



Ball Screws and Ball Splines



Linear Motion. Optimized.™

Thomson – the Choice for Optimized Motion Solutions

Often the ideal design solution 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.

The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that make us the supplier of choice for motion control technology.

- Thomson provides the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Altra, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

A Name You Can Trust

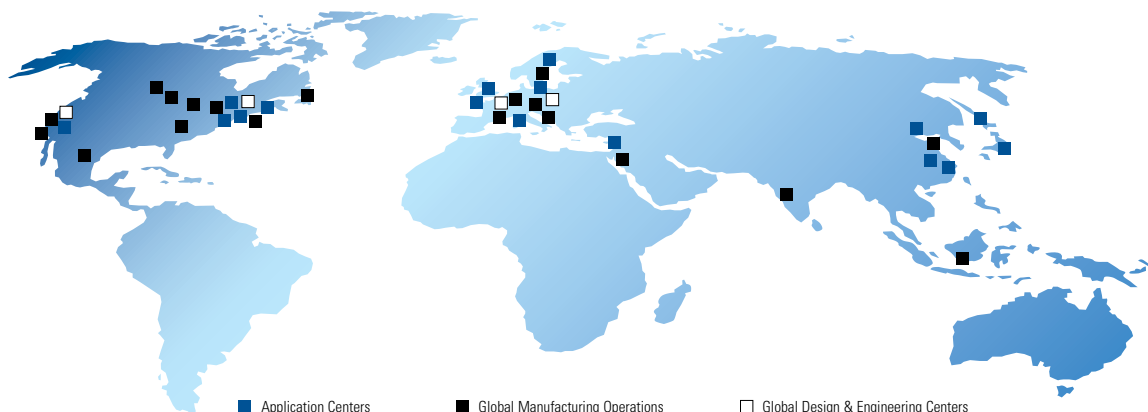
A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com. For assistance, contact your local sales office (contact information listed on the back of catalog).

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 Altra Business System

The Altra Business System (ABS) 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. ABS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. ABS 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



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Technology Comparison

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

Thomson’s comprehensive range of ball and lead screws outperform other linear motion methods and allows you to find the optimal solution for your positioning needs.

Compared to bulky, noisy and expensive hydraulic or pneumatic systems, Thomson ball and lead screws are compact, quiet and 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 solutions.

Belt, cable and chain-drive mechanisms are relatively inexpensive. However, they aren’t as precise, repeatable or as safe to use as ball 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 and lead 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 linear motion solutions, Thomson ball and lead screws provide the superior combination of speed, accuracy, efficiency, repeatability, quiet operation, lubrication retention, load capacity and compactness.

Thomson ball and 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 rooms to marine. Best of all, the value is high as you don’t pay for processes and features not required in your application.

The table below illustrates how Thomson ball and lead screws stacks up against other linear motion positioning solutions. On the next page, you can see a more detailed comparison between Thomson ball and lead screws to help you choose between the two. You can also contact Thomson customer support to let our application engineers help you select the optimal screw for your application.

Thomson Ball and Lead Screws vs. Other Linear Motion Positioning Solutions

	Thomson Ball & Lead Screws (ball / lead)	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 Between Ball and Lead Screws

Design Considerations	Thomson Ball Screw	Thomson Lead Screw
Load	Usually heavy (>100 lbs.)	Typically light (<100 lbs.)
Cost	Higher cost \$\$\$	Low cost \$\$
Anti-backlash	Available	Available — but has low stiffness
Self-locking	No	Yes — but depends on lead and lubrication
Efficiency	Generally ranges from 85% to 95%	Generally ranges from 30% to 70%
Duty Cycle	Unlimited	Typically 50%
Corrosion Resistance	Stainless steel, coating and plating options available depending on size and type	Available in stainless steel with polymer nuts as a standard
Lubrication	Must have lubrication Wide range of lubricants	Can operate with or without lubrication depending on application
Operating Temperature	Wide temperature range	Limited to expansion differences between the screw and the nut
Preload	Available	Not available
Travel Speed	Max. 165 in/s (4.2 m/s) for a 20 x 50 screw	Max. 65 in/s (1.6 m/s) for a 20 x 50 screw
Vibration and Noise	Ball re-circulation	Typically quiet, high leads are best
Custom Availability	Great flexibility in customizing Screw end machining	Flexibility in customizing nut materials and geometry along with screw end machining

Product Overview

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 a 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. 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 two distinct product families. Miniature Metric Rolled Ball Screw assemblies are an efficient, cost-effective solution in a small envelope. Miniature metric ball screw assemblies range from 4 to 14 mm in diameter, with standard lead accuracies of 52 microns/300 mm. Thomson Metric 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/300 mm standard) with the manufacturing efficiency of rolled processes. Thomson Metric 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.

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.



Inch Series Ball Screws

Precision Rolled Screws — Product Availability⁽¹⁾, Accuracy and Axial Play



Screw Diameter	Accuracy	Max. Axial Backlash (Non-preloaded) ⁽²⁾
0.375" to 4.000"	± 0.004 in/ft	0.002 to 0.015"

Inch	Screw Diameter											
	0.125	0.200	0.250	0.413	0.473	0.500	0.660	1.000	1.500	1.875	2.000	
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								●				

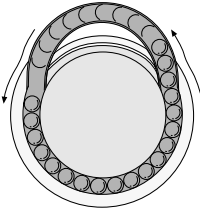
(1) Additional sizes are available. Contact customer service for more details.

(2) Standard lash dependent on ball diameter. See page 171 as reference. Consult factory for special requirements.

Product Overview

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.



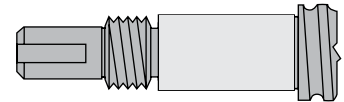
Load Locking Spring

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

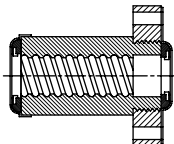
A standard 1/8-27 NPT tapped hole on ball nuts with a dynamic load capacity of 10,000 pounds or more provides easy access for continuing lubrication.

Coating

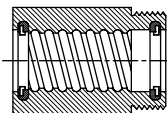
Our catalog standard ball screws feature a high luster polished and oiled finish, which provides superior surface finish, smoother operation, and a high quality look and feel which is consistent across our entire product line. Additional ball screw coatings (thin dense chrome, black oxide, manganese 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 217 for more details.



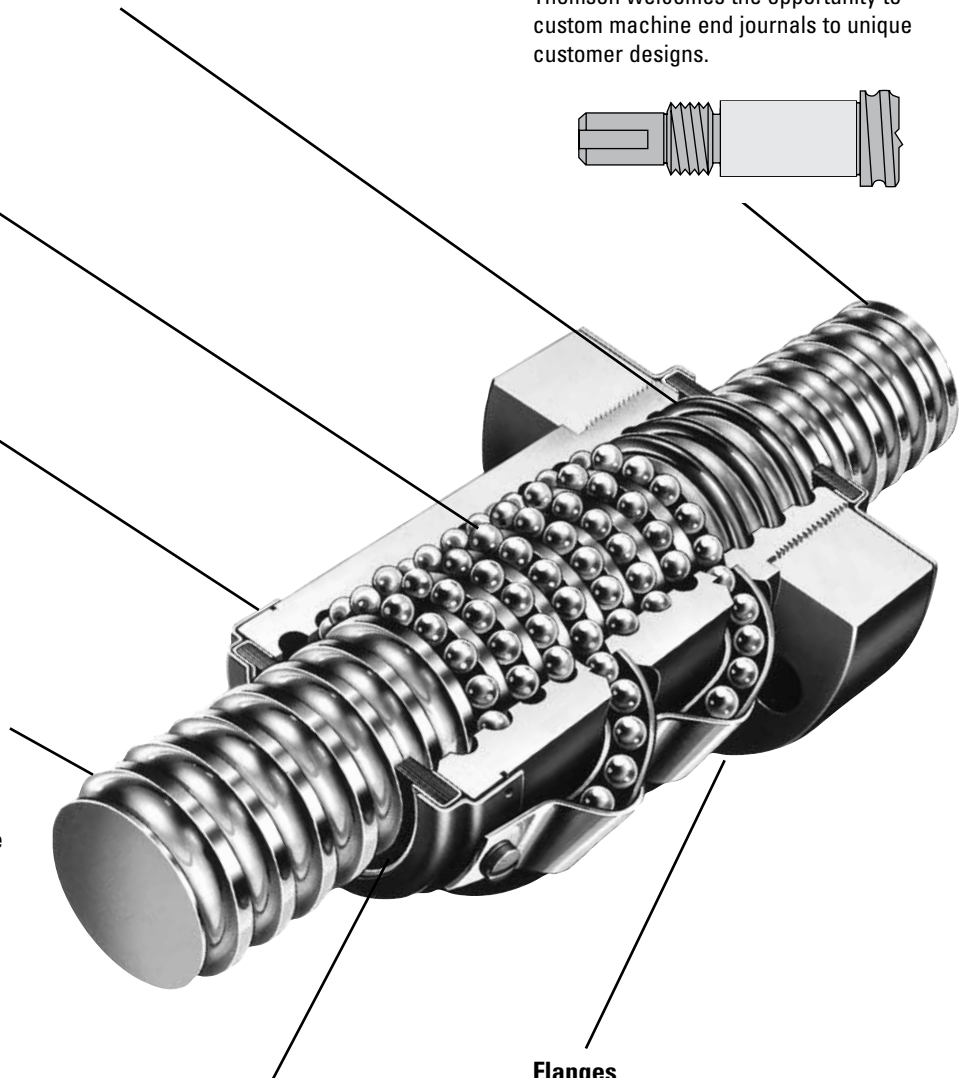
Type A



Type B

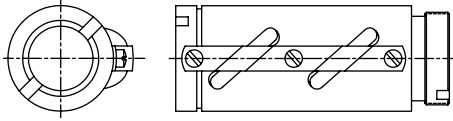
Flanges

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.



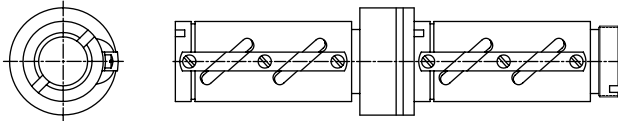
Product Overview

Standard Non-Preloaded Ball Nuts



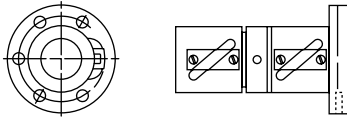
Standard Non-Preloaded Ball Nuts are a flexible, economical solution for use in industrial, transport grade applications. Both round and square models are available, with flange and wiper kits as accessories. Non-Preloaded Ball Nuts come standard with black-oxide coating (thin dense chrome is available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

Preloaded Ball Nuts



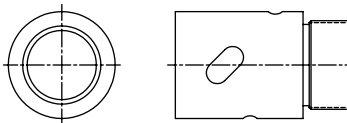
Preloaded Ball Nuts should be considered to eliminate backlash and increase system stiffness in applications where multi-directional positional accuracy and repeatability are required. Preloaded Ball Nuts consist of two non-preloaded ball nuts (round or square) joined by an adjustable preload package 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 system, 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. Please note, a full line of internal return 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.

0.375 x 0.125

Precision Rolled Ball Screws — Inch Series

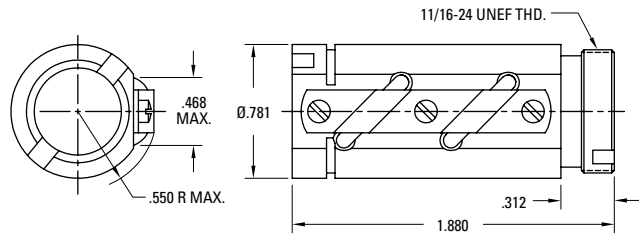
Diameter x Lead (in.)	0.375 x 0.125
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.3
Screw Root Diameter (in.)	0.31
Nominal Ball Diameter (in.)	0.078
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 36" P/N	190-9217		
Maximum Length 72" P/N	190-9441		

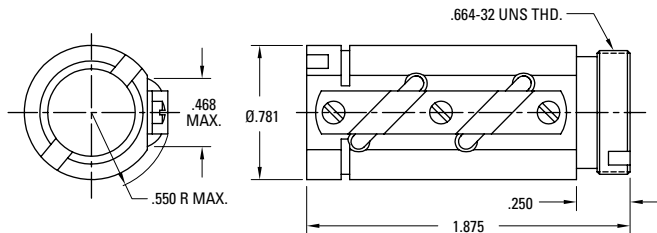
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

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



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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)

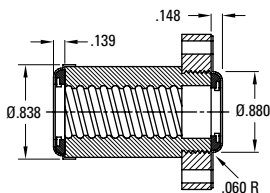


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	500	
Max. Static Load (lbs)	4,250	
Torque to raise 1 lb (oz-in.)	0.35	
Nut weight (lbs)	0.16	
Ball Nut Part Number	8103-448-013	
Flange Part Number	N/A	
Wiper Kit Part Number	N/A	

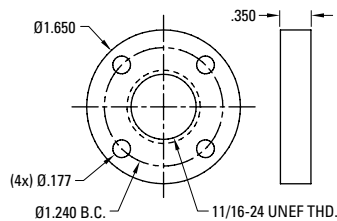
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Wiper and Flange Kits

Wiper P/N 8103-101-002



Flange P/N 8103-448-002



0.375 x 0.125

Precision Rolled Ball Screws — Inch Series

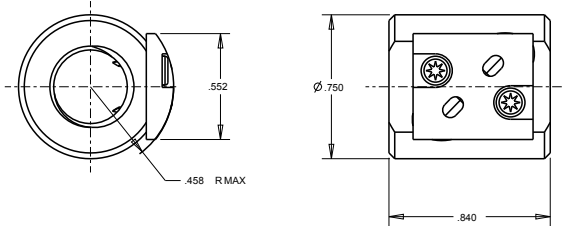
Diameter x Lead (in.)	0.375 x 0.125
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.3
Screw Root Diameter (in.)	0.31
Nominal Ball Diameter (in.)	0.078
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 31" P/N	190-9452		
Maximum Length 48" P/N			190-9576
Maximum Length 72" P/N		190-9575	

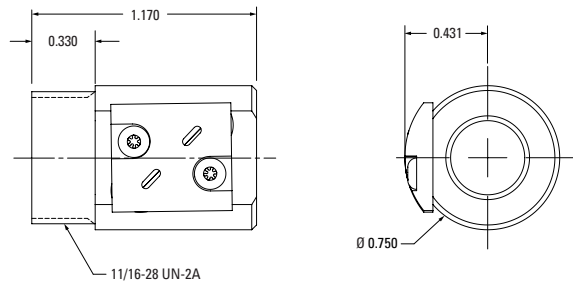
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Cylindrical Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	170	
Max. Static Load (lbs)	1,600	
Torque to raise 1 lb (oz-in.)	0.35	
Nut weight (lbs)	0.13	
Ball Nut Part Number	8103-448-017	
Flange Part Number	N/A	
Wiper Kit Part Number	N/A	

Single Circuit, Round Ball Nut

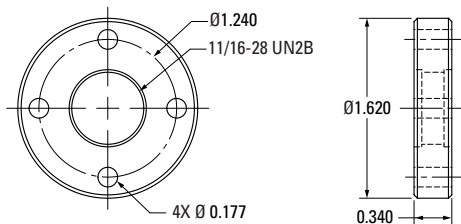


Thread Direction	Right Hand	Left Hand	Right Hand
Nut Material	Alloy Steel	Alloy Steel	Stainless Steel
Dynamic Load (lbs)	170		24
Max. Static Load (lbs)	1,600		255
Torque to raise 1 lb (oz-in.)	0.35		0.35
Nut weight (lbs)	0.13		0.13
Ball Nut Part Number	8103-448-018		8103-448-057
Flange Part Number	8103-448-056		N/A
Wiper Kit Part Number	N/A		N/A

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Wiper and Flange Kits

Flange P/N 8103-448-056



0.500 x 0.200

Precision Rolled Ball Screws — Inch Series

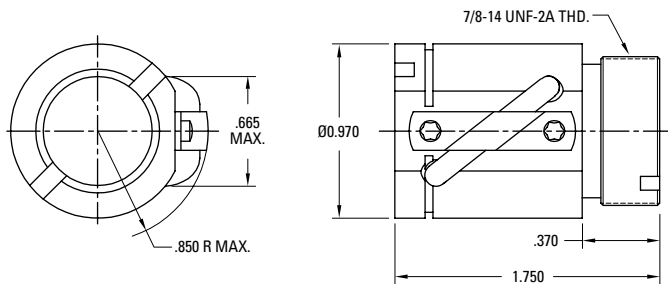
Diameter x Lead (in.)	0.500 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.7
Screw Root Diameter (in.)	0.41
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 72" P/N	190-9097		

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



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	600	
Max. Static Load (lbs)	2,975	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.27	
Ball Nut Part Number	8105-448-023	
Flange Part Number	N/A	
Wiper Kit Part Number	8105-101-002	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

0.500 x 0.200

Precision Rolled Ball Screws — Inch Series

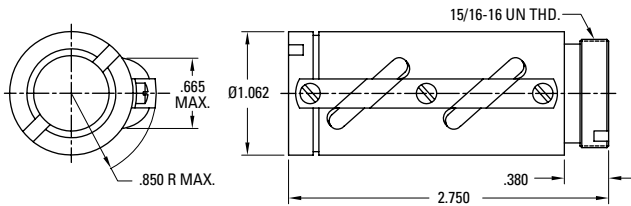
Diameter x Lead (in.)	0.500 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.7
Screw Root Diameter (in.)	0.41
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 72" P/N	190-9097		

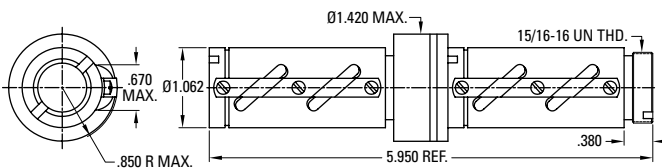
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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



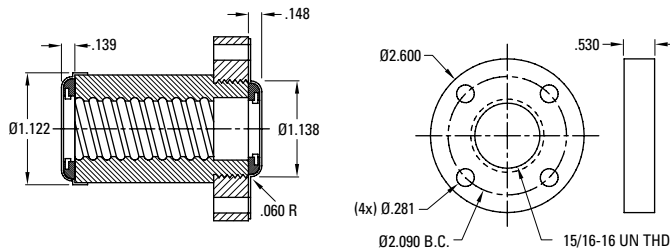
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,200	
Max. Static Load (lbs)	9,430	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.30	
Ball Nut Part Number	8105-448-008	
Flange Part Number	8105-448-002	
Wiper Kit Part Number	8105-101-002	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8105-101-002

Flange P/N 8105-448-002



0.500 x 0.500

Precision Rolled Ball Screws — Inch Series

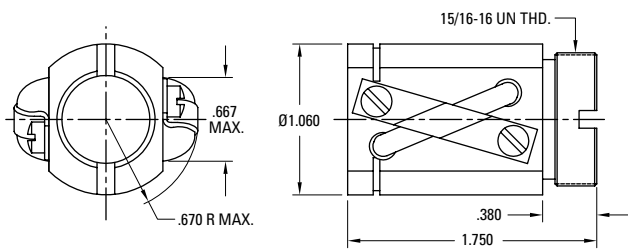
Diameter x Lead (in.)	0.500 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.7
Screw Root Diameter (in.)	0.41
Nominal Ball Diameter (in.)	0.125
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 72" P/N	190-9096		190-9010
Maximum Length 144" P/N			190-9043

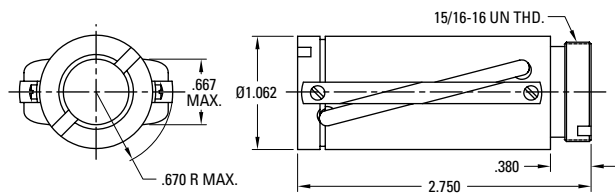
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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

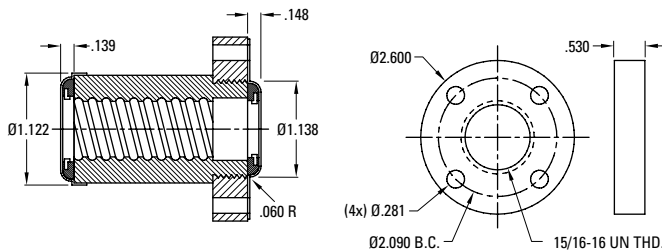
(1) Load Lock not available

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8105-101-002

Flange P/N 8105-448-002 / 8105-448-004



0.631 x 0.200

Precision Rolled Ball Screws — Inch Series

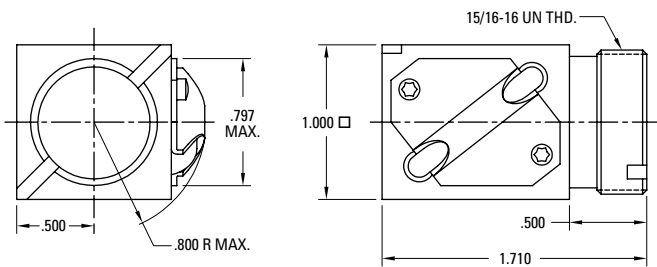
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9098	190-9099	
Maximum Length 144" P/N	190-9121	190-9122	190-9574

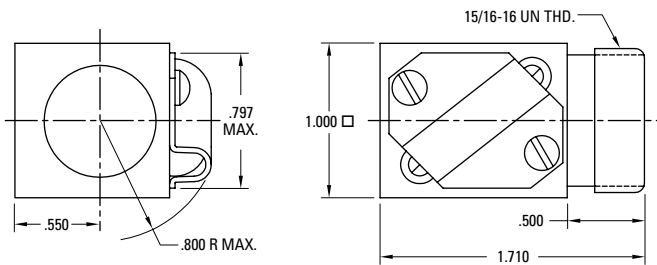
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Square Ball Nut with Load Lock



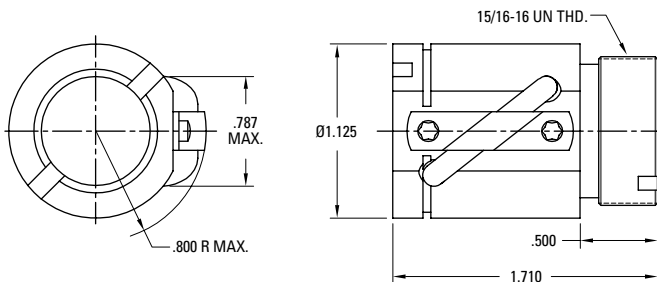
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	800
Max. Static Load (lbs)	6,384	6,384
Torque to raise 1 lb (oz-in.)	0.57	0.57
Nut weight (lbs)	0.27	0.27
Ball Nut Part Number	8106-448-022	8106-448-026
Flange Part Number	8105-448-002	8105-448-002
Wiper Kit Part Number	8106-101-006	8106-101-006

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			8106-448-045
Flange Part Number			8105-448-004
Wiper Kit Part Number			8106-101-006

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
Flange Part Number	8105-448-002	8105-448-002
Wiper Kit Part Number	8106-101-002	8106-101-002

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

0.631 x 0.200

Precision Rolled Ball Screws — Inch Series

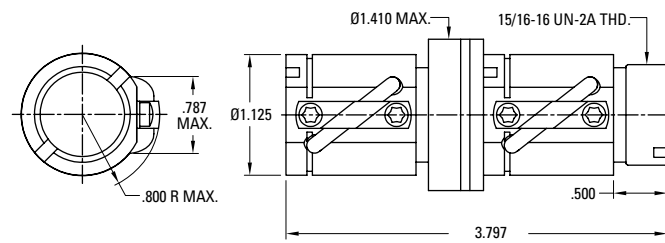
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9098	190-9099	
Maximum Length 144" P/N	190-9121	190-9122	

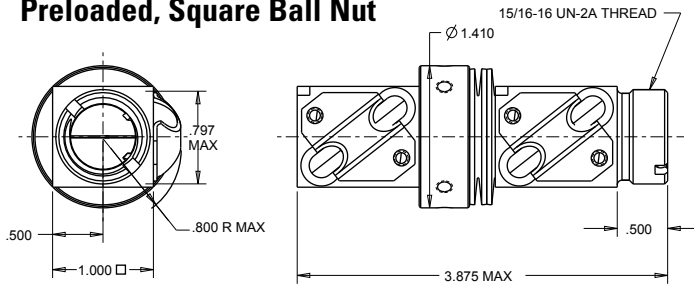
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Preloaded, Single Circuit, Round Ball Nut



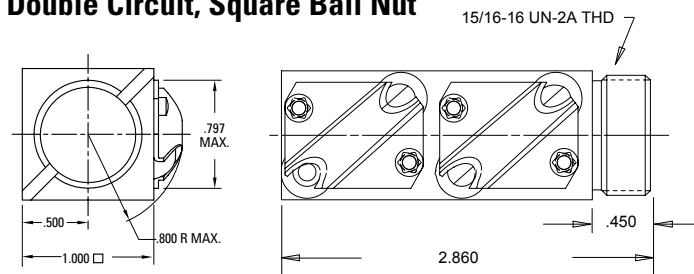
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	800
Max. Static Load (lbs)	6,384	6,384
Torque to raise 1 lb (oz-in.)	0.57	0.57
Nut weight (lbs)	0.79	0.79
Ball Nut Part Number	8106-448-015	8106-448-019
Flange Part Number	8105-448-002	8105-448-002
Wiper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

Preloaded, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	800	
Max. Static Load (lbs)	6,384	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.79	
Ball Nut Part Number	8106-448-012	
Flange Part Number	8105-448-002	
Wiper Kit Part Number	8106-101-006	

Double Circuit, Square Ball Nut

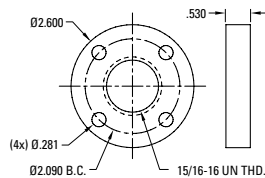
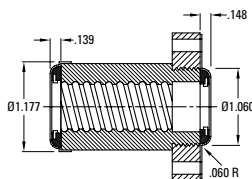


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,600	
Max. Static Load (lbs)	12,768	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.54	
Ball Nut Part Number	8106-448-036	
Flange Part Number	8105-448-002	
Wiper Kit Part Number	N/A	

Optional Wiper and Flange Kits

Wiper P/N 8106-101-002

Flange P/N 8105-448-002



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

0.631 x 0.200

Precision Rolled Ball Screws — Inch Series

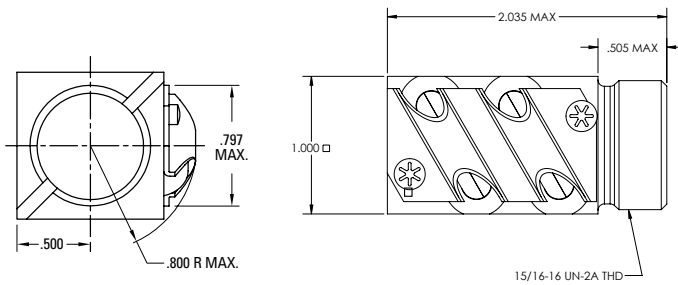
Diameter x Lead (in.)	0.631 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.9
Screw Root Diameter (in.)	0.50
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9098	190-9099	
Standard Length 144" P/N	190-9121	190-9122	

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

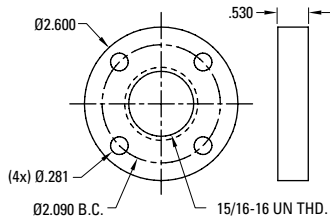


Thread Direction	Right Hand	Left Hand
Nut Material		Alloy Steel
Dynamic Load (lbs)		1,600
Max. Static Load (lbs)		12,768
Torque to raise 1 lb (oz-in.)		0.57
Nut weight (lbs)		0.54
Ball Nut Part Number		8106-448-037
Flange Part Number		8105-448-002
Wiper Kit Part Number		N/A

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8105-448-002



0.631 x 1.000

Precision Rolled Ball Screws — Inch Series

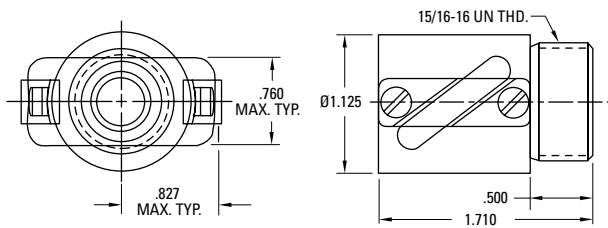
Diameter x Lead (in.)	0.631 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	0.8
Screw Root Diameter (in.)	0.48
Nominal Ball Diameter (in.)	0.125
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 96" P/N	190-9549		

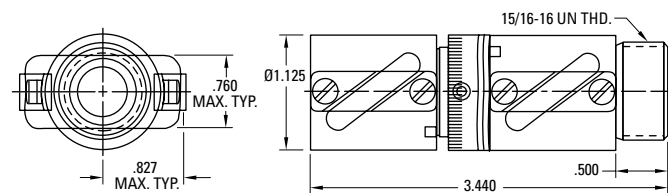
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	8106-448-041	
Flange Part Number	8106-448-046	
Wiper Kit Part Number	8106-101-007	

Preloaded, Double Circuit, Round Ball Nut

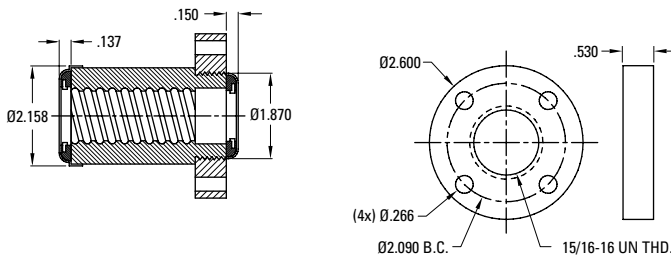


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	578	
Max. Static Load (lbs)	2,425	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	0.67	
Ball Nut Part Number	8106-448-042	
Flange Part Number	8106-448-046	
Wiper Kit Part Number	8106-101-007	

Optional Wiper and Flange Kits

Wiper P/N 8106-101-007

Flange P/N 8106-448-046



Note: Wiper kit does not include flange end cap.

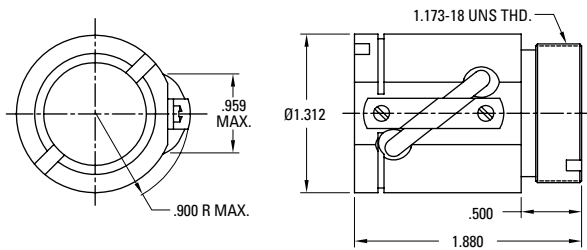
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

0.750 x 0.200

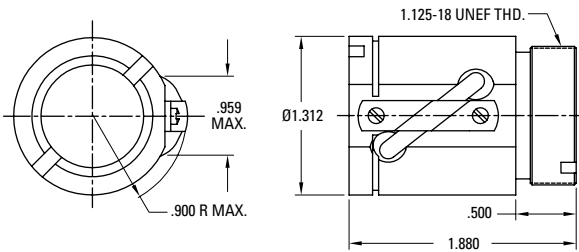
Precision Rolled Ball Screws — Inch Series

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

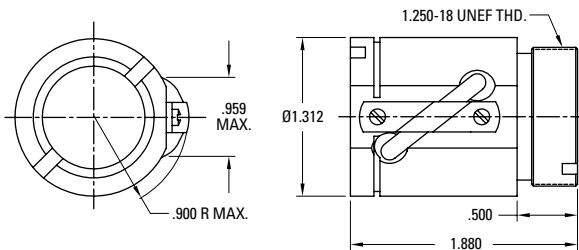
Single Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



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



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



Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9101		
Maximum Length 144" P/N	190-9124		

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

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Thread Direction	Right Hand	Left Hand
Nut Material	Carbon Steel	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	8107-448-047	
Flange Part Number	N/A	
Wiper Kit Part Number	N/A	

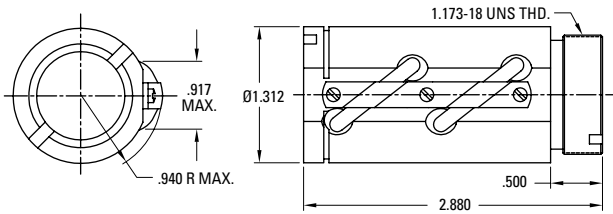
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

0.750 x 0.200

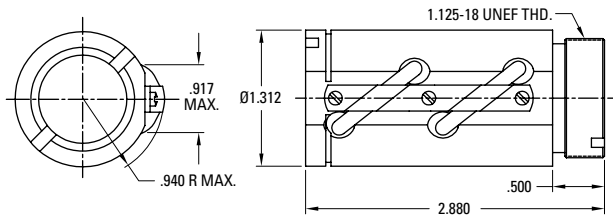
Precision Rolled Ball Screws — Inch Series

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

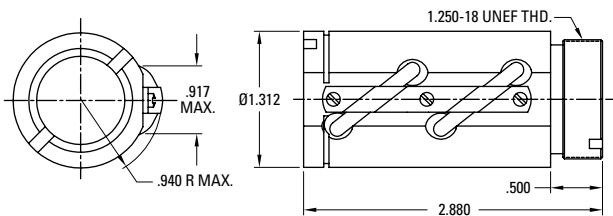
Double Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



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



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



Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9101		
Maximum Length 144" P/N	190-9124		

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

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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 118 – 137. Information on required lubrication is on page 177.

0.750 x 0.200

Precision Rolled Ball Screws — Inch Series

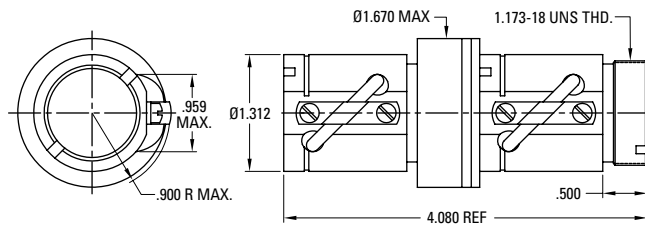
Diameter x Lead (in.)	0.750 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.66
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9101		
Maximum Length 144" P/N	190-9124		

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)



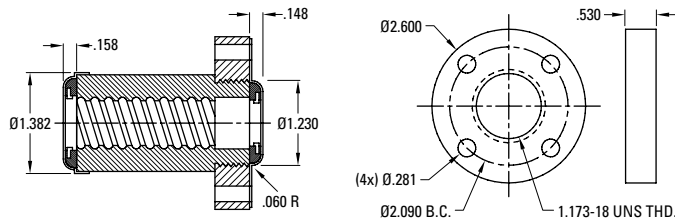
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	950	
Max. Static Load (lbs)	7,750	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.20	
Ball Nut Part Number	8107-448-025	
Flange Part Number	8107-448-007	
Wiper Kit Part Number	8107-101-002	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8107-101-002

Flange P/N 8107-448-007

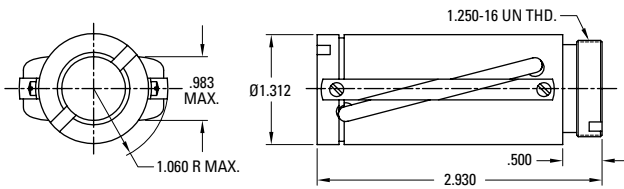


0.750 x 0.500

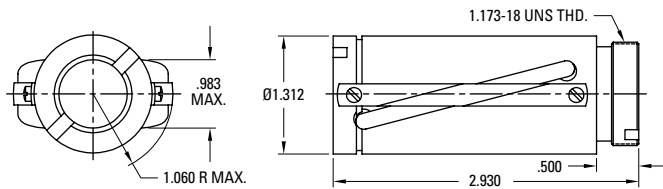
Precision Rolled Ball Screws — Inch Series

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

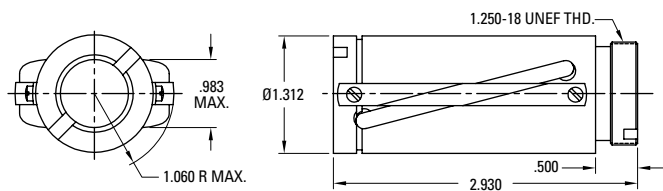
Double Circuit, Round Ball Nut with Load Lock (1.250 - 16 V-Thread)



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



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



Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9100		190-9006
Maximum Length 144" P/N	190-9123		190-9048

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

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

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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 118 – 137. Information on required lubrication is on page 177.

0.750 x 0.500

Precision Rolled Ball Screws — Inch Series

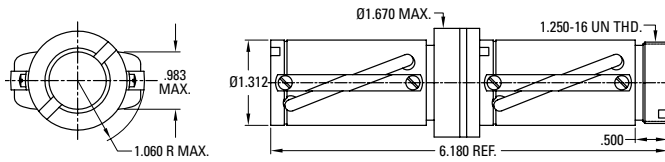
Diameter x Lead (in.)	0.750 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.4
Screw Root Diameter (in.)	0.63
Nominal Ball Diameter (in.)	0.156
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 72" P/N	190-9100		
Maximum Length 144" P/N	190-9123		

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)



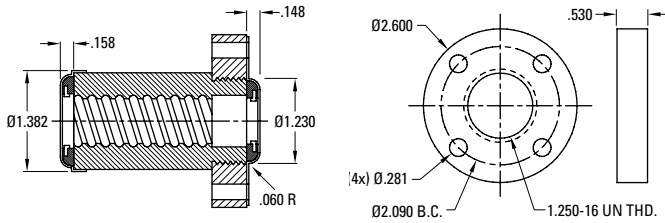
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,450	
Max. Static Load (lbs)	24,200	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	1.85	
Ball Nut Part Number	8107-448-011	
Flange Part Number	8107-448-002	
Wiper Kit Part Number	8107-101-002	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8107-101-002

Flange P/N 8107-448-002 / 8107-448-007



0.875 x 0.200

Precision Rolled Ball Screws — Inch Series

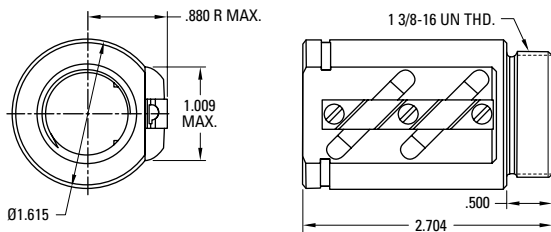
Diameter x Lead (in.)	0.875 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	1.8
Screw Root Diameter (in.)	0.74
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9550		
Maximum Length 288" P/N	190-9551		

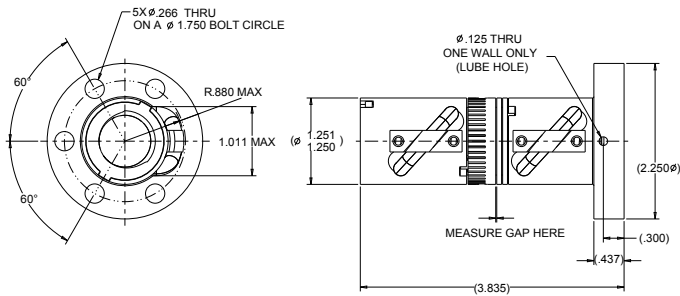
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	8109-448-001	
Flange Part Number	8109-448-002	
Wiper Kit Part Number	8109-101-001	

Preloaded, Single Circuit, Round Ball Nut with Integral Flange

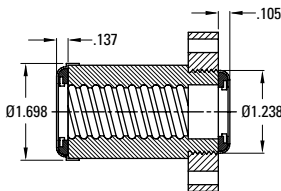


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	971	
Max. Static Load (lbs)	9,482	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	1.81	
Ball Nut Part Number	8109-448-003	
Flange Part Number	Integral	
Wiper Kit Part Number	Internal	

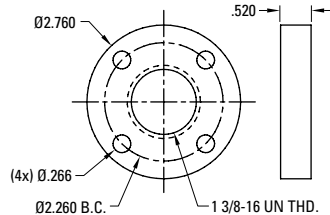
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8109-101-001



Flange P/N 8109-448-002



Note: Wiper kit does not include flange end cap.

