20	
Ball Nut Part Number	**8115-448-006**	
Flange Part Number	**8115-448-004**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**8115-101-004**	
Flange Part Number	**8115-448-004**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

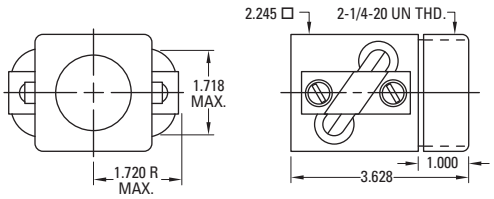
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	240"	
Maximum Length	288"	240"	
Part Number	**190-9107**	**190-9666**	

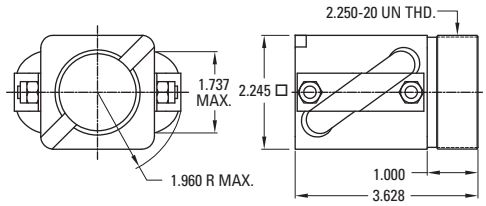
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Square Ball Nut



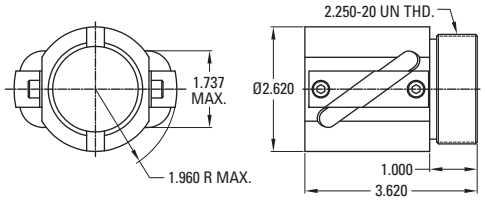
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	8,250	8,250
Max. Static Load (lbs)	34,662	34,662
Torque to raise 1 lb (oz-in.)	2.83	2.83
Nut weight (lbs)	3.88	3.88
Ball Nut Part Number	**8115-448-074**	**8115-448-080**
Flange Part Number	**8115-448-002**	**8115-448-002**
Wiper Kit Part Number	**N/A**	**N/A**

Double Circuit, Square Ball Nut — High Speed



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	34,662	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	3.88	
Ball Nut Part Number	**8115-448-076**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number	**N/A**	

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	47,800	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	3.90	
Ball Nut Part Number	**8115-448-014**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number*	**Internal**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

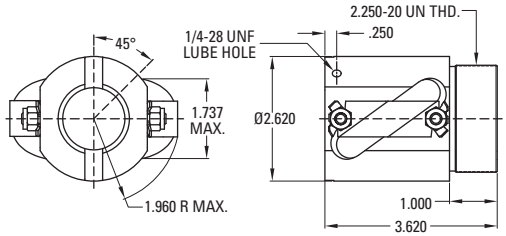
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	240"	
Maximum Length	288"	240"	
Part Number	**190-9107**	**190-9666**	

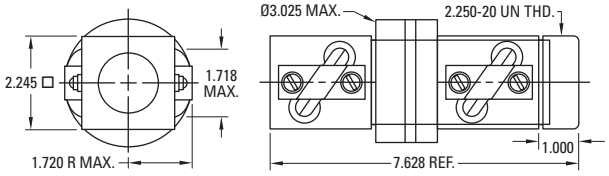
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut – High Speed



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	47,800	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	3.90	
Ball Nut Part Number	**8115-448-049**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number*	**Integral**	

Preloaded, Double Circuit, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	34,662	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.55	
Ball Nut Part Number	**8115-448-075**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number	**N/A**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

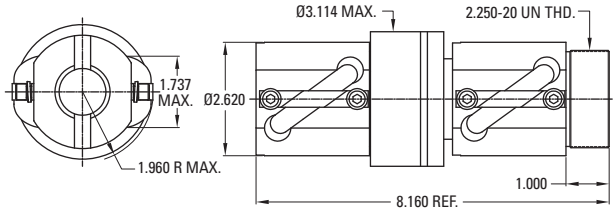
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	240"	
Maximum Length	288"	240"	
Part Number	**190-9107**	**190-9666**	

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

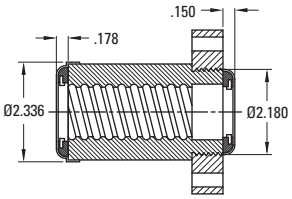
Preloaded, Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	47,800	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.60	
Ball Nut Part Number	**8115-448-011**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number*	**Internal**	

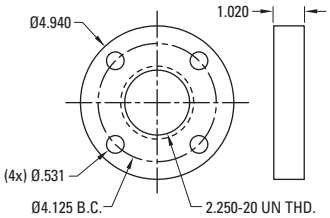
Wiper and Flange Kits

Wiper — 8115-101-012



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number (RND)	**8115-101-004**	
Wiper Part Number (SQ)	**8115-101-012**	
Flange Part Number	**8115-448-002**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 1.875 Precision Rolled Ball Screws — Inch Series

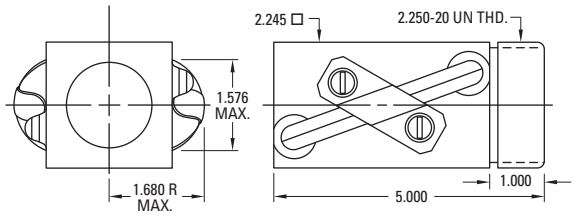
Diameter x Lead (in.)	1.500 x 1.875
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.3
Screw Root Diameter (in.)	1.19
Nominal Ball Diameter (in.)	0.281
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**7820599**		

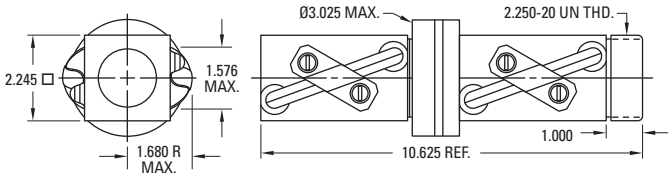
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	7,242	
Max. Static Load (lbs)	29,895	
Torque to raise 1 lb (oz-in.)	5.31	
Nut weight (lbs)	4.22	
Ball Nut Part Number	**5707654**	
Flange Part Number	**5707777**	
Wiper Kit Part Number	**5702658**	

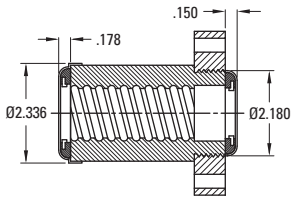
Preloaded, Double Circuit, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	7,242	
Max. Static Load (lbs)	29,895	
Torque to raise 1 lb (oz-in.)	5.31	
Nut weight (lbs)	9.93	
Ball Nut Part Number	**5704272**	
Flange Part Number	**5707777**	
Wiper Kit Part Number	**5702658**	

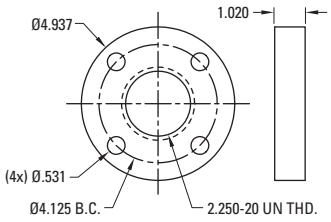
Wiper and Flange Kits

Wiper



Note: Wiper kit does not include flange end cap.

Flange



Wiper Part Number	**5702658**	
Flange Part Number	**5707777**	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

1.500 x 2.000 Precision Rolled Ball Screws — Inch Series

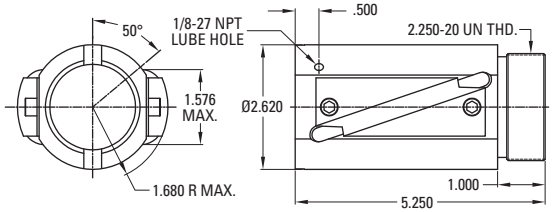
Diameter x Lead (in.)	1.500 x 2.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.21
Nominal Ball Diameter (in.)	0.281
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9345**		

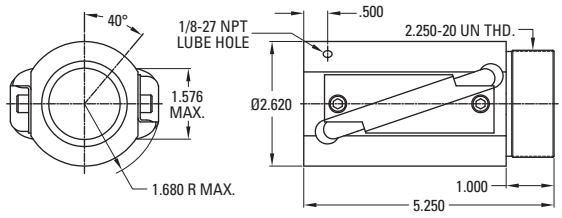
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	7,600	
Max. Static Load (lbs)	29,000	
Torque to raise 1 lb (oz-in.)	5.66	
Nut weight (lbs)	5.00	
Ball Nut Part Number	**8115-448-056**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number*	**Internal**	

Double Circuit, Round Ball Nut with Load Lock — High Speed

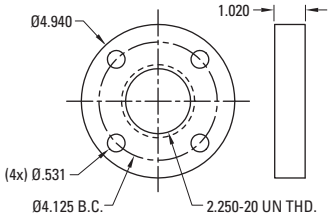


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	7,600	
Max. Static Load (lbs)	29,000	
Torque to raise 1 lb (oz-in.)	5.66	
Nut weight (lbs)	5.00	
Ball Nut Part Number	**8115-448-057**	
Flange Part Number	**8115-448-002**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Wiper Part Number	**8115-101-004**	
Flange Part Number	**8115-448-002**	

Flange



* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.000 x 0.500 Precision Rolled Ball Screws — Inch Series

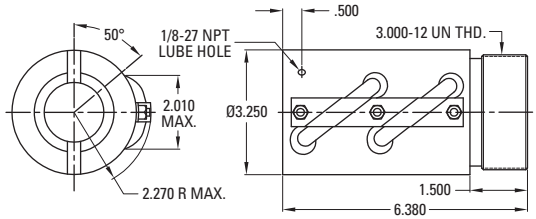
Diameter x Lead (in.)	2.000 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	9.8
Screw Root Diameter (in.)	1.72
Nominal Ball Diameter (in.)	0.375
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"	144"	
Maximum Length	288"	288"	
Part Number	**190-9112**	**190-9113**	

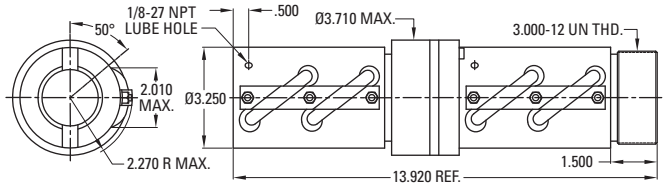
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	18,500	18,500
Max. Static Load (lbs)	143,400	143,400
Torque to raise 1 lb (oz-in.)	1.42	1.42
Nut weight (lbs)	8.00	8.00
Ball Nut Part Number	**8120-448-011**	**8120-448-013**
Flange Part Number	**8120-448-002**	**8120-448-002**
Wiper Kit Part Number*	**Internal**	**Internal**

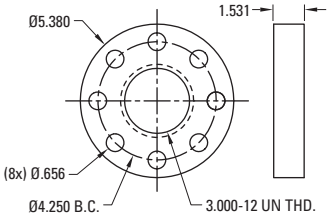
Preloaded, Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	18,500	18,500
Max. Static Load (lbs)	154,635	154,635
Torque to raise 1 lb (oz-in.)	1.42	1.42
Nut weight (lbs)	19.25	19.25
Ball Nut Part Number	**8120-448-006**	**8120-448-007**
Flange Part Number	**8120-448-002**	**8120-448-002**
Wiper Kit Part Number*	**Internal**	**Internal**

Flange Kit

Flange



Wiper Part Number	**8120-101-002**	
Flange Part Number	**8120-448-002**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.000 x 1.000 Precision Rolled Ball Screws — Inch Series

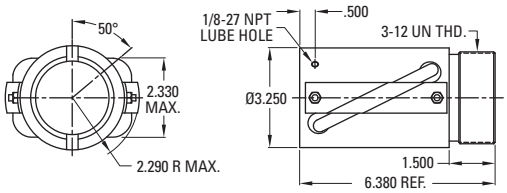
Diameter x Lead (in.)	2.000 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	9.8
Screw Root Diameter (in.)	1.72
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9111**		

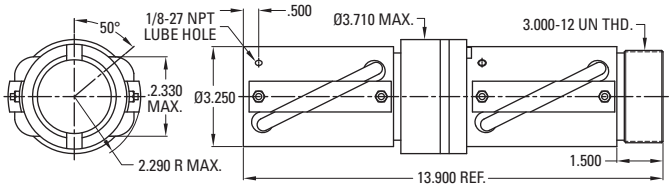
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	21,200	
Max. Static Load (lbs)	134,500	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.00	
Ball Nut Part Number	**8120-448-021**	
Flange Part Number	**8120-448-002**	
Wiper Kit Part Number*	**Internal**	

Preloaded, Double Circuit, Round Ball Nut with Load Lock

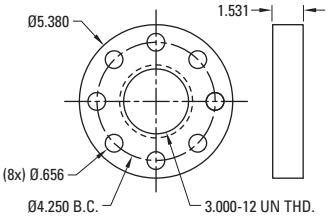


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	21,200	
Max. Static Load (lbs)	152,605	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	19.25	
Ball Nut Part Number	**8120-448-019**	
Flange Part Number	**8120-448-002**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Wiper Part Number	**8120-101-002**	
Flange Part Number	**8120-448-002**	

Flange



* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.250 x 0.500 Precision Rolled Ball Screws — Inch Series

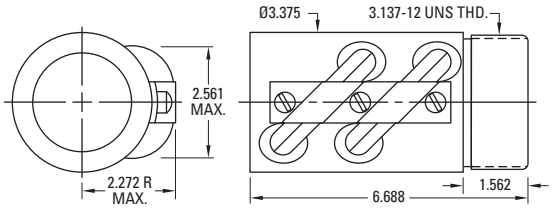
Diameter x Lead (in.)	2.250 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	10.9
Screw Root Diameter (in.)	1.85
Nominal Ball Diameter (in.)	0.375
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"	240"	
Maximum Length	240"	240"	
Part Number	**7820600**	**7820602**	

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock

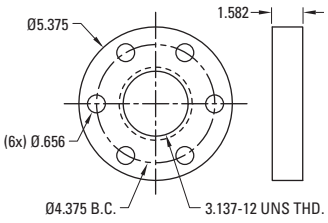


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	21,306	21,306
Max. Static Load (lbs)	161,150	161,150
Torque to raise 1 lb (oz-in.)	1.42	1.42
Nut weight (lbs)	8.25	8.25
Ball Nut Part Number	**7833235**	**5704000** (1)
Flange Part Number	**5707574**	**5707574**
Wiper Kit Part Number*	**Internal**	**Internal**

(1) Load Lock not available

Flange Kit

Flange



Wiper Part Number	**5702659**	
Flange Part Number	**5707574**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.250 x 1.000 Precision Rolled Ball Screws — Inch Series

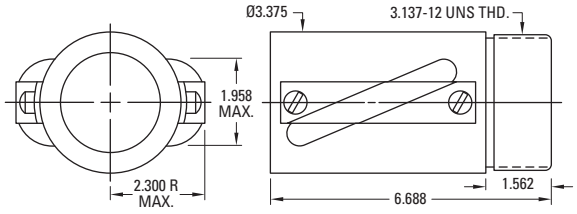
Diameter x Lead (in.)	2.250 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	10.9
Screw Root Diameter (in.)	1.85
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**7820604**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

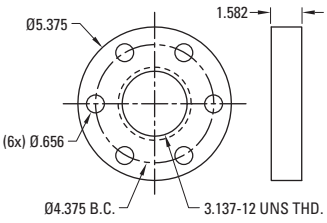
Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	26,538	
Max. Static Load (lbs)	161,150	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.25	
Ball Nut Part Number	**5704555**	
Flange Part Number	**5707574**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**5702659**	
Flange Part Number	**5707574**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.500 x 0.250 Precision Rolled Ball Screws — Inch Series

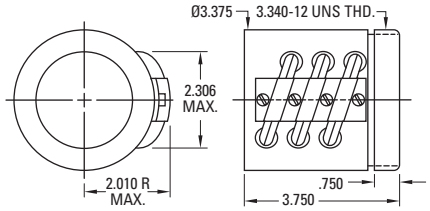
Diameter x Lead (in.)	2.500 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	15.5
Screw Root Diameter (in.)	2.32
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**7820606**		

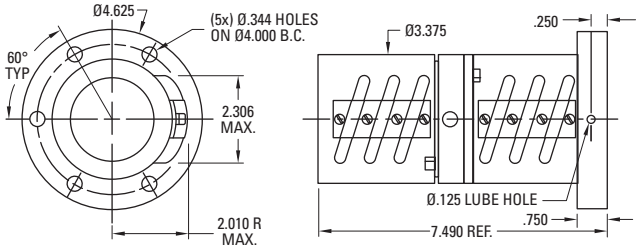
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Triple Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	6,315	
Max. Static Load (lbs)	81,938	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	4.72	
Ball Nut Part Number	**5703243**	
Flange Part Number	**5703263**	
Wiper Kit Part Number*	**Internal**	

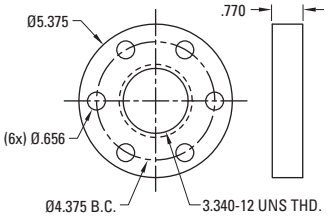
Preloaded, Triple Circuit, Round Ball Nut with Integral Flange



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	6,315	
Max. Static Load (lbs)	81,938	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	9.94	
Ball Nut Part Number	**7823590**	
Flange Part Number	**Integral**	
Wiper Kit Part Number	**Internal**	

Flange Kit

Flange



Wiper Part Number	**5703324**	
Flange Part Number	**5703263**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.500 x 0.500 Precision Rolled Ball Screws — Inch Series

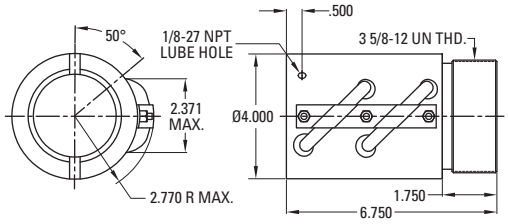
Diameter x Lead (in.)	2.500 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	15.0
Screw Root Diameter (in.)	2.22
Nominal Ball Diameter (in.)	0.375
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9116**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock

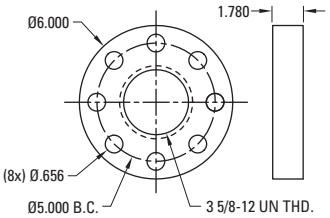


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	22,981	
Max. Static Load (lbs)	186,000	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	13.00	
Ball Nut Part Number	**8125-448-010**	
Flange Part Number	**8125-448-002**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Wiper Part Number	**8125-101-002**	
Flange Part Number	**8125-448-002**	

Flange



* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

2.500 x 1.000 Precision Rolled Ball Screws — Inch Series

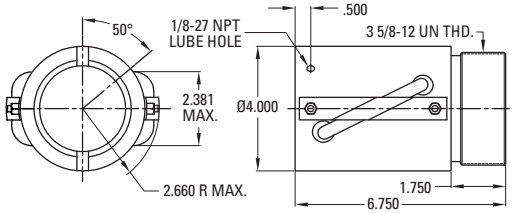
Diameter x Lead (in.)	2.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	15.0
Screw Root Diameter (in.)	2.22
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9115**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

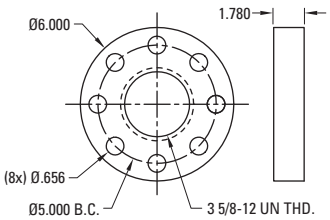
Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	27,000	
Max. Static Load (lbs)	174,000	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	13.00	
Ball Nut Part Number	**8125-448-008**	
Flange Part Number	**8125-448-002**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**8125-101-002**	
Flange Part Number	**8125-448-002**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

3.000 x 0.660 Precision Rolled Ball Screws — Inch Series

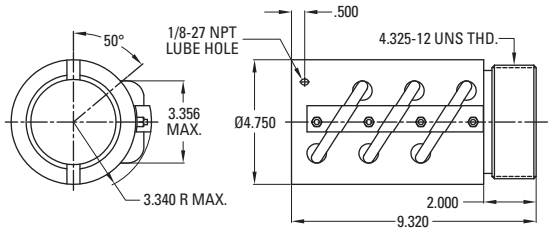
Diameter x Lead (in.)	3.000 x 0.660
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	18.3
Screw Root Diameter (in.)	2.48
Nominal Ball Diameter (in.)	0.500
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	144"		
Maximum Length	288"		
Part Number	**190-9117**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

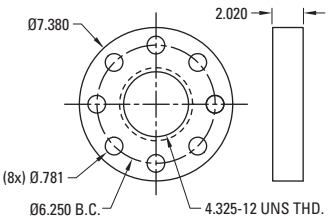
Triple Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	44,316	
Max. Static Load (lbs)	323,950	
Torque to raise 1 lb (oz-in.)	1.87	
Nut weight (lbs)	26.00	
Ball Nut Part Number	**8130-448-007**	
Flange Part Number	**8130-448-002**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**8130-101-002**	
Flange Part Number	**8130-448-002**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

3.000 x 1.500 Precision Rolled Ball Screws — Inch Series

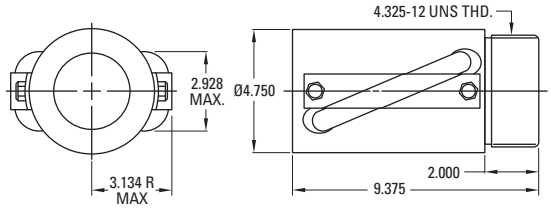
Diameter x Lead (in.)	3.000 x 1.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	19.3
Screw Root Diameter (in.)	2.48
Nominal Ball Diameter (in.)	0.500
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**7820609**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

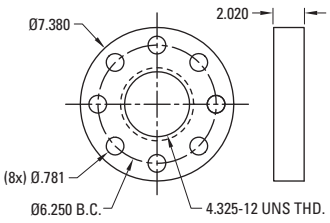
Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	53,646	
Max. Static Load (lbs)	253,617	
Torque to raise 1 lb (oz-in.)	4.25	
Nut weight (lbs)	27.2	
Ball Nut Part Number	**5704986**	
Flange Part Number	**5707575**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange



Wiper Part Number	**5702661**	
Flange Part Number	**5707575**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

4.000 x 1.000 Precision Rolled Ball Screws — Inch Series

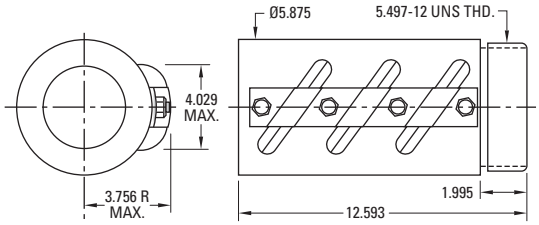
Diameter x Lead (in.)	4.000 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	34.4
Screw Root Diameter (in.)	3.34
Nominal Ball Diameter (in.)	0.625
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length	240"		
Maximum Length	240"		
Part Number	**5703262**		

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

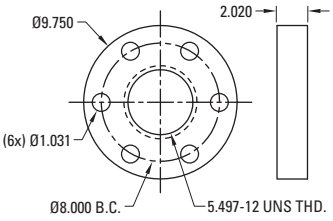
Triple Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	
Dynamic Load (lbs)	85,758	
Max. Static Load (lbs)	476,970	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	53.5	
Ball Nut Part Number	**5703258**	
Flange Part Number	**5703307**	
Wiper Kit Part Number*	**Internal**	

Flange Kit

Flange

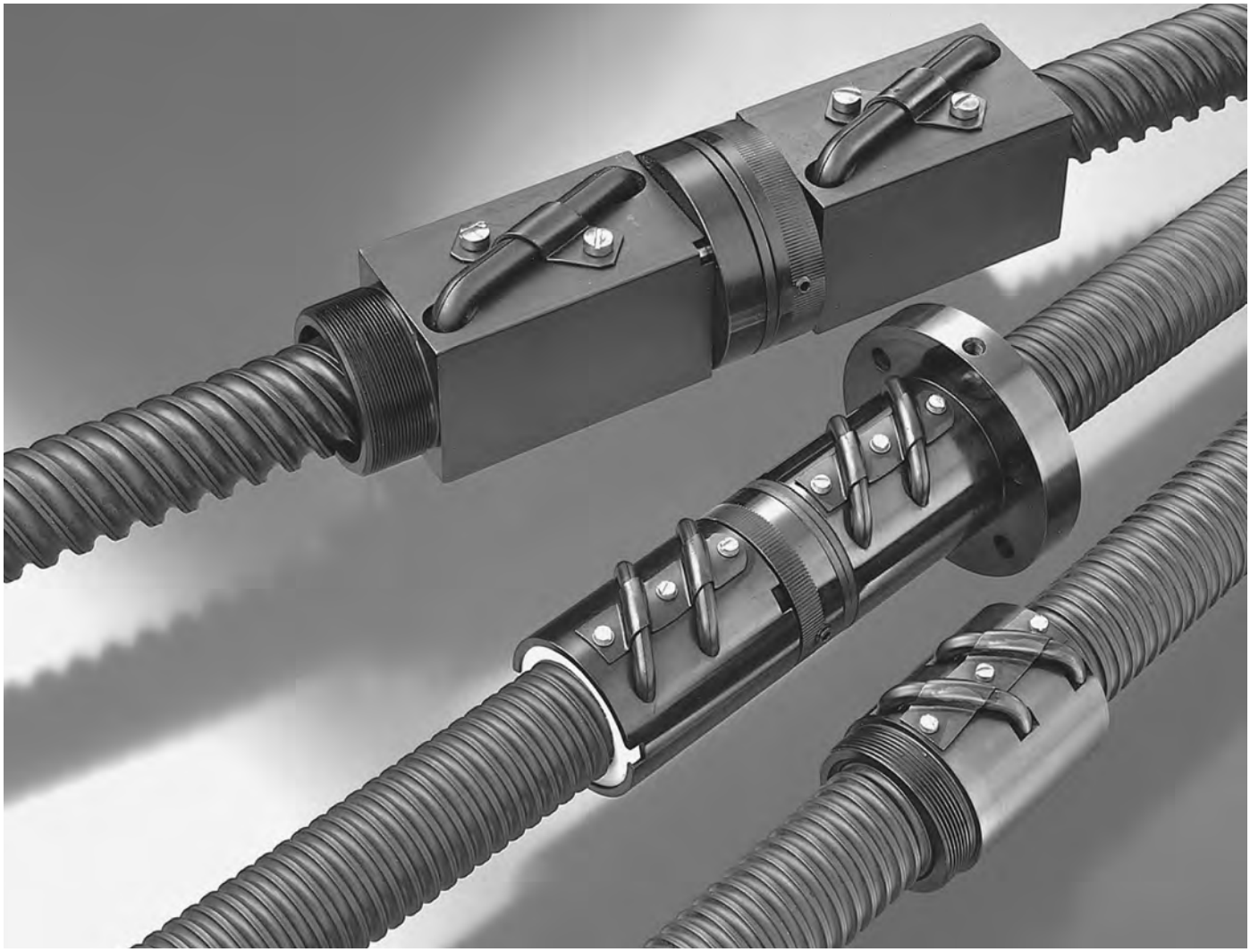


Wiper Part Number	**5703306**	
Flange Part Number	**5703307**	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series



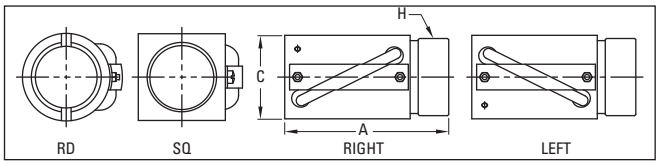
Current and Historical Standard & Custom Ball Screw Components, Inch Series

The Visual Product Reference section is intended to document the many standard and custom ball screw components that have been produced by Thomson and Warner Linear. This section is intended to help identify existing customer product that may or may not be still shown as featured product in this catalog. Most of these products remain readily available for sale and can be ordered using the part numbers shown. The following tables are organized by ball nut shape and then sorted by ball circle diameter (BCD) and lead. Please contact the factory for assistance if the correct ball nut or screw cannot be identified or for any additional questions.

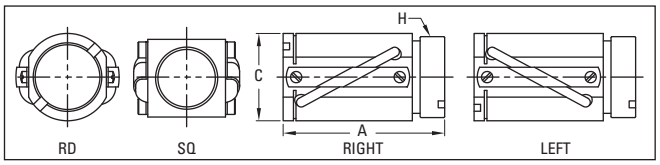
Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

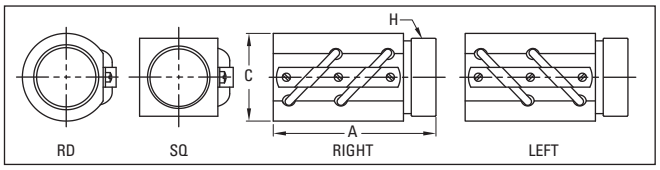
Visual Product Reference — Precision Rolled Ball Screws — Inch Series



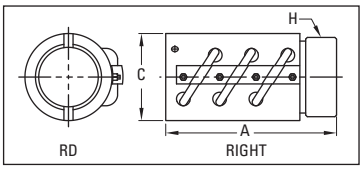
Type A



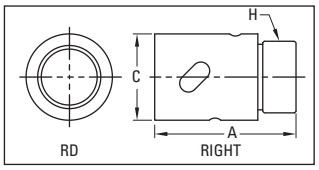
Type B



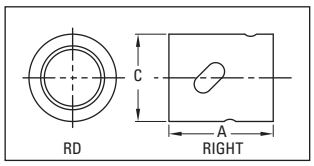
Type C



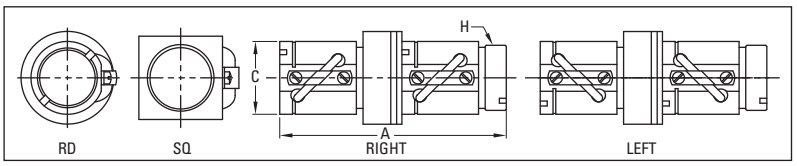
Type D



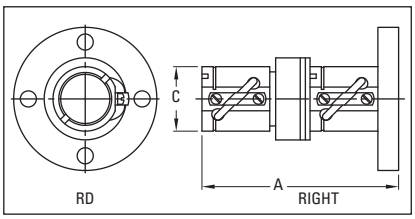
Type E



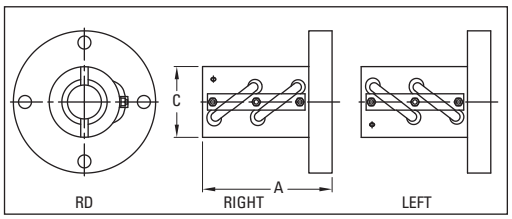
Type F



Type G

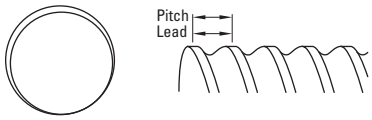


Type H

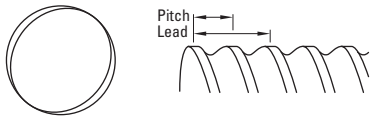


Type J

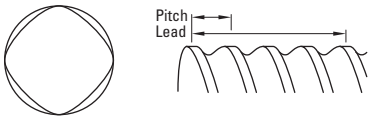
Type Other



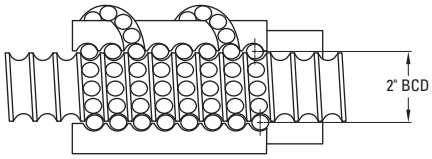
Single Start



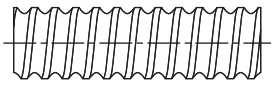
Double Start



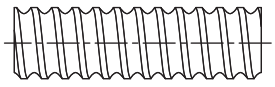
Four Start



Ball Circle Diameter (BCD)



Left Hand Screw



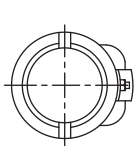
Right Hand Screw

Visual Product Reference Instructions

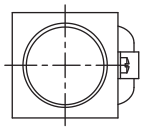
1. Visually determine the ball nut "Type" based on the above figures.
2. Narrow the choice by selecting the appropriate ball circle diameter (BCD) and lead as defined in the figure above.
3. If the ball nut has an identifying model number, this will uniquely identify the nut as shown in the 4th column of the tables. Unmarked nuts are listed as Thomson and will require dimensions to identify.
4. Count the number of ball return circuits and match to column 5.
5. Measure length, width/diameter, and V-thread (if applicable) of the ball nut and match to columns 6 – 8.
6. Determine if the thread direction is left of right by matching nut or screw (screw direction is shown in figure above) to provided figures and locating in column 9.
7. If the ball nut is not available, determine the number of starts of the screw (integral number of independent threads — see figures above), measure the screw major diameter, and measure the screw lead (distance between two adjacent turns of the screw — see figure above). Screw information is provided in columns 11 – 13.
8. Determine if the screw and/or nut material is either carbon steel (STEEL) or stainless steel (SS) and locate in column 14. Carbon steel nuts are coated with black oxide or other finish to prevent corrosion.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

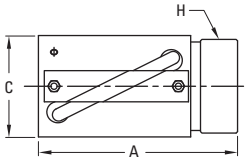
Type A



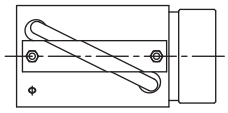
RD



SQ



RIGHT



LEFT

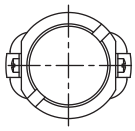
Return: Single Circuit
Shape: Round or Square
Mounting: V-Thread
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.375	0.125	RD	Thomson	1	1.000	0.750	0.664-32	RH	1	0.365	STEEL	**5709574**	**5707538**	**5706751**	**N/A**	44
0.375	0.125	RD	Thomson	1	1.000	0.750	0.664-32	LH	1	0.365	STEEL	**5709576**	**5708532**	**5706751**	**N/A**	44
0.375	0.125	RD	Thomson	1	1.000	0.750	0.664-32	RH	1	0.365	SS	**5709578**	**5706540**	**N/A**	**N/A**	44
0.375	0.125	RD	Thomson	1	1.170	0.750	11/16-28	RH	1	0.370	STEEL	**7831870**	**7824974**	**N/A**	**N/A**	
0.631	0.200	RD	Thomson	1	1.710	1.125	1-16	RH	1	0.620	STEEL	**7832206**	**5707540**	**7832920**	**N/A**	
0.631	0.200	RD	RC0605	1	1.710	1.125	15/16-16	RH	1	0.610	STEEL	**8106-448-009**	**190-9098**	**8105-448-002**	**8106-101-002**	48
0.631	0.200	RD	RE0605	1	1.710	1.125	15/16-16	LH	1	0.610	STEEL	**8106-448-007**	**190-9099**	**8105-448-002**	**8106-101-002**	
0.631	0.200	RD	RK0605	1	1.710	1.125	15/16-16	LH	1	0.610	STEEL	**8106-448-008**	**190-9099**	**8105-448-002**	**8106-101-002**	48
0.631	0.200	SQ	Thomson	1	1.710	1.000	15/16-16	RH	1	0.620	SS	**5707645**	**5705378**	**N/A**	**5702647**	48
0.631	0.200	SQ	Thomson	1	1.710	1.000	15/16-16	RH	1	0.620	STEEL	**7820827**	**5707540**	**5707570**	**5702647**	
0.631	0.200	SQ	Thomson	1	1.710	1.000	15/16-16	LH	1	0.620	STEEL	**7820828**	**5707541**	**5707570**	**5702647**	
0.631	0.200	SQ	RQ0605	1	1.710	1.000	15/16-16	RH	1	0.610	STEEL	**8106-448-010**	**190-9098**	**8105-448-002**	**N/A**	
0.631	0.200	SQ	RQ0605	1	1.710	1.000	15/16-16	RH	1	0.610	STEEL	**8106-448-022**	**190-9098**	**8105-448-002**	**N/A**	48
0.631	0.200	SQ	RR0605	1	1.710	1.000	15/16-16	LH	1	0.610	STEEL	**8106-448-026**	**190-9099**	**8105-448-002**	**N/A**	48
0.631	0.200	SQ	RR0605	1	1.710	1.000	15/16-16	LH	1	0.610	STEEL	**8106-448-011**	**190-9099**	**8105-448-002**	**N/A**	
0.750	0.200	RD	RC0705	1	1.880	1.312	1.173-18	RH	1	0.765	STEEL	**8107-448-017**	**190-9101**	**8107-448-007**	**8107-101-002**	
0.750	0.200	RD	RC0705	1	1.880	1.312	1.173-18	RH	1	0.765	STEEL	**8107-448-018**	**190-9101**	**8107-448-007**	**8107-101-002**	52
0.750	0.200	RD	RC0705	1	1.880	1.312	1.25-18	RH	1	0.765	STEEL	**8107-448-047**	**190-9101**	**N/A**	**N/A**	52
0.750	0.200	RD	RC0705STH	1	1.880	1.312	1.125-18	RH	1	0.765	STEEL	**8107-448-026**	**190-9101**	**N/A**	**N/A**	52
1.000	0.250	RD	RC1004	1	2.350	1.687	1-9/16-18	RH	1	0.985	STEEL	**8110-448-029**	**190-9104**	**8110-448-002**	**8110-101-002**	
1.000	0.250	RD	RC1004	1	2.350	1.687	1-9/16-18	RH	1	0.985	STEEL	**8110-448-032**	**190-9104**	**8110-448-002**	**8110-101-002**	60
1.000	0.250	RD	RK1004	1	2.350	1.687	1-9/16-18	LH	1	0.985	STEEL	**8110-448-030**	**190-9105**	**8110-448-002**	**8110-101-002**	60
1.000	0.250	SQ	Thomson	1	2.347	1.500	1.563-18	RH	1	0.985	STEEL	**5707508**	**7820426**	**5707571**	**5702649**	
1.000	0.250	SQ	Thomson	1	2.347	1.500	1.563-18	LH	1	0.985	STEEL	**5707535**	**7820428**	**5707571**	**5702649**	
1.000	0.250	SQ	RQ1004	1	2.347	1.500	1.563-18	RH	1	0.985	STEEL	**8110-448-055**	**190-9104**	**8110-448-002**	**N/A**	60

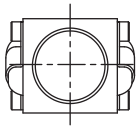
Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

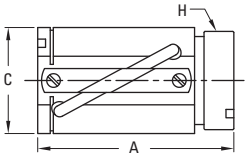
Type B



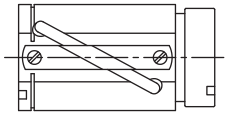
RD



SQ



RIGHT



LEFT

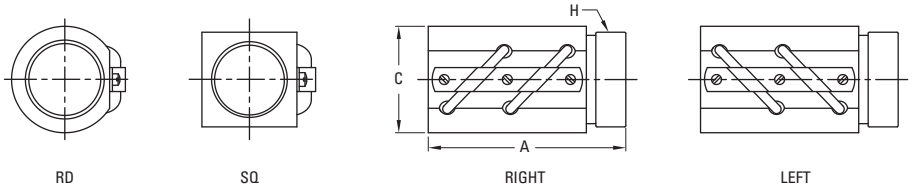
Return: Double Circuit
Shape: Round or Square
Mounting: V-Thread
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.500	0.500	RD	R-0502	2	2.750	1.062	15/16-16	RH	2	0.510	STEEL	**8105-448-011**	**190-9096**	**8105-448-002**	**8105-101-002**	47
0.500	0.500	RD	R-0502	2	2.750	1.060	15/16-16	RH	2	0.510	STEEL	**8105-448-014**	**190-9096**	**8105-448-002**	**8105-101-002**	47
0.500	0.500	RD	R-0502	2	2.750	1.062	15/16-16	RH	2	0.510	SS	**8105-448-016**	**190-9010**	**8105-448-002**	**8105-101-002**	47
0.500	0.500	RD	RS0502	2	2.750	1.062	15/16-16	RH	2	0.510	SS	**8105-448-016**	**190-9010**	**8105-448-002**	**8105-101-002**	
0.500	0.500	SQ	Thomson	2	1.875	1.000	15/16-16	RH	2	0.490	STEEL	**5709582**	**5706740**	**5707570**	**N/A**	
0.500	0.500	SQ	Thomson	2	1.875	1.000	15/16-16	RH	2	0.490	SS	**5709584**	**5706846**	**N/A**	**N/A**	
0.631	0.200	RD	RC0605	2	1.710	1.125	15/16-16	RH	1	0.610	STEEL	**8106-448-006**	**190-9098**	**8105-448-002**	**8106-101-002**	
0.631	1.000	RD	Thomson	2	1.710	1.125	15/16-16	RH	2	0.620	STEEL	**7826713**	**7826712**	**5707570**	**7827527**	51
0.750	0.500	RD	Thomson	2	2.995	1.300	1.25-18	RH	2	0.729	STEEL	**7824358**	**7824361**	**7823336**	**7824337**	
0.750	0.500	RD	R-0702	2	2.930	1.312	1-1/4-16	RH	2	0.765	STEEL	**8107-448-014**	**190-9100**	**8107-448-002**	**8107-101-002**	47
0.750	0.500	RD	R-0702	2	2.930	1.312	1.25-18	RH	2	0.765	STEEL	**8107-448-048**	**190-9100**	**N/A**	**N/A**	56
0.750	0.500	RD	R-0702	2	2.930	1.312	1.173-18	RH	2	0.765	STEEL	**8107-448-049**	**190-9100**	**8107-448-007**	**8107-448-002**	56
0.750	0.500	RD	RS0702	2	2.930	1.312	1-1/4-16	RH	2	0.765	SS	**8107-448-020**	**190-9006**	**8107-448-020**	**8107-101-002**	56
1.000	0.500	RD	Thomson	2	3.120	1.625	1-9/16-18	RH	2	0.974	STEEL	**7824286**	**7824290**	**5707571**	**7824292**	
1.000	0.500	RD	R-1002	2	3.120	1.687	1-9/16-18	RH	2	1.015	STEEL	**8110-448-022**	**190-9103**	**8110-448-002**	**8110-101-002**	63
1.000	1.000	RD	R-1001	2	3.000	1.687	1-9/16-18	RH	4	0.985	STEEL	**8110-448-020**	**190-9102**	**8110-448-002**	**8110-101-002**	64
1.000	1.000	RD	RS1001	2	3.000	1.687	1-9/16-18	RH	4	0.985	SS	**8110-448-034**	**190-9150**	**8110-448-002**	**8110-101-002**	64
1.000	1.000	SQ	Thomson	2	3.000	1.500	1.563-18	RH	4	0.985	STEEL	**5707509**	**7820429**	**5707571**	**5702650**	
1.000	1.000	SQ	Thomson	2	6.000	1.500	1.563-18	RH	4	0.985	STEEL	**7829720**	**7820429**	**5707571**	**5702650**	
1.000	1.000	SQ	RF1001	2	3.000	1.500	1.563-18	RH	4	0.985	STEEL	**8110-448-086**	**190-9102**	**8110-448-002**	**N/A**	64
1.500	1.000	RD	R-1501	2	3.620	2.620	2-1/4-20	RH	2	1.480	STEEL	**8115-448-014**	**190-9107**	**8115-448-002**	**8115-101-002**	72
1.500	1.000	RD	RH1501	2	3.620	2.620	2-1/4-20	RH	2	1.480	STEEL	**8115-448-049**	**190-9107**	**8115-448-002**	**8115-101-004**	73
1.500	1.000	SQ	Thomson	2	3.628	2.250	2-1/4-20	LH	2	1.480	STEEL	**5701995**	**7825925**	**5707777**	**5702657**	
1.500	1.000	SQ	Thomson	2	3.628	2.250	2-1/4-20	RH	2	1.480	STEEL	**5708280**	**7820598**	**5707777**	**5702657**	
1.500	1.000	SQ	Thomson	2	3.628	2.250	2-1/4-20	RH	2	1.480	STEEL	**20019711-10**	**7820598**	**5707777**	**5702657**	
1.500	1.000	SQ	RF1501	2	3.628	2.245	2-1/4-20	RH	2	1.480	STEEL	**8115-448-074**	**190-9107**	**8115-448-002**	**N/A**	72
1.500	1.000	SQ	RF1501 HS	2	3.628	2.245	2-1/4-20	RH	2	1.480	STEEL	**8115-448-076**	**190-9107**	**8115-448-002**	**N/A**	72
1.500	1.000	SQ	RR1501	2	3.628	2.245	2-1/4-20	LH	2	1.480	STEEL	**8115-448-080**	**190-9666**	**8115-448-002**	**N/A**	72
1.500	1.875	SQ	Thomson	2	5.000	2.250	2-1/4-20	RH	4	1.480	STEEL	**5707654**	**7820599**	**5707777**	**5702658**	75
1.500	2.000	RD	R-1520	2	5.260	2.620	2-1/4-20	RH	4	1.435	STEEL	**8115-448-056**	**190-9345**	**8115-448-002**	**8115-101-004**	76
1.500	2.000	RD	RH1520 HS	2	5.260	2.620	2-1/4-20	RH	4	1.435	STEEL	**8115-448-057**	**190-9345**	**8115-448-002**	**8115-101-004**	76
2.000	1.000	RD	R-2001	2	6.380	3.250	3-12	RH	2	2.045	STEEL	**8120-448-021**	**190-9111**	**8120-448-002**	**8120-101-002**	78
2.250	1.000	RD	Thomson	2	6.688	3.375	3.137-12	RH	2	2.230	STEEL	**5704555**	**7820604**	**5707574**	**5702659**	80
2.500	1.000	RD	R-2501	2	6.750	4.000	3-5/8-12	RH	2	2.545	STEEL	**8125-448-008**	**190-9115**	**8125-448-002**	**8125-448-002**	83
3.000	1.500	RD	Thomson	2	9.313	4.750	4.325-12	RH	2	2.910	STEEL	**5704986**	**7820609**	**5707575**	**5702661**	85
4.000	1.000	RD	R-2501	2	6.750	4.000	3-5/8-12	RH	2	2.545	STEEL	**8125-448-008**	**190-9115**	**8125-448-002**	**8125-101-002**	83

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

Type C



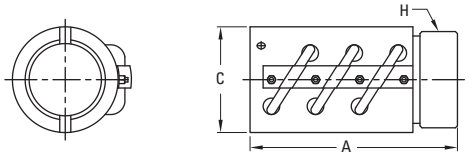
Return: Double Circuit
Shape: Round or Square
Mounting: V-Thread
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.375	0.125	RD	Thomson	2	1.875	0.750	0.664-32	RH	1	0.365	STEEL	**5707502**	**5707538**	**5706751**	**N/A**	
0.375	0.125	RD	Thomson	2	1.875	0.750	0.664-32	RH	1	0.365	SS	**5707643**	**5706540**	**N/A**	**N/A**	
0.375	0.125	RD	Thomson	2	1.875	0.750	0.664-32	LH	1	0.365	STEEL	**5708282**	**5708532**	**5706751**	**N/A**	
0.375	0.125	RD	R-0308	2	1.880	0.781	11/16-24	RH	1	0.380	STEEL	**8103-448-003**	**190-9217**	**8103-448-002**	**8103-101-002**	45
0.375	0.125	RD	R-0308LN	2	1.875	0.781	0.664-32	RH	1	0.380	STEEL	**8103-448-013**	**190-9217**	**N/A**	**8103-101-002**	45
0.500	0.200	RD	Thomson	2	2.600	1.030	15/16-16	RH	1	0.482	STEEL	**7826720**	**7826721**	**5707570**	**7826759**	
0.500	0.200	RD	R-0505	2	2.750	1.062	15/16-16	RH	1	0.510	STEEL	**8105-448-013**	**190-9097**	**8105-448-002**	**8105-101-002**	46
0.750	0.200	RD	Thomson	2	2.635	1.300	1.25-18	RH	1	0.727	STEEL	**7824297**	**7824298**	**7823336**	**7824337**	
0.750	0.200	RD	R-0705	2	2.880	1.312	1.173-18	RH	1	0.765	STEEL	**8107-448-016**	**190-9101**	**8107-448-007**	**8107-101-002**	53
0.750	0.200	RD	R-0705	2	2.880	1.312	1.25-18	RH	1	0.765	STEEL	**8107-448-046**	**190-9101**	**N/A**	**N/A**	53
0.750	0.200	RD	R-0705STH	2	2.880	1.312	1.125-18	RH	1	0.765	STEEL	**8107-448-027**	**190-9101**	**N/A**	**N/A**	53
0.875	0.200	RD	Thomson	2	2.704	1.615	1-3/8-16	RH	1	0.852	STEEL	**5708277**	**5708859**	**5708281**	**7831512**	61
1.000	0.250	RD	R-1004	2	3.130	1.687	1-9/16-18	RH	1	0.985	STEEL	**8110-448-026**	**190-9104**	**8110-448-002**	**8110-101-002**	61
1.000	0.250	RD	RL1004	2	3.130	1.687	1-9/16-18	LH	1	0.985	STEEL	**8110-448-024**	**190-9105**	**8100-448-002**	**8110-101-002**	61
1.000	0.250	SQ	Thomson	2	3.000	1.500	1.563-18	RH	1	0.985	STEEL	**5700348**	**7820426**	**5707571**	**5702649**	
1.000	0.250	SQ	RF1004	2	3.000	1.500	1.563-18	RH	1	0.985	STEEL	**8110-448-056**	**190-9104**	**8110-448-002**	**N/A**	60
1.150	0.200	RD	Thomson	2	2.500	1.687	1-5/8-20	RH	1	1.130	STEEL	**5701566**	**7820430**	**5708283**	**5702652**	
1.150	0.200	RD	Thomson	2	2.500	1.687	1-5/8-20	LH	1	1.130	STEEL	**7820207**	**7820431**	**5708283**	**5702652**	
1.150	0.200	RD	R-1105	2	2.500	1.687	1-5/8-20	RH	1	1.130	STEEL	**8111-448-006**	**190-9106**	**8111-448-002**	**8111-101-002**	66
1.171	0.413	RD	Thomson	2	3.375	2.125	1.967-18	RH	1	1.160	STEEL	**5707511**	**7820432**	**5707572**	**5702653**	68
1.500	0.250	RD	Thomson	2	2.875	2.088	1.967-18	LH	1	1.485	STEEL	**5701990**	**7820596**	**5706754**	**5702654**	69
1.500	0.250	RD	Thomson	2	2.875	2.088	1.967-18	RH	1	1.485	STEEL	**5709587**	**7820595**	**5706754**	**5702654**	
1.500	0.250	RD	Thomson	2	2.875	2.088	1.967-18	RH	1	1.485	STEEL	**7833233**	**7820595**	**5706754**	**5702654**	69
1.500	0.250	RD	R-1504	2	3.250	2.093	1.967-18	RH	1	1.515	STEEL	**8115-448-020**	**190-9110**	**8115-448-009**	**8115-101-006**	
1.500	0.473	RD	Thomson	2	4.312	2.625	2.548-18	RH	1	1.470	STEEL	**5707513**	**7820597**	**5707573**	**5702655**	70
1.500	0.473	RD	Thomson	2	3.625	2.625	N/A	RH	1	1.470	STEEL	**5708345**	**7820597**	**N/A**	**5702656**	
1.500	0.473	RD	R-1547	2	4.307	2.620	2.548-18	RH	1	1.415	STEEL	**8115-448-055**	**190-9328**	**8115-448-064**	**8115-101-004**	
1.500	0.500	RD	Thomson	2	5.590	2.623	2.375-16	RH	1	1.470	STEEL	**7824246**	**7824253**	**7824250**	**7824251**	
1.500	0.500	RD	R-1502	2	5.565	2.620	2.360-18	RH	1	1.535	STEEL	**8115-448-016**	**190-9108**	**8115-448-018**	**8115-101-004**	53
1.500	0.500	RD	RL1502	2	5.565	2.620	2.360-18	LH	1	1.535	STEEL	**8115-448-018**	**190-9109**	**8115-448-004**	**8115-101-004**	71
2.000	0.500	RD	R-2002	2	6.380	3.250	3-12	RH	1	2.045	STEEL	**8120-448-011**	**190-9112**	**8120-448-002**	**8120-101-002**	77
2.000	0.500	RD	RL2002	2	6.380	3.250	3-12	LH	1	2.045	STEEL	**8120-448-013**	**190-9113**	**8120-448-002**	**8120-101-002**	45
2.250	0.500	RD	Thomson	2	6.688	3.375	3.137-12	LH	1	2.230	STEEL	**5704000**	**7820602**	**5707574**	**5702659**	79
2.250	0.500	RD	Thomson	2	6.688	3.375	3.137-12	RH	1	2.230	STEEL	**5707516**	**7820600**	**5707574**	**5702659**	
2.250	0.500	RD	Thomson	2	6.688	3.375	3.137-12	RH	1	2.230	STEEL	**7833235**	**7820600**	**5707574**	**5702659**	79
2.250	0.500	RD	Thomson	2	5.250	3.376	N/A	RH	1	2.230	STEEL	**5708346**	**7820600**	**N/A**	**5702659**	
2.250	0.500	RD	Thomson	2	5.250	3.376	N/A	LH	1	2.230	STEEL	**7830722**	**7820602**	**N/A**	**5702659**	
2.250	0.500	RD	R-2202	2	6.680	3.370	3.137-12	RH	1	2.180	STEEL	**8122-448-005**	**190-9114**	**N/A**	**8122-101-002**	
2.500	0.500	RD	Thomson	2	6.750	3.625	3.5-12	RH	1	2.480	STEEL	**7824136**	**7824262**	**7824141**	**7824140**	
2.500	0.500	RD	R-2502	2	6.750	4.000	3-5/8-12	RH	1	2.545	STEEL	**8125-448-010**	**190-9116**	**8125-448-002**	**8125-101-002**	82

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

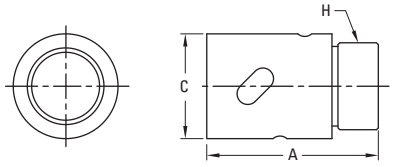
Type D



Return: Triple Circuit
Shape: Round
Mounting: V-Thread
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
2.500	0.250	RD	Thomson	3	3.750	3.375	3.34-12	RH	1	2.485	**STEEL**	**5703243**	**7820606**	**5703263**	**5703324**	81
3.000	0.660	RD	Thomson	3	9.313	4.750	4.325-12	RH	1	2.965	**STEEL**	**5707519**	**7820607**	**5707575**	**5702661**	
3.000	0.660	RD	Thomson	3	7.000	4.750	N/A	RH	1	2.965	**STEEL**	**5708347**	**7820607**	**N/A**	**5702662**	
3.000	0.660	RD	R-3066	3	9.320	4.750	4.325-12	RH	1	2.950	**STEEL**	**8130-448-007**	**190-9117**	**8130-448-002**	**8130-101-002**	84
4.000	1.000	RD	Thomson	3	12.593	5.875	5.497-12	RH	1	3.795	**STEEL**	**5703258**	**5703262**	**5703307**	**5703306**	86
6.000	1.000	RD	Thomson	3	14.438	9.000	8.5-8	RH	1	5.795	**STEEL**	**5704738**	**5704762**	**5704764**	**5704746**	

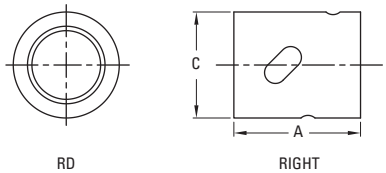
Type E



Return: Single-Liner
Shape: Round
Mounting: V-Thread
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.375	0.125	RD	RC0308	1	0.988	0.825	11/16-24	RH	1	0.380	STEEL	**8103-448-008**	**190-9217**	**N/A**	**8103-101-002**	
0.631	0.200	RD	Thomson	3	1.850	1.130	15/16-16	RH	1	0.620	STEEL	**7832872**	**7832873**	**5707570**	**INTEGRAL**	50

Type F



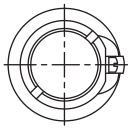
Return: Single-Liner
Shape: Round
Mounting: Cylindrical
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.187	0.050	RD	Thomson	2	0.594	0.500	N/A	RH	1	0.178	SS	**7821609**	**7821634**	**N/A**	**N/A**	42
0.187	0.050	RD	Thomson	2	0.594	0.500	N/A	RH	1	0.178	EPOXY	**7821632**	**7821634**	**N/A**	**N/A**	
0.187	0.063	RD	Thomson	2	0.594	0.500	N/A	RH	1	0.178	SS	**7821579**	**7821633**	**N/A**	**N/A**	43
0.187	0.063	RD	Thomson	2	0.594	0.500	N/A	RH	1	0.178	EPOXY	**7821631**	**7821633**	**N/A**	**N/A**	

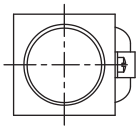
Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