1.000 x 0.250

Precision Rolled Ball Screws — Inch Series

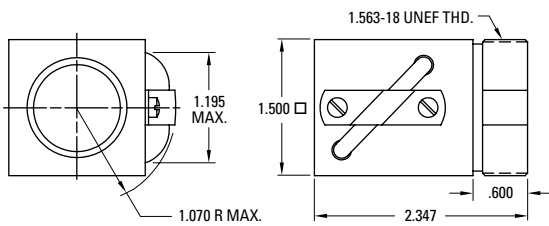
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9104	190-9105	
Maximum Length 288" P/N	190-9127		

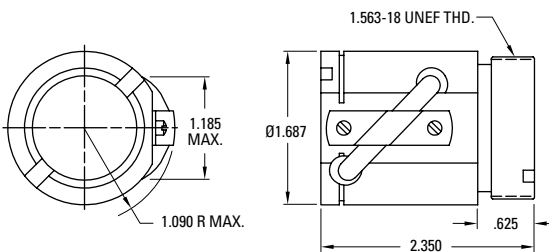
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Single Circuit, Square Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,612	1,612
Max. Static Load (lbs)	15,300	15,300
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	0.81	0.81
Ball Nut Part Number	8110-448-055	8110-448-091
Flange Part Number	8110-448-002	8110-448-002
Wiper Kit Part Number	8110-101-008	8110-101-008

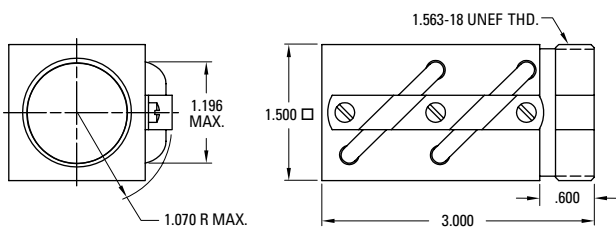
Single Circuit, Round Ball Nut with Load Lock



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	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	8110-101-008	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

1.000 x 0.250

Precision Rolled Ball Screws — Inch Series

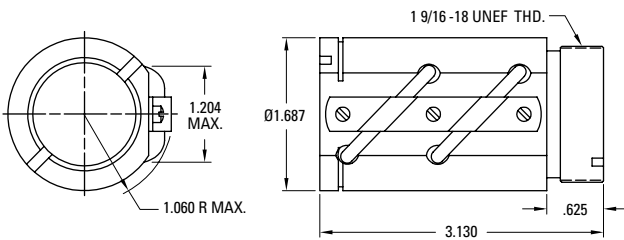
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9104	190-9105	
Maximum Length 288" P/N	190-9127		

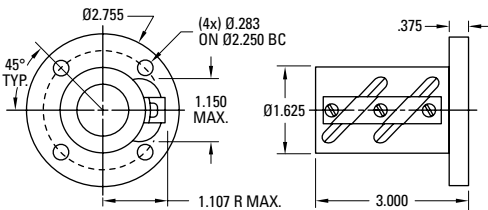
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

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

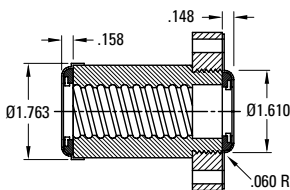


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,350	3,350
Max. Static Load (lbs)	30,750	30,750
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	1.50	1.50
Ball Nut Part Number	8110-448-087	8110-448-088
Flange Part Number	Integral	Integral
Wiper Kit Part Number	8110-101-007	8110-101-007

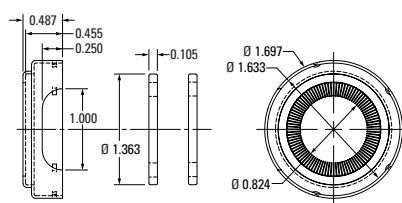
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

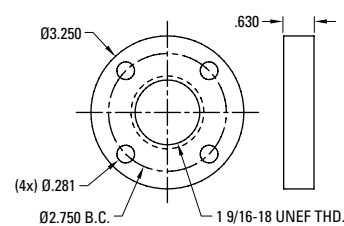
Wiper P/N 8110-101-002



Wiper P/N 8110-101-007



Flange P/N 8110-448-002



1.000 x 0.250

Precision Rolled Ball Screws — Inch Series

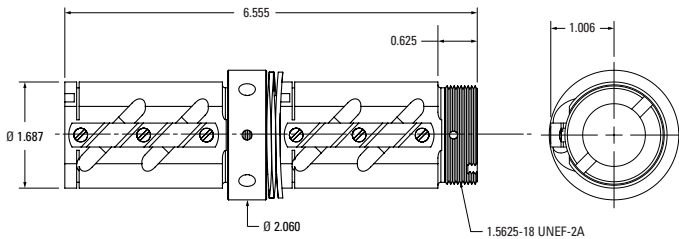
Diameter x Lead (in.)	1.000 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9104	190-9105	
Maximum Length 288" P/N	190-9127		

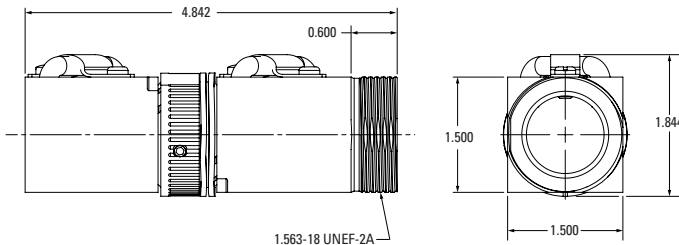
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Preloaded, Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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)	2.50	
Ball Nut Part Number	8110-448-017	8110-448-018
Flange Part Number	8110-448-002	8110-448-002
Wiper Kit Part Number	8110-101-002	8110-101-002

Preloaded, Single Circuit, Square Ball Nut

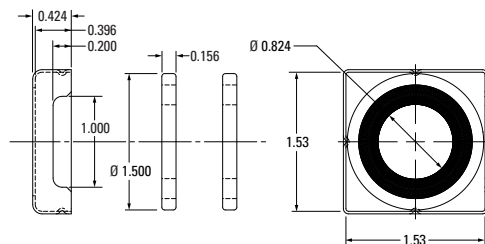


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	1,612	1,612
Max. Static Load (lbs)	15,300	15,300
Torque to raise 1 lb (oz-in.)	0.71	0.71
Nut weight (lbs)	0.81	0.81
Ball Nut Part Number	8110-448-100	8110-448-089
Flange Part Number	8110-448-002	8110-448-002
Wiper Kit Part Number	8110-101-008	8110-101-008

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8110-101-008



Note: Wiper Kit does not include flange end cap.

1.000 x 0.500

Precision Rolled Ball Screws — Inch Series

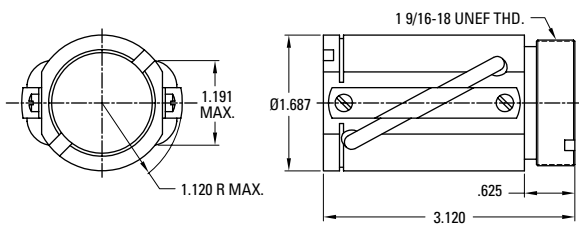
Diameter x Lead (in.)	1.000 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.6
Screw Root Diameter (in.)	0.88
Nominal Ball Diameter (in.)	0.156
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9103		
Maximum Length 288" P/N	190-9126		

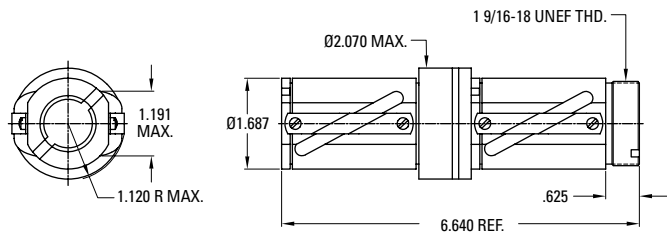
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,950	
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

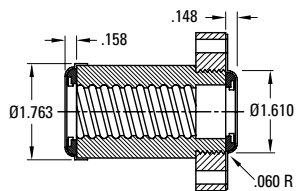


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,950	
Max. Static Load (lbs)	32,300	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	2.90	
Ball Nut Part Number	8110-448-016	
Flange Part Number	8110-448-002	
Wiper Kit Part Number	8110-101-002	

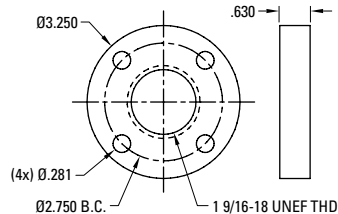
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8110-101-002



Flange P/N 8110-448-002



1.000 x 1.000

Precision Rolled Ball Screws — Inch Series

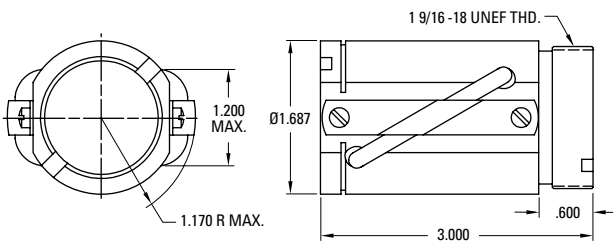
Diameter x Lead (in.)	1.000 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.3
Screw Root Diameter (in.)	0.84
Nominal Ball Diameter (in.)	0.156
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9102		190-9150"
Maximum Length 288" P/N	190-9125		

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

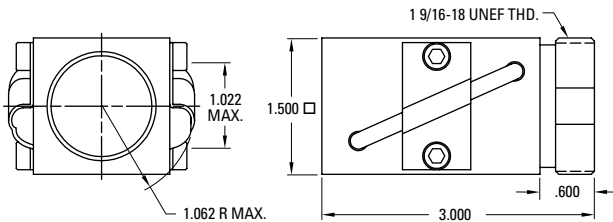
Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand	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

Double Circuit, Square Ball Nut with Load Lock

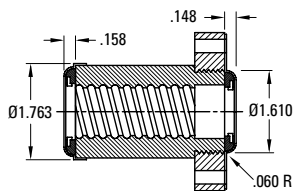


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	2,400	
Max. Static Load (lbs)	13,600	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	1.25	
Ball Nut Part Number	8110-448-086	
Flange Part Number	8110-448-002	
Wiper Kit Part Number	8110-101-009	

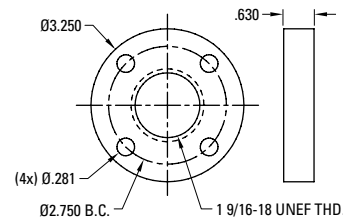
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8110-101-002



Flange P/N 8110-448-002 / 8110-448-037



1.150 x 0.200

Precision Rolled Ball Screws — Inch Series

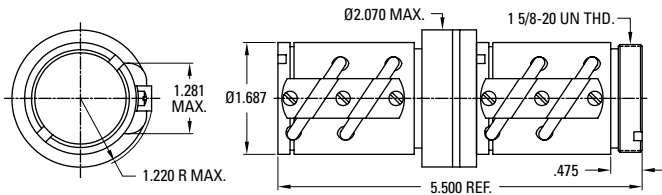
Diameter x Lead (in.)	1.150 x 0.200
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	3.2
Screw Root Diameter (in.)	1.02
Nominal Ball Diameter (in.)	0.125
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9106		
Maximum Length 288" P/N	190-9129		

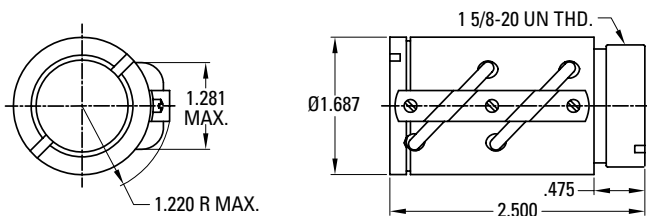
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Preloaded, Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

Double Circuit, Round Ball Nut with Load Lock

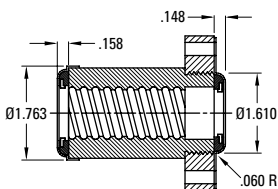


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	2,400	
Max. Static Load (lbs)	27,550	
Torque to raise 1 lb (oz-in.)	0.57	
Nut weight (lbs)	0.88	
Ball Nut Part Number	8111-448-006	
Flange Part Number	8111-448-002	
Wiper Kit Part Number	8111-101-002	

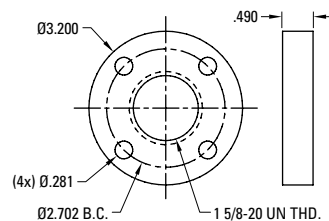
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8111-101-002



Flange P/N 8111-448-002



1.171 x 0.413

Precision Rolled Ball Screws — Inch Series

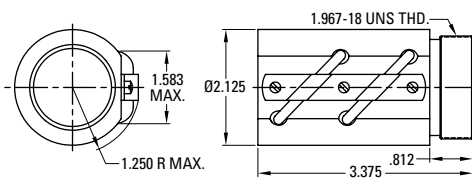
Diameter x Lead (in.)	1.171 x 0.413
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	2.8
Screw Root Diameter (in.)	0.87
Nominal Ball Diameter (in.)	0.281
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9552		
Maximum Length 288" P/N	190-9553		

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

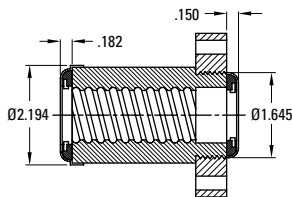


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,894	
Max. Static Load (lbs)	22,917	
Torque to raise 1 lb (oz-in.)	1.17	
Nut weight (lbs)	1.94	
Ball Nut Part Number	8111-448-015	
Flange Part Number	8111-448-003	
Wiper Kit Part Number	8111-101-003	

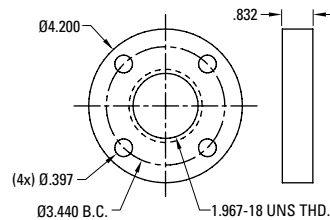
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8111-101-003



Flange P/N 8111-448-003



Note: Wiper kit does not include flange end cap.

1.500 x 0.250

Precision Rolled Ball Screws — Inch Series

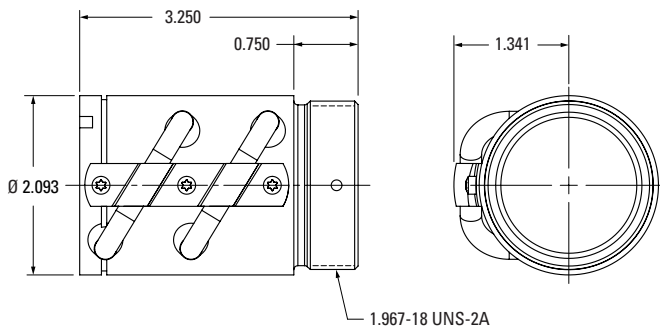
Diameter x Lead (in.)	1.500 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.2
Screw Root Diameter (in.)	1.32
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9110	190-9567	
Maximum Length 288" P/N	190-9133	190-9568	

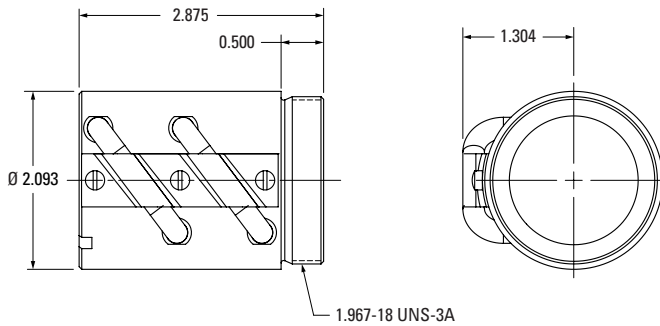
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	4,050	
Max. Static Load (lbs)	47,450	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	1.5	
Ball Nut Part Number	8115-448-020	
Flange Part Number	8115-448-009	
Wiper Kit Part Number	8115-101-006	

Double Circuit, Round Ball Nut



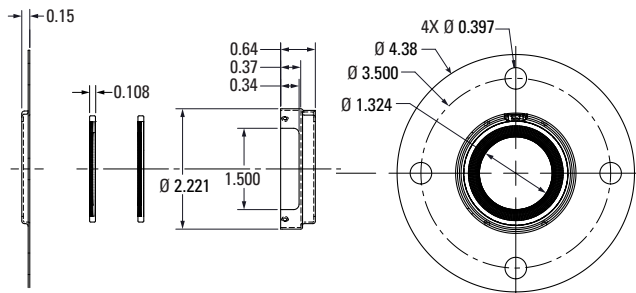
Thread Direction	Right Hand	Left Hand (1)
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)		4,198
Max. Static Load (lbs)		44,030
Torque to raise 1 lb (oz-in.)		0.71
Nut weight (lbs)		1.65
Ball Nut Part Number		8115-448-083 (1)
Flange Part Number		8115-448-084
Wiper Kit Part Number		8115-101-015

(1) Load Lock not available

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

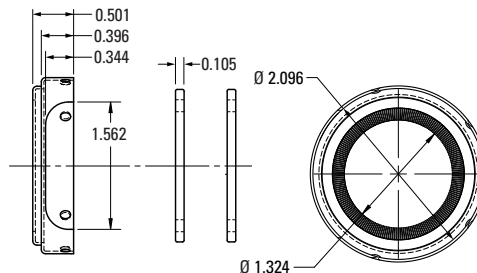
Optional Wiper Kits (Flange Kits, see next page)

Wiper P/N 8115-101-006



Note: Wiper kit does not include flange end cap.

Wiper P/N 8115-101-015



1.500 x 0.250

Precision Rolled Ball Screws — Inch Series

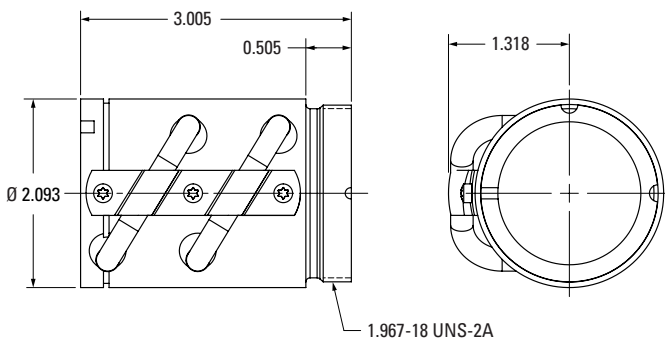
Diameter x Lead (in.)	1.500 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.2
Screw Root Diameter (in.)	1.32
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9110	190-9567	
Maximum Length 288" P/N	190-9133	190-9568	

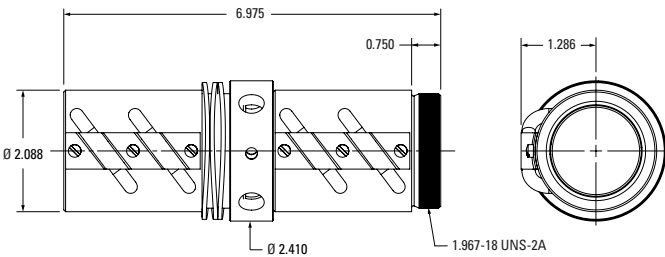
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	4,050	
Max. Static Load (lbs)	47,450	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	1.5	
Ball Nut Part Number	8115-448-085	
Flange Part Number	8115-448-084	
Wiper Kit Part Number	8115-101-006	

Preloaded, Double Circuit, Round Ball Nut with Load Lock



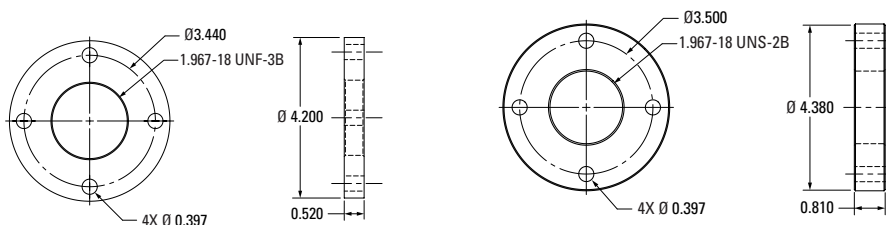
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	3,645	
Max. Static Load (lbs)	47,075	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	4.00	
Ball Nut Part Number	8115-448-012	
Flange Part Number	8115-448-009	
Wiper Kit Part Number	8115-101-006	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kits (Wiper Kits, see previous page)

Flange P/N 8115-448-084

Flange P/N 8115-448-009



Note: Wiper kit does not include flange end cap.

1.500 x 0.473

Precision Rolled Ball Screws — Inch Series

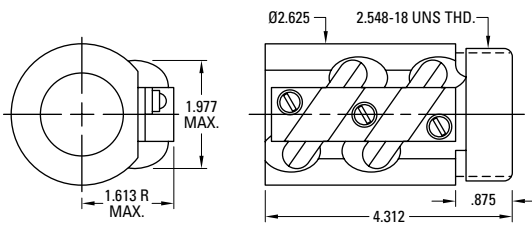
Diameter x Lead (in.)	1.500 x 0.473
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	4.5
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9554		
Maximum Length 288" P/N	190-9555		

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

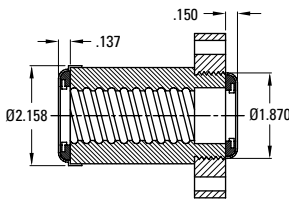


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	10,050	
Max. Static Load (lbs)	57,770	
Torque to raise 1 lb (oz-in.)	1.34	
Nut weight (lbs)	3.94	
Ball Nut Part Number	8115-448-081	
Flange Part Number	8115-448-064	
Wiper Kit Part Number	8115-101-014	

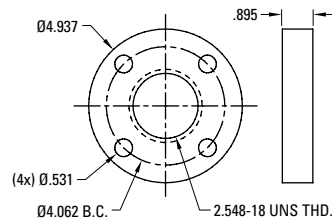
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8115-101-014



Flange P/N 8115-448-064



Note: Wiper kit does not include flange end cap.

1.500 x 0.500

Precision Rolled Ball Screws — Inch Series

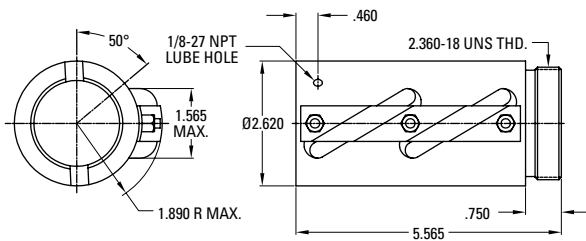
Diameter x Lead (in.)	1.500 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.27
Nominal Ball Diameter (in.)	0.312
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9108	190-9109	
Maximum Length 288" P/N	190-9131		

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

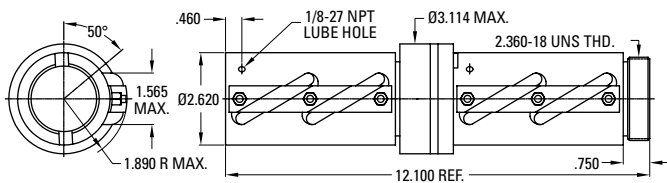
Double Circuit, Round Ball Nut with Load Lock



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

* Wiper kit included with this ball nut.

Preloaded, Double Circuit, Round Ball Nut with Load Lock

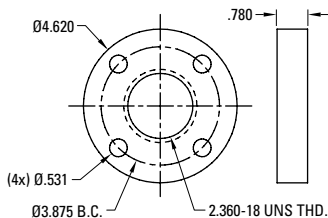


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	14,513	
Max. Static Load (lbs)	102,300	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	12.20	
Ball Nut Part Number	8115-448-006	
Flange Part Number	8115-448-004	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8115-448-004



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

1.500 x 1.000

Precision Rolled Ball Screws — Inch Series

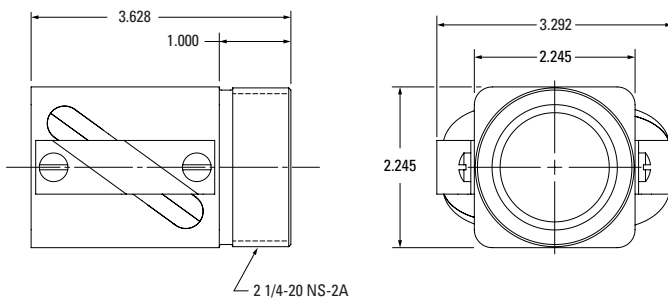
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9107	190-9569	
Maximum Length 288" P/N	190-9130	190-9570	

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



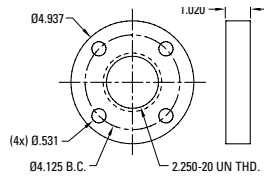
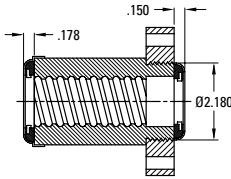
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)		8,250
Max. Static Load (lbs)		34,662
Torque to raise 1 lb (oz-in.)		2.83
Nut weight (lbs)		3.88
Ball Nut Part Number		8115-448-080
Flange Part Number		8115-448-002
Wiper Kit Part Number		8115-101-012

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Wiper and Flange Kits

Wiper P/N 8115-101-012

Flange P/N 8115-448-002



Note: Wiper kit does not include flange end cap.

1.500 x 1.000

Precision Rolled Ball Screws — Inch Series

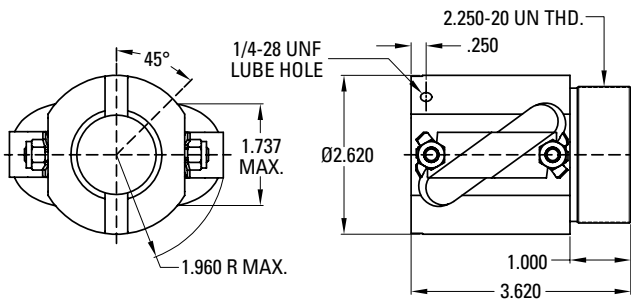
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9107	190-9569	
Maximum Length 288" P/N	190-9130	190-9570	

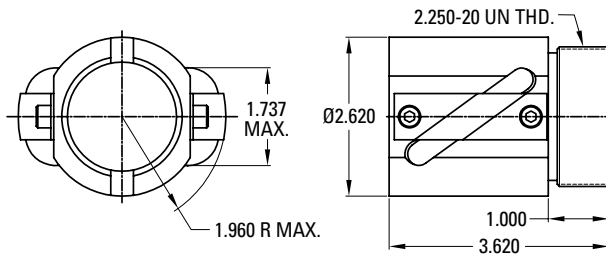
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut – High Speed



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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)	3.90	
Ball Nut Part Number	8115-448-049	
Flange Part Number	8115-448-002	
Wiper Kit Part Number*	Internal	

Double Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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)	3.90	
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 118 – 137. Information on required lubrication is on page 177.

1.500 x 1.000

Precision Rolled Ball Screws — Inch Series

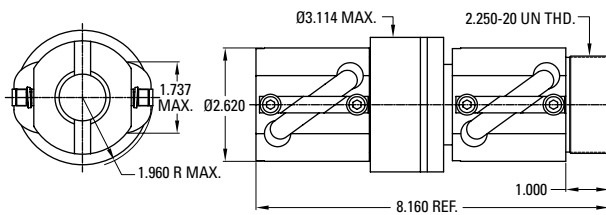
Diameter x Lead (in.)	1.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.14
Nominal Ball Diameter (in.)	0.344
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9107	190-9569	
Maximum Length 288" P/N	190-9130	190-9570	

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

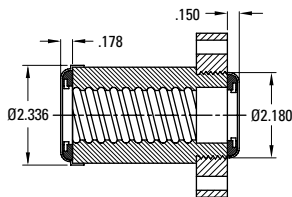


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	8,250	
Max. Static Load (lbs)	47,800	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.60	
Ball Nut Part Number	8115-448-011	
Flange Part Number	8115-448-002	
Wiper Kit Part Number*	Internal	

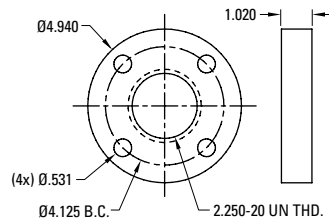
* Wiper kit included with this ball nut.

Optional Wiper and Flange Kits

Wiper P/N 8115-101-012



Flange P/N 8115-448-002



Note: Wiper kit does not include flange end cap.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

1.500 x 1.875

Precision Rolled Ball Screws — Inch Series

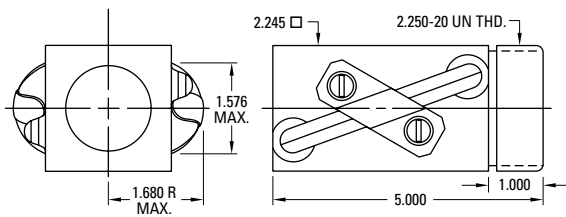
Diameter x Lead (in.)	1.500 x 1.875
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.3
Screw Root Diameter (in.)	1.19
Nominal Ball Diameter (in.)	0.281
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9556		
Maximum Length 288" P/N	190-9557		

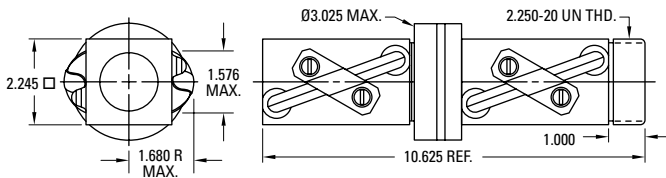
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Square Ball Nut



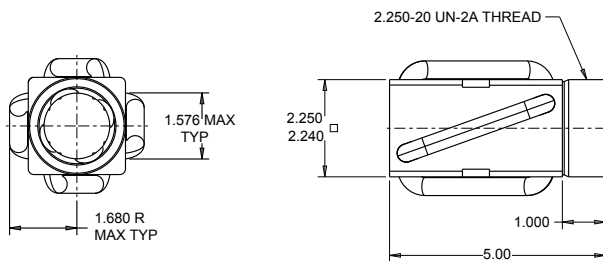
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	7,242	
Max. Static Load (lbs)	29,895	
Torque to raise 1 lb (oz-in.)	5.31	
Nut weight (lbs)	4.22	
Ball Nut Part Number	8115-448-082	
Flange Part Number	8115-448-002	
Wiper Kit Part Number	8115-101-013	

Preloaded, Double Circuit, Square Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	8115-448-087	
Flange Part Number	8115-448-002	
Wiper Kit Part Number	8115-101-013	

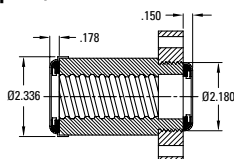
Quad Circuit, Square Ball Nut



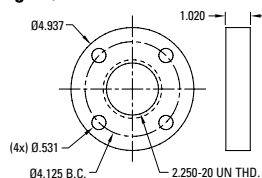
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	14,484	
Max. Static Load (lbs)	59,790	
Torque to raise 1 lb (oz-in.)	5.31	
Nut weight (lbs)	4.25	
Ball Nut Part Number	8115-448-086	
Flange Part Number	8115-448-002	
Wiper Kit Part Number	8115-101-013	

Optional Wiper and Flange Kits

Wiper P/N 8115-101-013



Flange P/N 8115-448-002



Note: Wiper kit does not include flange end cap.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

1.500 x 2.000

Precision Rolled Ball Screws — Inch Series

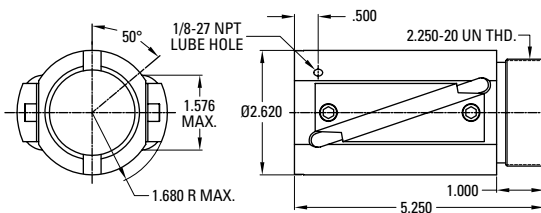
Diameter x Lead (in.)	1.500 x 2.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	5.6
Screw Root Diameter (in.)	1.21
Nominal Ball Diameter (in.)	0.281
Number of Starts	4

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9345		
Maximum Length 288" P/N	190-9409		

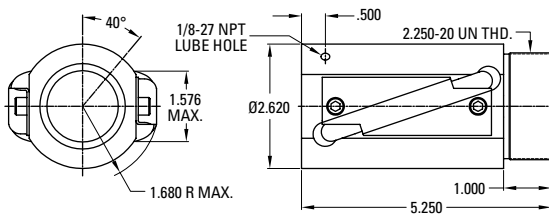
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	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

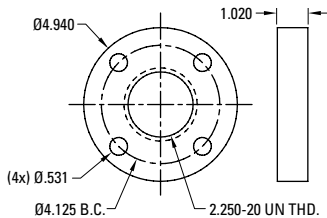


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	7,600	
Max. Static Load (lbs)	29,000	
Torque to raise 1 lb (oz-in.)	5.66	
Nut weight (lbs)	5.00	
Ball Nut Part Number	8115-448-057	
Flange Part Number	8115-448-002	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8115-448-002



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

2.000 x 0.500

Precision Rolled Ball Screws — Inch Series

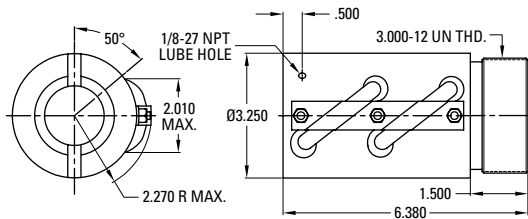
Diameter x Lead (in.)	2.000 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	9.8
Screw Root Diameter (in.)	1.72
Nominal Ball Diameter (in.)	0.375
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9112	190-9113	
Maximum Length 288" P/N	190-9135	190-9438	

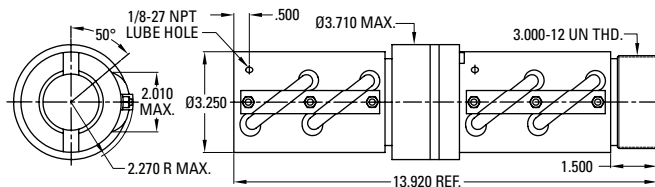
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

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)	154,635	154,635
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

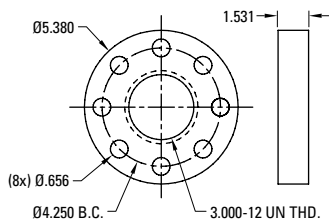


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	18,500	18,500
Max. Static Load (lbs)	154,635	154,635
Torque to raise 1 lb (oz-in.)	1.42	1.42
Nut weight (lbs)	19.25	19.25
Ball Nut Part Number	8120-448-006	8120-448-007
Flange Part Number	8120-448-002	8120-448-002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

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8120-448-002



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

2.000 x 1.000

Precision Rolled Ball Screws — Inch Series

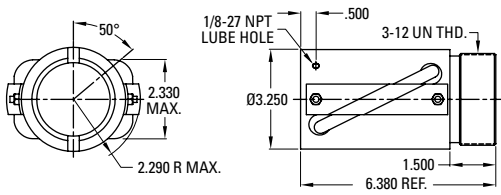
Diameter x Lead (in.)	2.000 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	9.8
Screw Root Diameter (in.)	1.72
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9111		
Maximum Length 288" P/N	190-9134		

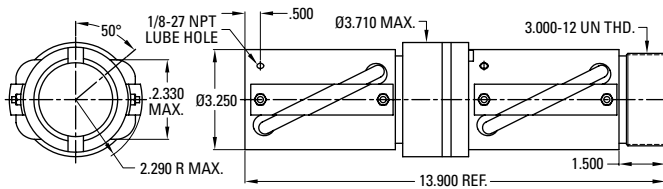
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	21,200	
Max. Static Load (lbs)	152,605	
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

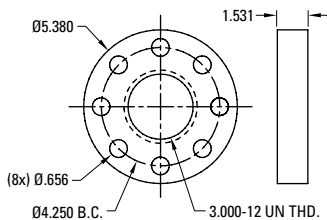


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	21,200	
Max. Static Load (lbs)	152,605	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	19.25	
Ball Nut Part Number	8120-448-019	
Flange Part Number	8120-448-002	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8120-448-002



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

2.250 x 0.500

Precision Rolled Ball Screws — Inch Series

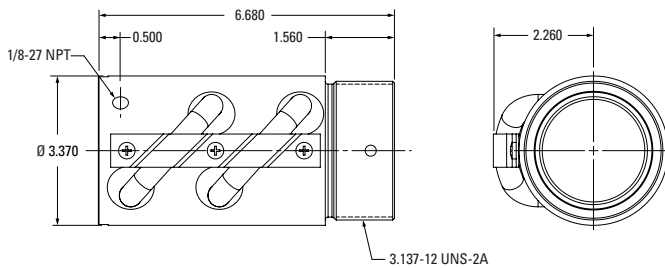
Diameter x Lead (in.)	2.250 x 0.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	10.9
Screw Root Diameter (in.)	1.85
Nominal Ball Diameter (in.)	0.375
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9114	190-9571	
Maximum Length 288" P/N	190-9137	190-9572	

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	8122-448-005	8122-448-007⁽¹⁾
Flange Part Number	8122-448-002	8122-448-008
Wiper Kit Part Number*	Internal	Internal

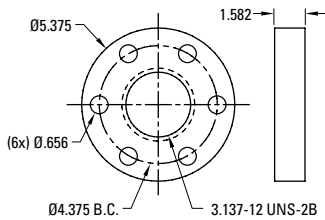
(1) Load Lock not available, 3.137-12 UNS-3A THD.

* Wiper kit included with this ball nut.

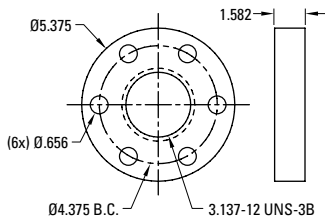
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8122-448-002



Flange P/N 8122-448-008



2.250 x 1.000

Precision Rolled Ball Screws — Inch Series

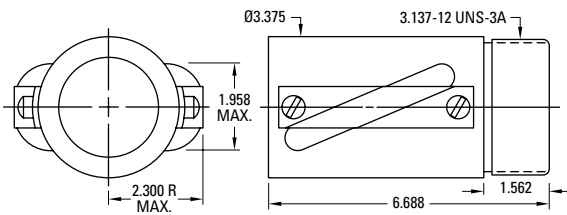
Diameter x Lead (in.)	2.250 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	10.9
Screw Root Diameter (in.)	1.85
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9558		
Maximum Length 288" P/N	190-9559		

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

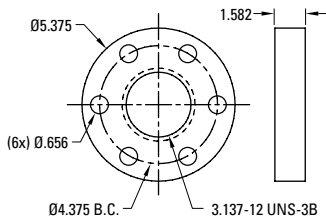


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	26,538	
Max. Static Load (lbs)	161,150	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	8.25	
Ball Nut Part Number	8122-448-006	
Flange Part Number	8122-448-008	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8122-448-008



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

2.500 x 0.250

Precision Rolled Ball Screws — Inch Series

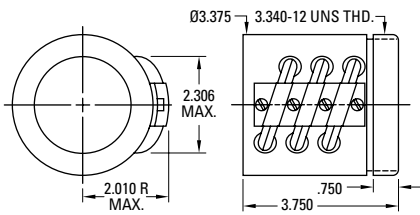
Diameter x Lead (in.)	2.500 x 0.250
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	15.5
Screw Root Diameter (in.)	2.32
Nominal Ball Diameter (in.)	0.156
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9560		
Maximum Length 288" P/N	190-9561		

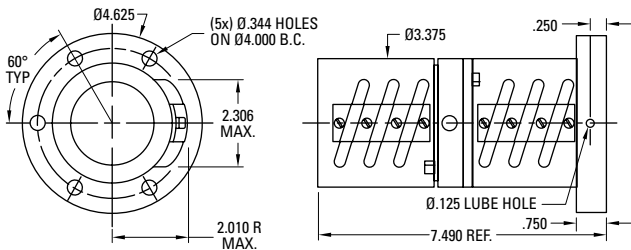
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

Triple Circuit, Round Ball Nut



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	8125-448-021	
Flange Part Number	8125-448-022	
Wiper Kit Part Number*	Internal	

Preloaded, Triple Circuit, Round Ball Nut with Integral Flange



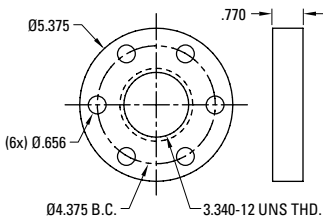
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	6,315	
Max. Static Load (lbs)	81,938	
Torque to raise 1 lb (oz-in.)	0.71	
Nut weight (lbs)	4.72	
Ball Nut Part Number		
Flange Part Number	Integral	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8125-448-022

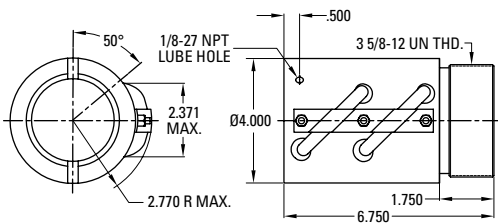


2.500 x 0.500

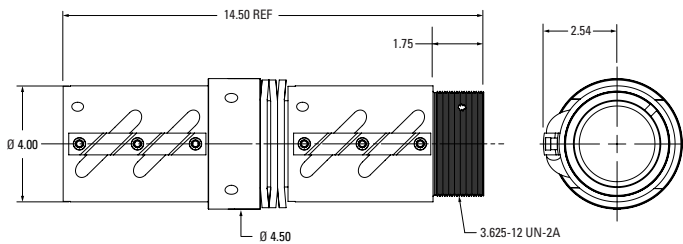
Precision Rolled Ball Screws — Inch Series

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

Double Circuit, Round Ball Nut with Load Lock

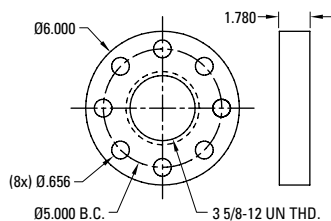


Preloaded, Double Circuit, Round Ball Nut with Load Lock



Optional Flange Kit

Flange P/N 8125-448-002



Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9116		
Maximum Length 288" P/N	190-9139		

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

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

* Wiper kit included with this ball nut.

Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	8125-448-006	
Flange Part Number	8125-448-002	
Wiper Kit Part Number*	Internal	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

2.500 x 1.000

Precision Rolled Ball Screws — Inch Series

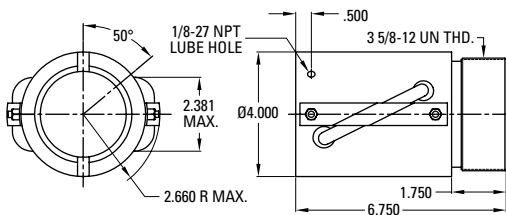
Diameter x Lead (in.)	2.500 x 1.000
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	15.0
Screw Root Diameter (in.)	2.22
Nominal Ball Diameter (in.)	0.375
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9115		
Maximum Length 288" P/N	190-9138		

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

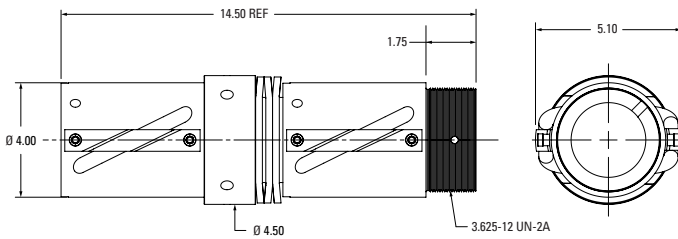
Double Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	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	

* Wiper kit included with this ball nut.

Preloaded, Double Circuit, Round Ball Nut with Load Lock

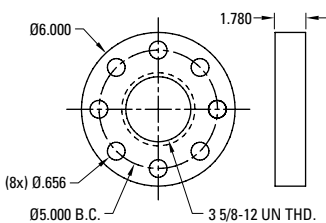


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	22,981	
Max. Static Load (lbs)	186,000	
Torque to raise 1 lb (oz-in.)	1.42	
Nut weight (lbs)	13.00	
Ball Nut Part Number	8125-448-004	
Flange Part Number	8125-448-002	
Wiper Kit Part Number*	Internal	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8125-448-002



3.000 x 0.660

Precision Rolled Ball Screws — Inch Series

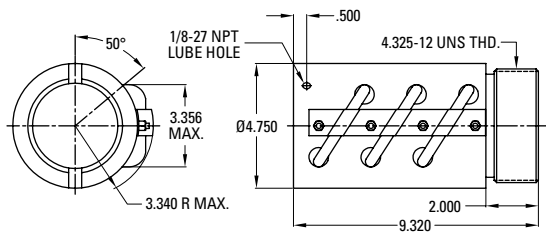
Diameter x Lead (in.)	3.000 x 0.660
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	18.3
Screw Root Diameter (in.)	2.48
Nominal Ball Diameter (in.)	0.500
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9117		
Maximum Length 288" P/N	190-9140		

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

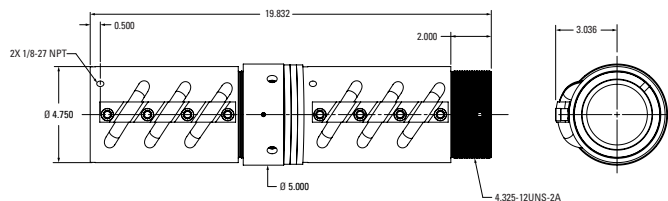
Triple Circuit, Round Ball Nut with Load Lock



Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	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	

* Wiper kit included with this ball nut.