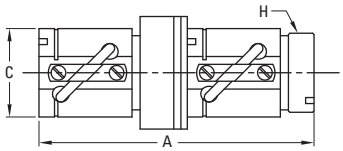
Type G



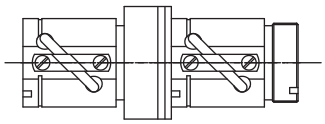
RD



SQ



RIGHT



LEFT

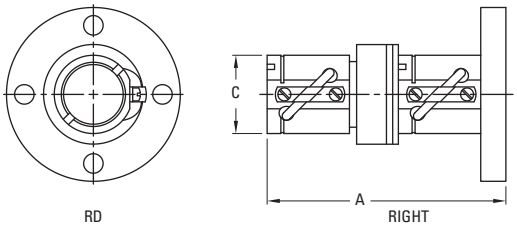
Return: See Table
Shape: Round or Square
Mounting: V-Thread
Backlash: Preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.375	0.125	RD	RP0308	2 X 2	4.130	0.781	11/16-24	RH	1	0.380	STEEL	**8103-448-004**	**190-9217**	**N/A**	**8103-101-002**	
0.500	0.200	RD	RP0505	2 X 2	5.950	1.062	15/16-16	RH	1	0.510	STEEL	**8105-448-008**	**190-9097**	**8105-448-002**	**8105-101-002**	46
0.500	0.500	RD	RP0502	2 X 2	6.000	1.060	15/16-16	RH	2	0.510	SS	**8105-448-009**	**190-9096**	**8105-448-002**	**8105-101-002**	
0.500	0.500	SQ	Thomson	2 X 2	3.875	1.000	15/16-16	RH	2	0.490	STEEL	**7826767**	**5706740**	**5707570**	**N/A**	
0.631	0.200	RD	RD0605	2 X 1	3.550	1.125	15/16-16	RH	1	0.610	STEEL	**8106-448-015**	**190-9098**	**8105-448-002**	**8106-101-002**	49
0.631	0.200	RD	RE0605	2 X 1	3.550	1.125	15/16-16	LH	1	0.610	STEEL	**8106-448-019**	**190-9099**	**8105-448-002**	**8106-101-002**	49
0.631	0.200	SQ	Thomson	2 X 1	3.510	1.000	15/16-16	RH	1	0.620	STEEL	**7820955**	**5707540**	**5707570**	**5702647**	
0.631	0.200	SQ	Thomson	2 X 1	3.510	1.000	15/16-16	LH	1	0.620	STEEL	**7820956**	**5707541**	**5707570**	**5702647**	
0.631	1.000	RD	Thomson	2 X 2	3.440	1.125	15/16-16	RH	4	0.620	STEEL	**7827531**	**7826712**	**5707570**	**7827527**	51
0.750	0.200	RD	RD0705	2 X 1	4.080	1.312	1.173-18	RH	1	0.765	STEEL	**8107-448-025**	**190-9101**	**8107-448-007**	**8107-101-002**	54
0.750	0.500	RD	Thomson	2 X 2	5.750	1.300	1.25-18	RH	2	0.729	STEEL	**7826991**	**7824361**	**7823336**	**7824337**	
0.750	0.500	RD	RP0705	2 X 2	6.180	1.312	1.250-16	RH	1	0.765	STEEL	**8107-448-011**	**190-9100**	**8107-448-002**	**8107-101-002**	57
1.000	0.250	RD	RU1004	2 X 1	4.847	1.500	1.563-18	RH	1	0.985	STEEL	**8110-448-092**	**190-9104**	**8110-448-002**	**8110-101-002**	61
1.000	0.250	SQ	Thomson	2 X 1	4.847	1.500	1.563-18	RH	1	0.985	STEEL	**5704167**	**7820426**	**5707571**	**5702649**	
1.000	0.250	SQ	Thomson	2 X 1	4.847	1.500	1.563-18	LH	1	0.985	STEEL	**5704168**	**7820428**	**5707571**	**5702649**	
1.000	0.250	SQ	RV1004	2 X 1	4.847	1.500	1.563-18	LH	1	0.985	STEEL	**8110-448-089**	**190-9105**	**8110-448-002**	**N/A**	61
1.000	0.500	RD	RP1002	2 X 2	6.640	1.687	1.5625-18	RH	2	1.015	STEEL	**8110-448-016**	**190-9103**	**8110-448-002**	**8110-101-002**	63
1.150	0.200	RD	Thomson	2 X 1	3.704	1.687	1-5/8-20	RH	1	1.130	STEEL	**5704270**	**7820430**	**5708283**	**5702652**	
1.150	0.200	RD	Thomson	2 X 1	3.704	1.687	1-5/8-20	LH	1	1.130	STEEL	**7820206**	**7820431**	**5708283**	**5702652**	
1.150	0.200	RD	RP1105	2 X 2	5.500	1.687	1.625-20	RH	1	1.130	STEEL	**8111-448-004**	**190-9106**	**8111-448-002**	**8111-101-002**	67
1.500	0.250	RD	Thomson	2 X 2	6.375	2.088	1.967-18	RH	1	1.485	STEEL	**5704271**	**7820595**	**5706754**	**5702654**	
1.500	0.250	RD	Thomson	2 X 2	6.375	2.088	1.967-18	RH	1	1.485	STEEL	**7833234**	**7820595**	**5706754**	**5702654**	69
1.500	0.250	RD	Thomson	2 X 2	6.375	2.088	1.967-18	LH	1	1.485	STEEL	**5704573**	**7820596**	**5706754**	**5702654**	69
1.500	0.500	RD	RP1502	2 X 2	12.100	2.620	2.360-18	RH	1	1.535	STEEL	**8115-448-006**	**190-9108**	**8115-448-004**	**8115-101-004**	71
1.500	1.000	RD	RP1501	2 X 2	8.160	2.620	2-1/4-20	RH	2	1.480	STEEL	**8115-448-011**	**190-9107**	**8115-448-002**	**8115-101-004**	73
1.500	1.000	SQ	Thomson	2 X 2	7.628	2.250	2-1/4-20	RH	2	1.480	STEEL	**5700698**	**7820598**	**5707777**	**5702657**	
1.500	1.000	SQ	RU1501	2 X 2	7.628	2.245	2-1/4-20	RH	2	1.480	STEEL	**8115-448-075**	**190-9107**	**8115-448-002**	**N/A**	73
1.500	1.875	SQ	Thomson	2 X 2	10.625	2.245	2-1/4-20	RH	4	1.480	STEEL	**5704272**	**7820599**	**5707777**	**5702658**	75
2.000	0.500	RD	RP2002	2 X 2	13.920	3.250	3-12	RH	1	2.045	STEEL	**8120-448-006**	**190-9112**	**8120-448-002**	**8120-101-002**	77
2.000	0.500	RD	RT2002	2 X 2	13.920	3.250	3-12	LH	1	2.045	STEEL	**8120-448-007**	**190-9113**	**8120-448-002**	**8120-101-002**	77
2.000	1.000	RD	RP2001	2 X 2	13.900	3.250	3-12	RH	2	2.045	STEEL	**8120-448-019**	**190-9111**	**8120-448-002**	**8120-101-002**	78

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

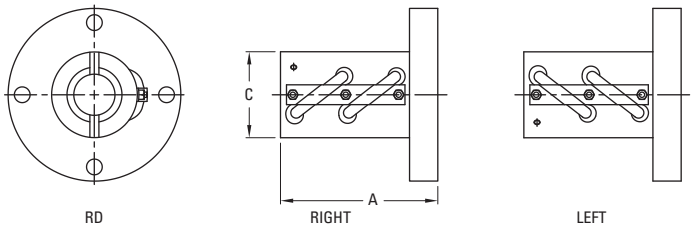
Type H



Return: See Table
Shape: Round
Mounting: Flange
Backlash: Preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.631	0.200	RD	Thomson	2 X 1	3.775	1.130	N/A	RH	1	0.620	STEEL	**7823584**	**5707540**	**INTEGRAL**	**INTEGRAL**	
0.875	0.200	RD	Thomson	2 X 1	3.835	1.250	N/A	RH	1	0.852	STEEL	**7823585**	**5708859**	**INTEGRAL**	**INTEGRAL**	
1.000	0.250	RD	Thomson	2 X 1	4.438	1.618	N/A	RH	1	0.985	STEEL	**7823586**	**7820426**	**INTEGRAL**	**INTEGRAL**	
1.000	0.250	RD	RD1004F	2 X 1	4.438	1.620	N/A	RH	1	0.985	STEEL	**8110-448-097**	**190-9104**	**INTEGRAL**	**INTEGRAL**	62
1.150	0.200	RD	Thomson	2 X 1	3.821	1.688	N/A	RH	1	1.130	STEEL	**7823587**	**7820430**	**INTEGRAL**	**INTEGRAL**	
1.150	0.200	RD	RD1105F	2 X 1	3.821	1.688	N/A	RH	4	1.130	STEEL	**8111-448-014**	**190-9106**	**INTEGRAL**	**INTEGRAL**	66
1.500	0.250	RD	Thomson	2 X 2	6.845	2.088	N/A	RH	1	1.485	STEEL	**7823588**	**7820595**	**INTEGRAL**	**INTEGRAL**	
2.250	0.500	RD	Thomson	2 X 2	13.787	3.375	N/A	RH	1	2.230	STEEL	**7823589**	**7820600**	**INTEGRAL**	**INTEGRAL**	
2.500	0.250	RD	Thomson	2 X 3	7.490	3.375	N/A	RH	1	2.485	STEEL	**7823590**	**7820606**	**INTEGRAL**	**INTEGRAL**	81
3.000	0.660	RD	Thomson	2 X 3	18.549	4.750	N/A	RH	1	2.965	STEEL	**5703045**	**7820607**	**INTEGRAL**	**INTEGRAL**	

Type J



Return: Double Circuit
Shape: Round
Mounting: Flange
Backlash: Non-preloaded

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
1.000	0.250	RD	Thomson	2	3.000	1.625	N/A	RH	1	0.985	STEEL	**5708278**	**7820426**	**INTEGRAL**	**5702651**	
1.000	0.250	RD	Thomson	2	3.000	1.625	N/A	LH	1	0.985	STEEL	**5708284**	**7820428**	**INTEGRAL**	**5702651**	
1.000	0.250	RD	R-1004F	2	3.000	1.625	N/A	RH	1	0.985	STEEL	**8110-448-087**	**190-9104**	**INTEGRAL**	**5702651**	61
1.000	0.250	RD	RL1004F	2	3.000	1.625	N/A	LH	1	0.985	STEEL	**8110-448-088**	**190-9105**	**INTEGRAL**	**5702651**	61

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Visual Product Reference — Precision Rolled Ball Screws — Inch Series

Type Other

Return: See Table
Shape: Miscellaneous
Mounting: Miscellaneous
Backlash: Miscellaneous

BCD (in.)	Lead (in.)	Shape	Nut Model	No. of Circuits	Length (in.) "A"	Width/ Dia. (in.) "C"	V-Thd. "H"	Thd. Dir.	No. of Starts	Major Screw Dia.	Mat'l	Nut P/N	Screw P/N	Flange P/N	Wiper P/N	Cat. Page
0.312	0.100	RD	Thomson	4	1.180	0.625	0.586-32	RH	1	0.292	STEEL	**7832875**	**7832897**	**N/A**	**N/A**	
0.375	0.063	RD	Thomson	8	1.180	0.750	11/16-32	RH	1	0.3685	STEEL	**7832874**	**7832894**	**N/A**	**N/A**	
0.375	0.125	RD	Thomson	1	0.677	0.749	N/A	RH	1	0.482	STEEL	**7824973**	**7824974**	**N/A**	**N/A**	
0.500	0.200	RD	Thomson	3	1.660	0.943	N/A	RH	1	0.482	STEEL	**7826763**	**7826721**	**N/A**	**INTEGRAL**	
0.500	0.500	RD	Thomson	2	1.500	1.320	N/A	RH	2	0.490	STEEL	**5707506**	**5706740**	**N/A**	**N/A**	
0.500	0.500	RD	Thomson	2	1.500	1.320	N/A	RH	2	0.490	SS	**5707644**	**5706846**	**N/A**	**N/A**	
0.750	0.200	RD	Thomson	4	1.800	1.297	N/A	RH	1	0.734	STEEL	**7826768**	**7826770**	**N/A**	**INTEGRAL**	

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Note: These ball nuts available for high quantity purchase only (100 piece minimum order required).

NOTES:

Precision Plus Ground Ball Screws — Inch Series

High accuracy and stiffness with zero backlash, for stringent applications where ball screw performance is critical.

Thomson Precision Plus Ground Ball Screw Assemblies provide the positioning accuracy and repeatability required for the most stringent positioning applications. Thomson assemblies are designed and manufactured to provide 8 times the lead accuracy of conventional ball screws (± .0005 in/ft), and provide consistent, zero-backlash, preload for high repeatability. All ball nuts feature an integral flange for optimal precision and mounting ease, and specially designed seals/wipers that provide superior lubricant retention while keeping out harmful contaminants. Precision Plus Ground Assemblies are ideal for machine tools, robots, semi-conductor/electronic assembly systems, and many more applications where high-level ball screw performance is required.

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Precision Plus Ground Ball Screws — Inch Series

Lead Accuracy: ± .0005 in/ft

Preloaded, Round Ball Nut with Integral Flange and Wiper

- Precision ground for highly accurate and smooth running performance
- Long-lasting preload for minimal backlash and consistent stiffness
- Standard sizes stocked for quick delivery. Additional sizes are available as custom product.

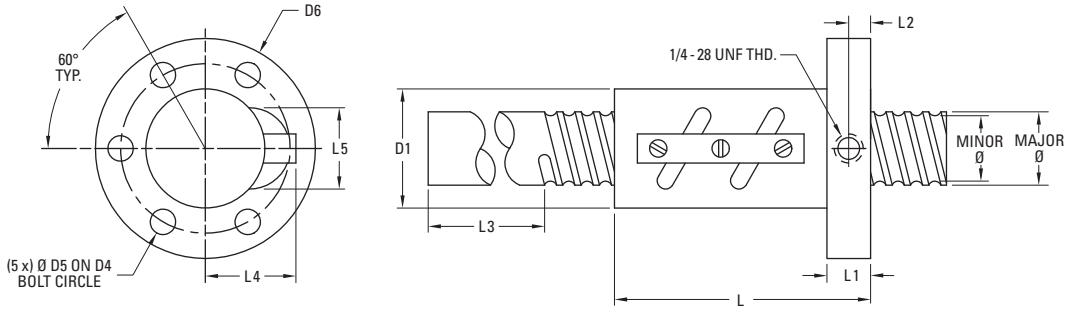
Nominal Diameter (size)	Lead	Ball Screw and Nut Assembly P/N[1][2][3]	Ball Nut Details		Performance Data			Screw Specifications			
			Direction	No. of Return Tubes	Dynamic Load Capacity (C_{am})	Static Load Capacity (C_o)	Max. Axial Backlash	Major Diameter (max.)	Minor Diameter	Standard Length	Screw Weight
(in.)	(in.)				(lbf)	(lbf)	(in.)	(in.)	(in.)	(in.)	(lb/ft)
0.631	0.200	**7820396**	Right Hand	2	440	2,110	0.00	0.611	0.496	42	0.90
0.750	0.200	**5700974**	Right Hand	2	1,473	9,916	0.00	0.750	0.599	42	1.45
0.875	0.200	**7820397**	Right Hand	2	1,375	10,780	0.00	0.875	0.740	60	1.78
1.000	0.200	**5700975**	Right Hand	2	1,565	13,073	0.00	1.000	0.865	72	2.20
1.000	0.250	**7820477**	Right Hand	2	2,285	15,815	0.00	1.000	0.833	72	2.20
1.150	0.200	**5700976**	Right Hand	2	1,680	14,886	0.00	1.130	1.015	72	3.18
1.250	0.200	**5700977**	Right Hand	2	1,800	16,625	0.00	1.250	1.115	72	3.75
1.250	0.200	**7820830**	Left Hand	2	1,800	16,625	0.00	1.235	1.115	72	3.75
1.250	0.500	**7820399**	Right Hand	2	1,765	11,080	0.00	1.250	1.050	96	3.77
1.500	0.200	**7820375**	Right Hand	4	4,745	45,073	0.00	1.500	1.349	120	5.18
1.500	0.250	**7820965**	Right Hand	4	4,250	27,250	0.00	1.500	1.333	120	5.18
1.500	0.500	**7820401**	Right Hand	2	5,075	35,770	0.00	1.500	1.236	120	4.79
1.750	0.200	**5700979**	Right Hand	4	4,464	47,446	0.00	1.750	1.615	96	7.56
2.000	0.200	**7820402**	Right Hand	6	6,181	65,903	0.00	2.000	1.849	120	9.81
2.250	0.500	**7820484**	Right Hand	2	20,160	108,325	0.00	2.250	1.858	120	10.87
2.500	0.250	**7820483**	Right Hand	6	8,945	93,165	0.00	2.500	2.333	120	15.46

(1) All Precision Plus Ground product is sold in matched sets as ball screw and nut assemblies.

(2) Dimensional information on bearing supports and standard end machining is available on page 144.

(3) Information on required lubrication is on page 243.

Precision Plus Ground Ball Screws — Inch Series



Nominal Diameter (size)	Lead	Nut Specifications											
		D1	D4	D5	D6	L	L1	L2	L3	L4 (max.)	L5 (max.)	Nut Weight	Ball Diameter
(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(lb)	(in.)
0.631	0.200	1.130	1.562	0.281	2.000	2.200	0.375	0.200	2.750	0.849	0.710	0.66	0.125
0.750	0.200	1.370	1.875	0.281	2.320	3.000	0.500	0.312	2.750	0.996	0.855	1.26	0.141
0.875	0.200	1.250	1.750	0.281	2.250	3.000	0.500	0.312	2.750	0.891	1.024	0.92	0.125
1.000	0.200	1.620	2.250	0.281	2.750	3.000	0.500	0.312	3.750	1.042	1.134	1.63	0.125
1.000	0.250	1.685	2.250	0.344	2.875	3.370	0.500	0.312	3.750	1.100	1.203	1.98	0.156
1.150	0.200	1.685	2.280	0.344	2.875	3.000	0.500	0.312	3.750	1.067	1.287	1.61	0.125
1.250	0.200	1.645	2.312	0.344	2.770	3.000	0.500	0.312	3.750	1.109	1.248	1.31	0.125
1.250	0.200	1.650	2.312	0.344	2.770	3.000	0.500	0.312	3.750	1.109	1.248	1.31	0.125
1.250	0.500	1.990	3.124	0.406	3.865	3.580	0.625	0.410	3.750	1.356	1.531	3.43	0.188
1.500	0.200	2.020	2.750	0.344	3.500	5.000	0.625	0.375	3.750	1.273	1.758	3.17	0.141
1.500	0.250	2.020	2.750	0.344	3.500	5.000	0.625	0.375	3.750	1.290	1.520	3.17	0.156
1.500	0.500	2.250	3.125	0.406	3.875	4.625	0.625	0.410	3.750	1.575	1.900	4.27	0.250
1.750	0.200	2.265	3.250	0.406	4.000	5.000	0.625	0.375	4.750	1.352	1.878	3.81	0.125
2.000	0.200	2.500	3.250	0.406	4.000	5.750	0.700	0.438	4.750	1.550	1.900	4.39	0.141
2.250	0.500	3.375	4.375	0.656	5.375	8.125	1.250	0.812	4.750	2.259	2.535	16.29	0.375
2.500	0.250	3.375	4.000	0.344	4.625	6.250	0.750	0.500	4.750	2.010	2.609	8.81	0.156

NOTES:

Metric Ball Screws

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Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Metric Ball Screws Product Overview

Superior performance for today's most stringent positioning requirements.

Thomson has a wide range of internal return metric ball screw products, featuring four distinct product families — Miniature, Fineline, Thomson NEFF and Precision Plus. Each family is designed to meet unique application requirements.

Miniature Rolled Ball Screws (page 109)

Miniature Rolled Ball Screw Assemblies are an efficient, cost-effective solution in a small envelope. Ball screw assemblies range from 4mm to 14mm in diameter, with standard lead accuracies of 52 microns/300mm.

Compact ball nuts are available with body diameters as small as 11mm and overall lengths as short as 17mm. Miniature Rolled Ball Screws are ideal for laboratory, semiconductor, and medical applications.

Miniature ball screws are available in two nut styles.

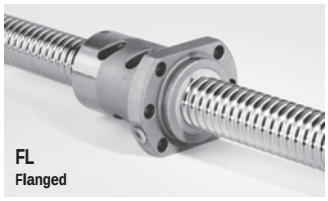
Type A
Miniature

Type B
Miniature

Precision Plus Ground Ball Screws (page 131)

Precision Plus Ground Ball Screw Assemblies are our highest precision product, with standard lead accuracies of 12 microns/300mm. These ball screw assemblies feature our FL-style ball nut, precisely preloaded to customer specifications. This unique nut design provides high repeatability and high stiffness for the most demanding ball screw applications. Each nut comes standard with an integral plastic wiper to protect against chips and other debris. Precision Plus Ground Ball Screws are ideal for applications requiring high repeatability and high stiffness (e.g., high precision machine tool).

Precision Plus screws are available with our FL style nut.



FL
Flanged

FineLine Rolled Ball Screws (page 113)

FineLine Rolled Ball Screw Assemblies are designed and manufactured to provide high level performance at an affordable price. Ball screws are manufactured using Thomson's patented, German-engineered Precision Screw Forming (PSF) Technology, which provides high accuracy (23 microns/300mm standard) with the manufacturing efficiency of rolled processes. Ball nuts are manufactured with one of two ball return systems (button or end return) made with reinforced steel, making them extremely durable and ideal for high speed, high load, and/or high temperature applications. Each nut comes standard with an integral plastic wiper to protect against chips or other debris. FineLine Rolled Ball Screws are ideal for machining centers, factory automation, packaging, and injection molding applications.

FineLine ball screws are available in four nut styles.

ZG
Threaded

FS
Flanged

FK
Flanged

FH
Flanged

Thomson NEFF Rolled Ball Screws (page 121)

Neff Rolled Ball Screw Assemblies are available in a wide range of diameters, leads and nut styles — all designed to provide quiet, smooth running, efficient performance. Standard NEFF ball screws are rolled to an accuracy of 50 microns/300mm, with higher accuracies readily available upon request.

Ball nuts include one of three unique ball return systems (depending on the diameter and lead of the screw used) providing perfect guidance, low wear, and smooth running performance. Ball nuts come standard with profiled rubber wipers to contain lubricant and help repel fine contaminants (dust, powders, etc). NEFF Rolled Ball Screws are ideal for wood working, water cutting, electronic assembly and medical applications.

Thomson NEFF ball screws are available in four nut styles.

KGF-D
Flanged

KGF-N
Flanged

KGM-D
Cylindrical

KGM-N
Cylindrical

Metric Ball Screws Product Overview

An overview of ball screw sizes available within each product family is shown below. Refer to individual product family sections for additional details.

Miniature Rolled Ball Screws — Product Availability (page 109)

	1mm	2mm	4mm	5mm	6mm	8mm	10mm	12mm	15mm	20mm	25mm	32mm	40mm	50mm
4mm	●													
5mm			●											
6mm	●				●									
8mm	●	●		●		●		●						
10mm		●					●		●	●				
12mm		●												
13mm								●		●				
14mm		●	●											

FineLine Rolled Ball Screws — Product Availability (page 113)

	1mm	2mm	4mm	5mm	6mm	8mm	10mm	12mm	15mm	20mm	25mm	32mm	40mm	50mm
12mm			●	●										
16mm				●										
20mm				●						●				
25mm				●			●				●			
32mm				●			●			●		●		
40mm				●			●			●			●	
50mm							●			●				
63mm							●			●				
80mm							●			●				

NEFF Rolled Ball Screws — Product Availability (page 121)

	1mm	2mm	4mm	5mm	6mm	8mm	10mm	12mm	15mm	20mm	25mm	32mm	40mm	50mm
12mm				●										
16mm				●			●							
20mm				●						●				●
25mm				●			●			●	●			●
32mm				●			●			●		●	●	
40mm				●			●			●			●	
50mm							●			●				
63mm							●							

Precision Plus Ground Ball Screws — Product Availability* (page 131)

	1mm	2mm	4mm	5mm	6mm	8mm	10mm	12mm	15mm	20mm	25mm	32mm	40mm	50mm
16mm				●										
20mm				●										
25mm				●										
32mm				●			●							
40mm				●										
50mm							●							
63mm							●							
80mm							●							

* Additional ground ball screw sizes are available in diameters up to 200mm. Contact us for more details.

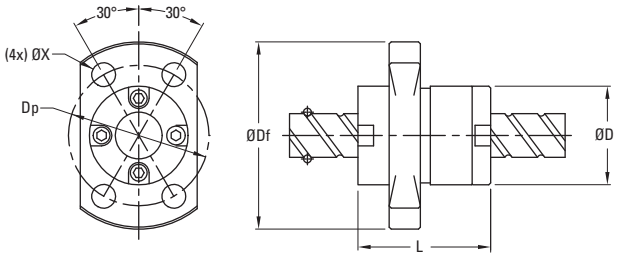
Metric Ball Screws Product Overview

The Thomson series of metric ball screws includes three families of rolled ball screws (Miniature, FineLine, Thomson NEFF) with four nut styles — Miniature, Cylindrical, Threaded and Flanged. An overview of our rolled product offering is organized by nut style, below. Refer to individual product family sections for additional details.

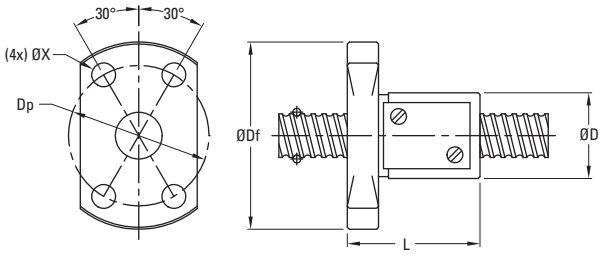
Miniature Ball Nuts

Miniature: Type A, Type B
Return: Internal
Style: Miniature
Mounting: Flanged
Backlash: Non-preloaded
Thread Direction: Right Hand

Type A



Type B



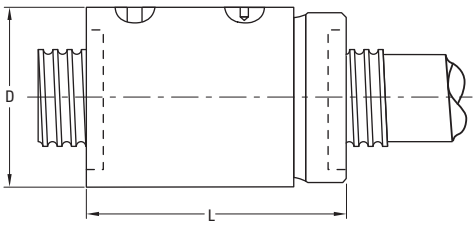
Nominal Diameter	Lead	Dynamic Load Capacity (C_{am})	Length L	Width/ Diameter D	Ball Nut Form	Flange Diameter Df	Bolt Hole Circle Dp	Hole Diameter X	Ball Nut	Screw and Nut Assembly P/N	Catalog Page
(mm)	(mm)	(kN)	(mm)	(mm)		(mm)	(mm)	(mm)			
4	1	0.6	17.0	11.0	Type B	24.0	18.0	3.4	Type B	**PRM0401**	110
5	4	0.5	22.0	12.0	Type B	24.0	18.0	3.4	Type B	**PRM0504**	110
6	1	0.7	17.0	13.0	Type B	26.0	20.0	3.4	Type B	**PRM0601**	110
6	6	0.9	17.0	14.0	Type A	27.0	21.0	3.4	Type A	**PRM0606**	110
8	1	0.8	17.0	16.0	Type B	29.0	23.0	3.4	Type B	**PRM0801**	110
8	2	2.4	24.0	20.0	Type B	37.0	29.0	4.5	Type B	**PRM0802**	110
8	5	1.9	28.0	18.0	Type B	31.0	25.0	3.4	Type B	**PRM0805**	110
8	8	2.2	20.0	18.0	Type A	31.0	25.0	3.4	Type A	**PRM0808**	110
8	12	2.2	27.0	18.0	Type A	31.0	25.0	3.4	Type A	**PRM0812**	110
10	2	2.7	24.0	23.0	Type B	40.0	32.0	4.5	Type B	**PRM1002**	110
10	10	3.3	24.0	23.0	Type A	40.0	32.0	4.5	Type A	**PRM1010**	110
10	15	3.3	33.0	23.0	Type A	40.0	32.0	4.5	Type A	**PRM1015**	110
10	20	2.1	23.0	20.0	Type A	37.0	29.0	4.5	Type A	**PRM1020**	110
12	2	3.0	24.0	25.0	Type B	42.0	34.0	4.5	Type B	**PRM1202**	110
13	12	5.0	30.0	28.0	Type A	45.0	37.0	4.5	Type A	**PRM1312**	110
13	20	5.0	43.0	28.0	Type A	45.0	37.0	4.5	Type A	**PRM1320**	110
14	2	3.2	25.0	26.0	Type B	45.0	36.0	5.5	Type B	**PRM1402**	110
14	4	5.7	33.0	30.0	Type B	49.0	40.0	5.5	Type B	**PRM1404**	110

Metric Ball Screws Product Overview

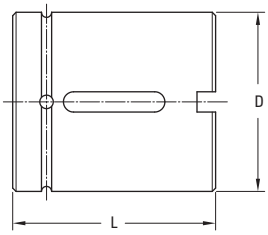
Cylindrical Ball Nuts

Fineline: ZG
NEFF: KGM-N, KGM-D
Return: Internal
Style: Cylindrical
Mounting: Threaded
Backlash: Z1, Z2 and Z3
Thread Direction: Right Hand

ZG



KGM-N, KGM-D



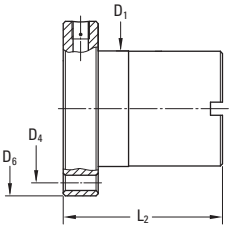
Nominal Diameter	Lead	Dynamic Load Capacity (C_{am})	Length L	Width/ Diameter D	Ball Nut Form	Flange Diameter Df	Bolt Hole Circle Dp	Hole Diameter X	Ball Nut	Nut P/N	Screw P/N	Catalog Page
(mm)	(mm)	(kN)	(mm)	(mm)		(mm)	(mm)	(mm)				
12	4	3.5	34.0	25.0	Threaded	n/a	n/a	n/a	ZG	**7832771**	**7832770**	114
12	5	4.4	24.0	20.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-1205-RH-EE**	**KGS-1205-050-RH**	128
16	5	9.3	34.0	28.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-1605-RH-EE**	**KGS-1605-050-RH**	126
16	5	12.1	57.5	32.0	Threaded	n/a	n/a	n/a	ZG	**7832778**	**7832776**	114
16	10	15.4	50.0	28.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-1610-RH-EE**	**KGS-1610-050-RH**	126
20	5	10.5	34.0	36.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2005-RH-EE**	**KGS-2005-050-RH**	126
20	5	10.5	34.0	32.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-2005-RH-EE**	**KGS-2005-050-RH**	128
20	5	14.8	57.5	38.0	Threaded	n/a	n/a	n/a	ZG	**7832781**	**7832779**	114
20	20	11.6	30.0	35.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-2020-RH-EE**	**KGS-2020-050-RH**	128
20	50	13.0	56.0	35.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-2050-RH-EE**	**KGS-2050-050-RH**	128
25	5	12.3	34.0	40.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2505-RH-EE**	**KGS-2505-050-RH**	126
25	5	12.3	34.0	38.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-2505-RH-EE**	**KGS-2505-050-RH**	128
25	5	20.4	63.5	42.0	Threaded	n/a	n/a	n/a	ZG	**7832788**	**7832786**	114
25	10	13.2	45.0	40.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2510-RH-EE**	**KGS-2510-050-RH**	126
25	10	19.9	61.0	42.0	Threaded	n/a	n/a	n/a	ZG	**7832792**	**7832790**	114
25	20	13.0	35.0	40.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2520-RH-EE**	**KGS-2520-050-RH**	126
25	25	16.7	35.0	40.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2525-RH-EE**	**KGS-2525-050-RH**	126
25	50	15.4	58.0	40.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-2550-RH-EE**	**KGS-2550-050-RH**	126
32	5	21.5	45.0	50.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-3205-RH-EE**	**KGS-3205-050-RH**	126
32	5	21.5	45.0	45.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-3205-RH-EE**	**KGS-3205-050-RH**	128
32	5	23.3	65.5	52.0	Threaded	n/a	n/a	n/a	ZG	**7832797**	**7832795**	114
32	10	33.4	60.0	53.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-3210-RH-EE**	**KGS-3210-050-RH**	128
32	10	33.8	85.0	52.0	Threaded	n/a	n/a	n/a	ZG	**7832800**	**7832798**	114
32	20	29.7	70.0	53.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-3220-RH-EE**	**KGS-3220-050-RH**	128
32	40	14.9	45.0	53.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-3240-RH-EE**	**KGS-3240-050-RH**	128
40	5	23.8	45.0	63.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-4005-RH-EE**	**KGS-4005-050-RH**	126
40	5	23.8	45.0	53.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-4005-RH-EE**	**KGS-4005-050-RH**	128
40	5	26.3	67.5	58.0	Threaded	n/a	n/a	n/a	ZG	**7832806**	**7832804**	114
40	10	38.0	60.0	63.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-4010-RH-EE**	**KGS-4010-050-RH**	126
40	10	78.6	105.5	65.0	Threaded	n/a	n/a	n/a	ZG	**7832810**	**7832808**	114
40	20	33.3	70.0	63.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-4020-RH-EE**	**KGS-4020-050-RH**	126
40	40	35.0	85.0	63.0	Keyway	n/a	n/a	n/a	KGM-D	**KGM-D-4040-RH-EE**	**KGS-4040-050-RH**	126
50	10	68.7	82.0	72.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-5010-RH-EE**	**KGS-5010-050-RH**	128
50	10	97.8	118.0	78.0	Threaded	n/a	n/a	n/a	ZG	**7832819**	**7832817**	114
50	20	60.0	82.0	85.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-5020-RH-EE**	**KGS-5020-050-RH**	128
63	10	76.0	82.0	85.0	Keyway	n/a	n/a	n/a	KGM-N	**KGM-N-6310-RH-EE**	**KGS-6310-050-RH**	128
63	10	109.7	118.0	92.0	Threaded	n/a	n/a	n/a	ZG	**7832824**	**7832822**	114
80	10	121.9	126.0	120.0	Threaded	n/a	n/a	n/a	ZG	**7832829**	**7832827**	114
80	20	213.7	187.0	120.0	Threaded	n/a	n/a	n/a	ZG	**7832832**	**7832830**	114

Metric Ball Screws Product Overview

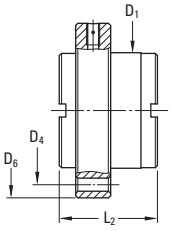
Flanged Ball Nuts

Fineline: FK, FH
NEFF: KGF-D
Return: Internal
Style: Flanged
Mounting: Flanged
Backlash: Z1, Z2 and Z3
Thread Direction: Right Hand

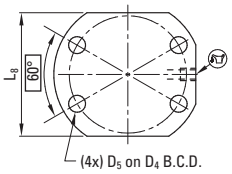
Form E



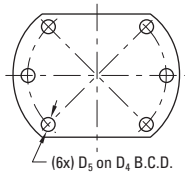
Form S



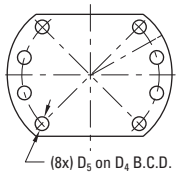
12mm



16 – 32mm



? 40mm



Note: KGF-D 2525 and 4040 models have round flanges.

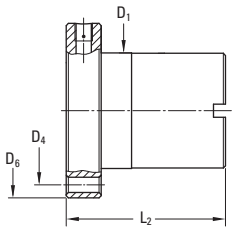
Nominal Diameter	Lead	Dynamic Load Capacity (C_{am})	Length L_2	Width/ Diameter D_1	Ball Nut Form	Flange Diameter D_6	Bolt Hole Circle D_4	Hole Diameter D_5	Ball Nut	Nut P/N	Screw P/N	Catalog Page
(mm)	(mm)	(kN)	(mm)	(mm)		(mm)	(mm)	(mm)				
12	5	5.6	46.5	24.0	Form S	40.0	32.0	4.6	FK	**7832773**	**7832772**	118
16	5	9.5	48.5	28.0	Form S	48.0	38.0	5.5	FK	**7832777**	**7832776**	118
16	5	9.3	42.0	28.0	Form E	48.0	38.0	5.5	KGF-D	**KGF-D-1605-RH-EE**	**KGS-1605-050-RH**	122
16	10	15.4	55.0	28.0	Form E	48.0	38.0	5.5	KGF-D	**KGF-D-1610-RH-EE**	**KGS-1610-050-RH**	122
20	5	11.5	48.5	36.0	Form S	58.0	47.0	6.6	FK	**7832780**	**7832779**	118
20	5	10.5	42.0	36.0	Form E	58.0	47.0	6.6	KGF-D	**KGF-D-2005-RH-EE**	**KGS-2005-050-RH**	122
20	20	10.8	36.0	36.0	Form S	58.0	47.0	6.6	FH	**7832784**	**7832783**	118
25	5	13.1	49.0	40.0	Form S	62.0	51.0	6.6	FK	**7832787**	**7832786**	118
25	5	12.3	42.0	40.0	Form E	62.0	51.0	6.6	KGF-D	**KGF-D-2505-RH-EE**	**KGS-2505-050-RH**	122
25	10	22.9	51.0	40.0	Form S	62.0	51.0	6.6	FH	**7832791**	**7832790**	118
25	10	13.2	55.0	40.0	Form E	62.0	51.0	6.6	KGF-D	**KGF-D-2510-RH-EE**	**KGS-2510-050-RH**	122
25	20	13.0	35.0	40.0	Form S	62.0	51.0	6.6	KGF-D	**KGF-D-2520-RH-EE**	**KGS-2520-050-RH**	122
25	25	13.1	39.0	40.0	Form S	62.0	51.0	6.6	FH	**7832794**	**7832793**	118
25	25	16.7	35.0	40.0	Form S	62.0	51.0	6.6	KGF-D	**KGF-D-2525-RH-EE**	**KGS-2525-050-RH**	122
25	50	15.4	58.0	40.0	Form S	62.0	51.0	6.6	KGF-D	**KGF-D-2550-RH-EE**	**KGS-2550-050-RH**	122
32	5	19.3	57.0	50.0	Form S	80.0	65.0	9.0	FK	**7832796**	**7832795**	118
32	5	21.5	55.0	50.0	Form E	80.0	65.0	9.0	KGF-D	**KGF-D-3205-RH-EE**	**KGS-3205-050-RH**	122
32	10	26.4	73.0	50.0	Form S	80.0	65.0	9.0	FK	**7832799**	**7832798**	118
32	10	33.4	69.0	53.0	Form E	80.0	65.0	9.0	KGF-D	**KGF-D-3210-RH-EE**	**KGS-3210-050-RH**	122
32	20	47.2	83.0	56.0	Form S	86.0	71.0	9.0	FH	**7832803**	**7832802**	118
32	20	29.7	80.0	53.0	Form E	80.0	65.0	9.0	KGF-D	**KGF-D-3220-RH-EE**	**KGS-3220-050-RH**	122
32	32	19.7	42.0	56.0	Form S	86.0	71.0	9.0	FH	**7833300**	**7833301**	118
32	32	18.0	42.0	50.0	Form S	80.0	65.0	9.0	KGF-D	**KGF-D-3232-RH-EE**	**KGS-3232-050-RH**	122
40	5	26.3	66.0	63.0	Form S	93.0	78.0	9.0	FK	**7832805**	**7832804**	118
40	5	23.8	57.0	63.0	Form E	93.0	78.0	9.0	KGF-D	**KGF-D-4005-RH-EE**	**KGS-4005-050-RH**	122
40	10	64.9	88.5	63.0	Form S	93.0	78.0	9.0	FK	**7832809**	**7832808**	118
40	10	38.0	71.0	63.0	Form E	93.0	78.0	9.0	KGF-D	**KGF-D-4010-RH-EE**	**KGS-4010-050-RH**	122
40	20	52.2	83.0	63.0	Form S	93.0	78.0	9.0	FH	**7832812**	**7832811**	118
40	20	33.3	80.0	63.0	Form E	93.0	78.0	9.0	KGF-D	**KGF-D-4020-RH-EE**	**KGS-4020-050-RH**	122
40	40	59.7	104.0	70.0	Form S	100.0	85.0	9.0	FH	**7832815**	**7832814**	118
40	40	35.0	85.0	63.0	Form S	93.0	78.0	9.0	KGF-D	**KGF-D-4040-RH-EE**	**KGS-4040-050-RH**	122
50	10	66.4	92.0	75.0	Form S	110.0	93.0	11.0	FK	**7832818**	**7832817**	118
50	10	68.7	95.0	75.0	Form E	110.0	93.0	11.0	KGF-D	**KGF-D-5010-RH-EE**	**KGS-5010-050-RH**	122
50	20	78.8	85.0	75.0	Form S	110.0	93.0	11.0	FH	**7832821**	**7832820**	118
50	20	60.0	95.0	85.0	Form E	125.0	103.0	11.0	KGF-D	**KGF-D-5020-RH-EE**	**KGS-5020-050-RH**	122
63	10	93.8	103.5	90.0	Form S	125.0	108.0	11.0	FK	**7832823**	**7832822**	118
63	20	103.1	86.0	95.0	Form S	135.0	115.0	13.5	FK	**7832826**	**7832825**	118
80	10	121.9	121.0	105.0	Form S	145.0	125.0	13.5	FK	**7832828**	**7832827**	118
80	20	176.4	160.5	125.0	Form S	165.0	145.0	13.5	FK	**7832831**	**7832830**	118

Metric Ball Screws Product Overview

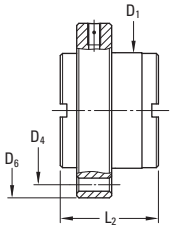
Flanged Ball Nuts

Fineline FS
NEFF KGF-N
Return: Internal
Style: Flanged
Mounting: Flanged
Backlash: Z1, Z2 and Z3
Thread Direction: Right Hand

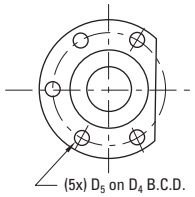
Form E



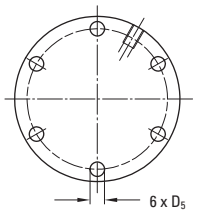
Form S



FS



KGF-N



Nominal Diameter	Lead	Dynamic Load Capacity (C_{am})	Length L_2	Width/ Diameter D_1	Ball Nut Form	Flange Diameter D_6	Bolt Hole Circle D_4	Hole Diameter D_5	Ball Nut	Nut P/N	Screw P/N	Catalog Page
(mm)	(mm)	(kN)	(mm)	(mm)		(mm)	(mm)	(mm)				
16	5	9.3	44.0	28.0	Form E	48.0	38.0	5.5	KGF-N	**KGF-N-1605-RH-EE**	**KGS-1605-050-RH**	124
20	5	11.1	48.0	33.0	Form E	58.0	45.0	6.6	FS	**7832782**	**7832779**	116
20	5	10.5	44.0	32.0	Form E	55.0	45.0	7.0	KGF-N	**KGF-N-2005-RH-EE**	**KGS-2005-050-RH**	124
20	20	11.5	56.5	40.0	Form E	63.0	50.0	6.6	FS	**7832785**	**7832783**	116
20	20	11.6	30.0	35.0	Form S	62.0	50.0	7.0	KGF-N	**KGF-N-2020-RH-EE**	**KGS-2020-050-RH**	124
20	50	13.0	56.0	35.0	Form S	62.0	50.0	7.0	KGF-N	**KGF-N-2050-RH-EE**	**KGS-2050-050-RH**	124
25	5	13.1	53.0	38.0	Form E	63.0	50.0	6.6	FS	**7832789**	**7832786**	116
25	5	12.3	46.0	38.0	Form E	62.0	50.0	7.0	KGF-N	**KGF-N-2505-RH-EE**	**KGS-2505-050-RH**	124
32	5	21.5	59.0	45.0	Form E	70.0	58.0	7.0	KGF-N	**KGF-N-3205-RH-EE**	**KGS-3205-050-RH**	124
32	10	26.4	72.0	50.0	Form E	80.0	65.0	9.0	FS	**7832801**	**7832798**	116
32	10	33.4	73.0	53.0	Form E	80.0	68.0	7.0	KGF-N	**KGF-N-3210-RH-EE**	**KGS-3210-050-RH**	124
32	40	14.9	45.0	53.0	Form S	80.0	68.0	7.0	KGF-N	**KGF-N-3240-RH-EE**	**KGS-3240-050-RH**	124
40	5	21.7	53.0	56.0	Form E	80.0	68.0	6.6	FS	**7832807**	**7832804**	116
40	5	23.8	59.0	53.0	Form E	80.0	68.0	7.0	KGF-N	**KGF-N-4005-RH-EE**	**KGS-4005-050-RH**	124
40	10	38.0	73.0	63.0	Form E	95.0	78.0	9.0	KGF-N	**KGF-N-4010-RH-EE**	**KGS-4010-050-RH**	124
40	20	39.7	62.0	75.0	Form E	110.0	93.0	11.0	FS	**7832813**	**7832811**	116
40	40	29.8	106.0	72.0	Form E	110.0	93.0	11.0	FS	**7832816**	**7832814**	116
50	10	68.7	97.0	72.0	Form E	110.0	90.0	11.0	KGF-N	**KGF-N-5010-RH-EE**	**KGS-5010-050-RH**	124
63	10	76.0	99.0	85.0	Form E	125.0	105.0	11.0	KGF-N	**KGF-N-6310-RH-EE**	**KGS-6310-050-RH**	124

NOTES:

Miniature Rolled Ball Screws — Metric Series

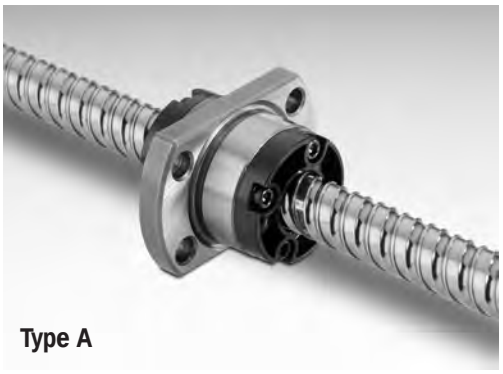
Miniature Rolled Ball Screw Assemblies are an efficient, cost-effective solution in a small envelope. Ball screw assemblies range from 4mm to 14mm in diameter, with standard lead accuracies of 52 microns/300mm. Compact ball nuts are available with body diameters as small as 11mm and overall lengths as short as 17mm. Miniature Rolled Ball Screws are ideal for laboratory, semiconductor, and medical applications.

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Miniature Rolled Ball Screws — Metric Series

4mm to 14mm Diameter, Lead Accuracy: ± 52µm/300mm



Type A

Type B

Non-Preloaded, Rolled Ball Screw Assemblies

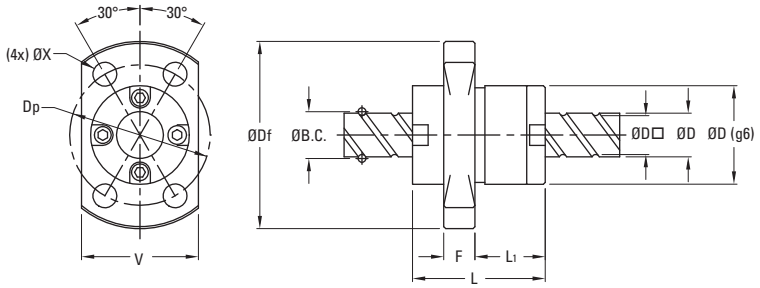
- Cost-effective solution in a small envelope, ideal for use in small spaces
- Clearance held to max .02mm
- Two nut styles (Type A & B) provide optimum performance in low and high lead assemblies

Nominal Diameter (size)	Lead	Nut Type	Ball Screw and Nut Assembly P/N[1]	Suggested Bearing Size	Performance Data						
					Dynamic Load Capacity		Static Load Capacity		Max. Axial Backlash	Minor Diameter	Max. Length
(mm)	(mm)			(mm)	(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)
4	1	B	**PRM0401**	N/A	0.6	126	0.8	178	0.02	3.3	100
5	4	B	**PRM0504**	N/A	0.5	106	0.7	162	0.02	4.3	220
6	1	B	**PRM0601**	4	0.7	153	1.2	270	0.02	5.3	265
6	6	A	**PRM0606**	4	0.9	196	1.5	326	0.02	5.2	265
8	1	B	**PRM0801**	6	0.8	175	1.7	371	0.02	7.3	360
8	2	B	**PRM0802**	6	2.4	540	4.1	922	0.02	6.6	360
8	5	B	**PRM0805**	6	1.9	416	3.0	674	0.02	6.6	360
8	8	A	**PRM0808**	6	2.2	495	3.8	854	0.02	6.7	360
8	12	A	**PRM0812**	6	2.2	495	4.0	899	0.02	6.7	360
10	2	B	**PRM1002**	6	2.7	607	5.3	1,191	0.02	8.6	355
10	10	A	**PRM1010**	6	3.3	742	5.9	1,326	0.02	8.4	405
10	15	A	**PRM1015**	6	3.3	742	6.4	1,439	0.02	8.4	405
10	20	A	**PRM1020**	6	2.1	472	4.0	899	0.02	8.7	405
12	2	B	**PRM1202**	8	3.0	674	6.4	1,439	0.02	10.6	395
13	12	A	**PRM1312**	8	5.0	1,124	9.9	2,226	0.02	11.0	700
13	20	A	**PRM1320**	8	5.0	1,124	10.7	2,405	0.02	11.0	700
14	2	B	**PRM1402**	8	3.2	719	7.5	1,686	0.02	12.6	445
14	4	B	**PRM1404**	8	5.7	1,281	11.6	2,608	0.02	11.8	445

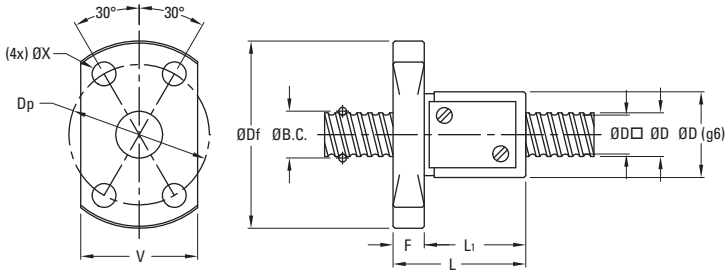
(1) All Miniature Rolled product is sold in matched sets as ball screw and nut assemblies. Please contact factory for sizes not listed.

Miniature Rolled Ball Screws — Metric Series

Type A — End Cap Design



Type B — Return Plate Design



Nominal Diameter (size)	Lead	Nut Type	Nut Specifications								
			Outside Diameter D	Flange Outside Diameter Df	Overall Length L	Body Length L1	Flange Width F	Flange Flat Width V	Bolt Circle Diameter Dp	Mounting Hole Diameter X	Ball Diameter
(mm)	(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
4	1	B	11.0	24.0	17.0	13.0	4.0	15.0	18.0	3.4	0.80
5	4	B	12.0	24.0	22.0	18.0	4.0	16.0	18.0	3.4	0.80
6	1	B	13.0	26.0	17.0	13.0	4.0	16.0	20.0	3.4	0.80
6	6	A	14.0	27.0	17.0	8.0	4.0	16.0	21.0	3.4	1.00
8	1	B	16.0	29.0	17.0	13.0	4.0	18.0	23.0	3.4	0.80
8	2	B	20.0	37.0	24.0	19.0	5.0	22.0	29.0	4.5	1.59
8	5	B	18.0	31.0	28.0	24.0	4.0	20.0	25.0	3.4	1.59
8	8	A	18.0	31.0	20.0	10.0	4.0	20.0	25.0	3.4	1.59
8	12	A	18.0	31.0	27.0	17.0	4.0	20.0	25.0	3.4	1.59
10	2	B	23.0	40.0	24.0	19.0	5.0	25.0	32.0	4.5	1.59
10	10	A	23.0	40.0	24.0	13.0	5.0	25.0	32.0	4.5	2.00
10	15	A	23.0	40.0	33.0	22.0	5.0	25.0	32.0	4.5	2.00
10	20	A	20.0	37.0	23.0	13.0	5.0	22.0	29.0	4.5	1.59
12	2	B	25.0	42.0	24.0	19.0	5.0	27.0	34.0	4.5	1.59
13	12	A	28.0	45.0	30.0	17.0	5.0	30.0	37.0	4.5	2.38
13	20	A	28.0	45.0	43.0	29.0	5.0	30.0	37.0	4.5	2.38
14	2	B	26.0	45.0	25.0	19.0	6.0	28.0	36.0	5.5	1.59
14	4	B	30.0	49.0	33.0	27.0	6.0	32.0	40.0	5.5	2.38

NOTES:

FineLine Rolled Ball Screws — Metric Series

FineLine Rolled Ball Screw Assemblies are designed and manufactured to provide high level performance at an affordable price. Ball screws are manufactured using Thomson's patented, German-engineered Precision Screw Forming (PSF) Technology, which provides high accuracy (23 microns/300mm standard) with the manufacturing efficiency of rolled processes. Ball nuts are manufactured with one of two ball return systems (button or end return) made with reinforced steel, making them extremely durable and ideal for high speed, high load, and/or high temperature applications. Each nut comes standard with an integral plastic wiper to protect against chips or other debris. FineLine Rolled Ball Screws are ideal for machining centers, factory automation, packaging, and injection molding applications.

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

FineLine Rolled Ball Screws — ZG Style Ball Nuts

Standard Lead Accuracy: ± 23µm/300mm

ZG Style Nut

Internal Return Threaded Ball Nut and Screw

- Flexible solution for non-standard mounting
- Integral wiper[4] included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1-2%
  Z2 – no preload, clearance held to max .18mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Ball Screw P/N[1] [2] [6]	Ball Nut P/N	Available Preload Types	Performance Data					Screw Specifications[3]			
			Type Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_o)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[5]	Screw Weight
(mm)	(mm)				(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
12	4	**7832770-P5**	**7832771**	Z1, Z2, Z3	3.5	787	4.0	899	0.07	11.6	9.7	3000	0.7
16	5	**7832776-P5**	**7832778**	Z1, Z2, Z3	12.1	2,720	14.5	3,260	0.09	15.6	12.7	3000	1.2
20	5	**7832779-P5**	**7832781**	Z1, Z2, Z3	14.8	3,327	20.7	4,654	0.09	19.6	16.7	4000	2.0
25	5	**7832786-P5**	**7832788**	Z1, Z2, Z3	20.4	4,586	33.7	7,576	0.09	24.6	21.7	5000	3.3
25	10	**7832790-P5**	**7832792**	Z1, Z2, Z3	19.9	4,474	31.8	7,149	0.09	24.6	21.7	5000	3.3
32	5	**7832795-P5**	**7832797**	Z1, Z2, Z3	23.3	5,238	45.5	10,229	0.09	31.6	28.7	6000	5.6
32	10	**7832798-P5**	**7832800**	Z1, Z2, Z3	33.8	7,599	52.0	11,690	0.15	31.6	27.1	6000	5.3
40	5	**7832804-P5**	**7832806**	Z1, Z2, Z3	26.3	5,912	59.2	13,309	0.09	39.6	36.7	6000	9.0
40	10	**7832808-P5**	**7832810**	Z1, Z2, Z3	78.6	17,670	136.2	30,619	0.18	39.6	34.0	6000	8.3
50	10	**7832817-P5**	**7832819**	Z1, Z2, Z3	97.8	21,986	213.2	47,929	0.18	49.5	43.0	6000	13.5
63	10	**7832822-P5**	**7832824**	Z1, Z2, Z3	109.7	24,662	275.6	61,957	0.18	62.5	56.9	6000	22.0
80	10	**7832827-T7**	**7832829**	Z2	121.9	27,404	375.0	84,303	0.18	79.5	73.9	6000	36.4
80	20	**7832830-T7**	**7832832**	Z2	213.7	48,044	496.0	111,511	0.18	79.5	69.9	6000	36.4

(1) FineLine Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

(2) All ball screws and nuts are right-hand thread.

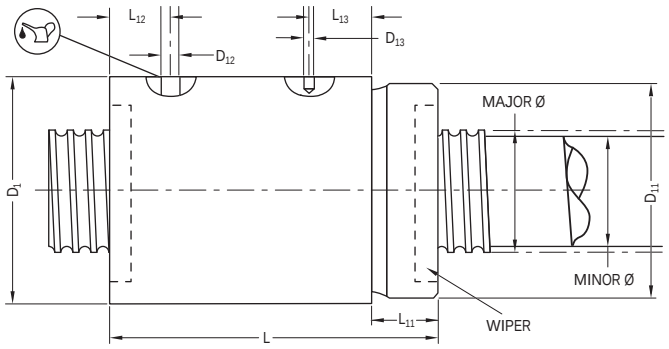
(3) Dimensional information on bearing supports and standard end machining is available on page 160.

(4) Wiper not included on 12 x 4 ball nut.

(5) Max. length includes 150mm on each end usable for end machining only. Max. travel length equals table value minus 300mm. Ends are hardened.

(6) -P5 Accuracy Class is ±23µm/300 mm. -T7 Accuracy Class is ±52 µm/300 mm

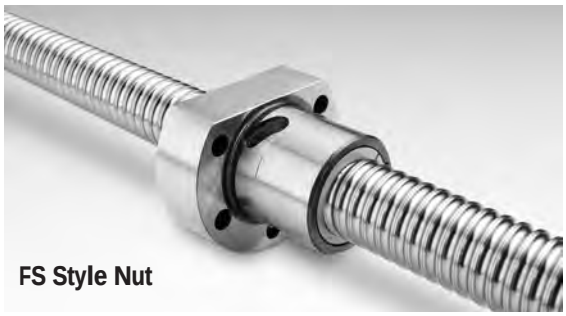
FineLine Rolled Ball Screws — ZG Style Ball Nuts



Nominal Diameter (size)	Lead	Nut Specifications (mm)									
		D_1	D_{11}	D_{12}	D_{13}	L	L_{11}	L_{12}	L_{13}	Nut Weight	Ball Diameter
(mm)	(mm)	h12				-0.2				(kg)	(mm)
12	4	25.0	M 20 x 1.0	3.0	—	34.0	10.0	5.0	—	0.10	1.984
16	5	32.0	M 30 x 1.5	M 6 x 1	4	57.5	16.5	10.5	22.0	0.22	3.500
20	5	38.0	M 35 x 1.5	M 6 x 1	4	57.5	16.5	10.5	22.0	0.30	3.500
25	5	42.0	M 40 x 1.5	M 6 x 1	4	63.5	17.0	10.5	23.0	0.37	3.500
25	10	42.0	M 40 x 1.5	M 6 x 1	4	61.0	17.0	10.0	21.0	0.38	3.500
32	5	52.0	M 48 x 1.5	M 6 x 1	5	65.5	19.0	10.5	23.0	0.55	3.500
32	10	52.0	M 48 x 1.5	M 6 x 1	5	85.0	19.0	12.0	43.0	0.65	5.556
40	5	58.0	M 56 x 1.5	M 8 x 1	5	67.5	19.0	12.0	22.5	0.60	3.500
40	10	65.0	M 60 x 2.0	M 8 x 1	6	105.5	27.0	13.0	43.0	1.25	7.144
50	10	78.0	M 72 x 2.0	M 8 x 1	6	118.0	29.0	13.0	53.0	1.95	7.144
63	10	92.0	M 85 x 2.0	M 8 x 1	6	118.0	29.0	13.0	53.0	2.40	7.144
80	10	120.0	M 110 x 2.0	M 8 x 1	8	126.0	34.0	15.5	53.0	4.90	7.144
80	20	120.0	M 110 x 2.0	M 8 x 1	8	187.0	39.0	18.0	83.0	4.90	12.700

FineLine Rolled Ball Screws — FS Style Ball Nuts

Standard Lead Accuracy: ± 23µm/300mm



FS Style Nut

Internal Return Flanged Ball Nut and Screw

- Compact package utilizing shortest nut length possible
- Integral wiper and flange included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1-2%
  Z2 – no preload, clearance held to max .18mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Ball Screw P/N[1] [2]	Ball Nut P/N	Available Preload Types	Performance Data					Screw Specifications[3]			
			Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_0)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[4]	Screw Weight
(mm)	(mm)				(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
20	5	**7832779-P5**	**7832782**	Z1, Z2, Z3	11.1	2,495	15.1	3,395	0.09	19.6	16.7	4000	2.0
20	20	**7832783-P5**	**7832785**	Z2, Z3	11.5	2,585	17.5	3,934	0.09	19.6	16.7	4000	1.9
25	5	**7832786-P5**	**7832789**	Z1, Z2, Z3	13.1	2,945	20.2	4,541	0.09	24.6	21.7	5000	3.3
32	10	**7832798-P5**	**7832801**	Z1, Z2, Z3	26.4	5,935	39.0	8,768	0.15	31.6	27.1	6000	5.3
40	5	**7832804-P5**	**7832807**	Z1, Z2, Z3	21.7	4,878	47.4	10,656	0.09	39.6	36.7	6000	9.0
40	20	**7832811-P5**	**7832813**	Z2, Z3	39.7	8,925	74.0	16,636	0.15	39.6	35.2	6000	7.6
40	40	**7832814-P5**	**7832816**	Z2, Z3	29.8	6,699	45.4	10,206	0.18	39.6	34.0	6000	8.4

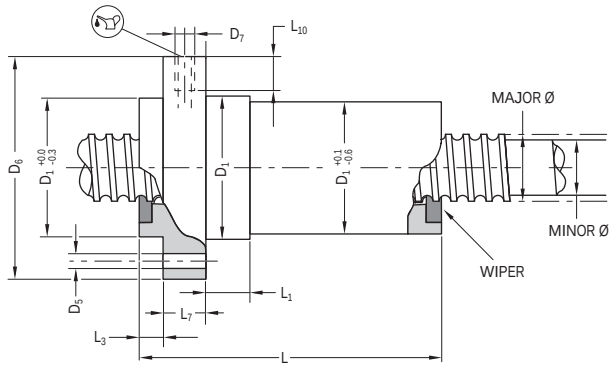
(1) FineLine Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

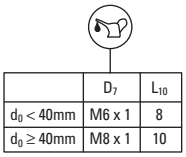
(2) All ball screws and nuts are right-hand thread.