Preloaded, Triple Circuit, Round Ball Nut with Load Lock

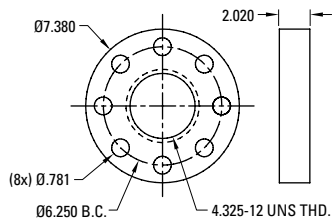


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	44,316	
Max. Static Load (lbs)	323,950	
Torque to raise 1 lb (oz-in.)	1.87	
Nut weight (lbs)	26.00	
Ball Nut Part Number	8130-448-004	
Flange Part Number	8130-448-002	
Wiper Kit Part Number*	Internal	

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8130-448-002



3.000 x 1.500

Precision Rolled Ball Screws — Inch Series

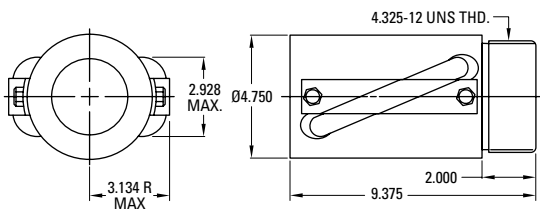
Diameter x Lead (in.)	3.000 x 1.500
Lead Accuracy (in/ft)	± 0.004
Screw Weight (lbs/ft)	19.3
Screw Root Diameter (in.)	2.48
Nominal Ball Diameter (in.)	0.500
Number of Starts	2

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Standard Length 144" P/N	190-9562		
Maximum Length 288" P/N	190-9563		

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



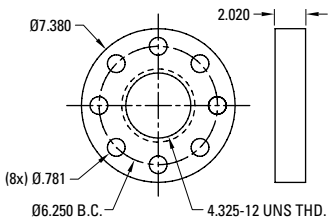
Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	53,646	
Max. Static Load (lbs)	253,617	
Torque to raise 1 lb (oz-in.)	4.25	
Nut weight (lbs)	27.2	
Ball Nut Part Number	8130-448-018	
Flange Part Number	8130-448-020	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Optional Flange Kit

Flange P/N 8130-448-020



4.000 x 1.000

Precision Rolled Ball Screws — Inch Series

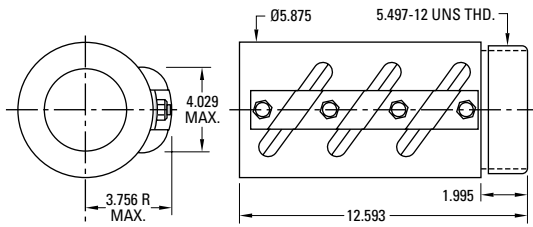
Diameter x Lead (in.)	4.000 x 1.000
Lead Accuracy (in/ft)	± 0.007
Screw Weight (lbs/ft)	34.4
Screw Root Diameter (in.)	3.34
Nominal Ball Diameter (in.)	0.625
Number of Starts	1

Ball Screw Part Numbers

Thread Direction	Right Hand	Left Hand	Right Hand
Screw Material	Alloy Steel	Alloy Steel	Stainless Steel
Maximum Length 244" P/N	190-9564		

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

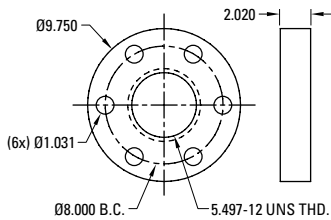


Thread Direction	Right Hand	Left Hand
Nut Material	Alloy Steel	Alloy Steel
Dynamic Load (lbs)	85,758	
Max. Static Load (lbs)	476,970	
Torque to raise 1 lb (oz-in.)	2.83	
Nut weight (lbs)	53.5	
Ball Nut Part Number	8140-448-001	
Flange Part Number	8140-448-002	
Wiper Kit Part Number*	Internal	

* Wiper kit included with this ball nut.

Optional Flange Kit

Flange P/N 8140-448-002



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Assembly Ordering

Assembly Ordering Key - Inch Series Ball Screws

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	03	08	L	45.5	F	R	X-	BK	1	S	X		X	
1. Nut configuration MR = RH, high capacity, cylindrical MV = RH, high capacity, V-threads R- = RH, dual circuit (3066 = triple circuit) RB = Precision high lead (legacy) RC = RH, single circuit RD = RH, single circuit, preloaded RE = LH, single circuit, preloaded RF = Dual circuits, square RG = Dual shortened circuits, square RH = RH, dual circuit, high speed RJ = RH, dual circuit, preloaded, high speed RK = LH, single circuit RL = LH, dual circuit RP = RH, dual circuit, preloaded RQ = RH, single circuit, Square RR = LH, square RS = RH, dual circuit, stainless steel RT = LH, dual circuit, preloaded RU = RH, square, preloaded RV = LH, square, preloaded RY = LH, round, 300 series stainless steel RZ = RH, stainless steel, preloaded 2. Nominal thread diameter 03 = 0.375 inch 05 = 0.500 inch 06 = 0.631 inch 07 = 0.750 inch 09 = 0.875 inch 10 = 1.000 inch 11 = 1.150 inch 11 = 1.171 inch 15 = 1.500 inch 20 = 2.000 inch 22 = 2.250 inch 25 = 2.500 inch 30 = 3.000 inch 40 = 4.000 inch					3. Thread lead 08 = 0.125 inch 05 = 0.200 inch 04 = 0.250 inch 41 = 0.413 inch 47 = 0.473 inch 02 = 0.500 inch 66 = 0.660 inch 01 = 1.000 inch 15 = 1.500 inch 18 = 1.875 inch 20 = 2.000 inch 4. Nut style L = Load Lock, standard LA = Load Lock, standard with 0.664-32 UNS V-threads LB = Load Lock, standard with 1.250-18 UNEF V-threads LC = Load Lock, standard with 1.125-18 UNEF V-threads LD = Load Lock, standard with 1.173-18 UNS V-threads N = Standard (no Load Lock) NB = Standard with 1.250-18 UNEF V-threads NC = Standard with 1.125-18 UNEF V-threads NF = Standard with Integral Flange ND = Standard with 1.173-18 UNS V-threads NA = Standard with 0.664-32 UNS V-threads NE = Standard with 1.967-18 UNS-3A V-threads 5. Threaded length xxx.xxx = Length (inch) 6. Assembly type X = No nut or flange (screw only) F = Screw and nut with flange O = Screw and nut without flange P = Screw and nut with pinned flange 7. Nut orientation R = Nut faces right end L = Nut faces left end X = Nut ships on arbor 8. Wipers X- = No wipers W- = Internal or optional add-on kit					9. Left end configuration X = Cut to length K = Machine to print xx.x = Annealed length [inch] BK = Base mount BF = Floating base mount FK = Flange mount FF = Floating flange mount QK = Base/flange mount QF = Floating base/flange mount WK = Heavy duty flange MK = Motor mount 10. Left end drive configuration Blank = With drive extension or cut to length 1 = Without drive extension 11. Left screw support configuration X = No support (machined only) S = Support installed on machined surface 12. Right end configuration X = Cut to length K = Machine to print xx.x = Annealed length [inch] BK = Base mount BF = Floating base mount FK = Flange mount FF = Floating flange mount QK = Base/flange mount QF = Floating base/flange mount WK = Heavy duty flange MK = Motor mount 13. Right end drive configuration Blank = With drive extension or cut to length 1 = Without drive extension 14. Right screw support configuration X = No support (machined only) S = Support installed on machined surface 15. Custom Modifier Blank = Standard M = Custom				

NOTE: Not all bearing supports are available in all sizes. See catalog or tact customer support for available combinations

Metric Ball Screws



Miniature Rolled Ball Screws

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

Metric Rolled Ball Screws

Thomson 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 (PST) Technology, which provides high accuracy (23 microns/300 mm standard) with the manufacturing efficiency of rolled processes. Ball Screw Assemblies are available in a wide range of diameters, leads, and nut styles - all designed to provide quiet, smooth running, and efficient performance. 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. Thomson Rolled Ball Screw Assemblies are ideal for machining centers, factory automation, packaging, injection molding, wood working, water jet cutting, electronic assembly, and medical applications.

Metric Ball Screws Overview



Miniature Rolled Ball Screws												
Diam.	Lead											
	1 mm	2 mm	2.5 mm	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	15 mm	20 mm
4 mm	●											
5 mm					●							
6 mm	●	●					●					
8 mm	●	●	●	●		●		●		●		
10 mm		●		●	●				●		●	●
12 mm		●		●	●	●			●			
13 mm					●	●			●	●		●
14 mm		●		●	●							

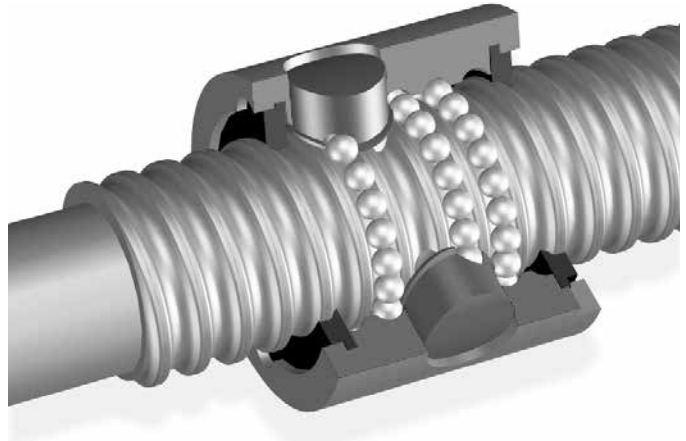
Metric Rolled Ball Screws														
Diam.	Lead													
	1 mm	2 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	15 mm	20 mm	25 mm	32 mm	40 mm	50 mm
16 mm				●			●							
20 mm				●						●				●
25 mm				●			●			●	●			●
32 mm				●			●			●		●	●	
40 mm				●			●			●			●	
50 mm							●			●				
63 mm							●			●				
80 mm							●							

Metric Ball Screw Nuts - Return Systems Overview

All ball screws require a recirculation system for the ball nut balls. Thomson return systems are optimized for each diameter and lead combination to maximize load capacity, minimize footprint and guarantee smooth and reliable operation.

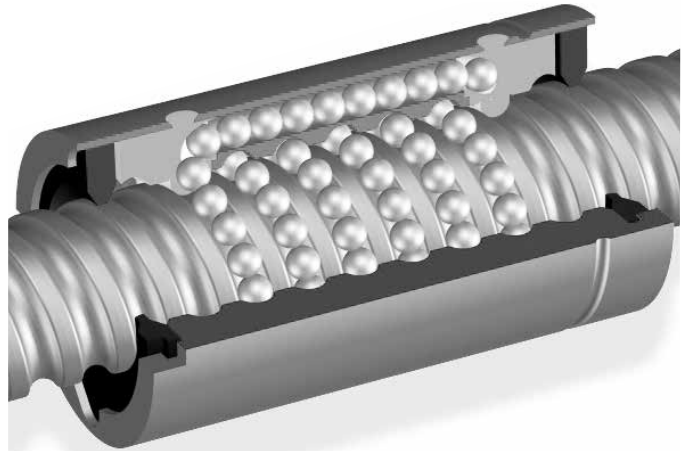
Single Circuit and Multi Circuit

After each turn, the balls are lifted from the shaft raceway and set back by a single turn. Thomson return systems made from glass-fiber reinforced plastic or steel guarantee a faultless and gentle recirculation of the balls.



Internal Return

After several turns, the balls are returned either by a patented plastic recirculation system integrated into the nut or through recirculation channels also integrated into the nut using steel recirculation inserts.



External Return

The balls are recirculated via two special end caps and return channels integrated into the nut.

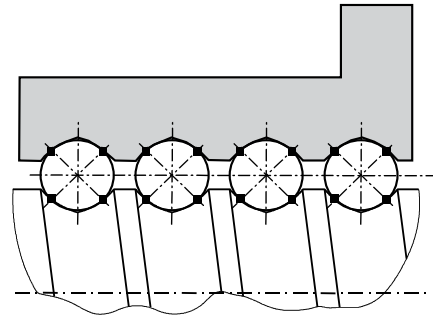


Metric Ball Screw Nuts - Pre-Loading Alternatives

Most of our metric ball nuts come standard as non-preloaded with pre-loaded available as an option on most sizes. Non-Preloaded Ball Nuts are a flexible, economical solution for use in industrial, transport grade applications. Preloaded Ball Nuts should be considered to eliminate backlash and increase system stiffness in applications where multi-directional positional accuracy and repeatability are required.

Pre-load (Type Z1)

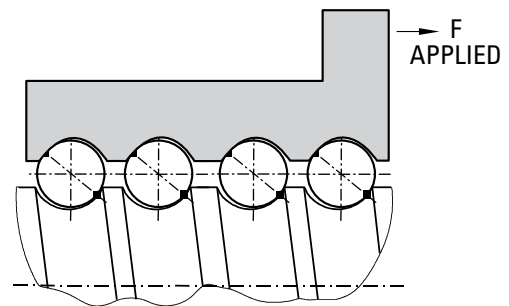
- Oversized balls slightly larger than the ball groove space are used to provide zero backlash between the screw and nut.
- The preload is approximately 1% to 2% of dynamic load capacity.
- Typically used for positioning applications where higher-level repeatability is desired.



No Pre-load (Type Z2)

(Standard lash)

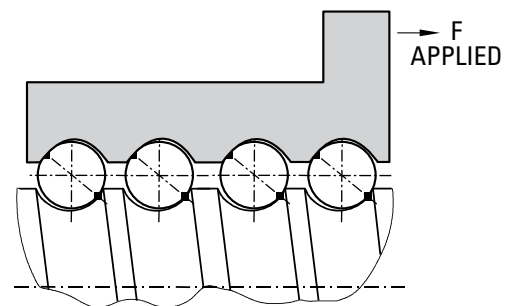
- Axial play is present between screw and nut.
- Typically used for transport or vertical applications.



No Pre-load (Type Z3)

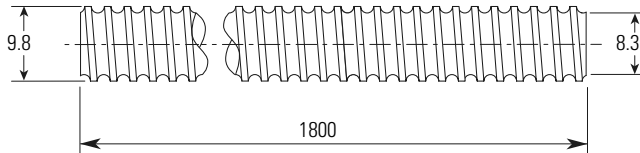
(Minimum lash)

- Axial play is present between screw and nut (held to 0.05 mm maximum).
- Typically used for transport or vertical applications.



Ø 10 x 2 mm Miniature Metric Ball Screws – Rolled

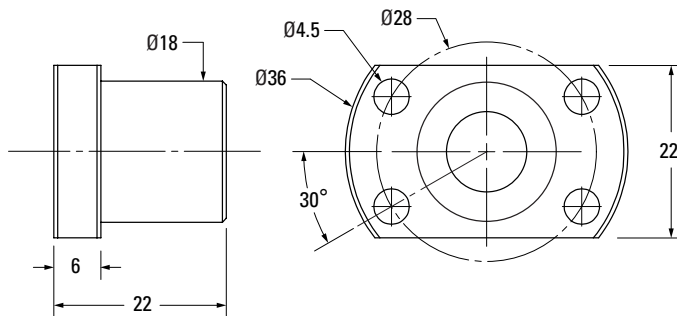
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	2 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.59 kg/m
Nominal Ball Diameter	1.588 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9680

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

Flanged Ball Nut

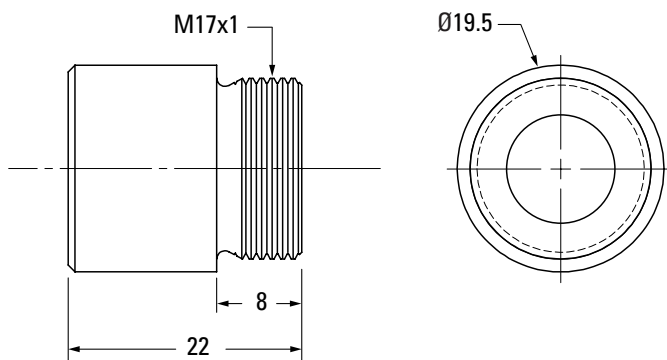


Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.0 kN
Max. Static Load	3.4 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	90
Wiper Type	N/A
Part Number	8103-448-039

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Threaded Ball Nut



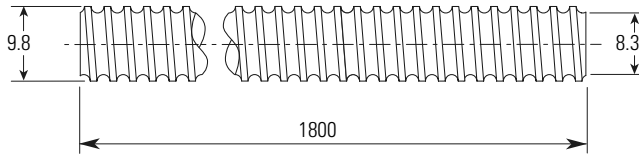
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.0 kN
Max. Static Load	3.4 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	90
Wiper Type	N/A
Part Number	8103-448-022

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 10 x 2 mm Miniature Metric Ball Screws – Rolled

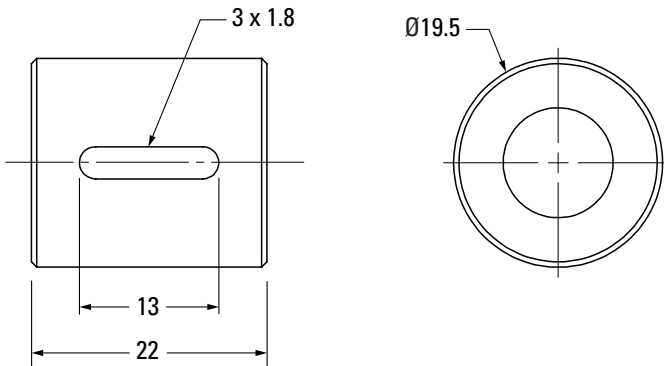
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	2 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.59 kg/m
Nominal Ball Diameter	1.588 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9680

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

Cylindrical Ball Nut



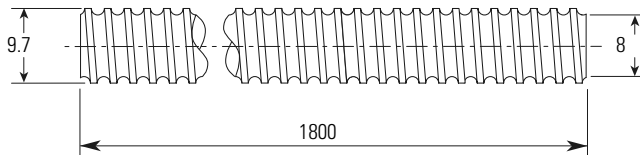
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.0 kN
Max. Static Load	3.4 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	90
Wiper Type	N/A
Part Number	8103-448-052

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 10 x 3 mm Miniature Metric Ball Screws – Rolled

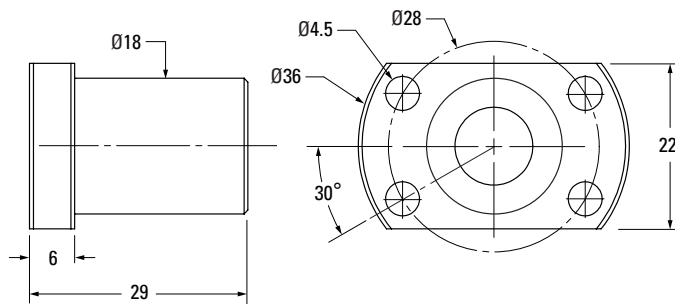
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	3 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.58 kg/m
Nominal Ball Diameter	1.984 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9681

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

Flanged Ball Nut

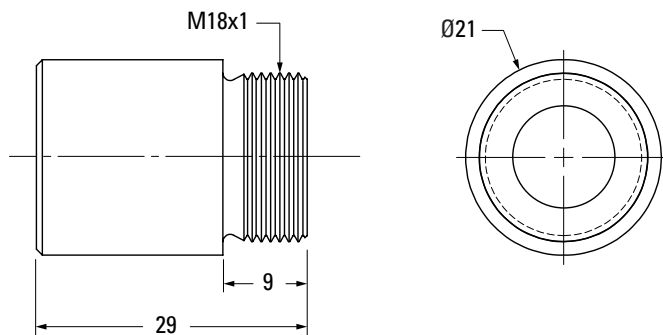


Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.8 kN
Max. Static Load	8.6 kN
Torque to Raise 1 kN	0.53 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	98
Wiper Type	N/A
Part Number	8103-448-040

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Threaded Ball Nut



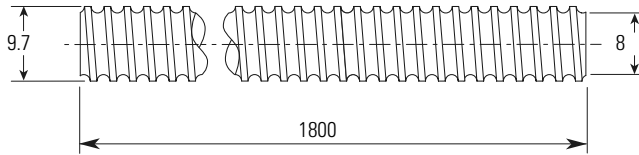
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.8 kN
Max. Static Load	8.6 kN
Torque to Raise 1 kN	0.53 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	98
Wiper Type	N/A
Part Number	8103-448-023

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 10 x 3 mm Miniature Metric Ball Screws – Rolled

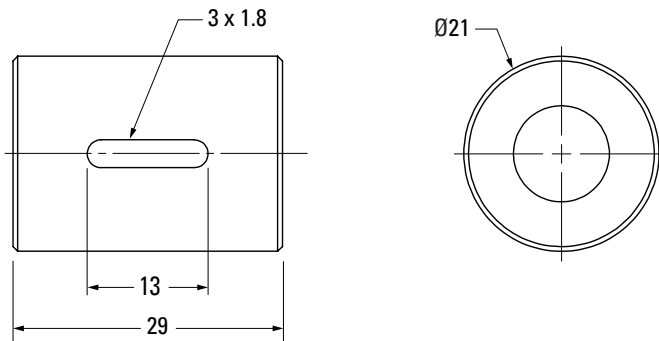
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	3 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.58 kg/m
Nominal Ball Diameter	1.984 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9681

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

Cylindrical Ball Nut



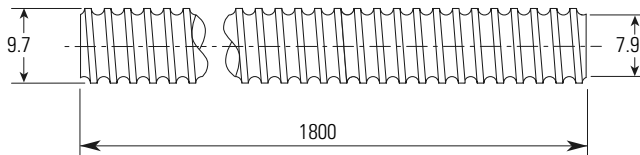
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.8 kN
Max. Static Load	8.6 kN
Torque to Raise 1 kN	0.53 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	98
Wiper Type	N/A
Part Number	8103-448-053

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 10 x 10 mm Miniature Metric Ball Screws – Rolled

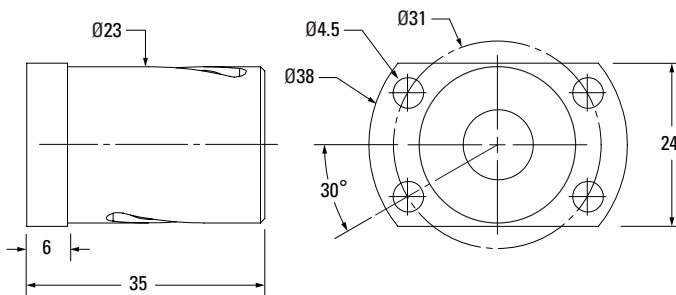
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.58 kg/m
Nominal Ball Diameter	1.984 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9689

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

Flanged Ball Nut

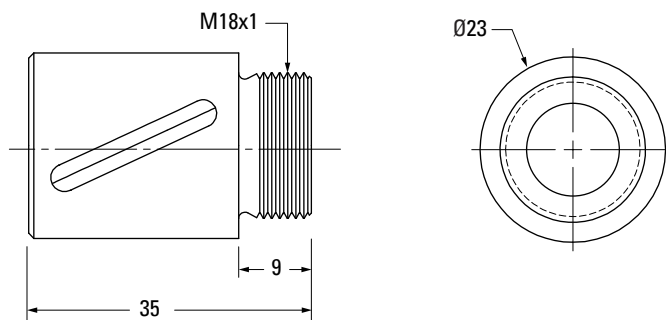


Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.9 kN
Max. Static Load	5.2 kN
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Internal
Number of Balls	76
Wiper Type	N/A
Part Number	8103-448-042

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Threaded Ball Nut



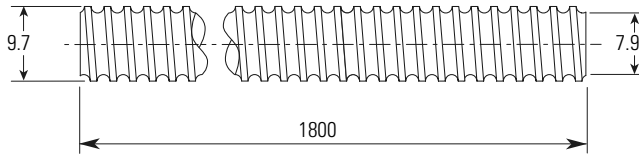
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.9 kN
Max. Static Load	5.2 kN
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Internal
Number of Balls	76
Wiper Type	N/A
Part Number	8103-448-030

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 10 x 10 mm Miniature Metric Ball Screws – Rolled

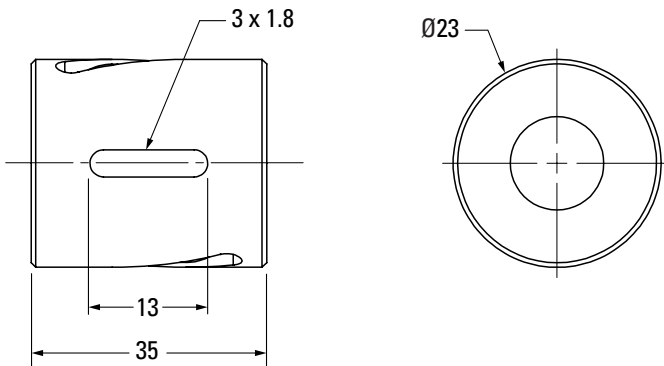
Ball Screw



Nominal Ball Screw Diameter	10 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.58 kg/m
Nominal Ball Diameter	1.984 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9689

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

Cylindrical Ball Nut



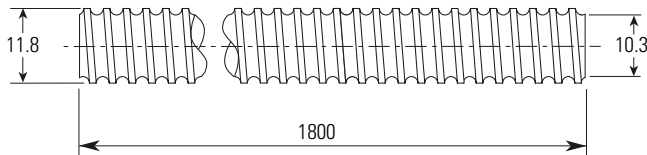
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	2.9 kN
Max. Static Load	5.2 kN
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Internal
Number of Balls	76
Wiper Type	N/A
Part Number	8103-448-055

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 12 x 2 mm Miniature Metric Ball Screws – Rolled

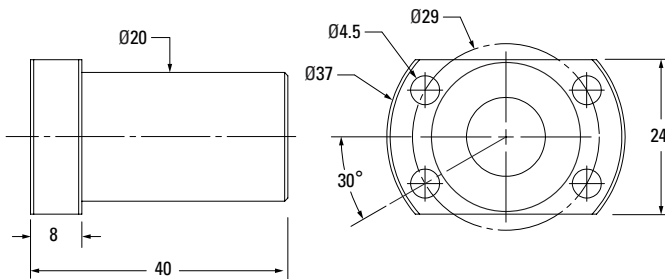
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	2 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.86 kg/m
Nominal Ball Diameter	1.588 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9690

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

Flanged Ball Nut

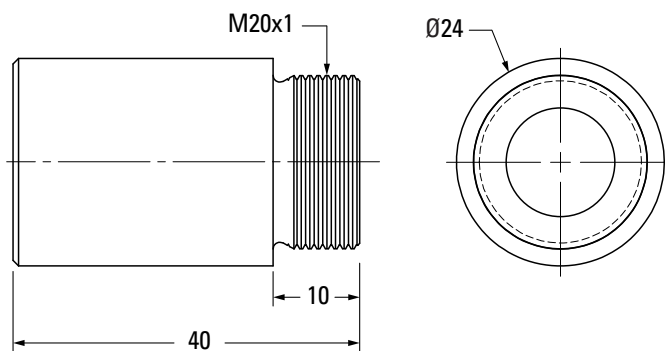


Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	6.8 kN
Max. Static Load	13.1 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	198
Wiper Type	N/A
Part Number	8105-448-043

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Threaded Ball Nut



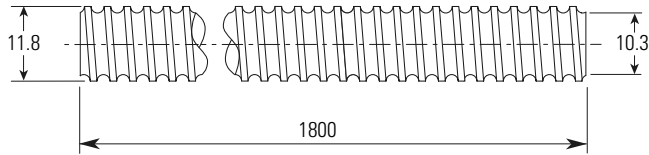
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	6.8 kN
Max. Static Load	13.1 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit Liner
Number of Balls	198
Wiper Type	N/A
Part Number	8105-448-031

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 12 x 2 mm Miniature Metric Ball Screws – Rolled

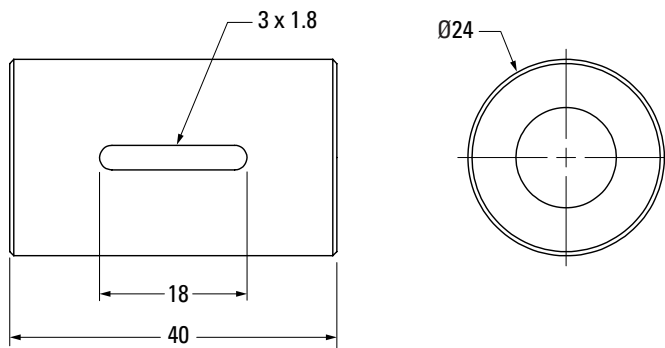
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	2 mm
Thread Direction	Right Hand
Screw Material	CF53
Screw Weight	0.86 kg/m
Nominal Ball Diameter	1.588 mm
Lead Accuracy ⁽¹⁾ T7 Part Number	190-9690

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

Cylindrical Ball Nut



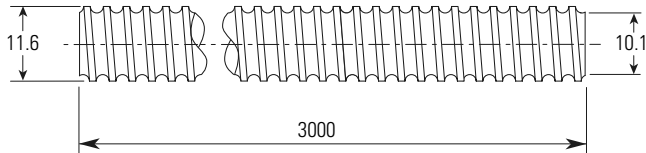
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	6.8 kN
Max. Static Load	13.1 kN
Torque to Raise 1 kN	0.35 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z2
Standard max. Backlash (Z2)	0.05 mm
Ball Return Type	Multi Circuit
Number of Balls	198
Wiper Type	N/A
Part Number	8105-448-056

(1) T7 = 52 µm / 300 mm

(2) Z2 = no preload, clearance held to max. indicated in table (standard unless specified)

Ø 12 x 4 mm Metric Ball Screws – Rolled

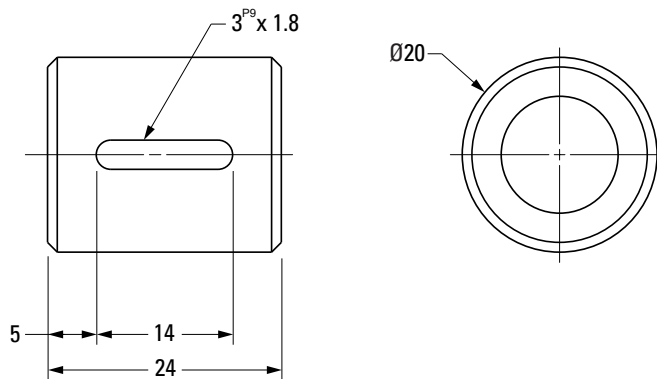
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	4 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	0.76 kg/m
Nominal Ball Diameter	2.0 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9715

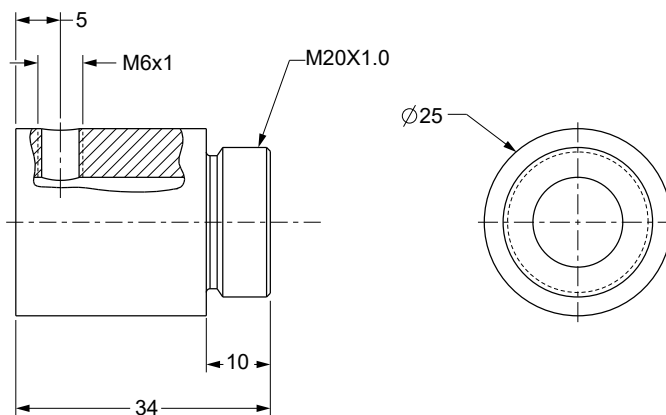
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.9 kN
Max. Static Load	6.6 kN
Number of Circuits	3
Torque to Raise 1 kN	0.708 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.024 mm
Ball Return Type	Channel
Number of Balls	63
Wiper Type	N/A
Part Number	KGM-N-1204-RH-00

Threaded Ball Nut, KGM-G



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	3.8 kN
Max. Static Load	4.3 kN
Number of Circuits	3
Torque to Raise 1 kN	0.708 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.024 mm
Ball Return Type	Single Circuit
Number of Balls	60
Wiper Type	N/A
Part Number	KGM-G-1204-RH-00

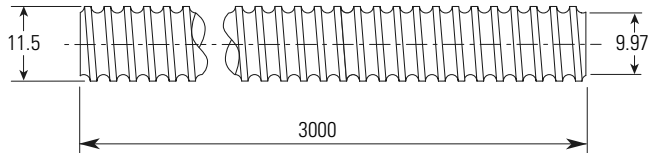
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 12 x 5 mm Metric Ball Screws – Rolled

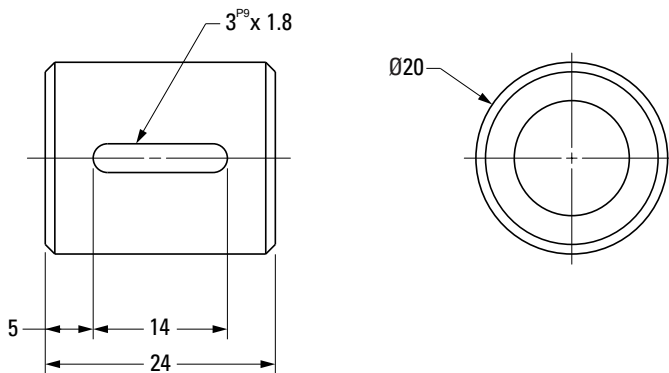
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	0.76 kg/m
Nominal Ball Diameter	5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9716

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

Cylindrical Ball Nut, KGM-N



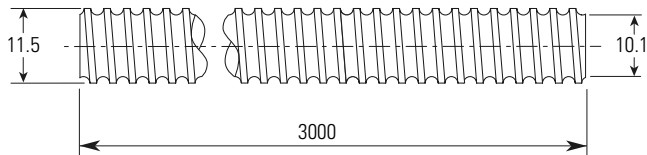
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.4 kN
Max. Static Load	6.8 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.024 mm
Ball Return Type	Channel
Number of Balls	63
Wiper Type	N/A
Part Number	KGM-N-1205-RH-00

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 12 x 10 mm Metric Ball Screws – Rolled

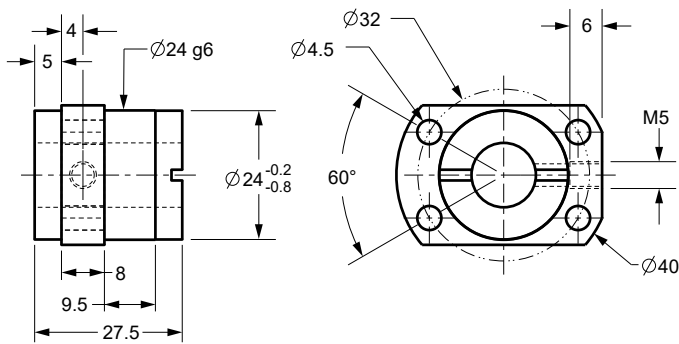
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	0.75 kg/m
Nominal Ball Diameter	2.0 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9717

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

Flanged Ball Nut



DIN 69051 Compliance

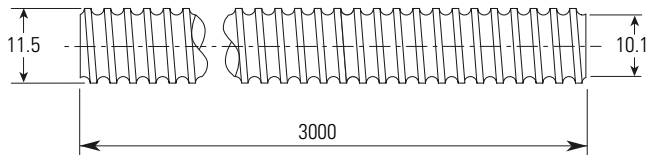
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.9 kN
Max. Static Load	8.0 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.024 mm
Ball Return Type	End Cap
Number of Balls	63
Wiper Type	Rubber
Part Number	7105-448-001

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 12 x 10 mm Metric Ball Screws – Rolled

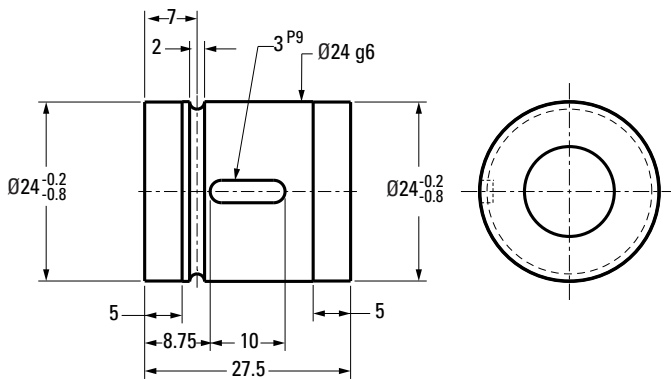
Ball Screw



Nominal Ball Screw Diameter	12 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	0.75 kg/m
Nominal Ball Diameter	2.0 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9717

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

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

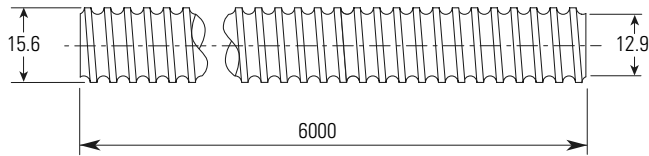
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	4.49 kN
Max. Static Load	8.0 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.024 mm
Ball Return Type	End Cap
Number of Balls	63
Wiper Type	Polymer
Part Number	KGM-D-1210-RH-00

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 16 x 5 mm Metric Ball Screws – Rolled

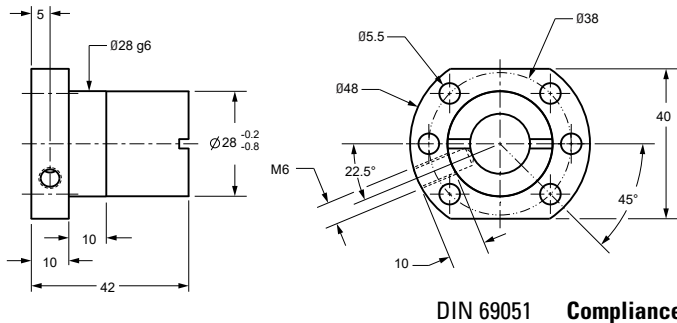
Ball Screw



Nominal Ball Screw Diameter	16 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	1.38 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9698

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

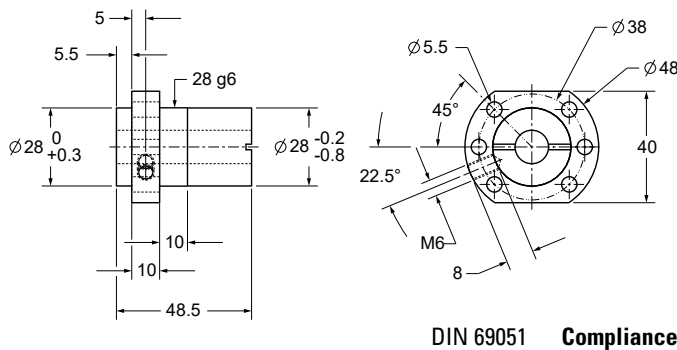
Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	9.3 kN
Max. Static Load	13.1 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Polymer
Number of Balls	45
Wiper Type	Rubber
Part Number	7106-448-061

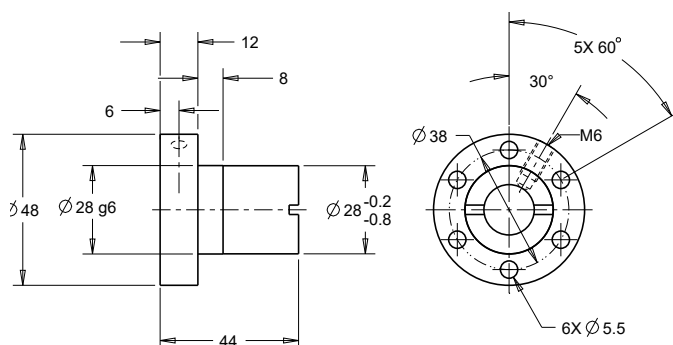
Flanged Ball Nut, KGF-D (FK)



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	9.5 kN
Max. Static Load	10.9 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	42
Wiper Type	Polymer
Part Number	KGF-D-1605-RH-KK

Flanged Ball Nut, KGF-N



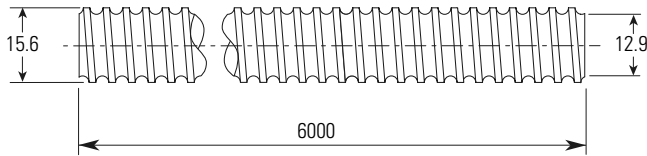
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	9.3 kN
Max. Static Load	13.1 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	45
Wiper Type	Rubber
Part Number	KGF-N-1605-RH-EE

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1 = light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 16 x 5 mm Metric Ball Screws – Rolled

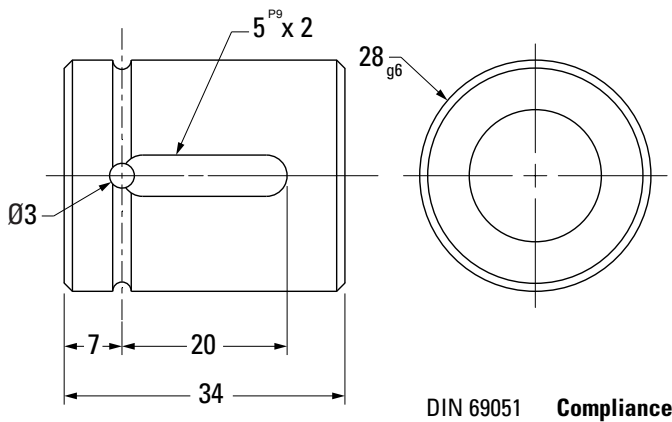
Ball Screw



Nominal Ball Screw Diameter	16 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	1.38 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9698

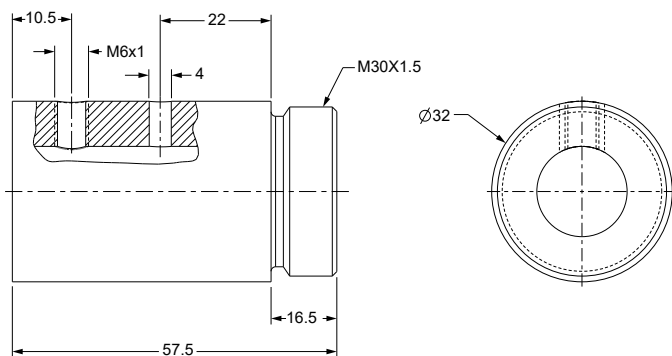
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-D



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	9.3 kN
Max. Static Load	13.1 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.10 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	45
Wiper Type	Polymer
Part Number	KGM-D-1605-RH-EE