(3) Dimensional information on bearing supports and standard end machining is available on page 160.

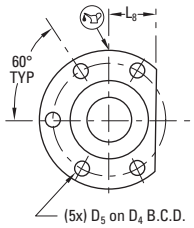
(4) Max. length includes 150mm on each end usable for end machining only. Max. travel length equals table value minus 300mm. Ends are hardened.

FineLine Rolled Ball Screws — FS Style Ball Nuts





	D_7	L_{10}
$d_0 < 40$mm	M6 x 1	8
$d_0 \geq 40$mm	M8 x 1	10



Nominal Diameter (size)	Lead	Nut Specifications (mm)										
		D_1	D_4	D_5	D_6	L	L_1	L_3	L_7	L_8	Nut Weight	Ball Diameter
(mm)	(mm)	g6		H13	h13				h13		(kg)	(mm)
20	5	33.0	45.0	6.6	58	48.0	12.0	0.0	15.0	22.0	0.35	3.500
20	20	40.0	50.0	6.6	63	56.5	15.0	0.0	20.0	21.0	0.45	3.500
25	5	38.0	50.0	6.6	63	53.0	11.0	0.0	20.0	21.0	0.37	3.500
32	10	50.0	65.0	9.0	80	72.0	12.0	0.0	12.0	28.5	0.80	5.556
40	5	56.0	68.0	6.6	80	53.0	12.0	0.0	19.0	30.0	1.20	3.500
40	20	75.0	93.0	11.0	110	62.0	15.0	0.0	16.0	42.5	1.60	5.556
40	40	72.0	93.0	11.0	110	106.0	16.0	0.0	16.0	42.5	2.40	7.144

FineLine Rolled Ball Screws — FK/FH Style Ball Nuts

Standard Lead Accuracy: ± 23µm/300mm[1]

FK Style Nut

FH Style Nut

Internal Return Flanged Ball Nut and Screw

- Two nut styles (FK & FH) provide optimal performance in low and high lead assemblies
- Integral wiper and flange included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1-2%
  Z2 – no preload, clearance held to max .18mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Nut Type	Ball Screw P/N[2][3][6]	Ball Nut P/N	Available Preload Types	Performance Data					Screw Specifications[4]			
				Type Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_0)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[5]	Screw Weight
(mm)	(mm)					(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
12	5	FK	**7832772-T7**	**7832773**	Z1, Z2, Z3	5.6	1,259	6.2	1,393	0.07	11.6	9.7	3000	0.7
16	5	FK	**7832776-P5**	**7832777**	Z1, Z2, Z3	9.5	2,136	10.9	2,450	0.09	15.6	12.7	3000	1.2
20	5	FK	**7832779-P5**	**7832780**	Z1, Z2, Z3	11.5	2,585	15.5	3,485	0.09	19.6	16.7	4000	2.0
20	20	FH	**7832783-P5**	**7832784**	Z2, Z3	10.8	2,428	18.6	4,181	0.08	19.6	16.7	4000	1.9
25	5	FK	**7832786-P5**	**7832787**	Z1, Z2, Z3	13.1	2,945	20.2	4,541	0.09	24.6	21.7	5000	3.3
25	10	FH	**7832790-P5**	**7832791**	Z2, Z3	22.9	5,148	141.2	31,743	0.09	24.6	21.7	5000	3.3
25	25	FH	**7832793-P5**	**7832794**	Z2, Z3	13.1	2,945	26.0	5,845	0.08	24.6	22.0	5000	3.3
32	5	FK	**7832795-P5**	**7832796**	Z1, Z2, Z3	19.3	4,339	36.3	81,606	0.09	31.6	28.7	6000	5.6
32	10	FK	**7832798-P5**	**7832799**	Z1, Z2, Z3	26.4	5,935	39.0	8,768	0.15	31.6	27.1	6000	5.3
32	20	FH	**7832802-P5**	**7832803**	Z2, Z3	47.2	10,611	83.2	18,704	0.15	31.6	27.1	6000	5.3
32	32	FH	**7833301-P5**	**7833300**	Z2, Z3	19.7	4,429	37.4	8,408	0.08	31.3	28.3	6000	5.3
40	5	FK	**7832804-P5**	**7832805**	Z1, Z2, Z3	26.3	5,912	59.2	13,309	0.09	39.6	36.7	6000	9.0
40	10	FK	**7832808-P5**	**7832809**	Z1, Z2, Z3	64.9	14,590	109.0	24,504	0.18	39.6	34.0	6000	8.3
40	20	FH	**7832811-P5**	**7832812**	Z2, Z3	52.2	11,735	103.6	23,290	0.15	39.6	35.2	6000	7.6
40	40	FH	**7832814-P5**	**7832815**	Z2, Z3	59.7	13,421	108.9	24,482	0.18	39.6	34.0	6000	8.4
50	10	FK	**7832817-P5**	**7832818**	Z1, Z2, Z3	66.4	14,927	134.3	30,192	0.18	49.5	43.0	6000	13.5
50	20	FH	**7832820-P5**	**7832821**	Z2, Z3	78.8	17,715	188.7	42,421	0.16	49.5	44.6	6000	13.6
63	10	FK	**7832822-P5**	**7832823**	Z1, Z2, Z3	93.8	21,087	229.7	51,639	0.18	62.5	56.9	6000	22.0
63	20	FH	**7832825-P5**	**7832826**	Z2, Z3	103.1	23,178	270.8	60,878	0.18	62.5	56.9	6000	22.0
80	10	FK	**7832827-T7**	**7832828**	Z1, Z2, Z3	121.9	27,404	374.9	84,281	0.18	79.5	73.9	6000	36.4
80	20	FK	**7832830-T7**	**7832831**	Z2, Z3	176.4	39,700	375.0	84,300	0.18	79.5	69.9	6000	36.4

(1) 12mm and 80mm nominal diameter screws are ± 52µm/300mm.

(2) FineLine Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

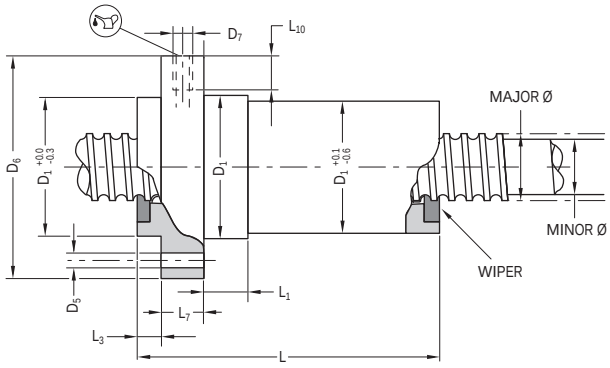
(3) All ball screws and nuts are right-hand thread.

(4) Dimensional information on bearing supports and standard end machining is available on page 160.

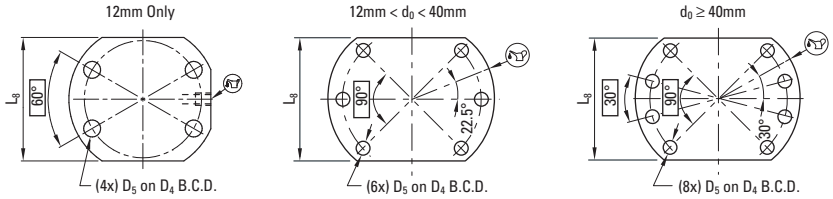
(5) Max. length includes 150mm on each end usable for end machining only. Max. travel length equals table value minus 300mm. Ends are hardened.

(6) -P5 Accuracy Class is ±23µm/300 mm. -T7 Accuracy Class is ±52 µm/300 mm

FineLine Rolled Ball Screws — FK/FH Style Ball Nuts



	D_7	L_{10}
d_0 < 40mm	M6 x 1	8
d_0 ≥ 40mm	M8 x 1	10



Nominal Diameter (size)	Lead	Nut Specifications (mm)										
		D_1	D_4	D_5	D_6	L	L_1	L_3	L_7	L_8	Nut Weight	Ball Diameter
(mm)	(mm)	g6		H13	h13				h13	h13	(kg)	(mm)
12	5	24.0	32.0	4.6	40.0	46.5	10.0	5.5	8.0	26.0	0.1	2.381
16	5	28.0	38.0	5.5	48.0	48.5	10.0	5.5	10.0	40.0	0.3	3.500
20	5	36.0	47.0	6.6	58.0	48.5	10.0	5.5	10.0	44.0	0.4	3.500
20	20	36.0	47.0	6.6	58.0	36.0	4.0	11.0	10.0	44.0	0.5	3.500
25	5	40.0	51.0	6.6	62.0	49.0	10.0	6.0	10.0	48.0	0.4	3.500
25	10	40.0	51.0	6.6	62.0	51.0	9.0	16.0	10.0	48.0	0.5	3.500
25	25	40.0	51.0	6.6	62.0	39.0	9.0	10.0	10.0	48.0	0.6	3.500
32	5	50.0	65.0	9.0	80.0	57.0	10.0	6.0	12.0	62.0	0.7	3.500
32	10	50.0	65.0	9.0	80.0	73.0	16.0	6.0	12.0	62.0	0.8	5.556
32	20	56.0	71.0	9.0	86.0	83.0	25.0	19.0	22.0	68.0	1.4	5.556
32	32	56.0	71.0	9.0	86.0	42.0	12.0	9.0	12.0	68.0	0.8	3.969
40	5	63.0	78.0	9.0	93.0	66.0	10.0	7.0	14.0	70.0	1.2	3.500
40	10	63.0	78.0	9.0	93.0	88.5	16.0	7.0	14.0	70.0	1.4	7.144
40	20	63.0	78.0	9.0	93.0	83.0	25.0	19.5	14.0	70.0	1.6	5.556
40	40	70.0	85.0	9.0	100.0	104.0	25.0	21.0	14.0	77.0	2.4	7.144
50	10	75.0	93.0	11.0	110.0	92.0	16.0	7.0	16.0	85.0	2.0	7.144
50	20	75.0	93.0	11.0	110.0	85.0	16.0	22.0	16.0	85.0	2.2	6.400
63	10	90.0	108.0	11.0	125.0	103.5	16.0	7.0	18.0	95.0	3.0	7.144
63	20	95.0	115.0	13.5	135.0	86.0	18.0	24.0	20.0	100.0	3.8	7.144
80	10	105.0	125.0	13.5	145.0	121.0	16.0	9.0	20.0	110.0	3.9	7.144
80	20	125.0	145.0	13.5	165.0	160.5	25.0	9.0	25.0	130.0	3.9	7.144

NOTES:

Thomson NEFF Rolled Ball Screws — Metric Series

NEFF Rolled Ball Screw Assemblies are available in a wide range of diameters, leads and nut styles — all designed to provide quiet, smooth running, efficient performance. Standard NEFF ball screws are rolled to an accuracy of 50 microns/300mm, with higher accuracies readily available upon request. Ball nuts include one of three unique ball return systems (depending on the diameter and lead of the screw used) providing perfect guidance, low wear, and smooth running performance. Ball nuts come standard with profiled rubber wipers to contain lubricant and help repel fine contaminants (dust, powders, etc). NEFF Rolled Ball Screws are ideal for wood working, water cutting, electronic assembly and medical applications.

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Thomson NEFF Rolled Ball Screws — KGF-D Style Ball Nuts

Standard Lead Accuracy: ± 50µm/300mm[1]

KGF-D Style Nut

Internal Return Flanged Ball Nut and Screw

- Flexible solution for non-standard mounting
- Integral wiper and flange included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1 – 2%
  Z2 – no preload, clearance held to max .08 – .15mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Nut Type	Ball Screw P/N[1][2][3]	Ball Nut P/N	Available Preload Types[4]	Performance Data					Screw Specifications[6]			
				Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_o)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[7]	Screw Weight
(mm)	(mm)					(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
16	5	E	**KGS-1605-050-RH**	**KGF-D-1605-RH-EE**	Z1, Z2, Z3	9.3	2,091	13.1	2,945	0.08	15.3	12.9	6000	1.3
16	10	E	**KGS-1610-050-RH**	**KGF-D-1610-RH-EE**	Z1, Z2, Z3	15.4	3,462	26.5	5,957	0.08	15.2	13.0	6000	1.3
20	5	E	**KGS-2005-050-RH**	**KGF-D-2005-RH-EE**	Z1, Z2, Z3	10.5	2,361	16.6	3,732	0.08	19.3	16.9	6000	2.0
25	5	E	**KGS-2505-050-RH**	**KGF-D-2505-RH-EE**	Z1, Z2, Z3	12.3	2,766	22.5	5,058	0.08	24.3	21.9	6000	3.3
25	10	E	**KGS-2510-050-RH**	**KGF-D-2510-RH-EE**	Z1, Z2, Z3	13.2	2,968	25.3	5,688	0.08	24.3	21.9	6000	3.3
25	20	S	**KGS-2520-050-RH**	**KGF-D-2520-RH-EE**	Z2, Z3	13.0	2,921	23.3	5,238	0.15	24.4	22.0	6000	3.3
25	25	S	**KGS-2525-050-RH**	**KGF-D-2525-RH-EE**	Z2, Z3	16.7	3,755	32.2	7,239	0.08	24.3	22.0	6000	3.3
25	50	S	**KGS-2550-050-RH**	**KGF-D-2550-RH-EE**	Z2, Z3	15.4	3,463	31.7	7,126	0.15	23.9	21.5	6000	3.3
32	5	E	**KGS-3205-050-RH**	**KGF-D-3205-RH-EE**	Z1, Z2, Z3	21.5	4,834	49.3	11,083	0.08	31.3	28.9	6000	5.6
32	10	E	**KGS-3210-050-RH**	**KGF-D-3210-RH-EE**	Z1, Z2, Z3	33.4	7,509	54.5	12,252	0.08	32.5	27.3	6000	5.6
32	20	E	**KGS-3220-050-RH**	**KGF-D-3220-RH-EE**	Z2, Z3	29.7	6,678	59.8	13,444	0.08	31.5	27.9	6000	5.6
32	32	S	**KGS-3232-050-RH**	**KGF-D-3232-RH-EE**	Z2, Z3	18.0	4,047	34.7	7,800	0.15	31.6	27.1	6000	5.3
40	5	E	**KGS-4005-050-RH**	**KGF-D-4005-RH-EE**	Z1, Z2, Z3	23.8	5,351	63.1	14,185	0.08	39.3	36.9	6000	9.0
40	10	E	**KGS-4010-050-RH**	**KGF-D-4010-RH-EE**	Z1, Z2, Z3	38.0	8,544	69.1	15,534	0.08	39.3	34.1	6000	8.4
40	20	E	**KGS-4020-050-RH**	**KGF-D-4020-RH-EE**	Z2, Z3	33.3	7,487	76.1	17,108	0.08	39.5	35.9	6000	9.0
40	40	S	**KGS-4040-050-RH**	**KGF-D-4040-RH-EE**	Z2, Z3	35.0	7,869	101.9	22,908	0.08	38.7	36.3	6000	9.0
50	10	E	**KGS-5010-050-RH**	**KGF-D-5010-RH-EE**	Z1, Z2, Z3	68.7	15,446	155.8	35,025	0.08	49.3	44.1	6000	13.5
50	20	E	**KGS-5020-050-RH**	**KGF-D-5020-RH-EE**	Z2, Z3	60.0	13,490	136.3	30,641	0.08	49.3	44.1	6000	13.5

(1) 23µm/300mm lead accuracy available upon request for most sizes.

(2) Thomson NEFF Rolled Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

(3) All ball screws and nuts are right-hand thread.

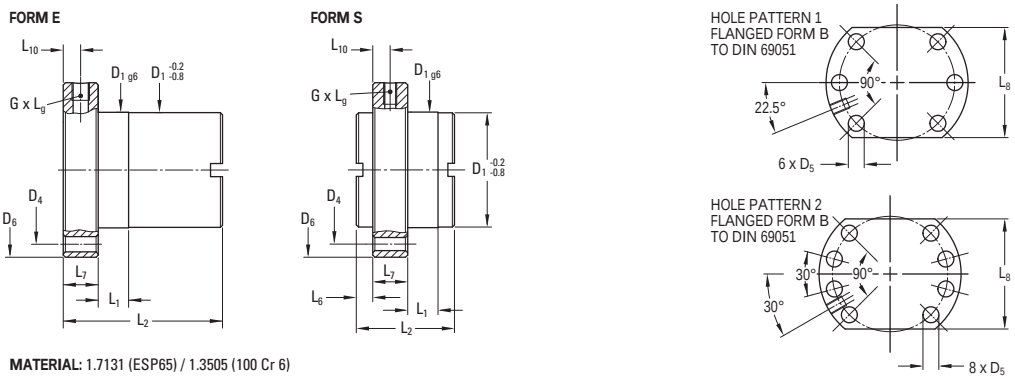
(4) Double nut pre-load systems (for up to 10% of dynamic load rating) are also available for all sizes. Contact customer service for more details.

(5) Round flange.

(6) Dimensional information on bearing supports and standard end machining is available on page 160.

(7) Max. length includes 200mm on each end usable for end machining only. Max. travel length equals table value minus 400mm. Ends are soft annealed.

Thomson NEFF Rolled Ball Screws — KGF-D Style Ball Nuts



MATERIAL: 1.7131 (ESP65) / 1.3505 (100 Cr 6)

Nominal Diameter (size)	Lead	Hole Pattern	Nut Specifications (mm)														
			D_1	D_4	D_5	D_6	L_1	L_2	L_6	L_7	L_8	L_9	L_{10}	Lube Hole (G)	No. of Circuits	Nut Weight	Ball Diameter
(mm)	(mm)		g6													(kg)	(mm)
16	5	1	28.0	38.0	5.5	48.0	10.0	42.0	—	10.0	40.0	10.0	5.0	M 6	3.0	0.20	3.500
16	10	1	28.0	38.0	5.5	48.0	10.0	55.0	—	10.0	40.0	10.0	5.0	M 6	6.0	0.30	3.000
20	5	1	36.0	47.0	6.6	58.0	10.0	42.0	—	10.0	44.0	10.0	5.0	M 6	3.0	0.25	3.500
25	5	1	40.0	51.0	6.6	62.0	10.0	42.0	—	10.0	48.0	10.0	5.0	M 6	3.0	0.35	3.500
25	10	1	40.0	51.0	6.6	62.0	16.0	55.0	—	10.0	48.0	10.0	5.0	M 6	3.0	0.45	3.500
25	20	1	40.0	51.0	6.6	62.0	4.0	35.0	10.5	10.0	48.0	8.0	5.0	M 6	4.0	0.30	3.500
25	25	1	40.0	51.0	6.6	62.0	9.0	35.0	8.0	10.0	N/A[5]	8.0	5.0	M 6	5.0	0.65	3.500
25	50	1	40.0	51.0	6.6	62.0	10.0	58.0	10.0	10.0	48.0	8.0	5.0	M 6	5.0	0.40	3.500
32	5	1	50.0	65.0	9.0	80.0	10.0	55.0	—	12.0	62.0	10.0	6.0	M 6	5.0	0.55	3.500
32	10	1	53.0	65.0	9.0	80.0	16.0	69.0	—	12.0	62.0	10.0	6.0	M 8x1	3.0	0.90	7.140
32	20	1	53.0	65.0	9.0	80.0	16.0	80.0	—	12.0	62.0	10.0	6.0	M 6	4.0	1.10	5.000
32	32	1	50.0	65.0	9.0	80.0	12.0	42.0	9.0	12.0	62.0	8.0	6.0	M6	3.0	0.80	3.969
40	5	2	63.0	78.0	9.0	93.0	10.0	57.0	—	14.0	70.0	10.0	7.0	M 6	5.0	0.70	3.500
40	10	2	63.0	78.0	9.0	93.0	16.0	71.0	—	14.0	70.0	10.0	7.0	M 8x1	3.0	1.20	7.140
40	20	2	63.0	78.0	9.0	93.0	16.0	80.0	—	14.0	70.0	10.0	7.0	M 8x1	4.0	1.50	5.000
40	40	2	63.0	78.0	9.0	93.0	16.0	85.0	7.5	14.0	N/A[5]	10.0	7.0	M 8x1	8.0	1.20	3.500
50	10	2	75.0	93.0	11.0	110.0	16.0	95.0	—	16.0	85.0	10.0	8.0	M 8x1	5.0	2.00	7.140
50	20	2	85.0	103.0	11.0	125.0	22.0	95.0	—	18.0	95.0	10.0	9.0	M 8x1	4.0	2.50	7.140

Thomson NEFF Rolled Ball Screws — KGF-N Style Ball Nuts

Standard Lead Accuracy: ± 50µm/300mm[1]

KGF-N Style Nut

Internal Return Flanged Ball Nut and Screw

- Flexible solution for non-standard mounting
- Integral wiper and flange included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1 – 2%
  Z2 – no preload, clearance held to max .08 – .15mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Nut Type	Ball Screw P/N[1][2][3]	Ball Nut P/N	Available Preload Types[4]	Performance Data					Screw Specifications[5]			
				Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_o)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[6]	Screw Weight
(mm)	(mm)					(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
16	5	E	**KGS-1605-050-RH**	**KGF-N-1605-RH-EE**	Z1, Z2, Z3	9.3	2,091	13.1	2,945	0.08	15.3	12.9	6000	1.3
20	5	E	**KGS-2005-050-RH**	**KGF-N-2005-RH-EE**	Z1, Z2, Z3	10.5	2,361	16.6	3,732	0.08	19.3	16.9	6000	2.0
20	20	S	**KGS-2020-050-RH**	**KGF-N-2020-RH-EE**	Z2, Z3	11.6	2,608	18.4	4,136	0.08	19.3	16.9	6000	2.0
20	50	S	**KGS-2050-050-RH**	**KGF-N-2050-RH-EE**	Z2, Z3	13.0	2,923	24.6	5,530	0.15	18.9	16.5	6000	2.0
25	5	E	**KGS-2505-050-RH**	**KGF-N-2505-RH-EE**	Z1, Z2, Z3	12.3	2,766	22.5	5,058	0.08	24.3	21.9	6000	3.3
32	5	E	**KGS-3205-050-RH**	**KGF-N-3205-RH-EE**	Z1, Z2, Z3	21.5	4,834	49.3	11,083	0.08	31.3	28.9	6000	5.6
32	10	E	**KGS-3210-050-RH**	**KGF-N-3210-RH-EE**	Z1, Z2, Z3	33.4	7,509	54.5	12,252	0.08	32.5	27.3	6000	5.6
32	40	S	**KGS-3240-050-RH**	**KGF-N-3240-RH-EE**	Z2, Z3	14.9	3,350	32.4	7,284	0.08	30.7	28.3	6000	5.6
40	5	E	**KGS-4005-050-RH**	**KGF-N-4005-RH-EE**	Z1, Z2, Z3	23.8	5,351	63.1	14,185	0.08	39.3	36.9	6000	9.0
40	10	E	**KGS-4010-050-RH**	**KGF-N-4010-RH-EE**	Z1, Z2, Z3	38.0	8,544	69.1	15,534	0.08	39.3	34.1	6000	8.4
50	10	E	**KGS-5010-050-RH**	**KGF-N-5010-RH-EE**	Z1, Z2, Z3	68.7	15,446	155.8	35,025	0.08	49.3	44.1	6000	13.5
63	10	E	**KGS-6310-050-RH**	**KGF-N-6310-RH-EE**	Z1, Z2, Z3	76.0	17,087	197.0	44,287	0.08	62.3	57.1	6000	22.0

(1) 23µm/300mm lead accuracy available upon request for most sizes.

(2) Thomson NEFF Rolled Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

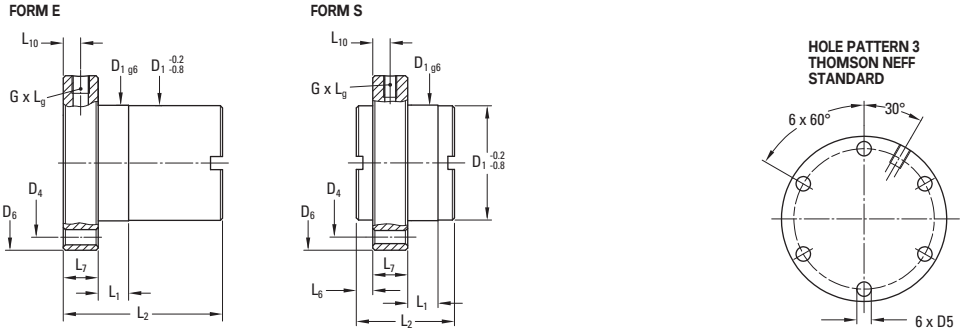
(3) All ball screws and nuts are right-hand thread.

(4) Double nut pre-load systems (for up to 10% of dynamic load rating) are also available for all sizes. Contact customer service for more details.

(5) Dimensional information on bearing supports and standard end machining is available on page 160.

(6) Max. length includes 200mm on each end usable for end machining only. Max. travel length equals table value minus 400mm. Ends are soft annealed.

Thomson NEFF Rolled Ball Screws — KGF-N Style Ball Nuts



MATERIAL: 1.7131 (ESP65) / 1.3505 (100 Cr 6)

Nominal Diameter (size)	Lead	Nut Specifications (mm)													
		D_1	D_4	D_5	D_6	L_1	L_2	L_6	L_7	L_9	L_{10}	Lube Hole (G)	No. of Circuits	Nut Weight	Ball Diameter
(mm)	(mm)	g6												(kg)	(mm)
16	5	28.0	38.0	5.5	48.0	8.0	44.0	—	12.0	8.0	6.0	M 6	3	0.20	3.500
20	5	32.0	45.0	7.0	55.0	8.0	44.0	—	12.0	8.0	6.0	M 6	3	0.25	3.500
20	20	35.0	50.0	7.0	62.0	4.0	30.0	8.0	10.0	8.0	5.0	M 6	4	0.25	3.500
20	50	35.0	50.0	7.0	62.0	10.0	56.0	9.0	10.0	8.0	5.0	M 6	5	0.40	3.500
25	5	38.0	50.0	7.0	62.0	8.0	46.0	—	14.0	8.0	7.0	M 6	3	0.35	3.500
32	5	45.0	58.0	7.0	70.0	10.0	59.0	—	16.0	8.0	8.0	M 6	5	0.55	3.500
32	10	53.0	68.0	7.0	80.0	10.0	73.0	—	16.0	8.0	8.0	M 8x1	3	0.90	7.140
32	40	53.0	68.0	7.0	80.0	14.0	45.0	7.5	16.0	10.0	8.0	M 6	4	0.45	3.500
40	5	53.0	68.0	7.0	80.0	10.0	59.0	—	16.0	8.0	8.0	M 6	5	0.70	3.500
40	10	63.0	78.0	9.0	95.0	10.0	73.0	—	16.0	8.0	8.0	M 8x1	3	1.20	7.140
50	10	72.0	90.0	11.0	110.0	10.0	97.0	—	18.0	8.0	9.0	M 8x1	5	2.00	7.140
63	10	85.0	105.0	11.0	125.0	10.0	99.0	—	20.0	8.0	10.0	M 8x1	5	2.80	7.140

Thomson NEFF Rolled Ball Screws — KGM-D Style Ball Nuts

Standard Lead Accuracy: ± 50µm/300mm[1]

Threaded ball nut and screw, offering low cost, high precision performance in applications typically requiring ground product.

KGM-D Style Nut

Internal Return Cylindrical Ball Nut and Screw

- Flexible solution for non-standard mounting
- Integral wiper included as standard
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1-2%
  Z2 – no preload, clearance held to max .18mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Nut Type	Ball Screw P/N[1][2][3]	Ball Nut P/N	Available Preload Types[4]	Performance Data					Screw Specifications[5]			
				Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_o)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[6]	Screw Weight
(mm)	(mm)					(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
16	5	E	**KGS-1605-050-RH**	**KGM-D-1605-RH-EE**	Z1, Z2, Z3	9.3	2,091	13.1	2,945	0.08	15.3	12.9	6000	1.3
16	10	E	**KGS-1610-050-RH**	**KGM-D-1610-RH-EE**	Z1, Z2, Z3	15.4	3,463	26.5	5,957	0.08	15.2	13.0	6000	1.3
20	5	E	**KGS-2005-050-RH**	**KGM-D-2005-RH-EE**	Z1, Z2, Z3	10.5	2,361	16.6	3,732	0.08	19.3	16.9	6000	2.0
25	5	E	**KGS-2505-050-RH**	**KGM-D-2505-RH-EE**	Z1, Z2, Z3	12.3	2,766	22.5	5,058	0.08	24.3	21.9	6000	3.3
25	10	E	**KGS-2510-050-RH**	**KGM-D-2510-RH-EE**	Z1, Z2, Z3	13.2	2,947	25.3	5,688	0.08	24.3	21.9	6000	3.3
25	20	S	**KGS-2520-050-RH**	**KGM-D-2520-RH-EE**	Z2, Z3	13.0	2,923	23.3	5,238	0.15	24.4	22.0	6000	3.3
25	25	S	**KGS-2525-050-RH**	**KGM-D-2525-RH-EE**	Z2, Z3	16.7	3,755	32.2	7,239	0.08	24.3	22.0	6000	3.3
25	50	S	**KGS-2550-050-RH**	**KGM-D-2550-RH-EE**	Z2, Z3	15.4	3,463	31.7	7,126	0.15	23.9	21.5	6000	3.3
32	5	E	**KGS-3205-050-RH**	**KGM-D-3205-RH-EE**	Z1, Z2, Z3	21.5	4,834	49.3	11,083	0.08	31.3	28.9	6000	5.6
40	5	E	**KGS-4005-050-RH**	**KGM-D-4005-RH-EE**	Z1, Z2, Z3	23.8	5,351	63.1	14,185	0.08	39.3	36.9	6000	9.0
40	10	E	**KGS-4010-050-RH**	**KGM-D-4010-RH-EE**	Z1, Z2, Z3	38.0	8,544	69.1	15,534	0.08	39.3	34.1	6000	8.4
40	20	E	**KGS-4020-050-RH**	**KGM-D-4020-RH-EE**	Z1, Z2, Z3	33.3	7,487	76.1	17,108	0.08	39.5	35.9	6000	9.0
40	40	S	**KGS-4040-050-RH**	**KGM-D-4040-RH-EE**	Z2, Z3	35.0	7,869	101.9	22,908	0.08	38.7	36.3	6000	9.0

(1) 23µm/300mm lead accuracy available upon request for most sizes.

(2) Thomson NEFF Rolled Ball Screws, Ball Nuts and End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

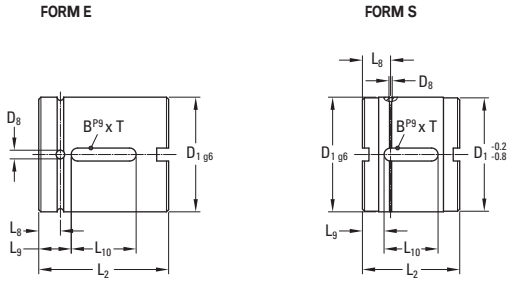
(3) All ball screws and nuts are right-hand thread.

(4) Double nut pre-load systems (for up to 10% of dynamic load rating) are also available for all sizes. Contact customer service for more details.

(5) Dimensional information on bearing supports and standard end machining is available on page 160.

(6) Max. length includes 200mm on each end usable for end machining only. Max. travel length equals table value minus 400mm. Ends are soft annealed.

Thomson NEFF Rolled Ball Screws — KGM-D Style Ball Nuts



MATERIAL: 1.7131 (ESP65) / 1.3505 (100 Cr 6)

Nominal Diameter (size)	Lead	Nut Specifications (mm)									
		D_1	D_8	L_2	L_8	L_9	L_{10}	BxT	No. of Circuits	Nut Weight	Ball Diameter
(mm)	(mm)	g6								(kg)	(mm)
16	5	28.0	3.0	34.0	7.0	7.0	20.0	5x2	3	0.10	3.500
16	10	28.0	3.0	50.0	7.0	15.0	20.0	5x2	6	0.20	3.000
20	5	36.0	3.0	34.0	7.0	7.0	20.0	5x2	3	0.20	3.500
25	5	40.0	3.0	34.0	7.0	7.0	20.0	5x2	3	0.20	3.500
25	10	40.0	3.0	45.0	7.5	12.5	20.0	5x2	3	0.24	3.500
25	20	40.0	1.5	35.0	14.0	11.5	12.0	5x3	4	0.20	3.500
25	25	40.0	1.5	35.0	11.5	11.0	13.0	5x3	5	0.45	3.500
25	50	40.0	1.5	58.0	17.0	19.0	20.0	5x3	5	0.30	3.500
32	5	50.0	3.0	45.0	7.5	8.0	30.0	6x2.5	5	0.50	3.500
40	5	63.0	3.0	45.0	7.5	8.0	30.0	6x2.5	5	0.80	3.500
40	10	63.0	4.0	60.0	10.0	15.0	30.0	6x2.5	3	1.00	7.140
40	20	63.0	3.0	70.0	7.5	20.0	30.0	6x2.5	4	1.20	5.000
40	40	63.0	1.5	85.0	15.0	27.5	30.0	6x3.5	8	0.90	3.500

Thomson NEFF Rolled Ball Screws — KGM-N Style Ball Nuts

Standard Lead Accuracy: ± 50µm/300mm[1]

Threaded ball nut and screw, offering low cost, high precision performance in applications typically requiring ground product.

KGM-N Style Nut

Internal Return Cylindrical Ball Nut and Screw

- Flexible solution for non-standard mounting
- Integral wiper included as standard[5]
- Available in three preload classes (Type Z1, Z2, Z3)
  Z1 – light preload to 1 – 2%
  Z2 – no preload, clearance held to max .18mm
  Z3 – no preload, clearance held to max .05mm

Nominal Diameter (size)	Lead	Nut Type	Ball Screw P/N[1] [2] [3]	Ball Nut P/N	Available Preload Types[4]	Performance Data					Screw Specifications[7]			
				Z2 Standard		Dynamic Load Capacity (C_{am})		Static Load Capacity (C_o)		Max. Axial Backlash	Major Diameter	Minor Diameter	Max. Length[8]	Screw Weight
(mm)	(mm)					(kN)	(lbf)	(kN)	(lbf)	(mm)	(mm)	(mm)	(mm)	(kg/m)
12	5	E	**KGS-1205-050-RH**	**KGM-N-1205-RH-OO**	Z1, Z2, Z3	4.4	990	6.8	1,529	0.08	11.3	10.1	1500[9]	0.8
20	5	E	**KGS-2005-050-RH**	**KGM-N-2005-RH-EE**	Z1, Z2, Z3	10.5	2,361	16.6	3,732	0.08	19.3	16.9	6000	2.0
20	20	S	**KGS-2020-050-RH**	**KGM-N-2020-RH-EE**	Z2, Z3	11.6	2,608	18.4	4,136	0.08	19.3	16.9	6000	2.0
20	50	S	**KGS-2050-050-RH**	**KGM-N-2050-RH-EE**	Z2, Z3	13.0	2,923	24.6	5,530	0.15	18.9	16.5	6000	2.0
25	5	E	**KGS-2505-050-RH**	**KGM-N-2505-RH-EE**	Z1, Z2, Z3	12.3	2,766	22.5	5,058	0.08	24.3	21.9	6000	3.3
32	5	E	**KGS-3205-050-RH**	**KGM-N-3205-RH-EE**	Z1, Z2, Z3	21.5	4,834	49.3	11,083	0.08	31.3	28.9	6000	5.6
32	10	E	**KGS-3210-050-RH**	**KGM-N-3210-RH-EE**	Z1, Z2, Z3	33.4	7,509	54.5	12,252	0.08	32.5	27.3	6000	5.6
32	20	E	**KGS-3220-050-RH**	**KGM-N-3220-RH-EE**	Z1, Z2, Z3	29.7	6,678	59.8	13,444	0.08	31.5	27.9	6000	5.6
32	40	S	**KGS-3240-050-RH**	**KGM-N 3240-RH-EE**	Z2, Z3	14.9	3,350	32.4	7,284	0.08	30.7	28.3	6000	5.6
40	5	E	**KGS-4005-050-RH**	**KGM-N-4005-RH-EE**	Z1, Z2, Z3	23.8	5,351	63.1	14,185	0.08	39.3	36.9	6000	9.0
50	10	E	**KGS-5010-050-RH**	**KGM-N-5010-RH-EE**	Z1, Z2, Z3	68.7	15,446	155.8	35,025	0.08	49.3	44.1	6000	13.5
50	20	E	**KGS-5020-050-RH**	**KGM-N-5020-RH-EE**	Z1, Z2, Z3	60.0	13,490	136.3	30,641	0.08	49.3	44.1	6000	13.5
63	10	E	**KGS-6310-050-RH**	**KGM-N-6310-RH-EE**	Z1, Z2, Z3	76.0	17,087	197.0	44,287	0.08	62.3	57.1	6000	22.0

(1) 23µm/300mm lead accuracy available upon request for most sizes.

(2) Ball screws, ball nuts and end blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

(3) All ball screws and nuts are right-hand thread.

(4) Double nut pre-load systems (for up to 10% of dynamic load rating) are also available for all sizes. Contact customer service for more details.

(5) 12x5 nut does not include wiper.

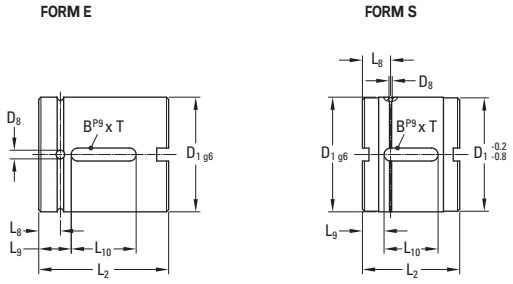
(6) D1 -0.2/-0.8 does not apply, therefore D1 -1.0/-1.5.

(7) Dimensional information on bearing supports and standard end machining is available on page 160.

(8) Max. length includes 200mm on each end usable for end machining only. Max. travel length equals table value minus 400mm. Ends are soft annealed.

(9) Max. length includes 100mm on each end usable for end machining only. Max. travel length equals table value minus 200mm. Ends are soft annealed.

Thomson NEFF Rolled Ball Screws — KGM-N Style Ball Nuts



MATERIAL: 1.7131 (ESP65) / 1.3505 (100 Cr 6)

Nominal Diameter (size)	Lead	Nut Specifications (mm)									
		D_1	D_8	L_2	L_8	L_9	L_{10}	BxT	No. of Circuits	Nut Weight	Ball Diameter
(mm)	(mm)	g6								(kg)	(mm)
12	5	20.0[5]	—	24.0	—	5.0	14.0	3x1.8	3	0.03	2.000
20	5	32.0	3.0	34.0	7.0	7.0	20.0	5x2	3	0.10	3.500
20	20	35.0	1.5	30.0	11.5	9.0	12.0	5x3	4	0.14	3.500
20	50	35.0	1.5	56.0	16.0	18.0	20.0	5x3	5	0.30	3.500
25	5	38.0	3.0	34.0	7.0	7.0	20.0	5x2	3	0.15	3.500
32	5	45.0	3.0	45.0	7.5	8.0	30.0	6x2.5	5	0.30	3.500
32	10	53.0	4.0	60.0	10.0	15.0	30.0	6x2.5	3	0.55	7.140
32	20	53.0	3.0	70.0	7.5	20.0	30.0	6x2.5	4	0.80	5.000
32	40	53.0[6]	1.5	45.0	13.0	10.0	25.0	6x4	4	0.46	3.500
40	5	53.0	3.0	45.0	7.5	8.0	30.0	6x2.5	5	0.60	3.500
50	10	72.0	4.0	82.0	11.0	23.0	36.0	6x2.5	5	1.10	7.140
50	20	85.0	4.0	82.0	10.0	23.0	36.0	6x2.5	4	1.40	7.140
63	10	85.0	4.0	82.0	11.0	23.0	36.0	6x2.5	5	1.45	7.140

NOTES:

Precision Plus Ground Ball Screws — Metric Series

Precision Plus Ground Ball Screw Assemblies are our highest precision product, with standard lead accuracies of 12 microns/ 300mm. These ball screw assemblies feature our FL-style ball nut, precisely preloaded to customer specifications. This unique nut design provides high repeatability and high stiffness for the most demanding ball screw applications. Each nut comes standard with an integral plastic wiper to protect against chips and other debris. Precision Plus Ground Ball Screws are ideal for applications requiring high repeatability and high stiffness (e.g., high precision machine tool).

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Precision Plus Ground Ball Screws — Metric Series

Standard Lead Accuracy: ± 12µm/300mm

Flanged ball nut and screw assembly, offering the highest level of accuracy, repeatability and stiffness.

FL Style Nut

Internal Return Flanged Ball Nut and Screw

- Excellent accuracy, repeatability and stiffness
- Features Z0 Type preload (range from 2% to 13%, to customer specification)
- Nut stiffness based on 10% preload (F = 10% x C_{am})
- Integral wiper and flange included as standard
- Additional sizes available in diameters up to 200mm. Contact us for more details.

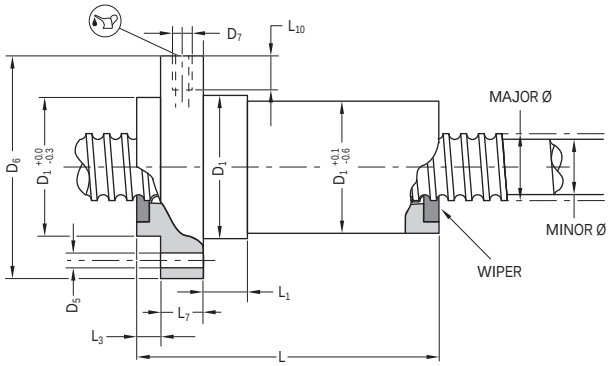
Nominal Diameter (size)	Lead	Nut Type	Ball Screw and Nut Assembly P/N[1] [2]	Performance Data							Screw Specifications[3]			
				Dynamic Load Capacity (C_{am})		Static Load Capacity (C_0)		Minimum Stiffness	Max. Axial Backlash	No. of Loaded Turns	Major Diameter	Minor Diameter	Max. Length	Screw Weight
(mm)	(mm)			(kN)	(lbf)	(kN)	(lbf)	(kN/µm)	(mm)	(turns)	(mm)	(mm)	(mm)	(kg/m)
16	5	FL	**7832835**	6.7	1,506	7.2	1,619	0.16	0.00	2 + 2	15.6	12.7	3000	1.2
20	5	FL	**7832838**	11.5	2,585	15.5	3,485	0.30	0.00	3 + 3	19.6	16.7	4000	2.0
25	5	FL	**7832841**	12.6	2,833	19.1	4,294	0.38	0.00	3 + 3	24.5	21.7	5000	3.3
32	5	FL	**7832862**	19.3	4,339	36.4	8,183	0.60	0.00	4 + 4	31.6	28.7	6000	5.6
32	10	FL	**7832844**	26.4	5,935	39.0	8,768	0.49	0.00	3 + 3	31.6	27.1	6000	5.3
40	5	FL	**7832847**	26.3	5,912	59.2	13,309	0.89	0.00	5 + 5	39.6	36.7	6000	9.0
40	10	FL	**7832850**	64.9	14,590	109.0	24,504	0.94	0.00	4 + 4	39.6	34.0	6000	8.3
50	10	FL	**7832853**	69.0	15,511	142.2	31,966	1.18	0.00	5 + 5	49.5	43.0	6000	13.5
63	10	FL	**7832856**	93.8	21,087	229.7	51,639	1.74	0.00	5 + 5	62.5	56.9	6000	22.0
80	10	FL	**7832859**	121.9	27,404	375.0	84,303	2.45	0.00	6 + 6	79.5	73.9	6000	36.4

(1) End Blocks can be sold together as assemblies or separately as components (preloaded ball nuts sold only as an assembly).

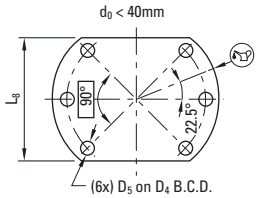
(2) All ball screws and nuts are right-hand thread.

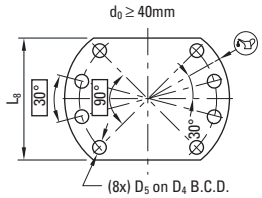
(3) Dimensional information on bearing supports and standard end machining is available on page 160.

Precision Plus Ground Ball Screws — Metric Series



	D7	L10
$d_0 < 40mm$	M6 x 1	8
$d_0 \geq 40mm$	M8 x 1	10





Nominal Diameter (size)	Lead	Nut Specifications (mm)										
		D_1	D_4	D_5	D_6	L	L_1	L_3	L_7	L_8	Nut Weight	Ball Diameter
(mm)	(mm)	g6		H13	h13				h13	h13	(kg)	(mm)
16	5	28.0	38.0	5.5	48.0	55.0	10.0	5.5	10.0	40.0	0.3	3.500
20	5	36.0	47.0	6.6	58.0	68.5	10.0	5.5	10.0	44.0	0.4	3.500
25	5	40.0	51.0	6.6	62.0	69.5	10.0	6.0	10.0	48.0	0.4	3.500
32	5	50.0	65.0	9.0	80.0	83.0	12.0	6.0	12.0	62.0	0.7	3.500
32	10	50.0	65.0	9.0	80.0	105.5	12.0	6.0	12.0	62.0	0.8	3.500
40	5	63.0	78.0	9.0	93.0	97.0	14.0	7.0	14.0	70.0	1.3	3.500
40	10	63.0	78.0	9.0	93.0	142.0	14.0	7.0	14.0	70.0	1.5	7.144
50	10	75.0	93.0	11.0	110.0	144.0	16.0	7.0	16.0	85.0	2.2	7.144
63	10	90.0	108.0	11.0	125.0	166.0	18.0	7.0	18.0	95.0	3.3	7.144
80	10	105.0	125.0	13.5	145.0	192.0	20.0	9.0	20.0	110.0	4.3	7.144

NOTES:

Ball Splines

A Thomson Precision ball spline consists of mating inner and outer races containing concave axial races and a complement of bearing balls. The balls provide the only physical contact between the inner and outer races. Unlimited rolling travel is achieved by diverting the path of the balls at the extremes of the outer race into the end cap return circuit. This provides a closed loop through which the balls recirculate when the races are displaced axially relative to each other. The bearing balls resist radial displacement resulting from torque loads.

- Efficiency — coefficient of friction .007 maximum
- Hardness — minimum of RC 56 in ball race
- Lash — .005 inch maximum standard play perpendicular to rotational axis

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Precision Rolled Ball Splines

0.375 in to 6.000 in Diameter

Inner and Outer Spline Races

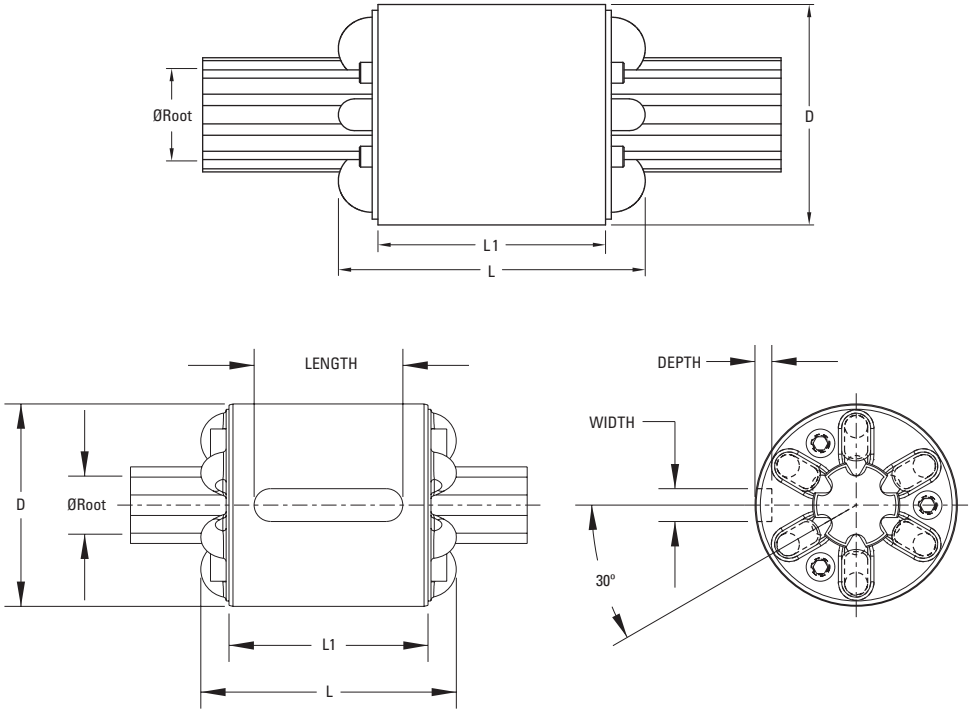
- Offers high speed, anti-friction linear motion under high torsional loads
- All units available with and without keyway
- ***All sizes stocked for quick delivery***

Nominal Diameter	Active Races[1][2]	Inner Race P/N	Outer Race P/N (w/o keyway)	Outer Race P/N (w/ keyway)	Performance Data				Inner Race Specifications		
					Dynamic Load Capacity (C_{am})	Static Torque Capacity (C_o)	Max. Diametral Backlash	Max. Angular Backlash	Root Diameter	Standard Length	Inner Weight
(in.)					(in-lb)	(in-lb)	(in.)	(radians)	(in.)	(in.)	(lb/ft)
0.375	3	**5707547**	**5706900**	**7828127**	200	626	0.005	0.0266	0.200	24	0.02
0.625	3	**5707548**	**5707445**	**7828128**	585	1,770	0.005	0.0160	0.425	48	0.06
0.625	6	**5707548**	**5708943**	**7828129**	1,170	3,540	0.005	0.0160	0.425	48	0.06
1.000	3	**5706084**	**5707472**	**7828130**	1,300	3,900	0.005	0.0100	0.800	144	0.17
1.000	6	**5706084**	**5708944**	**7828131**	2,600	7,800	0.005	0.0100	0.800	144	0.17
1.500	3	**5706388**	**5707528**	**7828132**	4,200	11,588	0.005	0.0067	1.230	144	0.4
1.500	6	**5706388**	**5708945**	**7828133**	8,400	23,176	0.005	0.0067	1.230	144	0.4
2.000	3	**5706436**	**5707530**	**7828134**	8,000	20,138	0.005	0.0050	1.670	144	0.75
2.000	6	**5706436**	**5708946**	**7828135**	16,000	40,276	0.005	0.0050	1.670	144	0.75
2.500	3	**5706484**	**5707532**	**7828136**	13,500	36,625	0.005	0.0040	2.100	144	1.17
2.500	6	**5706484**	**5708947**	**7828137**	27,000	62,250	0.005	0.0040	2.100	144	1.17
4.062	6	**5702204**	**5708330**	**7828138**	57,000	140,000	0.005	0.0025	3.660	144	3.13
6.000	8	**5704982**	**5704798**	**7828140**	214,700	584,000	0.007	0.0023	5.470	72	7.01

(1) Dimensional information on bearing supports and standard end machining is available on page 176.

(2) Information on required lubrication is on page 243.

Precision Rolled Ball Splines



Nominal Diameter	Active Races	Outer Race Specifications					
		D (max.)	L	L1	Keyway Dimensions (Optional) (Width x Depth x Length)	Outer Weight	Ball Diameter
(in.)		(in.)	(in.)	(in.)	(in.)	(lb)	(in.)
0.375	3	1.161	1.589	1.099	0.187 x 0.093 x 1.000	0.25	0.156
0.625	3	1.531	2.035	1.505	0.250 x 0.125 x 1.125	0.37	0.187
0.625	6	1.531	2.035	1.505	0.250 x 0.125 x 1.125	0.37	0.187
1.000	3	1.906	2.598	2.068	0.250 x 0.125 x 1.625	0.92	0.187
1.000	6	1.906	2.598	2.068	0.250 x 0.125 x 1.625	0.92	0.187
1.500	3	2.693	3.719	3.005	0.250 x 0.125 x 2.000	3.33	0.250
1.500	6	2.693	3.719	3.005	0.375 x 0.187 x 2.000	3.33	0.250
2.000	3	3.427	4.022	3.130	0.250 x 0.125 x 2.500	5.42	0.312
2.000	6	3.427	4.022	3.130	0.500 x 0.219 x 2.500	5.42	0.312
2.500	3	4.170	4.426	3.380	0.250 x 0.125 x 3.000	7.50	0.375
2.500	6	4.170	4.426	3.380	0.500 x 0.250 x 3.000	7.50	0.375
4.062	6	5.6245	5.495	4.500	1.000 x 0.500 x 3.500	14.50	0.375
6.000	8	8.625	7.495	5.995	1.000 x 0.500 x 5.500	51.52	0.500

NOTES:

Bearing Supports/End Machining

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Need a quote or have a question about an application? Contact us in North America at:

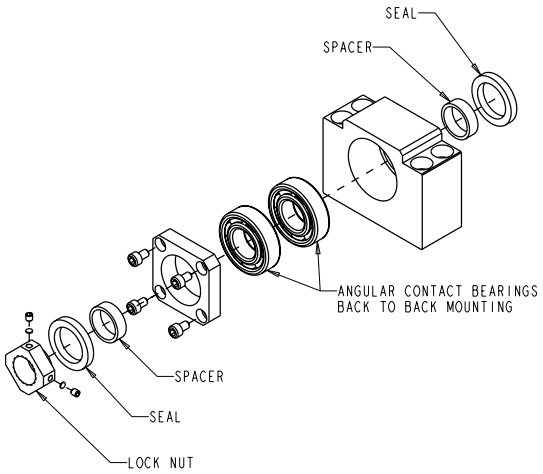
Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Bearing Supports/End Machining Product Overview

Thomson Bearing Supports — complete package for simple mounting of Thomson ball screw and ball spline assemblies. Flange and Base mounts available with dual angular contact bearings or floating radial bearing.

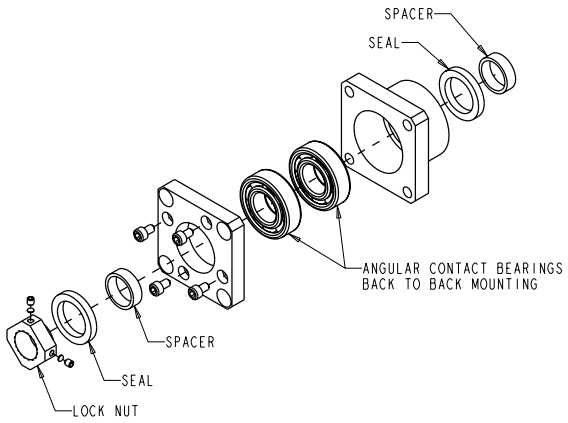
- Rugged steel construction
- Low profile, compact design
- Base or Flange mounting configurations
- Pre-assembled and ready for installation
- Available off-the-shelf

BK Bearing Support[1][2]



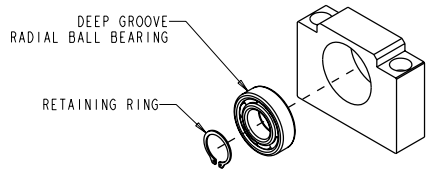
The base mounted BK Bearing Support contains an angular contact bearing pair arranged back-to-back (DB) for increased stiffness and axial load capacity. Design dimensions fit standard Type BK or BK1 end machining.

FK Bearing Support[1][2]



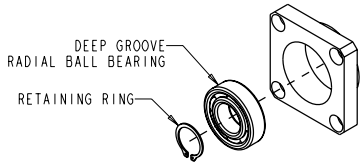
The flange mounted FK Bearing Support contains an angular contact bearing pair arranged back-to-back (DB) for increased stiffness and axial load capacity. Design dimensions fit standard Type FK or FK1 end machining.

BF Bearing Support[1][3]



The base mounted BF Bearing Support contains a floating radial bearing to allow axial shaft movement. Design dimensions fit standard Type BF or BF1 end machining.

FF Bearing Support[1][3]



The flange mounted FF Bearing Support contains a floating radial bearing to allow axial shaft movement. Design dimensions fit standard Type FF or FF1 end machining.

(1) Bearings supports are classified as “simple” for purposes of critical speed and column strength calculations.

(2) Locknut included in assembly

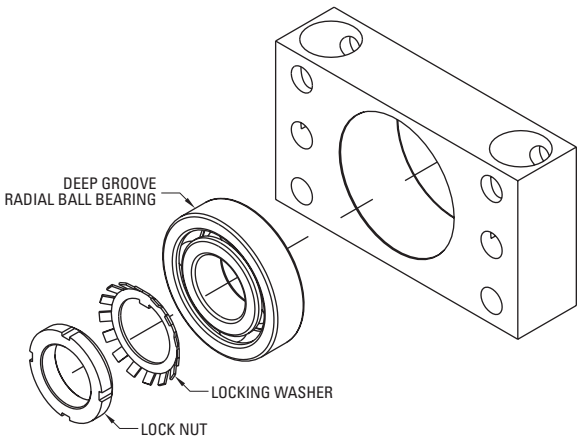
(3) Retaining ring included in assembly

Bearing Supports/End Machining Product Overview

Thomson Bearing Supports — a unitized package for simple mounting of Thomson ball screw and ball spline assemblies. Both "Floating" and "Simple" style bearing supports are available.

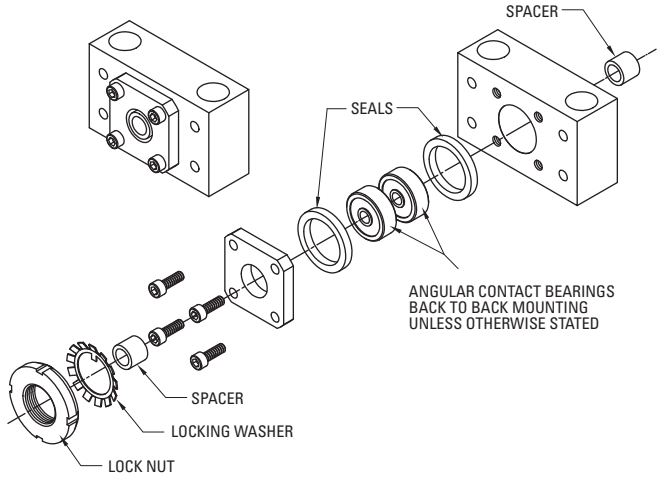
- Rugged steel construction
- Low profile, compact design
- Foot or face mounting
- Pre-assembled and ready for installation
- Available off-the-shelf for quick building convenience

QF Bearing Support[1][2]



The QF Bearing Support provides a single deep groove radial ball bearing. Design dimensions fit standard Type QF or QF1 end machining.

QK Bearing Support[1][2]



The QK Bearing Support contains high angular contact bearings arranged in a back-to-back (DB) configuration for high stiffness. Design dimensions fit standard Type QK or QK1 end machining.

(1) Both QK and QF Bearings Supports are classified as "simple" for purposes of critical speed and column strength calculations.

(2) Installation accessories (locknut and washer) included for complete assembly.

Bearing Supports/End Machining Product Overview

Inch Series Ball Screws						
Diameter x Lead	BK	BF	FK	FF	QK	QF
0.500 x 0.200 0.500 x 0.500	7833360	7833368	7833377	7833384	7828282	7833291
0.631 x 0.200 0.631 x 1.000	7833361	7833369	7833378	7833385	7824154	7833256
0.750 x 0.200 0.750 x 0.500	7833362	7833370	7833379	7833386	7824155	7833259
0.875 x 0.200	7833363	7833371	7833380	7833387	7824156	7833262
1.000 x 0.200 1.000 x 0.500 1.000 x 1.000 1.171 x 0.413	7833364	7833372	7833381	7833388	7824157	7833265
1.150 x 0.200 1.250 x 0.200 1.250 x 0.250 1.250 x 0.500	7833365	7833373	7833382	7833389	7824158	7833268
1.500 x 0.200 1.500 x 0.250	7833366	7833374	7833383	7833390	7824159	7833270
1.500 x 0.473	7833365	7833373	7833382	7833389	7824158	7833268
1.500 x 0.500	7833366	7833374	7833383	7833390	7824159	7833270
1.500 x 1.000	7833365	7833373	7833382	7833389	7824158	7833268
1.500 x 1.875 1.500 x 2.000	7833366	7833374	7833383	7833390	7824159	7833270
1.750 x 0.200	7833367	7833375	-	-	7829544	7833273
2.000 x 0.200 2.000 x 0.500 2.000 x 1.000 2.250 x 0.500 2.250 x 1.000	-	-	-	-	7824160	7833276
2.500 x 0.250 2.500 x 0.500 2.500 x 1.000	-	-	-	-	7824161	7833279

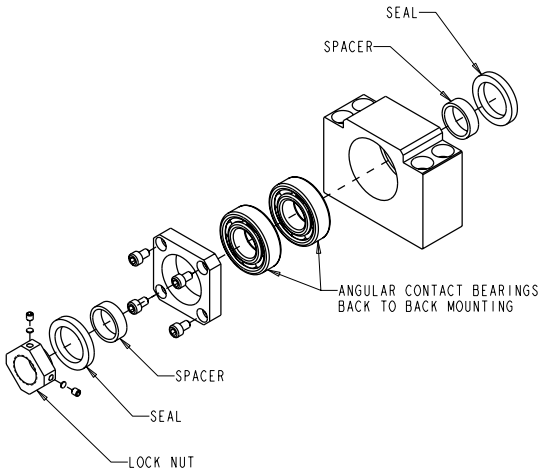
Metric Ball Screws						
Diameter	BK	BF	FK	FF	QK	QF
12	7833391	7833398	7833405	7833411	7829546	7833292
16	7833392	7833399	7833406	7833412	7829547	7833282
20	7833393	7833400	7833407	7833413	7829548	7833283
25	7833394	7833401	7833408	7833414	7829549	7833284
32	7833395	7833402	7833409	7833415	7829550	7833285
40	7833396	7833403	7833410	7833416	7829551	7833286
50	7833397	7833404	-	-	7829552	7823287
63	-	-	-	-	7829553	7833288

Ball Splines						
Nominal Size	BK	BF	FK	FF	QK	QF
0.625	7833360	7833368	7833377	7833384	7824154	7833256
1.000	7833364	7833372	7833381	7833388	7824157	7833265
1.500	7833365	7833373	7833382	7833389	7824158	7833268
2.000	7833367	7833375	-	-	7829554	7833273
2.500	-	-	-	-	7824161	7833279

NOTES:

Bearing Supports/End Machining — Inch Series Ball Screws

BK Support Blocks

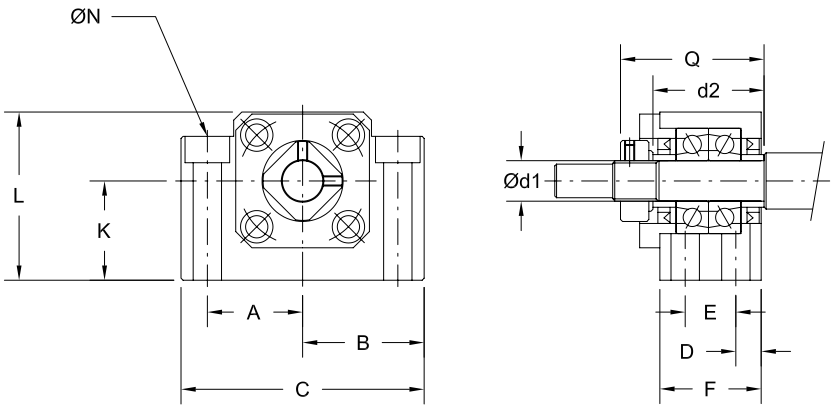


Standard P/N	Dia.x Lead (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833360	0.500 x 0.200	326	1450	989	4400	RN10	0.9
7833361	0.631 x 0.200 0.631 x 1.000	627	2790	1596	7100	RN12	1.0
7833362	0.750 x 0.200 0.750 x 0.500	1057	4700	2315	10300	RN15	1.3
7833363	0.875 x 0.200	1558	6930	3192	14200	RN17	2.9
7833364	1.000 x .200 & 0.250 1.000 x 0.500 & 1.000 1.171 x 0.413	1832	8150	3215	14300	RN20	2.8
7833365	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 & 1.000	2113	9400	3732	16600	RN25	5.3
7833366	1.500 x 0.200 & 0.250 1.500 x 0.500 & 1.875 1.500 x 2.000	3035	13500	5170	23000	RN30	7.5
7833367	1.750 x 0.200	6789	30200	11375	50600	RN40	15.0

Note: Design dimensions fit standard Type BK and BK1 end machining. See page 156 for details.

Bearing Supports/End Machining - Inch Series Ball Screws

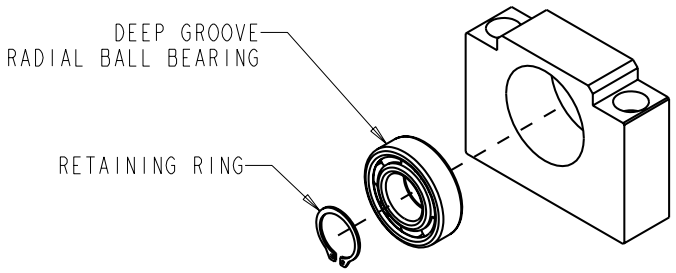
BK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)											
	d1 (mm)	d2	A	B	C	D	E	F	K ±0.001	L	N	Q
7833360	10	1.063	0.906	1.181	2.362	0.236	0.512	0.984	0.866	1.535	4 Holes 0.260 dia Thru 0.425 C-Bore x 0.197 Deep	1.339
7833361	12	1.063	0.906	1.181	2.362	0.236	0.512	0.984	0.984	1.693	4 Holes 0.260 dia. Thru 0.425 C-Bore x 0.059 Deep	1.339
7833362	15	1.181	1.063	1.378	2.756	0.236	0.591	1.063	1.102	1.890	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.256 Deep	1.496
7833363	17	1.496	1.339	1.693	3.386	0.315	0.748	1.378	1.535	2.520	4 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep	2.008
7833364	20	1.575	1.378	1.732	3.465	0.315	0.748	1.378	1.339	2.362	4 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep	2.008
7833365	25	1.890	1.673	2.087	4.173	0.394	0.866	1.654	1.890	3.150	4 Holes 0.433 dia. Thru 0.699 C-Bore x 0.433 Deep	2.480
7833366	30	1.969	2.008	2.520	5.039	0.433	0.906	1.772	2.008	3.504	4 Holes 0.551 dia. Thru 0.787 C-Bore x 0.512 Deep	2.756
7833367	40	2.598	2.559	3.150	6.299	0.551	1.299	2.402	2.362	4.331	4 Holes 0.709 dia. Thru 1.024 C-Bore x 0.689 Deep	3.583

Bearing Supports/End Machining — Inch Series Ball Screws

BF Support Blocks

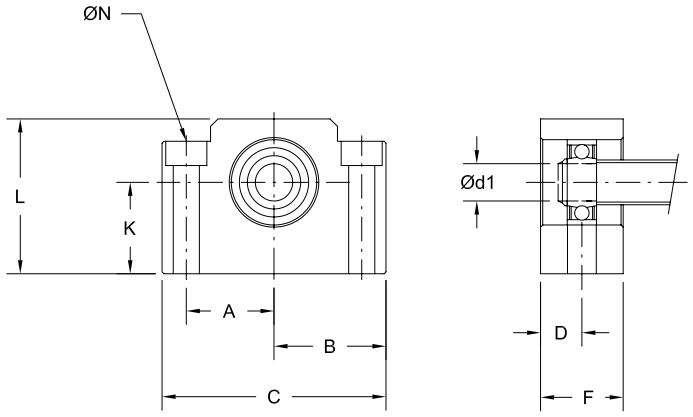


Standard P/N	Dia.x Lead (inch)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833368	0.500 x 0.200	366	1630	821	3650	8	0.7
7833369	0.631 x 0.200 0.631 x 1.000	674	3000	1708	7600	10	0.8
7833370	0.750 x 0.200 0.750 x 0.500	780	3470	1945	8650	15	0.9
7833371	0.875 x 0.200	1057	4700	2450	10900	17	1.7
7833372	1.000 x .200 & 0.250 1.000 x 0.500 & 1.000 1.171 x 0.413	1461	6500	3237	14400	20	1.7
7833373	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 & 1.000	1753	7800	3597	16000	25	3.2
7833374	1.500 x 0.200 & 0.250 1.500 x 0.500 & 1.875 1.500 x 2.000	2540	11300	4991	22200	30	4.3
7833375	1.750 x 0.200	5822	25900	11375	50600	40	7.3

Note: Design dimensions fit standard Type BF and BF1 end machining. See page 156 for details.

Bearing Supports/End Machining - Inch Series Ball Screws

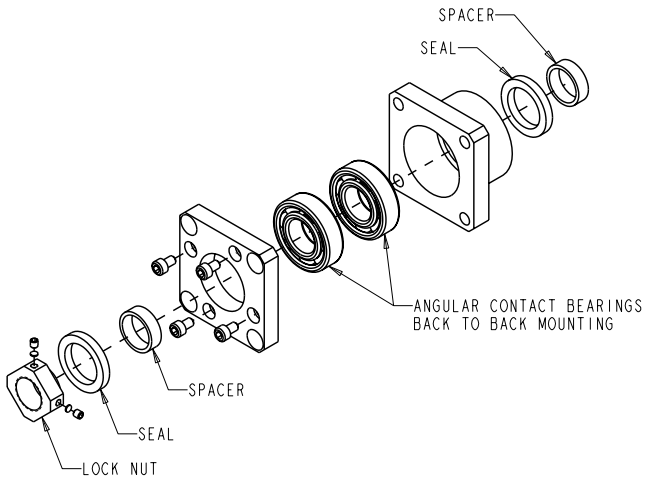
BF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)								
	d1 (mm)	A	B	C	D	F	K ±0.001	L	N
7833368	8	0.906	1.181	2.362	0.394	0.787	0.866	1.535	2 Holes 0.260 dia Thru 0.425 C-Bore x 0.197 Deep
7833369	10	0.906	1.181	2.362	0.394	0.787	0.984	1.693	2 Holes 0.260 dia. Thru 0.425 C-Bore x 0.059 Deep
7833370	15	1.063	1.378	2.756	0.394	0.787	1.102	1.890	2 Holes 0.260 dia. Thru 0.433 C-Bore x 0.256 Deep
7833371	17	1.339	1.693	3.386	0.453	0.906	1.535	2.520	2 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep
7833372	20	1.378	1.732	3.465	0.512	1.024	1.339	2.362	2 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep
7833373	25	1.673	2.087	4.173	0.591	1.181	1.890	3.150	2 Holes 0.433 dia. Thru 0.699 C-Bore x 0.433 Deep
7833374	30	2.008	2.520	5.039	0.630	1.260	2.008	3.504	2 Holes 0.551 dia. Thru 0.787 C-Bore x 0.512 Deep
7833375	40	2.559	3.150	6.299	0.728	1.457	2.362	4.331	2 Holes 0.709 dia. Thru 1.024 C-Bore x 0.689 Deep

Bearing Supports/End Machining — Inch Series Ball Screws

FK Support Blocks

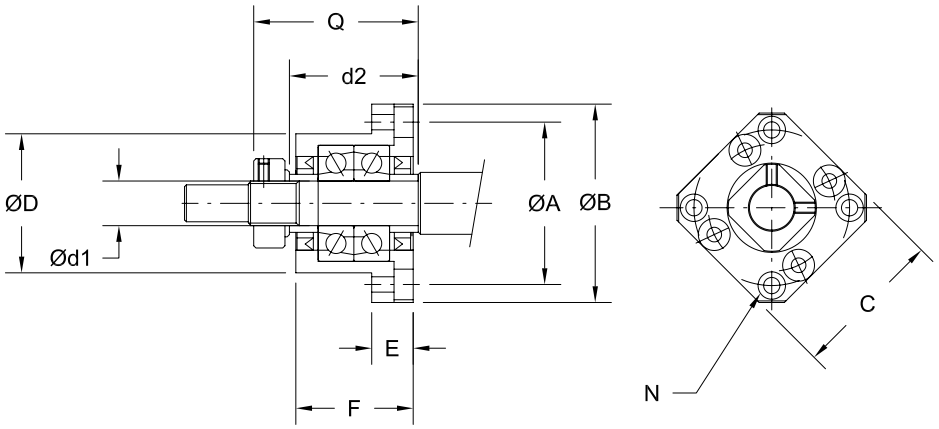


Standard P/N	Dia.x Lead (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833377	0.500 x 0.200	326	1450	989	4400	RN10	0.6
7833378	0.631 x 0.200 0.631 x 1.000	627	2790	1596	7100	RN12	0.6
7833379	0.750 x 0.200 0.750 x 0.500	1057	4700	2315	10300	RN15	0.9
7833380	0.875 x 0.200	1558	6930	3192	14200	RN17	1.9
7833381	1.000 x .200 & 0.250 1.000 x 0.500 & 1.000 1.171 x 0.413	1832	8150	3215	14300	RN20	2.5
7833382	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 & 1.000	2113	9400	3732	16600	RN25	3.5
7833383	1.500 x 0.200 & 0.250 1.500 x 0.500 & 1.875 1.500 x 2.000	3035	13500	5170	23000	RN30	5.2

Note: Design dimensions fit standard Type FK and FK1 end machining. See page 157 for details.

Bearing Supports/End Machining - Inch Series Ball Screws

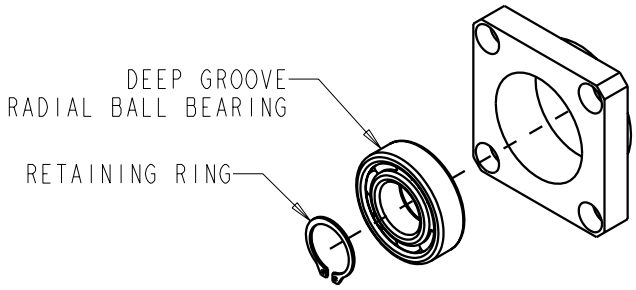
FK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)									
	d1 (mm)	d2	A	B	C	D	E	F	N	Q
7833377	10	1.063	1.654	2.047	1.654	1.3382 1.3376	0.394	1.063	4 Holes 0.177 dia Thru 0.315 C-Bore x 0.157 Deep	1.299
7833378	12	1.063	1.732	2.1126	1.732	1.4170 1.4163	0.394	1.063	4 Holes 0.177 dia. Thru 0.315 C-Bore x 0.157 Deep	1.299
7833379	15	1.496	1.969	2.480	2.047	1.5744 1.5738	0.591	1.260	4 Holes 0.217 dia. Thru 0.374 C-Bore x 0.236 Deep	1.575
7833380	17	1.732	2.441	3.031	2.402	1.9681 1.9675	0.866	1.772	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.394 Deep	2.244
7833381	20	1.969	2.756	3.346	2.677	2.2437 2.2430	0.866	2.047	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.394 Deep	2.598
7833382	25	2.362	3.150	3.858	3.110	2.4799 2.4792	1.063	2.244	4 Holes 0.354 dia. Thru 0.591 C-Bore x 0.512 Deep	2.913
7833383	30	1.969	3.740	4.606	3.661	2.9524 2.9516	1.181	2.441	4 Holes 0.433 dia. Thru 0.689 C-Bore x 0.591 Deep	3.150

Bearing Supports/End Machining — Inch Series Ball Screws

FF Support Blocks

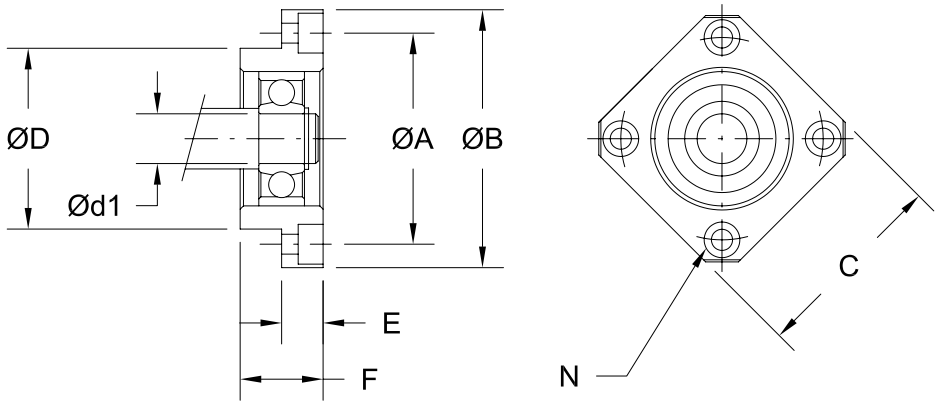


Standard P/N	Dia.x Lead (inch)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833384	0.500 x 0.200	366	1630	821	3650	10	0.2
7833385	0.631 x 0.200 0.631 x 1.000	674	3000	1708	7600	12	0.3
7833386	0.750 x 0.200 0.750 x 0.500	780	3470	1945	8650	15	0.5
7833387	0.875 x 0.200	1057	4700	2450	10900	17	0.8
7833388	1.000 x .200 & 0.250 1.000 x 0.500 & 1.000 1.171 x 0.413	1461	6500	3237	14400	20	1.0
7833389	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 & 1.000	1753	7800	3597	16000	25	1.5
7833390	1.500 x 0.200 & 0.250 1.500 x 0.500 & 1.875 1.500 x 2.000	2540	11300	4991	22200	30	2.3

Note: Design dimensions fit standard Type FF and FF1 end machining. See page 157 for details.

Bearing Supports/End Machining - Inch Series Ball Screws

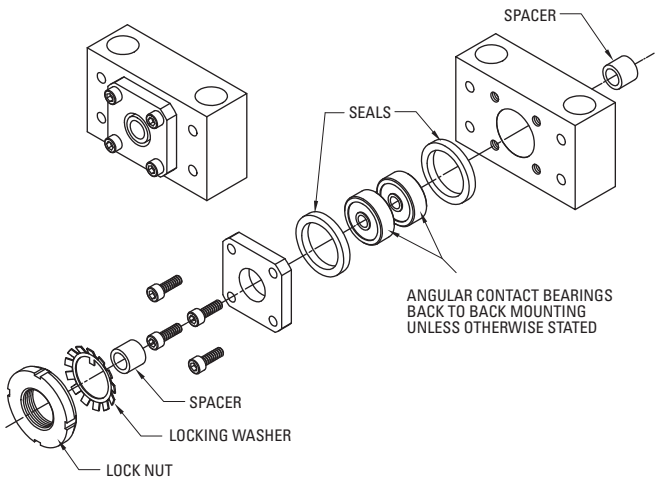
FF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)							
	d1 (mm)	A	B	C	D	E	F	N
7833384	8	1.378	1.693	1.378	1.1021 1.1016	0.276	0.472	4 Holes 0.134 dia Thru 0.256 C-Bore x 0.157 Deep
7833385	10	1.654	2.047	1.654	1.3382 1.3376	0.276	0.591	4 Holes 0.177 dia. Thru 0.315 C-Bore x 0.157 Deep
7833386	15	1.969	2.480	2.047	1.5744 1.5738	0.354	0.669	4 Holes 0.217 dia. Thru 0.374 C-Bore x 0.217 Deep
7833387	17	2.441	3.031	2.402	1.9681 1.9675	0.433	0.787	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.256 Deep
7833388	20	2.756	3.346	2.677	2.2437 2.2430	0.433	0.787	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.256 Deep
7833389	25	3.150	3.858	3.110	2.4799 2.4792	0.551	0.945	4 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep
7833390	30	3.740	4.606	3.661	2.9524 2.9516	0.709	1.063	4 Holes 0.433 dia. Thru 0.669 C-Bore x 0.433 Deep

Bearing Supports/End Machining — Inch Series Ball Screws

QK Bearing Support Blocks



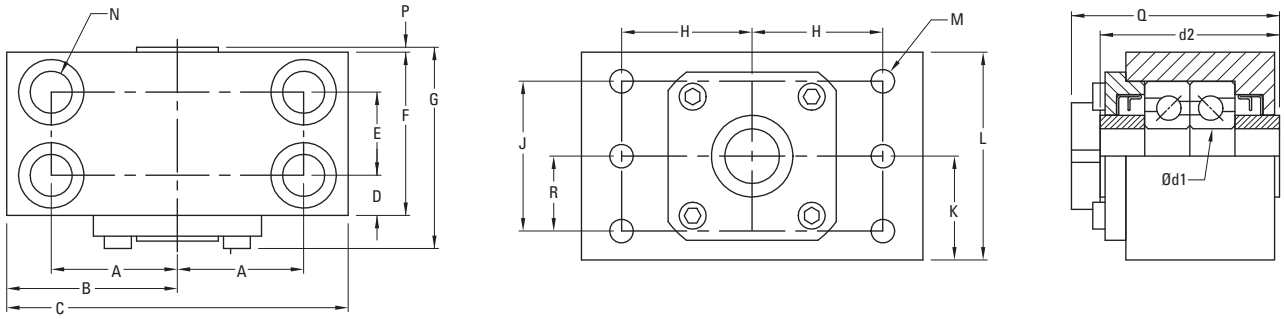
Standard P/N	Dia. x Lead (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7828282 [1]	0.500 x 0.200 0.500 x 0.500	440	1960	1030	4550	5/16-24	2.0
7824154	0.631 x 0.200 0.631 x 1.000	630	2790	1600	7100	N-01	1.5
7824155	0.750 x 0.200 0.750 x 0.500	1060	4700	2320	10300	N-02	3.5
7824156	0.875 x 0.200	1560	6930	3200	14200	N-03	3.5
7824157	1.000 x 0.200 1.000 x 0.250 1.000 x 0.500 1.000 x 1.000 1.171 x 0.413	1838	8150	3225	14300	N-04	5.5
7824158	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 1.500 x 1.000	2120	9400	3750	16600	N-05	9.5
7824159	1.500 x 0.200 1.500 x 0.250 1.500 x 0.500 1.500 x 1.875 1.500 x 2.000	3050	13500	5200	23000	N-06	11.5
7829554	1.750 x 0.200	6800	30200	11400	50600	N-08	21.5
7824160	2.000 x 0.200 & 0.500 & 1.000 2.250 x 0.500 2.250 x 1.000	9000	39900	15000	66600	N-09	35.0
7824161	2.500 x 0.250 2.500 x 0.500 2.500 x 1.000	10800	47900	17300	76800	N-10	39.0

(1) Deep groove radial bearing.

Note: Design dimensions fit standard Type QK or QK1 end machining. See page 158 for details.

Bearing Supports/End Machining - Inch Series Ball Screws

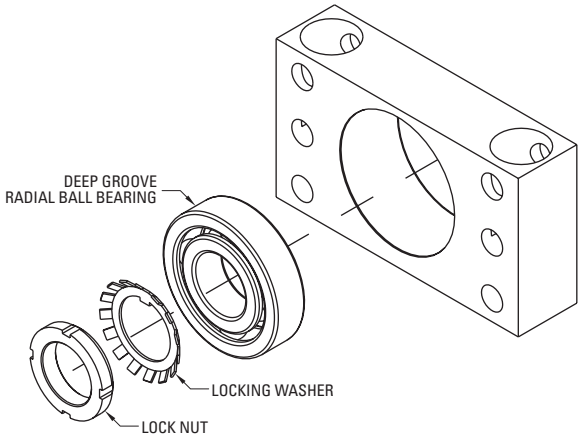
QK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)																
	d1 (mm)	d2	A & H	B	C	D	E	F	G	J	K	L	M	N	P	Q	R
7828282	9	1.44	1.000	1.38	2.75	0.63	—	1.19	1.4	1.375	1.000	2.00	4 Holes 0.281 dia.	2 Holes 0.281 dia. Thru 0.50 C-Bore x 0.56 DP	—	1.8	0.688
7824154	12	1.26	1.125	1.50	3.00	0.67	—	1.34	1.7	1.125	1.000	1.88	4 Holes 0.281 dia.	2 Holes 0.406 dia. Thru 0.625 C-Bore x 0.875 DP	0.02	1.6	0.625
7824155	15	1.73	1.250	1.75	3.50	0.75	—	1.50	1.9	1.375	1.125	2.13	4 Holes 0.281 dia.	2 Holes 0.406 dia. Thru 0.625 C-Bore x 1.00 DP	0.02	2.1	0.750
7824156	17	1.89	1.437	2.00	4.00	0.83	—	1.66	2.0	1.375	1.25	2.38	4 Holes 0.406 dia.	2 Holes 0.531 dia. Thru 0.812 C-Bore x 1.125 DP	0.02	2.3	0.750
7824157	20	2.20	1.625	2.25	4.50	0.94	—	1.87	2.4	1.750	1.438	2.75	4 Holes 0.469 dia.	2 Holes 0.656 dia. Thru 1.00 C-Bore x 1.312 DP	0.04	2.7	0.938
7824158	25	2.36	2.125	3.00	6.00	0.97	—	1.94	2.6	2.000	1.750	3.38	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.00 DP	0.03	2.9	1.000
7824159	30	2.52	2.375	3.25	6.50	1.03	—	2.06	2.7	2.000	1.875	3.63	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.062 DP	0.05	3.0	1.000
7829554	40	3.62	2.937	3.75	7.50	0.76	1.63	3.15	3.8	3.000	2.250	4.25	6 Holes 0.656 dia.	4 Holes 0.906 dia. Thru 1.375 C-Bore x 2.25 DP	0.05	4.2	1.500
7824160	45	3.94	3.313	4.25	8.50	0.87	1.72	3.47	4.2	3.625	2.813	5.63	6 Holes 0.812 dia.	4 Holes 1.031 dia. Thr 1.625 C-Bore x 3.500 DP	0.05	4.5	1.813
7824161	50	4.25	3.563	4.50	9.00	0.92	1.72	3.56	4.5	3.625	2.813	5.63	6 Holes 0.812 dia.	4 Holes 1.031 dia. Thru 1.625 C-Bore x 3.500 DP	0.05	4.9	1.813

Bearing Supports/End Machining — Inch Series Ball Screws

QF Support Blocks

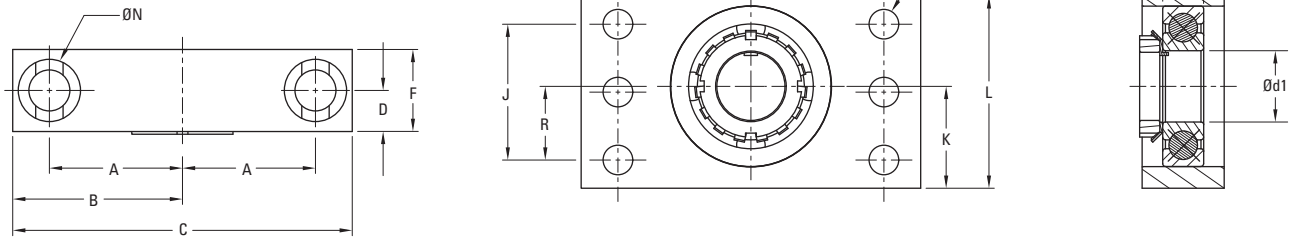


Standard P/N	Dia. x Lead (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833291	0.500 x 0.200	440	1960	1030	4550	5/16-24	0.8
7833256	0.631 x 0.200 0.631 x 1.000	674	3000	1708	7600	N-01	1.3
7833259	0.750 x 0.200 0.750 x 0.500	780	3470	1945	8650	N-02	1.6
7833262	0.875 x 0.200	1057	4700	2450	10900	N-03	2.3
7833265	1.000 x 0.200 & 0.250 1.000 x 0.500 & 1.000 1.171 x 0.413	1461	6500	3237	14400	N-04	5.8
7833268	1.150 x 0.200 1.250 x 0.200 & 0.500 1.500 x 0.473 & 1.000	1753	7800	3597	16000	N-05	6.8
7833270	1.500 x 0.200 & 0.250 1.500 x 0.500 & 1.875	2540	11300	4991	22200	N-06	8.7
7833273	1.750 x 0.200	5822	25900	11375	50600	N-08	9.7
7833276	2.000 x 0.200 & 0.500 & 1.000 2.250 x 0.500 & 1.000	7081	31500	13376	59500	N-09	16.2
7833279	2.500 x 0.250 & 0.500	8475	37700	15579	69300	N-10	18.5

Note: Design dimensions fit standard Type QF or QF1 end machining. See page 158 for details.

Bearing Supports/End Machining — Inch Series Ball Screws

QF Support Blocks



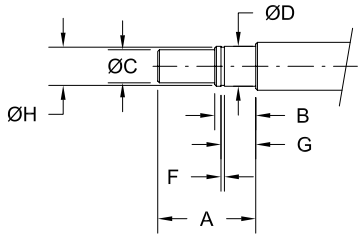
Standard P/N	Bearing Block Dimensions (inch)													
	d1 (mm)	d2	A & H	B	C	D	F	J	K	L	M	N	Q	R
7833291	9.0	0.118	1.000	1.380	2.750	0.276	0.551	1.375	1.000	2.000	4 Holes 0.281 dia.	2 Holes 0.281 dia. Thru 0.50 C-Bore x 0.56 DP	0.757	0.688
7833256	12.0	0.197	1.125	1.500	3.000	0.394	0.787	1.125	1.000	1.875	4 Holes 0.281 dia.	2 Holes 0.406 dia. Thru 0.625 C-Bore x 0.875 DP	0.960	0.625
7833259	15.0	0.217	1.250	1.750	3.500	0.433	0.866	1.375	1.125	2.125	4 Holes 0.281 dia.	2 Holes 0.406 dia. Thru 0.625 C-Bore x 0.875 DP	1.019	0.750
7833262	17.0	0.236	1.437	2.000	4.000	0.473	0.945	1.375	1.250	2.375	4 Holes 0.406 dia.	2 Holes 0.531 dia. Thru 0.812 C-Bore x 1.125 DP	1.109	0.750
7833265	20.0	0.276	1.625	2.250	4.500	0.551	1.102	1.750	1.438	2.750	4 Holes 0.469 dia.	2 Holes 0.656 dia. Thru 1.000 C-Bore x 1.312 DP	1.258	0.938
7833268	25.0	0.531	2.125	3.000	6.000	0.827	1.654	2.000	1.750	3.375	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.000 DP	1.654	1.000
7833270	30.0	0.512	2.375	3.250	6.500	0.827	1.654	2.000	1.875	3.625	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.062 DP	1.654	1.000
7833273	40.0	0.453	2.937	3.750	7.500	0.906	1.811	3.000	2.250	4.250	6 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.250 DP	1.869	1.625
7833276	45.0	0.492	3.313	4.250	8.500	0.985	1.969	3.625	2.813	5.625	6 Holes 0.812 dia.	2 Holes 1.031 dia. Thru 1.625 C-Bore x 3.500 DP	1.987	1.813
7833279	50.0	0.531	3.563	4.500	9.000	1.063	2.126	3.625	2.813	5.625	6 Holes 0.812 dia.	2 Holes 1.031 dia. Thru 1.625 C-Bore x 3.500 DP	2.167	1.813

Bearing Supports/End Machining — Inch Series Ball Screws

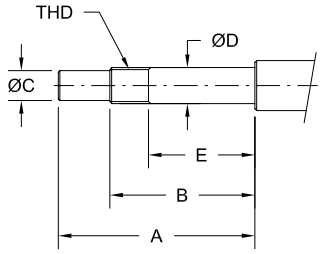
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

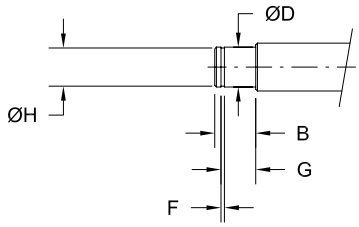
TYPE BF, REQUIRED FOR BF SUPPORT



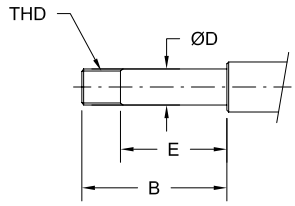
TYPE BK, REQUIRED FOR BK SUPPORT



TYPE BF1, REQUIRED FOR BF SUPPORT



TYPE BK1, REQUIRED FOR BK SUPPORT



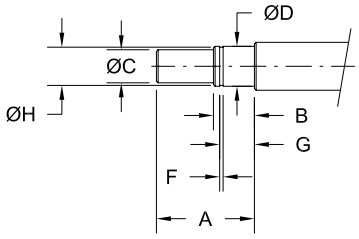
Screw Size	Type BF / BF1 (inch)									Type BK / BK1 (inch)							
Diameter x Lead (inch)	Standard P/N	A	B	C h7	D	F +0.006/ -.000	G +0.008/ -.000	H +.000/ -.008	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
0.500 x 0.200	7833368	0.984	0.394	0.2362 0.2357	0.3148 0.3145	0.035	0.311	0.299	608	7833360	2.008	1.417	0.3150 0.3144	0.3935 0.3932	0.787	M10x1	7000
0.631 x 0.200 0.631 x 1.000	7833369	1.024	0.433	0.3150 0.3144	0.3935 0.3932	0.045	0.360	0.378	6000	7833361	2.008	1.417	0.3937 0.3931	0.4722 0.4720	0.866	M12x1	7001
0.750 x 0.200 0.750 x 0.500	7833370	1.299	0.512	0.4724 0.4717	0.5904 0.5900	0.045	0.400	0.563	6002	7833362	2.362	1.575	0.4724 0.4717	0.5904 0.5900	1.102	M15x1	7002
0.875 x 0.200	7833371	1.535	0.630	0.5906 0.5898	0.6691 0.6687	0.045	0.518	0.638	6203	7833363	2.992	2.087	0.5906 0.5898	0.6691 0.6687	1.417	M17x1	7203
1.000 x .200/0.250 1.000 x 0.500/1.000 1.171 x 0.413	7833372	1.614	0.630	0.6693 0.6686	0.7872 0.7869	0.053	0.526	0.748	6004	7833364	3.071	2.087	0.6693 0.6686	0.7872 0.7869	1.496	M20x1	7004
1.150 x 0.200 1.250 x 0.200/0.500 1.500 x 0.473/1.000	7833373	1.969	0.787	0.7874 0.7866	0.9841 0.9837	0.053	0.644	0.941	6205	7833365	3.740	2.559	0.7874 0.7866	0.9841 0.9837	1.850	M25x1.5	7205
1.500 x 0.200/0.250 1.500 x 0.500/1.875 1.500 x 2.000	7833374	2.323	0.827	0.9843 0.9834	1.1809 1.1805	0.069	0.699	1.126	6206	7833366	4.331	2.835	0.9843 0.9834	1.1809 1.1805	1.850	M30x1.5	7206
1.750 x 0.200	7833375	2.974	0.906	1.3780 1.3771	1.5746 1.5742	0.077	0.785	1.496	6208	7833367	5.630	3.661	1.3780 1.3771	1.5746 1.5742	2.283	M40x1.5	7208

Bearing Supports/End Machining — Inch Series Ball Screws

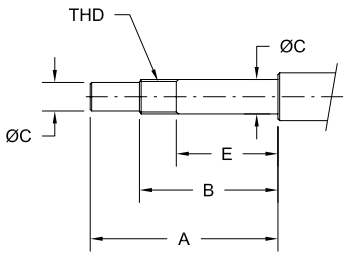
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

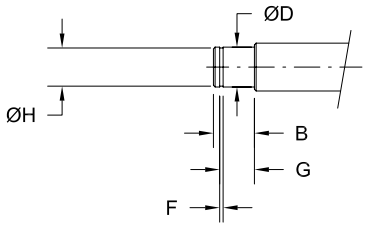
TYPE FF, REQUIRED FOR FF SUPPORT



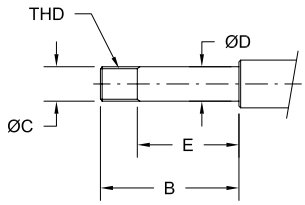
TYPE FK, REQUIRED FOR FK SUPPORT



TYPE FF1, REQUIRED FOR FF SUPPORT



TYPE FK1, REQUIRED FOR FK SUPPORT



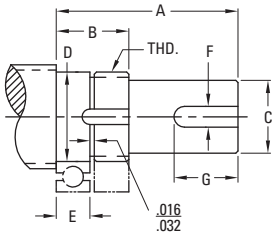
Screw Size	Type FF/FF1 (inch)										Type FK/FK1 (inch)							
Diameter x Lead (inch)	Standard P/N	A	B	C h7	D	F +0.006/ -.000	G +0.008/ -.000	H +0.000/ -.008	Snap Ring (DIN 471) (mm)	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
0.500 x 0.200	7833384	0.984	0.394	0.2362 0.2357	0.3148 0.3145	0.035	0.311	0.299	8	608	7833377	2.008	1.417	0.3150 0.3144	0.3935 0.3932	0.984	M10x1	7000
0.631 x 0.200 0.631 x 1.000	7833385	1.024	0.433	0.3150 0.3144	0.3935 0.3932	0.045	0.360	0.378	10	6000	7833378	2.008	1.417	0.3937 0.3931	0.4722 0.4720	0.984	M12x1	7001
0.750 x 0.200 0.750 x 0.500	7833386	1.299	0.512	0.4724 0.4717	0.5904 0.5900	0.045	0.400	0.563	15	6002	7833379	2.638	1.850	0.4724 0.4717	0.5904 0.5900	1.339	M15x1	7002
0.875 x 0.200	7833387	1.535	0.630	0.5906 0.5898	0.6691 0.6687	0.045	0.518	0.638	17	6203	7833380	3.189	2.283	0.5906 0.5898	0.6691 0.6687	1.693	M17x1	7203
1.000 x 0.200 /0.250 1.000 x 0.500/1.000 1.171 x 0.413	7833388	1.614	0.630	0.6693 0.6686	0.7872 0.7869	0.053	0.526	0.748	20	6004	7833381	3.425	2.441	0.6693 0.6686	0.7872 0.7869	1.772	M20x1	7204
1.150 x 0.200 1.250 x 0.200/0.500 1.500 x 0.473/1.000	7833389	1.969	0.787	0.7874 0.7866	0.9841 0.9837	0.053	0.644	0.941	25	6205	7833382	4.173	2.992	0.7874 0.7866	0.9841 0.9837	2.205	M25x1.5	7205
1.500 x 0.200/0.250 1.500 x 0.500/1.875 1.500 x 2.000	7833390	2.323	0.827	0.9843 0.9834	1.1809 1.1805	0.069	0.699	1.126	30	6206	7833383	4.331	2.835	0.9843 0.9834	1.1809 1.1805	1.850	M30x1.5	7206

Bearing Supports/End Machining — Inch Series Ball Screws

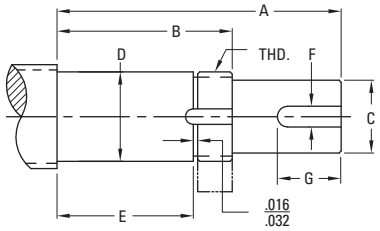
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

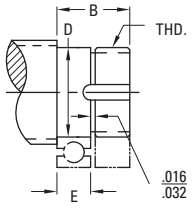
TYPE QF, REQUIRED QF SUPPORT



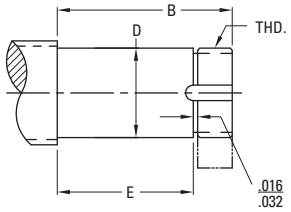
TYPE QK, REQUIRED FOR QK SUPPORT



TYPE QF1, REQUIRED FOR QF SUPPORT



TYPE QK1, REQUIRED FOR QK SUPPORT



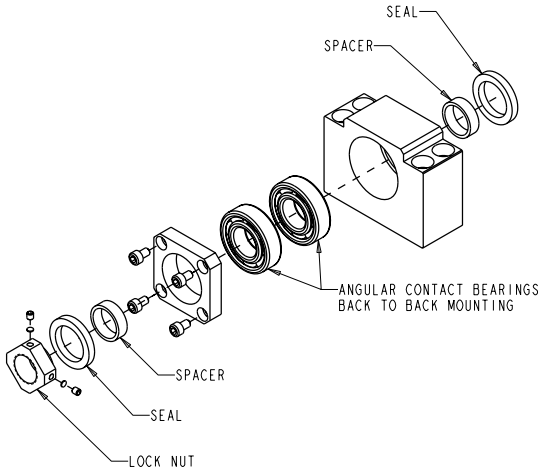
Screw Size	Type QF/QF1 (inch)				Type QK/QK1 (inch)				Common Dimensions					
Diameter x Lead (inch)	Standard P/N	A	B	E	Standard P/N	A	B	E	C	D [1]	F	G	THD	Bearing Trade No.
0.500 x 0.200	7833291	1.970	0.720	0.291	7828282	2.874	1.812	1.398	0.2500 0.2490	0.3544 0.3541	0.092	1.000	5/16-24	629
0.631 x 0.200 0.631 x 1.000	7833256	2.110	0.810	0.394	7824154	3.292	1.992	1.576	0.4060 0.4050	0.4726 0.4723	0.125	1.250	N-01	7201
0.750 x 0.200 0.750 x 0.500	7833259	1.870	0.870	0.433	7824155	3.180	2.180	1.732	0.5000 0.4990	0.5908 0.5905	0.125	0.875	N-02	7202
0.875 x 0.200	7833262	2.233	0.918	0.472	7824156	3.649	2.334	1.888	0.5620 0.5610	0.6695 0.6692	0.125	1.250	N-03	7203
1.000 x 0.200 /0.250 1.000 x 0.500/1.000 1.171 x 0.413	7833265	2.375	1.060	0.551	7824157	4.028	2.713	2.204	0.6250 0.6240	0.7877 0.7873	0.188	1.250	N-04	7204
1.150 x 0.200 1.250 x 0.200/0.500 1.500 x 0.473/1.000	7833268	2.680	1.120	0.591	7824158	4.453	2.893	2.364	0.7500 0.7490	0.9846 0.9842	0.188	1.250	N-05	7205
1.500 x 0.200/0.250 1.500 x 0.500/1.875 1.500 x 2.000	7833270	2.970	1.160	0.630	7824159	4.860	3.050	2.520	1.0000 0.9990	1.1814 1.1810	0.250	1.250	N-06	7206
1.750 x 0.200	7833273	3.650	1.460	0.906	7829554	6.368	4.178	3.624	1.3750 1.3740	1.5752 1.5747	0.313	1.875	N-08	7308
2.000 x 0.200 /0.500/1.000 2.250 x 0.500 2.250 x 1.000	7833276	3.730	1.540	0.984	7824160	6.682	4.492	3.936	1.3750 1.3740	1.7721 1.7716	0.313	1.875	N-09	7309
2.500 x 0.250 2.500 x 0.500 2.500 x 1.000	7833279	4.560	1.680	1.063	7824161	7.749	4.872	4.252	1.7500 1.7490	1.9689 1.9684	0.375	2.750	N-10	7310

(1) Dimensioned for press fit of bearing on bearing journal.

NOTES:

Bearing Supports/End Machining — Metric Series Ball Screws

BK Support Blocks

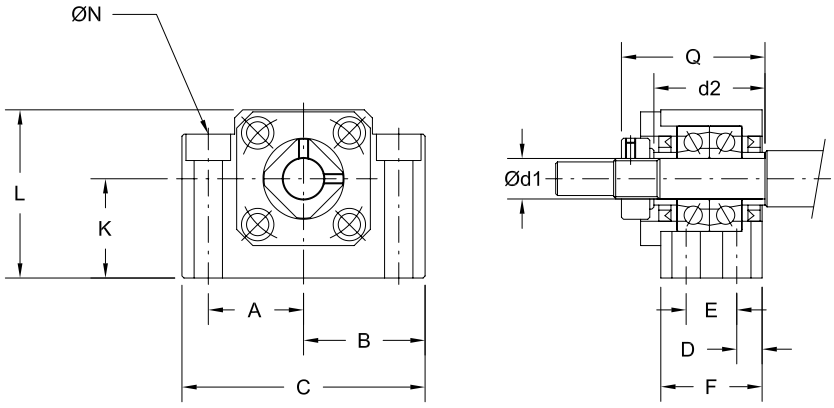


Standard P/N	Dia.x Lead (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (kg)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833391	12	326	1450	989	4400	RN10	0.4
7833392	16	627	2790	1596	7100	RN12	0.5
7833393	20	1057	4700	2315	10300	RN15	0.6
7833394	25	1832	8150	3215	14300	RN20	1.3
7833395	32	2113	9400	3732	16600	RN25	2.4
7833396	40	3035	13500	5170	23000	RN30	3.4
7833397	50	6789	30200	11375	50600	RN40	6.8

Note: Design dimensions fit standard Type BK and BK1 end machining. See page 172 for details.

Bearing Supports/End Machining - Metric Series Ball Screws

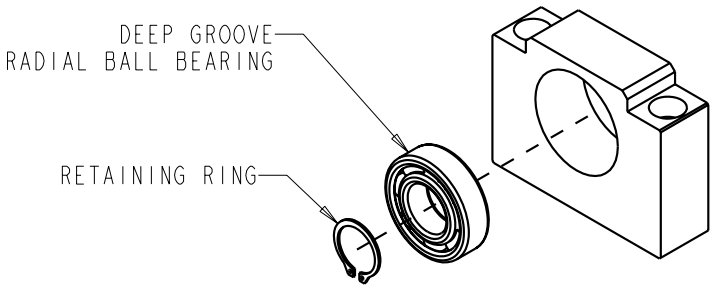
BK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (mm)											
	d1	d2	A	B	C	D	E	F	K ±0.02	L	N	Q
7833391	10	27.0	23.0	30.0	60.0	6.0	13.0	25.0	22.00	39.0	4 Holes 6.6 dia Thru 10.8 C-Bore x 5.0 Deep	34.0
7833392	12	27.0	23.0	30.0	60.0	6.0	13.0	25.0	25.00	43.0	4 Holes 6.6 dia. Thru 10.8 C-Bore x 1.5 Deep	34.0
7833393	15	30.0	27.0	35.0	70.0	6.0	15.0	27.0	28.00	48.0	4 Holes 6.6 dia. Thru 11.0 C-Bore x 6.5 Deep	38.0
7833394	20	40.0	35.0	44.0	88.0	8.0	19.0	35.0	34.00	60.0	4 Holes 9.0 dia. Thru 14.0 C-Bore x 8.5 Deep	51.0
7833395	25	48.0	42.5	53.0	106.0	10.0	22.0	42.0	48.00	80.0	4 Holes 11.0 dia. Thru 17.0 C-Bore x 11.0 Deep	63.0
7833396	30	50.0	51.0	64.0	128.0	11.0	23.0	45.0	51.00	89.0	4 Holes 14.0 dia. Thru 20.0 C-Bore x 13.0 Deep	70.0
7833397	40	66.0	65.0	80.0	160.0	14.0	33.0	61.0	60.00	110.0	4 Holes 18.0 dia. Thru 26.0 C-Bore x 17.5 Deep	91.0

Bearing Supports/End Machining — Metric Series Ball Screws

BF Support Blocks

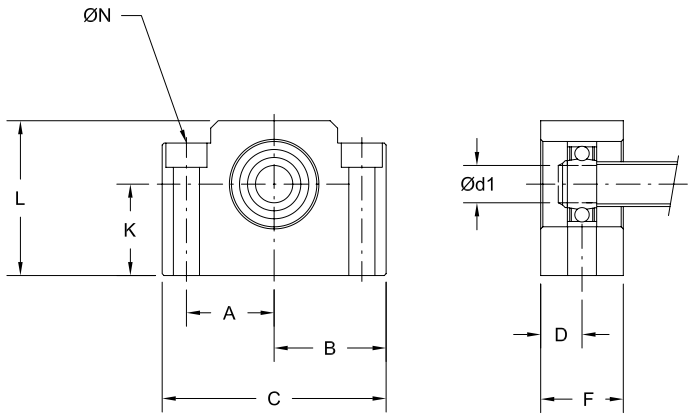


Standard P/N	Dia.x Lead (mm)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (mm)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833398	12	366	1630	821	3650	8	0.3
7833399	16	674	3000	1708	7600	10	0.4
7833400	20	780	3470	1945	8650	15	0.4
7833401	25	1461	6500	3237	14400	20	0.8
7833402	32	1753	7800	3597	16000	25	1.5
7833403	40	2540	11300	4991	22200	30	2.0
7833404	50	5822	25900	11375	50600	40	3.3

Note: Design dimensions fit standard Type BF and BF1 end machining. See page 172 for details.

Bearing Supports/End Machining - Metric Series Ball Screws

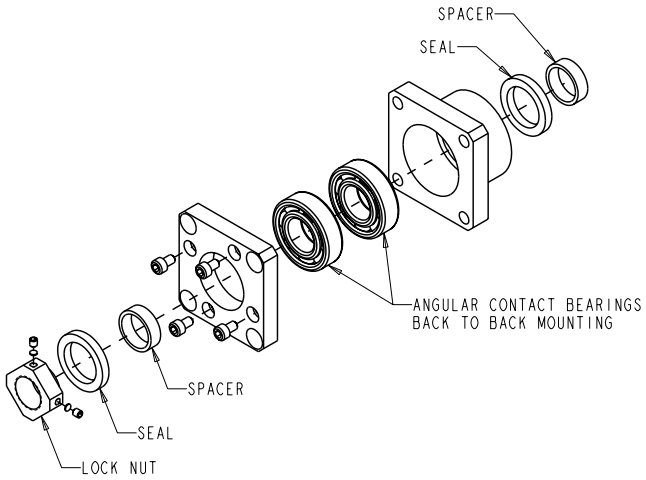
BF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (mm)								
	d1 (mm)	A	B	C	D	F	K ±0.02	L	N
7833398	8	23.0	30.0	60.0	10.0	20.0	22.00	39.0	2 Holes 6.6 dia Thru 10.8 C-Bore x 5.0 Deep
7833399	10	23.0	30.0	60.0	10.0	20.0	25.00	43.0	2 Holes 6.6 dia. Thru 10.8 C-Bore x 1.5 Deep
7833400	15	27.0	35.0	70.0	10.0	20.0	28.00	48.0	2 Holes 6.6 dia. Thru 11.0 C-Bore x 6.5 Deep
7833401	20	35.0	44.0	88.0	13.0	26.0	34.00	60.0	2 Holes 9.0 dia. Thru 14.0 C-Bore x 8.5 Deep
7833402	25	42.5	53.0	106.0	15.0	30.0	48.00	80.0	2 Holes 11.0 dia. Thru 17.0 C-Bore x 11.0 Deep
7833403	30	51.0	64.0	128.0	16.0	32.0	51.00	89.0	2 Holes 14.0 dia. Thru 20.0 C-Bore x 13.0 Deep
7833404	40	65.0	80.0	160.0	18.5	37.0	60.00	110.0	2 Holes 18.0 dia. Thru 26.0 C-Bore x 17.5 Deep

Bearing Supports/End Machining — Metric Series Ball Screws

FK Support Blocks

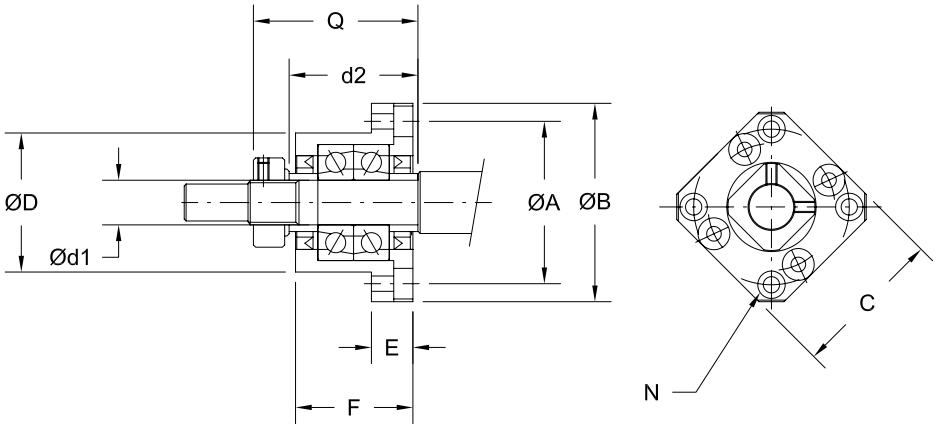


Standard P/N	Dia.x Lead (mm)	Bearing Rating				Lock Nut Type	Bearing Block Weight (kg)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833405	12	326	1450	989	4400	RN10	0.3
7833406	16	627	2790	1596	7100	RN12	0.3
7833407	20	1057	4700	2315	10300	RN15	0.4
7833408	25	1832	8150	3215	14300	RN20	1.2
7833409	32	2113	9400	3732	16600	RN25	1.6
7833410	40	3035	13500	5170	23000	RN30	2.4

Note: Design dimensions fit standard Type FK and FK1 end machining. See page 173 for details.

Bearing Supports/End Machining - Metric Series Ball Screws

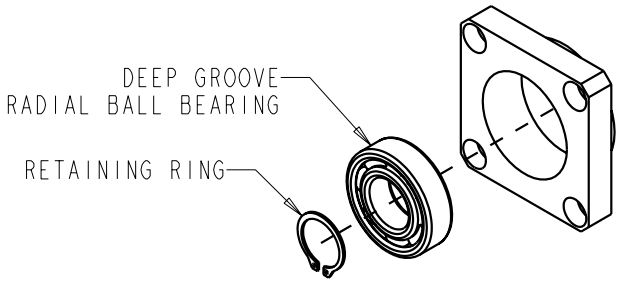
FK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (mm)									
	d1	d2	A	B	C	D g6	E	F	N	Q
7833405	10	27.0	42.0	52.0	42.0	34.0	10.0	27.0	4 Holes 4.5 dia Thru 8.0 C-Bore x 4.0 Deep	33.0
7833406	12	27.0	44.0	54.0	44.0	36.0	10.0	27.0	4 Holes 4.5 dia. Thru 8.0 C-Bore x 4.0 Deep	33.0
7833407	15	38.0	50.0	63.0	52.0	40.0	15.0	32.0	4 Holes 5.5 dia. Thru 9.5 C-Bore x 6.0 Deep	40.0
7833408	20	50.0	70.0	85.0	68.0	57.0	22.0	52.0	4 Holes 6.6 dia. Thru 11.0 C-Bore x 10.0 Deep	66.0
7833409	25	60.0	80.0	98.0	79.0	63.0	27.0	57.0	4 Holes 9.0 dia. Thru 15.0 C-Bore x 13.0 Deep	74.0
7833410	30	50.0	95.0	117.0	93.0	75.0	30.0	62.0	4 Holes 11.0 dia. Thru 17.5 C-Bore x 15.0 Deep	80.0

Bearing Supports/End Machining — Metric Series Ball Screws

FF Support Blocks

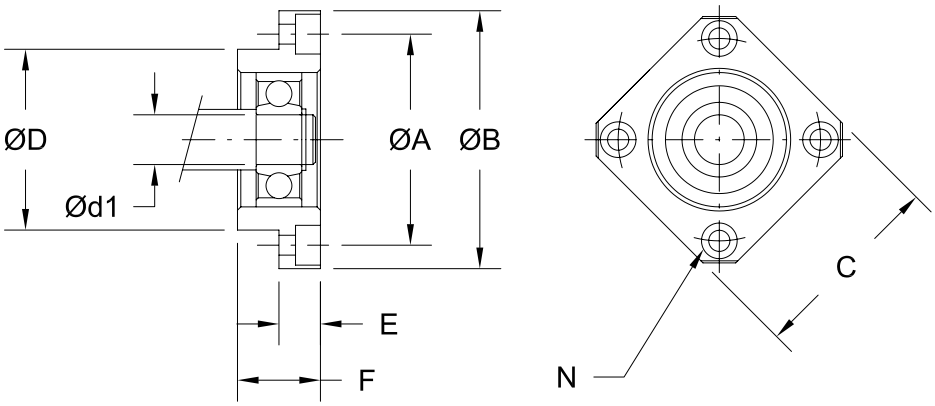


Standard P/N	Dia.x Lead (mm)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (kg)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833411	12	366	1630	821	3650	8	0.1
7833412	16	674	3000	1708	7600	10	0.2
7833413	20	780	3470	1945	8650	15	0.2
7833414	25	1461	6500	3237	14400	20	0.5
7833415	32	1753	7800	3597	16000	25	0.7
7833416	40	2540	11300	4991	22200	30	1.1

Note: Design dimensions fit standard Type FF and FF1 end machining. See page 173 for details.