Threaded Ball Nut, KGM-G



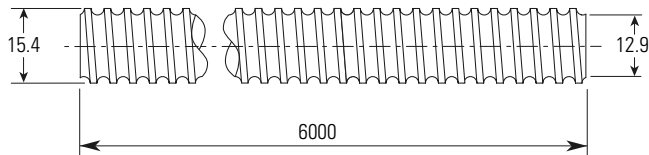
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	12.1 kN
Max. Static Load	14.5 kN
Number of Circuits	4
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.22 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	56
Wiper Type	Polymer
Part Number	KGM-G-1605-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
 (2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 16 x 10 mm Metric Ball Screws – Rolled

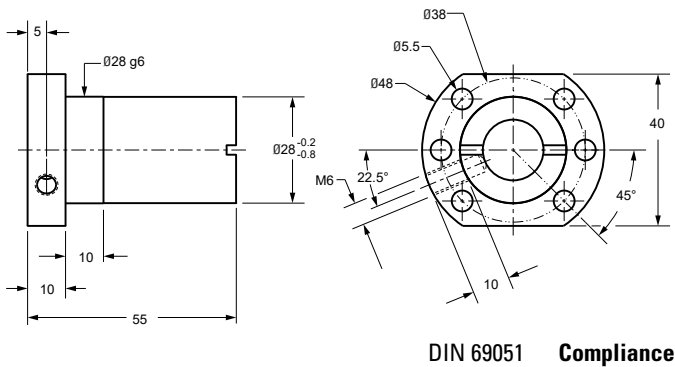
Ball Screw



Nominal Ball Screw Diameter	16 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	1.26 kg/m
Nominal Ball Diameter	3.0 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9699

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

Flanged Ball Nut



DIN 69051 Compliance

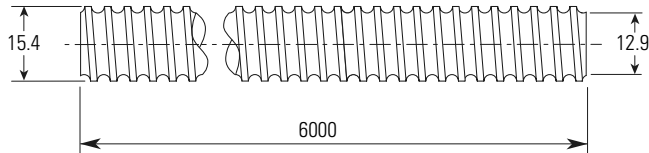
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	15.4 kN
Max. Static Load	26.5 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.3 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Channel
Number of Balls	102
Wiper Type	Rubber
Part Number	7106-448-062

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 16 x 10 mm Metric Ball Screws – Rolled

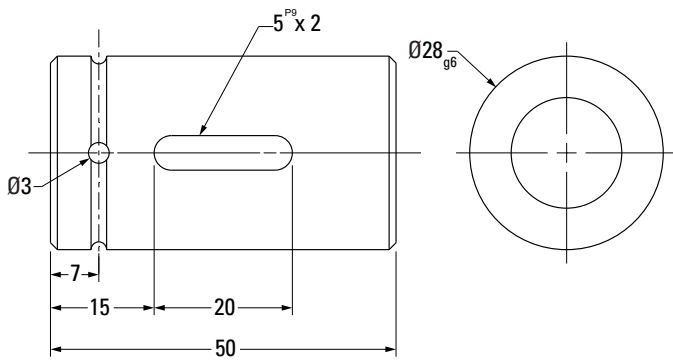
Ball Screw



Nominal Ball Screw Diameter	16 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	1.26 kg/m
Nominal Ball Diameter	3.0 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9699

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

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

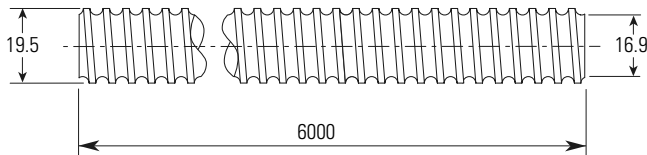
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	15.4 kN
Max. Static Load	26.5 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.2 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.035 mm
Ball Return Type	Channel
Number of Balls	102
Wiper Type	Polymer
Part Number	KGM-D-1610-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

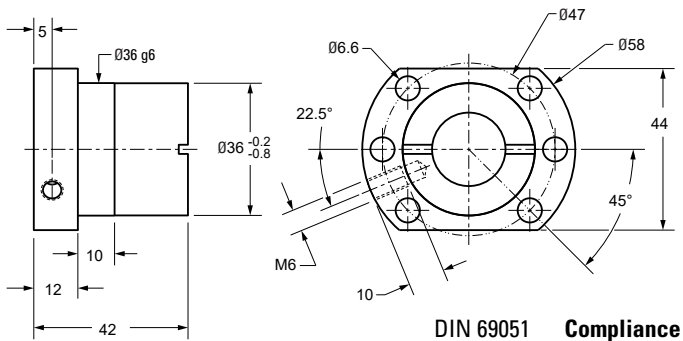
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 20 x 5 mm Metric Ball Screws – Rolled

Ball Screw



Flanged Ball Nut

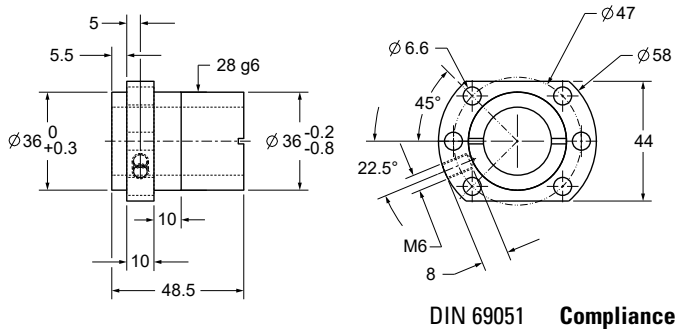


Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	2.20 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9700

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

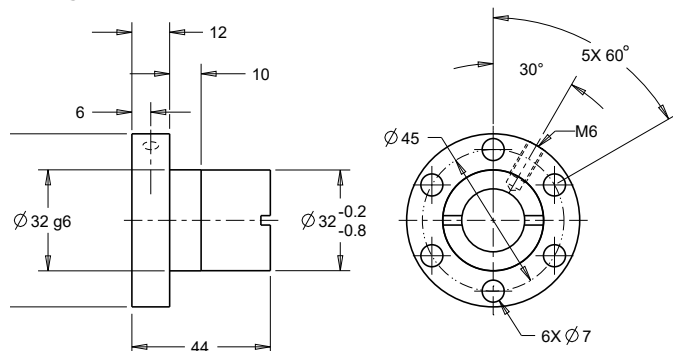
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	10.5 kN
Max. Static Load	16.6 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.25 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.035 mm
Ball Return Type	Channel
Number of Balls	48
Wiper Type	Rubber
Part Number	7107-448-063

Flanged Ball Nut, KGF-D (FK)



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	11.5 kN
Max. Static Load	15.5 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	54
Wiper Type	Polymer
Part Number	KGF-D-2005-RH-KK

Flanged Ball Nut, KGF-N



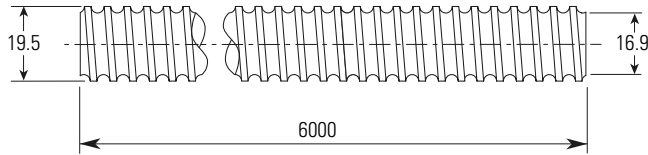
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	10.5 kN
Max. Static Load	16.6 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.25 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	48
Wiper Type	Rubber
Part Number	KGF-N-2005-RH-EE

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

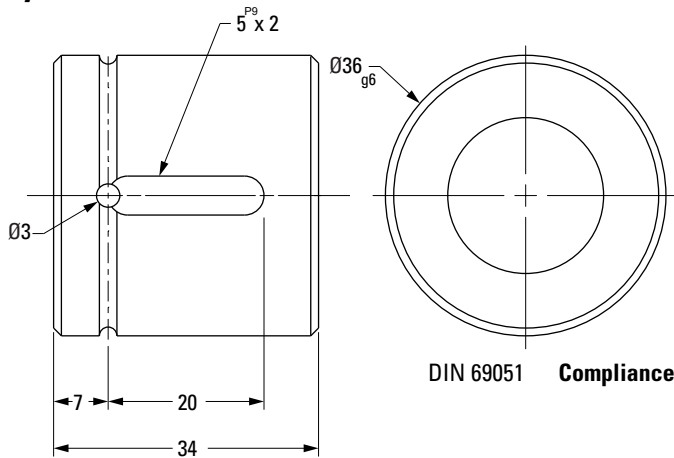
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1 = light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 20 x 5 mm Metric Ball Screws – Rolled

Ball Screw

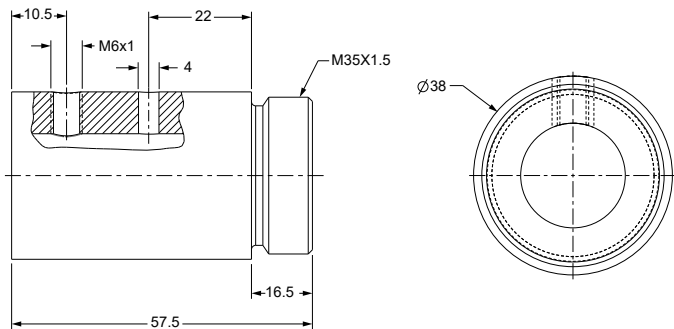


Cylindrical Ball Nut, KGM-D

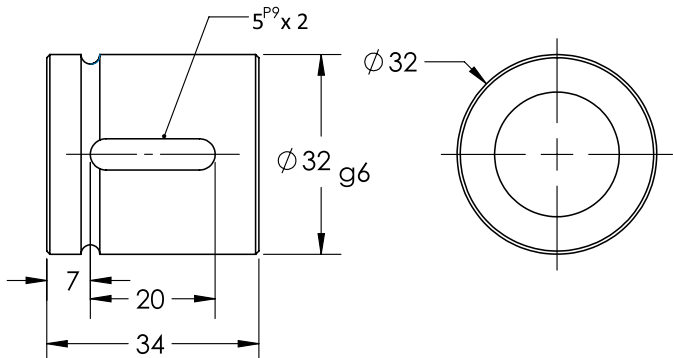


DIN 69051 Compliance

Threaded Ball Nut, KGM-G



Cylindrical Ball Nut, KGM-N



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	2.20 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9700

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	10.5 kN
Max. Static Load	16.6 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Channel
Number of Balls	48
Wiper Type	Polymer
Part Number	KGM-D-2005-RH-EE

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	14.8 kN
Max. Static Load	20.7 kN
Number of Circuits	4
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	72
Wiper Type	Polymer
Part Number	KGM-G-2005-RH-KK

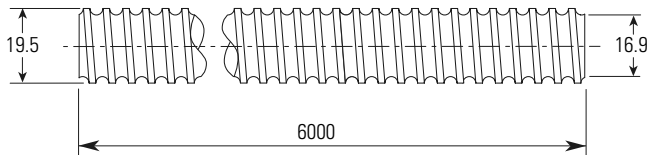
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	10.5 kN
Max. Static Load	16.6 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	48
Wiper Type	Rubber
Part Number	KGM-N-2005-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 20 x 20 mm Metric Ball Screws – Rolled

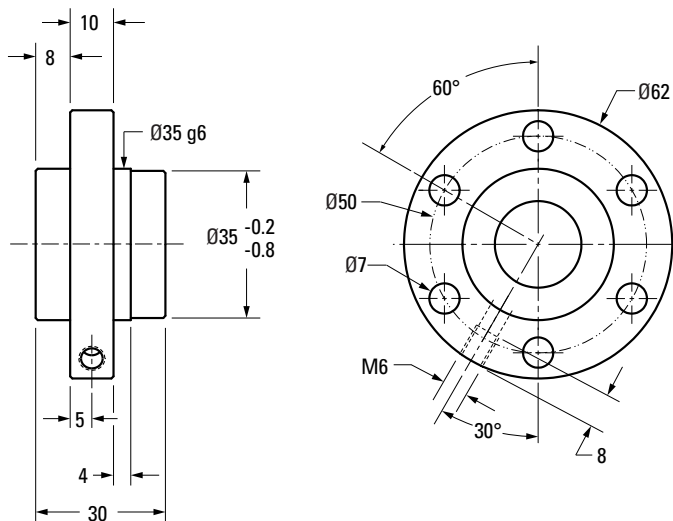
Ball Screw



Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	2.23 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9718

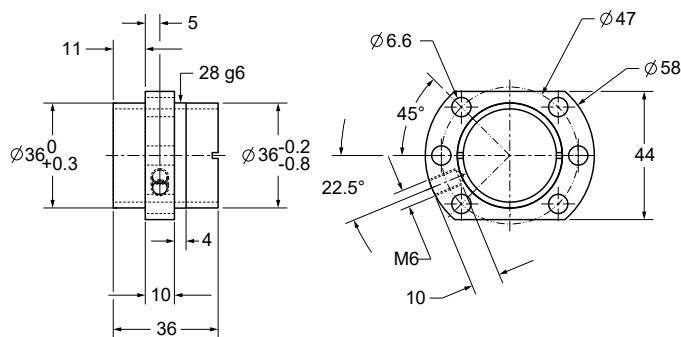
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Flanged Ball Nut, KGF-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	11.6 kN
Max. Static Load	18.4 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	0.3 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	100
Wiper Type	Rubber
Part Number	KGF-N-2020-RH-EE

Flanged Ball Nut, KGF-D (FH)



DIN 69051 Compliance

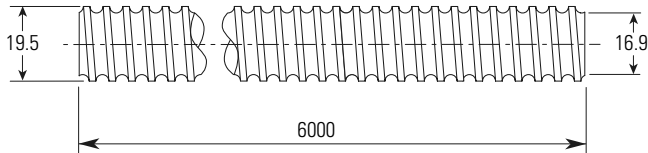
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	10.8 kN
Max. Static Load	17.5 kN
Number of Circuits	2.8
Torque to Raise 1 kN	3.54 Nm
Nut Weight	0.5 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	100
Wiper Type	Polymer
Part Number	KGF-D-2020-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 20 x 20 mm Metric Ball Screws – Rolled

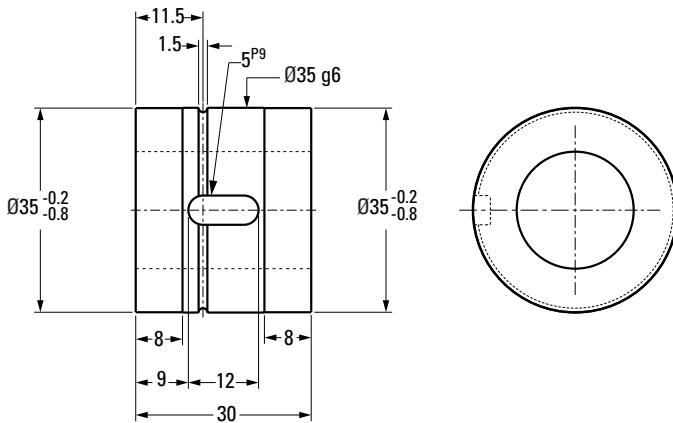
Ball Screw



Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	2.23 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9718

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

Cylindrical Ball Nut, KGM-N



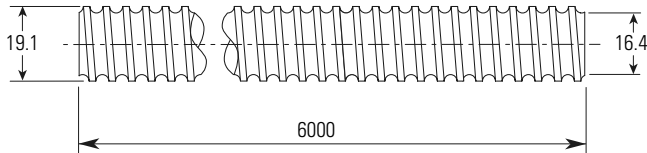
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	11.6 kN
Max. Static Load	18.4 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	100
Wiper Type	Polymer
Part Number	KGM-N-2020-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 20 x 50 mm Metric Ball Screws – Rolled

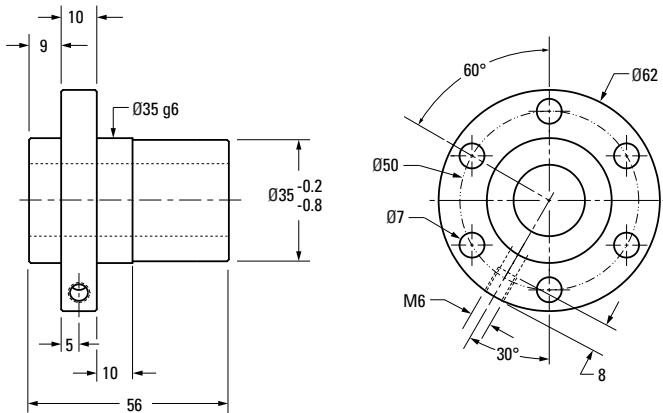
Ball Screw



Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	50 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	2.05 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9729

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

Flanged Ball Nut, KGF-N



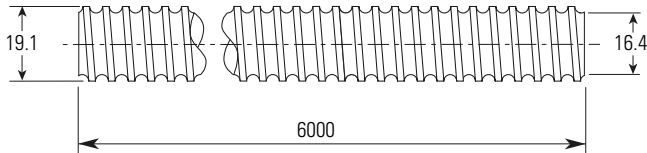
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.0 kN
Max. Static Load	24.6 kN
Number of Circuits	5
Torque to Raise 1 kN	8.85 Nm
Nut Weight	0.4 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	140
Wiper Type	Rubber
Part Number	KGF-N-2050-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 20 x 50 mm Metric Ball Screws – Rolled

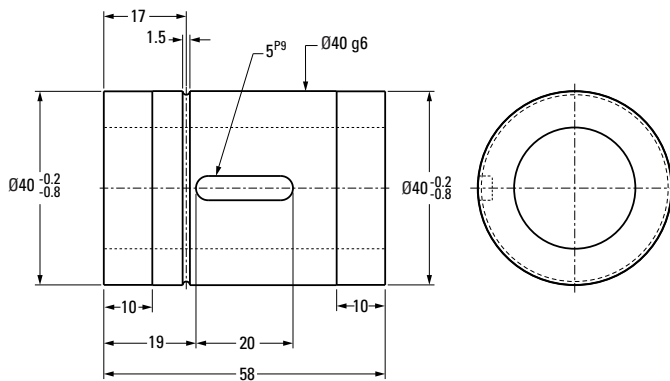
Ball Screw



Nominal Ball Screw Diameter	20 mm
Nominal Ball Screw Lead	50 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	2.05 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9729

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

Cylindrical Ball Nut, KGM-N



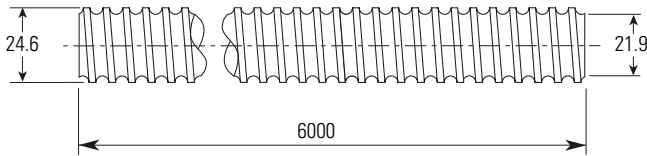
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.0 kN
Max. Static Load	24.6 kN
Number of Circuits	5
Torque to Raise 1 kN	8.85 Nm
Nut Weight	0.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	140
Wiper Type	Rubber
Part Number	KGM-N-2050-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

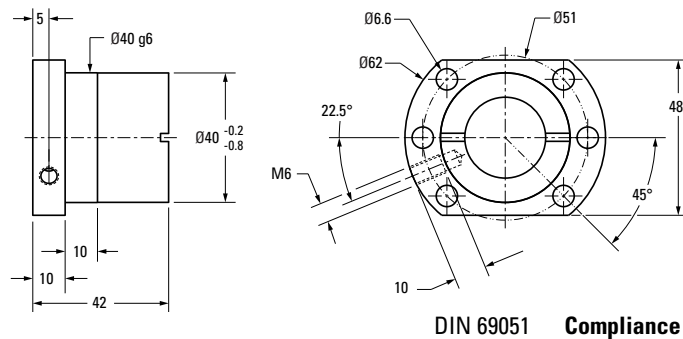
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 5 mm Metric Ball Screws – Rolled

Ball Screw



Flanged Ball Nut

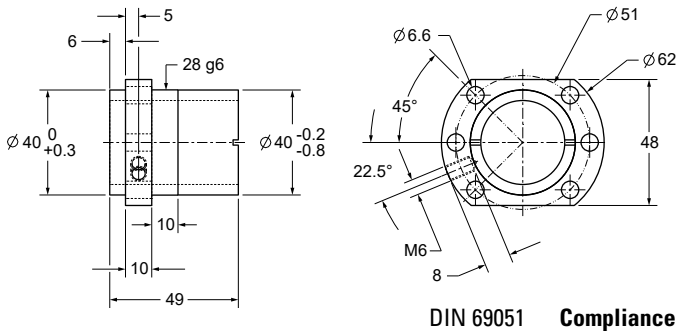


Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	3.32 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9701

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

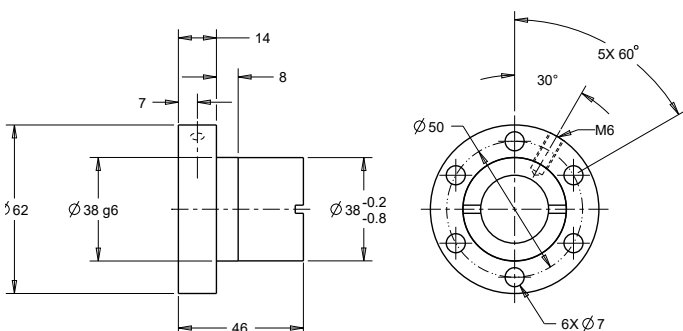
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	12.3 kN
Max. Static Load	22.5 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	63
Wiper Type	Rubber
Part Number	7110-448-064

Flanged Ball Nut, KGF-D (FK)



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.1 kN
Max. Static Load	20.2 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	66
Wiper Type	Polymer
Part Number	KGF-D-2505-RH-KK

Flanged Ball Nut, KGF-N



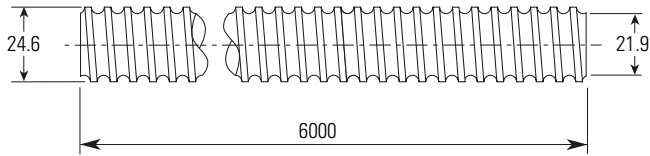
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	12.3 kN
Max. Static Load	22.5 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	63
Wiper Type	Rubber
Part Number	KGF-N-2505-RH-EE

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

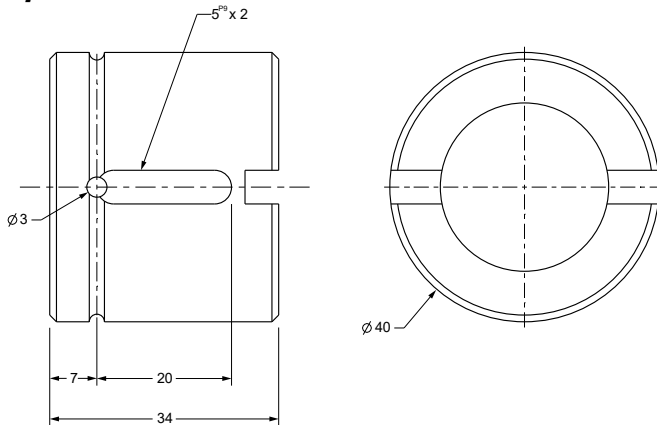
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 5 mm Metric Ball Screws – Rolled

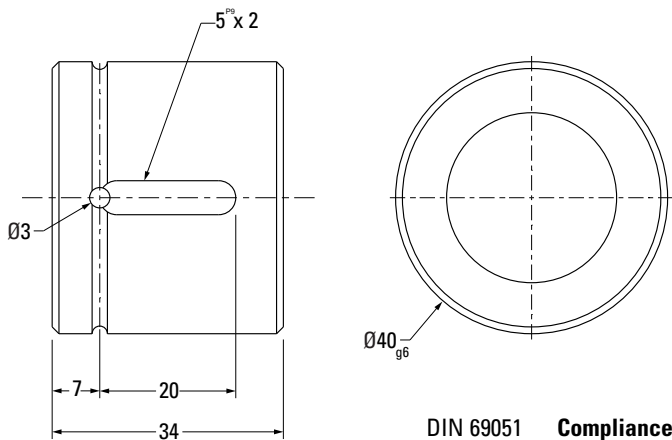
Ball Screw



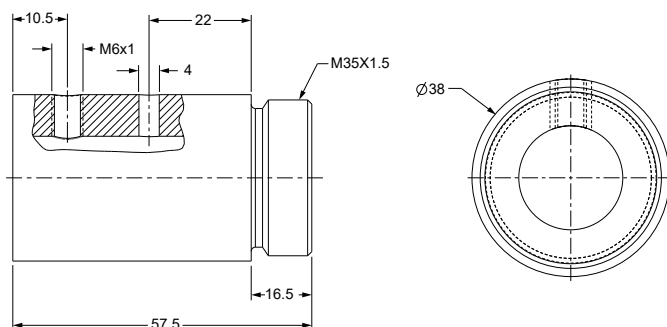
Cylindrical Ball Nut, KGM-N



Cylindrical Ball Nut, KGM-D



Threaded Ball Nut, KGM-G



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	3.32 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9701

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	12.3 kN
Max. Static Load	22.5 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.15 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	63
Wiper Type	Rubber
Part Number	KGM-N-2505-RH-EE

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	12.3 kN
Max. Static Load	22.5 kN
Number of Circuits	3
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.090 mm
Ball Return Type	Single Circuit
Number of Balls	63
Wiper Type	Rubber
Part Number	KGM-D-2505-RH-EE

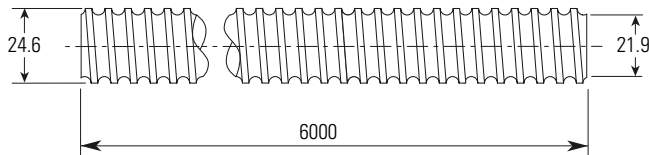
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	20.4 kN
Max. Static Load	33.7 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.090 mm
Ball Return Type	Single Circuit
Number of Balls	110
Wiper Type	Polymer
Part Number	KGM-G-2505-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 10 mm Metric Ball Screws – Rolled

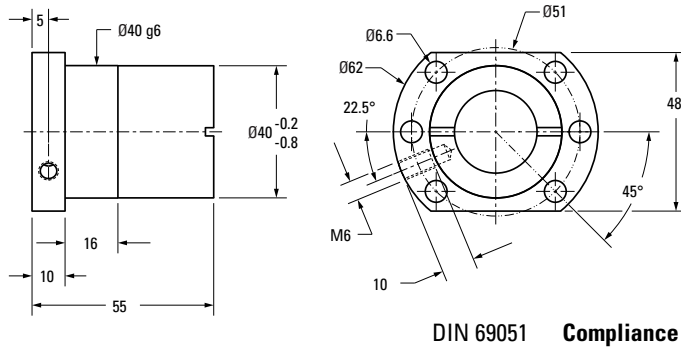
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	3.34 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9702

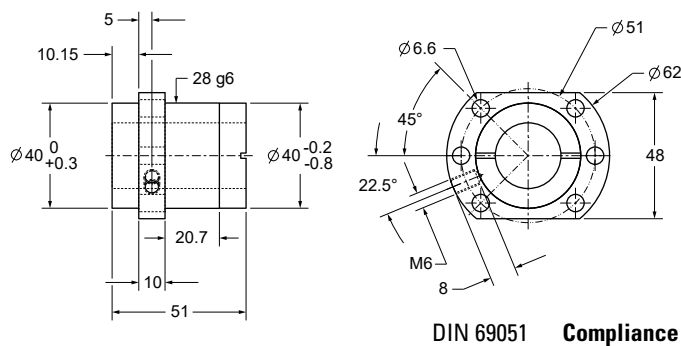
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Flanged Ball Nut



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.2 kN
Max. Static Load	25.3 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Channel
Number of Balls	75
Wiper Type	Rubber
Part Number	7110-448-065

Flanged Ball Nut, KGF-D (FH)



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	24.7 kN
Max. Static Load	53.4 kN
Number of Circuits	6.1
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	164
Wiper Type	Polymer
Part Number	KGF-D-2510-RH-KK

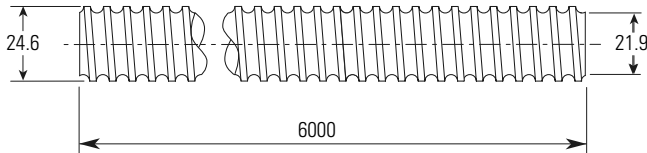
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 25 x 10 mm Metric Ball Screws – Rolled

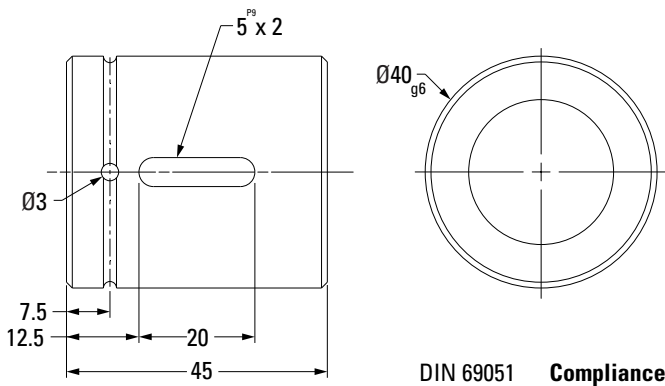
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	3.34 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9702

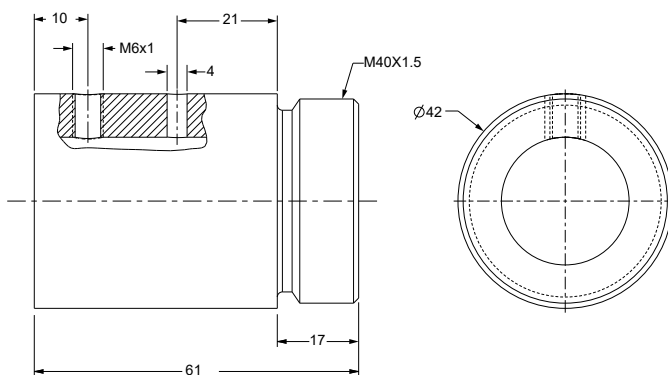
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-D



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.2 kN
Max. Static Load	25.3 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.24 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Channel
Number of Balls	75
Wiper Type	Rubber
Part Number	KGM-D-2510-RH-EE

Threaded Ball Nut, KGM-G



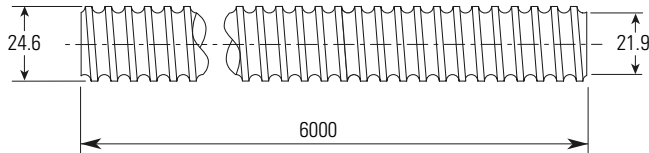
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	19.9 kN
Max. Static Load	31.8 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Multi Circuit
Number of Balls	55
Wiper Type	Polymer
Part Number	KGM-G-2510-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
 (2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 25 x 20 mm Metric Ball Screws – Rolled

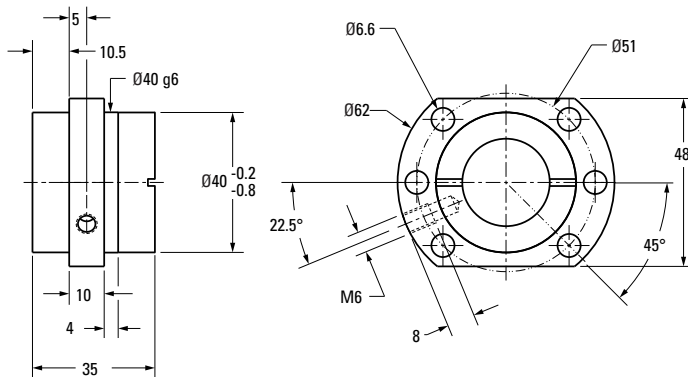
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	3.32 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9703

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

Flanged Ball Nut



DIN 69051 Compliance

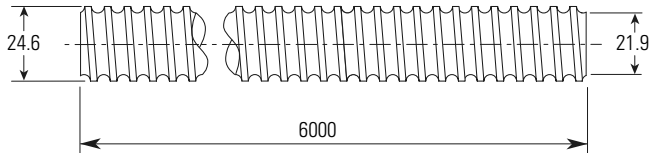
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.0 kN
Max. Static Load	23.3 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	0.3 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	80
Wiper Type	Rubber
Part Number	7110-448-066

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 20 mm Metric Ball Screws – Rolled

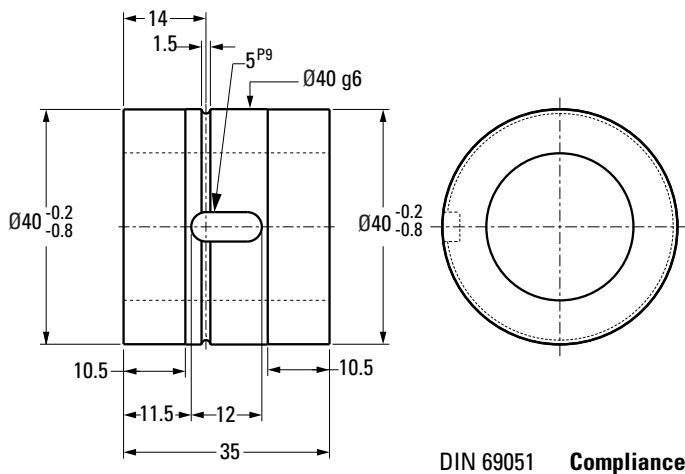
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	3.32 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9703

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

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

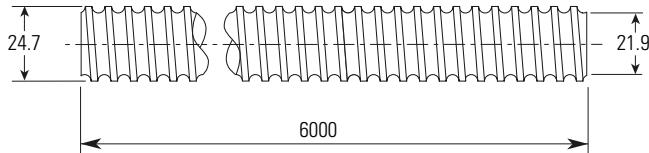
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	13.0 kN
Max. Static Load	23.3 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	0.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	80
Wiper Type	Rubber
Part Number	KGM-D-2520-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

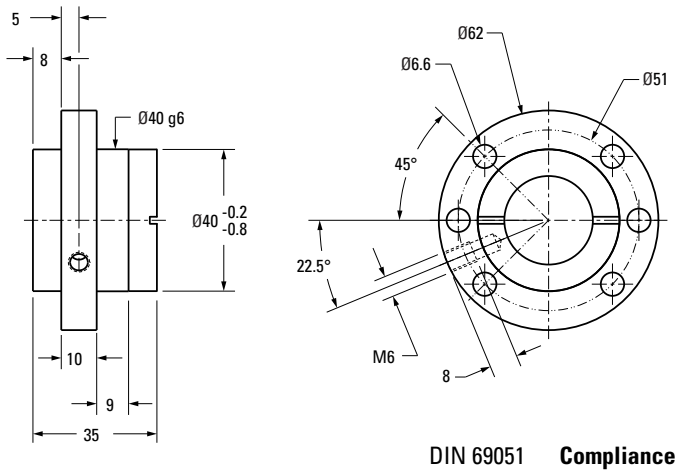
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 25 mm Metric Ball Screws – Rolled

Ball Screw



Flanged Ball Nut



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	25 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	3.4 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9704

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

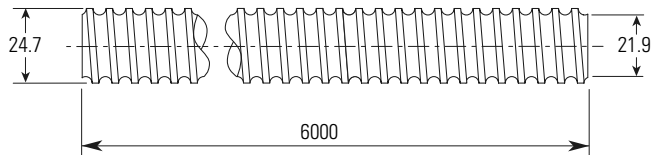
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	16.7 kN
Max. Static Load	32.2 kN
Number of Circuits	5
Torque to Raise 1 kN	4.43 Nm
Nut Weight	0.7 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	130
Wiper Type	Rubber
Part Number	7110-448-067

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 25 mm Metric Ball Screws – Rolled

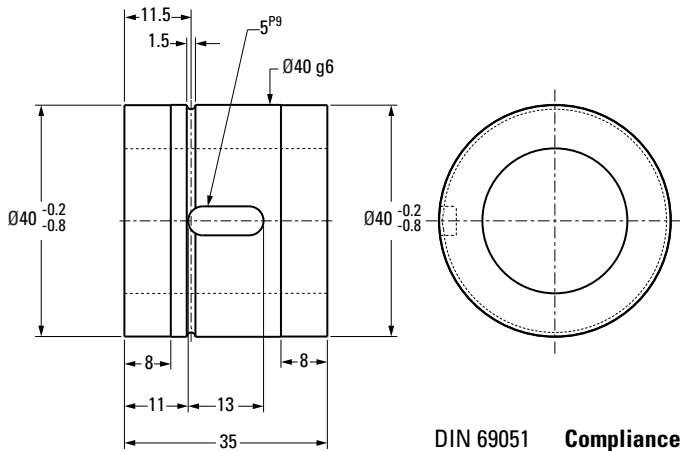
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	25 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	3.4 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9704

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

Cylindrical Ball Nut, KGM-D



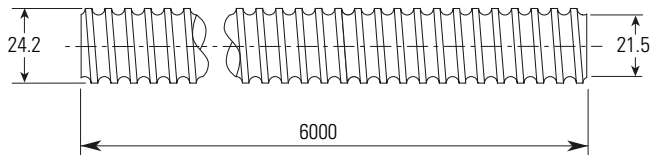
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	16.7 kN
Max. Static Load	32.2 kN
Number of Circuits	5
Torque to Raise 1 kN	4.43 Nm
Nut Weight	0.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	130
Wiper Type	Rubber
Part Number	KGM-D-2525-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 50 mm Metric Ball Screws – Rolled

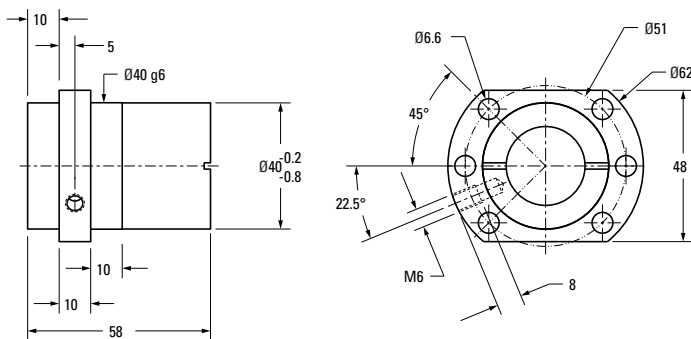
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	50 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	3.37 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9730

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

Flanged Ball Nut



DIN 69051 Compliance

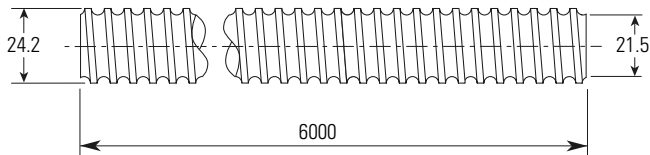
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	15.4 kN
Max. Static Load	31.7 kN
Number of Circuits	5
Torque to Raise 1 kN	8.85 Nm
Nut Weight	0.4 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	130
Wiper Type	Rubber
Part Number	7110-448-068

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 25 x 50 mm Metric Ball Screws – Rolled

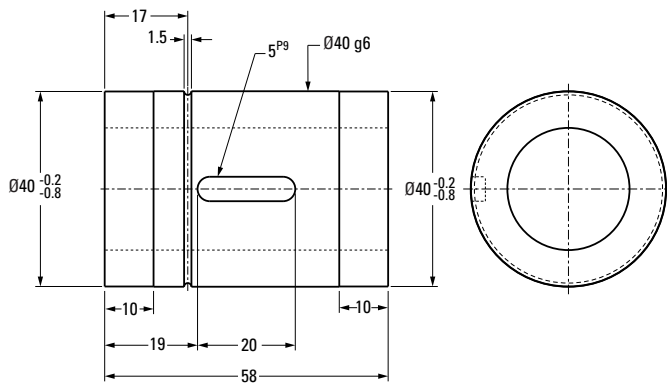
Ball Screw



Nominal Ball Screw Diameter	25 mm
Nominal Ball Screw Lead	50 mm
Thread Direction	Right Hand
Number of Thread Starts	5
Screw Material	CF53
Screw Weight	3.37 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9730

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

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

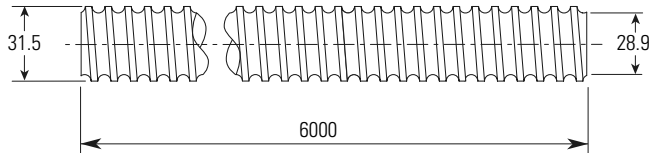
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	15.4 kN
Max. Static Load	31.7 kN
Number of Circuits	5
Torque to Raise 1 kN	8.85 Nm
Nut Weight	0.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	130
Wiper Type	Rubber
Part Number	KGM-D-2550-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

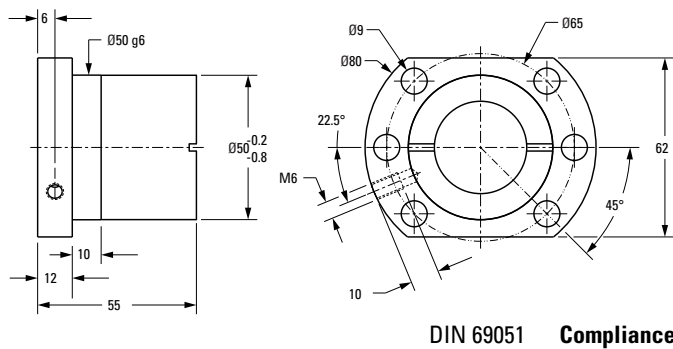
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 32 x 5 mm Metric Ball Screws – Rolled

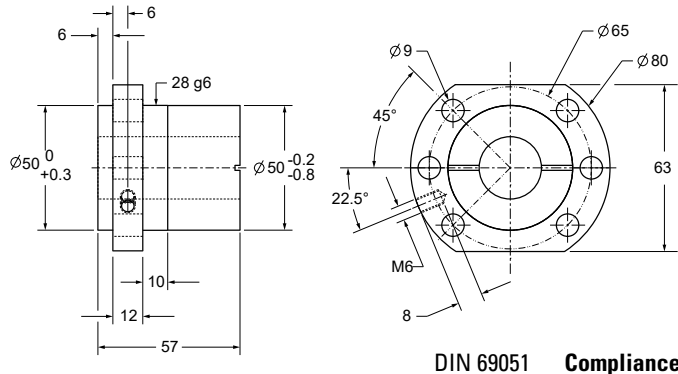
Ball Screw



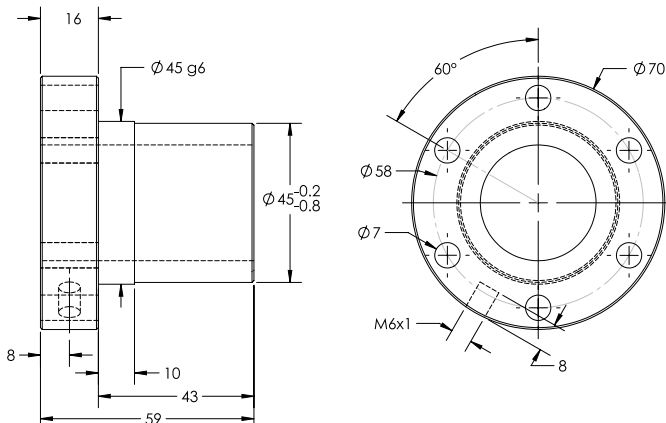
Flanged Ball Nut



Flanged Ball Nut, KGF-D (FK)