Bearing Supports/End Machining - Metric Series Ball Screws

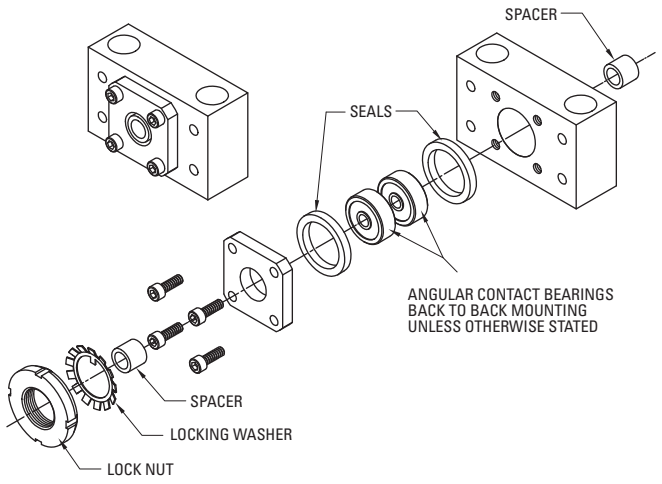
FF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (mm)							
	d1	A	B	C	D g6	E	F	N
7833411	8	35.0	43.0	35.0	28.0	7.0	12.0	4 Holes 3.4 dia Thru 6.5 C-Bore x 4.0 Deep
7833412	10	42.0	52.0	42.0	34.0	7.0	15.0	4 Holes 4.5 dia. Thru 8.0 C-Bore x 4.0 Deep
7833413	15	50.0	63.0	52.0	40.0	9.0	17.0	4 Holes 5.5 dia. Thru 9.5 C-Bore x 5.5 Deep
7833414	20	70.0	85.0	68.0	57.0	11.0	20.0	4 Holes 6.6 dia. Thru 11.0 C-Bore x 6.5 Deep
7833415	25	80.0	98.0	79.0	63.0	14.0	24.0	4 Holes 9.0 dia. Thru 14.0 C-Bore x 8.5 Deep
7833416	30	95.0	117.0	93.0	75.0	18.0	27.0	4 Holes 11.0 dia. Thru 17.0 C-Bore x 11.0 Deep

Bearing Supports/End Machining — Metric Series Ball Screws

QK Bearing Support Blocks



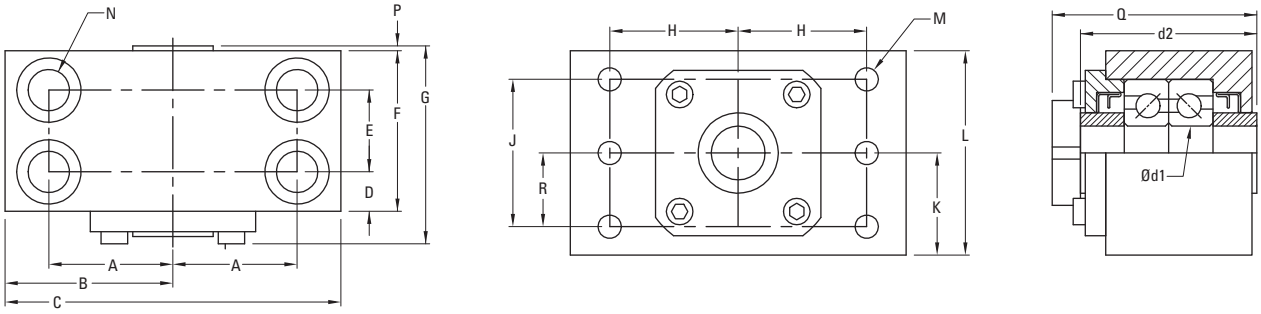
Standard P/N	Dia. (mm)	Bearing Rating				Lock Nut Type	Bearing Block Weight lbs (kg)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7829546 [1]	12	440	1960	1030	4550	M8-1.25	2 (.9)
7829547	16	630	2790	1600	7100	KM-01	1.5 (.7)
7829548	20	1060	4700	2320	10300	KM-02	3.5 (1.6)
7829549	25	1838	8150	3225	14300	KM-03	5.5 (2.5)
7829550	32	2120	9400	3750	16600	KM-05	9.5 (4.3)
7829551	40	3050	13500	5200	23000	KM-06	11.5 (5.2)
7829552	50	6800	30200	11400	50600	KM-08	21.5 (9.8)
7829553	63	10800	47900	17300	76800	KM-10	39 (17.7)

(1) Deep groove radial bearing.

Note: Design dimensions fit standard Type QK and QK1 end machining. See page 174 for details.

Bearing Supports/End Machining — Metric Series Ball Screws

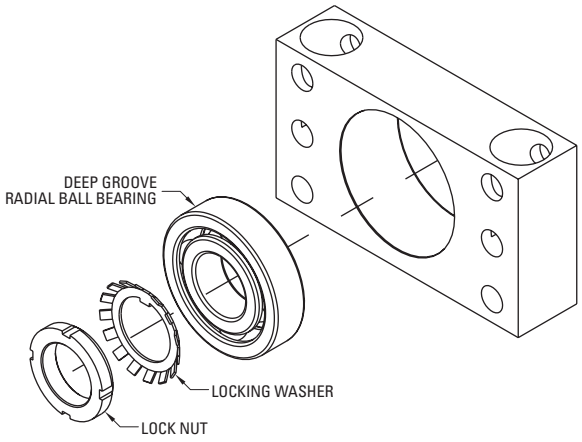
QK Support Blocks



Standard P/N	Bearing Block Dimensions (mm)																
	d1	d2	A & H	B	C	D	E	F	G	J	K	L	M	N	P	Q	R
7829546	9	37	25.40	35	70	16.0	—	30.23	35	35	25.40	50.80	4 Holes 7.13 dia.	2 Holes 7.13 dia. Thru 12.7 C-Bore x 14.22 DP	—	46.20	17.46
7829547	12	32	28.58	38	76	17.0	—	34.00	43	29	25.40	47.75	4 Holes 7.13 dia.	2 Holes 10.31 dia. Thru 15.88 C-Bore x 22.23 DP	0.51	40.64	15.88
7829548	15	44	31.75	45	89	19.0	—	38.00	47	35	28.58	54.10	4 Holes 7.13 dia.	2 Holes 10.31 dia. Thru 15.88 C-Bore x 25.4 DP	0.51	53.34	19.05
7829549	20	56	41.28	57	114	24.0	—	48.00	60	44	36.53	69.85	4 Holes 11.91 dia.	2 Holes 16.66 dia. Thru 25.4 C-Bore x 33.33 DP	1.00	68.58	23.83
7829550	25	60	53.98	76	152	24.5	—	49.00	65	51	44.45	85.85	4 Holes 16.66 dia.	2 Holes 23.01 dia. Thru 34.93 C-Bore x 50.80 DP	0.76	73.66	25.40
7829551	30	64	60.33	83	165	26.0	—	52.00	68	51	47.63	92.20	4 Holes 16.66 dia.	2 Holes 23.01 dia. Thru 34.93 C-Bore x 52.38 DP	1.14	76.20	25.40
7829552	40	92	74.60	96	192	19.2	41.50	80.00	96	76	57.15	107.95	6 Holes 16.66 dia.	4 Holes 23.01 dia. Thru 34.93 C-Bore x 57.15 DP	1.27	106.68	38.10
7829553	50	108	90.51	115	230	23.5	43.75	90.75	113	92	71.45	143.00	4 Holes 20.63 dia.	4 Holes 26.19 dia. Thru 41.28 C-Bore x 88.90 DP	2.29	124.46	46.05

Bearing Supports/End Machining — Metric Series Ball Screws

QF Support Blocks

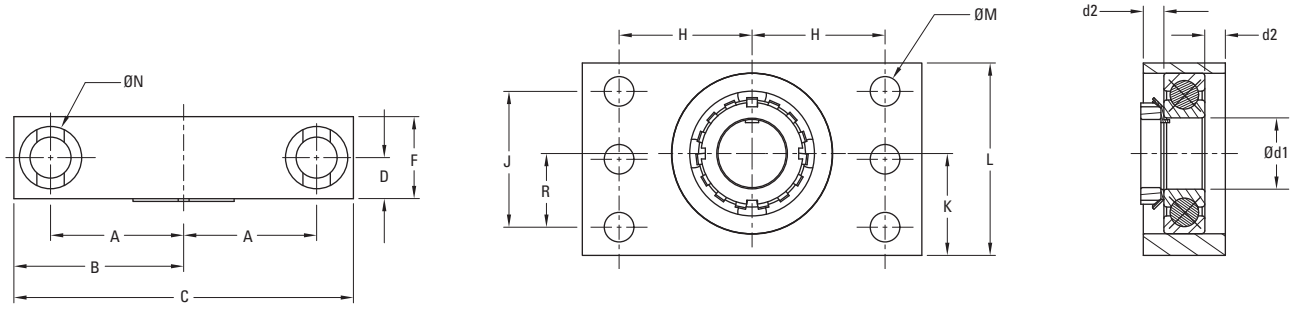


Standard P/N	Dia. x Lead (mm)	Bearing Rating				Lock Nut Type	Bearing Block Weight lbs (kg)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833292	12 x 10	440	1960	1030	4550	M8-1.25	0.36 (0.16)
7833282	16 x 5 & 10 & 16	674	3000	1708	7600	KM-01	0.59 (0.27)
7833283	20 x 5 & 10 & 20	780	3470	1945	8650	KM-02	0.73 (0.33)
7833284	25 x 5 & 10 & 25	1461	6500	3237	14400	KM-04	2.63 (1.19)
7833285	32 x 5 & 10 & 32	1753	7800	3597	16000	KM-05	3.08 (1.40)
7833286	40 x 5 & 10 & 20 40 x 32 & 40 & 50	2540	11300	4991	22200	KM-06	3.95 (1.79)
7833287	50 x 10 & 50	5822	25900	11375	50600	KM-08	4.40 (2.00)
7833288	63 x 10 & 20	7081	31500	13376	59500	KM-10	8.39 (3.81)

Note: Design dimensions fit standard Type QF and QF1 end machining. See page 174 for details.

Bearing Supports/End Machining — Metric Series Ball Screws

QF Support Blocks



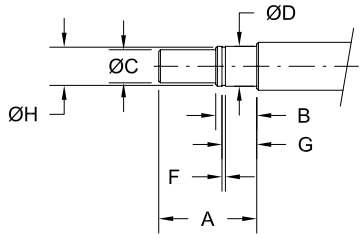
Standard P/N	Bearing Block Dimensions (mm)													
	d1	d2	A & H	B	C	D	F	J	K	L	M	N	Q	R
7833292	9.0	3.0	25.4	35.0	70.0	7.0	14.0	34.9	25.4	50.8	4 Holes 7.1 dia.	2 Holes 7.1 dia. Thru 12.7 C-Bore x 14.3 DP	18.5	17.5
7833282	12.0	5.0	28.6	38.0	76.0	10.0	20.0	28.6	25.4	47.6	4 Holes 7.1 dia.	2 Holes 10.3 dia. Thru 15.9 C-Bore x 22.2 DP	20.0	15.9
7833283	15.0	5.5	31.8	45.0	89.0	11.0	22.0	34.9	28.6	54.0	4 Holes 7.1 dia.	2 Holes 10.3 dia. Thru 15.9 C-Bore x 22.2 DP	22.0	19.1
7833284	20.0	7.0	41.3	57.0	114.0	14.0	28.0	44.5	36.5	69.9	4 Holes 11.9 dia.	2 Holes 16.7 dia. Thru 25.4 C-Bore x 33.3 DP	28.0	23.8
7833285	25.0	13.5	54.0	76.0	152.0	21.0	42.0	50.8	44.5	85.7	4 Holes 16.7 dia.	2 Holes 23.0 dia. Thru 34.9 C-Bore x 50.8 DP	42.0	25.4
7833286	30.0	13.0	60.3	83.0	165.0	21.0	42.0	50.8	47.6	92.1	4 Holes 16.7 dia.	2 Holes 23.0 dia. Thru 34.9 C-Bore x 52.4 DP	42.0	25.4
7833287	40.0	11.5	74.6	96.0	192.0	23.0	46.0	76.2	57.2	108.0	6 Holes 16.7 dia.	2 Holes 23.0 dia. Thru 34.9 C-Bore x 57.2 DP	46.0	41.3
7833288	50.0	13.5	90.5	115.0	230.0	27.0	54.0	92.1	71.4	142.9	6 Holes 20.6 dia.	2 Holes 26.2 dia. Thru 41.3 C-Bore x 88.9 DP	54.0	46.0

Bearing Supports/End Machining — Metric Series Ball Screws

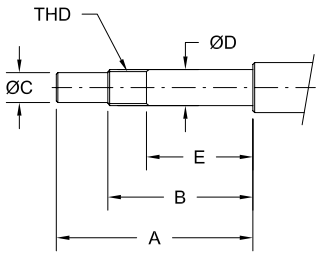
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

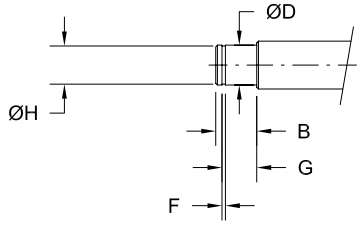
TYPE BF, REQUIRED FOR BF SUPPORT



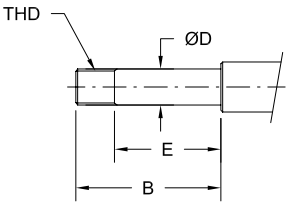
TYPE BK, REQUIRED FOR BK SUPPORT



TYPE BF1, REQUIRED FOR BF SUPPORT



TYPE BK1, REQUIRED FOR BK SUPPORT



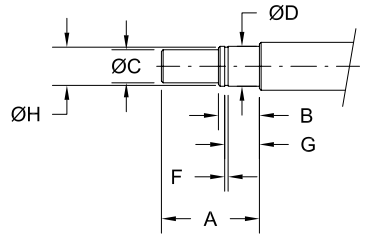
Screw Size	Type BF/ BF1 (mm)										Type BK/ BK1 (mm)							
Diameter (mm)	Standard P/N	A	B	C h7	D	F +0.14/-0.00	G +0.2/-0.0	H +0.0/-0.2	Snap Ring (DIN 471) (mm)	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
12	7833398	25.0	10.0	6.0	7.995 7.988	0.90	7.90	7.60	8	608	7833391	51.0	36.0	8.0	9.995 9.988	20.0	M10x1	7000
16	7833399	26.0	11.0	8.0	9.995 9.988	1.15	9.15	9.60	10	6000	7833392	51.0	36.0	10.0	11.995 11.988	22.0	M12x1	7001
20	7833400	33.0	13.0	12.0	14.995 14.986	1.15	10.15	14.30	15	6002	7833393	60.0	40.0	12.0	14.995 14.986	28.0	M15x1	7002
25	7833401	41.0	16.0	17.0	19.995 19.986	1.35	13.35	19.00	20	6004	7833394	78.0	53.0	17.0	19.995 19.986	38.0	M20x1	7004
32	7833402	50.0	20.0	20.0	24.995 24.986	1.35	16.35	23.90	25	6205	7833395	95.0	65.0	20.0	24.995 24.986	47.0	M25x1.5	7205
40	7833403	59.0	21.0	25.0	29.995 29.985	1.75	17.75	28.60	30	6206	7833396	110.0	72.0	25.0	29.995 29.985	47.0	M30x1.5	7206
50	7833404	73.0	23.0	35.0	39.995 39.985	1.95	19.95	38.00	40	6208	7833397	143.0	93.0	35.0	39.995 39.985	58.0	M40x1.5	7208

Bearing Supports/End Machining — Metric Series Ball Screws

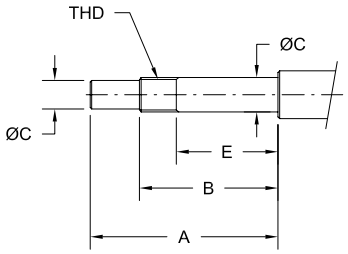
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

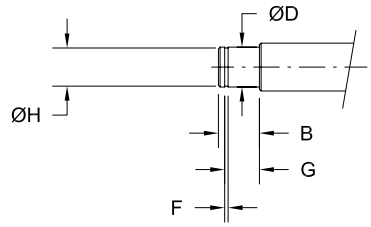
TYPE FF, REQUIRED FOR FF SUPPORT



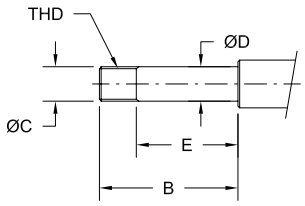
TYPE FK, REQUIRED FOR FK SUPPORT



TYPE FF1, REQUIRED FOR FF SUPPORT



TYPE FK1, REQUIRED FOR FK SUPPORT



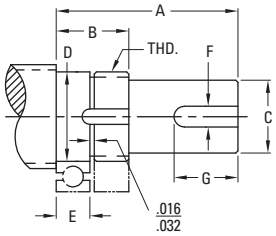
Screw Size	Type FF/ FF1 (mm)										Type FK/ FK1 (mm)							
Diameter (mm)	Standard P/N	A	B	C h7	D	F +0.14/-0.00	G +0.2/-0.0	H +0.0/-0.2	Snap Ring (DIN 471) (mm)	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
12	7833411	25.0	10.0	6.0	7.995 7.988	0.90	7.90	7.60	8	608	7833405	51.0	36.0	8.0	9.995 9.988	25.0	M10x1	7000
16	7833412	26.0	11.0	8.0	9.995 9.988	1.15	9.15	9.60	10	6000	7833406	51.0	36.0	10.0	11.995 11.988	25.0	M12x1	7001
20	7833413	33.0	13.0	12.0	14.995 14.986	1.15	10.15	14.30	15	6002	7833407	67.0	47.0	12.0	14.995 14.986	34.0	M15x1	7002
25	7833414	41.0	16.0	17.0	19.995 19.986	1.35	13.35	19.00	20	6004	7833408	87.0	62.0	17.0	19.995 19.986	45.0	M20x1	7204
32	7833415	50.0	20.0	20.0	24.995 24.986	1.35	16.35	23.90	25	6205	7833409	106.0	76.0	20.0	24.995 24.986	56.0	M25x1.5	7205
40	7833416	59.0	21.0	25.0	29.995 29.985	1.75	17.75	28.60	30	6206	7833410	110.0	72.0	25.0	29.995 29.985	47.0	M30x1.5	7206

Bearing Supports/End Machining — Metric Series Ball Screws

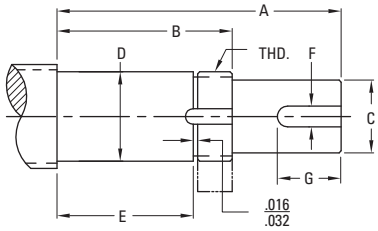
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

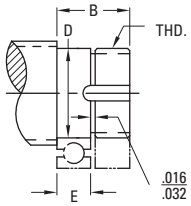
TYPE QF, REQUIRED QF SUPPORT



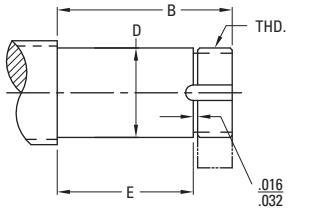
TYPE QK, REQUIRED FOR QK SUPPORT



TYPE QF1, REQUIRED FOR QF SUPPORT



TYPE QK1, REQUIRED FOR QK SUPPORT



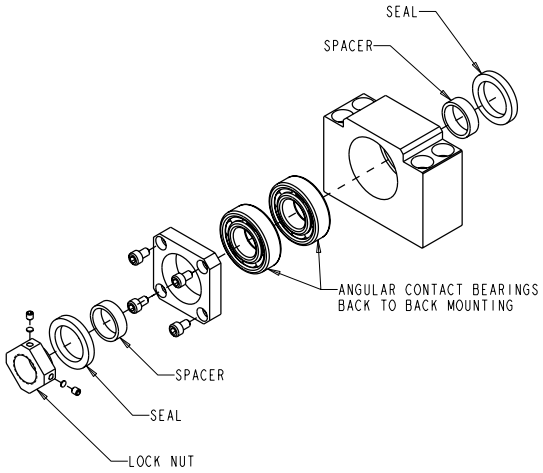
Screw Size	Type QF/ QF1 (mm)				Type QK/ QK1 (mm)				Common Dimensions				
Diameter (mm)	Standard P/N	A	B	E	Standard P/N	A	B	E	C	D[1]	F	G	THD
12	7833292	46.0	19.0	7.4	7829546	73.0	46.0	35.5	6.000/5.987	9.001/8.994	—	—	M8-1.25
16	7833282	54.0	21.0	10.0	7829547	84.0	51.0	40.0	10.000/9.987	12.006/11.999	3.0	30.0	KM-01
20	7833283	47.0	22.0	11.0	7829548	80.0	55.0	44.0	12.000/11.984	15.006/14.999	4.0	22.0	KM-02
25	7833284	61.0	27.0	14.0	7829549	103.0	69.0	56.0	16.000/15.984	20.007/19.997	5.0	30.0	KM-04
32	7833285	68.0	29.0	15.0	7829550	113.0	74.0	60.0	20.000/19.980	25.008/24.996	5.0	32.0	KM-05
40	7833286	76.0	30.0	16.0	7829551	124.0	78.0	64.0	25.000/24.980	30.007/29.997	8.0	34.0	KM-06
50	7833287	95.0	40.0	23.0	7829552	164.0	109.0	92.0	32.000/31.976	40.010/39.997	8.0	47.0	KM-08
63	7833288	116.0	43.0	27.0	7829553	197.0	124.0	108.0	40.000/39.977	50.010/49.997	10.0	65.0	KM-10

(1) Dimensioned for press fit of bearing on bearing journal.

NOTES:

Bearing Supports/End Machining — Ball Splines

BK Support Blocks

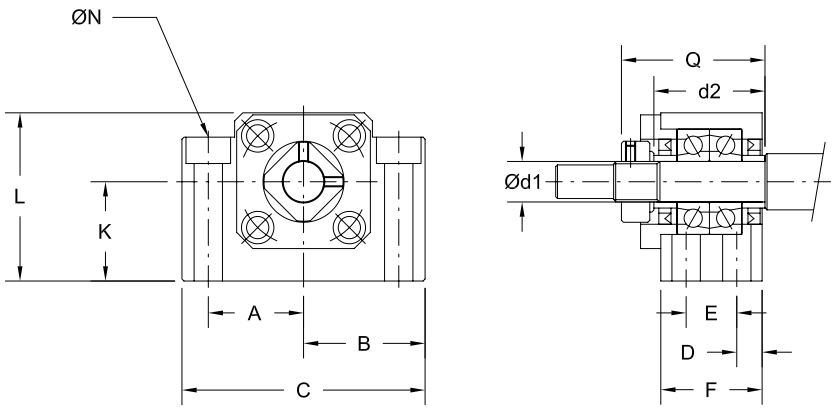


Standard P/N	Spline Size (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833360	0.625	326	1450	989	4400	RN10	0.9
7833364	1.000	1832	8150	3215	14300	RN20	2.8
7833365	1.500	2113	9400	3732	16600	RN25	5.3
7833367	2.00	6789	30200	11375	50600	RN40	15.0

Note: Design dimensions fit standard Type BK and BK1 end machining. See page 188 for details.

Bearing Supports/End Machining — Ball Splines

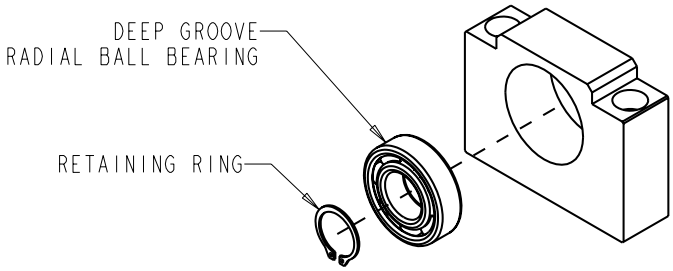
BK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)											
	d1 (mm)	d2	A	B	C	D	E	F	K ±0.001	L	N	Q
7833360	10	1.063	0.906	1.181	2.362	0.236	0.512	0.984	0.866	1.535	4 Holes 0.260 dia Thru 0.425 C-Bore x 0.197 Deep	1.339
7833364	20	1.575	1.378	1.732	3.465	0.315	0.748	1.378	1.339	2.362	4 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep	2.008
7833365	25	1.890	1.673	2.087	4.173	0.394	0.866	1.654	1.890	3.150	4 Holes 0.433 dia. Thru 0.699 C-Bore x 0.433 Deep	2.480
7833367	40	2.598	2.559	3.150	6.299	0.551	1.299	2.402	2.362	4.331	4 Holes 0.709 dia. Thru 1.024 C-Bore x 0.689 Deep	3.583

Bearing Supports/End Machining — Ball Splines

BF Support Blocks

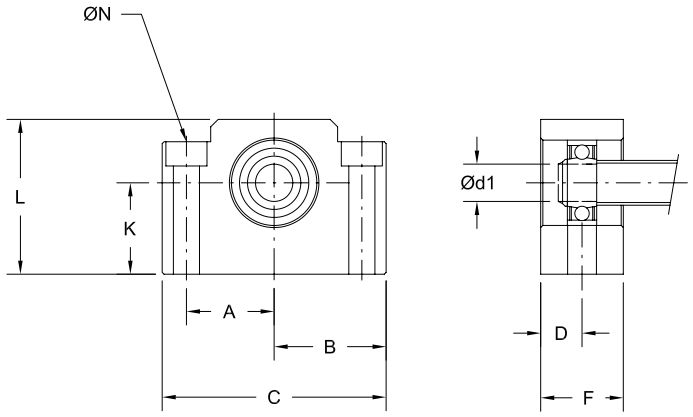


Standard P/N	Spline Size (inch)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833368	0.625	366	1630	821	3650	8	0.7
7833372	1.000	1461	6500	3237	14400	20	1.7
7833373	1.500	1753	7800	3597	16000	25	3.2
7833375	2.00	5822	25900	11375	50600	40	7.3

Note: Design dimensions fit standard Type BF and BF1 end machining. See page 188 for details.

Bearing Supports/End Machining — Ball Splines

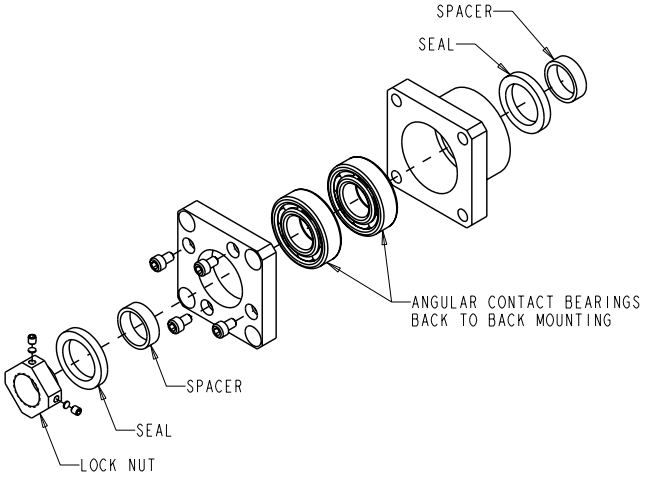
BF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)								
	d1 (mm)	A	B	C	D	F	K ±0.001	L	N
7833368	8	0.906	1.181	2.362	0.394	0.787	0.866	1.535	2 Holes 0.260 dia Thru 0.425 C-Bore x 0.197 Deep
7833372	20	1.378	1.732	3.465	0.512	1.024	1.339	2.362	2 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep
7833373	25	1.673	2.087	4.173	0.591	1.181	1.890	3.150	2 Holes 0.433 dia. Thru 0.699 C-Bore x 0.433 Deep
7833375	40	2.559	3.150	6.299	0.728	1.457	2.362	4.331	2 Holes 0.709 dia. Thru 1.024 C-Bore x 0.689 Deep

Bearing Supports/End Machining — Ball Splines

FK Support Blocks

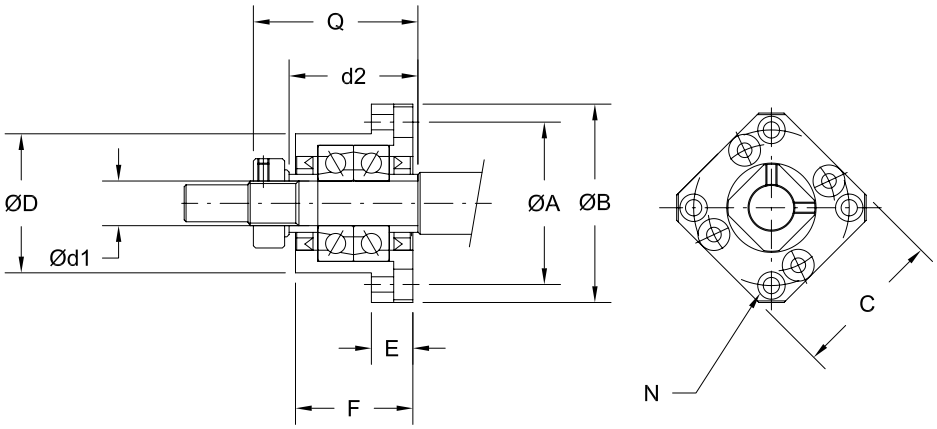


Standard P/N	Spline (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833377	0.625	326	1450	989	4400	RN10	0.6
7833381	1.000	1832	8150	3215	14300	RN20	2.5
7833382	1.500	2113	9400	3732	16600	RN25	3.5

Note: Design dimensions fit standard Type FK and FK1 end machining. See page 189 for details.

Bearing Supports/End Machining — Ball Splines

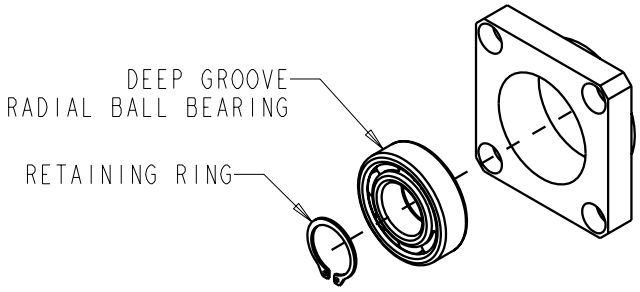
FK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)									
	d1 (mm)	d2	A	B	C	D	E	F	N	Q
7833360	10	1.063	1.654	2.047	1.654	1.3382 1.3376	0.394	1.063	4 Holes 0.177 dia Thru 0.315 C-Bore x 0.157 Deep	1.299
7833364	20	1.969	2.756	3.346	2.677	2.2437 2.2430	0.866	2.047	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.394 Deep	2.598
7833365	25	2.362	3.150	3.858	3.110	2.4799 2.4792	1.063	2.244	4 Holes 0.354 dia. Thru 0.591 C-Bore x 0.512 Deep	2.913

Bearing Supports/End Machining — Ball Splines

FF Support Blocks

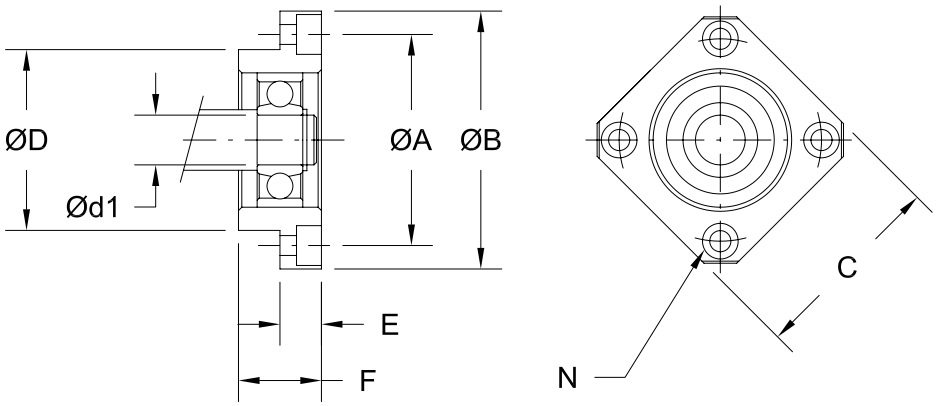


Standard P/N	Spline Size (inch)	Bearing Rating				Snap Ring (DIN 471) (mm)	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833384	0.625	366	1630	821	3650	10	0.2
7833388	1.000	1461	6500	3237	14400	20	1.0
7833389	1.500	1753	7800	3597	16000	25	1.5

Note: Design dimensions fit standard Type FF and FF1 end machining. See page 189 for details.

Bearing Supports/End Machining — Ball Splines

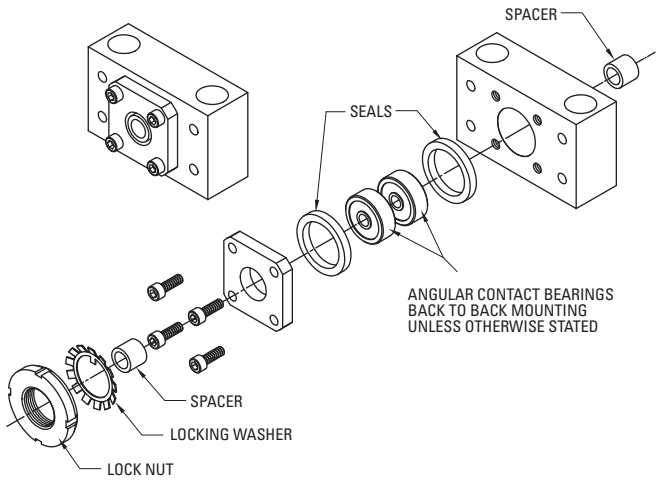
FF Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)							
	d1 (mm)	A	B	C	D	E	F	N
7833368	8	1.378	1.693	1.378	1.1021 1.1016	0.276	0.472	4 Holes 0.134 dia Thru 0.256 C-Bore x 0.157 Deep
7833372	20	2.756	3.346	2.677	2.2437 2.2430	0.433	0.787	4 Holes 0.260 dia. Thru 0.433 C-Bore x 0.256 Deep
7833373	25	3.150	3.858	3.110	2.4799 2.4792	0.551	0.945	4 Holes 0.354 dia. Thru 0.551 C-Bore x 0.335 Deep

Bearing Supports/End Machining — Ball Splines

QK Bearing Support Blocks



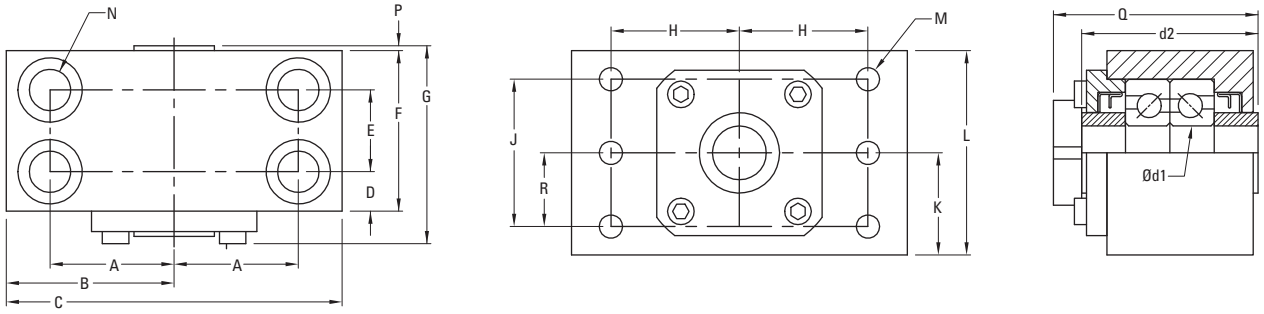
Standard P/N	Spline Size (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7828282 (1)	0.625	440	1960	1030	4550	5/16-24	2.0
7824157	1.000	1838	8150	3225	14300	N-04	5.5
7824158	1.500	2120	9400	3750	16600	N-05	9.5
7829554	2.000	6800	30200	11400	50600	N-08	21.5
7824161	2.500	10800	47900	17300	76800	N-10	39

(1) Deep groove radial bearing.

Note: Design dimensions fit standard Type QK and QK1 end machining. See page 190 for details.

Bearing Supports/End Machining — Ball Splines

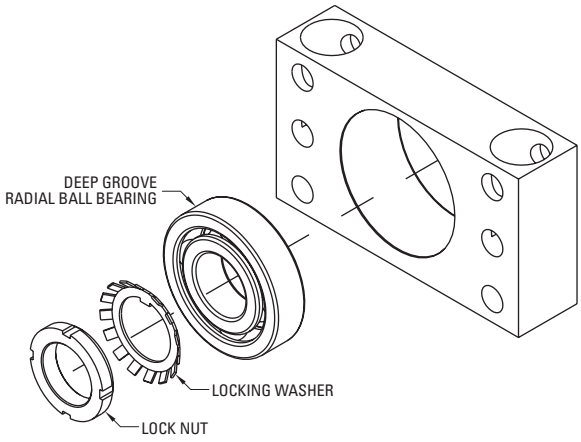
QK Bearing Support Blocks



Standard P/N	Bearing Block Dimensions (inch)																
	d1 (mm)	d2	A & H	B	C	D	E	F	G	J	K	L	M	N	P	Q	R
7828282	9	1.44	1.000	1.38	2.75	0.63	—	1.19	1.4	1.375	1.000	2.00	4 Holes 0.281 dia.	2 Holes 0.281 dia. Thru 0.50 C-Bore x 0.56 DP	—	1.8	0.688
7824157	20	2.2	1.625	2.25	4.50	0.83	—	1.87	2.4	1.750	1.438	2.75	4 Holes 0.469 dia.	2 Holes 0.656 dia. Thru 1.00 C-Bore x 0.312 DP	0.04	2.7	0.938
7824158	25	2.36	2.125	3.00	6.00	0.94	—	1.94	2.6	2.000	1.750	3.38	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.00 DP	0.03	2.9	1.000
7829554	40	3.62	2.937	3.75	7.50	0.76	1.63	3.15	3.8	3.000	2.250	4.25	6 Holes 0.656 dia.	4 Holes 0.906 dia. Thru 1.375 C-Bore x 2.25 DP	0.05	4.2	1.500
7824161	50	4.25	3.563	4.50	9.00	0.92	1.72	3.56	4.5	3.625	2.813	5.63	6 Holes 0.812 dia.	4 Holes 1.031 dia. Thru 1.625 C-Bore x 3.500 DP	0.05	4.9	1.813

Bearing Supports/End Machining — Ball Splines

QF Support Blocks

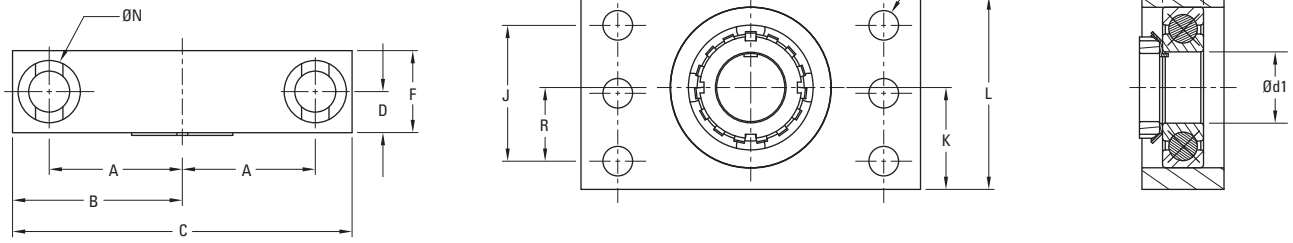


Standard P/N	Spline Size (inch)	Bearing Rating				Lock Nut Type	Bearing Block Weight (lbs)
		Static Rating C_o		Dynamic Rating C_{am}			
		(lbs)	(N)	(lbs)	(N)		
7833291	0.625	440	1960	1030	4550	5/16-24	0.8
7833265	1.000	1461	6500	3237	14400	N-04	5.8
7833268	1.500	1753	7800	3597	16000	N-05	6.8
7833273	2.000	5822	25900	11375	50600	N-08	9.7
7833279	2.500	8475	37700	15579	69300	N-10	18.5

Note: Design dimensions fit standard Type QF and QF1 end machining. See page 190 for details.

Bearing Supports/End Machining — Ball Splines

QF Support Blocks



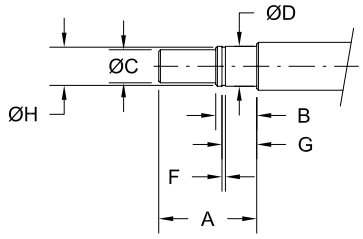
Standard P/N	Bearing Block Dimensions (inch)													
	d1 (mm)	d2	A & H	B	C	D	F	J	K	L	M	N	Q	R
7833291	9.0	0.118	1.000	1.380	2.750	0.276	0.551	1.375	1.000	2.000	4 Holes 0.281 dia.	2 Holes 0.281 dia. Thru 0.500 C-Bore x 0.562 DP	0.757	0.688
7833265	20.0	0.276	1.625	2.250	4.500	0.551	1.102	1.750	1.438	2.750	4 Holes 0.469 dia.	2 Holes 0.656 dia. Thru 1.000 C-Bore x 1.312 DP	1.258	0.938
7833268	25.0	0.531	2.125	3.000	6.000	0.827	1.654	2.000	1.750	3.375	4 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.000 DP	1.654	1.000
7833273	40.0	0.453	2.937	3.750	7.500	0.906	1.811	3.000	2.250	4.250	6 Holes 0.656 dia.	2 Holes 0.906 dia. Thru 1.375 C-Bore x 2.250 DP	1.869	1.625
7833279	50.0	0.531	3.563	4.500	9.000	1.063	2.126	3.625	2.813	5.625	6 Holes 0.812 dia.	2 Holes 1.031 dia. Thru 1.625 C-Bore x 3.500 DP	2.167	1.813

Bearing Supports/End Machining — Ball Splines

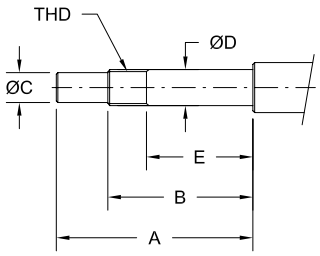
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

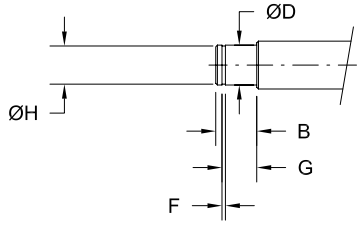
TYPE BF, REQUIRED FOR BF SUPPORT



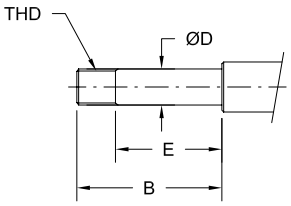
TYPE BK, REQUIRED FOR BK SUPPORT



TYPE BF1, REQUIRED FOR BF SUPPORT



TYPE BK1, REQUIRED FOR BK SUPPORT



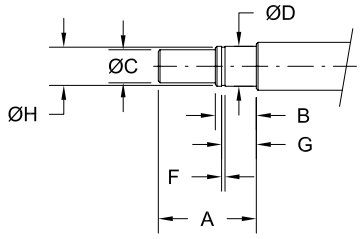
Spline Size Nominal Diameter	Type BF/BF1 (inch)										Type BK/BK1 (inch)							
	Standard P/N	A	B	C h7	D	F +0.006/ -0.000	G +0.008/ -0.000	H +0.000/ -0.008	Snap Ring (DIN 471) (mm)	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
0.625	7833368	0.984	0.394	0.2362 0.2357	0.3148 0.3145	0.035	0.311	0.299	8	608	7833360	2.008	1.417	0.3150 0.3144	0.3935 0.3932	0.787	M10x1	7000
1.000	7833372	1.614	0.630	0.6693 0.6686	0.7872 0.7869	0.053	0.526	0.748	20	6004	7833364	3.071	2.087	0.6693 0.6686	0.7872 0.7869	1.496	M20x1	7004
1.500	7833373	1.969	0.787	0.7874 0.7866	0.9841 0.9837	0.053	0.644	0.941	25	6205	7833365	3.740	2.559	0.7874 0.7866	0.9841 0.9837	1.850	M25x1.5	7205
2.000	7833375	2.874	0.906	1.3780 1.3771	1.5746 1.5742	0.077	0.785	1.496	40	6208	7833367	5.630	3.661	1.3780 1.3771	1.5746 1.5742	2.283	M40x1.5	7208

Bearing Supports/End Machining — Ball Splines

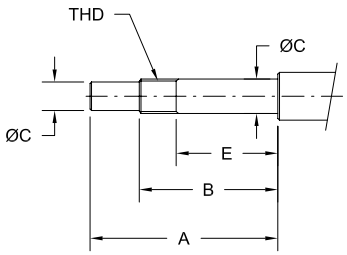
Standard End Machining

The typical ends shown below can be machined on all ball screws. Specific dimensional data is provided in the table.

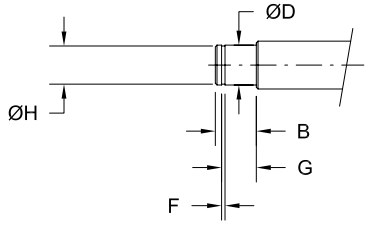
TYPE FF, REQUIRED FOR FF SUPPORT



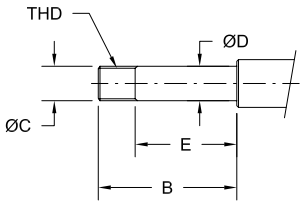
TYPE FK, REQUIRED FOR FK SUPPORT



TYPE FF1, REQUIRED FOR FF SUPPORT



TYPE FK1, REQUIRED FOR FK SUPPORT



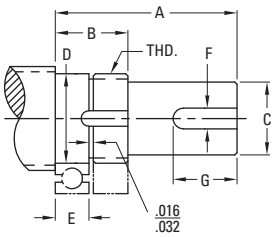
Spline Size Nominal Diameter	Type FF/FF1 (inch)										Type FK/FK1 (inch)							
	Standard P/N	A	B	C h7	D	F +0.006/ -0.000	G +0.008/ -0.000	H +0.000/ -0.008	Snap Ring (DIN 471) (mm)	Bearing Trade No.	Standard P/N	A	B	C h7	D	E	THD	Bearing Trade No.
0.625	7833384	0.984	0.394	0.2362 0.2357	0.3148 0.3145	0.035	0.311	0.299	8	608	7833377	2.008	1.417	0.3150 0.3144	0.3935 0.3932	0.984	M10x1	7000
1.000	7833388	1.614	0.630	0.6693 0.6686	0.7872 0.7869	0.053	0.526	0.748	20	6004	7833381	3.425	2.441	0.6693 0.6686	0.7872 0.7869	1.772	M20x1	7004
1.500	7833389	1.969	0.787	0.7874 0.7866	0.9841 0.9837	0.053	0.644	0.941	25	6205	7833382	4.173	2.992	0.7874 0.7866	0.9841 0.9837	2.205	M25x1.5	7205

Bearing Supports/End Machining — Ball Splines

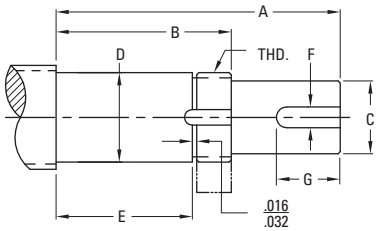
Standard End Machining

The typical ends shown below can be machined on all ball splines. Specific dimensional data is provided in the table.

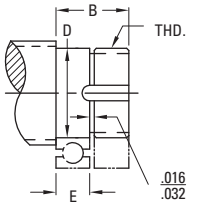
TYPE QF, REQUIRED QF SUPPORT



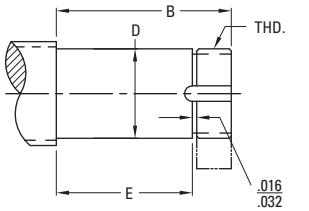
TYPE QK, REQUIRED FOR QK SUPPORT



TYPE QF1, REQUIRED FOR QF SUPPORT



TYPE QK1, REQUIRED FOR QK SUPPORT



Spline Size (inch)	Type QF/QF1					Type QK/QK1					Common Dimensions				
	Standard P/N	A	B	E	Bearing Trade No.	Standard P/N	A	B	E	Bearing Trade No.	C	D[1]	F	G	THD
0.625	7833291	1.970	0.720	0.291	629	7828282	2.874	1.812	1.398	629	0.2500 0.2490	0.3544 0.3541	.092	1.000	5/16-24
1.000	7833265	2.375	1.060	0.551	6204	7824157	4.028	2.713	2.204	7204	0.6250 0.6240	0.7877 0.7873	.118	1.25	N-04
1.500	7833270	2.970	1.160	0.630	620	7824159	4.860	3.050	2.520	7206	1.0000 0.9990	1.1814 1.1810	.250	1.250	N-06
2.000	7833273	3.650	1.460	0.906	6308	7829554	6.368	4.178	3.624	7308	1.3750 1.3740	1.5752 1.5747	.313	1.875	N-08
2.500	7833279	4.560	1.680	1.063	6310	7824161	7.749	4.872	4.252	7310	1.7500 1.7490	1.9689 1.9684	.375	2.750	N-10

(1) Dimensioned for press fit of bearing on bearing journal.

Engineering

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Email: thomsonbsa@danahermotion.com
Web: www.thomsonbsa.com

Lead Screws Engineering Overview

Precision Lead Screws & Supernuts®

Features/Advantages

Low Cost

Considerable savings when compared to ball screw assemblies.

Variety

Largest range of leads and diameters 3/16" to 3" to match your requirements.

Lubrication

Internally lubricated plastic nuts will operate without lubrication. However, additional lubrication or PTFE coating of the screw is recommended to optimize efficiency and life. See page 243.

Vibration and Noise

No ball recirculating vibration and often less audible noise compared to ball screws.

Design Considerations

Load

Supernuts provide a cost effective solution for moderate to light loads. For vertical applications, anti backlash supernuts should be mounted with thread/flange on the bottom.

Cantilevered Loads

Cantilevered loads that might cause a moment on the nut will cause premature failure.

Column Loading

Refer to column loading chart on page 196.

Critical Speed

Refer to critical speed chart on page 195.

Self-Locking

Lead screws can be self locking at low leads. Generally, the lead of the screw should be more than 1/3 of the diameter to satisfactorily backdrive.

Custom

Option of custom designs to fit into your design envelope.

Non-Corrosive*

Stainless Steel and internally lubricated acetal.

Environment

Less susceptible to particulate contamination compared to ball screws.

Lightweight

Less mass to move.

Temperature

Ambient and friction generated heat are the primary causes of premature plastic nut failure. Observe the temperature limits below and discuss your design with our application engineers for continuous duty, high load and high speed applications.
Thomson BSA recommends bronze nuts for very high temperature environments or can aid in your selection of high temperature plastic for a custom assembly.

Efficiency

Except at very high leads, efficiency increases as lead increases. Although the internally lubricated acetal provides excellent lubricity, Ball Screw Assemblies remain significantly more efficient than any Acme design.

Length Limitations

3/16" to 1/4"	3'
5/16" to 10mm	4'
7/16" to 5/8"	6'
>5/8"	12'

Lead Accuracy

Standard Grade (SRA)	.010 in/ft
Precision Grade (SPR)	.003 in/ft

Assembly		Screws	Nuts**			
Maximum Temperature	Friction Coefficient	Material	Material	Tensile Strength	Water Absorption (24 HRS %)	Thermal Expansion Coefficient
180°F	0.08 – 0.14	Stainless Steel*	Acetal with PTFE	8,000 psi	0.15	5.4 x 10-5 in. /in. /°F

* Other materials available on a custom basis.
** Plastic nuts only. See bronze nut section for information on our bronze nut products, page 29.

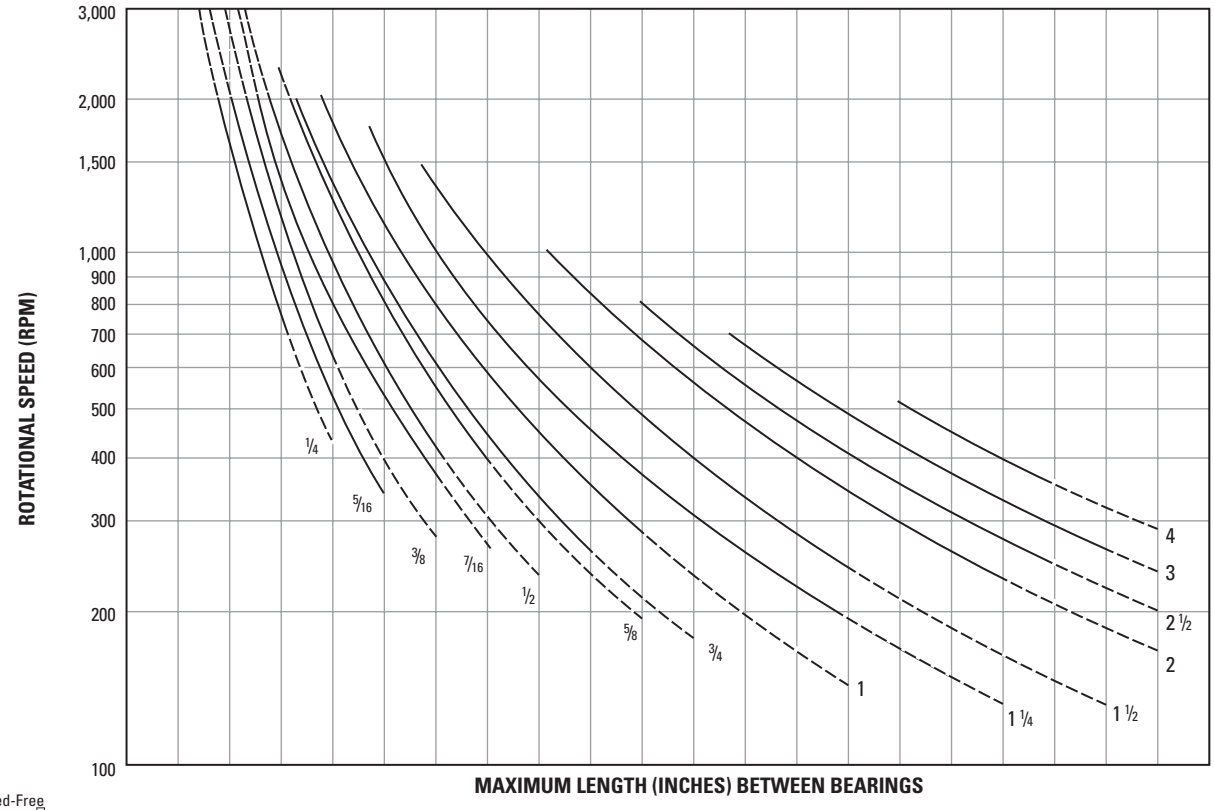
Engineering Guidelines for Lead Screws

Critical Speed Limits Chart for Lead Screws and Miniature Rolled Ball Screws

Every screw shaft has a rotational speed limit. That is the point at which the rotational speed sets up excessive vibration. This critical point is modified by the type of end bearing support used.

To use this chart, determine the required rpm and the maximum length between bearing supports. Next, select one of the four types of end support shown below. The critical speed limit can be found by locating the point at which rpm (horizontal lines) intersects with the unsupported screw length (vertical lines) as modified by the type of supports selected below. We recommend operating at no more than 80% of the critical speed limit to allow for misalignment and/or lack of screw straightness. If speed falls into dotted line, consult factory.

Warning: Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard screws within the nominal size range and truncated at the maximum ball nut rotational speed. DO NOT EXCEED this rpm regardless of screw length.



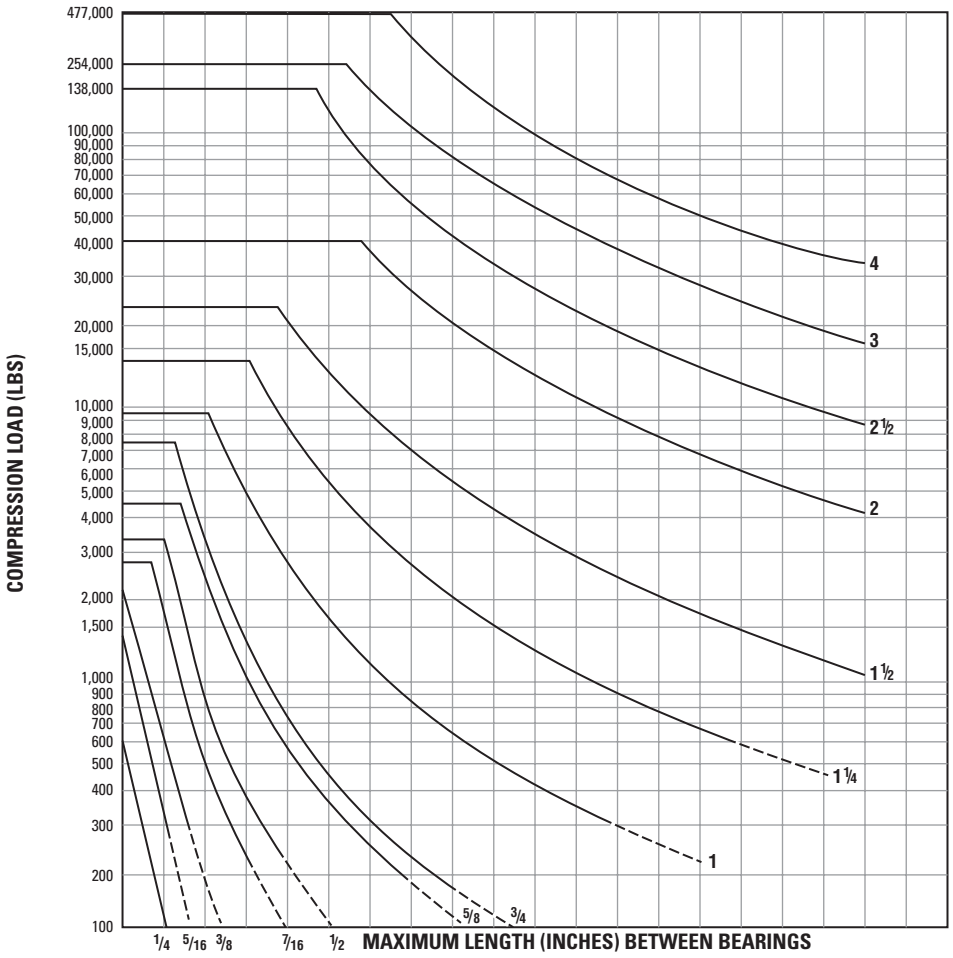
A Fixed-Free	Inches	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	120	126
	mm	152	304	457	609	762	914	1056	1219	1371	1524	1676	1828	1981	2133	2286	2438	2590	2743	3048	3200
B Simple-Simple	Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318	4572	4826	5080
C Fixed-Simple	Inches	12	24	36	48	61	73	85	97	109	121	133	145	158	170	182	194	206	218	230	242
	mm	304	609	914	1219	1549	1854	2159	2463	2768	3073	3378	3683	4013	4318	4622	4927	5232	5537	5842	6146
D Fixed-Fixed	Inches	15	30	45	60	75	90	105	119	134	149	164	179	194	209	224	239	254	269	284	298
	mm	381	762	1143	1524	1905	2286	2667	3022	3403	3784	4165	4546	4927	5308	5689	6070	6451	6832	7213	7569

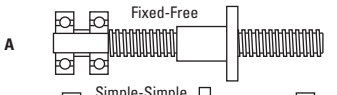
Engineering Guidelines for Lead Screws

Column Loading Capacities Chart for Lead Screws and Miniature Rolled Ball Screws

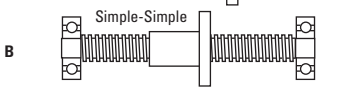
Use the chart below to determine the Maximum Compression Load for Screw Shaft. Usually, screw operated in tension can handle loads up to the rated capacity of the nut, providing the screw length is within standard lengths. End supports have an effect on the load capacity of screws. The four standard variations are shown below with corresponding rating adjustments. Find the point of intersecting lines of load (horizontal) and length (vertical) to determine the minimum safe diameter of screw. If loads fall into dotted lines, consult factory.

Warning: DO NOT EXCEED ball 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.

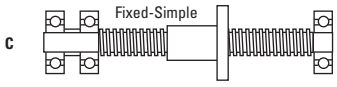




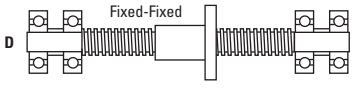
Inches	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
mm	127	254	381	508	635	762	889	1016	1143	1270	1397	1524	1651	1778	1905	2032	2159	2286	2413



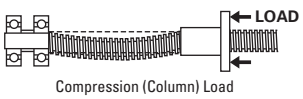
Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318	4572	4826



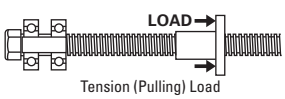
Inches	14	28	42	57	71	85	99	113	127	141	156	170	184	198	212	226	240	255	270
mm	356	711	1067	1448	1803	2159	2515	2870	3226	3581	3962	4318	4674	5029	5385	5740	6096	6477	6858



Inches	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380
mm	508	1016	1524	2032	2540	3048	3556	4064	4572	5080	5588	6096	6604	7112	7620	8128	8636	9144	9652



Compression (Column) Load



Tension (Pulling) Load

Ball Screws — Inch Series Engineering

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Engineering Guidelines for Inch Series Ball Screws

Selecting a Ball Screw Assembly for Your Application — Inch Series

A ball screw assembly is a mechanical device for translating rotational motion to linear motion. As well as being able to apply or withstand high thrust loads, they can do so with minimum internal friction. They are made to close tolerances and are therefore suitable for use in situations in which high precision is necessary. The selection of the correct ball screw assembly for a specific application is an iterative process to determine the smallest envelope and most cost-effective solution. Below is a list of the most common (but not complete) design considerations used to select a ball screw assembly.

- Compression or Tension Load
- Linear Velocity
- Positional Accuracy and Repeatability
- Required Life Expectancy
- Mounting Configuration
- Dimensional Constraints
- Input Power Requirements
- Environmental Condition

At a minimum, the design load, linear velocity, and positional accuracy should be the known inputs and are used to calculate the diameter, lead, and load capacity of the ball screw assembly. Individual ball screw components are then selected based on life, dimensional constraints, mounting configuration, and environmental conditions.

The following procedure will take you through the most common application-based selection of a ball screw assembly. As no two applications are the same, so the determination process is never the same.

1. Determine the required positional accuracy and repeatability that your application requires (page 202. Backlash is the linear independent motion between the ball screw and the ball nut and can be controlled by preloading the ball nut (page 203). The manufacturing process, rolled screws versus ground screws, dictates the accuracy (page 203).
2. Determine how you plan to mount the ball screw assembly into your machine (see page 205). The configuration of the end supports and the travel distance (Max L) will dictate the load and speed limitations of the ball screw.
3. A ball nut in tension can handle loads up to the rated capacity of the nut. For a ball nut in compression, calculate the Permissible Compression Loading (page 201) or use the Compression Loading Chart (page 209) to select a ball screw diameter that meets or exceeds your design load.
4. Calculate the lead of the ball screw that will produce the speed requirement (page 200).
5. The ball nut life can then be calculated using the Dynamic Load Rating (C_{am}) provided in the catalog detail pages (page 200) or use the Life Expectancy Charts (pages 207 or 208).
6. Every ball screw has a rotation speed limit, which is the point of excessive vibration/harmonics in the screw. The critical speed is dependent on the end support configuration. Calculate the Critical Screw Speed of the chosen ball screw (page 201) or use the Acceptable Speed Chart (page 206) to determine the critical speed.
7. If the load, life and speed calculations confirm that the selected ball screw assembly meets or exceeds the design requirements, then proceed to the next step. If not… Larger diameter screws will increase the load capacity and increase the speed rating. Smaller lead screws will decrease the linear speed (assuming constant input motor speed), increase the motor speed (assuming constant linear speed), and decrease the input torque required. Higher lead screws will increase the linear speed (assuming constant input motor speed), decrease the input motor speed (assuming constant linear speed), and increase the input torque required. Repeat steps 3 thru 5 until the correct solution is obtained.
8. Determine how the ball nut will interface into your application. A ball nut flange is the typical method of attaching the ball nut to the load. Threaded ball nuts and cylindrical ball nuts are alternative ways to provide the interface.
9. Additional design considerations and features are also available. Preloaded ball nuts are available to reduce system backlash and increase positional accuracy. Wiper kits to protect the assembly from contaminants and to contain lubrication are standard on some units and optional on most others. Bearing supports and end machining are also available as options for all ball screws.
10. The final considerations are system mounting and lubrication. The ball nut should be loaded axially only as any radial loading significantly reduces the performance of the assembly (page 204). The assembly should also be properly aligned with the drive system, bearing supports, and load to achieve optimal performance (page 204). The ball screw assembly should never be run without proper lubrication. Many lubricants are available depending on the application and environment (page 204).

Note: Application and customer service support is available to assist in the selection of your ball screw assembly. Please contact your local Danaher representative or the customer support center (1-540-633-3549 — DMAC) for any additional assistance.

Engineering Guidelines for Inch Series Ball Screws

Ball Screw Assembly Selection Example:

Inputs:

Load: 30,000 lb. Compression Maximum
10,000 lb. dynamic
Linear Speed: 200 in./min.
Input Speed: 400 rpm
Travel: 85 in.
Life: 2×10^6 inches

1. Accuracy (pages 202 and 203)
No Preload and Standard Rolled (±.004 in./12 in.)

2. End Supports (page 205)
Fixed/Supported

3. Determine Screw Diameter
From Chart (page 209): Ø2.000 in.

From Equation (page 201): $30{,}000 / .8 = \dfrac{1.47 \times 1.405 \times 10^7 \times d_r^4}{(85)^2}$

therefore, $d_r = 1.903$ in.

4. Determine Lead (page 200)

$\text{Lead} = \dfrac{200 \text{ in./min.}}{400 \text{ rpm}}$ therefore, Lead = .500 in.

5. Determine Life
From Catalog (page 77): Dynamic Load = 18,500 lbs.

From Equation (page 200): Life (inches) = $\left[\dfrac{18{,}500}{10{,}000}\right]^3 \times 10^6$

therefore, Life = 6.3×10^6 inches

Verified via Chart (page 207)

6. Determine Critical Speed
From Catalog (page 77): Screw Root Diameter is 1.72 in.

From Equation (page 201): $.8 \times 1.47 \times 4.76 \times 10^6 \times \dfrac{d_r}{l^2}$

therefore, Speed = 1,332.6 rpm

Verified via Chart (page 206)

7. Design Verification
OK per load, speed and life.

8. Load Interface
Flanged connection preferred.

9. Additional Requirements
- Wipers required
- Bearing Supports required
- End Machining needed
- Right Hand Thread
- Carbon Steel

10. Mounting and Lubrication
System will require motor interface and linear rails for alignment.
TriGel 450R

Product Selection (page 77):

Ball Nut: P/N 8120-448-011
Ball Screw: P/N 190-9112
Wiper Kit: P/N 8120-101-002
Flange: P/N 8120-448-002

Engineering Guidelines for Inch Series Ball Screws

Design Formulas

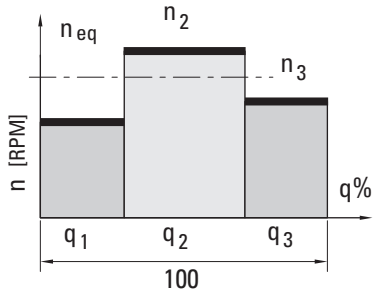
These formulas allow you to calculate a number of important factors which govern the application of Thomson ball screws.

1. Ball Screw Life (L)

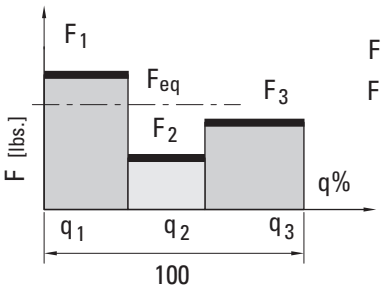
The ball screw assembly's useful life will vary according to load and speed. Life is typically rated at 90% confidence, L10 (which represents time at which 90% of assemblies still perform).

Functional life should be determined by approximating equivalent rotational speed and loading force over typical performance cycles.

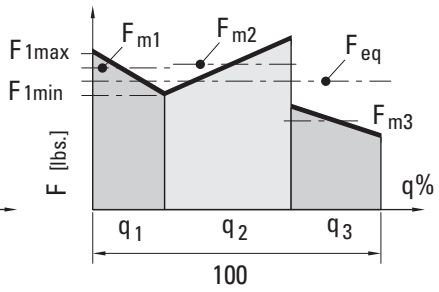
Simple rotational speed profile



Simple loading profile (1)



Simple loading profile (2)



$$n_{eq}\left[\min^{-1}\right] = \sum_{i=1}^{n} n_i \times \frac{q_i}{100}$$

$$F_{eq}\left[\text{lbs.}\right] = \left(\sum_{i=1}^{n} F_i^{3} \times \frac{n_i}{n_{eq}} \times \frac{q_i}{100} \right)^{1/3}$$

$$F_{eq}\left[\text{lbs.}\right] = \left(\sum_{i=1}^{n} F_{mi}^{3} \times \frac{n_i}{n_{eq}} \times \frac{q_i}{100} \right)^{1/3}$$

Modified Life

$$L_{10}\left[\text{inches}\right] = \left[\frac{C_{am}}{F_{eq}}\right]^{3} \times 10^{6}$$

$$L_{h10}\left[\text{hours}\right] = \frac{L_{10}}{n_{eq} \times 60}$$

Parameters:

n_{eq} = Travel Rate (inches/min)
F_{eq} = equivalent operating load [lbs.]
C_{am} = dynamic load rating [lbs.] (see product detail pages) (Based on 1.0 million inches)

2. Rotational Speed Required for a Specific Linear Velocity

$$n = \frac{\text{Travel Rate (in. x min.}^{-1})}{\text{Lead (in.)}}$$

n = rpm

3. Machine Service Life

After ball screw life (L) is calculated, apply it to the following formula to determine machine service life.

$$\text{Machine Service Life (in years)} = \frac{L_{h10}\,[\text{hours}]}{(\text{machine operating hours}) \bullet (\text{days/year}) \bullet \left(\frac{\text{ball screw operating hours}}{\text{machine operating hours}}\right)}$$

Engineering Guidelines for Inch Series Ball Screws

4. Torque

a. Driving torque: T_d (lb_f-in.) = $\frac{F_{eq} \times P}{2?e} = 0.177 \times F_{eq} \times P$

b. Backdrive torque: T_b (lb_f-in.) = $\frac{F_{eq} \times P \times e}{2?} = 0.143 \times F_{eq} \times P$

(conversion of linear to rotational motion)

F_{eq} = Equivalent Operating Load (lb_f)
P = Lead (in.)
e = Efficiency = 0.90
T_d = Driving Torque (lb_f-in.)
T_b = Backdrive Torque (lb_f-in.)
1 lb_f-in. = 0.113 (N•m)

5. Power

P_d (hp) = $\frac{F_{eq} \times P}{(2?)\ e} \times \frac{n}{6.3021 \times 10^4} = \frac{F_{eq} \times P \times n}{3.564 \times 10^5}$

P_d = Power (hp)
n = rpm
1 hp = 746 W

6. Permissible Rotational Speed

The permissible rotational speed depends on two factors: critical screw speed and critical nut speed.

6a. Critical Screw Speed

The critical screw speed is related to the natural frequency of the screw shaft. Exceeding this value may result in excessive vibration. The critical screw speed may be found using the following equations or the chart on page 206.

$n_c = C_s \times 4.76 \times 10^6 \times \frac{d_r}{l^2}$

$n_s = n_c \times S$

n_c = Critical Speed (rpm)
n_s = Safe Drive Speed
d_r = Root Diameter (in.)
l = Length between Bearing Supports (in.)
S = Safety Factor (0.8 maximum)
C_s = End Fixity Factor

End Fixity Factor - Critical Screw Speed			
End Supports			C_s
A		One end fixed, one end free	0.36
B		Both ends supported	1.00
C		One end fixed, one end supported	1.47
D		Both ends fixed	2.23

6b. Critical Nut Speed

The critical nut speed is related to the velocity of the ball bearings rotating around the screw shaft. Exceeding this value may result in permanent damage to the ball recirculation components. Thomson recommends a maximum DN value of 3000 for standard tube transfer designs with a lead to diameter ratio less than 2/3. For sizes with a lead to diameter ratio of 2/3 or greater, such as .750x.500 and 1.500x2.000, the product detail pages should be consulted to find the recommended maximum speed.

$DN = d_0 n$

where
d_0 = nominal shaft diameter (in)
n = rotational speed of shaft (rpm)

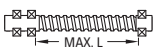
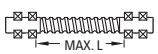
7. Permissible Compression Loading

Exceeding the recommended maximum compression force may result in buckling of the screw shaft.

$F_c = \frac{C_s \times 1.405 \times 10^7 \times d_r^4}{l^2}$

$F_s = F_c \times S$

F_c = Critical Buckling Force (lbs.)
F_s = Safe Compression Force (lbs.)
d_r = Root Diameter (in.)
l = Max Unsupported Length (in.)
S = Safety Factor (0.8 maximum)
C_s = End Fixity Factor

End Fixity Factor - Permissible Compression Loading			
End Supports			C_s
A		One end fixed, one end free	0.25
B		Both ends supported	1.00
C		One end fixed, one end supported	2.00
D		Both ends fixed	4.00

Engineering Guidelines for Inch Series Ball Screws

Accuracy Classes

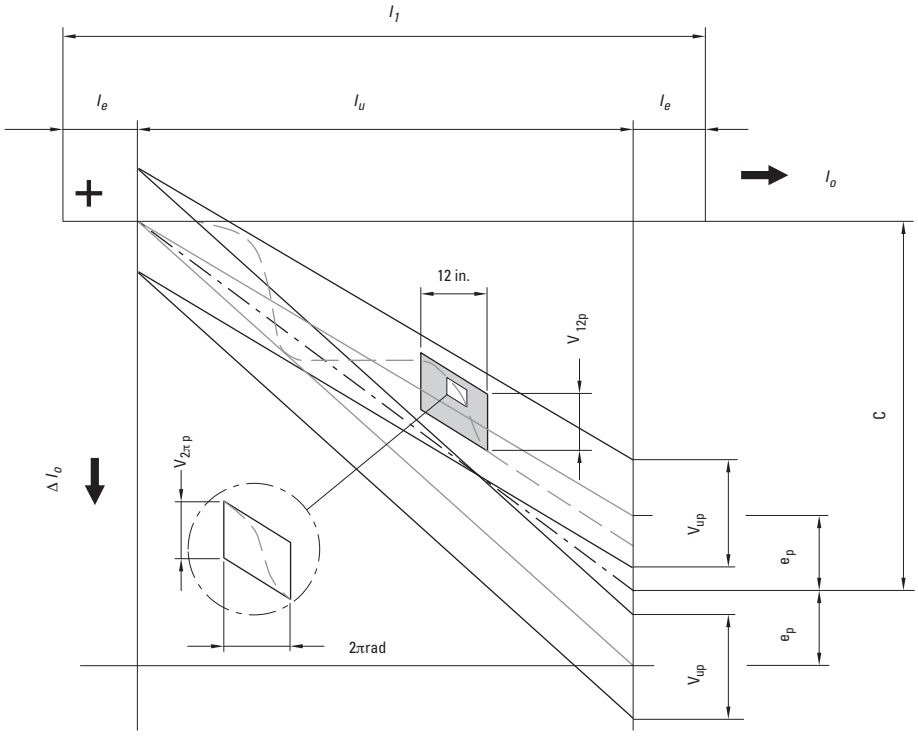
Accuracy is a measure of how closely a motion system will approach a command position. Perfect accuracy, for example, means that advancing a ball nut a precise amount from a given point on the screw always requires exactly the theoretically predicted number of revolutions.

Inch ball screws are produced in two main tolerance classes: Precision and Precision Plus. Precision grade ball screws are used in applications requiring only coarse movement or those utilizing linear feedback for position location. As such, most Precision grade screws are provided with nuts having backlash. Precision Plus grade ball screws are used where repeatable positioning within microns is critical, without the use of a linear feedback device.

Differences between Precision and Precision Plus grades are highlighted in the graph. Precision grade screws allow greater cumulative variation over the useful length of the screw. Precision Plus grade screws contain accumulation of lead error to provide precise positioning over the screw's entire useful length.

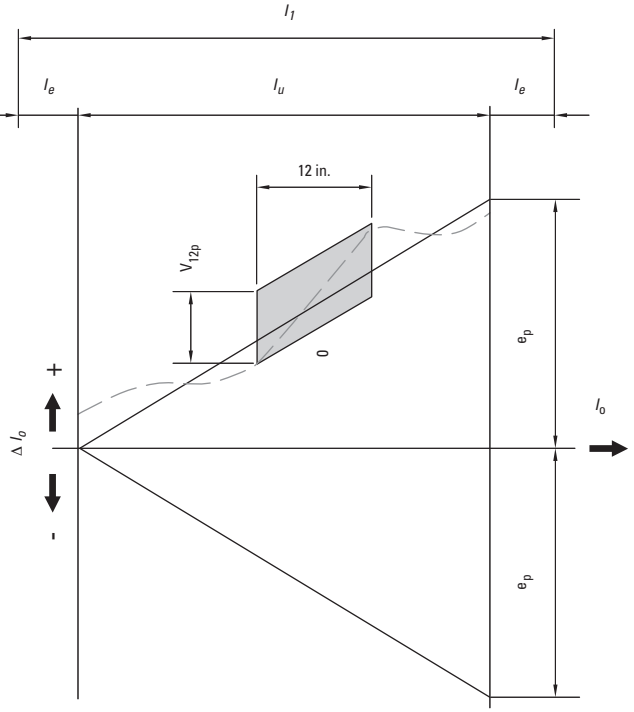
Precision Plus Ball Screws

Maximum error over useful length = $e_p + 1/2V_{up} + C$



Precision Ball Screws

Maximum error over useful length = e_p



l_o = nominal travel

l_1 = thread length

l_o = travel deviation

l_u = useful travel

l_e = excess travel

C = travel compensation for useful travel (std. = 0)

e_p = tolerance for actual mean travel deviation (the difference between the maximum and minimum values of the permissible actual mean travel)

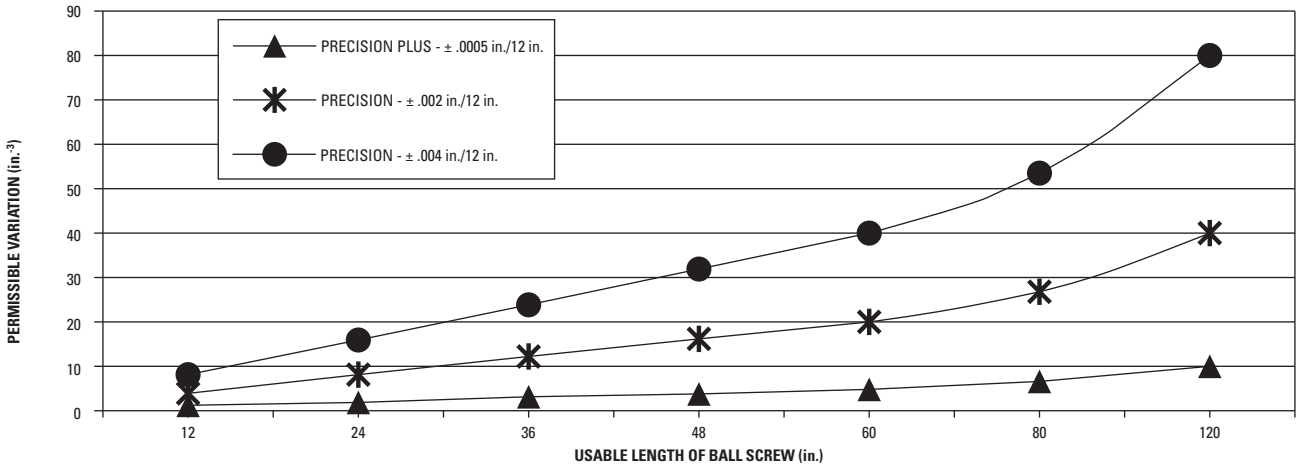
V_{up} = permissible travel variation within useful travel, l_u

V_{12p} = permissible travel deviation within 12 inch travel

$V_{2?p}$ = permissible travel deviation within 1 revolution

Engineering Guidelines for Inch Series Ball Screws

Permissible Travel Variation Over Usable Length

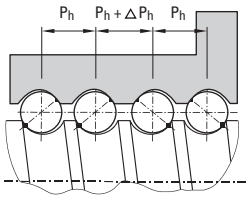


Tolerance Class	Lead Accuracy V_{300p}	Permissible Travel Deviation V_{up} (in.$^{-3}$) Over Screw Length l_u (in.)							
		l_u =	12	24	36	48	60	80	120
Precision Plus*	±.0005 in./12 in.	V_{up} (in.)	1	2	3	4	5	6.67	10
Precision	±.002 in./12 in.	V_{up} (in.)	4	8	12	16	20	26.7	40
Precision*	±.004 in./12 in.	V_{up} (in.)	8	16	24	32	40	53.3	80

* Standard product tolerances

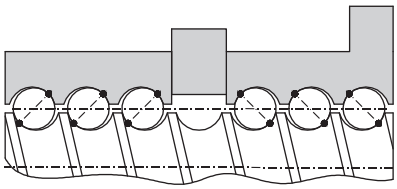
Preload Types

Skip-Lead Preload



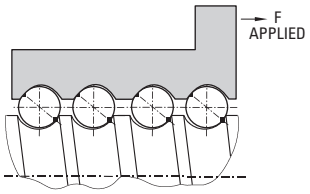
- The lead is offset within the ball nut to provide a precise preload.
- Typically used where both repeatability and high stiffness are required.

Double-Nut Adjustable Preload



- A compression spring is used to axially load two ball nuts against each other.
- Typically used for positioning applications where repeatability is critical.

No Preload



- Axial play is present between screw and nut (typically .002"-.008" depending on size).
- Typically used for transport or vertical applications.

Engineering Guidelines for Inch Series Ball Screws

Lubrication Guidelines

Ball screws must be lubricated to operate properly and achieve the rated life. We recommend using TriGEL-450R or TriGEL-1800RC for lubricating ball screws. Other oils and greases may be applicable but have not been evaluated.

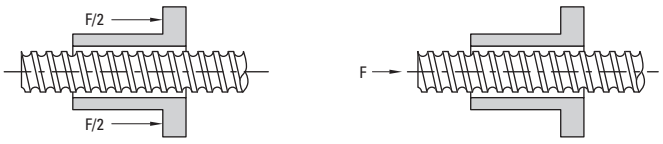
The TriGEL grease can be applied directly to the screw threads near the root of the ball track. Some ball nut sizes are available with threaded lube holes for mounting lubrication fittings. For these ball nuts, the TriGEL grease can be pumped directly into the nut. Please refer to the catalog detail views to verify which ball nuts have the threaded lube holes. It is recommended to use these nuts in conjunction with a wiper kit to contain the lubricant in the body of the nut.

Ball 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 or crusted, the maintenance interval should be reduced. Before adding additional grease, wipe the screw clean, removing the old grease and any particulate contamination seen on the screw. If oil is being used, the best results may be obtained by utilizing a continuous-drip type applicator.

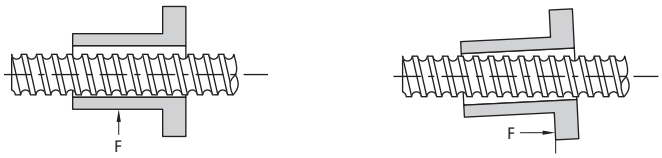
Nut Loading

Axial loading (on nut or screw) is optimal for performance and life. For applications requiring radial loads, please contact us.

Axial Loading: optimal



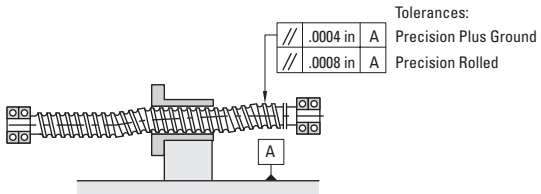
Radial Loading: detrimental*

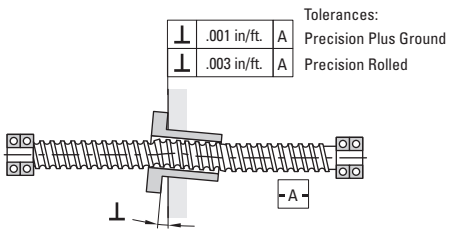


* Minimize radial loading to less than 5% of the axial load.

Nut Mounting

Use the following guidelines to achieve optimal performance.





Engineering Guidelines for Inch Series Ball Screws

Bearing Support Reference Drawings (End Fixity)

Critical Speed — That condition where the rotary speed of the assembly sets up harmonic vibrations. (Refer to Figure 1.) These vibrations are the result of shaft diameter, unsupported length, type of bearing support, position of the ball nut in the stroke, how the ball nut is mounted, the shaft or ball nut rpm, etc. (Note: Shaft vibrations may also be caused by a bent screw or faulty installation alignment.) The four end fixity drawings (A, B, C, and D) show the bearing configurations for supporting a rotating shaft. The selection chart for Travel Rate vs. Length on page 206, shows these same configurations at the bottom of the chart and factors in their effect on critical shaft speed for the unsupported screw length.

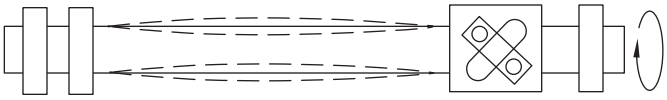
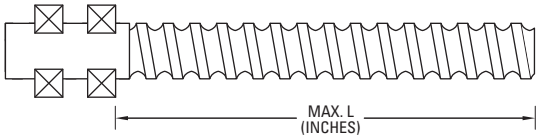


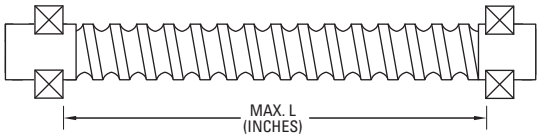
Figure 1

Bearing Support vs. Speed (travel rate or rpm)

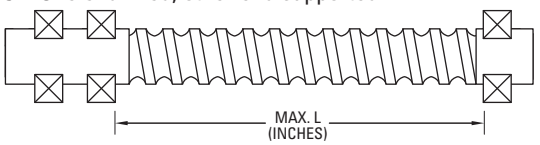
A – One end fixed, other end free



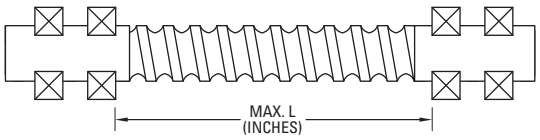
B – Both ends supported



C – One end fixed, other end supported



D – Both ends fixed



Tension Loads — Those loads where the force pulls on the bearing and its support. (Refer to Figure 2.) Where practical, applications should be designed to function with the load in tension to achieve the widest possible selection of screw sizes. Ball screws operating in both tension and compression may be preloaded between the support bearings or mounted per the guidelines under Compression Loads.

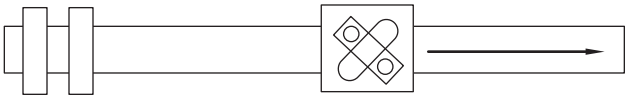


Figure 2

Compression Loads — Those loads where the force pushes on the bearing and its support. (Refer to Figure 3.) Compression loads tend to cause the screw shaft to bend. This normally requires a ball screw with a larger diameter than one for tension loading only. The four end fixity drawings (A, B, C and D) show the bearing configurations for supporting a shaft subject to compression loads. The selection chart for Compression Load vs. Length, on page 209, shows these same configurations at the bottom of the chart and factors in their effect on the unsupported length of the screw for compression loads.

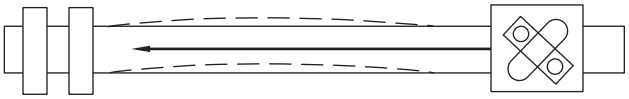
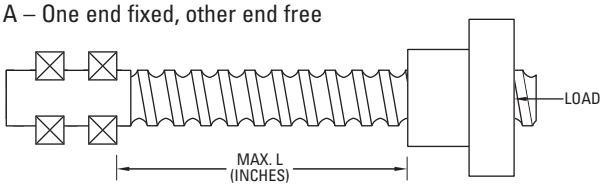


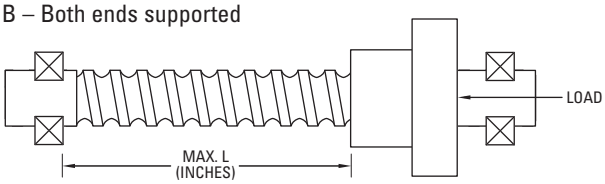
Figure 3

Bearing Support vs. Compression Load on Screws

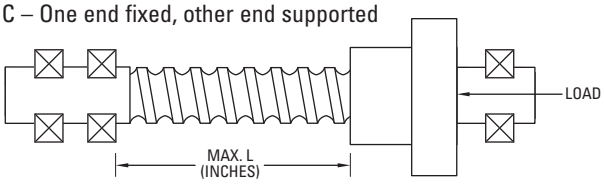
A – One end fixed, other end free



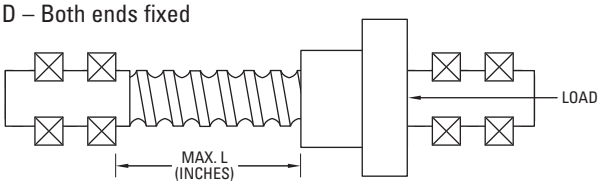
B – Both ends supported



C – One end fixed, other end supported



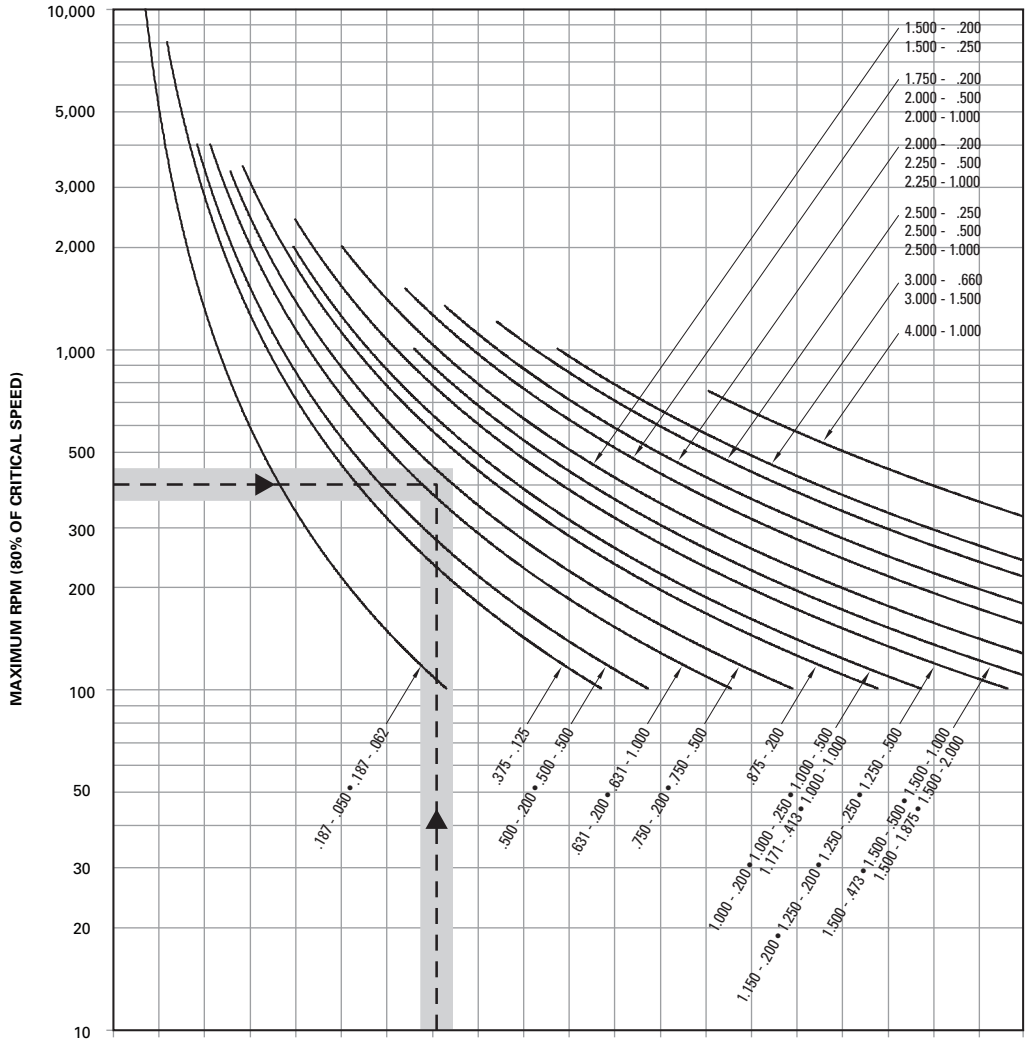
D – Both ends fixed



Note: The information in this guide for end fixity is based on the centers of the two bearings spaced apart by 1-1/2 times the root diameter of the screw.

Engineering Guidelines for Inch Series Ball Screws

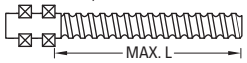
Acceptable Speed† vs. Length for Screws



END SUPPORT TYPE

One end fixed, other end free

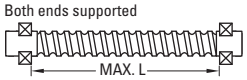
A



Inches	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
mm	152	304	457	609	762	914	1056	1219	1371	1524	1676	1828	1981	2133	2286	2438	2590	2743	2895	3048

Both ends supported

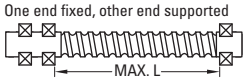
B



Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318	4572	4826	5080

One end fixed, other end supported

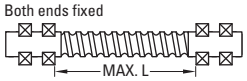
C



Inches	12	24	36	48	61	73	85	97	109	121	133	145	158	170	182	194	206	218	230	242
mm	304	609	914	1219	1549	1854	2159	2463	2768	3073	3378	3683	4013	4318	4622	4927	5232	5537	5842	6146

Both ends fixed

D



Inches	15	30	45	60	75	90	105	119	134	149	164	179	194	209	224	239	254	269	284	298
mm	381	762	1143	1524	1905	2286	2667	3022	3403	3784	4165	4546	4927	5308	5689	6070	6451	6832	7213	7569

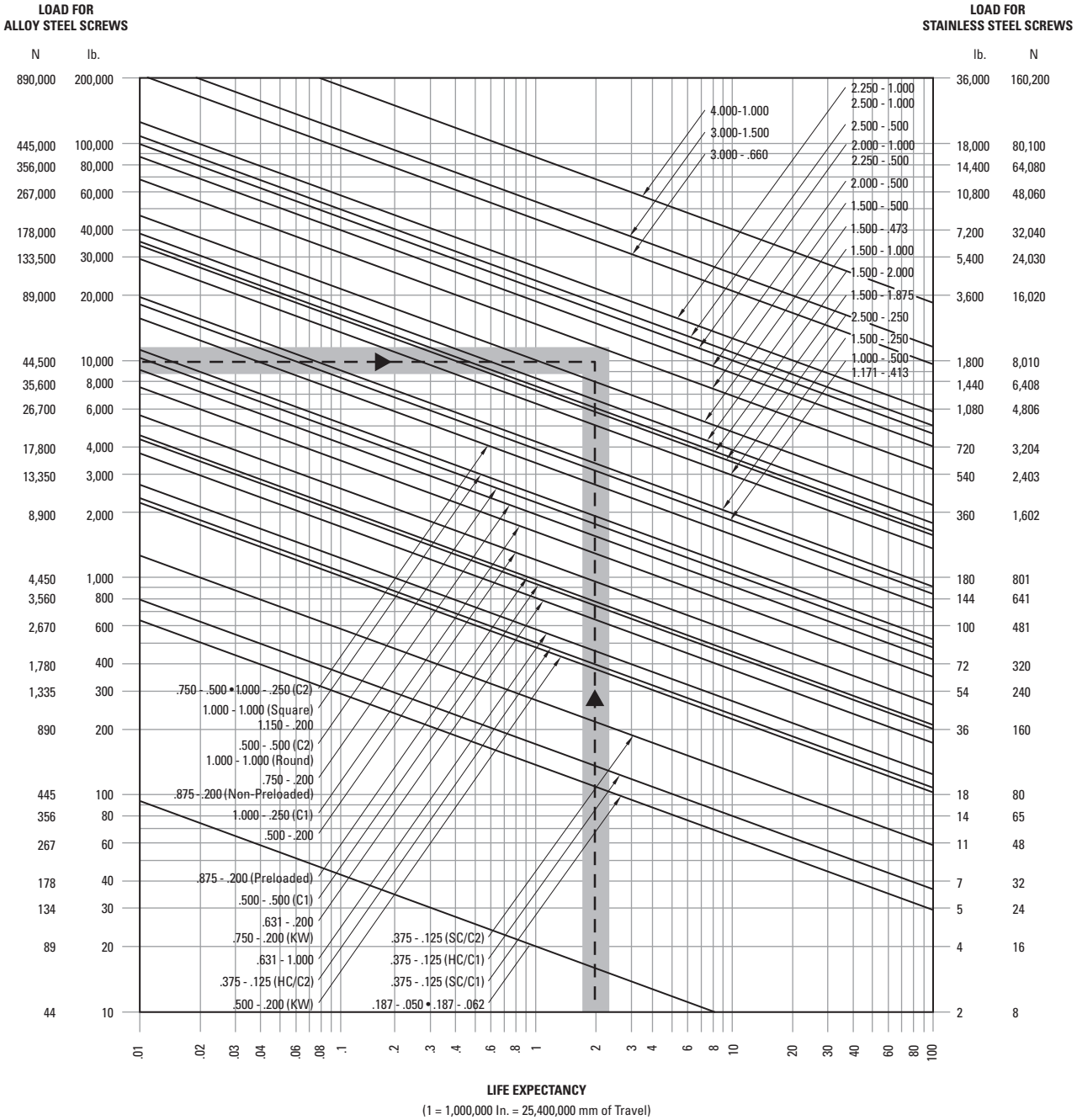
Example: Travel rate of 400 rpm.
Unsupported length of 85 in. (2159mm).
End fixity of one end fixed, other end supported.

All screws with curves which pass through or above and to the right of the plotted point are suitable for the example. The acceptable velocities shown by this graph apply to the screw shaft selected and are not indicative of the velocities attainable of all of the associated ball nut assemblies. Consult Thomson engineering for high speed applications.

†80% of critical speed

Engineering Guidelines for Inch Series Ball Screws

Life Expectancy for Precision Ball Screw Assemblies



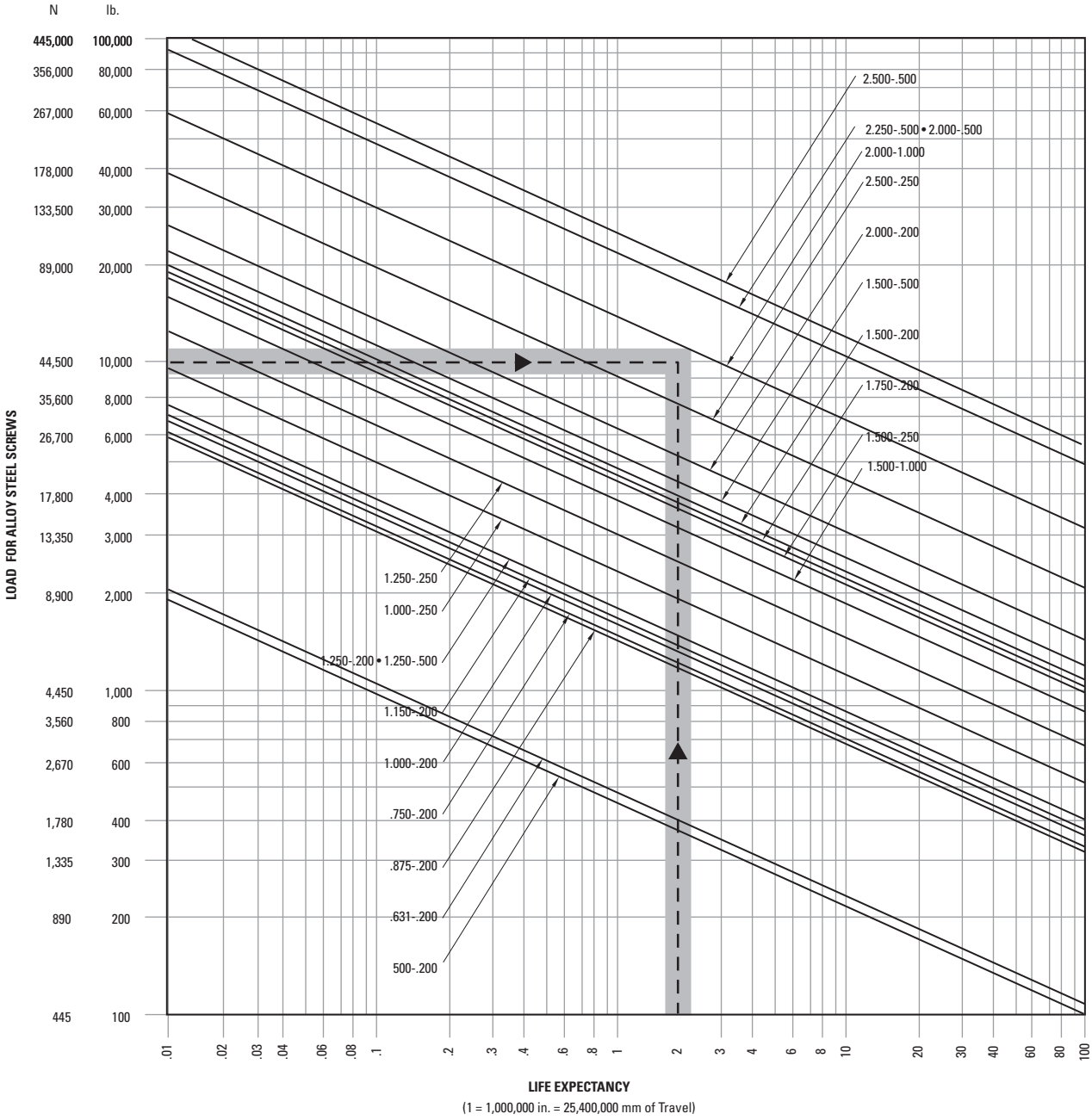
C1 = Single Circuit C2 = Double Circuit SC = Standard Capacity HC = High Capacity

Example: Application life expectancy (total travel) desired is 2 million in. (50.8 million mm).
Normal operating load is 10,000 lb. (44,500 N).

All screws with curves which pass through or are above and to the right of the plotted point are suitable for the example. The suitable dynamic life expectancies shown in this graph are not to exceed the maximum static load capacity as given in the rating table for the individual ball nut assembly.

Engineering Guidelines for Inch Series Ball Screws

Life Expectancy for Precision Plus Preloaded Ball Screw Assemblies

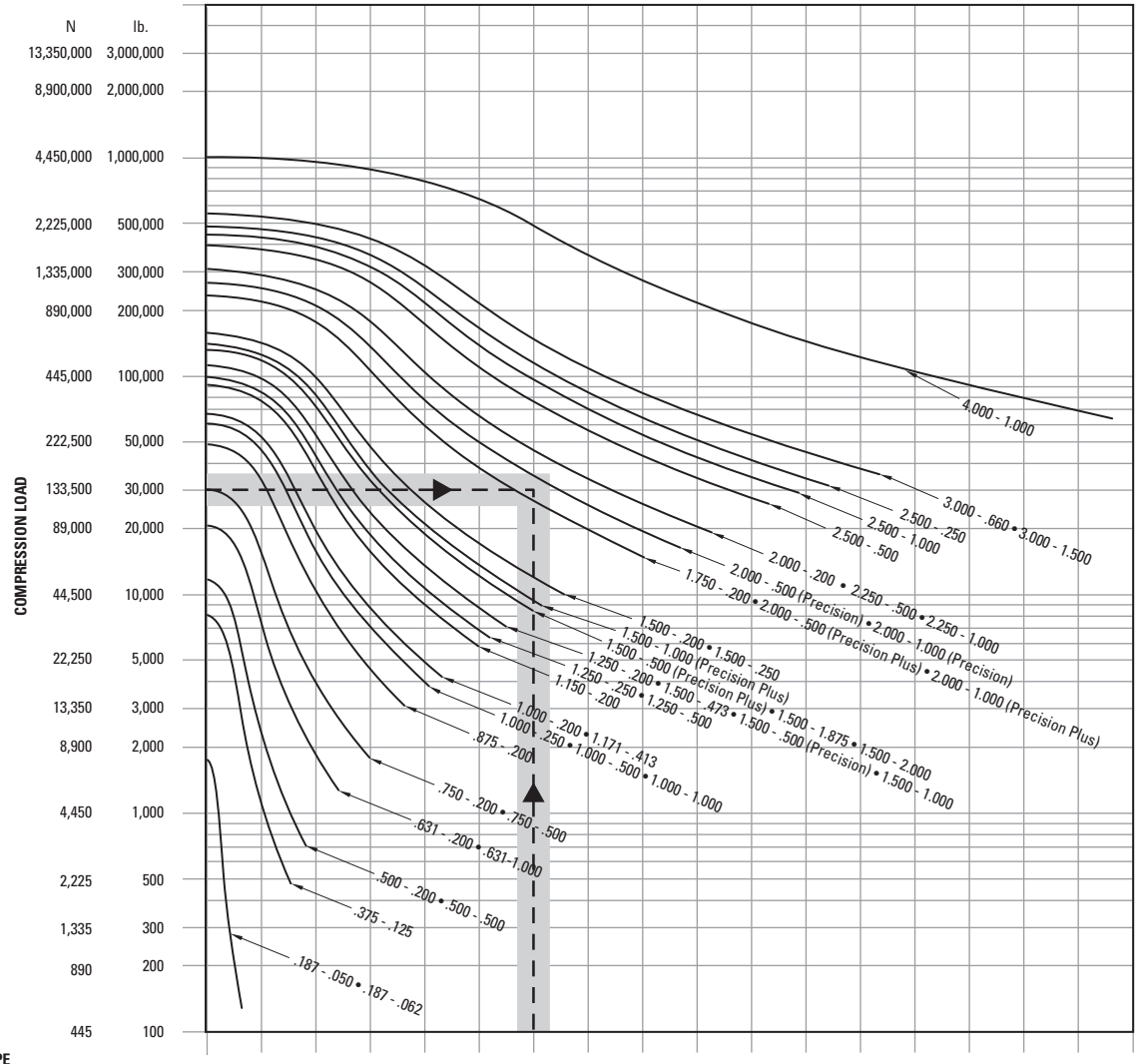


Example: Application life expectancy (total travel) desired is 2 million in. (50.8 million mm).
Normal operating load is 10,000 lb. (44,500 N).

All screws with curves which pass through or are above and to the right of the plotted point are suitable for the example. The suitable dynamic life expectancies shown in this graph are not to exceed the maximum static load capacity as given in the rating table for the individual ball nut assembly.

Engineering Guidelines for Inch Series Ball Screws

Compression Load vs. Length for Designated Ball Screws



END SUPPORT TYPE

A One end fixed other end free — LOAD, MAX. L	Inches	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
	mm	127	254	381	508	635	762	88	1016	1143	1270	1397	1524	1651	1778	1905	2032	2159
B Both ends supported — LOAD, MAX. L	Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
	mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318
C One end fixed other end supported — LOAD, MAX. L	Inches	14	28	42	57	71	85		113	127	141	156	170	184	198	212	226	240
	mm	356	711	1067	1448	1803	215	2515	2870	3226	3581	3962	4318	4674	5029	5385	5740	6096
D Both ends fixed — LOAD, MAX. L	Inches	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340
	mm	508	1016	1524	2032	2540	3048	3556	4064	4572	5080	5588	6096	6604	7112	7620	8128	8636

Example: Maximum system load is 30,000 lb. (133,500 N).
Length of 85 in. (2159mm).
End fixity of one end fixed, other end supported.

All screws with curves which pass through or above and to the right of the plotted point are suitable for the example.

The suitable compression loads shown in this graph are not to exceed the maximum static load capacity as given in the rating table for the individual ball nut assembly.

NOTES:

Ball Screws — Metric Series Engineering

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Engineering Guidelines for Metric Series Ball Screws

Selecting a Ball Screw Assembly for Your Application — Metric Series

A ball screw assembly is a mechanical device for translating rotational motion to linear motion. As well as being able to apply or withstand high thrust loads, they can do so with minimum internal friction. They are made to close tolerances and are therefore suitable for use in situations in which high precision is necessary. The selection of the correct ball screw assembly for a specific application is an iterative process to determine the smallest envelope and most cost-effective solution. Below is a list of the most common (but not complete) design considerations used to select a ball screw assembly.

- Compression or Tension Load
- Linear Velocity
- Positional Accuracy and Repeatability
- Required Life Expectancy
- Mounting Configuration
- Dimensional Constraints
- Input Power Requirements
- Environmental Condition

At a minimum, the design load, linear velocity, and positional accuracy should be the known inputs and are used to calculate the diameter, lead, and load capacity of the ball screw assembly. Individual ball screw components are then selected based on life, dimensional constraints, mounting configuration, and environmental conditions.

The following procedure will take you through the most common application-based selection of a ball screw assembly. As no two applications are the same, so the determination process is never the same.

1. Determine the required positional accuracy and repeatability that your application requires (page 216). Backlash is the linear independent motion between the ball screw and the ball nut and can be controlled by preloading the ball nut (page 217). The manufacturing process, rolled screws versus ground screws, dictates the accuracy (page 217).
2. Determine how you plan to mount the ball screw assembly into your machine (see page 205). The configuration of the end supports and the travel distance (Max L) will dictate the load and speed limitations of the ball screw.
3. A ball nut in tension can handle loads up to the rated capacity of the nut. For a ball nut in compression, calculate the Permissible Compression Loading (page 215) or use the Compression Loading Chart (page 220) to select a ball screw diameter that meets or exceeds your design load.
4. Calculate the lead of the ball screw that will produce the speed requirement (page 214).
5. The ball nut life can then be calculated using the Dynamic Load Rating (C_{am}) provided in the catalog detail pages (page 214). Since multiple ball nuts may be available for a given diameter and lead, use the chart on page 103 to select available styles.
6. Every ball screw has a rotation speed limit, which is the point of excessive vibration/harmonics in the screw. The critical speed is dependent on the end support configuration. Calculate the Critical Screw Speed of the chosen ball screw (page 215) or use the Acceptable Speed Chart (page 219) to determine the critical speed.
7. If the load, life and speed calculations confirm that the selected ball screw assembly meets or exceeds the design requirements, then proceed to the next step. If not… Larger diameter screws will increase the load capacity and increase the speed rating. Smaller lead screws will decrease the linear speed (assuming constant input motor speed), increase the motor speed (assuming constant linear speed), and decrease the input torque required. Higher lead screws will increase the linear speed (assuming constant input motor speed), decrease the input motor speed (assuming constant linear speed), and increase the input torque required. Repeat steps 3 thru 5 until the correct solution is obtained.
8. Determine how the ball nut will interface into your application. A ball nut flange is the typical method of attaching the ball nut to the load. Threaded ball nuts and cylindrical ball nuts are alternative ways to provide the interface.
9. Additional design considerations and features are also available. Preloaded ball nuts are available to reduce system backlash and increase positional accuracy. Wiper kits to protect the assembly from contaminants and to contain lubrication are standard on some units and optional on most others. Bearing supports and end machining are also available as options for all ball screws.
10. The final considerations are system mounting and lubrication. The ball nut should be loaded axially only as any radial loading significantly reduces the performance of the assembly (page 218). The assembly should also be properly aligned with the drive system, bearing supports, and load to achieve optimal performance (page 218). The ball screw assembly should never be run without proper lubrication. Many lubricants are available depending on the application and environment (page 218).

Note: Application and customer service support is available to assist in the selection of your ball screw assembly. Please contact your local Danaher representative or the customer support center (1-540-633-3549 — DMAC) for any additional assistance.

Engineering Guidelines for Metric Series Ball Screws

Ball Screw Assembly Selection Example:

Inputs:

Load: 133,440 N Compression Maximum
44,480 N dynamic
Linear Speed: 5.08 meter/min.
Input Speed: 400 rpm
Travel: 2159 in.
Life: 2.5×10^4 meters

1. **Accuracy (pages 216 and 217)**
   No Preload and Standard Rolled (±50 µm per 300mm)

2. **End Supports (page 205)**
   Fixed/Supported

3. **Determine Screw Diameter**
   From Chart (page 220): Ø50mm

   From Equation (page 215): $133{,}440 / .8 = \dfrac{1.47 \times 9.687 \times 10^4 \times d_r^4}{(2159)^2}$

   therefore, $d_r = 48.3$mm

4. **Determine Lead (pages 214 and 103)**

   $\text{Lead} = \dfrac{5.08 \text{ meter/min.}}{400 \text{ rpm}}$ therefore, Lead = 12.7mm, Use 10mm

5. **Determine Life**
   From Catalog (page 118): Dynamic Load = 66,400 N

   $\text{Life (revolutions)} = \left[\dfrac{66{,}400}{44{,}480}\right]^3 \times 10^6$

   therefore, Life = 3.3×10^6 revs (3.3×10^4 meters)

6. **Determine Critical Speed**
   From Catalog (page 118): Screw Root Diameter is 43.0mm

   From Equation (page 215): $.8 \times 1.47 \times 1.2 \times 10^6 \times \dfrac{d_r}{l^2}$

   therefore, Speed = 1,301.8 rpm

   Verified via Chart (page 219)

7. **Design Verification**
   OK per load, speed and life.

8. **Load Interface**
   Flanged connection preferred.

9. **Additional Requirements**
   - Wipers required
   - Bearing Supports required
   - End Machining needed
   - Right Hand Thread
   - Carbon Steel

10. **Mounting and Lubrication**
    System will require motor interface and linear rails for alignment.
    TriGel 450R

Product Selection (page 118):

Ball Nut: P/N 7832818
Ball Screw: P/N 7832817-P5

Engineering Guidelines for Metric Series Ball Screws

Design Formulas

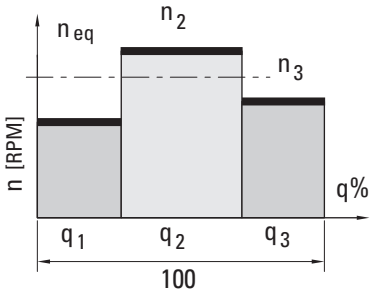
These formulas allow you to calculate a number of important factors which govern the application of Thomson ball screws.

1. Ball Screw Life (L)

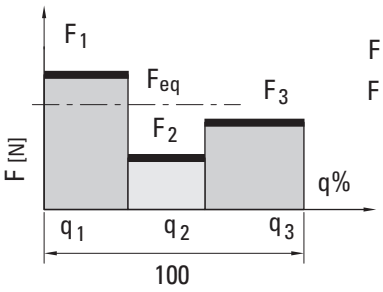
The ball screw assembly's useful life will vary according to load and speed. Life is typically rated at 90% confidence, L10 (which represents time at which 90% of assemblies still perform).

Functional life should be determined by approximating equivalent rotational speed and loading force over typical performance cycles.

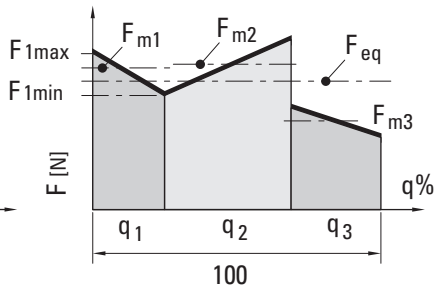
Simple rotational speed profile



Simple loading profile (1)



Simple loading profile (2)



$$n_{eq}\,[\text{min}^{-1}] = \sum_{i=1}^{n} n_i \times \frac{q_i}{100}$$

$$F_{eq}\,[\text{N}] = \left(\sum_{i=1}^{n} F_i^{3} \times \frac{n_i}{n_{eq}} \times \frac{q_i}{100} \right)^{1/3}$$

$$F_{eq}\,[\text{N}] = \left(\sum_{i=1}^{n} F_{mi}^{3} \times \frac{n_i}{n_{eq}} \times \frac{q_i}{100} \right)^{1/3}$$

Modified Life

$$L_{10}\,[\text{revolutions}] = \left[\frac{C_{am}}{F_{eq}} \right]^{3} \times 10^{6}$$

$$L_{h10}\,[\text{hours}] = \frac{L_{10}}{n_{eq} \times 60}$$

Parameters:

n_{eq} = equivalent operating rotational speed [rpm]

F_{eq} = equivalent operating load [N]

C_{am} = dynamic load rating [N] (see specification tables) (Based on 1.0 million revolutions)

2. Rotational Speed Required for a Specific Linear Velocity

$$n = \frac{\text{Travel Rate (mm x min.}^{-1}\text{)}}{\text{Lead (mm)}}$$

n = rpm

3. Machine Service Life

After ball screw life (L) is calculated, apply it to the following formula to determine machine service life.

$$\text{Machine Service Life (in years)} = \frac{L_{h10}\,[\text{hours}]}{(\text{machine operating hours}) \bullet (\text{days/year}) \bullet \left(\frac{\text{ball screw operating hours}}{\text{machine operating hours}} \right)}$$

Engineering Guidelines for Metric Series Ball Screws

4. Torque

a. Driving torque: T_d (N•m) = $\frac{F_{eq} \times P}{2?e} = 1.77 \times 10^{-4} \times F_{eq} \times P$

b. Backdrive torque: T_b (N•m) = $\frac{F_{eq} \times P \times e}{2?} = 1.43 \times 10^{-4} \times F_{eq} \times P$

(conversion of linear to rotational motion)

F_{eq} = Equivalent Operating Load (N)
P = Lead (mm)
e = Efficiency = 0.90
T_d = Driving Torque (N•m)
T_b = Backdrive Torque (N•m)
1 lb-in. = 0.113 N•m

5. Power

P_d (W) = $\frac{F_{eq} \times P}{(2?)\ e} \times \frac{n}{9.546 \times 10^3} = \frac{F_{eq} \times P \times n}{5.398 \times 10^4}$

P_d = Power (W)
n = rpm
1 hp = 746 W

6. Permissible Rotational Speed

The permissible rotational speed depends on two factors: critical screw speed and critical nut speed.