Flanged Ball Nut, KGF-N



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	5.9 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9706

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	21.5 kN
Max. Static Load	49.3 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	140
Wiper Type	Rubber
Part Number	7112-448-069

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	19.3 kN
Max. Static Load	36.3 kN
Number of Circuits	4
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.7 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	116
Wiper Type	Polymer
Part Number	KGF-D-3205-RH-KK

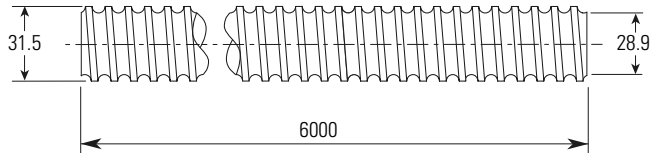
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	21.5 kN
Max. Static Load	49.3 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	140
Wiper Type	Rubber
Part Number	KGF-N-3205-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

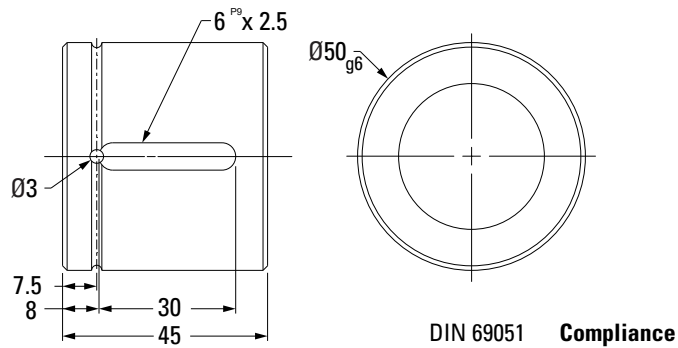
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 32 x 5 mm Metric Ball Screws – Rolled

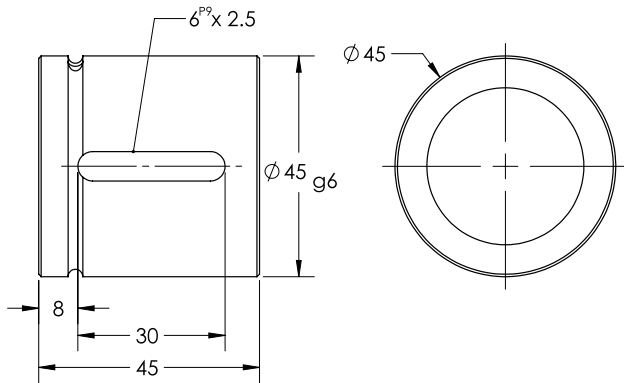
Ball Screw



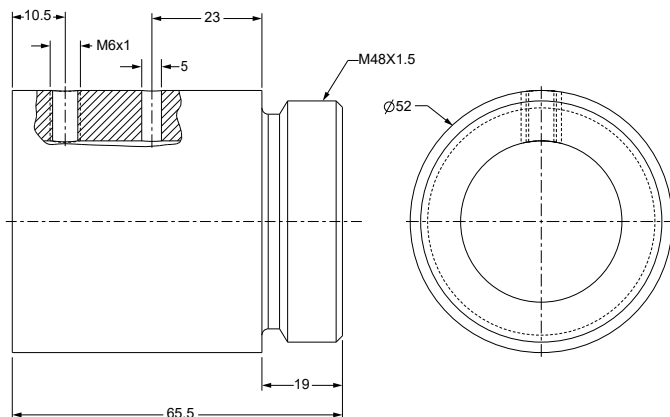
Cylindrical Ball Nut, KGM-D



Cylindrical Ball Nut, KGM-N



Threaded Ball Nut, KGM-G



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	5.9 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9706

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	21.5 kN
Max. Static Load	49.3 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	140
Wiper Type	Rubber
Part Number	KGM-D-3205-RH-EE

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	21.5 kN
Max. Static Load	49.3 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	140
Wiper Type	Rubber
Part Number	KGM-N-3205-RH-EE

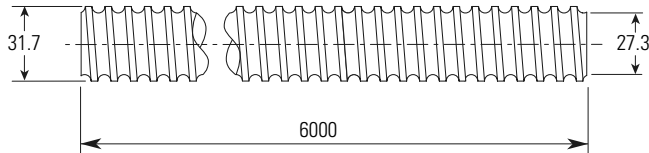
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	23.3 kN
Max. Static Load	45.5 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	145
Wiper Type	Polymer
Part Number	KGM-G-3205-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 32 x 10 mm Metric Ball Screws – Rolled

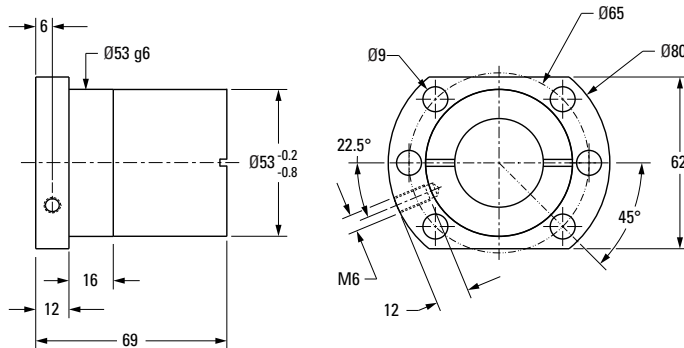
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	5.56 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9707

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

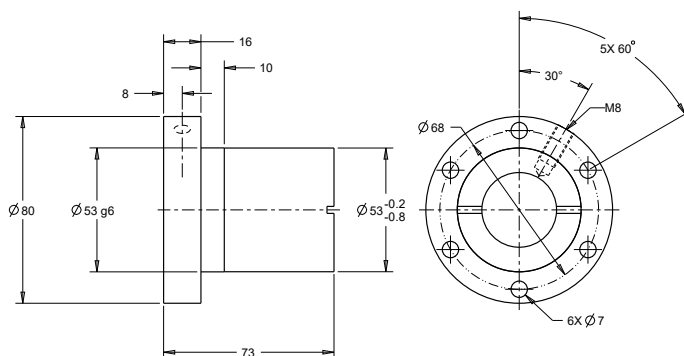
Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	33.4 kN
Max. Static Load	54.5 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	42
Wiper Type	Rubber
Part Number	7112-448-070

Flanged Ball Nut, KGF-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	33.4 kN
Max. Static Load	54.5 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	42
Wiper Type	Rubber
Part Number	KGF-N-3210-RH-EE

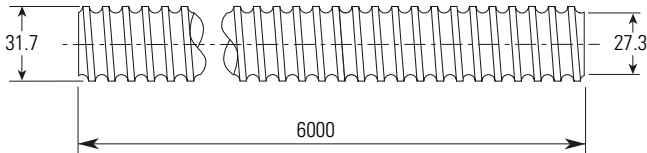
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 32 x 10 mm Metric Ball Screws – Rolled

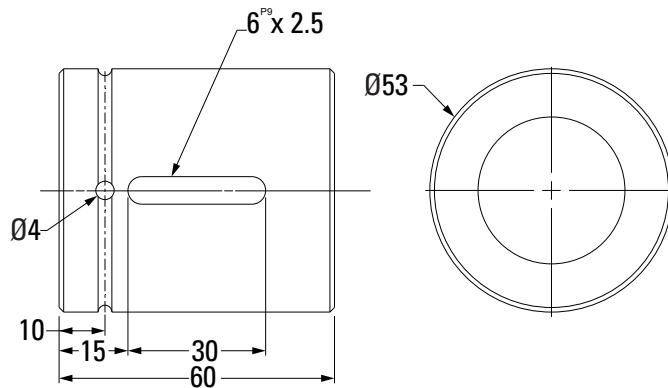
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	5.56 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9707

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

Cylindrical Ball Nut, KGM-N



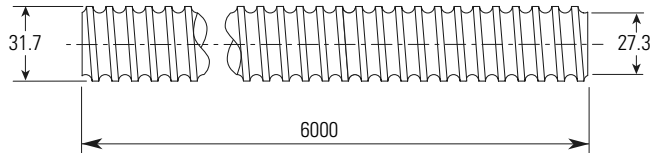
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	33.4 kN
Max. Static Load	54.5 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Polymer
Number of Balls	42
Wiper Type	Rubber
Part Number	KGM-N-3210-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 32 x 20 mm Metric Ball Screws – Rolled

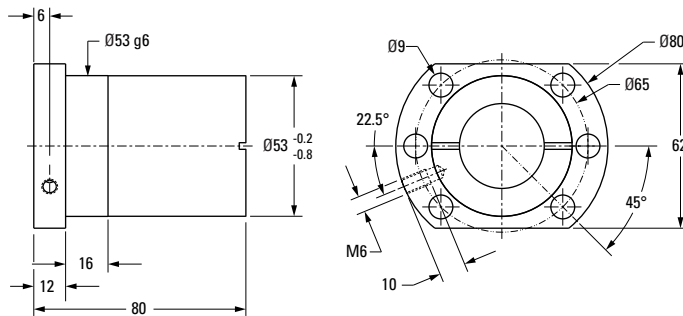
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	5.60 kg/m
Nominal Ball Diameter	5.000 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9708

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

Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	29.7 kN
Max. Static Load	59.8 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.9 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.059 mm
Ball Return Type	Channel
Number of Balls	84
Wiper Type	Rubber
Part Number	7112-448-071

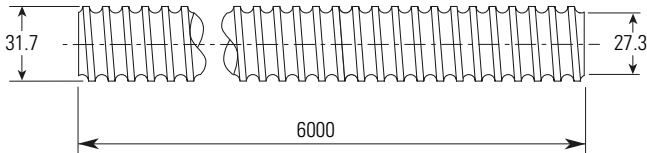
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 32 x 20 mm Metric Ball Screws – Rolled

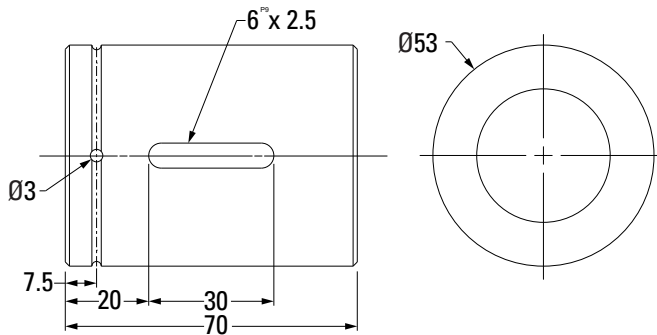
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	5.60 kg/m
Nominal Ball Diameter	5.000 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9708

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

Cylindrical Ball Nut, KGM-N



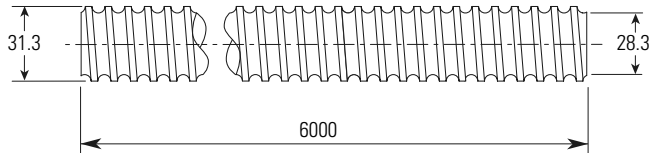
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	29.7 kN
Max. Static Load	59.8 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.059 mm
Ball Return Type	Channel
Number of Balls	84
Wiper Type	Rubber
Part Number	KGM-N-3220-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 32 x 32 mm Metric Ball Screws – Rolled

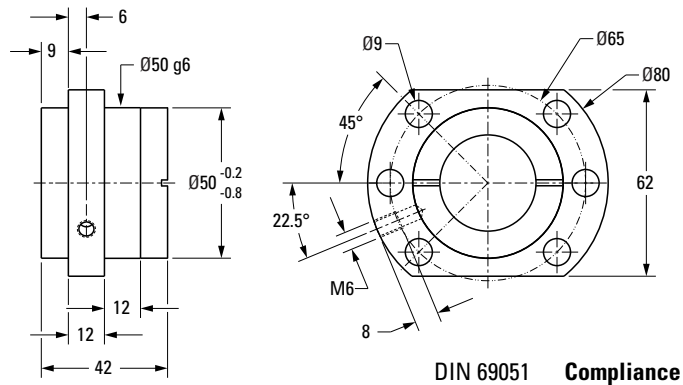
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	32 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	5.74 kg/m
Nominal Ball Diameter	3.969 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9722

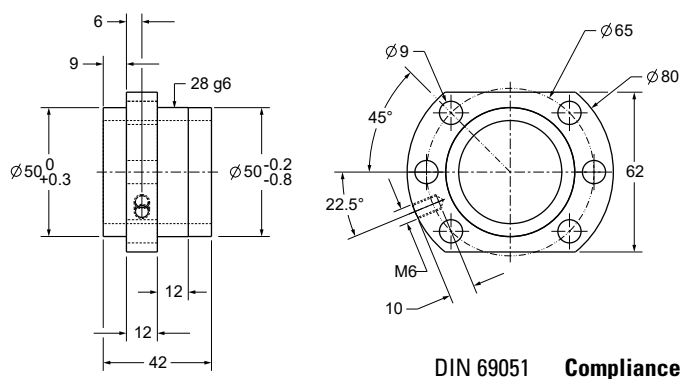
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Flanged Ball Nut



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	19.7 kN
Max. Static Load	37.4 kN
Number of Circuits	4
Torque to Raise 1 kN	5.66 Nm
Nut Weight	0.8 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.047 mm
Ball Return Type	End Cap
Number of Balls	124
Wiper Type	Rubber
Part Number	7112-448-072

Flanged Ball Nut, KGF-D (FH)



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	19.7 kN
Max. Static Load	39.0 kN
Number of Circuits	4
Torque to Raise 1 kN	5.66 Nm
Nut Weight	0.8 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.047 mm
Ball Return Type	End Cap
Number of Balls	124
Wiper Type	Polymer
Part Number	KGF-D-3232-RH-KK

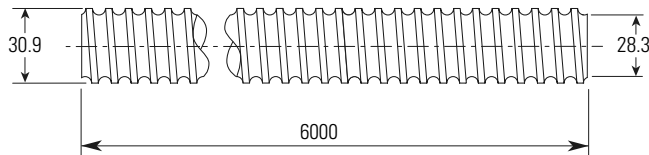
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 32 x 40 mm Metric Ball Screws – Rolled

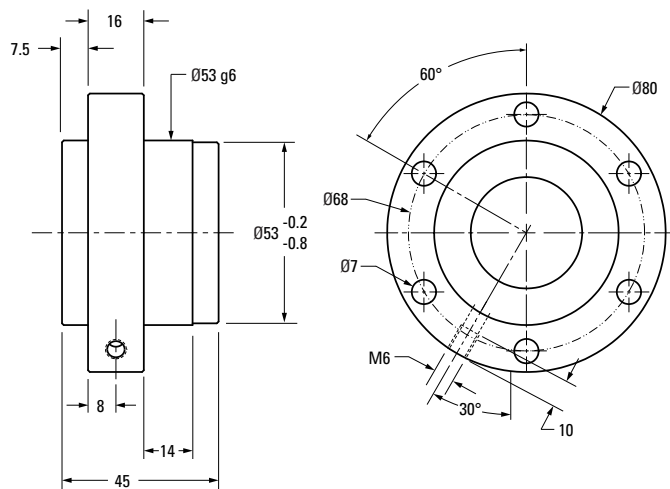
Ball Screw



Nominal Ball Screw Diameter	32 mm
Nominal Ball Screw Lead	40 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	5.63 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9723

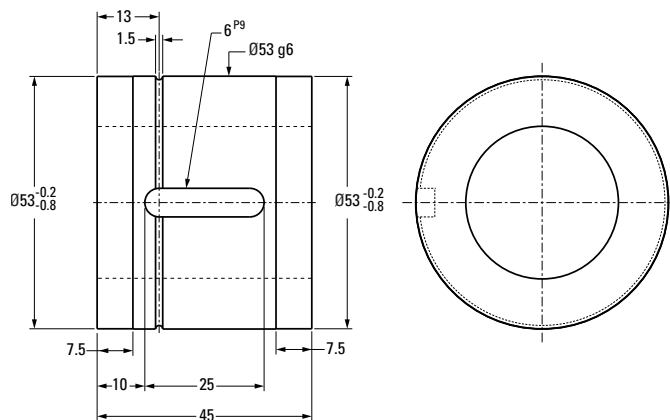
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Flanged Ball Nut, KGF-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	14.9 kN
Max. Static Load	32.4 kN
Number of Circuits	4
Torque to Raise 1 kN	7.08 Nm
Nut Weight	0.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	168
Wiper Type	Rubber
Part Number	KGF-N-3240-RH-EE

Cylindrical Ball Nut, KGM-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	14.9 kN
Max. Static Load	32.4 kN
Number of Circuits	4
Torque to Raise 1 kN	7.08 Nm
Nut Weight	0.46 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	168
Wiper Type	Rubber
Part Number	KGM-N-3240-RH-EE

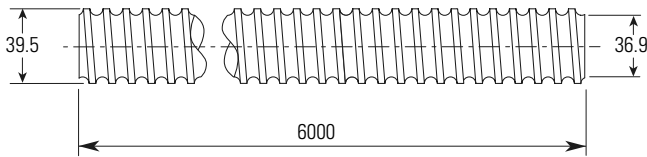
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

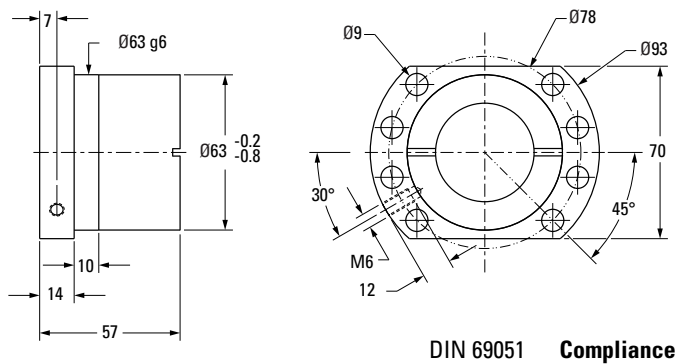
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 40 x 5 mm Metric Ball Screws – Rolled

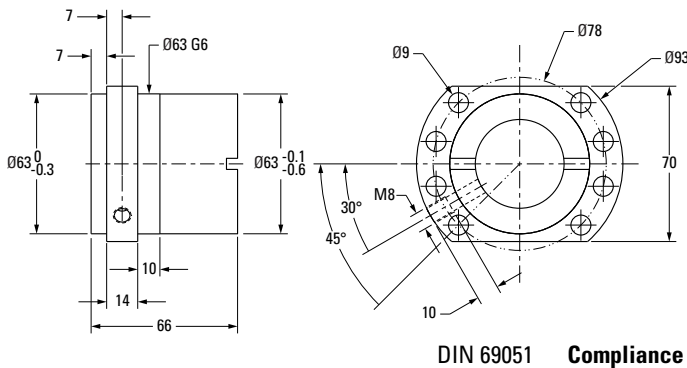
Ball Screw



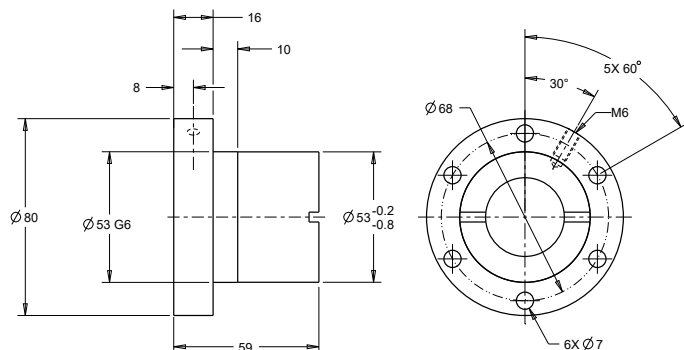
Flanged Ball Nut



Flanged Ball Nut, KGF-D (FK)



Flanged Ball Nut, KGF-N



Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	9.03 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9710

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	23.8 kN
Max. Static Load	63.1 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.7 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	180
Wiper Type	Rubber
Part Number	7115-448-073

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	26.3 kN
Max. Static Load	59.2 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	1.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	EUS
Number of Balls	180
Wiper Type	Polymer
Part Number	KGF-D-4005-RH-KK

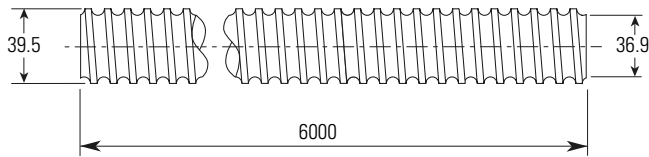
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	23.8 kN
Number of Circuits	5
Max. Static Load	63.1 kN
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.7 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	180
Wiper Type	Rubber
Part Number	KGF-N-4005-RH-EE

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

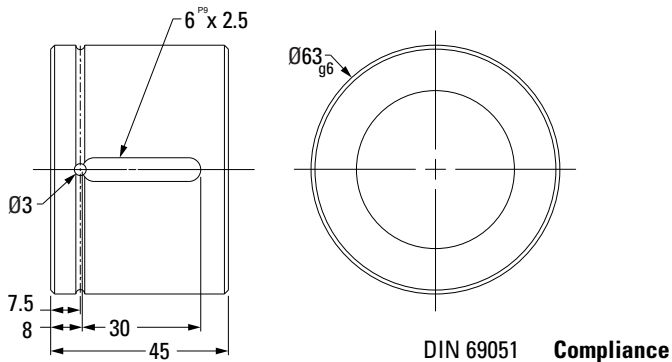
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1 = light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 40 x 5 mm Metric Ball Screws – Rolled

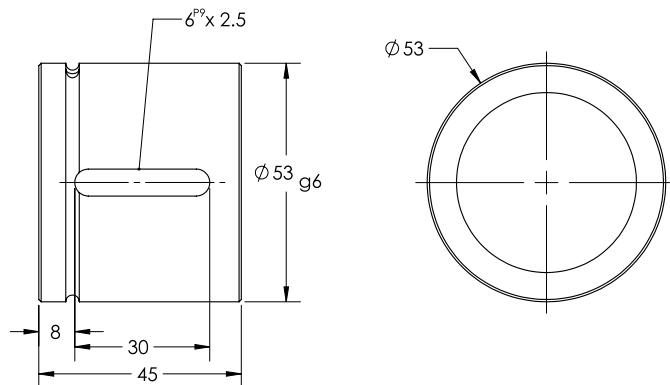
Ball Screw



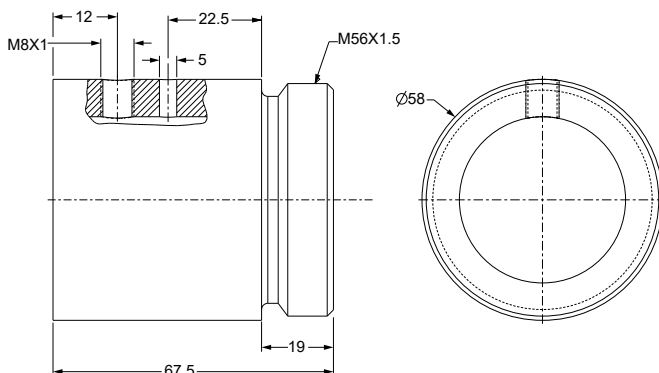
Cylindrical Ball Nut, KGM-D



Cylindrical Ball Nut, KGM-N



Threaded Ball Nut, KGM-G



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	5 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	9.03 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9710

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	21.5 kN
Max. Static Load	49.3 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.8 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	180
Wiper Type	Rubber
Part Number	KGM-D-4005-RH-EE

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	23.8 kN
Max. Static Load	63.1 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit Metal
Number of Balls	180
Wiper Type	Rubber
Part Number	KGM-N-4005-RH-EE

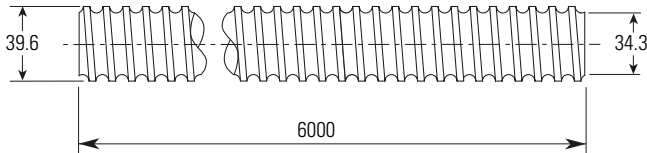
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	26.3 kN
Max. Static Load	59.2 kN
Number of Circuits	5
Torque to Raise 1 kN	0.885 Nm
Nut Weight	0.6 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	Single Circuit
Number of Balls	180
Wiper Type	Polymer
Part Number	KGM-G-4005-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

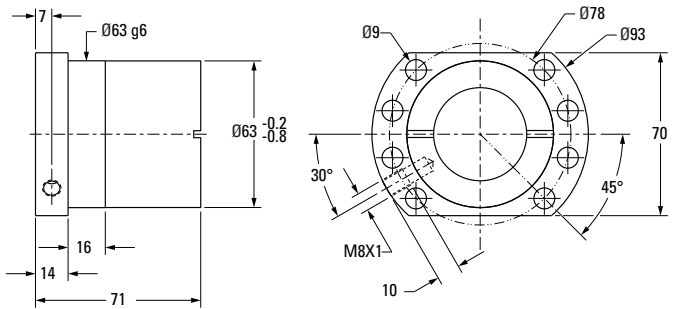
(2) Z1 = light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 40 x 10 mm Metric Ball Screws – Rolled

Ball Screw

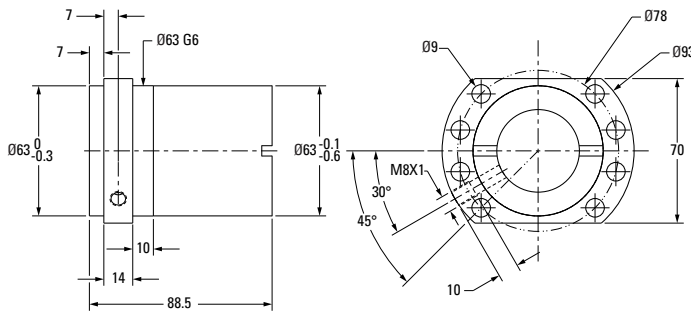


Flanged Ball Nut



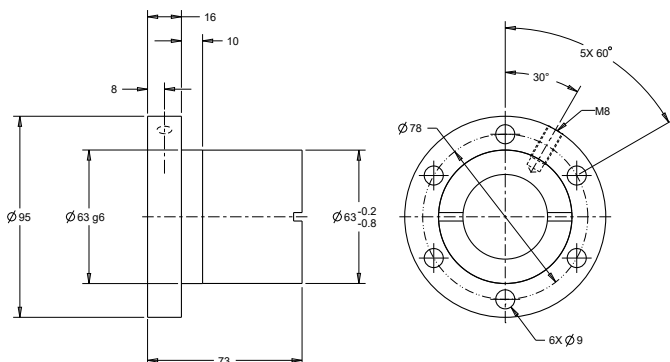
DIN 69051 Compliance

Flanged Ball Nut, KGF-D (FK)



DIN 69051 Compliance

Flanged Ball Nut, KGF-N



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	8.43 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9711

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	38.0 kN
Max. Static Load	69.2 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	54
Wiper Type	Rubber
Part Number	7115-448-074

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	64.9 kN
Max. Static Load	109.0 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	72
Wiper Type	Polymer
Part Number	KGF-D-4010-RH-KK

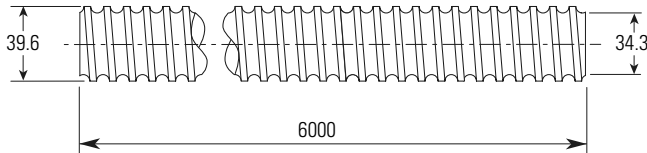
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	69.1 kN
Number of Circuits	3
Max. Static Load	109.0 kN
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	54
Wiper Type	Rubber
Part Number	KGF-N-4010-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1 = light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 40 x 10 mm Metric Ball Screws – Rolled

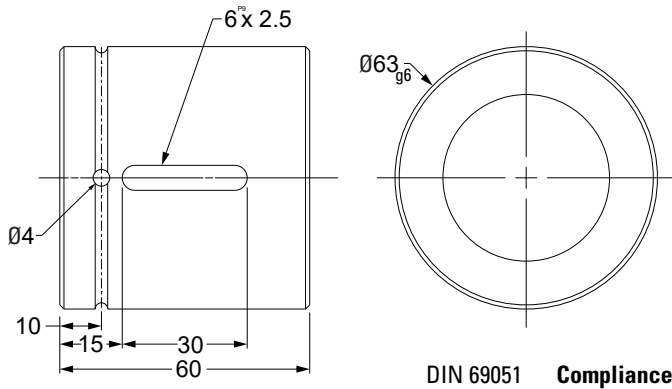
Ball Screw



Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	8.43 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9711

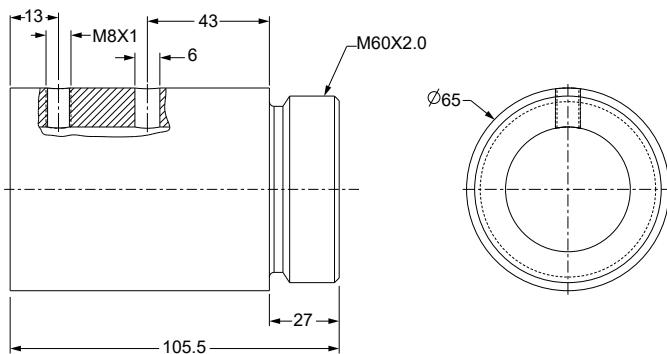
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-D



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	38.0 kN
Max. Static Load	69.1 kN
Number of Circuits	3
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	54
Wiper Type	Rubber
Part Number	KGM-D-4010-RH-EE

Threaded Ball Nut, KGM-G



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	78.6 kN
Max. Static Load	136.2 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.3 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	90
Wiper Type	Polymer
Part Number	KGM-G-4010-RH-KK

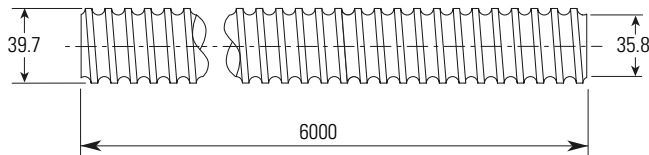
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 40 x 20 mm Metric Ball Screws – Rolled

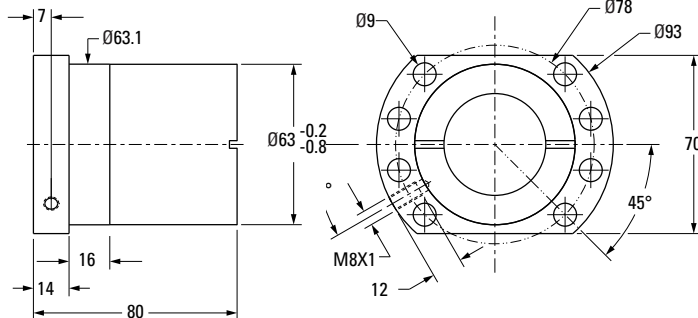
Ball Screw



Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	9.0 kg/m
Nominal Ball Diameter	5.0 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9712

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

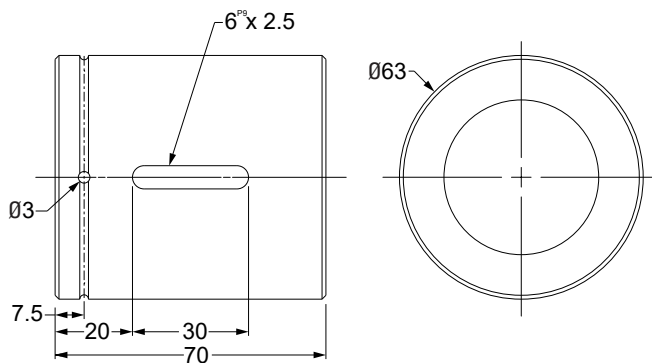
Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	33.3 kN
Max. Static Load	76.1 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	1.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.059 mm
Ball Return Type	Channel
Number of Balls	104
Wiper Type	Rubber
Part Number	7115-448-075

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	33.3 kN
Max. Static Load	76.1 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	1.2 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.059 mm
Ball Return Type	Channel
Number of Balls	102
Wiper Type	Rubber
Part Number	KGM-D-4020-RH-EE

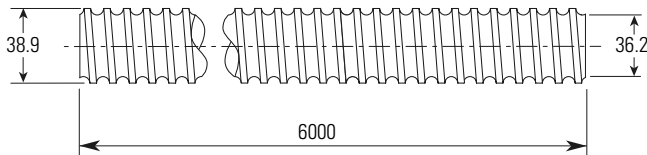
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 40 x 40 mm Metric Ball Screws – Rolled

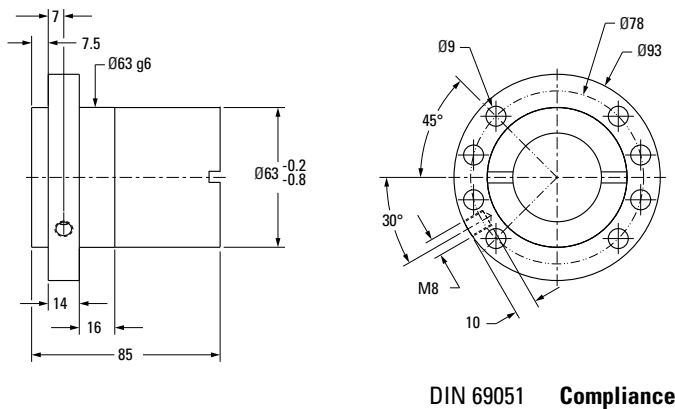
Ball Screw



Nominal Ball Screw Diameter	40 mm
Nominal Ball Screw Lead	40 mm
Thread Direction	Right Hand
Number of Thread Starts	4
Screw Material	CF53
Screw Weight	9.0 kg/m
Nominal Ball Diameter	3.5 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9713

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

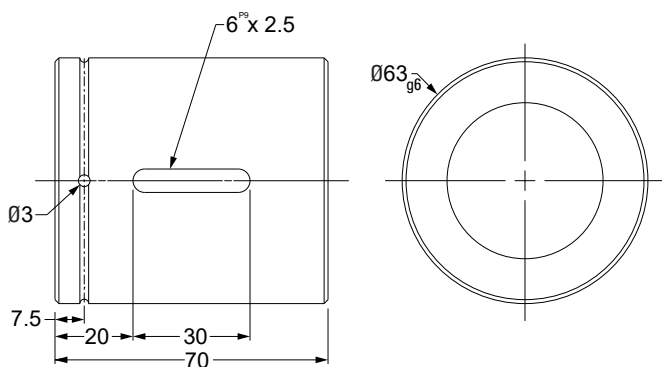
Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	35.0 kN
Max. Static Load	101.9 kN
Number of Circuits	8
Torque to Raise 1 kN	7.08 Nm
Nut Weight	1.2 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	360
Wiper Type	Rubber
Part Number	7115-448-076

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	35.0 kN
Max. Static Load	101.9 kN
Number of Circuits	8
Torque to Raise 1 kN	7.08 Nm
Nut Weight	0.9 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.041 mm
Ball Return Type	End Cap
Number of Balls	380
Wiper Type	Rubber
Part Number	KGM-D-4040-RH-EE

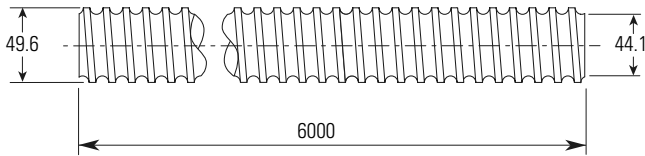
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

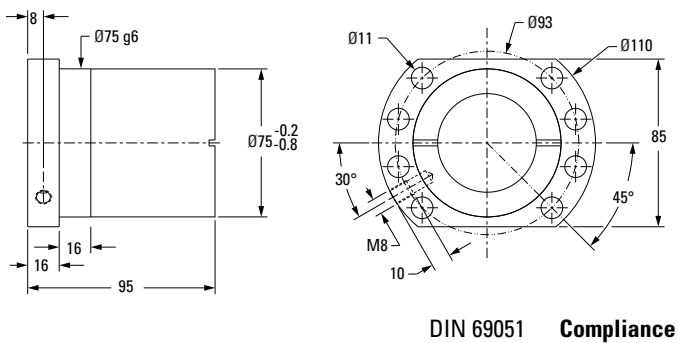
Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 50 x 10 mm Metric Ball Screws – Rolled

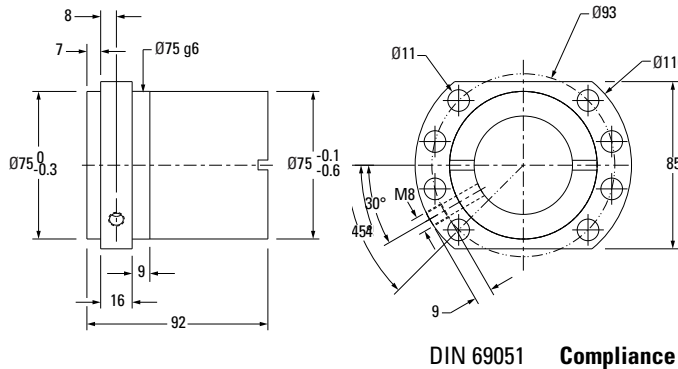
Ball Screw



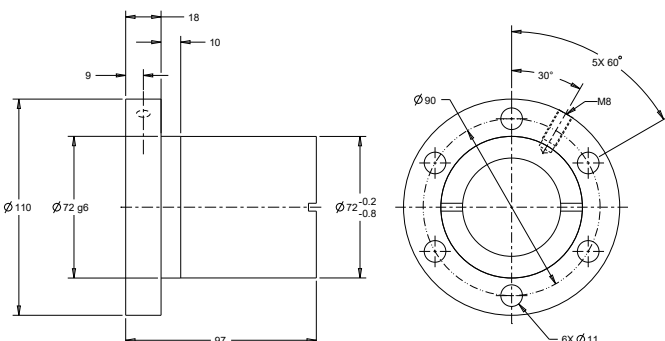
Flanged Ball Nut



Flanged Ball Nut, KGF-D (FK)



Flanged Ball Nut, KGF-N



Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Nominal Ball Screw Diameter	50 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	13.5 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9714

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	68.7 kN
Max. Static Load	155.8 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	115
Wiper Type	Rubber
Part Number	7120-448-077

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	66.4 kN
Max. Static Load	134.3 kN
Number of Circuits	4
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	88
Wiper Type	Polymer
Part Number	KGF-D-5010-RH-KK

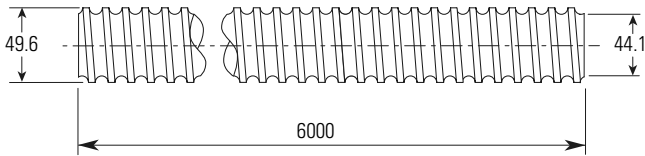
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	68.7 kN
Max. Static Load	155.8 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	115
Wiper Type	Rubber
Part Number	KGF-N-5010-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 50 x 10 mm Metric Ball Screws – Rolled

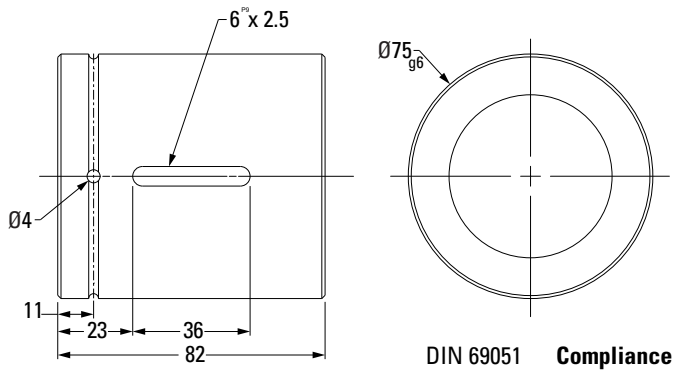
Ball Screw



Nominal Ball Screw Diameter	50 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	13.5 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9714

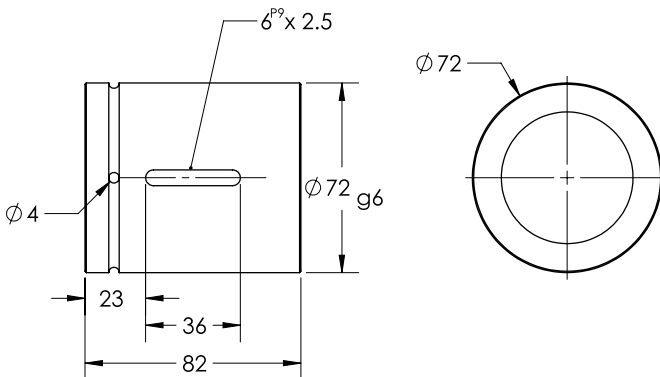
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-D



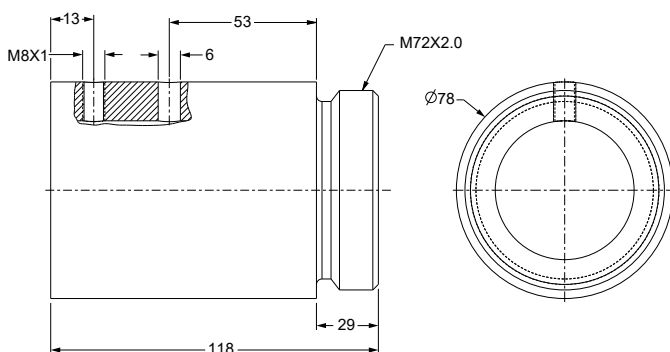
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	68.7 kN
Max. Static Load	155.8 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	155
Wiper Type	Rubber
Part Number	KGM-D-5010-RH-EE

Cylindrical Ball Nut, KGM-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	68.7 kN
Max. Static Load	155.8 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.1 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	115
Wiper Type	Rubber
Part Number	KGM-N-5010-RH-EE

Threaded Ball Nut, KGM-G



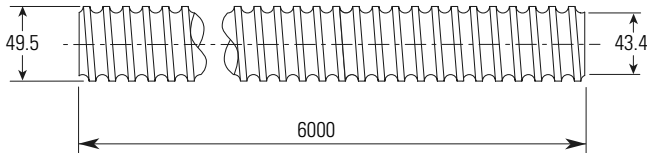
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	97.8 kN
Max. Static Load	213.2 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	132
Wiper Type	Polymer
Part Number	KGM-G-5010-RH-KK