6a. Critical Screw Speed

The critical screw speed is related to the natural frequency of the screw shaft. Exceeding this value may result in excessive vibration. The critical screw speed may be found using the following equations or the chart on page 219.

$n_c = C_s \times 1.2 \times 10^8 \times \frac{d_r}{l^2}$

$n_s = n_c \times S$

n_c = Critical Speed (rpm)
n_s = Safe Drive Speed
d_r = Root Diameter (mm)
l = Length between Bearing Supports (mm)
S = Safety Factor (0.8 maximum)
C_s = End Fixity Factor

End Fixity Factor - Critical Screw Speed			
End Supports			C_s
A		One end fixed, one end free	0.36
B		Both ends supported	1.00
C		One end fixed, one end supported	1.47
D		Both ends fixed	2.23

6b. Critical Nut Speed

The critical nut speed is related to the velocity of the ball bearings rotating around the screw shaft. Exceeding this value may result in permanent damage to the ball recirculation components. Thomson recommends a maximum DN value of 140,000 for standard internal transfer designs, which encompass the majority of the Metric products. Higher values may be accommodated by special design (consult with applications engineering).

$DN = d_0 n$

where
d_0 = nominal shaft diameter (mm)
n = rotational speed of shaft (rpm)

7. Permissible Compression Loading

Exceeding the recommended maximum compression force may result in buckling of the screw shaft.

$F_c = \frac{C_s \times 9.687 \times 10^4 \times d_r^4}{l^2}$

$F_s = F_c \times S$

F_c = Critical Buckling Force (N)
F_s = Safe Compression Force (N)
d_r = Root Diameter (mm)
l = Max Unsupported Length (mm)
S = Safety Factor (0.8 maximum)
C_s = End Fixity Factor

End Fixity Factor - Permissible Compression Loading			
End Supports			C_s
A		One end fixed, one end free	0.25
B		Both ends supported	1.00
C		One end fixed, one end supported	2.00
D		Both ends fixed	4.00

Engineering Guidelines for Metric Series Ball Screws

Accuracy Classes

Accuracy is a measure of how closely a motion system will approach a command position. Perfect accuracy, for example, means that advancing a ball nut a precise amount from a given point on the screw always requires exactly the theoretically predicted number of revolutions.

Metric ball screws are produced in two main tolerance classes: T (transport) and P (positioning). Transport grade ball screws are used in applications requiring only coarse movement or those utilizing linear feedback for position location. As such, most transport grade screws are provided with nuts having backlash (T7 grade screws cannot be supplied with preloaded nuts). Precision grade ball screws are used where repeatable positioning within microns is critical, without the use of a linear feedback device.

Differences between P & T grades are highlighted in the graph. T grade transport screws allow greater cumulative variation over the useful length of the screw. P grade positioning screws contain accumulation of lead error to provide precise positioning over the screw's entire useful length.

l_o = nominal travel

l_1 = thread length

l_o = travel deviation

l_u = useful travel

l_e = excess travel

C = travel compensation for useful travel (std. = 0)

e_p = tolerance for actual mean travel deviation (the difference between the maximum and minimum values of the permissible actual mean travel)

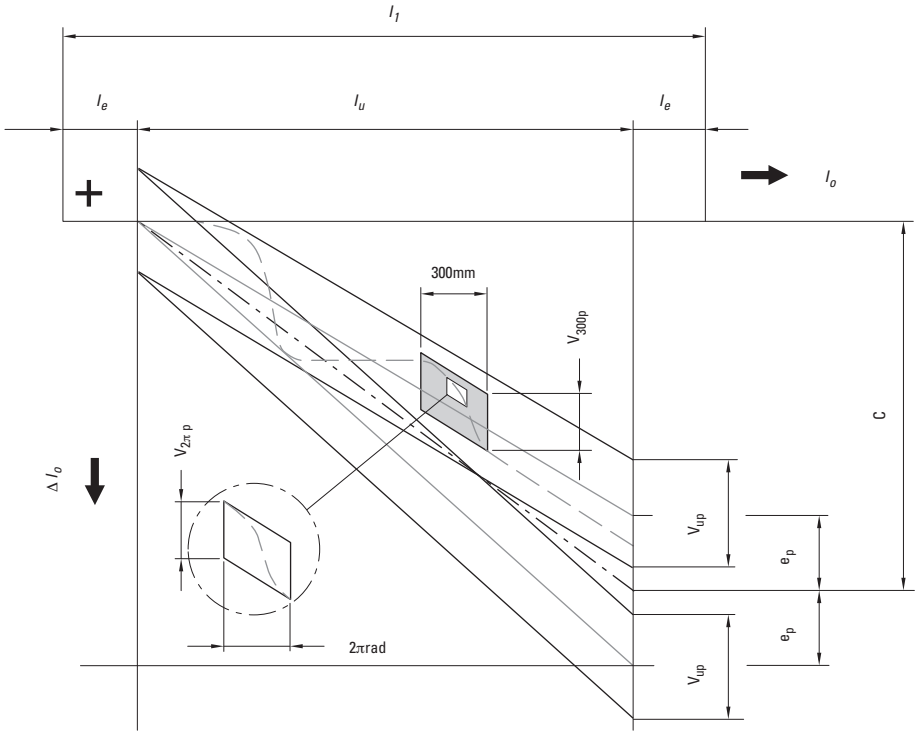
V_{up} = permissible travel variation within useful travel, l_u

V_{300p} = permissible travel deviation within 300mm travel

$V_{2?p}$ = permissible travel deviation within 1 revolution

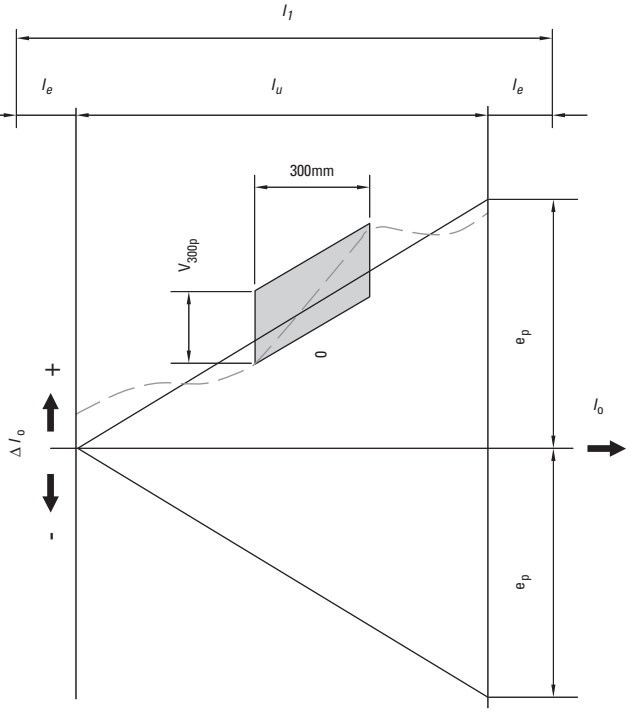
P — Positioning Class Ball Screws

Maximum error over useful length = $e_p + 1/2V_{up} + C$



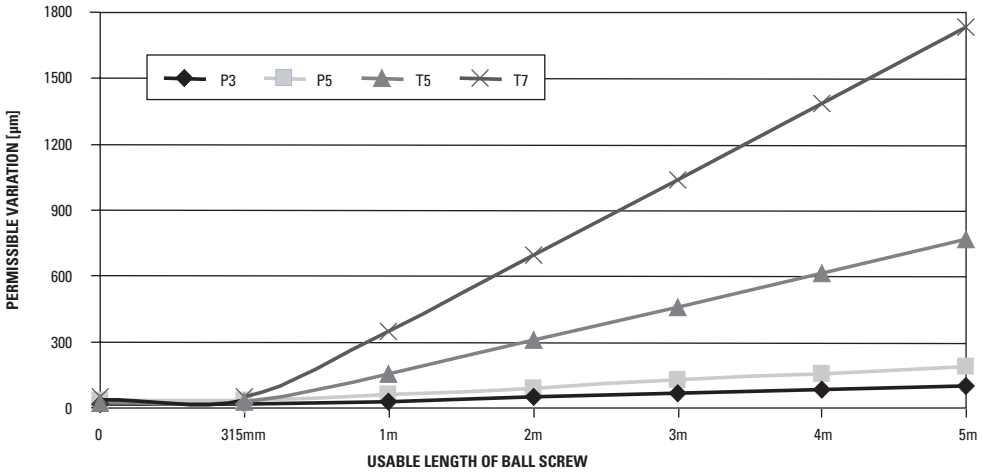
T — Transport Class Ball Screws

Maximum error over useful length = e_p



Engineering Guidelines for Metric Series Ball Screws

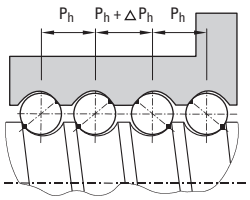
Permissible Travel Variation Over Usable Length



Tolerance Class	Lead Accuracy V_{300p}	Permissible Travel Deviation V_{up} (µm) Over Screw Length l_u (mm)															
		l_u	>		315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
		(mm)	?	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300
P3	±12 µm/300mm	e_p (µm)		12	13	15	16	18	21	24	29	35	41	50	62	76	—
		V_{up} (µm)		12	12	13	14	16	17	19	22	25	29	34	41	49	—
P5	±23 µm/300mm	e_p (µm)		23	25	27	30	35	40	46	54	65	77	93	115	140	170
		V_{up} (µm)		23	25	26	29	31	35	39	44	51	59	69	82	99	119
T5	±23 µm/300mm	V_{up} (µm)		23	$=2 \times l_u/300 \times V_{300p}$												
T7	±52 µm/300mm	V_{up} (µm)		52	$=2 \times l_u/300 \times V_{300p}$												

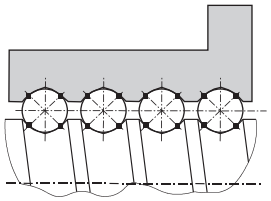
Preload Types

Precise Preload (Type Z0)
(Available with FL nut only)



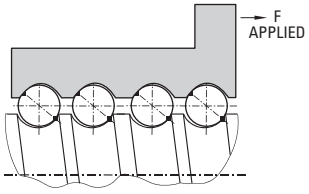
- The lead is offset within the ball nut to provide a precise preload.
- The preload is approximately 10% of dynamic load capacity, but can range from 2% to 13% as specified by customers.
- Typically used where both repeatability and high stiffness are required.

Preload (Type Z1)



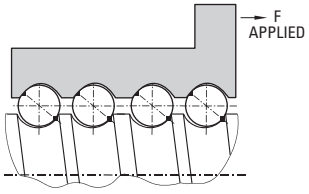
- Oversized balls slightly larger than the ball groove space are used to provide zero backlash between the screw and nut.
- The preload is approximately 1% to 2% of dynamic load capacity.
- Typically used for positioning applications where higher-level repeatability is desired.

No Preload (Type Z2)
(Clearance of .08mm to .18mm)



- Axial play is present between screw and nut (held to .18mm maximum).
- Typically used for transport or vertical applications.

No Preload (Type Z3)
(Clearance to .05mm max.)



- Axial play is present between screw and nut (held to .05mm maximum).
- Typically used for transport or vertical applications.

Engineering Guidelines for Metric Series Ball Screws

Lubrication Guidelines

Ball screws must be lubricated to operate properly and achieve the rated life. We recommend using TriGEL-450R or TriGEL-1800RC for lubricating ball screws. Other oils and greases may be applicable but have not been evaluated.

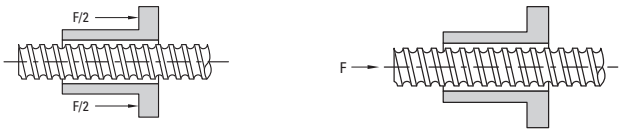
The TriGEL grease can be applied directly to the screw threads near the root of the ball track. Some ball nut sizes are available with threaded lube holes for mounting lubrication fittings. For these ball nuts, the TriGEL grease can be pumped directly into the nut. Please refer to the catalog detail views to verify which ball nuts have the threaded lube holes. It is recommended to use these nuts in conjunction with a wiper kit to contain the lubricant in the body of the nut.

Ball screws may require lubrication frequently frequently depending on both environmental and operating conditions. If the lubricant appears to be dispersed before this point or has become dry or crusted, the maintenance interval should be reduced. Before adding additional grease, wipe the screw clean, removing the old grease and any particulate contamination seen on the screw. If oil is being used, the best results may be obtained by utilizing a continuous-drip type applicator.

Nut Loading

Axial loading (on nut or screw) is optimal for performance and life.
For applications requiring radial loads, please contact us.

Axial Loading: optimal

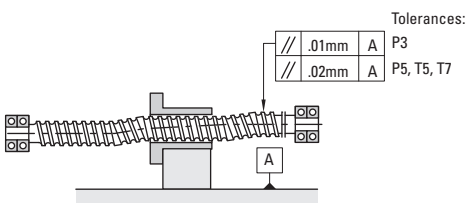


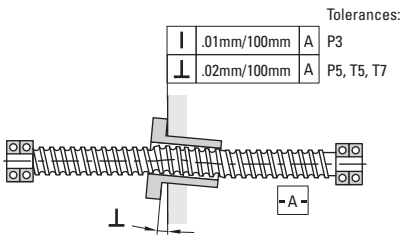
Radial Loading: detrimental*

* Minimize radial loading to less than 5% of the axial load.

Nut Mounting

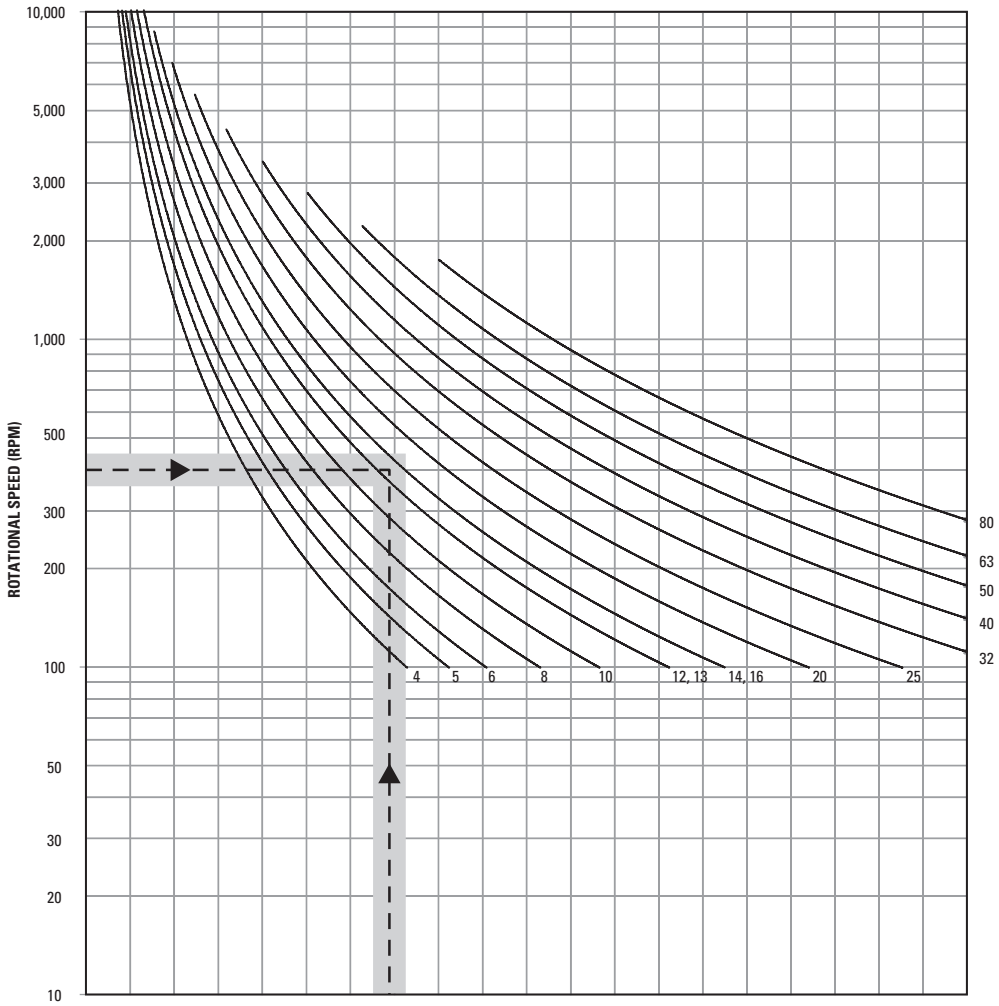
Use the following guidelines to achieve optimal performance.
(All units are mm)





Engineering Guidelines for Metric Series Ball Screws

Acceptable Speed† vs. Length for Screws



END SUPPORT TYPE

A One end fixed, other end free	Inches	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
	mm	152	304	457	609	762	914	1056	1219	1371	1524	1676	1828	1981	2133	2286	2438	2590	2743	2895	3048
B Both ends supported	Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318	4572	4826	5080
C One end fixed, other end supported	Inches	12	24	36	48	61	73	85	97	109	121	133	145	158	170	182	194	206	218	230	242
	mm	304	609	914	1219	1549	1854	2159	2463	2768	3073	3378	3683	4013	4318	4622	4927	5232	5537	5842	6146
D Both ends fixed	Inches	15	30	45	60	75	90	105	119	134	149	164	179	194	209	224	239	254	269	284	298
	mm	381	762	1143	1524	1905	2286	2667	3022	3403	3784	4165	4546	4927	5308	5689	6070	6451	6832	7213	7569

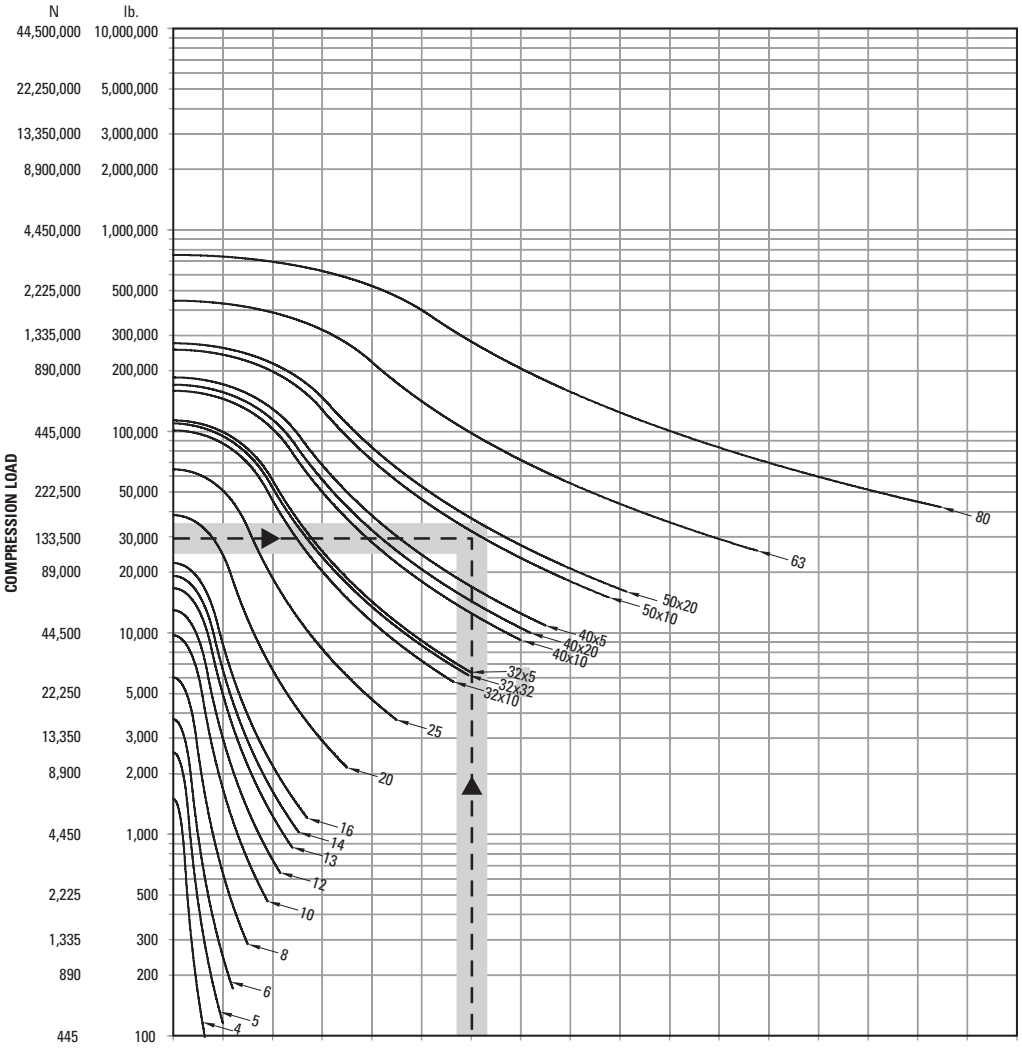
Example: Travel rate of 400 rpm.
Unsupported length of 85 in. (2159mm).
End fixity of one end fixed, other end supported.

All screws with curves which pass through or above and to the right of the plotted point are suitable for the example. The acceptable velocities shown by this graph apply to the screw shaft selected and are not indicative of the velocities attainable of all of the associated ball nut assemblies. Consult Thomson engineering for high speed applications.

†80% of critical speed

Engineering Guidelines for Metric Series Ball Screws

Compression Load vs. Length for Designated Ball Screws



END SUPPORT TYPE

A One end fixed, other end free — LOAD, MAX. L

Inches	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
mm	127	254	381	508	635	762	889	1016	1143	1270	1397	1524	1651	1778	1905	2032	2159

B Both ends supported — LOAD, MAX. L

Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318

C One end fixed, other end supported — LOAD, MAX. L

Inches	14	28	42	57	71	85	99	113	127	141	156	170	184	198	212	226	240
mm	356	711	1067	1448	1803	2159	2515	2870	3226	3581	3962	4318	4674	5029	5385	5740	6096

D Both ends fixed — LOAD, MAX. L

Inches	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340
mm	508	1016	1524	2032	2540	3048	3556	4064	4572	5080	5588	6096	6604	7112	7620	8128	8636

Example: Maximum system load is 30,000 lb. (133,500 N).
Length of 85 in. (2159mm).
End fixity of one end fixed, other end supported.

All screws with curves which pass through or above and to the right of the plotted point are suitable for the example.

The suitable compression loads shown in this graph are not to exceed the maximum static load capacity as given in the rating table for the individual ball nut assembly.

Ball Splines — Engineering

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Engineering Guidelines for Ball Splines

Selection Procedures

Applications Analysis — Follow this step-by-step procedure to determine the ball spline best suited for your application. It is suggested you analyze the requirements of your application using a work pad for easy reference.

Maximum Static Load — Determine the maximum static torque loads encountered in the application. This must include shock loads. Using the table on page 136, note the ball spline sizes and race combinations which have capacities in excess of the application requirements.

Rated Load — In many ball spline applications, freedom of axial movement is essential while actual travel is negligible. For example, a spline used on a jet engine accessory gear box drive moves less than 1/10 inch. This axial freedom is essential to eliminate damaging stress forces to the engine and gear box housings, but total daily travel may be less than 2 inches. Select the size and race combination with a rated load that will meet your application requirement from the table.

Life Expectancy — On occasion, it is important to plan for a specific life expectancy. These applications usually are designed to use the smallest practical ball spline at the maximum possible torque or where considerable translation occurs. For these applications, use the Life Expectancy chart on page 223. Contact Thomson if light weight and small size are considerations.

Determine the following:

- life expectancy — total inches of travel desired during the life of the application
- application load — the normal operating load for the application in inch-pounds (Newton-millimeters) of torque

Speed vs. Length — Determine the following:

- Speed — determine the maximum revolutions per minute (rpm) required
- Maximum length — determine the maximum unsupported length
- End fixity — determine the type of configuration (refer to the Bearing Support reference drawings on page 205). Quick Mount bearing support blocks can be used on diameters 5/8 inch through 2-1/2 inch. Using the example at the bottom of the Speed vs. Length chart on page 224, plot the point for your specific application.

Design Formulas

Life Ratings

$$L_{10}\,[\text{in.}] = \left[\frac{C_{am}}{T}\right]^3 \times 10^6$$

Parameters:

T = dynamic equivalent torque (A constant torque under the influence of which a ball spline assembly would have the same life as it will attain under the actual applied torque condition.)

C_{am} = dynamic load rating [lbs.] (based on 1.0 million inches)

$$n_c = C_s \times 4.76 \times 10^6 \times \frac{d_r}{l^2}$$

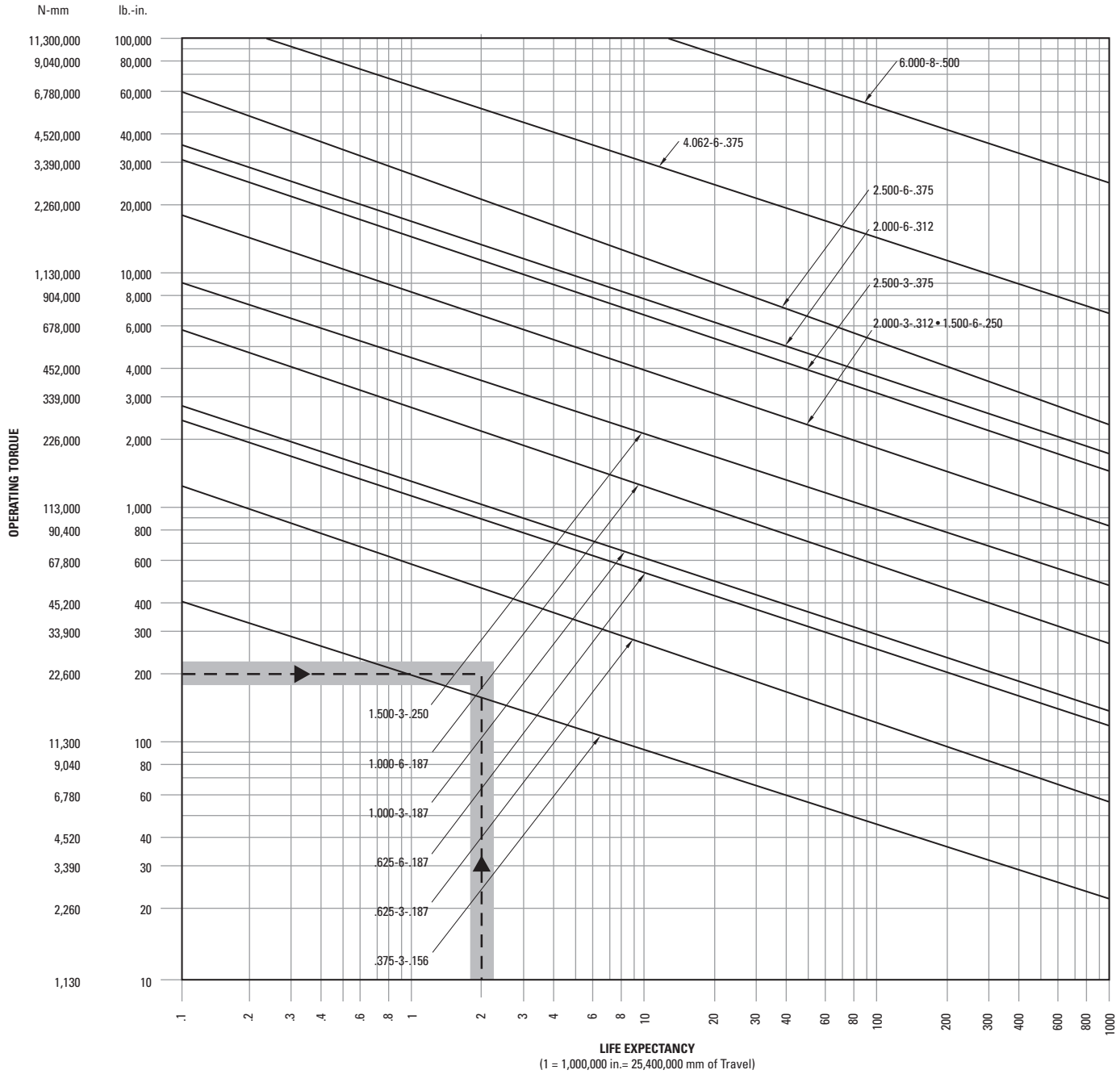
$$n_s = n_c \times S$$

n_c = Critical Speed (rpm)
n_s = Safe Drive Speed
d_r = Root Diameter (in.)
l = Length between Bearing Supports (in.)
S = Safety Factor (0.8 maximum)
C_s = End Fixity Factor

End Fixity Factor			
End Supports			C_s
A		One end fixed, one end free	0.36
B		Both ends supported	1.00
C		One end fixed, one end supported	1.47
D		Both ends fixed	2.23

Engineering Guidelines for Ball Splines

Life Expectancy for Precision Ball Splines

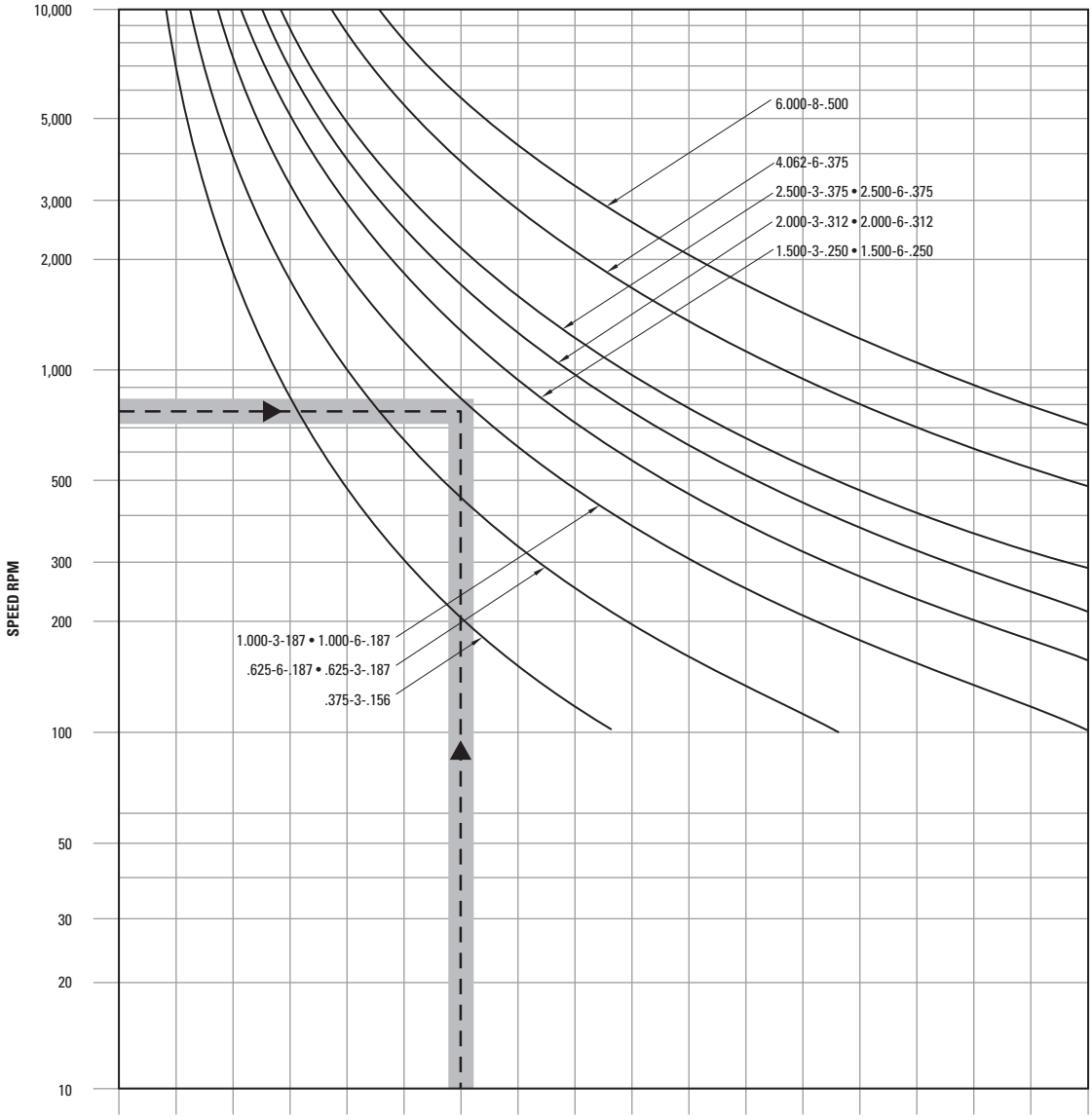


Example: Desired life of 2 million in.
(50.8 million mm).
Operating torque is 200 lb-in.
(22.6 N · mm)

All splines with curves which pass through or are above and to the right of the plotted point are suitable for the example.

Engineering Guidelines for Ball Splines

Speed vs. Length for Precision Ball Splines



END SUPPORT TYPE

A One end fixed, other end free	Inches	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102
	mm	152	304	457	609	762	914	1056	1219	1371	1524	1676	1828	1981	2133	2286	2438	2590
B Both ends supported	Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
	mm	254	508	762	1016	1270	1524	1778	2032	2286	2743	2794	3048	3302	3556	3810	4064	4318
C One end fixed, other end supported	Inches	12	24	36	48	61	73	85	97	109	121	133	145	158	170	182	194	206
	mm	304	609	914	1219	1549	1854	2159	2463	2768	3073	3378	3683	4013	4318	4622	4927	5232
D Both ends fixed	Inches	15	30	45	60	75	90	105	119	134	149	164	179	194	209	224	239	254
	mm	381	762	1143	1524	1905	2286	2667	3022	3403	3784	4165	4546	4927	5308	5689	6070	6451

Example: Maximum shaft speed is 800 rpm.
Unsupported length is 60 in. (1524mm).
End fixity is both ends supported.

All splines with curves which pass through or are above and to the right of the plotted point are suitable for the example.

Bearing Supports — Engineering

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

Engineering Guidelines for Bearing Supports

Design Formulas

These formulas allow you to determine the life of Thomson bearing supports.

1. Dynamic Equivalent Radial Load (P_r)

$$P_r = X * F_r + Y_1 * F_a$$

$$KT = \frac{F_a}{(\#\text{ of Bearings}) * C_o}$$

$P_r = 0.56 * F_r + Y_1 * F_a$ (Deep Groove Radial Ball Bearings)

$P_r = 0.43 * F_r + F_a$ (Angular Contact Ball Bearings, Contact Angle = 20°)

$P_r = 0.35 * F_r + 0.57 * F_a$ (Angular Contact Ball Bearings, Contant Angle = 40°)

P_r = Dynamic equivalent radial load
F_r = Applied radial load
F_a = Applied axial load
X = Dynamic radial load factor
Y_1 = Dynamic axial load factor
C_o = Static load rating
C_{am} = Dynamic load rating
n = rpm

Table 1 — Load Factor

KT	Y_1
0.015	2.30
0.020	2.22
0.025	2.10
0.030	2.00
0.040	1.86
0.050	1.76
0.060	1.68
0.080	1.57
0.100	1.48
0.120	1.42
0.150	1.34
0.200	1.25
0.250	1.18
0.300	1.13
0.400	1.05
0.500	1.00
0.600	—
0.800	—
1.000	—
1.200	—

Table 2 — Contact Angle

Bearing Trade No.	Inch End Blocks	Metric End Blocks	Contact Angle
609	7828282	7829546	Radial
7201	7824154	7829547	20°
7202	7824155	7829548	20°
7203	7824156	—	20°
7204	7824157	7829549	40°
7205	7824158	7829550	40°
7206	7824159	7829551	40°
7308	7829554	7829552	40°
7309	7824160	—	40°
7310	7824161	7829553	40°

2. Bearing Support Life (L)

$$L_{10}\text{ (revolutions)} = \left(\frac{C_{am}}{P_r}\right)^3 * (* 1 \times 10^6)$$

$$L_{10}\text{ (hours)} = \left(\frac{C_{am}}{P_r}\right)^3 * \left(\frac{1 \times 10^6}{60 * n}\right)$$

Example:

F_a = P = axial load
F_r = 0 (typical ball screw application)

$P_r = Y_1F_a$ (radial)
$P_r = F_a$ (20° contact angle)
$P_r = .57\ F_a$ (40° contact angle)

Ball Screw: .500 x .200

Quick Mount Bearing Support: 7828282 (2x radial bearings)

F_a = 100 lbs
F_r = 0 lbs

Floating Bearing Support: 7833291

F_a = 0
F_r = 0

Part Number: 7828282

C_{am} = 930 lbs C_o = 320 lbs

$F_a < C_o$

$P_r = Y_1F_a$

$$KT = \frac{100}{(2)\ (320)} = .156$$

$$Y_1 = 1.25 + \left(\frac{.200 - KT}{.200 - .150}\right)(1.34 - 1.25)$$

Y_1 = 1.329

P_r = (1.329) (100) = 132.9

$$L_{10} = \left(\frac{930}{132.9}\right)^3 \text{ million revs} = 342 \text{ million revs}$$

Installation

This section is organized so that the installer can follow step by step instructions to prepare and install a new ball screw assembly. Ball screw assemblies are offered in several variations, so all of the installation steps may not be followed for a specific type. The Glossary of Terms will define any terms with which the user may not be familiar. All product specifications and dimensions are found in this catalog.

Installation Can Be Completed in Six Easy Steps

STEP ONE: Mounting the Flange to the Ball Nut
STEP TWO: Mount Front End of Wiper to the Screw (brush type wipers only)
STEP THREE: Install Ball Nut onto the Ball Screw
STEP FOUR: Complete Installation of the Wiper Kit
STEP FIVE: Lubricate the Ball Nut and Screw
STEP SIX: Install Ball Screw Assembly into Your Machine

Ball screws are delivered to the user in one of four ways:

1. Finished ends with assembled ball nut, ready to mount in a machine. No further preparation is required.
2. Screw ends machined and ball nut supplied on an arbor ready for transfer.
3. Screw cut and annealed ready for machining and ball nut supplied on an arbor ready for transfer.
4. Hardened screw in bulk length with ball nut supplied on an arbor ready for transfer.

Ball nuts are delivered without flanges attached and without lubrication. **Ball screw assemblies must not be run without proper lubrication.**

STEP ONE: Mounting the Flange to the Ball Nut

If flange is not used, proceed to STEP TWO.

Preparation of Ball Nut

A ball nut flange is the recommended means of attaching a ball nut to a load. A flange should be tightened firmly against the ball nut on its threads and secured by one of the methods described below. Take care not to grasp and damage the return tubes when tightening the flange. Ball circulation will be impaired if the return tubes are damaged.

Flanges are provided loose from the factory unless otherwise specified. The standard method to secure the flange to the ball nut is shown in Method "A" (retain with pins). Smaller ball screw assemblies may be assembled using Method "B" (retain with set screws). Flanges can be pinned at the factory upon request.

Flange Installation Method A

Retain with pins (recommended)

1. Remove the ball nut from the transfer arbor. Catch and save the balls for reassembly.
2. Apply Loctite grade 271 (red in color) to the ball nut V-threads.
3. Thread the flange onto the ball nut until it contacts the ball nut shoulder.
4. Loosen the flange until the required machine bolts can be inserted into the flange mounting holes without interfering with the ball return guides (see Figure 1).
5. Drill two holes approximately 90° apart, as shown in Figure 1. Note: the pin circle diameter is also the V-thread pitch diameter.
6. Press two groove type pins to the bottom of the drilled holes.
7. Stake the pin holes to prevent the pins from disengaging.
8. Remove all chips from the ball nut, and clean it thoroughly to remove potential contaminants.
9. Reassemble the flanged ball nut and components on the transfer arbor or ball screw.

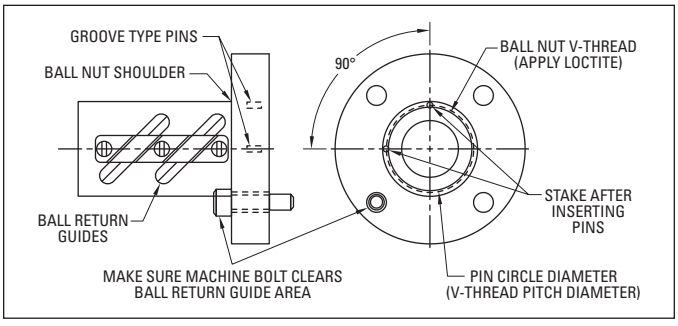


Figure 1

Installation

Flange Installation Method B

Retain with set screws (optional for flanges with set screws)

1. Apply Loctite grade 271 (red in color) to the ball nut V-threads.
2. Thread the flange onto the ball nut until it contacts the ball nut shoulder.
3. Loosen the flange until the required machine bolts can be inserted into the flange mounting holes without interfering with the ball return guides (see Figure 2).
4. Apply Loctite grade 271 (red in color) to the radial threaded hole in the flange.
5. Select a cup point set screw with a length of one half the threaded hole depth. Install two set screws, tightening to the manufacturer's recommended torque (see Figure 2).

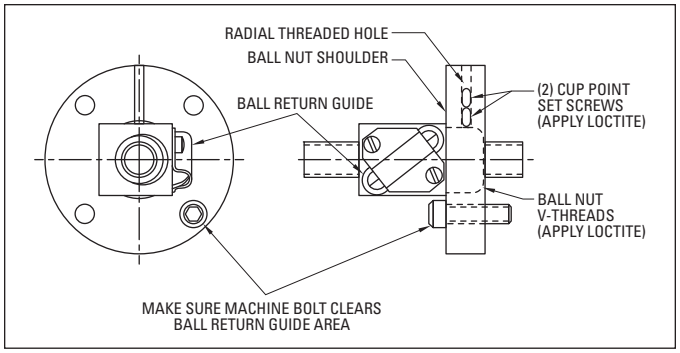


Figure 2

Method B Dimensions

V-Thread	Reference			Pin Circle Diameter	Drill		Pin	
	BCD	Lead	Ball Diameter		Diameter	Depth	Diameter	Length
.664-32 UNS	0.375	0.125	0.063	Use Method A — Retain with set screws				
0.6875-24 UNEF	0.375	0.125	0.063					
0.9375-16 UN	0.500	0.200	0.125					
0.9375-16 UN	0.500	0.500	0.125					
0.9375-16 UN	0.631	0.200	0.125					
0.9375-16 UN	0.631	1.000	0.125					
1.173-18 UNS	0.750	0.200	0.125					
1.125-18 UNEF	0.750	0.200	0.125					
1.250-18 UNEF	0.750	0.200	0.125					
1.173-18 UNS	0.750	0.500	0.156					
1.250-16 UN	0.750	0.500	0.156					
1.375-16 UN	0.875	0.200	0.125	1.332	0.094	0.312	0.094	0.250
1.563-18 UNEF	1.000	0.250	0.156	1.527	0.125	0.438	0.125	0.375
1.563-18 UNEF	1.000	0.500	0.156	1.527	0.125	0.438	0.125	0.375
1.563-18 UNEF	1.000	1.000	0.156	1.527	0.125	0.438	0.125	0.375
1.625-20 UN	1.150	0.200	0.125	1.591	0.094	0.312	0.094	0.250
1.967-18 UNS	1.171	0.413	0.281	1.929	0.188	0.438	0.188	0.375
1.967-18 UNS	1.500	0.250	0.156	1.929	0.125	0.312	0.125	0.250
2.548-18 UNS	1.500	0.473	0.344	2.509	0.250	0.438	0.250	0.375
2.360-18 UNS	1.500	0.500	0.312	2.337	0.250	0.438	0.250	0.375
2.250-20 UN	1.500	1.000	0.344	2.215	0.250	0.562	0.250	0.500
2.250-20 UN	1.500	1.875	0.281	2.215	0.188	0.562	0.188	0.500
2.250-20 UN	1.500	2.000	0.281	2.215	0.188	0.562	0.188	0.500
3.000-12 UN	2.000	0.500	0.375	2.944	0.250	1.000	0.250	0.625
3.000-12 UN	2.000	1.000	0.375	2.944	0.250	1.000	0.250	0.625
3.137-12 UNS	2.250	0.500	0.375	3.080	0.250	1.000	0.250	0.625
3.137-12 UNS	2.250	1.000	0.375	3.080	0.250	1.000	0.250	0.625
3.340-12 UNS	2.500	0.250	0.156	3.283	0.125	0.750	0.125	0.500
3.625-12 UN	2.500	0.500	0.375	3.443	0.250	1.000	0.250	0.625
3.625-12 UN	2.500	1.000	0.375	3.443	0.250	1.000	0.250	0.625
4.325-12 UNS	3.000	0.660	0.500	4.267	0.250	1.188	0.250	0.750
4.325-12 UNS	3.000	1.500	0.500	4.267	0.250	1.188	0.250	0.750
5.497-12 UNS	4.000	1.000	0.625	5.439	0.375	1.250	0.375	0.750

Installation

STEP TWO: Mount Front End of Wiper to the Screw

If wiper is not included or integral to ball nut, then proceed to STEP THREE.

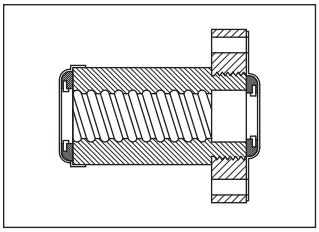
Wipers

Wipers are available for most units as optional items. Precision inch ball nuts typically do not include wipers but they may be added as an option. Precision Plus inch ball nuts and all metric ball nuts include wipers as standard. Wipers generally fall into two categories: one style is internally mounted inside the extreme ends of the ball nut; the other is a wiper and retainer kit combination mounted on the exterior end of the ball nut. In some applications, one or the other may be used or a combination of both. Visual inspection will reveal the style used.

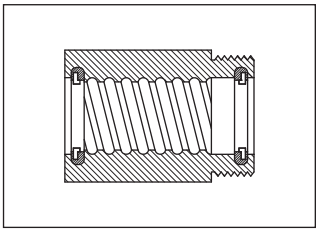
To obtain maximum service from a ball screw assembly, the ball nut should be protected from metal chips and dirt. Foreign material entering the ball nut may be rolled into the ball race, causing high localized loading, abrasion and spalling of the balls, resulting in premature failure. The wiper helps prohibit contaminants from entering the nut as it translates along the screw. These wipers are effective in most industrial applications.

For wipers with flange retainer: 1) Select end of screw to install ball nut (typically end with shortest journal length). 2) Orient ball nut with flange facing desired direction. 3) Install wiper holder and wiper for leading end of ball nut to ball screw. Then follow the ball nut installation procedure, STEP THREE, page 230 4) Install wiper holder onto trailing end of ball nut once the ball nut is installed on the ball screw.

Brush Wiper

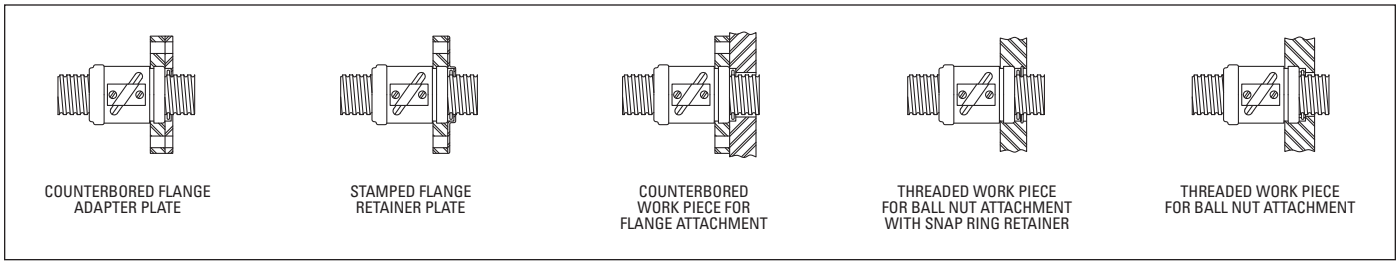


Wiper with Flange Retainer



Internal Snap Ring

Typical Methods of Attaching Wipers to V-Thread End



Wiper without Flange Retainer

Installation

STEP THREE: Install Ball Nut onto the Ball Screw

Installing Ball Nut onto Ball Screw

Each ball nut is completely assembled and loaded with bearing balls before it leaves the factory. The balls are held in place by a shipping arbor/mandrel.

CAUTION: If the arbor is removed without turning the nut onto the screw, the bearing balls will fall out of the nut and will require reloading.

Method A: Install Ball Nut without Preload onto Ball Screw

Method B: Install Ball Nut with Preload onto Ball Screw Using Gap Technique (required on part numbers listed in Table B)

Method C: Install Ball Nut with Preload onto Ball Screw Using Turn Technique (required on part numbers listed in Table C)

Method A: Install Ball Nut without Preload onto Ball Screw

To transfer the ball nut to the screw, proceed as follows:

1. Remove any ball nut retainer from the arbor. Hold the arbor firmly end to end with the screw. Make certain the arbor end is centered on the screw shaft end. (See Figure 3.)

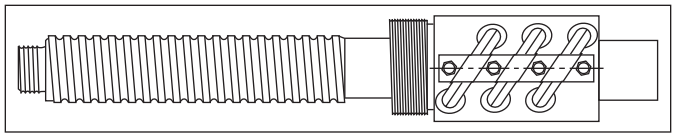


Figure 3

2. Slide the ball nut down to the screw shaft and rotate to the thread until you feel the balls drop into the screw thread. Then rotate with the screw thread until the ball nut completely clears the end of the screw shaft adjacent to the arbor. (See Figure 4.)

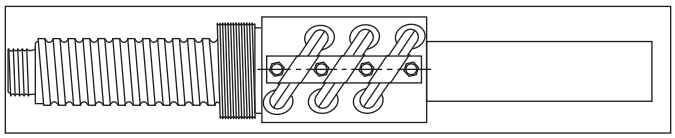


Figure 4

3. Remove the arbor. (See Figure 5.)

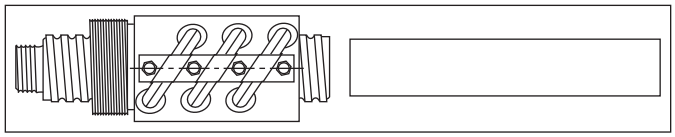


Figure 5

To transfer the ball nut to the arbor, reverse these steps.

CAUTION: When end machining makes it impossible to bring the arbor adjacent to the shaft ball grooves, wrap the machined portion with tape to the nominal O.D. of the arbor. The tape will permit the ball nut to slide over the machined area without the balls dropping into machined irregularities in the shaft.

CAUTION: Extreme care must be taken to prevent the ball nut from sliding off the end of the screw shaft during installation and handling. Temporary stops can be made by wrapping tape around the shaft ball grooves at each end. Be sure to remove the tape and any residual adhesive after the ball screw assembly is properly installed.

Notes regarding installation of Preloaded Ball Nuts (Applicable to Methods B and C):

Installing Preloaded Double Nut
Preloaded Ball Screws (Double Nut Design)

General Description: The two primary reasons for preloading ball screws are to: eliminate backlash and obtain maximum system stiffness.

Preload for units having a compensating spring feature should be established in excess of the normal operating load whenever possible. Further adjustment is not normally required during the life expectancy. Units of this type are used in many specific applications requiring special considerations.

Transferring Ball Nuts from Arbor

Double nut design ball nuts are supplied on arbors. Care must be used not to lose any of the bearing balls, or trap balls between circuits when rotating the ball nut onto the screw.

Method B: Install Ball Nut with Preload onto Ball Screw Using Gap Technique (required on part numbers listed in Table B)

Use this procedure for assemblies having part numbers indicated in Table B.

Preloading Double Nuts Using Gap Technique

Ball nuts are transferred from arbor without a preload. Before preloading these ball nuts, oil the coupling threads, spring washers, ball nut bearing surfaces and the ball grooves of the screw shaft.

Be sure to keep the ball return tubes of the two ball nuts aligned (see Figure 6). Also, make sure the coupling tangs line up with the slots in the ball nut if they have become disengaged.

Position the ball nut midway on the screw shaft. Place retainers on screw to prevent the ball nut from accidentally running off the screw shaft. With the ball return tubes facing upwards, tighten the spanner nut against the spring washer "finger tight", plus 1/4 turn. Rotate the screw shaft through several turns in both directions while holding the ball nut with the ball return tubes on top. Continue to tighten the spanner nut with spanner or channel locks until the .003" (075mm) average gap is obtained resulting in the preload as indicated by the chart. Rotate the screw in both directions several times and check for smoothness. Be sure the spring washer of the coupling is centralized (not protruding in any direction). Use a plastic or brass mallet, if necessary, to help seat the coupling system. Tap lightly. Recheck torque and re-average gap as necessary.

Check the torque by rotating screw shaft with a torque wrench. Secure the spanner nut with the set screw(s) provided.

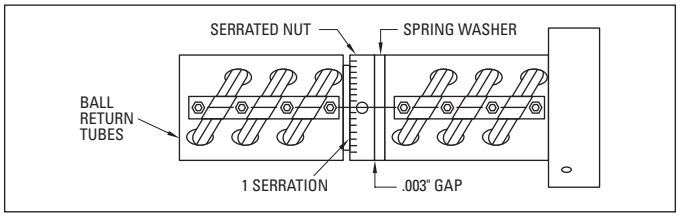


Figure 6

Installation

Table B. Preload Using Gap Technique

Ball Nut Nominal Size & Lead	Ball Nut P/N	Preload Lbs (Newtons) at .003" Gap	Torque In-Lbs (N-mm) at .003" Gap
.500 x .500	7826767	150 (667)	1.0 (113)
.631 x .200	7820955 / 7820956 7823584	150 (667)	1.0 (113)
.631 x 1.000	7827531	50 (222)	50 (222)
.750 x .500	7826991	220 (979)	1.5 (170)
.875 x .200	7823585	220 (979)	1.5 (170)
1.000 x .250	5704167 / 5704168	330 (1468)	2.0 (226)
1.000 x .250	8110-448-089	330 (1468)	2.0 (226)
1.000 x .250	8110-448-092	330 (1468)	2.0 (226)
1.000 x .250	8110-448-097	330 (1468)	2.0 (226)
1.000 x 1.000	7829720	330 (1468)	2.0 (226)
1.150 x .200	5704270 / 7820206 7823587	240 (1068)	1.5 (170)
1.150 x .200	8111-448-014	242 (1078)	1.5 (170)
1.500 x .250	5704271 / 7823588 7833234 / 5704573	920 (4092)	5.5 (622)
1.500 x 1.000	5700698	1550 (6894)	10.0 (1130)
1.500 x 1.875	5704272	1550 (6894)	10.0 (1130)
2.250 x .500	7823589	5000 (22240)	30.0 (3390)
2.500 x .250	7823590	1300 (5782)	10.0 (1130)
3.000 x .660	5703045	12400 (55155)	75.0 (8475)

Method C: Install Ball Nut with Preload onto Ball Screw Using Turn Technique (required on part numbers listed in Table C)

Use this procedure for assemblies having part numbers indicated in Table C.

Preloading Double Nuts Using Turn Technique

Turn the locknut onto the V-threads of the rear nut until it shoulders against the nut (Figure 7). Do not tighten the set screws yet.

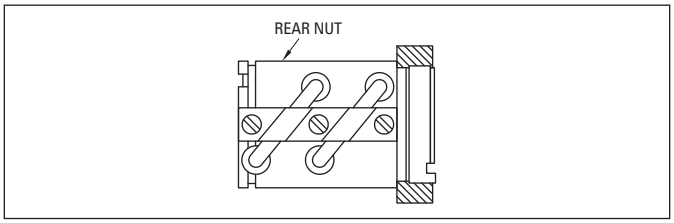


Figure 7. Assembly of locknut to rear nut.

Turn the front nut onto the screw as shown in Figure 10 Insert the tanged sleeve into position against the front nut with preload springs oriented as shown in Figure 8.

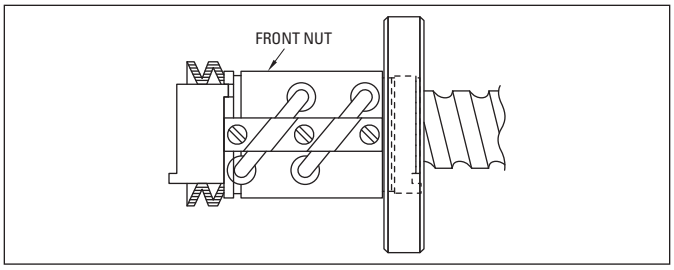


Figure 8. Preload spring orientation.

Insert the slots of the rear nut (lock nut end) into the tangs of the preload sleeve and turn the rear nut onto the screw. Both nuts now turn as an assembly with the tangs in full engagement to prevent the two nuts from rotating separately. The return tubes of the two nuts should be in line with one another. The adjuster nut must be loose at this point, not compressing the belleville springs. (See Figure 9.)

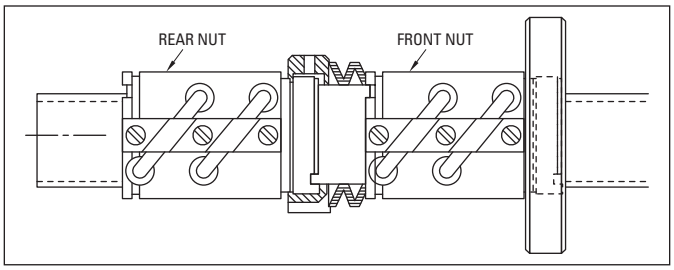


Figure 9. Assembly of rear nut to preload spring.

Hand turn the locknut until all freeplay is just removed. At this point, further turning will begin compressing the preload springs and begin to set the preload force.

Assembly

Transfer the front nut, with flange attached, onto the ball screw as shown in Figure 10. The nut should be turned onto the screw only far enough to avoid loss of bearing balls upon removing the mandrel.

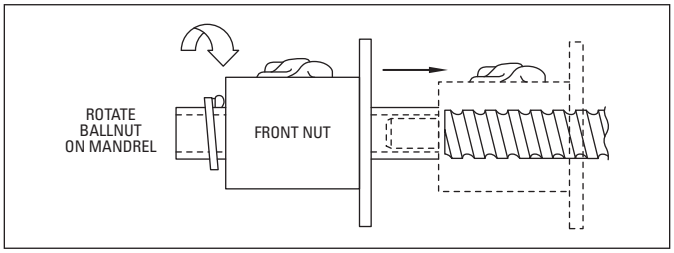


Figure 10. Transfer of front nut to screw.

Installation

Method C (Continued)

Bring the rear nut on its mandrel to position for turning onto the screw. (See Figure 11.)