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
 (2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 50 x 20 mm Metric Ball Screws – Rolled

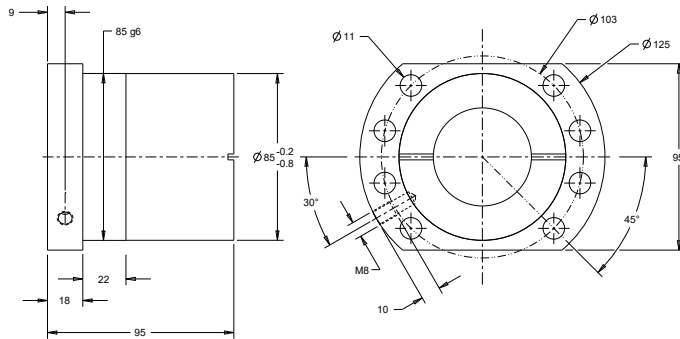
Ball Screw



Nominal Ball Screw Diameter	50 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	13.4 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy⁽¹⁾ P5 Part Number	195-9725

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

Flanged Ball Nut



DIN 69051 Compliance

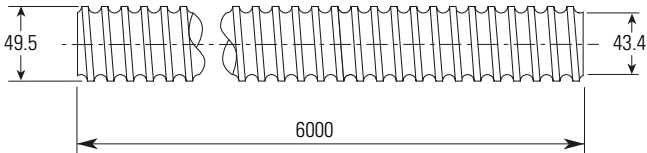
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	60.0 kN
Max. Static Load	136.3 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	2.5 kg
Preload Classes⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Channel
Number of Balls	100
Wiper Type	Rubber
Part Number	7120-448-078

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 50 x 20 mm Metric Ball Screws – Rolled

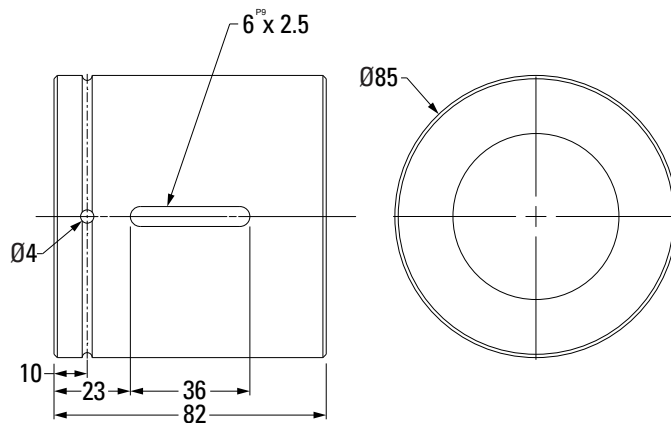
Ball Screw



Nominal Ball Screw Diameter	50 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	13.4 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9725

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

Cylindrical Ball Nut, KGM-N



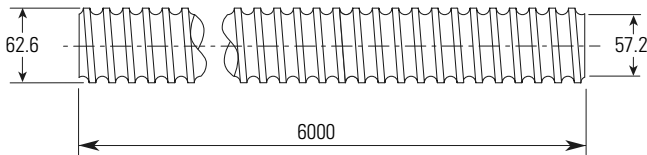
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	60.0 kN
Max. Static Load	136.3 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	1.4 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Channel
Number of Balls	100
Wiper Type	Rubber
Part Number	KGM-N-5020-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

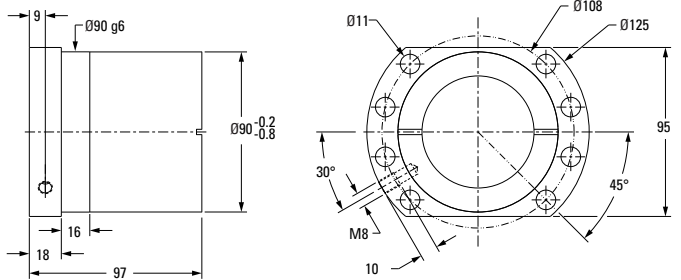
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 63 x 10 mm Metric Ball Screws – Rolled

Ball Screw

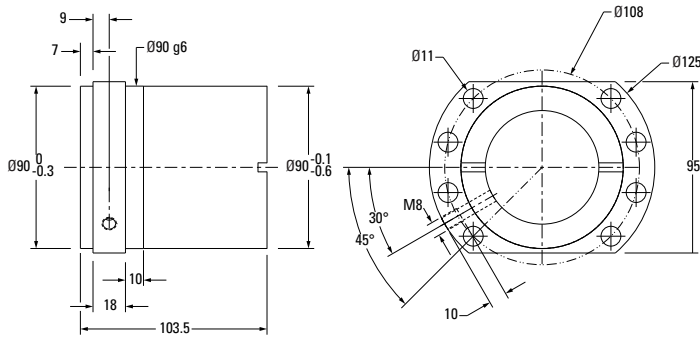


Flanged Ball Nut



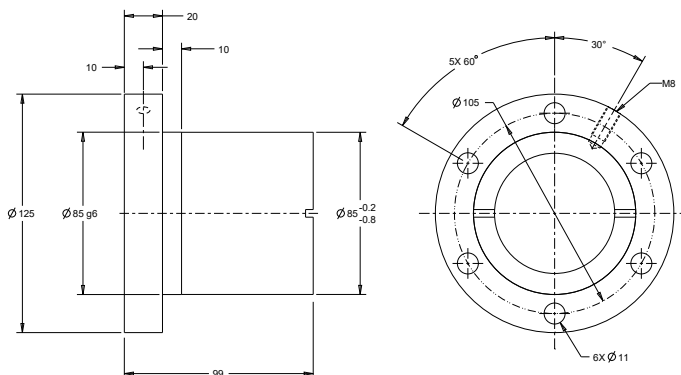
DIN 69051 Compliance

Flanged Ball Nut, KGF-D (FK)



DIN 69051 Compliance

Flanged Ball Nut, KGF-N



Nominal Ball Screw Diameter	63 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	22.0 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9726

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

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	76.0 kN
Max. Static Load	197.0 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	140
Wiper Type	Rubber
Part Number	7125-448-001

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	93.8 kN
Max. Static Load	229.7 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	140
Wiper Type	Polymer
Part Number	KGF-D-6310-RH-KK

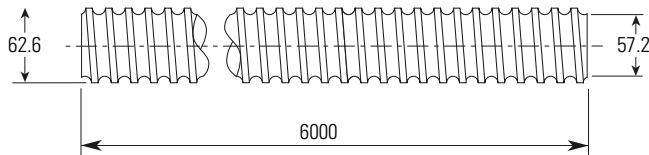
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	76.0 kN
Max. Static Load	197.0 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	140
Wiper Type	Rubber
Part Number	KGF-N-6310-RH-EE

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 63 x 10 mm Metric Ball Screws – Rolled

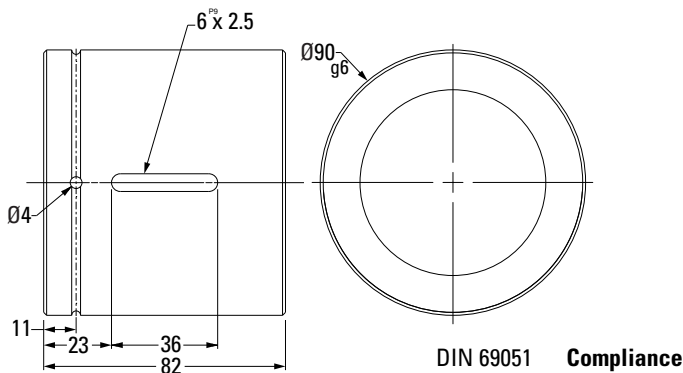
Ball Screw



Nominal Ball Screw Diameter	63 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	22.0 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9726

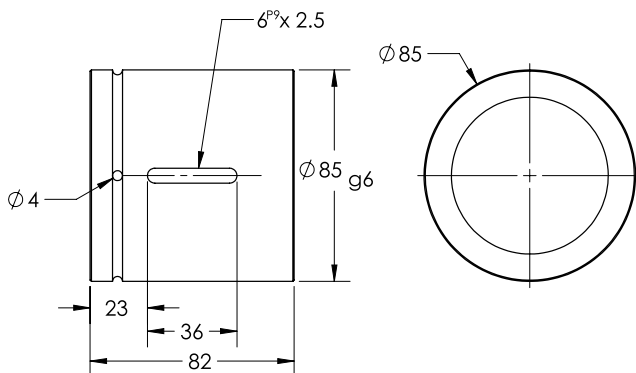
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-D



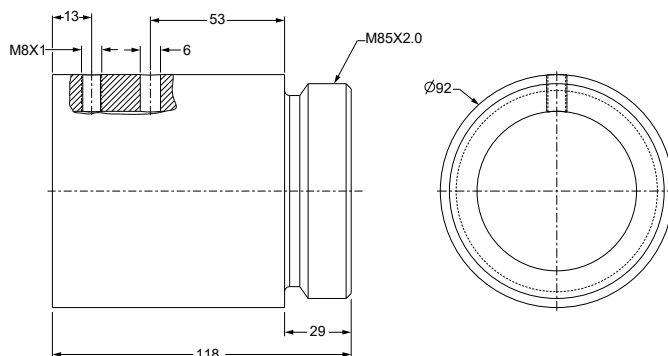
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	68.7 kN
Max. Static Load	155.8 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	0.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	140
Wiper Type	Rubber
Part Number	KGM-D-6310-RH-EE

Cylindrical Ball Nut, KGM-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	76.0 kN
Max. Static Load	197.0 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	1.5 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	140
Wiper Type	Rubber
Part Number	KGM-N-6310-RH-EE

Threaded Ball Nut, KGM-G



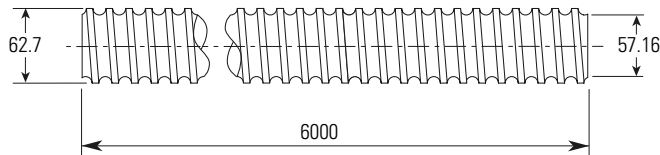
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	109.7 kN
Max. Static Load	213.2 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	2.0 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit
Number of Balls	168
Wiper Type	Polymer
Part Number	KGM-G-6310-RH-KK

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
 (2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 63 x 20 mm Metric Ball Screws – Rolled

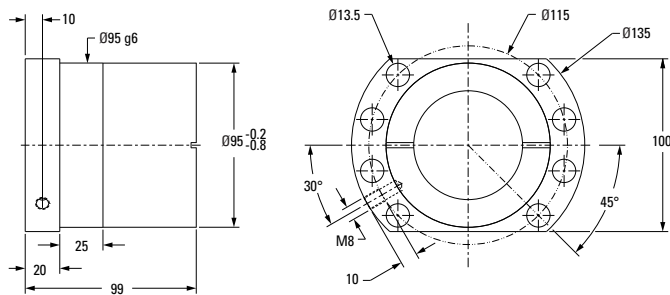
Ball Screw



Nominal Ball Screw Diameter	63 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	22 kg/m
Nominal Ball Diameter	7.14 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9727

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

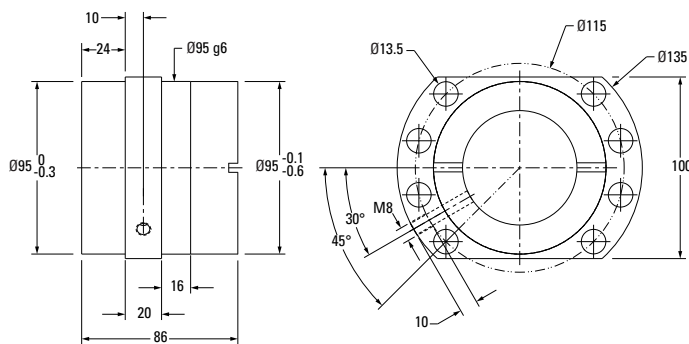
Flanged Ball Nut



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	78.4 kN
Max. Static Load	173.4 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	2.95 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Polymer
Number of Balls	96
Wiper Type	Rubber
Part Number	7125-448-002

Flanged Ball Nut, KGF-D (FH)



DIN 69051 Compliance

Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	103.1 kN
Max. Static Load	270.8 kN
Number of Circuits	5.6
Torque to Raise 1 kN	3.54 Nm
Nut Weight	3.8 kg/m
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	End Cap
Number of Balls	96
Wiper Type	Polymer
Part Number	KGF-D-6320-RH-KK

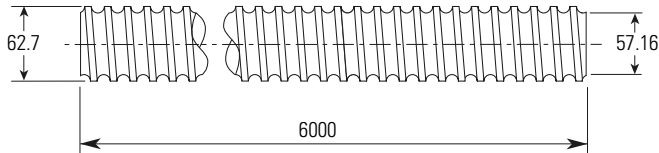
(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 63 x 20 mm Metric Ball Screws – Rolled

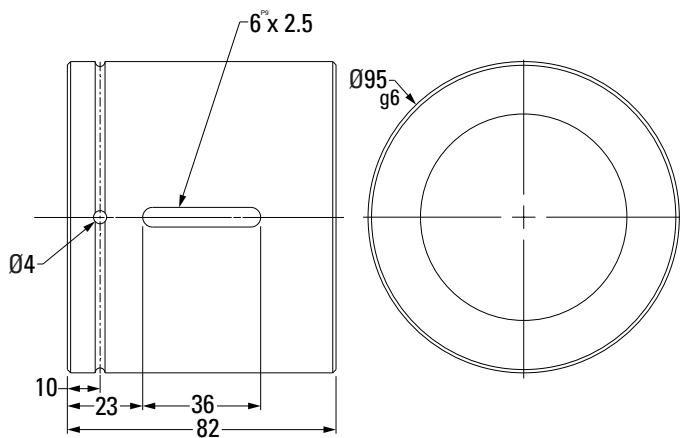
Ball Screw



Nominal Ball Screw Diameter	63 mm
Nominal Ball Screw Lead	20 mm
Thread Direction	Right Hand
Number of Thread Starts	2
Screw Material	CF53
Screw Weight	22 kg/m
Nominal Ball Diameter	7.14 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9727

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

Cylindrical Ball Nut, KGM-D



DIN 69051 Compliance

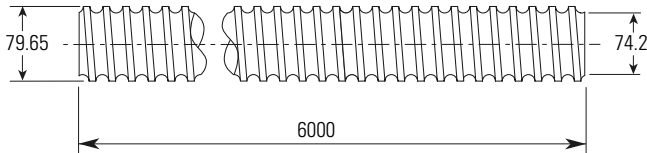
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	78.4 kN
Max. Static Load	171.3 kN
Number of Circuits	4
Torque to Raise 1 kN	3.54 Nm
Nut Weight	1.95 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Channel
Number of Balls	96
Wiper Type	Rubber
Part Number	KGM-D-6320-RH-EE

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm

(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Ø 80 x 10 mm Metric Ball Screws – Rolled

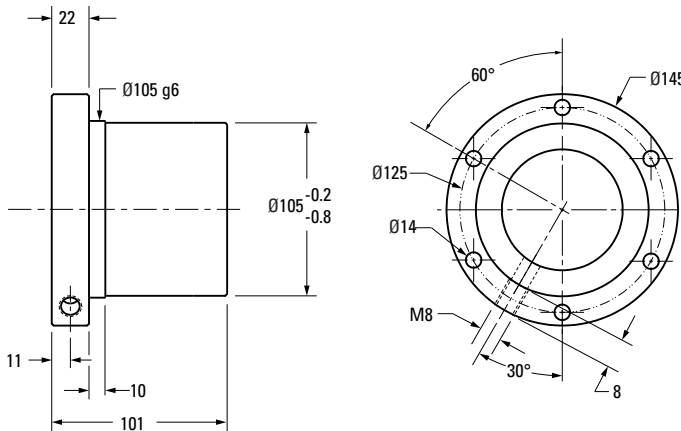
Ball Screw



Nominal Ball Screw Diameter	80 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	36.4 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9728

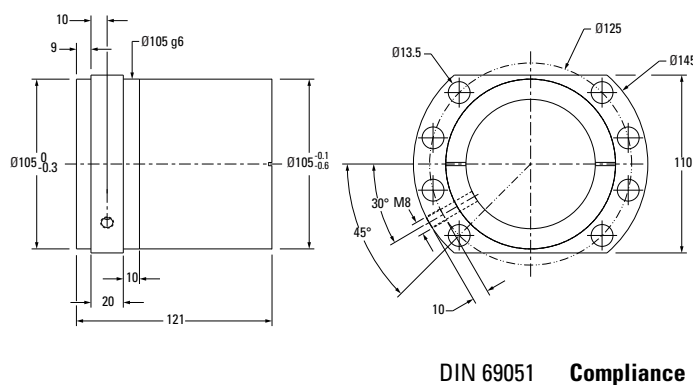
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Flanged Ball Nut, KGF-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	86.3 kN
Max. Static Load	262.4 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	3.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.08 mm
Ball Return Type	Single Circuit Polymer
Number of Balls	175
Wiper Type	Rubber
Part Number	KGF-N-8010-RH-EE

Flanged Ball Nut, KGF-D (FK)



DIN 69051 Compliance

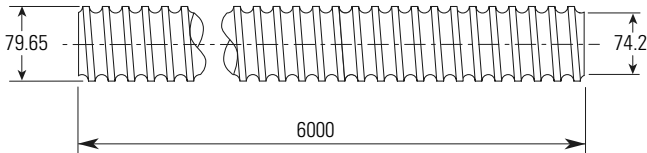
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	121.9 kN
Max. Static Load	374.9 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	3.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.084 mm
Ball Return Type	Single Circuit Metal
Number of Balls	210
Wiper Type	Polymer
Part Number	KGF-D-8010-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
(2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Ø 80 x 10 mm Metric Ball Screws – Rolled

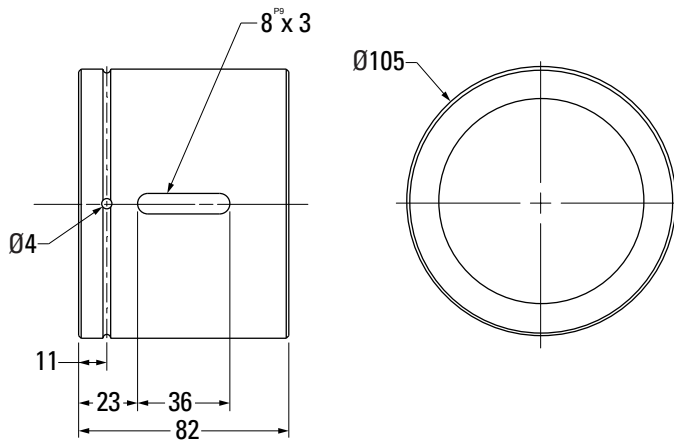
Ball Screw



Nominal Ball Screw Diameter	80 mm
Nominal Ball Screw Lead	10 mm
Thread Direction	Right Hand
Number of Thread Starts	1
Screw Material	CF53
Screw Weight	36.4 kg/m
Nominal Ball Diameter	7.144 mm
Lead Accuracy ⁽¹⁾ P5 Part Number	195-9728

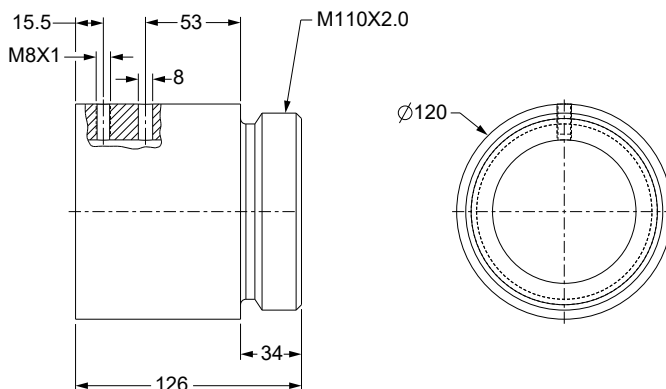
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order

Cylindrical Ball Nut, KGM-N



Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	86.3 kN
Max. Static Load	262.4 kN
Number of Circuits	5
Torque to Raise 1 kN	1.77 Nm
Nut Weight	3.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.08 mm
Ball Return Type	Single Circuit Polymer
Number of Balls	175
Wiper Type	Rubber
Part Number	KGM-N-8010-RH-EE

Threaded Ball Nut, KGM-G



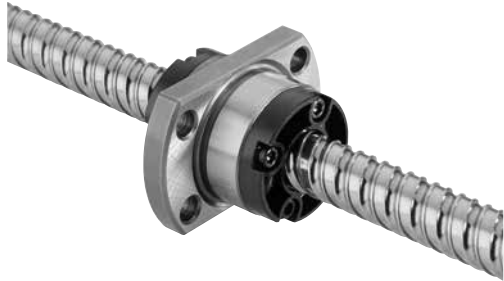
Thread Direction	Right Hand
Nut Material	1.7131 (ESP 65)
Dynamic Load	121.9 kN
Max. Static Load	375 kN
Number of Circuits	6
Torque to Raise 1 kN	1.77 Nm
Nut Weight	4.9 kg
Preload Classes ⁽²⁾	Z1, Z2 (standard), Z3
Standard max. Backlash (Z2)	0.18 mm
Ball Return Type	Single Circuit Metal
Number of Balls	210
Wiper Type	Polymer
Part Number	KGM-G-8010-RH-KK

(1) P3 = 12 µm / 300 mm, P5 = 23 µm / 300 mm, T5 = 23 µm / 300 mm, T7 = 52 µm / 300 mm
 (2) Z1= light preload to 1-2%, Z2 = no preload, clearance held to max. indicated in table (standard unless specified), Z3 = no preload, clearance held to max. 0.05 mm

Note: Dimensional information for all End Journals and Bearing Supports is available on page 118 – 137. Information on required lubrication is on page 177.

Metric Miniature Rolled Ball Screws — PRM Series

4mm to 14mm Diameter, Lead Accuracy: $\pm 52\mu\text{m}/300\text{mm}$



Type A



Type B

Non-Preloaded, Rolled Ball Screw Assemblies

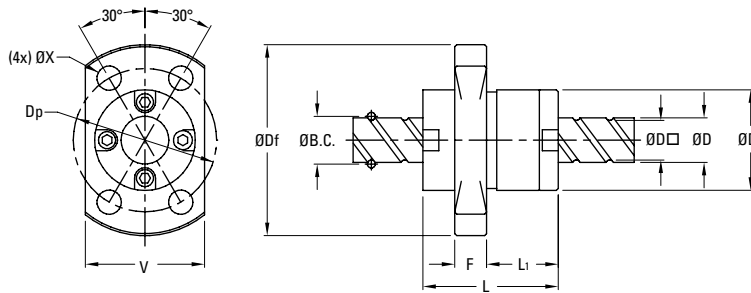
- Cost-effective solution in a small envelope, ideal for use in small spaces
- Clearance held to max .02mm
- Two nut styles (Type A & B) provide optimum performance in low and high lead assemblies

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

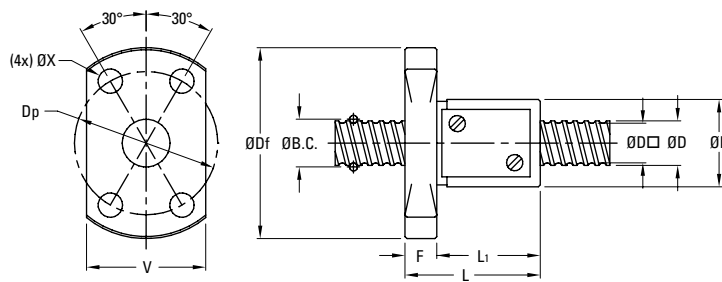
(1) All Miniature Rolled product is sold in matched sets as ball screw and nut assemblies. Please contact factory for sizes not listed.

Metric Miniature Rolled Ball Screws — PRM 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

Ordering

Ordering Key - Metric Ball Screws

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RM	16	05	FD	Z1-	271.54	R	X-	FK	1	S	X		X	

1. Nut configuration

RM = Metric

2. Nominal thread diameter

10 = 10 mm
12 = 12 mm
16 = 16 mm
20 = 20 mm
25 = 25 mm
32 = 32 mm
40 = 40 mm
50 = 50 mm
63 = 63 mm
80 = 80 mm

3. Thread lead

02 = 2 mm
03 = 3 mm
04 = 4 mm
05 = 5 mm
10 = 10 mm
20 = 20 mm
25 = 25 mm
32 = 32 mm
40 = 40 mm
50 = 50 mm

4. Nut style

F = Flanged internal ball return (FSI)
T = Threaded internal ball return (TSI)
R = Cylindrical internal ball return (RSI)
FD = Flanged (DIN 69051), internal ball return
FH = Flanged, end cap return
FK = Flanged, metal ball return
FN = Flanged, polymer ball return
MD = Flanged (DIN 69051), polymer ball return
MG = Threaded, metal ball return
MN = Cylindrical, internal ball return
FS = No nut, Fineline screw only
Blank = No nut, standard screw only

5. Nut assembly condition

Z1- = Light preload (1-2%)
Z2- = Standard backlash
Z3- = Backlash reduced (0.05 mm max.)

6. Threaded length

xxx.xx- = Length (mm)

7. Nut orientation

R = Nut faces right end
L = Nut faces left end
X = Nut ships on arbor

8. Wipers

X- = No wipers
W- = Polymer wipers (standard)

9. Left end configuration

X = Cut to length
K = Machine to print
xx.x = Annealed length [inch]
BK = Base mount
BF = Floating base mount
FK = Flange mount
FF = Floating flange mount
QK = Base/flange mount
QF = Floating base/flange mount
WK = Heavy duty flange
MK = Motor mount

10. Left end drive configuration

Blank = With drive extension or cut to length
1 = Without drive extension

11. Left screw support configuration

X = No support (machined only)
S = Support installed on machined surface

12. Right end configuration

X = Cut to length
K = Machine to print
xx.x = Annealed length [inch]
BK = Base mount
BF = Floating base mount
FK = Flange mount
FF = Floating flange mount
QK = Base/flange mount
QF = Floating base/flange mount
WK = Heavy duty flange
MK = Motor mount

13. Right end drive configuration

Blank = With drive extension or cut to length
1 = Without drive extension

14. Right screw support configuration

X = No support (machined only)
S = Support installed on machined surface

15. Custom Modifier

Blank = Standard
M = Custom

NOTE: Not all bearing supports are available in all sizes. See catalog or tact customer support for available combinations

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 0.007 maximum
- Hardness — minimum of RC 56 in ball race
- Lash — 0.005 inch maximum standard play perpendicular to rotational axis

Precision Rolled Ball Splines

0.625 in to 4.000 in Diameter



Inner and Outer Spline Races

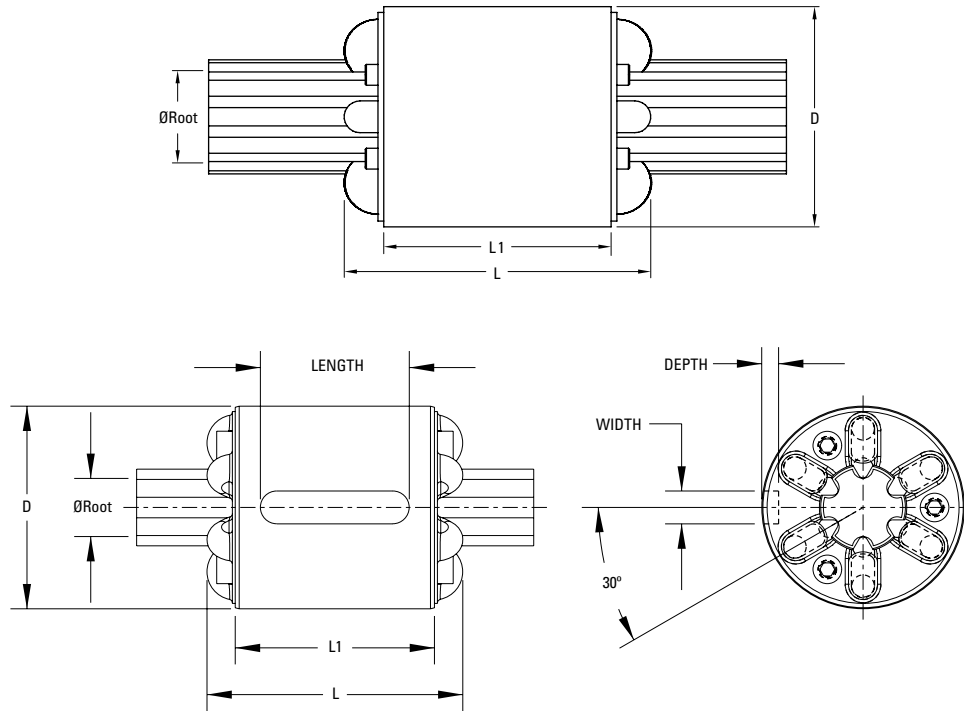
- Offers high speed, anti-friction linear motion under high torsional loads
- All units available with and without keyway
- **All sizes stocked for quick delivery**

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/in)
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	72	0.17
1.000	6	5706084	5708944	7828131	2,600	7,800	0.005	0.0100	0.800	72	0.17
1.500	3	5706388	5707528	7828132	4,200	11,588	0.005	0.0067	1.230	72	0.4
1.500	6	5706388	5708945	7828133	8,400	23,176	0.005	0.0067	1.230	72	0.4
2.000	3	5706436	5707530	7828134	8,000	20,138	0.005	0.0050	1.670	72	0.75
2.000	6	5706436	5708946	7828135	16,000	40,276	0.005	0.0050	1.670	72	0.75
2.500	3	5706484	5707532	7828136	13,500	36,625	0.005	0.0040	2.100	72	1.17
2.500	6	5706484	5708947	7828137	27,000	62,250	0.005	0.0040	2.100	72	1.17
4.062	6	5702204	5708330	7828138	57,000	140,000	0.005	0.0025	3.660	72	3.13

(1) Dimensional information on bearing supports and standard end machining is available on page 118 - 137.

(2) Information on required lubrication is on page 177.

Precision Rolled Ball Splines

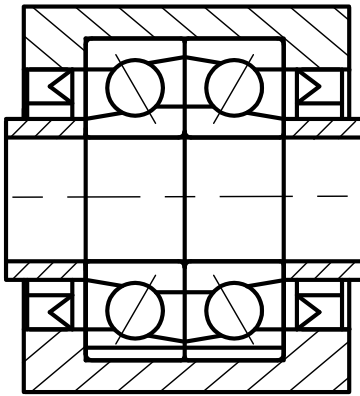


Nominal Diameter	Active Races	Outer Race Specifications					
		D (max.)	L	L1	Keyway Dimensions (Optional) (Width x Depth x Length)	Outer Weight	Ball Diameter
(in.)		(in.)	(in.)	(in.)	(in.)	(lb)	(in.)
0.625	3	1.531	2.035	1.505	0.250 x 0.125 x 1.125	0.37	0.187
0.625	6	1.531	2.035	1.505	0.250 x 0.125 x 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

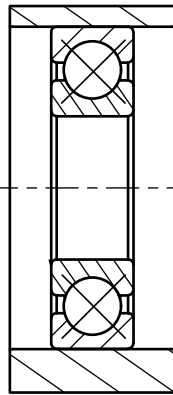
Bearing Supports and End Machining Overview

For most applications, the ball screw end(s) will be supported with a bearing. Configurations that are commonly used to support the ends of a ball screw are:

- A pair of back-to-back (fixed support)
- A deep groove radial bearing (floating/simple support)



Fixed Bearing Configuration



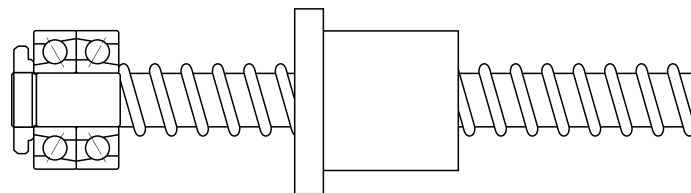
Floating Bearing Configuration



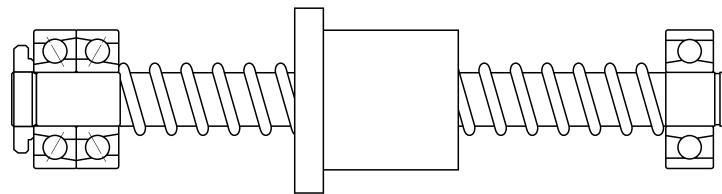
Screw with Machined End and a Bearing Block End Support

Bearing Support Combinations

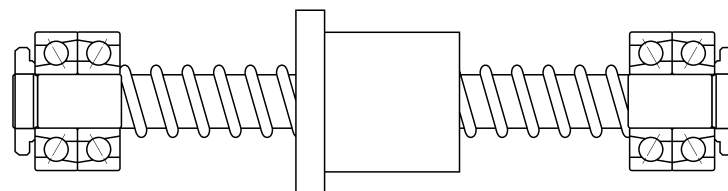
Three combinations of bearing supports are typically used. Fixed on one end and free on the other offers the least support where Fixed on both ends offers the most support. Screws with more support are able to support higher loads without buckling and obtain higher critical speeds.



Fixed / Free



Fixed / Simple



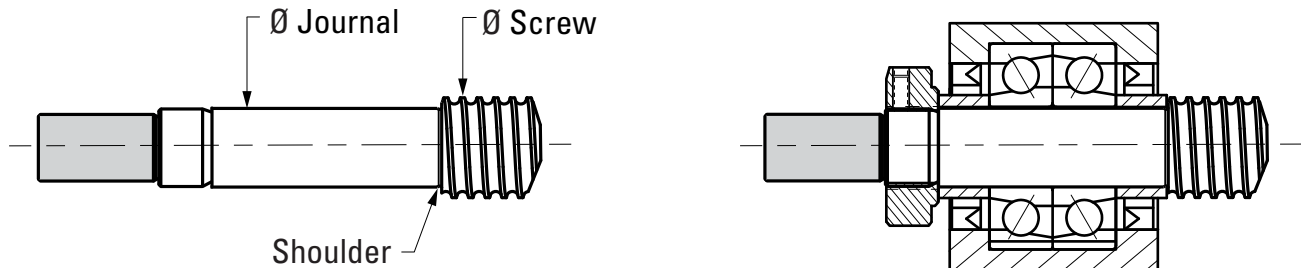
Fixed / Fixed

Bearing Supports and End Machining Overview

End Machining

To fit a bearing support to a ball screw, a bearing journal must first be machined into the screw. The maximum diameter of the journal is limited by the screw geometry. Enough of the screw must be machined away to provide a shoulder for the bearing to seat against. The recommended maximum journal diameter is usually near the ball screws root diameter.

To attach a ball screw to a drive system, a drive extension is machined into the screw. It is important to specify if this drive extension is wanted on one or both ends. The shaded area in the drawings below represents the drive extension. See the specific end machining in the following pages for details.



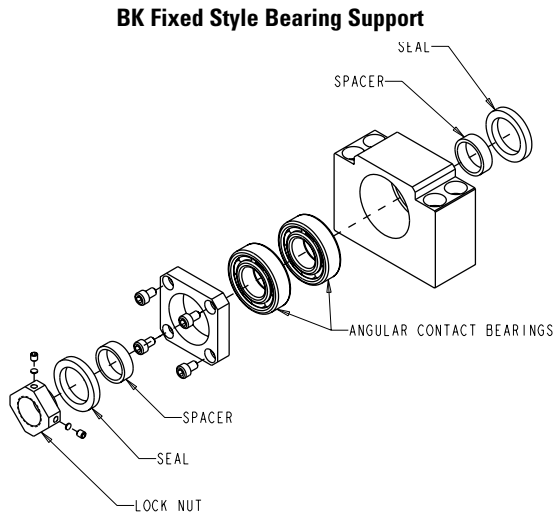
Diameter x Lead		Maximum Recommended Journal Diameter (mm) ⁽¹⁾	End Support Style and Part Number							
inch	mm		BK	BF	FK	FF	MK	WK	QK	QF
0.500 x all	12 x all	10	7833360	7833368	7833377	7833384	7833685	-	7828282	7833291
0.631 x all	16 x all	12	7833361	7833369	7833378	7833385	7833686	-	7824154	7833256
0.750 x all	20 x all	15	7833362	7833370	7833379	7833386	7833687	-	7824155	7833259
0.875 x all	N/A	17	7833363	7833371	7833380	7833387	-	7833595	7824156	7833262
1.000 x all 1.171 x all	25 x all	20	7833364	7833372	7833381	7833388	7833690	7833596	7824157	7833265
1.150 x all 1.250 x all 1.500 x 0.473 1.500 x 1.000	32 x all	25	7833365	7833373	7833382	7833389	-	7833597	7824158	7833268
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	40 x all	30	7833366	7833374	7833383	7833390	-	7833599	7824159	7833270
1.750 x all	50 x all	40	7833367	7833375	-	-	-	7833602	7829554	7833273
2.000 x all	N/A	45	7833367	7833375	-	-	-	-	7824160	7833276
2.500 x all	63 x all	50	-	-	-	-	-	-	7824161	7833279

(1) Some support blocks or applications may use a journal smaller than the maximum recommended diameter.

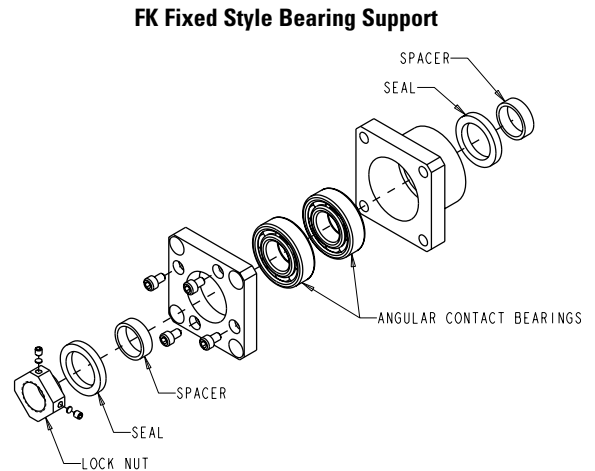
Bearing Supports and End Machining Overview

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

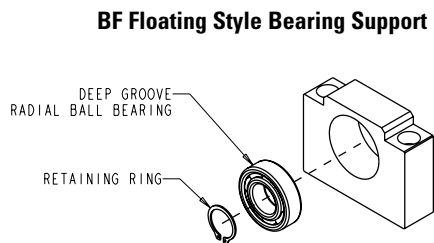
- Rugged steel construction
- Low profile, compact design
- Base or Flange mounting configurations
- Pre-assembled and ready for installation
- Available off-the-shelf



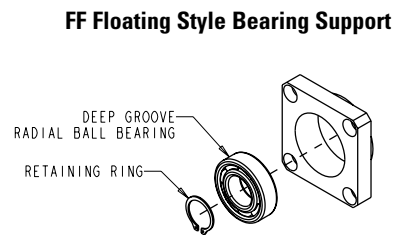
The base mounted BK Bearing Support contains an angular contact bearing pair for increased stiffness and axial load capacity.



The flange mounted FK Bearing Support contains an angular contact bearing pair for increased stiffness and axial load capacity.



The base mounted BF Bearing Support contains a floating radial bearing to allow axial shaft movement.



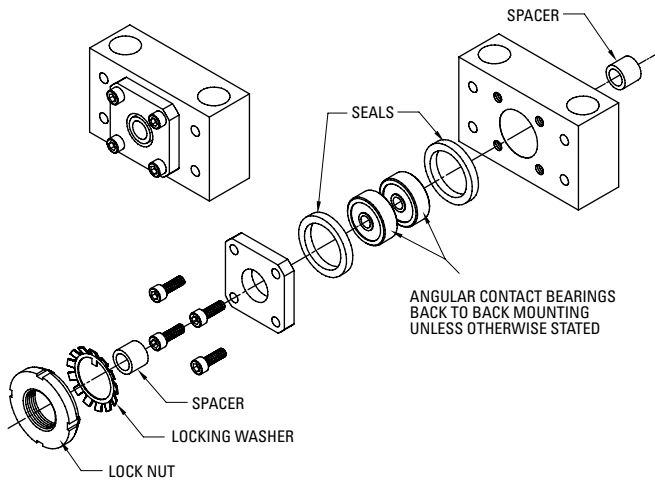
The flange mounted FF Bearing Support contains a floating radial bearing to allow axial shaft movement.

Bearing Supports and End Machining Overview

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

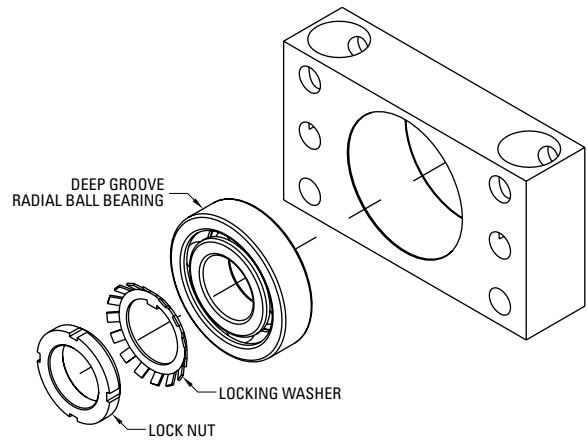
- Pre-assembled and ready for installation
- Available off-the-shelf for quick building convenience
- Rugged steel construction
- Low profile, compact design
- Foot or face mounting

QK Fixed Style Bearing Support



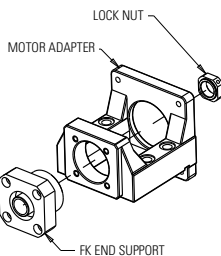
The QK Bearing Support contains high angular contact bearings arranged in a back-to-back (DB) configuration for high stiffness. Design dimensions fit standard Type QK or QK1 end machining.

QF Floating Style Bearing Support



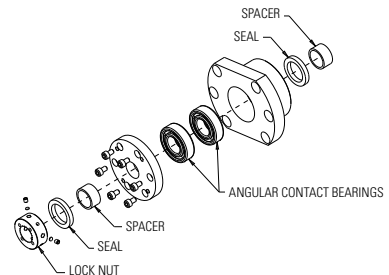
The QF Bearing Support provides a single deep groove radial ball bearing. Design dimensions fit standard Type QF or QF1 end machining.

MK Fixed Style Bearing Support



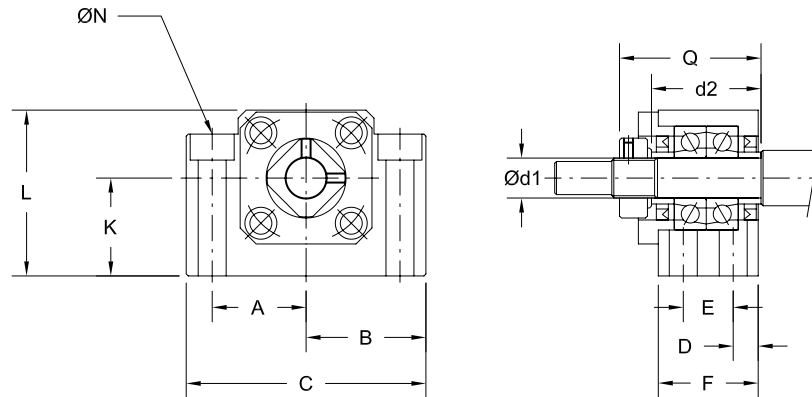
Base mounted NEMA 23 or 34 motor mount.

WK Fixed Style Bearing Support



Heavy duty flange mounted WK support contains higher load capacity bearings.

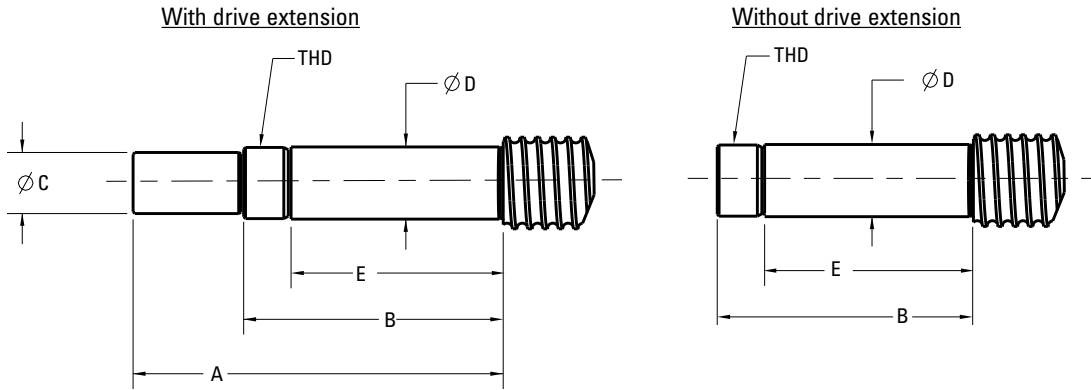
Base Mount – Fixed Bearing Support (BK)



Standard P/N	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))											
		d1 (mm)	d2	A	B	C	D	E	F	K ±0.001 (±0.02)	L	N	Q
7833360	0.500 (12)	10	1.063 (27.0)	0.906 (23.0)	1.181 (30.0)	2.362 (60.0)	0.236 (6.0)	0.512 (13.0)	0.984 (25.0)	0.866 (22.0)	1.535 (39.0)	4x 0.260 (6.6) Thru, 0.425 (10.8) C-Bore x 0.197 (5.0) Dp	1.339 (34.0)
7833361	0.631 (16)	12	1.063 (27.0)	0.906 (23.0)	1.181 (30.0)	2.362 (60.0)	0.236 (6.0)	0.512 (13.0)	0.984 (25.0)	0.984 (25.0)	1.693 (43.0)	4x 0.260 (6.6) Thru, 0.425 (10.8) C-Bore x 0.059 (1.5) Dp	1.339 (34.0)
7833362	0.750 (20)	15	1.496 (38.0)	1.063 (27.0)	1.378 (35.0)	2.756 (70.0)	0.236 (6.0)	0.591 (15.0)	1.063 (27.0)	1.102 (28.0)	1.890 (48.0)	4x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.256 (6.5) Dp	1.496 (38.0)
7833363	0.875 (22)	17	1.732 (44.0)	1.339 (34.0)	1.693 (43.0)	3.386 (86.0)	0.315 (8.0)	0.748 (19.0)	1.378 (35.0)	1.535 (39.0)	2.520 (64.0)	4x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5) Dp	2.008 (51.0)
7833364	1.000 / 1.171 (25)	20	1.969 (50.0)	1.378 (35.0)	1.732 (44.0)	3.465 (88.0)	0.315 (8.0)	0.748 (19.0)	1.378 (35.0)	1.339 (34.0)	2.362 (60.0)	4x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5) Dp	2.008 (51.0)
7833365	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	2.362 (60.0)	1.673 (42.5)	2.087 (53.0)	4.173 (106.0)	0.394 (10.0)	0.866 (22.0)	1.654 (42.0)	1.890 (48.0)	3.150 (80.0)	4x 0.433 (11.0) Thru, 0.699 (17.0) C-Bore x 0.433 (11.0) Dp	2.480 (63.0)
7833366	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 (40)	30	1.969 (50.0)	2.008 (51.0)	2.520 (64.0)	5.039 (128.0)	0.433 (11.0)	0.906 (23.0)	1.772 (45.0)	2.008 (51.0)	3.504 (89.0)	4x 0.551 (14.0) Thru, 0.787 (20.0) C-Bore x 0.512 (13.0) Dp	2.756 (70.0)
7833367	1.750 / 2.000 (50)	40	2.598 (66.0)	2.559 (65.0)	3.150 (80.0)	6.299 (160.0)	0.551 (14.0)	1.299 (33.0)	2.402 (61.0)	2.362 (60.0)	4.331 (110.0)	4x 0.709 (18.0) Thru, 1.024 (26.0) C-Bore x 0.689 (17.5) Dp	3.583 (91.0)

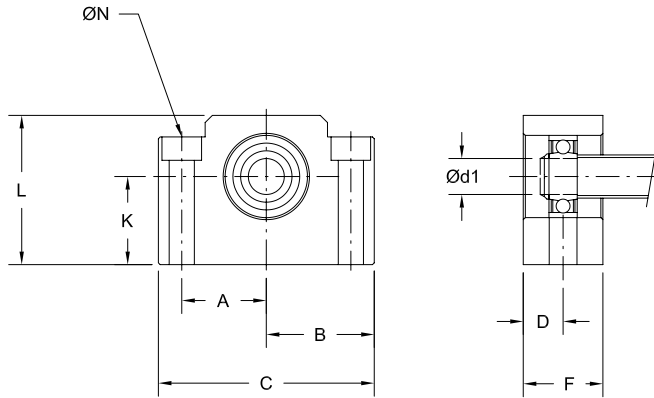
Standard P/N	Bearing Rating				Lock Nut Type	Block Weight (lbs (kg))	Bearing Trade No.
	Dynamic Rating		Static Rating				
	(lbs)	(N)	(lbs)	(N)			
7833360	1168	5197	430	1912	RN10	0.9 (0.4)	7000
7833361	1345	5982	478	2128	RN12	1.0 (0.5)	7001
7833362	1543	6864	529	2353	RN15	1.3 (0.6)	7002
7833363	2690	11963	910	4050	RN17	2.9 (1.3)	7203
7833364	3726	16572	1294	5756	RN20	2.8 (1.3)	7204
7833365	4608	20495	1563	6952	RN25	5.3 (2.4)	7205
7833366	6614	29418	2070	9208	RN30	7.5 (3.4)	7206
7833367	10362	46088	4043	17984	RN40	15.0 (6.8)	7208

End Machining Dimensions – Fixed Bearing Support (BK)



Standard P/N	Dia x Lead (inch (mm))	Type BK / BK1 (inch (mm))					
		A	B	C (h7)	D (g6)	E	THD
7833360	0.500 (12)	2.008 (51.0)	1.417 (36.0)	0.3150/0.3144 (8.0)	0.3935/0.3932 (9.995/9.988)	0.787 (20.0)	M10x1
7833361	0.631 (16)	2.008 (51.0)	1.417 (36.0)	0.3937/0.3931 (10.0)	0.4722/0.4720 (11.995/11.988)	0.866 (22.0)	M12x1
7833362	0.750 (20)	2.362 (60.0)	1.575 (40.0)	0.4724/0.4717 (12.0)	0.5904/0.5900 (14.995/14.986)	1.102 (28.0)	M15x1
7833363	0.875	2.992 (76.0)	2.087 (53.0)	0.5906/0.5898 (15.0)	0.6691/0.6687 (16.995/16.986)	1.417 (36.0)	M17x1
7833364	1.000 / 1.171 (25)	3.071 (78.0)	2.087 (53.0)	0.6693/0.6686 (17.0)	0.7872/0.7869 (19.995/19.986)	1.496 (38.0)	M20x1
7833365	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	3.740 (95.0)	2.559 (65.0)	0.7874/0.7866 (20.0)	0.9841/0.9837 (24.995/24.985)	1.850 (47.0)	M25x1.5
7833366	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 (40)	4.331 (110.0)	2.835 (72.0)	0.9843/0.9834 (25.0)	1.1809/1.1805 (29.995/29.985)	1.850 (47.0)	M30x1.5
7833367	1.750 / 2.000 (50)	5.630 (143.0)	3.661 (93.0)	1.3780/1.3771 (35.0)	1.5746/1.5742 (39.995/39.985)	2.283 (58.0)	M40x1.5

Base Mount – Floating Bearing Support (BF)



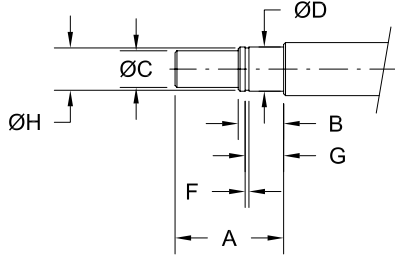
Standard P/N	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))								
		d1 (mm)	A	B	C	D	F	K ±0.001 (±0.02)	L	N
7833368	0.500 (12)	8	0.906 (23.0)	1.181 (30.0)	2.362 (60.0)	0.394 (10.0)	0.787 (20.0)	0.866 (22.00)	1.535 (39.0)	2x 0.260 (6.6) Thru, 0.425 (10.8) C-Bore x 0.197 (5.0) Dp
7833369	0.631 (16)	10	0.906 (23.0)	1.181 (30.0)	2.362 (60.0)	0.394 (10.0)	0.787 (20.0)	0.984 (25.00)	1.693 (43.0)	2x 0.260 (6.6) Thru, 0.425 (10.8) C-Bore x 0.059 (1.5) Dp
7833370	0.750 (20)	15	2.244 (57.0)	1.378 (35.0)	2.756 (70.0)	0.394 (10.0)	0.787 (20.0)	1.102 (28.00)	1.890 (48.0)	2x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.256 (6.5) Dp
7833371	0.875 (22)	17	1.339 (34.0)	1.693 (43.0)	3.386 (86.0)	0.453 (11.5)	0.906 (23.0)	1.535 (39.00)	2.520 (64.0)	2x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5) Dp
7833372	1.000 1.171 (25)	20	1.378 (35.0)	1.732 (44.0)	3.465 (88.0)	0.512 (13.0)	1.024 (26.0)	1.339 (34.00)	2.362 (60.0)	2x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5) Dp
7833373	1.150 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	1.673 (42.5)	2.087 (53.0)	4.173 (106.0)	0.591 (15.0)	1.181 (30.0)	1.890 (48.00)	3.150 (80.0)	2x 0.433 (11.0) Thru, 0.699 (17.0) C-Bore x 0.433 (11.0) Dp
7833374	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 (40)	30	2.008 (51.0)	2.520 (64.0)	5.039 (128.0)	0.630 (16.0)	1.260 (32.0)	2.008 (51.00)	3.504 (89.0)	2x 0.551 (14.0) Thru, 0.787 (20.0) C-Bore x 0.512 (13.0) Dp
7833375	1.750 2.000 (50)	40	2.559 (65.0)	3.150 (80.0)	6.299 (160.0)	0.728 (18.5)	1.457 (37.00)	2.362 (60.00)	4.331 (110.0)	2x 0.709 (18.0) Thru, 1.024 (26.0) C-Bore x 0.689 (17.5) Dp

Standard P/N	*Snap Ring (mm)	Block Weight (lbs (kg))	Bearing Trade No.
7833368	8	0.7 (0.3)	608
7833369	10	0.8 (0.4)	6000
7833370	15	0.9 (0.42)	6002
7833371	17	1.7 (0.8)	6203
7833372	20	1.7 (0.8)	6204
7833373	25	3.2 (1.5)	6205
7833374	30	4.3 (2.0)	6206
7833375	40	7.3 (3.3)	6208

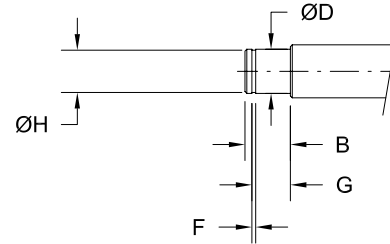
*DIN 471

End Machining Dimensions – Floating Bearing Support (BF)

With drive extension

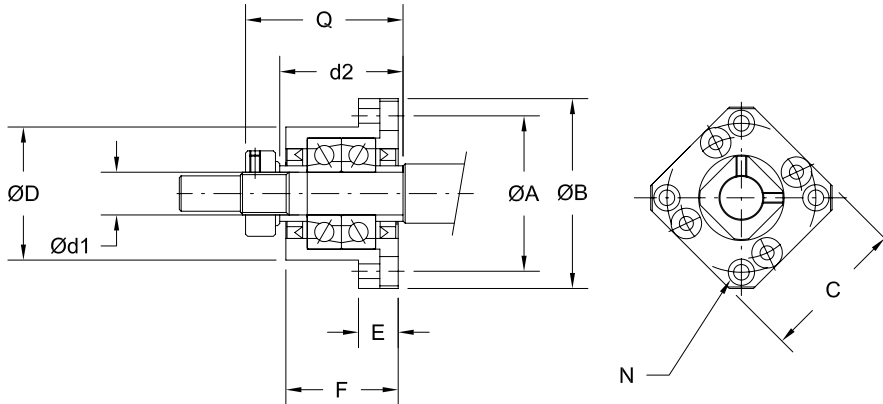


Without drive extension



Standard P/N	Dia x Lead (inch (mm))	Type BF / BF1 (inch (mm))						
		A	B	C (h7)	D (g6)	F +0.006/-0.000 (+0.140/-0.000)	G +0.008/-0.000 (+0.0200/-0.000)	H +0.000/-0.008 (+0.000/-0.200)
7833368	0.500 (12)	0.984 (25.0)	0.394 (10.0)	0.2362/0.2357 (6.0)	0.3148/0.3145 (7.995/7.988)	0.035 (0.90)	0.311 (7.90)	0.299 (7.60)
7833369	0.631 (16)	1.024 (26.0)	0.433 (11.0)	0.3150/0.3144 (8.0)	0.3935/0.3932 (9.995/9.988)	0.045 (1.15)	0.360 (9.15)	0.378 (9.60)
7833370	0.750 (20)	1.299 (33.0)	0.512 (13.0)	0.4724/0.4717 (12.0)	0.5904/0.5900 (14.995/14.986)	0.045 (1.15)	0.400 (10.15)	0.563 (14.30)
7833371	0.875 (22)	1.535 (39.0)	0.630 (16.0)	0.5906/0.5898 (15.0)	0.6691/0.6687 (16.995/16.986)	0.045 (1.14)	0.518 (13.16)	0.638 (16.21)
7833372	1.000 1.171 (25)	1.614 (41.0)	0.630 (16.0)	0.6693/0.6686 (17.0)	0.7872/0.7869 (19.995/19.986)	0.053 (1.35)	0.526 (13.40)	0.748 (19.00)
7833373	1.150 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	1.969 (50.0)	0.787 (20.0)	0.7874/0.7866 (20.0)	0.9841/0.9837 (24.995/24.985)	0.053 (1.35)	0.644 (16.35)	0.941 (23.90)
7833374	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 (40)	2.323 (59.0)	0.827 (21.0)	0.9843/0.9834 (25.0)	1.1809/1.1805 (24.995/24.985)	0.069 (1.75)	0.699 (17.75)	1.126 (28.60)
7833375	1.750 2.000 (50)	2.974 (73.0)	0.906 (23.0)	1.3780/1.3771 (35.0)	1.5746/1.5742 (39.995/39.985)	0.077 (1.95)	0.785 (19.95)	1.496 (38.00)

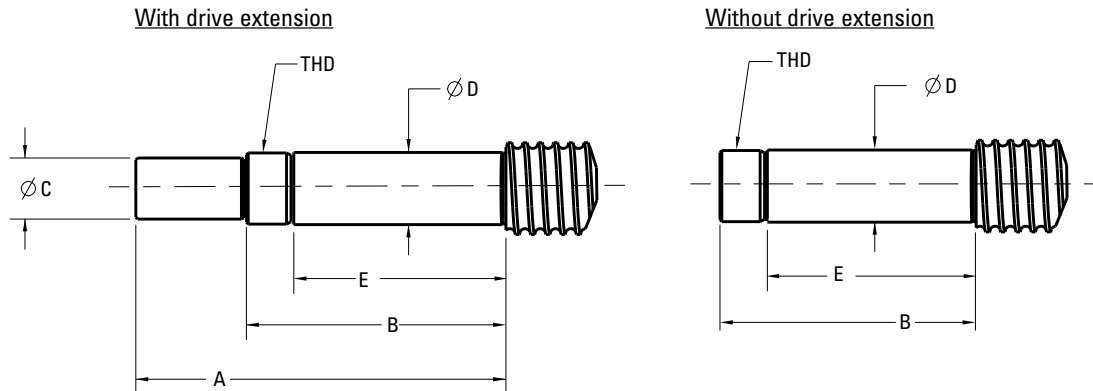
Flange Mount – Fixed Bearing Support (FK)



Standard P/N	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))									
		d1 (mm)	d2	A	B	C	D (g6)	E	F	N	Q
7833377	0.500 (12)	10	1.063 (27.0)	1.654 (42.0)	2.047 (52.0)	1.654 (42.0)	1.3382/1.3376 (34.0)	0.394 (10.0)	1.063 (27.0)	4x 0.177 (4.5) Thru, 0.315 (8.0) C-Bore x 0.157 (4.0) Dp	1.299 (33.0)
7833378	0.631 (16)	12	1.063 (27.0)	1.732 (44.0)	2.126 (54.0)	1.732 (44.0)	1.4170/1.4163 (36.0)	0.394 (10.0)	1.063 (27.0)	4x 0.177 (4.5) Thru, 0.315 (8.0) C-Bore x 0.157 (4.0) Dp	1.299 (33.0)
7833379	0.750 (20)	15	1.496 (38.0)	1.969 (50.0)	2.480 (63.0)	2.047 (52.0)	1.5744/1.5738 (40.0)	0.591 (15.0)	1.260 (32.0)	4x 0.217 (5.5) Thru, 0.374 (9.5) C-Bore x 0.236 (6.0) Dp	1.575 (40.0)
7833380	0.875 (22)	17	1.732 (44.0)	2.441 (62.0)	3.031 (77.0)	2.402 (61.0)	1.9681/1.9675 (50.0)	0.866 (22.0)	1.772 (45.0)	4x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.394 (10.0) Dp	2.244 (57.0)
7833381	1.000 / 1.171 (25)	20	1.969 (50.0)	2.756 (70.0)	3.346 (85.0)	2.677 (68.0)	2.2437/2.2430 (57.0)	0.866 (22.0)	2.047 (52.0)	4x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.394 (10.0) Dp	2.598 (66.0)
7833382	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	2.362 (60.0)	3.150 (80.0)	3.858 (98.0)	3.110 (79.0)	2.4799/2.4792 (63.0)	1.063 (27.0)	2.244 (57.0)	4x 0.354 (9.0) Thru, 0.591 (15.0) C-Bore x 0.512 (13.0) Dp	2.913 (74.0)
7833383	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 (40)	30	1.969 (50.0)	3.740 (95.0)	4.606 (117.0)	3.661 (93.0)	2.9524/2.9516 (75.0)	1.181 (30.0)	2.441 (62.0)	4x 0.433 (11.0) Thru, 0.689 (17.5) C-Bore x 0.591 (15.0) Dp	3.150 (80.0)

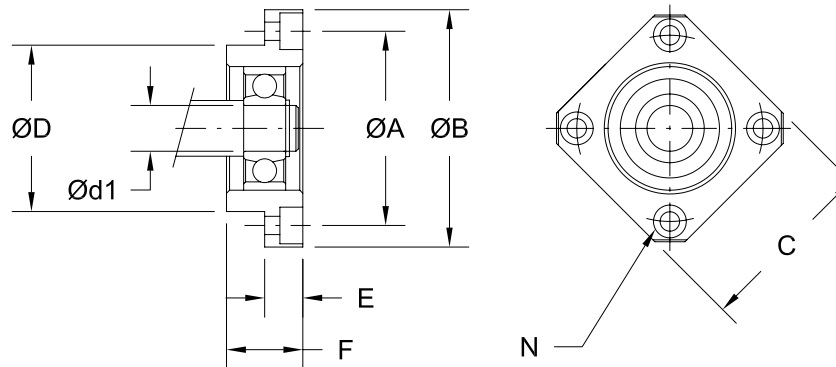
Standard P/N	Bearing Rating				Lock Nut Type	Block Weight (lbs (kg))	Bearing Trade No.
	Dynamic Rating		Static Rating				
	(lbs)	(N)	(lbs)	(N)			
7833377	1168	5197	430	1912	RN10	0.6 (0.3)	7000
7833378	1345	5982	478	2128	RN12	0.6 (0.3)	7001
7833379	1543	6864	529	2353	RN15	0.9 (0.4)	7002
7833380	2690	11963	910	4050	RN17	1.9 (0.9)	7203
7833381	3726	16572	1294	5756	RN20	2.5 (1.14)	7204
7833382	4608	20495	1563	6952	RN25	3.5 (1.59)	7205
7833383	6614	29418	2070	9208	RN30	5.2 (2.36)	7206

End Machining Dimensions – Fixed Bearing Support (FK)



Standard P/N	Dia x Lead (inch (mm))	Type FK / FK1 (inch (mm))					
		A	B	C (h7)	D (g6)	E	THD
7833377	0.500 (12)	2.008 (51.0)	1.417 (36.0)	0.3150/0.3144 (8.0)	0.3935/0.3932 (9.995/9.988)	0.984 (25.0)	M10x1
7833378	0.631 (16)	2.008 (51.0)	1.417 (36.0)	0.3937/0.3931 (10.0)	0.4722/0.4720 (11.995/11.988)	0.984 (25.0)	M12x1
7833379	0.750 (20)	2.638 (67.0)	1.850 (47.0)	0.4724/0.4717 (12.0)	0.5904/0.5900 (14.995/14.986)	1.339 (34.0)	M15x1
7833380	0.875	3.189 (81.0)	2.283 (58.0)	0.5906/0.5898 (15.0)	0.6691/0.6687 (16.995/16.986)	1.693 (43.0)	M17x1
7833381	1.000 / 1.171 (25)	3.425 (87.0)	2.441 (62.0)	0.6693/0.6686 (17.0)	0.7872/0.7869 (19.995/19.986)	1.772 (45.0)	M20x1
7833382	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	4.173 (106.0)	2.992 (76.0)	0.7874/0.7866 (20.0)	0.9841/0.9837 (24.995/24.985)	2.205 (56.0)	M25x1.5
7833383	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 (40)	4.331 (110.0)	2.835 (72.0)	0.9843/0.9834 (25.0)	1.1809/1.1805 (29.995/29.985)	1.850 (47.0)	M30x1.5

Flange Mount – Floating Bearing Support (FF)



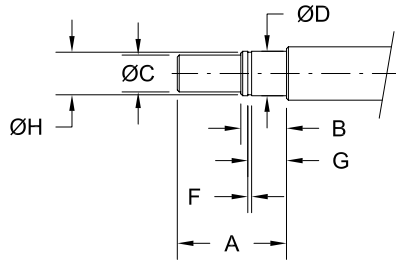
Standard P/N	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))							
		d1 (mm)	A	B	C	D (g6)	E	F	N
7833384	0.5	8	1.378 (35.0)	1.693 (43.0)	1.378 (35.0)	1.1021/1.1016 (28.0)	0.276 (7.0)	0.472 (12.0)	4x 0.134 (3.4) Thru, 0.256 (6.5) C-Bore x 0.157 (4.0) Dp
7833385	0.631 (12)	10	1.654 (42.0)	2.047 (52.0)	1.654 (42.0)	1.3382/1.3376 (34.0)	0.276 (7.0)	0.591 (15.0)	4x 0.177 (4.5) Thru, 0.315 (8.0) C-Bore x 0.157 (4.0) Dp
7833386	0.750 (20)	15	1.969 (50.0)	2.480 (63.0)	2.047 (52.0)	1.5744/1.5738 (40.0)	0.354 (9.0)	0.669 (17.0)	4x 0.217 (5.5) Thru, 0.374 (9.5) C-Bore x 0.217 (5.5) Dp
7833387	0.875 (22)	17	2.441 (62.0)	3.031 (77.0)	2.402 (61.0)	1.9681/1.9675 (50.0)	0.433 (11.0)	0.787 (20.0)	4x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.256 (6.5) Dp
7833388	1.000 1.171 (25)	20	2.756 (70.0)	3.346 (85.0)	2.677 (68.0)	2.2437/2.2430 (57.0)	0.433 (11.0)	0.787 (20.0)	4x 0.260 (6.6) Thru, 0.433 (11.0) C-Bore x 0.256 (6.5) Dp
7833389	1.150 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	3.150 (80.0)	3.858 (98.0)	3.110 (79.0)	2.4799/2.4792 (63.0)	0.551 (14.0)	0.945 (24.0)	4x 0.354 (9.0) Thru, 0.551 (4.0) C-Bore x 0.335 (8.5) Dp
7833390	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 (40)	30	3.740 (95.0)	4.606 (117.0)	3.661 (93.0)	2.9524/2.9516 (75.0)	0.709 (18.0)	1.063 (27.0)	4x 0.433 (11.0) Thru, 0.669 (17.0) C-Bore x 0.433 (11.0) Dp

Standard P/N	*Snap Ring (mm)	Block Weight (lbs (kg))	Bearing Trade No.
7833384	8	0.2 (0.1)	608
7833385	10	0.3 (0.2)	6000
7833386	15	0.5 (0.2)	6002
7833387	17	0.8 (0.5)	6203
7833388	20	0.8 (0.5)	6204
7833389	25	1.5 (0.7)	6205
7833390	30	2.3 (1.1)	6206

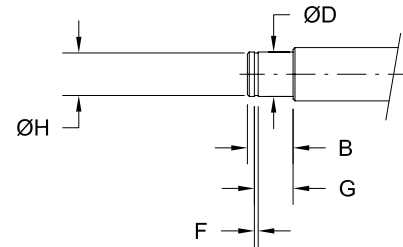
*DIN 471

End Machining Dimensions – Floating Bearing Support (FF)

With drive extension

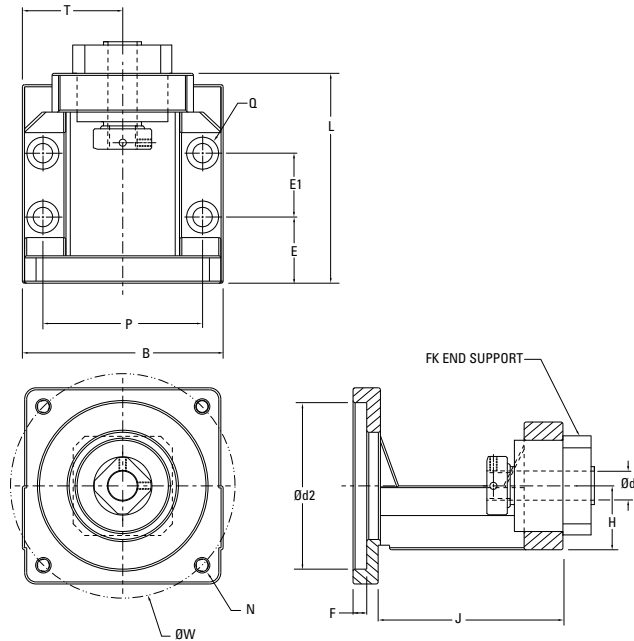


Without drive extension



Standard P/N	Dia x Lead (inch (mm))	Type FF / FF1 (inch (mm))						
		A	B	C (h7)	D (g6)	F +0.006/-0.000 (+0.140/-0.000)	G +0.008/-0.000 (+0.200/-0.000)	H +0.000/-0.008 (+0.000/-0.200)
7833384	0.500 (12)	0.984 (25.0)	0.394 (10.0)	0.236 (6.0)	0.3148/0.3145 (7.995/7.988)	0.035 (0.90)	0.311 (7.90)	0.299 (7.60)
7833385	0.631 (16)	1.024 (26.0)	0.433 (11.0)	0.315 (8.0)	0.3935/0.3932 (9.995/9.988)	0.045 (1.15)	0.360 (9.15)	0.378 (9.60)
7833386	0.750 (20)	1.299 (33.0)	0.512 (13.0)	0.472 (12.0)	0.5904/0.5900 (14.995/14.986)	0.045 (1.15)	0.400 (10.15)	0.563 (14.30)
7833387	0.875 (22)	1.535 (39.0)	0.630 (16.0)	0.591 (15.0)	0.6691/0.6687 (16.995/16.986)	0.045 (1.14)	0.518 (13.16)	0.638 (16.21)
7833388	1.000 1.171 (25)	1.614 (41.0)	0.748 (19.0)	0.669 (17.0)	0.7872/0.7869 (19.995/19.986)	0.053 (1.35)	0.604 (15.35)	0.748 (19.00)
7833389	1.150 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	1.969 (50.0)	0.787 (20.0)	0.787 (20.0)	0.9841/0.9837 (24.995/24.985)	0.053 (1.35)	0.644 (16.35)	0.941 (23.90)
7833390	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 (40)	2.323 (59.0)	0.827 (21.0)	0.984 (25.0)	1.1809/1.1805 (29.995/29.985)	0.069 (1.75)	0.699 (17.75)	1.126 (28.60)

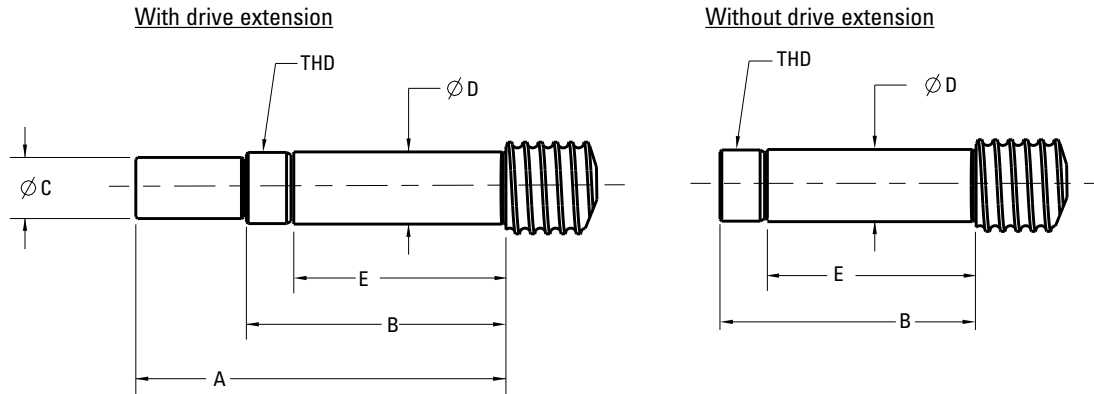
Motor Mount – Fixed Bearing Support (MK)



Standard P/N	Dia x Lead (inch (mm))	Bearing Block Dimensions (inch)																
		d1 (mm)	d2	W	N	D	L	H ±0.001 (±0.02)	B	P	T	E	E1	F	J	FK Support	Frame Size	S
7833685	0.500 (12)	10	1.500 (38.1)	2.626 (66.7)	M4	1.339 (34)	2.913 (74)	0.866 (22.00)	2.559 (65)	1.969 (50)	1.280 (32.5)	0.945 (24)	0.787 (20)	0.157 (4)	2.559 (65)	7833377	NEMA 23	4x 0.260 (6.6) Thru, 0.441 (11.2) C-Bore x 0.236 (6.0)
7833686	0.631 (16)	12	1.500 (38.1)	2.626 (66.7)	M4	1.417 (36)	2.913 (74)	0.984 (25.00)	2.559 (65)	1.969 (50)	1.280 (32.5)	0.945 (24)	0.787 (20)	0.157 (4)	2.559 (65)	7833378	NEMA 23	4x 0.260 (6.6) Thru, 0.441 (11.2) C-Bore x 0.236 (6.0)
7833687	0.750 (20)	15	1.500 (38.1)	2.626 (66.7)	M4	1.575 (40)	3.228 (82)	1.102 (28.009)	2.756 (70)	2.165 (55)	1.378 (35.0)	0.945 (24)	1.102 (28)	0.157 (4)	2.874 (73)	7833379	NEMA 23	4x 0.260 (6.6) Thru, 0.441 (11.2) C-Bore x 0.236 (6.0)
7833690	1.000/1.171 (25)	20	2.874 (73.0)	3.874 (98.4)	M6	2.244 (57)	4.449 (113)	1.339 (34.00)	3.465 (88)	2.756 (70)	1.732 (44.0)	1.142 (29)	1.654 (42)	0.236 (6)	4.016 (102)	7833691	NEMA 34	4x 0.335 (8.5) Thru, 0.571 (14.5) C-Bore x 0.315 (8.0) Dp

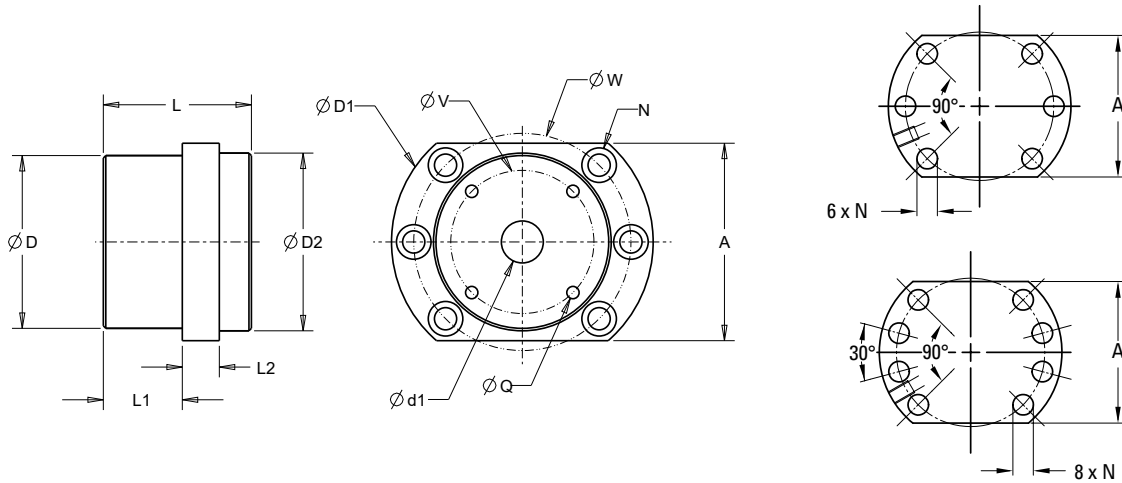
Standard P/N	Bearing Rating				Lock Nut Type	Block Weight (lbs (kg))	Bearing Trade No.
	Dynamic Rating		Static Rating				
	(lbs)	(N)	(lbs)	(N)			
7833685	1168	5197	430	1912	RN10	0.6 (0.3)	7000
7833686	1345	5982	478	2128	RN12	0.6 (0.3)	7001
7833687	1543	6864	529	2353	RN15	0.9 (0.4)	7002
7833690	3726	16572	1294	5756	RN20	2.5 (1.14)	7204

End Machining Dimensions – Fixed Bearing Support (MK)



Standard P/N	Dia x Lead (inch (mm))	Type MK / MK1 (inch (mm))					
		A	B	C (h7)	D (g6)	E	THD
7833685	0.500 (12)	2.008 (51.0)	1.417 (36.0)	0.3150/0.3144 (8.0)	0.3935/0.3932 (9.995/9.988)	0.984 (25.0)	M10x1
7833686	0.631 (16)	2.008 (51.0)	1.417 (36.0)	0.3937/0.3931 (10.0)	0.4722/0.4720 (11.995/11.988)	0.984 (25.0)	M12x1
7833687	0.750 (20)	2.638 (67.0)	1.850 (47.0)	0.4724/0.4717 (12.0)	0.5904/0.5900 (14.995/14.986)	1.339 (34.0)	M15x1
7833690	1.000 / 1.171 (25)	3.425 (87.0)	2.441 (62.0)	0.6693/0.6686 (17.0)	0.7872/0.7869 (19.995/19.986)	1.772 (45.0)	M20x1

Flange Mount – Fixed Bearing Support (WK)

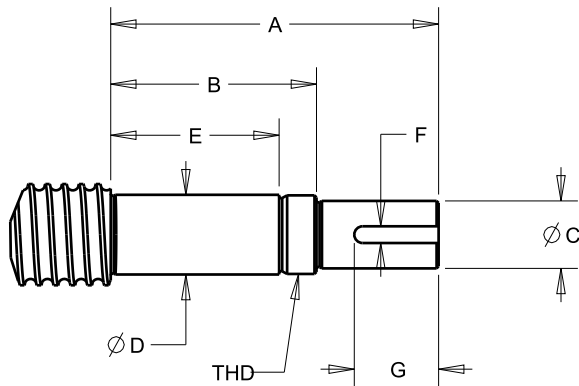


Standard P/N	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))											
		d1 (mm)	D g6	D1	D2	L	L1	L2	A	W	N	V	Q
7833595	0.875 (22)	17	2.756 (70.0)	4.173 (106.0)	2.835 (72.0)	2.362 (60.0)	1.260 (32.0)	0.591 (15.0)	3.150 (80.0)	3.465 (88.00)	6x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5)	2.283 (58.0)	4x M5 THD, x .0394 Dp (4x M5 THD, x 10 Dp)
7833596	1.000 / 1.171 (25)	20	2.756 (70.0)	4.173 (106.0)	2.835 (72.0)	2.362 (60.0)	1.260 (32.0)	0.591 (15.0)	3.150 (80.0)	3.465 (88.00)	6x 0.354 (9.0) Thru, 0.551 (14.0) C-Bore x 0.335 (8.5)	2.283 (58.0)	4x M5 THD, x .0394 Dp (4x M5 THD, x 10 Dp)
7833597	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	3.346 (85.0)	5.118 (130.0)	3.543 (90.0)	2.598 (66.0)	1.299 (33.0)	0.709 (18.0)	3.937 (100.0)	4.331 (110.00)	6x 0.433 (11.0) Thru, 0.669 (17.0) C-Bore x 0.433 (11.0)	2.756 (70.0)	4x M6 THD, x 0.472 Dp (4x M6 THD, x 12 Dp)
7833599	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 (40)	30	3.346 (85.0)	5.118 (130.0)	3.543 (90.0)	2.598 (66.0)	1.299 (33.0)	0.709 (18.0)	3.937 (100.0)	4.331 (110.00)	6x 0.433 (11.0) Thru, 0.669 (17.0) C-Bore x 0.433 (11.0)	2.756 (70.0)	4x M6 THD, x 0.472 Dp (4x M6 THD, x 12 Dp)
7833602	1.750 / 2.000 (50)	40	3.740 (95.0)	5.591 (142.0)	4.016 (66.0)	2.598 (66.0)	1.299 (33.0)	0.709 (18.0)	3.937 (100.0)	4.331 (110.00)	8x 0.433 (11.0) Thru, 0.669 (17.0) C-Bore x 0.433 (11.0)	3.150 (80.0)	4x M6 THD, x 0.472 Dp (4x M6 THD, x 12 Dp)

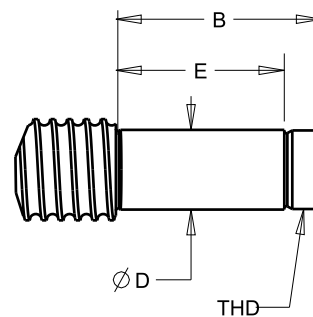
Standard P/N	Bearing Rating				Lock Nut Type	Block Weight (lbs (kg))	Bearing Trade No.
	Dynamic Rating		Static Rating				
	(lbs)	(N)	(lbs)	(N)			
7833595	5974	26574	4938	21966	M17x1	4.2 (1.9)	
7833596	5974	26574	4938	21966	M20x1	4.2 (1.9)	
7833597	9149	40695	6415	28536	M25x1.5	6.8 (3.1)	
7833599	9700	43147	6570	29222	M30x1.5	6.6 (3.0)	
7833602	11684	51972	7165	31870	M40x1.5	7.9 (3.6)	

End Machining Dimensions – Fixed Bearing Support (WK)

TYPE WK, REQUIRED FOR WK SUPPORT

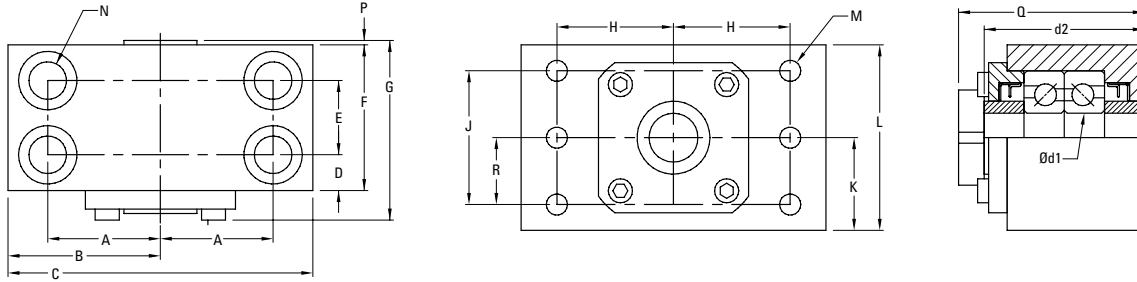


TYPE WK1, REQUIRED FOR WK SUPPORT



Standard P/N	Dia x Lead (inch (mm))	Type WK / WK1 (inch (mm))							
		A	B	C	D	E	F	G	THD
7833595	0.875	4.528 (115.0)	3.189 (81.0)	0.5906/0.5898 (15.0)	0.6691/0.6687 (16.995/16.986)	2.283 (58.0)	0.197 (5.0)	1.181 (30.0)	M17x1
7833596	1.000 / 1.171 (25)	4.528 (115.0)	3.189 (81.0)	0.6693/0.6686 (17.0)	0.7872/0.7869 (19.995/19.986)	2.283 (58.0)	0.197 (5.0)	1.181 (30.0)	M20x1
7833597	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	5.039 (128.0)	3.504 (89.0)	0.7874/0.7866 (20.0)	0.9841/0.9837 (24.995/24.985)	2.480 (63.0)	0.197 (5.0)	1.260 (32.0)	M25x1.5
7833599	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 (40)	5.315 (135.0)	3.504 (89.0)	0.9843/0.9834 (25.0)	1.1809/1.1805 (29.995/29.985)	2.480 (63.0)	0.315 (8.0)	1.339 (34.0)	M30x1.5
7833602	1.750 / 2.000 (50)	5.787 (147.0)	3.622 (92.0)	1.3780/1.3771 (35.0)	1.5746/1.5742 (39.995/39.985)	2.441 (62.0)	0.315 (8.0)	1.850 (47.0)	M40x1.5