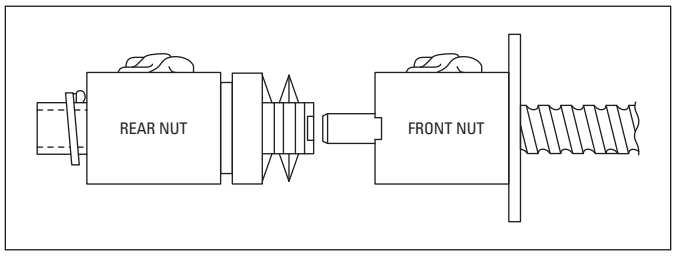


Figure 11. Positioning rear nut for mounting.

NOTE: Normally the rear nut for preloading is shipped fully assembled from the factory. If the spring package is not assembled to the rear nut as shown in Figure 12, review Preload Components Assembly for assembly instructions.

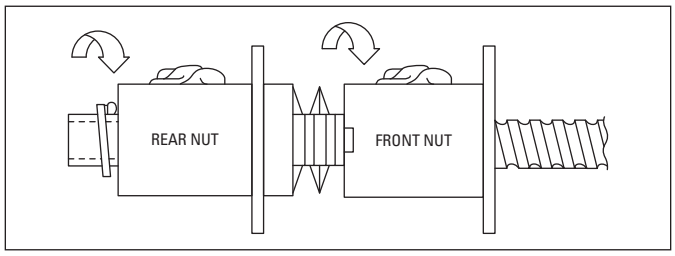


Figure 12. Mounting rear nut.

Insert the tabs of the preload sleeve into the slots of the front nut and then turn the rear nut onto the screw. Both nuts now turn as an assembly with the tangs in full engagement to prevent the two nuts from rotating separately. The return tubes of the two nuts should be in line with one another. The adjuster nut must be loose at this point, not compressing the belleville springs. (See Figure 13.)

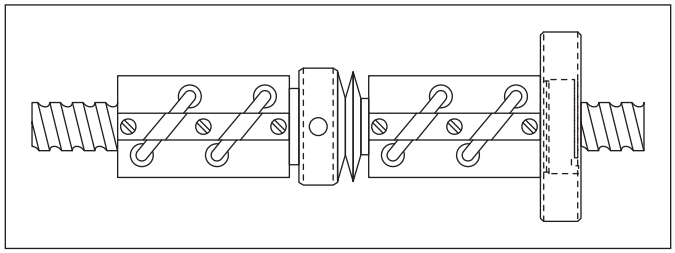


Figure 13. Assembled preload ready for setting.

Turn the locknut until all freeplay is just removed. At this point further turning will begin compressing the preload springs and set the preload force.

Setting the Preload

Amount of Preload

Refer to Table C on page 233 for the number of turns, after freeplay is removed, required for the desired preload. The approximate preload per rotation is also given for preloads between recommended and maximum.

Methods of Setting the Preload

1. Small ball screws with light loads may often be set by hand-turning the adjuster nut to position while preventing rotation of the ball nuts.
2. Ball screws of medium size often require a spanner wrench to turn the adjuster nut to position.
3. Large size units sometimes require a spanner wrench with a pipe extension.

Rotation of the ball nuts during preload setting can be prevented by securing the flange in a fixture or installing the ball screw in its end use application.

CAUTION: Clamping the O.D. of the ball nuts in a vise or similar gripping system to prevent rotation during preload setting is unacceptable due to damage that may be caused to the balls or return tubes of the ball nut.

After setting the preload to the desired preload force, tighten the set screws into the adjuster nut to secure the preload setting.

Preload Components Assembly

Use in conjunction with Assembly instructions on page 231 if assembly of resilient preload components to rear nut is necessary.

Turn the locknut onto the V-threads of the rear nut until the spanner wrench holes line up with the pin holes on the nut. (See Figure 14.)

Do not tighten the set screws at this point.

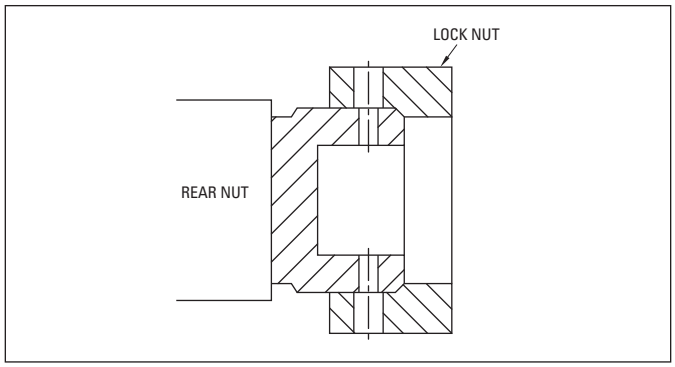


Figure 14. Assembly of locknut to rear nut.

Installation

Method C (Continued)

Insert the sleeve into position with preload springs oriented as shown in Figure 15. Align the sleeve holes for insertion of the spring pins.

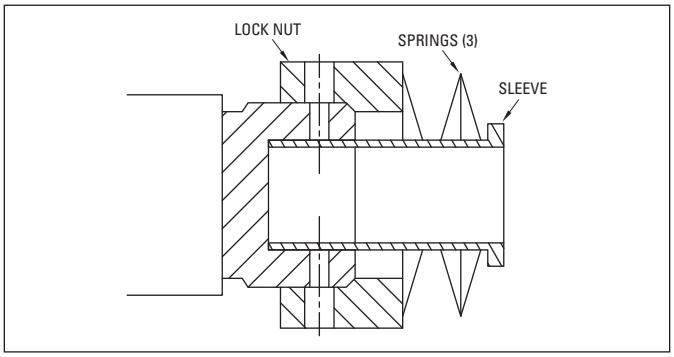


Figure 15. Assembly of sleeve and preload springs.

Press the pins to a depth just below the root of the V-threads in the locknut to allow the locknut to turn freely (see Figure 16). The pins must not be inserted deeper, as they may interfere with the ball screw grooves.

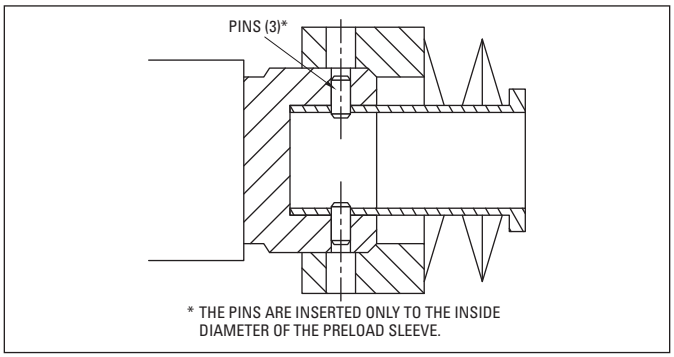


Figure 16. Inserting retainer pin.

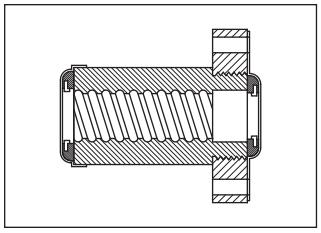
Table C. Preload Using Turn Technique

Ball Nut Nominal Size & Lead	Ball Nut P/N	Preload Lbs (Newtons)	Turns
.375 x .125	8103-448-004	50	0.29
.375 x .125	8103-448-005	50	0.29
.500 x .200	8105-448-008	120	0.24
.500 x .500	8105-448-009	220	0.46
.500 x .500	8105-448-012	190	0.33
.631 x .200	8106-448-015	80	0.25
.631 x .200	8106-448-019	80	0.25
.750 x .500	8107-448-011	345	0.58
.750 x .200	8107-448-012	190	0.33
.750 x .200	8107-448-025	190	0.33
1.000 x 1.000	8110-448-015	225	0.43
1.000 x .500	8110-448-016	395	0.77
1.000 x .250	8110-448-017	335	0.64
1.000 x .250	8110-448-018	335	0.64
1.150 x .200	8111-448-004	240	0.59
1.500 x .500	8115-448-006	1290	0.65
1.500 x .500	8115-448-007	1290	0.65
1.500 x 1.000	8115-448-011	825	0.49
1.500 x .250	8115-448-012	405	0.62
1.500 x .500	8115-448-029	1290	0.65
1.500 x 1.000	8115-448-032	825	0.49
1.500 X 2.000	8115-448-059	760	0.40
1.500 x 1.000	8115-448-075	825	0.49
2.000 x .500	8120-448-006	1915	0.26
2.000 x .500	8120-448-007	1915	0.26
2.000 x 1.000	8120-448-019	2195	0.30
2.250 x .500	8122-448-003	1930	0.51
2.250 x .500	8122-448-008	1930	0.51
2.500 x 1.000	8125-448-004	2690	0.51
2.500 x .500	8125-448-006	2120	0.40
2.500 x .500	8125-448-015	2120	0.40
3.000 x .660	8130-448-004	3800	0.34
3.000 x .660	8130-448-010	3800	0.34

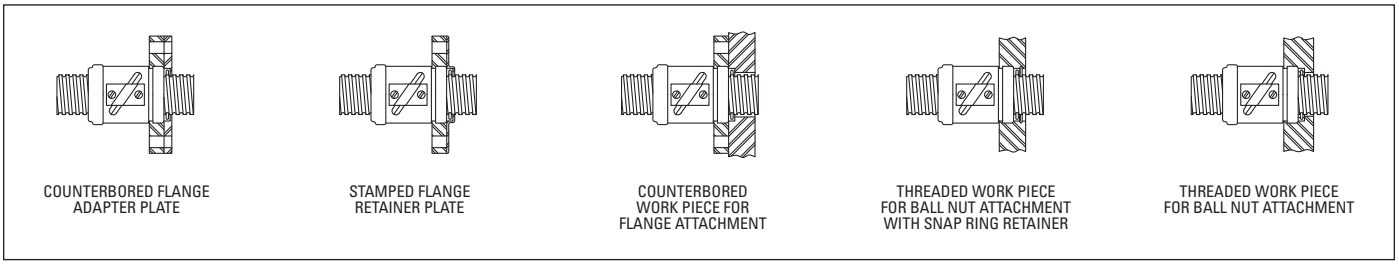
Installation

STEP FOUR: Complete Installation of the Wiper Kit

If applicable, complete wiper kit installation.



Wiper with Flange Retainer



Wiper without Flange Retainer

Installation

STEP FIVE: Lubricate the Ball Nut and Screw

Lubrication

Ball screw components are coated with a light oil for shipping and storage and must be properly lubricated upon assembly.

We recommend using TriGEL-450R or TriGEL-1800RC for lubricating ball screws every 500,000 to 1 million inches of travel or every six months. Other lubricants may be applicable but have not been evaluated.

The TriGEL grease can be applied directly to the screw threads near the root of the ball track. Some ball nut sizes are available with threaded lube holes for mounting lubrication fittings. For these ball nuts, the TriGEL grease can be pumped directly into the nut. Please refer to the catalog to verify which ball nuts have the threaded lube holes. It is recommended to use these nuts in conjunction with a wiper kit to contain the lubricant within the body of the nut.

Ball screws may require lubrication more frequently than 500,000 inches depending on both environmental and operating conditions. If the lubricant appears to be dispersed before this point or has become dry or crusted, the maintenance interval should be reduced. Before adding additional lubrication, wipe the screw clean, removing the old grease and any particular contamination seen on the screw.

Initial Lubrication

As with ball bearings, ball screws can be lubricated using either oils, greases or solid lubricants. Oils are recommended for systems which operate at high speeds, in aggressive environments, or in high ambient temperatures. Greases are recommended for ball screws where an oil circulation lubrication system cannot be applied, or areas where a lubricated-for-life situation is possible. Solid lubricants are typically applied to adverse operating conditions where oils and greases are not suitable.

Grease Lubrication Quantity

The nut can be filled to as much as 70% but no lower than 30% of its free space, depending upon operating speed and nDm. Nuts which are not fitted with wipers can be filled completely.

Grease Relubrication

In general, ball screws should be relubricated every 500,000 revolutions or every six months. Ball screws which operate above 70°C should be relubricated more often (1/2 the relubrication period for every 15°C increment above 70°C). Use of synthetic lubricants can increase the relubrication interval up to four times, depending on formulation and operating conditions.

Relubrication quantities should equal 30% of the nut free space. When possible, relubrication should be performed while the screw is operating.

Run-In

In order to distribute the grease throughout the ball screw elements, it is recommended that the screw be run two to ten times over its complete operating stroke. Run-in should be performed at initial start-up and after every subsequent relubrication.

Grease Operating Life

When relubricated with the proper frequency, ball screws should achieve their rated fatigue life. When no relubrication is possible, actual grease operating life will be affected by operating speed, running temperature, and the extent of environmental contamination.

Relubrication intervals can best be determined by experience. Changes in grease consistency, grease color, operating torque and operating temperature can indicate the need for lubrication replenishment.

Installation

STEP SIX: Install Ball Screw Assembly into Your Machine

Installation of Ball Screw Assembly

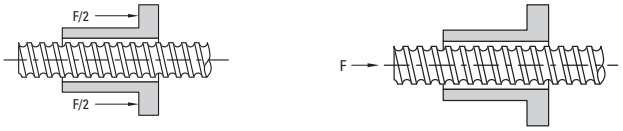
A ball nut flange is the recommended means of attaching a ball nut to a load. The ball screw assembly should be mounted into a system or machine as shown in the figures below. Axial loading of the nut is optimal for performance and life and side loading installations or applications should be avoided.

Typical ball screw installations are combined with linear slides to provide support and guidance. Linear rails and ball screws must then be aligned parallel to prevent binding, increased system torque and a decrease in life. Typical installation practice consists of "floating" the ball screw or the linear rail into alignment. To "float" a screw into alignment, secure the linear rail into position and adjust the mounting blocks or nut to minimize the error from parallel.

Nut Loading

Axial loading (on nut or screw) is optimal for performance and life. For applications requiring radial loads, please contact us.

Axial Loading: optimal

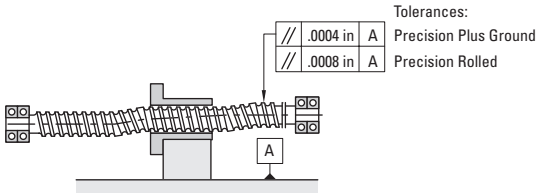


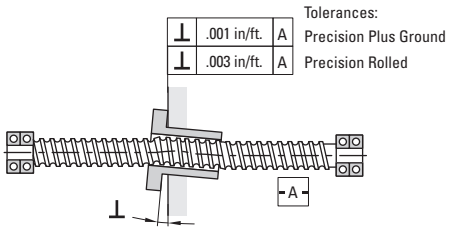
Radial Loading: detrimental*

* Minimize radial loading to less than 5% of the axial load.

Nut Mounting (Inch)

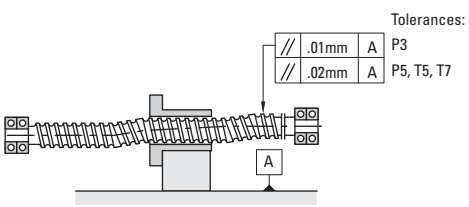
Use the following guidelines to achieve optimal performance.

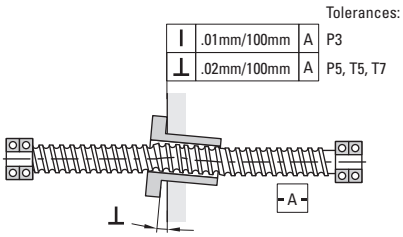




Nut Mounting (Metric)

Use the following guidelines to achieve optimal performance.
(All units are mm)





Maintenance and Service

If proper attention is paid to ball bearing screw selection and installation, virtually no maintenance will be required except for routine lubrication.

All Thomson ball screw assemblies are designed for maximum life and trouble-free operation when adequately serviced and maintained. Ball screw disassembly should be attempted only after complying with the general inspection and maintenance instructions outlined in this section. Be positive that the ball screw is at fault. Disassembly should be done only by persons familiar with ball screw assembly principles. In any unusual circumstances, contact Thomson.

Troubleshooting

Misalignment is one of the most common problems. Evidence of misalignment can generally be detected by one of the following situations:

- Squealing noise caused by the balls sliding in one or more of the circuits.
- Roughness in the form of vibrations or slightly erratic operation. This can normally be detected by "feel" when placing your hand on the return circuits.
- Excessive heat at the ball nut. Any appreciable temperature above the ambient of adjacent components should be considered excessive.

Gouging or scoring marks on the ball contact area of the screw may be caused by trapped balls between the circuits, broken balls, broken pick-up fingers or deflectors, or foreign objects which may have been digested by the ball nut.

When any of these conditions are encountered, examine the installation and, if necessary, immediately take corrective action to eliminate the cause and prevent further damage.

General Inspection of the Screw Shaft

Inspect the shaft ball grooves for signs of excessive wear, pitting, gouges, corrosion, or brinelling. Normally, where any of these conditions exist on most Thomson Precision units, it may be more economical and advisable to replace the screw shaft. Consult Thomson for evaluation and possible repair of Precision Plus units.

Backlash

Secure the screw shaft rigidly in a table clamp or similar device. Make sure it cannot rotate. Push firmly on the ball nut, first in one direction, then in the opposite direction. The axial movement of the ball nut is the backlash. This measurement can be taken with a dial indicator. Make sure that neither member rotates while the readings are taken.

Backlash with the following limits is considered acceptable:

Ball Diameter	Max. Permissible† Lash (used unit)	Max. Lash (new unit)
0 - 1/8"	.008	.005
5/32" - 1/4"	.014	.007
9/32" - 15/32"	.025	.010
1/2" and up	.050	.015

† Values based on wear resulting from foreign material contamination and/or lack of lubrication.

If, after inspection, the screw shaft appears to be usable but has excessive backlash, proceed with further disassembly and component inspection.

Disassembly

General Instructions: Have a clean container, such as a tote tray or cardboard box, handy for each ball return circuit of the ball nut assembly. A piece of clean cloth should be placed on the work table and gathered around the edge to form a pocket to retain the balls. Place the ball nut assembly over the cloth and remove the clamp.

Where more than one guide is held in place by a single clamp, secure each remaining guide with a strip of tape around the diameter of the ball nut to prevent accidental guide removal before you are ready for that circuit.

Remove both halves of the guide simultaneously to prevent distortion to either half. Catch all the balls from this circuit on the cloth by rotating the screw or ball nut slowly. Place the removed components into a container. Identify the container, the guide, and the circuit of the ball nut so the components can be reassembled in the same circuit from which they were removed. Repeat for each circuit.

Maintenance and Service

General Description

A Thomson ball screw is a force and motion transfer device belonging to the family of power transmission screws. It replaces sliding friction of the conventional power screw with the rolling friction of bearing balls. The balls circulate in hardened steel races formed by concave helical grooves in the screw and nut. All reactive loads between the screw and nut are carried by the balls which provide the only physical contact between these members.

As the screw and the nut rotate relative to each other, the balls are diverted from one end and carried by ball guides to the opposite end of the nut. This recirculation permits unrestricted travel of the nut in relation to the screw.

Method I: Ball nuts using a deflector return system are identified by threaded deflector studs extending through holes in the nut and the guide clamp. Lock nuts on the deflector studs are used to secure the clamps that hold the guides in place.

Method II: Ball nuts with pick-up fingers are identified by the finger projections integral with the guide. In this method, capscrew fasteners are used to fasten the clamp that holds the guide in place.

Pick-up Finger Method: Refer to the Component Inspection section.

Deflector Method: To remove the deflectors from the ball nut assembly, remove the ball nut from the screw shaft. The ball nut must be rotated since the deflectors engage loosely in the screw ball grooves and act as a thread. The deflectors now can be removed from the opposite ends of the ball nut so that you can use them for reference during component inspection.

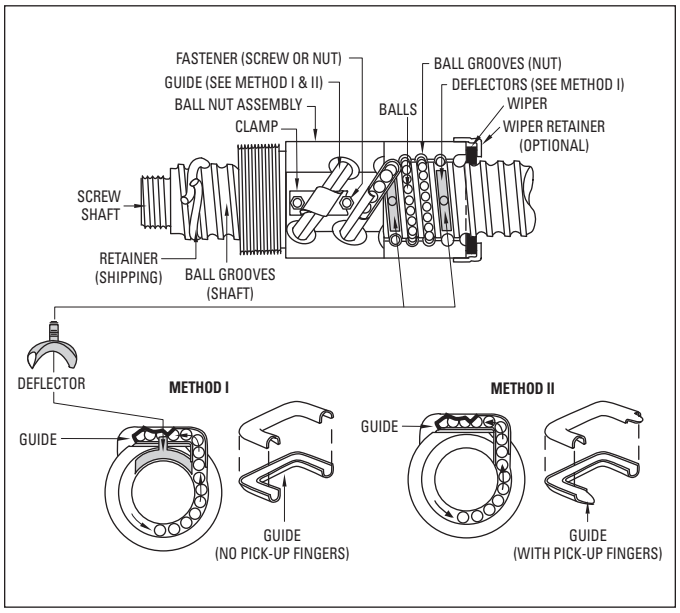


Figure 17

Maintenance and Service

Component Inspection and Replacement

Balls: If there is more than one circuit in the ball nut, count the balls in each of the separate containers to be sure each has the same number (within a variation of three balls). Check random samples (about 1/4 of the balls for a circuit) for the following:

- True roundness, with a .0001 in. maximum variation.
- Signs of scuffing or fish scaling.
- More than .0001 in. diameter variation between balls of the same circuit.

Where the random sampling shows balls out of round, signs of scuffing or variation of diameter in excess of .0001 in., or short count in any circuit, all balls in the unit must be replaced with a complete set of new balls. Ball kits are available from Thomson.

To ensure proper operation and long life of the serviced assembly, it is imperative that the diameters of all the replacement balls do not vary in excess of .00005 in. If Thomson kits are not used for service, make sure the balls meet the above specification. (Note: Use only chrome alloy steel balls, Grade 25 or better. Carburized balls or carbon steel balls will not provide adequate life.) See Ball Chart table.

Deflectors: Examine the ends of the deflectors for wear or brinelling. Wear can be determined by comparison with the unused ends of the two outside deflectors. Since these ends have not been subjected to wear from balls, they are in a like-new condition. Where wear or brinelling is evident, it is best to replace the deflectors with new ones.

Pick-up Fingers: Inspect the pick-up fingers, which consist of short extensions at the end of the guides. Replace with new guides if a ball brinell impression appears on the tip. Remove any burrs on the fingers. If the guides were distorted during removal, replace with new guides.

Ball Nut: Inspect the internal threads of the ball nut for signs of excessive wear, pitting, gouges, corrosion, spalling, or brinelling in the ball groove area. On large ball nuts, running the tip of your finger along the groove which is accessible will enable you to detect a secondary ridge in the ball groove area when wear is excessive or brinelling has occurred. (The extended lead of a mechanical pencil can also be used as a groove probe.) If inspection indicates any of these flaws, the ball nut assembly should be replaced.

Wipers: Prolonged use and environmental conditions will generally determine the condition of wipers. After cleaning wipers, reassemble over the screw shaft to determine whether a snug fit is maintained over the complete contour of the screw shaft. Any loose fitting or worn wipers should be replaced. Wiper kits are available for Thomson ball screws.

Note: If the assemblies have had extended use, it is recommended that all low cost items be replaced with new parts (i.e., balls, guides, deflectors, clamps). These can be ordered by simply referring to the assembly part number purchased.

Reassembly

Cleaning: Clean all components with a commercial solvent and dry thoroughly before reassembly.

Deflector Method: Where the ball nut is equipped with deflectors, install these and secure temporarily by running the lock nuts down the studs and tightening.

General Instructions: Position the ball nut on the screw shaft. Ball nuts with deflectors have to be screwed on. Other ball nuts will slide on.

Using dowels with an O.D. approximately equal to the diameter of the balls, center the ball nut grooves with the shaft grooves by inserting dowels into each of the ball nut return circuit holes.

Remove the second dowel from one end. With the ball return holes up, fill the circuit with balls from the container corresponding to that circuit. Turning the screw in the ball nut will help to feed the balls into the groove. When the circuit is full, the balls will begin to lift the end dowel from its position. To be sure there are no voids, lightly tap the top bearing ball and see if the end dowel moves.

The remaining ball in the container should fit into one of the halves of the return guide with space for about three to six left.

Note: There must be some free space in the ball circuit so the balls will roll and not skid. Do not try to add extra balls into the circuit.

Place a dab of bearing grease at each end of the half return guide to hold the balls in place. Now, take the other half of the return guide and place it over the half guide you have filled with balls and insert two ends of the ball guide into the respective hole in the ball nut. Seat by tapping gently with a rawhide or plastic mallet.

Note: Where more than one ball circuit must be filled in the ball nut, tape the ball return circuit to the ball nut to prevent accidental removal. Repeat the filling procedure for the remaining circuits.

With all ball circuits filled and all return guides in place, secure the return guides with the retaining clamp.

CAUTION: Care should be taken to ensure that balls are not accidentally trapped between circuits in units having pick-up fingers. In deflector units, the deflectors will fill this space.

Inspection: Wrap tape around the ball grooves at the ends of the screw shaft to prevent the ball nut from rolling off. Now inspect the assembly for free movement of the ball nut along the entire stroke. There should be no binding, squeal, or roughness at any point.

Reducing Backlash: Backlash can be reduced by replacing all the balls with a larger size. If the diameters of the bearing balls are increased by .001 in., backlash is decreased by .003 in. (Ball kits are available for these applications.)

Maintenance and Service

Ball Chart (Grade 25 or Better)

Size (Inches)	Part Number	Nominal Diameter (Inches)	Number of Balls
.187 x .050	**7821609**	0.039	30
.187 x .062	**7821579**	0.039	30
.375 x .125	**5709574**	0.063	62
.375 x .125	**5709576**	0.063	62
.375 x .125	**5709578**	0.063	62
.375 x .125	**8103-448-003**	0.078	108
.375 x .125	**8103-448-013**	0.078	108
.500 x .200	**8105-448-013**	0.125	96
.500 x .200	**8105-448-008**	0.125	192
.500 x .500	**8105-448-014**	0.125	108
.500 x .500	**8105-448-011**	0.125	146
.500 x .500	**8105-448-016**	0.125	146
.631 x .200	**8106-448-022**	0.125	68
.631 x .200	**8106-448-026**	0.125	68
.631 x .200	**5707645**	0.125	67
.631 x .200	**8106-448-009**	0.125	70
.631 x .200	**8106-448-008**	0.125	70
.631 x .200	**8106-448-015**	0.125	140
.631 x .200	**8106-448-019**	0.125	140
.631 x .200	**7832872**	0.138	42
.631 x 1.000	**7826713**	0.125	46
.631 x 1.000	**7827531**	0.125	92
.750 x .200	**8107-448-018**	0.125	86
.750 x .200	**8107-448-026**	0.125	86
.750 x .200	**8107-448-016**	0.125	86
.750 x .200	**8107-448-027**	0.125	172
.750 x .200	**8107-448-046**	0.125	172
.750 x .200	**8107-448-025**	0.125	172
.750 x .500	**8107-448-014**	0.156	152
.750 x .500	**8107-448-020**	0.156	152
.750 x .500	**8107-448-049**	0.156	152
.750 x .500	**8107-448-048**	0.156	152
.750 x .500	**8107-448-011**	0.156	304
.875 x .200	**5708277**	0.125	184
1.000 x .250	**8110-448-055**	0.156	86
1.000 x .250	**8110-448-032**	0.156	89
1.000 x .250	**8110-448-030**	0.156	89
1.000 x .250	**8110-448-056**	0.156	171
1.000 x .250	**8110-448-026**	0.156	182
1.000 x .250	**8110-448-024**	0.156	182
1.000 x .250	**8110-448-087**	0.156	182
1.000 x .250	**8110-448-088**	0.156	182
1.000 x .250	**8110-448-092**	0.156	168
1.000 x .250	**8110-448-089**	0.156	168
1.000 x .250	**8110-448-097**	0.156	170
1.000 x .500	**8110-448-022**	0.156	196
1.000 x .500	**8110-448-016**	0.156	392
1.000 x 1.000	**8110-448-086**	0.156	100
1.000 x 1.000	**8110-448-020**	0.156	152
1.000 x 1.000	**8110-448-034**	0.156	152

Size (Inches)	Part Number	Nominal Diameter (Inches)	Number of Balls
1.150 x .200	**8111-448-006**	0.125	252
1.150 x .200	**8111-448-014**	0.125	224
1.150 x .200	**8111-448-004**	0.125	504
1.171 x .413	**5707511**	0.281	60
1.500 x .250	**7833233**	0.156	230
1.500 x .250	**5701990**	0.156	230
1.500 x .250	**7833234**	0.156	464
1.500 x .250	**5704573**	0.156	464
1.500 x .473	**5707513**	0.344	86
1.500 x.500	**8115-448-016**	0.312	140
1.500 x.500	**8115-448-018**	0.312	140
1.500 x.500	**8115-448-006**	0.312	280
1.500 x 1.000	**8115-448-074**	0.344	60
1.500 x 1.000	**8115-448-080**	0.344	60
1.500 x 1.000	**8115-448-076**	0.344	60
1.500 x 1.000	**8115-448-014**	0.344	68
1.500 x 1.000	**8115-448-049**	0.344	68
1.500 x 1.000	**8115-448-075**	0.344	120
1.500 x 1.000	**8115-448-011**	0.344	136
1.500 x 1.875	**5707654**	0.281	84
1.500 x 1.875	**5704272**	0.281	168
1.500 x 2.000	**8115-448-056**	0.281	96
1.500 x 2.000	**8115-448-057**	0.281	96
2.000 x .500	**8120-448-011**	0.375	150
2.000 x .500	**8120-448-013**	0.375	150
2.000 x .500	**8120-448-006**	0.375	300
2.000 x .500	**8120-448-007**	0.375	300
2.000 x 1.000	**8120-448-021**	0.375	160
2.000 x 1.000	**8120-448-019**	0.375	320
2.250 x .500	**7833235**	0.375	154
2.250 x 1.000	**5704555**	0.375	164
2.500 x .250	**5703243**	0.156	468
2.500 x .250	**7823590**	0.156	936
2.500 x .500	**8125-448-010**	0.375	184
2.500 x 1.000	**8125-448-008**	0.375	194
3.000 x .660	**8130-448-007**	0.500	180
3.000 x 1.500	**5704986**	0.500	166
4.000 x 1.000	**5703258**	0.625	186
.375 x 3	**5706900 / 7828127**	0.156	54
.625 x 3	**5707445 / 7828128**	0.187	60
.625 x 6	**5708943 / 7828129**	0.187	120
1.000 x 3	**5707472 / 7828130**	0.187	78
1.000 x 6	**5708944 / 7828131**	0.187	156
1.500 x 3	**5707528 / 7828132**	0.250	84
1.500 x 6	**5708945 / 7828133**	0.250	168
2.000 x 3	**5707530 / 7828134**	0.312	72
2.000 x 6	**5708946 / 7828135**	0.312	144
2.500 x 3	**5707532 / 7828136**	0.375	66
2.500 x 6	**5708947 / 7828137**	0.375	132
4.062 x 6	**5708330 / 7828138**	0.375	180
6.000 x 8	**5704798 / 7828140**	0.500	224

Maintenance and Service

Size (mm)	Part Number	Nominal Diameter (mm)	Number of Balls
25 x 10	**7832938**	3.500	164
32 x 10	**7832801**	5.556	54
40 x 5	**7832807**	3.500	180
40 x 20	**7832813**	5.556	156
40 x 40	**7832816**	7.144	96
12 x 5	**7832773**	2.381	48
16 x 5	**7832777**	3.500	42
20 x 5	**7832780**	3.500	54
20 x 20	**7832784**	3.500	100
25 x 5	**7832787**	3.500	66
25 x 10	**7832791**	3.500	164
25 x 25	**7832794**	3.500	120
32 x 5	**7832796**	3.500	116
32 x 10	**7832799**	5.556	54
32 x 20	**7832803**	5.556	136
32 x 32	**7833300**	3.969	124
40 x 5	**7832805**	3.500	180
40 x 10	**7832809**	7.144	72
40 x 20	**7832812**	5.556	156
40 x 40	**7832815**	7.144	96
50 x 10	**7832818**	7.144	88
50 x 20	**7832821**	6.350	164
63 x 10	**7832823**	7.144	140
63 x 20	**7832826**	7.144	186
80 x 10	**7832828**	7.144	210
80 x 20	**7832831**	12.700	80
16 x 5	**7832835**	3.500	56
20 x 5	**7832838**	3.500	108
25 x 5	**7832841**	3.500	132
32 x 5	**7832862**	3.500	232
32 x 10	**7832844**	5.500	108
40 x 5	**7832847**	3.500	360
40 x 10	**7832850**	6.350	160
50 x 10	**7832853**	7.144	176
63 x 10	**7832856**	7.144	280
80 x 10	**7832859**	7.144	420
16 x 5	**KGF-D-1605-RH-EE**	3.500	45
16 x 10	**KGF-D-1610-RH-EE**	3.000	102
20 x 5	**KGF-D-2005-RH-EE**	3.500	48
25 x 5	**KGF-D-2505-RH-EE**	3.500	63
25 x 10	**KGF-D-2510-RH-EE**	3.500	75
25 x 20	**KGF-D-2520-RH-EE**	3.500	80
25 x 25	**KGF-D-2525-RH-EE**	3.500	130
25 x 50	**KGF-D-2550-RH-EE**	3.500	130
32 x 5	**KGF-D-3205-RH-EE**	3.500	140
32 x 10	**KGF-D-3210-RH-EE**	7.140	42
32 x 20	**KGF-D-3220-RH-EE**	5.000	84
32 x 32	**KGF-D-3232-RH-EE**	3.969	124
40 x 5	**KGF-D-4005-RH-EE**	3.500	180
40 x 10	**KGF-D-4010-RH-EE**	7.140	54
40 x 20	**KGF-D-4020-RH-EE**	5.000	104
40 x 40	**KGF-D-4040-RH-EE**	3.500	360
50 x 10	**KGF-D-5010-RH-EE**	7.140	115
50 x 20	**KGF-D-5020-RH-EE**	7.140	100

Size (mm)	Part Number	Nominal Diameter (mm)	Number of Balls
16 x 5	**KGF-N-1605-RH-EE**	3.500	45
20 x 5	**KGF-N-2005-RH-EE**	3.500	48
20 x 20	**KGF-N-2020-RH-EE**	3.500	100
20 x 50	**KGF-N-2050-RH-EE**	3.500	140
25 x 5	**KGF-N-2505-RH-EE**	3.500	63
32 x 5	**KGF-N-3205-RH-EE**	3.500	140
32 x 10	**KGF-N-3210-RH-EE**	7.140	42
32 x 40	**KGF-N-3240-RH-EE**	3.500	168
40 x 5	**KGF-N-4005-RH-EE**	3.500	180
40 x 10	**KGF-N-4010-RH-EE**	7.140	54
50 x 10	**KGF-N-5010-RH-EE**	7.140	115
63 x 10	**KGF-N-6310-RH-EE**	7.140	140
16 x 5	**KGM-D-1605-RH-EE**	3.500	45
16 x 10	**KGM-D-1610-RH-EE**	3.000	102
20 x 5	**KGM-D-2005-RH-EE**	3.500	48
25 x 5	**KGM-D-2505-RH-EE**	3.500	63
25 x 10	**KGM-D-2510-RH-EE**	3.500	75
25 x 20	**KGM-D-2520-RH-EE**	3.500	80
25 x 25	**KGM-D-2525-RH-EE**	3.500	130
25 x 50	**KGM-D-2550-RH-EE**	3.500	130
32 x 5	**KGM-D-3205-RH-EE**	3.500	140
40 x 5	**KGM-D-4005-RH-EE**	3.500	180
40 x 10	**KGM-D-4010-RH-EE**	7.140	54
40 x 20	**KGM-D-4020-RH-EE**	5.000	104
40 x 40	**KGM-D-4040-RH-EE**	3.500	360
12 x 5	**KGM-N-1205-RH-OO**	2.000	60
20 x 5	**KGM-N-2005-RH-EE**	3.500	48
20 x 20	**KGM-N-2020-RH-EE**	3.500	100
20 x 50	**KGM-N-2050-RH-EE**	3.500	140
25 x 5	**KGM-N-2505-RH-EE**	3.500	63
32 x 5	**KGM-N-3205-RH-EE**	3.500	140
32 x 10	**KGM-N-3210-RH-EE**	7.140	42
32 x 20	**KGM-N-3220-RH-EE**	5.000	84
32 x 40	**KGM-N-3240-RH-EE**	3.500	168
40 x 5	**KGM-N-4005-RH-EE**	3.500	180
50 x 10	**KGM-N-5010-RH-EE**	7.140	115
50 x 20	**KGM-N-5020-RH-EE**	7.140	100
12 x 4	**7832771**	1.984	57
16 x 5	**7832778**	3.500	56
20 x 5	**7832781**	3.500	72
25 x 5	**7832788**	3.500	110
25 x 10	**7832792**	3.500	55
32 x 5	**7832797**	3.500	145
32 x 10	**7832800**	5.556	72
40 x 5	**7832806**	3.500	180
40 x 10	**7832810**	7.144	90
50 x 10	**7832819**	7.144	132
63 x 10	**7832824**	7.144	168
80 x 10	**7832829**	7.144	210
80 x 20	**7832832**	12.700	100
20 x 5	**7832782**	3.500	54
20 x 20	**7832785**	3.500	100
25 x 5	**7832789**	3.500	66

Maintenance and Service

Inspection and Existing Preload Check: Whenever possible, the complete ball screw assembly should be removed from the machine prior to a thorough inspection. Preliminary screw inspection can be made while the unit is still in the machine. Preload can be determined by measuring movement of the nut in respect to the screw shaft. Clamp an indicator to the screw shaft with its probe resting on the face of the nut. Apply a load to the machine carriage in both directions. Be sure that the screw cannot rotate or move axially. Any measurable backlash between the ball nut and screw is an indication that preload does not exist. (See Figure 18.)

If no backlash exists, proceed further as outlined to determine whether proper preload remains in the unit. Existing preload, Wp, can be determined by measuring torque, Tp, using the following formula:

$$Wp = \frac{Tp}{.007}$$

where: Wp = Preload force, in lb.
Tp = Torque, in lb-in. (due to preload only)

Note: The above check is to determine preload only, and does not take into account torque due to seal drag or operating load.

Torque can be measured by means of a spring scale mounted to any projection on the ball nut or by means of a lever or rod secured to the ball nut. In taking this measurement, be sure the exact lever arm distance is measured. (See Figure 18.) This measurement (inch) multiplied by the scale reading (lb.) equals Tp (torque lb-in.). Existing preload can now be determined using the above formula.

Preload adjustment of a Precision ball screw (Figure 18) requires no disassembly. Possible removal of the ball nut from the machine housing may be necessary to expose the adjusting nut.

Disassembly: If in doubt about disassembly of preloaded ball nuts, contact Thomson Application Engineering. If the unit is to be disassembled for general repair, follow the steps previously outlined in this section.

If being disassembled for preload adjustment, follow the guidelines except remove only one-half of the ball nut assembly to an arbor. If a standard arbor is not available, one can be made from a piece of shafting or tubing with a diameter approximately .005 inch less than the root diameter of the ball grooves in the screw shaft. Both halves of the ball nut will come apart as soon as the last ball in the nut is free of the grooves in the screw shaft. It is not necessary to remove the other half from the screw.

Preload Adjustment: The adjusting nut unit in Figure 18 can be adjusted to the desired preload with the use of additional shims. To make further adjustment, loosen the set screw lock located on the periphery of the lock nut. Use a spanner wrench to rotate the adjusting nut to the desired setting. Recheck the preload.

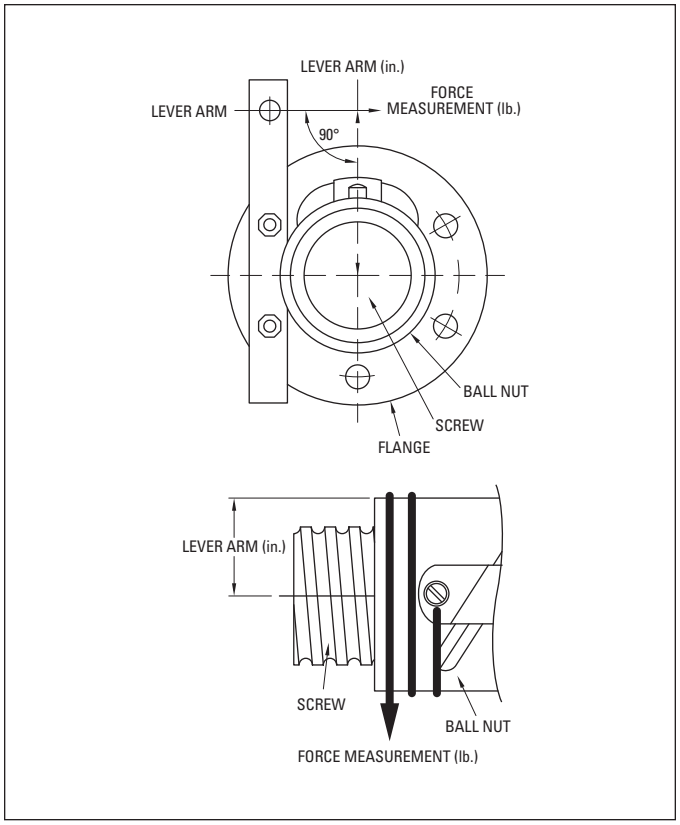


Figure 18

For all other standard units in Figure 18, a shim increase of .001 inch will, as a general rule, increase preload by 500 to 1,000 lb. This varies depending upon screw size; therefore, some judgement and trial and error may be necessary before the desired preload is achieved.

Preload force, Wp, can be determined by measuring torque, Tp, after the desired preload has been established using the following formula:

$$Tp = .007 \times Wp$$

where: Tp = torque, lb-in. (due to preload only)
Wp = preload force, lb.

This section is intended to provide basic necessary information to properly service and maintain Thomson ball screws. Other forms of preloaded units may be encountered which have been designed for particular applications. Please contact Thomson Application Engineering for other specific information.

Lubrication

Guidelines

Ball screws must be lubricated to operate properly and achieve the rated life. We recommend using TriGEL-450R or TriGEL-1800RC for lubricating ball screws. Other oils and greases may be applicable but have not been evaluated.

The TriGEL® grease can be applied directly to the screw threads near the root of the ball track. Some ball nut sizes are available with threaded lube holes for mounting lubrication fittings. For these ball nuts, the TriGEL grease can be pumped directly into the nut. Please refer to the catalog detail views to verify which ball nuts have the threaded lube holes. It is recommended to use these nuts in conjunction with a wiper kit to contain the lubricant in the body of the nut.

Lubrication

Inspection Prior to Lubrication: All ball screw assemblies should run smoothly throughout the entire stroke. If the torque is not uniform over the entire stroke:

- Visually inspect the screw shaft for accumulations of foreign matter.
- Using cleaning fluid or solvent, remove dirt from the ball grooves. Be sure to flush the ball nut assembly thoroughly.
- Cycle the ball nut along the screw shaft several times. Wipe with a dry, lintless cloth and lubricate immediately.
- If the assembly continues to operate erratically after cleaning, contact Thomson for further instructions.

Lubrication: The operating environment primarily determines the frequency and type of lubrication required by ball screws. The screw shaft should be inspected frequently and lubricated as required by the environmental conditions present. Lubricants can vary from instrument grade oil for dirty and heavy-dust environments to a good grade ball bearing grease for protected or clean environments. For most applications, a good 10W30 oil periodically wiped on the screw shaft with a damp cloth or applied by a drip or mist lubricator will suffice.

CAUTION: Where the screw is unprotected from airborne dirt, dust, etc., do not leave a heavy film of lubricant on the screw. Keep the screw shaft barely damp with lubricant. Inspect at regular intervals to be certain lubricating film is present. Where the application requires operation at temperatures below 0° F, an instrument grade oil is recommended. Operating environments from 0° F to 180° F will require a good grade 10W30 oil. For assemblies with balls larger than 3/8 in. diameter, MIL G 3278 grease is recommended. Bearing grease is recommended for operating environments at nominally higher temperatures. Again, in unprotected conditions, the lubricant is best applied with a lubricant-dampened cloth, taking care not to leave an excessive film thickness on the screw. Ball screws should never be run dry.

Lubrication Selection Chart for Ball & Lead Screw Assemblies

Thomson Gel Type	TriGel-300S	TriGel-450R	TriGel-600SM	TriGel-1200SC	TriGel-1800RC
Application	Acme Screws Supernuts, Plastic Nuts	Ball Screws, Linear Bearings	Bronze Nuts	Acme Plastic Nuts, Clean Room, High Vacuum	Ball Screws, Linear Bearings, Bronze Nuts, Clean Room, Vacuum
Maximum Temperature*	200°C (392°F)	125°C (257°F)	125°C (257°F)	250°C (482°F)	125°C (257°F)
Mechanism Materials	Plastic on Plastic or Metal	Metal on Metal	Metal on Metal Bronze on Steel	Plastic or Metals, Combination	Metal on Metal
Mechanical Load	Light	Moderate	Moderate to Heavy	Light to Moderate	Moderate
Very Low Torque Variation over Temperature	Yes	—	—	Yes	—
Very Low Starting Torque	Yes	Yes	—	Yes	Yes
Compatibility with Reactive Chemicals	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Usually OK	Not recommended w/o OEM testing
Compatibility with Plastics and Elastomers	May cause silicon rubber seals to swell	May cause EPDM seals to swell	May cause EPDM seals to swell	Usually OK	May cause EPDM seals to swell
Clean Room Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
High Vacuum Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
Vapor Pressure (25°C)	Varies with lot	Varies with lot	Varies with lot	$8x10^{-9}$ torr	$4x10^{-9}$ torr
Order Number 10cc Syringe 1 Pound Tube 4oz Tube	 TriGel-300S TriGel-300S-1 NA	 TriGel-450R TriGel-450R-1 NA	 NA NA TriGel-600SM	 TriGel-1200SC NA NA	 TriGel-1800RC NA NA

* Maximum temperature for continuous exposure. Higher surge temperatures may be permissible but should be validated in the actual end use by the OEM. Low temperature limits are -15°C or lower. Consult Thomson for specifics.

Repair

Thomson has decades of experience in designing and manufacturing ball screws. Our expert engineers and technicians will restore your worn or damaged actuators to original specification, regardless of design or make. Or we can reverse engineer the units to meet new specs. You get:

- Less machine downtime
- Savings of 50-90% compared to new ball screws
- Extended service life
- The same precision as new

Service

We know how downtime shuts down production. We are geared to keeping your machines up and running smoothly.
We will:

- Inspect and provide a quotation with fast turnaround
- Provide “like new” one-year warranty on all rebuilt assemblies
- Save you money versus the cost of a new ball screw

Experience

With many years in the ball screw business, our engineers, metallurgists, production specialists and customer service representatives give you the industry’s most reliable reconditioning service.
We will check returned units for:

- Straightness
- Ball groove form
- Lead accuracy
- Drunkenness
- Wear
- Metal fatigue
- End machining concentricity, damaged V-threads and worn or damaged bearing and seal journals
- Condition of ball return components
- Condition of wipers and stops
- Condition of flange or housing mounting surfaces

Capability

We can then:

- Rebuild internal and external assemblies
- Machine and grind ball screws and nuts
- Eutectic build-up of undersized, scored or damaged bearing journals.
- In-house heat-treating, if required
- Plating capability to ASTM or MIL SPECS
- Upgraded wiper technology

Results

We can chart and document inspection and test results of rebuilt units with:

- Backlash and torque readouts
- Zeiss coordinate measurement system to check ball nut drunkenness
- CAD with Finite Element Analysis capability
- Full metallurgical lab for materials analysis

Then we return the assembly, inspection results and recommended application guidelines, for long service life.

Our commitment to ball screw reconditioning is one more reason why Thomson is the industry leader in linear actuator technology. If you need expert assistance with ball screw repair, contact our customer service department at 1-800-554-8466.

Glossary/Formulas

Accuracy
A measurement of precision. Perfect accuracy, for example, means advancing a ball nut 1 in. from any point on a screw will always require the exact same number of revolutions.

Annealed Ends
A manufacturing process which removes brittleness while softening screw stock to allow for machining of end journals.

Arbor or Mandrel
Temporary shaft used to support ball nut during shipping assembly/disassembly.

Axial Lash/Backlash
The axial free motion between the ball nut and ball screw; a measure of system stiffness and repeatability.

Backdrive
Application of a force on a ball nut to cause rotation of the screw shaft; in essence, converting linear to rotary motion.

Ball Bearing Spline
A linear motion device using the rolling contact principle. In a spline, the path of the bearings is parallel to the shaft to allow axial freedom and to provide torque transmitting capacity.

Ball Circle Diameter
The distance between the centerlines of two exactly opposing recirculating balls when they are in contact with the screw. The basic point of reference used by Thomson when dealing with ball screws.

Ball Nut
A nut compatible with a ball screw. The nut contains a series of bearing balls which are carried from one end of the nut to the other by a return tube.

Ball Screw
A ball bearing screw is a screw that runs on bearing balls. The primary function of a ball bearing screw is to convert rotary motion to linear motion or torque to thrust.

Bearing Ball Circuit
The closed path of recirculating balls within the ball nut assembly. A multiple circuits has a greater load carrying capability than a single circuit ball nut assembly of the same.

Compression Load
Compression load is a load which would tend to compress or buckle the ball screw shaft.

Conformity Ratio
Ratio of the ball track radius to the ball diameter.

Contact Angle
Nominal angle between a plane perpendicular to the screw and a line drawn between a ball and the ball tracks and projected on a plane passing through the screw axis and the center of the ball. The angle at which the ball contacts the groove.

Column Load
Column loading is the compression load on the screw. This load has a tendency to buckle the screw and is dependent on screw diameter, screw length and type of mounting.

Critical Speed
The condition where the rotary speed of the assembly sets up harmonic vibrations. These vibrations are the result of shaft diameter, unsupported length, type of bearing support, ball nut mounting method, or the shaft or ball nut rpm. Vibrations may also be caused by a bent screw or faulty installation alignment.

Cycle
The complete forward and reverse motion of the screw (or nut) when moving the load. One cycle is equivalent to two load carrying strokes (one forward and one backward).

Diameter — Major
The outside diameter of the ball bearing screw shaft. In dealing with ball bearing screws, this is the basic measurement.

Diameter — Minor (Root)
Diameter of the screw measured at the bottom of the ball track.

Diameter — Pitch
The nominal diameter of a theoretical cylinder passing through the centers of the balls when they are in contact with the ball bearing screw and ball nut tracks.

Driving Torque
The amount of effort, measured in pound-inches, required to turn the ball screw and move the load.

Dynamic Load Rating
Dynamic load rating is the maximum load which a ball bearing screw assembly can maintain for 1.0 million inches of travel (Inch Series) or 1.0 million revolutions (Metric Series).

Efficiency
Expressed as a percentage, the ability of a ball screw assembly to convert torque to thrust with minimal mechanical loss. Thomson ball screws operate at over 90% efficiency.

End Bearing Support (End Fixity)
The three basic bearing configurations that are commonly used to support the ends of a ball screw are.

a) A single journal or ball type bearing (simple support).
b) A pair of back-to-back, angular contact bearings to control end play (simple support).
c) A pair of spaced bearings for added rigidity (rigid support)

Four combinations of bearing supports are used throughout this catalog for selection purposes.

Flange
A metal mounting plate attached to a ball nut.

Gothic (or Ogival) Groove
A ball track cross-section shaped like a Gothic arch.

Journal
1. A machined cylindrical surface.
2. End journals are machined ends of ball bearing screws which allow for bearing mounting.

Land Area
The area on the outside diameter of a ball bearing screw between ball grooves.

Lead
The axial distance a screw travels during one revolution.

Lead Error
The amount of positional error per foot (Inch Series) or per 300mm (Metric Series) that is inherent in linear motion on ball screws.

Glossary/Formulas

Lead Tolerance
The maximum variation from nominal, measured in inches per foot, cumulative.

Left (Right) Hand Threads
The direction of threads on a shaft or in a nut. Left hand means that the nut will move away if rotated counterclockwise. Right hand means the nut will move away if rotated clockwise.

Linear Expansion
Ball screw and spline inner races have a coefficient of linear expansion of 0.0000065 for each degree of change (F) and for each inch of race length.

Load Carrying Balls
The balls in contact with the ball grooves of both the nut and the screw for load carrying purposes.

Load/Life Rating
The usable life of a ball bearing screw assembly measured in inches of travel under a specific load. The length of travel that 90 percent of a group of ball bearing screws will complete, or exceed, before the first evidence of fatigue develops.

Lubrication
To provide the maximum useful life, ball splines and ball screws require lubrication. In general, standard ball bearing lubrication practices are acceptable.

Off Center Load (Eccentric)
A load tending to cock the ball nut on the screw, reducing the rated life. This must be considered in the selection of the ball screw assembly.

Operating Loads
The normal operating force in pounds (lb.) or Newtons (N) which the ball spline or ball screw will experience is considered the operating load. Contact us for assistance in applications subject to widely fluctuating loads or to optimize design.

Preload
The use of one group of bearing balls set in opposition to another to remove axial lash or backlash and increase ball bearing screw stiffness. All axial backlash is eliminated in preloading.

Protective Coatings
Standard outer races are supplied with a black oxide coating. Inner races are furnished with a phosphate coating. Contact Application Engineering for additional options.

Repeatability
A measure of constancy that is directly related to axial backlash. Higher backlash equates to lower repeatability and may be corrected by preloading the ball nut if required.

Root Diameter
The diameter of the screw shaft as measured at the bottom of the ball track.

Screw Diameter (land diameter)
The outside diameter of the screw shaft.

Screw Starts
The integral number of independent threads on the screw shaft; typically one, two, or four.

Side Load (radial)
A load from the side that will reduce the rated life and must be considered in the selection of the ball bearing screw.

Spring Rate
A ratio of load versus deflection of a component or of a total system. System stiffness will always be less than its most compliant member. Thus, in any system where a ball screw is used and where high system stiffness is a primary design requirement, Thomson should be contacted for recommendations based on the specifics of the application.

Static Load
Static load is the maximum non-operating load capacity above which brinelling of the ball track occurs.

Straightness
The linearity of a screw shaft. Precision screw stock is .010 in/ft. with .040 inch max. Precision Plus stock is typically .003 inch over the entire length of the screw.

Stroke
The maximum length of extension of a ball nut on the screw shaft.

Temperature (operating)
With suitable lubricants, ball splines and ball screws will operate with a minimum loss of efficiency between temperatures of -65° to +300°F (-53° to +149°C). Contact our application engineers for assistance in applications with extreme temperatures.

Tension Load
Tension load is a load which would tend to stretch the ball screw shaft.

Thrust Load
Thrust load is loading parallel to and concentric with the centerline of the screw shaft which acts continuously in one direction. Thrust loading is the proper method of attaching the load to the ball bearing screw assembly.

Travel and Travel Rate
The distance a ball nut moves relative to the screw shaft. Travel rate is the distance traveled in a specific time period.

Glossary/Formulas

Some Useful Formulas for Ball Screw Assemblies

Torque, Rotary to Linear

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

Ball Screw Assemblies

$$\text{Torque (in lbs)} = .177 \times \text{Load (lbs)} \times \text{Lead (inches)}$$

Lead Screw Assemblies

$$\text{Torque (in lbs)} = \frac{\text{Load (lbs)} \times \text{Lead (inches)}}{2? \times \text{efficiency}^*}$$

* Acme screw efficiency is variable with the helix angle of the threads, the friction of the material and the finish. See the efficiency formula below.

Torque, Linear to Rotary

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

Ball Screw Assemblies

$$\text{Torque (in lbs)} = .143 \times \text{Load (lbs)} \times \text{Lead (inches)}$$

Lead Screw Assemblies

$$\text{Torque (in lbs)} = \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2?}$$

The higher the lead of the screw the less effort required to backdrive either the screw or the nut.
As a rule, the lead of the screw should be more than 1/3 the diameter of the screw to satisfactorily backdrive.

Efficiency

Ball Screw Assemblies

Most ball screw assemblies are better than 90% efficient.

Lead Screw Assemblies

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

f = coefficient of friction

Horsepower

Torque to Horsepower

$$hp = \frac{\text{Torque (in lbs)} \times rpm}{63{,}000}$$

Horsepower to Torque

$$\text{Torque} = \frac{63{,}000 \times hp}{rpm}$$

Column Load Strength*

(Based on Eulers Formula)

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

Pcr = maximum loads (lbs)
F_c = end support factor
- .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

(Maximum rotational speed of screw)

$$C_s = F_c \times 4.76 \times 10^6 \times \frac{d}{L^2}$$

C_s = critical speed (rpm)
d = root diameter of screw (in.)
L = length between supports (in.)
F_c = end support factor
- .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

ENGINEERING

NOTES:

Custom Capabilities

Thomson's Advantage
In addition to our extensive standard ball and lead screw products, Thomson has designed and manufactured custom engineered products to fit the unique requirements of our customers. We welcome and encourage requests for specialized products, regardless of quantity or frequency of order. Our custom products range from one-time-only units to high quantity requirements. A few of our custom possibilities are listed below:

Custom Plastic Nuts
If cost or design constraints dictate a more integrated package, let our engineering staff help you simplify your design. We offer a full range of manufacturing capabilities from injection molding to CNC machining with the largest selection of engineering plastics to suit your applications and specifications.

- Our engineering staff will ensure your part is right the first time
- Full range of engineering plastics including internally lubricated and high temperature thermoplastics

Precision Screw Products
Thomson provides engineering support and quality assurance for all of its components and assemblies allowing our customers to focus on the larger design picture. Our full range of designs and sizes for our linear motion components allow greater design flexibility, while our support staff ensures proper initial application and comprehensive support once installed.

Components and Assemblies
From components to complete assemblies, Thomson always provides the highest performance products to your applications. Let us assist in your design to ensure proper operation of our components, or let us provide you a complete solution.

- Complete solutions to your linear motion designs with our industry tested assemblies
- Full complement of linear motion components: Rails (square and round), Motor Mounts, Bearing Mounts, Ball Nuts, Acme Plastic Nuts, Bronze Nuts, Anti-Backlash Nuts, Miniature Ball Nuts, Bearings, and more

If you don't see it, just ask us. Our application engineers will help you specify these options and modifications or they will work with you to create entirely new ones which will improve your machine's performance and lower your cost.

Design Ranges
During our 65 plus years of servicing customers, our engineers have continuously developed new lead screw, ball screw, and spline assemblies required for many of industry's most unique, demanding applications. Our current product offering represents our evolving and expanding design and manufacturing capabilities.
The result of this experience is a portfolio of capabilities second to none. Thomson is the pioneer in the design and manufacture of:

- High speed ball screws – up to 300 in/min
- Telescoping assemblies – up to five sections
- Hollow shafting for low inertia and low weight
- Safety nuts with up to five redundant load paths
- Nyliner nuts, offering extreme speeds and loads
- Ultimate accuracy assemblies – up to .0002 in/ft

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