Base and Flange Mount – Fixed Bearing Support (QK)

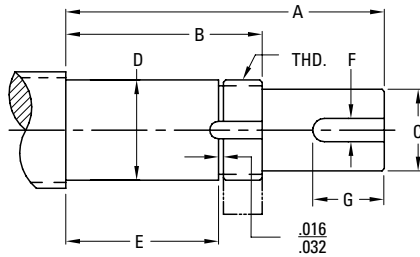


Standard P/N inch (metric)	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))																
		d1 (mm)	d2	A & H	B	C	D	E	F	G	J	K	L	M	N	P	Q	R
7828282 (7829546)	0.500 (12)	9	1.530 (37.0)	1.000 (25.4)	1.380 (35.0)	2.750 (70.0)	0.630 (16.0)	-	1.190 (30.2)	1.645 (35.0)	1.375 (35.0)	1.000 (25.40)	2.000 (50.8)	4x 0.281 (7.13)	2x 0.281 (7.1) Thru, 0.50 (12.7) C-Bore x 0.56 (14.2) Dp	-	1.8 (46.25)	0.688 (17.5)
7824154 (7829547)	0.631 (16)	12	1.260 (32.0)	1.125 (28.6)	1.500 (38.0)	3.000 (76.0)	0.670 (17.0)	-	1.340 (34.0)	1.700 (43.0)	1.125 (29.0)	1.000 (25.40)	1.880 (47.8)	4x 0.281 (7.13)	2x 0.406 (10.31) Thru, 0.625 (15.88) C-Bore x 0.875 (22.23) Dp	0.02 (0.51)	1.6 (40.64)	0.625 (15.9)
7824155 (7829548)	0.750 (20)	15	1.730 (44.0)	1.250 (31.8)	1.750 (45.0)	3.500 (89.0)	0.750 (19.0)	-	1.500 (38.0)	1.900 (47.0)	1.375 (35.0)	1.125 (28.58)	2.130 (54.1)	4x 0.281 (7.13)	2x 0.406 (10.31) Thru, 0.625 (15.88) C-Bore x 0.875 (22.23) Dp	0.02 (0.51)	2.1 (53.34)	0.750 (19.1)
7824156 (N/A)	0.875 (22)	17	1.890 (48.0)	1.437 (36.5)	2.000 (50.8)	4.000 (101.6)	0.830 (21.1)	-	1.660 (42.2)	2.000 (50.8)	1.375 (35.0)	1.250 (31.75)	2.380 (60.5)	4x 0.406 (10.31)	2x 0.531 (13.48) Thru, 0.812 (20.62) C-Bore x 1.125 (28.57) Dp	0.02 (0.51)	2.3 (58.42)	0.750 (19.1)
7824157 (7829549)	1.000 / 1.171 (25)	20	2.200 (56.0)	1.625 (41.3)	2.250 (57.0)	4.500 (114.0)	0.940 (24.0)	-	1.870 (48.0)	2.400 (60.0)	1.750 (44.0)	1.438 (36.53)	2.750 (69.9)	4x 0.469 (11.91)	2x 0.656 (16.66) Thru, 1.00 (25.40) C-Bore x 1.312 (33.33) Dp	0.04 (1.00)	2.7 (68.58)	0.938 (23.8)
7824158 (7829550)	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	2.360 (60.0)	2.125 (54.0)	3.000 (76.0)	6.000 (152.0)	0.970 (24.5)	-	1.940 (49.0)	2.600 (65.0)	2.000 (51.0)	1.750 (44.45)	3.380 (85.9)	4x 0.656 (16.66)	2x 0.906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.00 (50.80) Dp	0.03 (0.76)	2.9 (73.66)	1.000 (25.40)
7824159 (7829551)	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 (40)	30	2.520 (64.0)	2.375 (60.3)	3.250 (83.0)	6.500 (165.0)	1.030 (26.0)	-	2.060 (52.0)	2.700 (68.0)	2.000 (51.0)	1.875 (47.63)	3.630 (92.2)	4x 0.656 (16.66)	2x 0.906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.062 (53.38) Dp	0.045 (1.14)	3 (76.20)	1.000 (25.40)
7829554 (7829552)	1.750 (50)	40	3.620 (92.0)	2.937 (74.6)	3.750 (96.0)	7.500 (192.0)	0.760 (19.2)	1.630 (41.5)	3.150 (80.0)	3.800 (96.0)	3.000 (76.0)	2.250 (57.15)	4.250 (108.0)	6x 0.656 (16.66)	4x 0.906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.25 (57.15) Dp	0.05 (1.27)	4.2 (106.68)	1.500 (38.10)
7824160 (N/A)	2.000	45	3.940 (100.0)	3.313 (84.2)	4.250 (108.0)	8.500 (216.0)	0.870 (22.1)	1.720 (43.8)	3.470 (88.1)	4.200 (106.7)	3.625 (92.0)	2.813 (71.54)	5.630 (143.0)	6x 0.812 (20.63)	4x 1.031 (26.19) Thru, 1.625 (41.28) C-Bore x 3.50 (88.90) Dp	0.05 (1.27)	4.5 (114.30)	1.813 (46.05)
7824161 (7829553)	2.500 (63)	50	4.250 (108.0)	3.563 (90.5)	4.500 (115.0)	9.000 (230.0)	0.920 (23.5)	1.720 (43.8)	3.560 (90.8)	4.500 (113.0)	3.625 (92.0)	2.813 (71.54)	5.630 (143.0)	6x 0.812 (20.63)	4x 1.031 (26.19) Thru, 1.625 (41.28) C-Bore x 3.50 (88.90) Dp	0.05 (2.29)	4.9 (124.46)	1.813 (46.10)

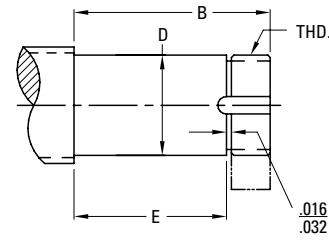
Standard P/N inch (metric)	Bearing Rating				Lock Nut Type inch (metric)	Block Weight (lbs (kg))	Bearing Trade No.
	Dynamic Rating		Static Rating				
	(lbs)	(N)	(lbs)	(N)			
7828282 (7829546)	1030	4550	440	1960	5/16-24 (M8-1.25)	2.0 (0.9)	609
7824154 (7829547)	1600	7100	630	2790	N-01 (KM-01)	1.5 (0.7)	7201
7824155 (7829548)	2320	10300	1060	4700	N-02 (KM-02)	3.5 (1.6)	7202
7824156 (N/A)	3200	14200	1560	6930	N-03	3.5 (1.6)	7203
7824157 (7829549)	3225	14300	1838	8150	N-04 (KM-04)	5.5 (2.5)	7204
7824158 (7829550)	3750	16600	2120	9400	N-05 (KM-05)	9.5 (4.3)	7205
7824159 (7829551)	5200	23000	3050	13500	N-06 (KM-06)	11.5 (5.2)	7206
7829554 (7829552)	11400	50600	6800	30200	N-08 (KM-08)	21.5 (9.8)	7308
7824160 (N/A)	15000	66600	9000	39900	N-09	35.0 (15.6)	7309
7824161 (7829553)	17300	76800	10800	47900	N-10 (KM-10)	39.0 (17.7)	7310

End Machining Dimensions – Fixed Bearing Support (QK)

With drive extension

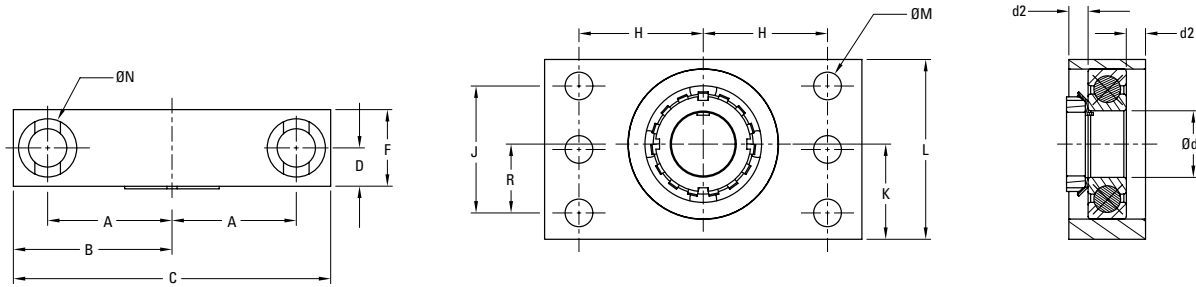


Without drive extension



Standard P/N	Dia x Lead (inch (mm))	Type QK /QK1 (inch (mm))							
		A	B	C (h7)	D (g6)	E	F	G	THD
7828282 (7829546)	0.500 (12)	2.915 (73.0)	1.665 (46.0)	0.2500/0.2490 (6.000/5.987)	0.3544/0.3541 (9.001/8.994)	1.260 (36.0)	0.094 (-)	1.000 (-)	5/16-24 (M8-1.25)
7824154 (7829547)	0.631 (16)	3.292 (84.0)	1.992 (51.0)	0.4060/0.4050 (10.000/9.987)	0.4726/0.4723 (12.006/11.999)	1.576 (40.0)	0.125 (3.0)	1.250 (32.0)	N-01 (KM-01)
7824155 (7829548)	0.750 (20)	3.180 (80.0)	2.180 (55.0)	0.5000/0.4990 (12.000/11.984)	0.5908/0.5905 (15.006/14.999)	1.732 (44.0)	0.125 (4.0)	0.875 (22.0)	N-02 (KM-02)
7824156 (N/A)	0.875 (22)	3.649 (92.7)	2.334 (59.3)	0.5620/0.5610	0.6695/0.6692	1.888 (48.0)	0.125 (3.18)	1.250 (31.8)	N-03
7824157 (7829549)	1.000 / 1.171 (25)	4.028 (103.0)	2.713 (69.0)	0.6250/0.6240 (16.000/15.984)	0.7877/0.7873 (20.007/19.997)	2.204 (56.0)	0.188 (5.0)	1.250 (31.8)	N-04 (KM-04)
7824158 (7829550)	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	4.453 (113.0)	2.893 (74.0)	0.7500/0.7490 (20.000/19.980)	0.9846/0.9842 (25.008/24.996)	2.364 (60.0)	0.188 (5.0)	1.250 (31.8)	N-05 (KM-05)
7824159 (7829551)	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 (40)	4.860 (124.0)	3.050 (78.0)	1.000/0.9990 (25.000/24.980)	1.1814/1.1810 (30.007/29.997)	2.496 (63.39)	0.250 (6.4)	1.250 (31.8)	N-06 (KM-06)
7829554 (7829552)	1.750 (50)	6.368 (164.0)	4.178 (109.0)	1.3750/1.3740 (32.000/31.976)	1.5752/1.5747 (30.007/29.997)	3.624 (92.0)	0.313 (8.0)	1.875 (47.6)	N-08 (KM-08)
7824160 (N/A)	2.000	6.682 (169.7)	4.492 (114.1)	1.3750/1.3740 (32.000/31.976)	1.7721/1.7716 (45.011/44.999)	3.936 (100.0)	0.313 (8.0)	1.875 (47.6)	N-09
7824161 (7829553)	2.500 (63)	7.749 (197.0)	4.872 (124.0)	1.7500/1.7490 (40.000/39.377)	1.9689/1.9684 (50.010/49.997)	4.252 (108.0)	0.375 (10.0)	2.750 (69.9)	N-10 (KM-10)

Base and Flange Mount – Floating Bearing Support (QF)

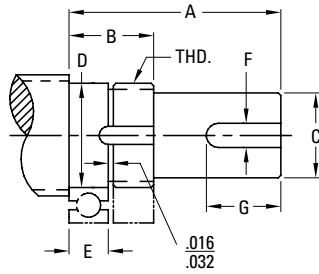


Standard P/N inch (metric)	Dia. x Lead (inch (mm))	Bearing Block Dimensions (inch (mm))													
		d1 (mm)	d2	A & H	B	C	D	F	J	K	L	M	N	Q	R
7833291 (7833292)	0.500 (12)	9	0.118 (3.0)	1.000 (25.4)	1.380 (35.0)	2.750 (70.0)	0.276 (7.0)	0.551 (14.0)	1.375 (35.0)	1.000 (25.40)	2.000 (50.8)	4x 0.281 (7.13)	2x 0.281 (7.1) Thru, 0.50 (12.7) C-Bore x 0.56 (14.2) Dp	0.757 (18.5)	0.688 (17.5)
7833256 (7833282)	0.631 (16)	12	0.197 (5.0)	1.125 (28.6)	1.500 (38.0)	3.000 (76.0)	0.394 (10.0)	0.787 (20.0)	1.125 (29.0)	1.000 (25.40)	1.880 (47.8)	4x 0.281 (7.13)	2x 0.406 (10.31) Thru, 0.625 (15.88) C-Bore x 0.875 (22.23) Dp	0.96 (20.0)	0.625 (15.9)
7833259 (7833283)	0.750 (20)	15	0.217 (5.5)	1.250 (31.8)	1.750 (45.0)	3.500 (89.0)	0.433 (11.0)	0.866 (22.1)	1.375 (35.0)	1.125 (28.58)	2.130 (54.1)	4x 0.281 (7.13)	2x 0.406 (10.31) Thru, 0.625 (15.88) C-Bore x 0.875 (22.23) Dp	1.019 (22.0)	0.750 (19.1)
7833262 (N/A)	0.875 (22)	17	0.236 (6.0)	1.437 (36.5)	2.000 (50.8)	4.000 (101.6)	0.473 (12.0)	0.945 (24.0)	1.375 (35.0)	1.250 (31.75)	2.380 (60.5)	4x 0.406 (10.31)	2x 0.531 (13.48) Thru, 0.812 (20.62) C-Bore x 1.125 (28.57) Dp	1.109 (22.0)	0.750 (19.1)
7833265 (7833284)	1.000 / 1.171 (25)	20	0.276 (7.0)	1.625 (41.3)	2.250 (57.0)	4.500 (114.0)	0.551 (14.0)	1.102 (28.0)	1.750 (44.0)	1.438 (36.53)	2.750 (69.9)	4x 0.469 (11.91)	2x 0.656 (16.66) Thru, 1.00 (25.40) C-Bore x 1.312 (33.33) Dp	1.258 (22.0)	0.938 (23.8)
7833268 (7833285)	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	25	0.531 (13.5)	2.125 (54.0)	3.000 (76.0)	6.000 (152.0)	0.827 (21.0)	1.654 (42.0)	2.000 (51.0)	1.750 (44.45)	3.380 (85.9)	4x 0.656 (16.66)	2x 0.906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.00 (50.80) Dp	1.654 (28.0)	1.000 (25.40)
7833270 (7833286)	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 (40)	30	0.512 (13.0)	2.375 (60.3)	3.250 (83.0)	6.500 (165.0)	0.827 (21.0)	1.654 (42.0)	2.000 (51.0)	1.875 (47.63)	3.630 (92.2)	4x 0.656 (16.66)	2x .0906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.062 (53.38) Dp	1.654 (42.0)	1.000 (25.40)
7833273 (7833287)	1.750 (50)	40	0.453 (11.5)	2.937 (74.6)	3.750 (96.0)	7.500 (192.0)	0.906 (23.0)	1.811 (46.0)	3.000 (76.0)	2.250 (57.15)	4.250 (108.0)	6x 0.656 (16.66)	4x 0.906 (23.01) Thru, 1.375 (34.93) C-Bore x 2.25 (57.15) Dp	1.869 (42.0)	1.500 (38.10)
7833276 (N/A)	2.000	45	0.492 (12.5)	3.313 (84.2)	4.250 (108.0)	8.500 (216.0)	0.985 (25.0)	1.969 (50.0)	3.625 (92.0)	2.813 (71.54)	5.630 (143.0)	6x 0.812 (20.63)	4x 1.031 (26.19) Thru, 1.625 (41.28) C-Bore x 3.50 (88.90) Dp	1.987 (50.5)	1.813 (46.05)
7833279 (7833288)	2.500 (63)	50	0.531 (13.5)	3.563 (90.5)	4.500 (115.0)	9.000 (230.0)	1.063 (27.0)	2.126 (54.0)	3.625 (92.0)	2.813 (71.54)	5.630 (143.0)	6x 0.812 (20.63)	4x 1.031 (26.19) Thru, 1.625 (41.28) C-Bore x 3.50 (88.90) Dp	2.167 (54.0)	1.813 (46.10)

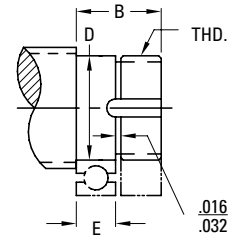
Standard P/N inch (metric)	Lock nut (mm)	Block Weight (lbs (kg))	Bearing Trade No.
7833291 (7833292)	5/16-24 (M8-1.25)	0.8 (0.4)	609
7833256 (7833282)	N-01 (KM-01)	1.3 (0.6)	6201
7833259 (7833283)	N-02 (KM-02)	1.6 (0.7)	6202
7833262 (N/A)	N-03	2.3 (1.0)	6203
7833265 (7833284)	N-04 (KM-04)	5.8 (2.6)	6204
7833268 (7833285)	N-05 (KM-05)	6.8 (3.1)	6205
7833270 (7833286)	N-06 (KM-06)	8.7 (3.9)	6206
7833273 (7833287)	N-08 (KM-08)	9.7 (4.4)	6308
7833276 (N/A)	N-09	16.2 (7.3)	6309
7833279 (7833288)	N-10 (KM-10)	18.5 (8.4)	6310

End Machining Dimensions – Floating Bearing Support (QF)

With drive extension



Without drive extension



Standard P/N	Dia x Lead (inch (mm))	Type QF/QF1 (inch (mm))							
		A	B	C (h7)	D (g6)	E	F	G	THD
7833291 (7833292)	0.500 (12)	1.970 (46.0)	0.720 (19.0)	0.2500/0.2490 (6.000/5.987)	0.3544/0.3541 (9.001/8.994)	0.315 (7.0)	0.094 (-)	1.000 (-)	5/16-24 (M8-1.25)
7833256 (7833282)	0.631 (16)	2.110 (54.0)	0.810 (21.0)	0.4060/0.4050 (10.000/9.987)	0.4726/0.4723 (12.006/11.999)	0.394 (10.0)	0.125 (3.0)	1.250 (30.0)	N-01 (KM-01)
7833259 (7833283)	0.750 (20)	1.870 (47.09)	0.870 (22.0)	0.5000/0.4990 (12.000/11.984)	0.5908/0.5905 (15.006/14.999)	0.433 (11.0)	0.125 (4.0)	0.875 (22.0)	N-02 (KM-02)
7833262 (N/A)	0.875 (22)	2.233 (56.7)	0.918 (23.3)	0.5620/0.5610	0.6695/0.6692	0.472 (12.0)	0.125 (3.18)	1.250 (31.8)	N-03
7833265 (7833284)	1.000 / 1.171 (25)	2.375 (61.0)	1.060 (27.0)	0.6250/0.6240 (16.000/15.984)	0.7877/0.7873 (20.007/19.997)	0.551 (14.0)	0.188 (5.0)	1.250 (30.0)	N-04 (KM-04)
7833268 (7833285)	1.150 / 1.250 1.500 x 0.473 (32) 1.500 x 1.000 (32)	2.680 (68.0)	1.120 (29.0)	0.7500/0.7490 (20.000/19.980)	0.9846/0.9842 (25.008/24.996)	0.591 (15.09)	0.188 (5.0)	1.250 (32.0)	N-05 (KM-05)
7833270 (7833286)	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 (40)	2.970 (76.09)	1.160 (30.0)	1.000/0.9990 (25.000/24.980)	1.1814/1.1810 (30.007/29.997)	0.630 (16.0)	0.250 (8.0)	1.250 (34.0)	N-06 (KM-06)
7833273 (7833287)	1.750 (50)	3.650 (95.0)	1.460 (40.0)	1.3750/1.3740 (32.000/31.976)	1.5752/1.5747 (40.010/39.997)	0.906 (23.0)	0.313 (8.0)	1.875 (47.0)	N-08 (KM-08)
7833276 (N/A)	2.000	3.730 (94.7)	1.540	1.3750/1.3740	1.7721/1.7716	0.984 (25.0)	0.313 (8.0)	1.875 (47.6)	N-09
7833279 (7833288)	2.500 (63)	4.560 (116.0)	1.680 (43.0)	1.7500/1.7490 (40.000/39.377)	1.9689/1.9684 (50.010/49.997)	1.063 (27.0)	0.375 (10.0)	2.750 (65.0)	N-10 (KM-10)

Engineering



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 143). Backlash is the linear independent motion between the ball screw and the ball nut and can be controlled by preloading the ball nut (page 144). The manufacturing process, rolled screws versus ground screws, dictates the accuracy (page 144).
2. Determine how you plan to mount the ball screw assembly into your machine (see page 146). 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 142) or use the Compression Loading Chart (page 149) 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 140).
5. The ball nut life can then be calculated using the Dynamic Load Rating (C_{am}) provided in the catalog detail pages or use the Life Expectancy Charts (page 148).
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 142) or use the Acceptable Speed Chart (page 147) 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 eliminate system backlash and increase stiffness. 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 most 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 145). The assembly should also be properly aligned with the drive system, bearing supports, and load to achieve optimal performance and life (page 145). The ball screw assembly should never be run without proper lubrication. Many lubricants are available depending on the application and environment (page 145).

Note: Application and customer service support is available to assist in the selection of your ball screw assembly. Please contact your local Thomson representative or the customer support center (1-540-633-3549 — TCS) 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 143 and 144)

No Preload and Standard Rolled (± 0.004 in./12 in.)

2. End Supports (page 146)

Fixed/Supported

3. Determine Screw Diameter

From Chart (page 149): Ø2.000 in.

$$\text{From Equation (page 142): } 30,000 / .8 = \frac{2.0 \times 1.405 \times 10^7 \times d_r^4}{(85)^2}$$

therefore, $d_r = 1.762$ in.

4. Determine Lead

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

5. Determine Life

From Catalog (page 43): Dynamic Load = 21,306 lbs.

$$\text{From Equation (page 141): Life (inches)} = \left[\frac{21,306}{10,000} \right]^3 \times 10^6$$

therefore, Life = 9.7×10^6 inches

Verified via Chart (page 149)

6. Determine Critical Speed

From Catalog (page 43): Screw Root Diameter is 1.85 in.

$$\text{From Equation (page 142): } .8 \times 1.47 \times 4.76 \times 10^6 \times \frac{d_r}{l^2}$$

therefore, Speed = 1,433 rpm

Verified via Chart (page 147)

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

Ball Nut: P/N 8122-488-005

Engineering Guidelines for Inch Series Ball Screws

Design Formulas

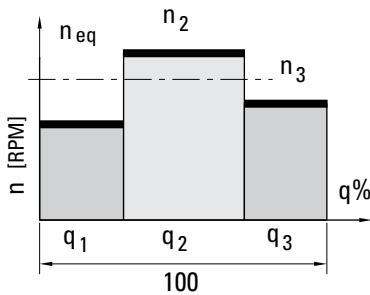
These formulas allow you to calculate a number of important factors which govern the application of Thomson ball screws.

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).

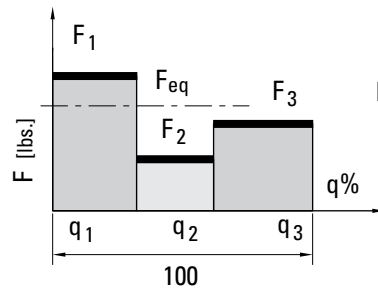
Functional life should be determined by approximating equivalent rotational speed and loading force over typical performance cycles.

Simple rotational speed profile



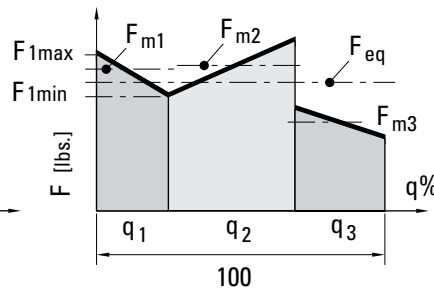
$$n_{eq} [\text{min}^{-1}] = \sum_{i=1}^n n_i \times \frac{q_i}{100}$$

Simple loading profile (1)



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

Simple loading profile (2)



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

Modified Life

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

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

Parameters:

- n_{eq} = 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

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

3. Machine Service Life

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

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

Engineering Guidelines for Inch Series Ball Screws

4. Torque

$$a. \text{ Driving torque: } T_d (\text{lb}_f\text{-in.}) = \frac{F_{eq} \times P}{2\pi e} = 0.177 \times F_{eq} \times P$$

$$b. \text{ Backdrive torque: } T_b (\text{lb}_f\text{-in.}) = \frac{F_{eq} \times P \times e}{2\pi} = 0.143 \times F_{eq} \times P$$

(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

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

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.


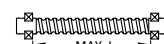

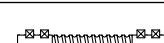
6a. Critical Screw Speed

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 147.

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

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

$$n_s = n_c \times S$$

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. Thomson recommends a maximum DN value of 5250 for high speed nuts equipped with deflectors.

$$DN = d_0 n$$

where

d_0 = nominal shaft diameter (in)
 n = rotational speed of shaft (rpm)

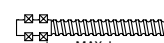

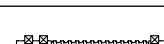
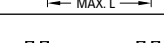
7. Permissible Compression Loading

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_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

$$F_s = F_c \times S$$

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

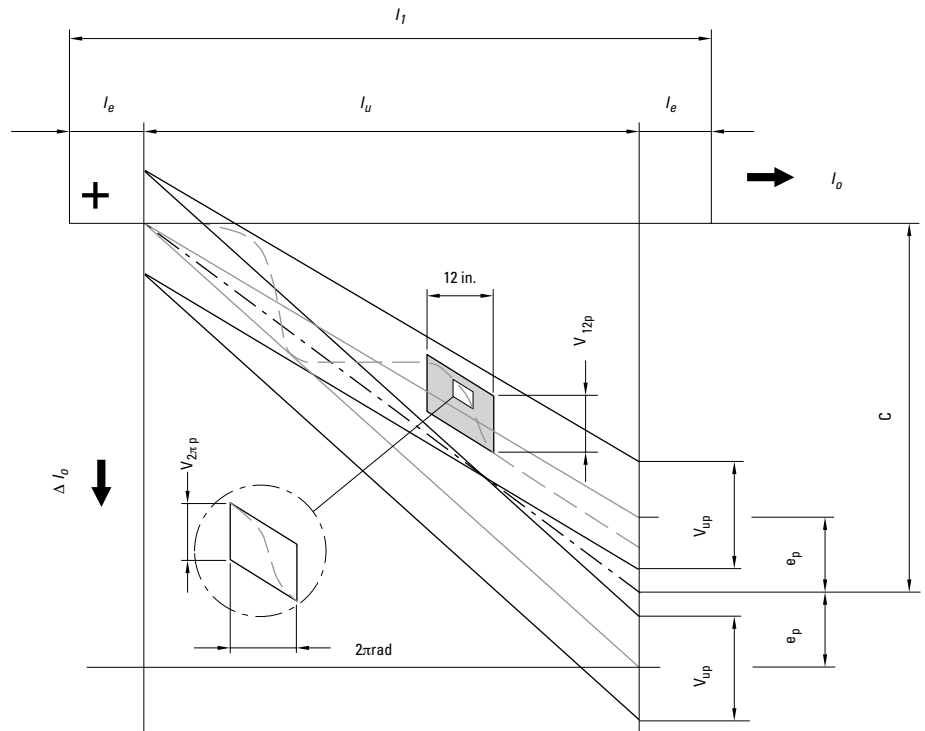
Accuracy is a measure of how closely a motion system will approach a command position. Perfect accuracy, for example, means that advancing a ball nut a precise amount from a given point on the screw always requires exactly the theoretically predicted number of revolutions.

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.

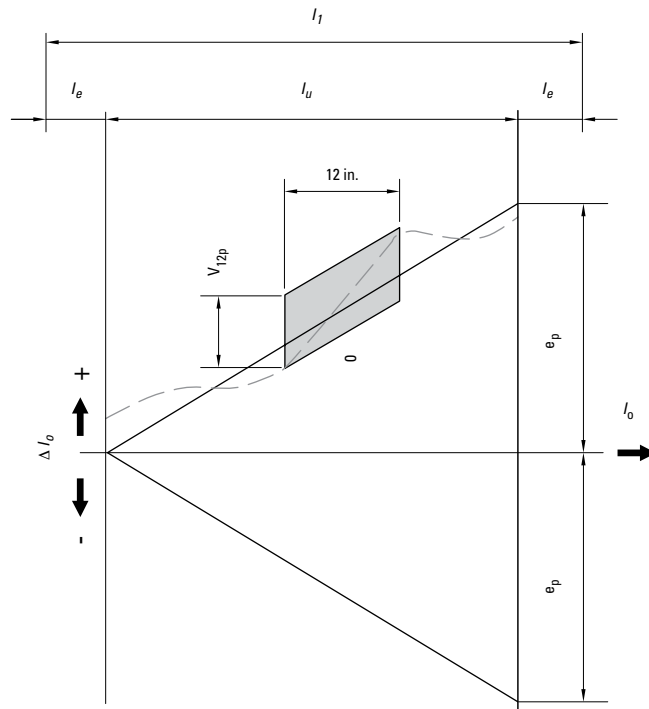
Precision Plus Ball Screws

Maximum error over useful length = $e_p + 1/2V_{up} + C$



Precision Ball Screws

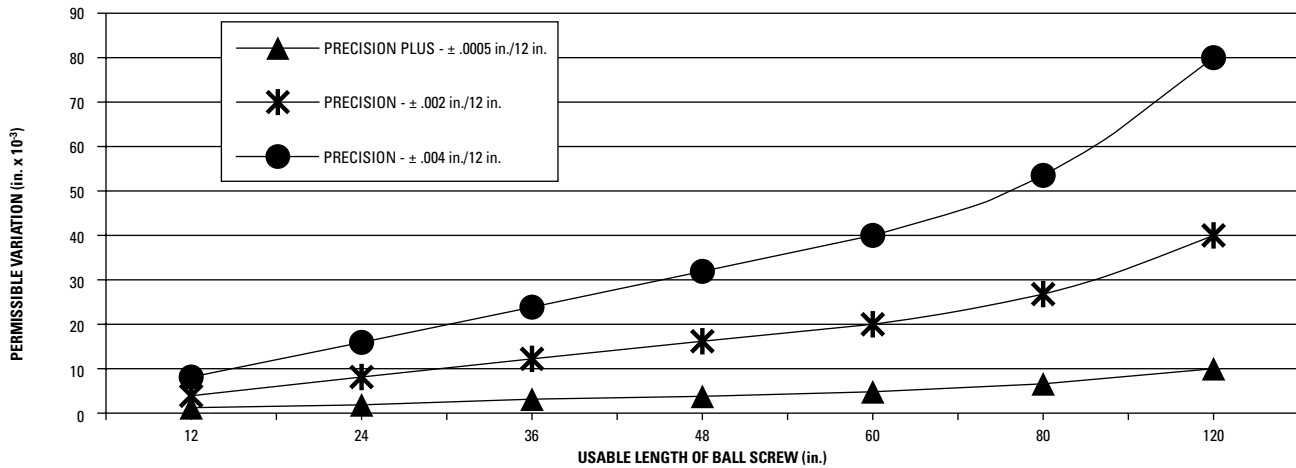
Maximum error over useful length = e_p



- 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
- $V_{2\pi p}$ = permissible travel deviation within 1 revolution

Engineering Guidelines for Inch Series Ball Screws

Permissible Travel Variation Over Usable Length

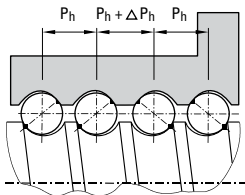


Tolerance Class	Lead Accuracy V_{300p}	Permissible Travel Deviation V_{up} (in. x 10^{-3}) Over Screw Length l_u (in.)							
		$l_u =$	12	24	36	48	60	80	120
Precision Plus*	±.0005 in./12 in.	V_{up} (in.)	1	2	3	4	5	6.67	10
Precision	±.002 in./12 in.	V_{up} (in.)	4	8	12	16	20	26.7	40
Precision*	±.004 in./12 in.	V_{up} (in.)	8	16	24	32	40	53.3	80

* Standard product tolerances

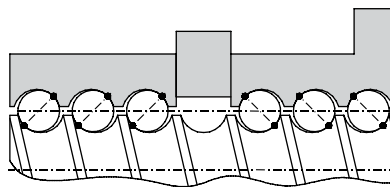
Preload Types

Skip-Lead Preload

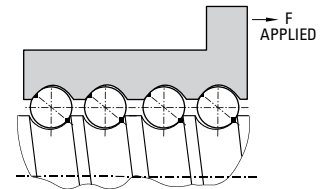


- The lead is offset within the ball nut to provide a precise preload.
- Typically used where both repeatability and high stiffness are required.

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.



- Axial play is present between screw and nut (typically .002"-.008" depending on size).
- Typically used for transport or vertical applications.

No Preload

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



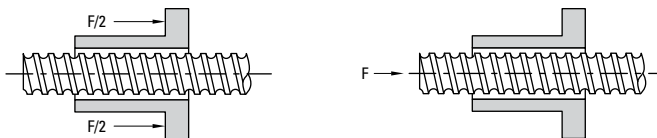
interval should be reduced. Before adding additional grease, wipe the screw clean, removing the old grease and any particulate

contamination seen on the screw. If oil is being used, the best results may be obtained by utilizing a continuous-drip type applicator.

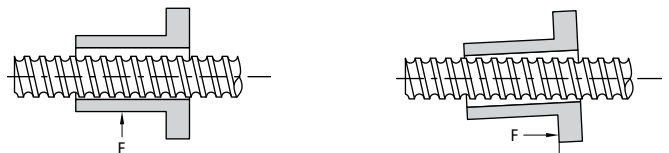
Nut Loading

Axial loading (on nut or screw) is optimal for performance and life. For applications requiring radial loads, please contact us.

Axial Loading: optimal



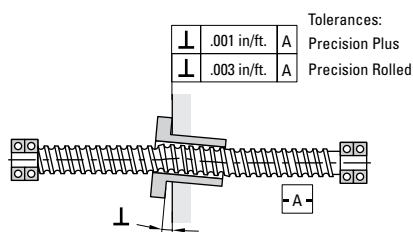
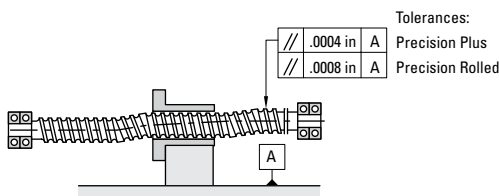
Radial Loading: detrimental*



* 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 147, shows these same configurations at the bottom of the chart and factors in their effect on critical shaft speed for the unsupported screw length.

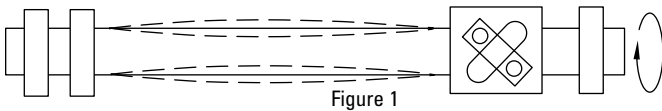
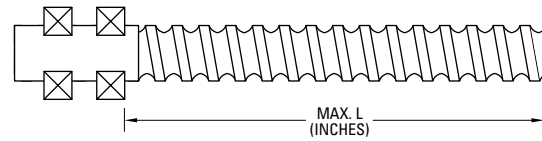


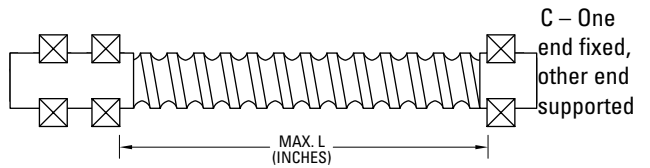
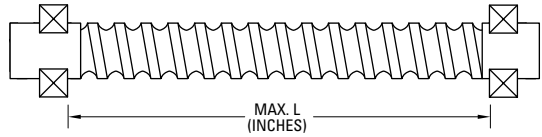
Figure 1

Bearing Support vs. Speed (travel rate or rpm)

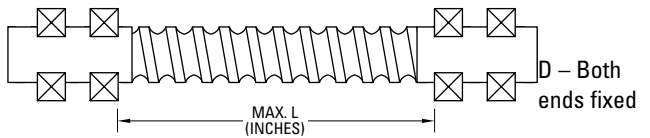
A – One end fixed, other end free



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.

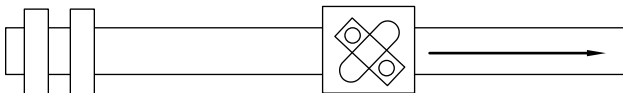


Figure 2

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 149, 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.

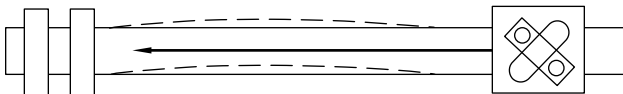
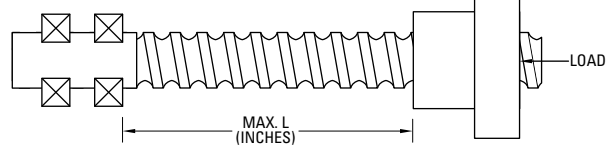


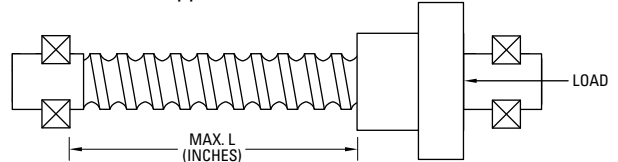
Figure 3

Bearing Support vs. Compression Load on Screws

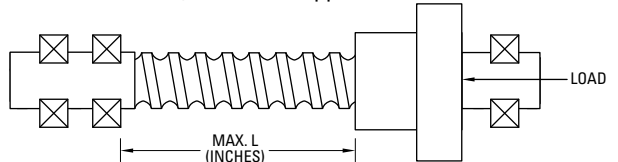
A – One end fixed, other end free



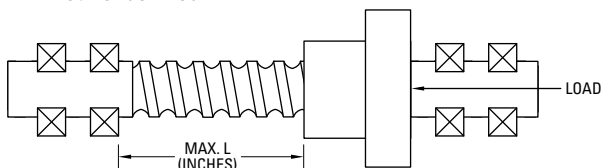
B – Both ends supported



C – One end fixed, other end supported

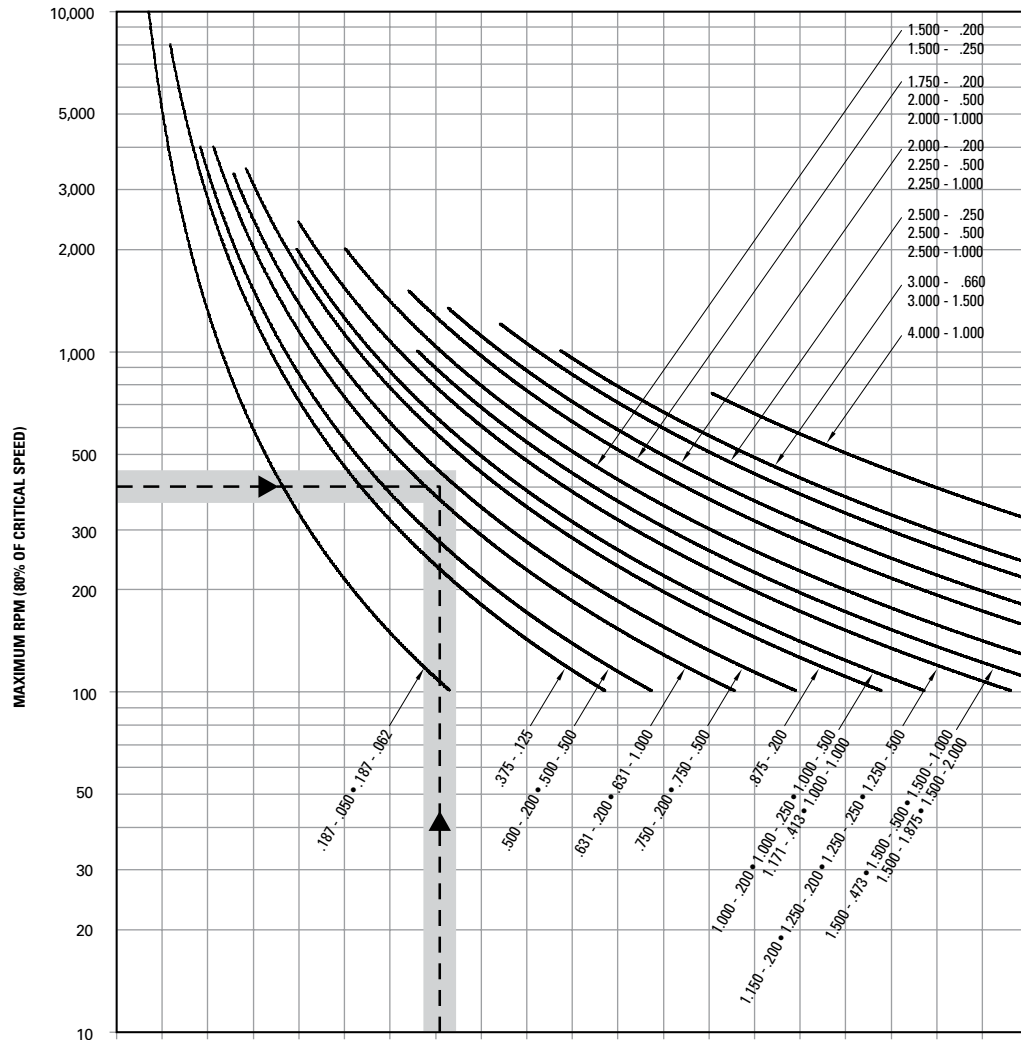


D – Both ends fixed



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	1066	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	7594

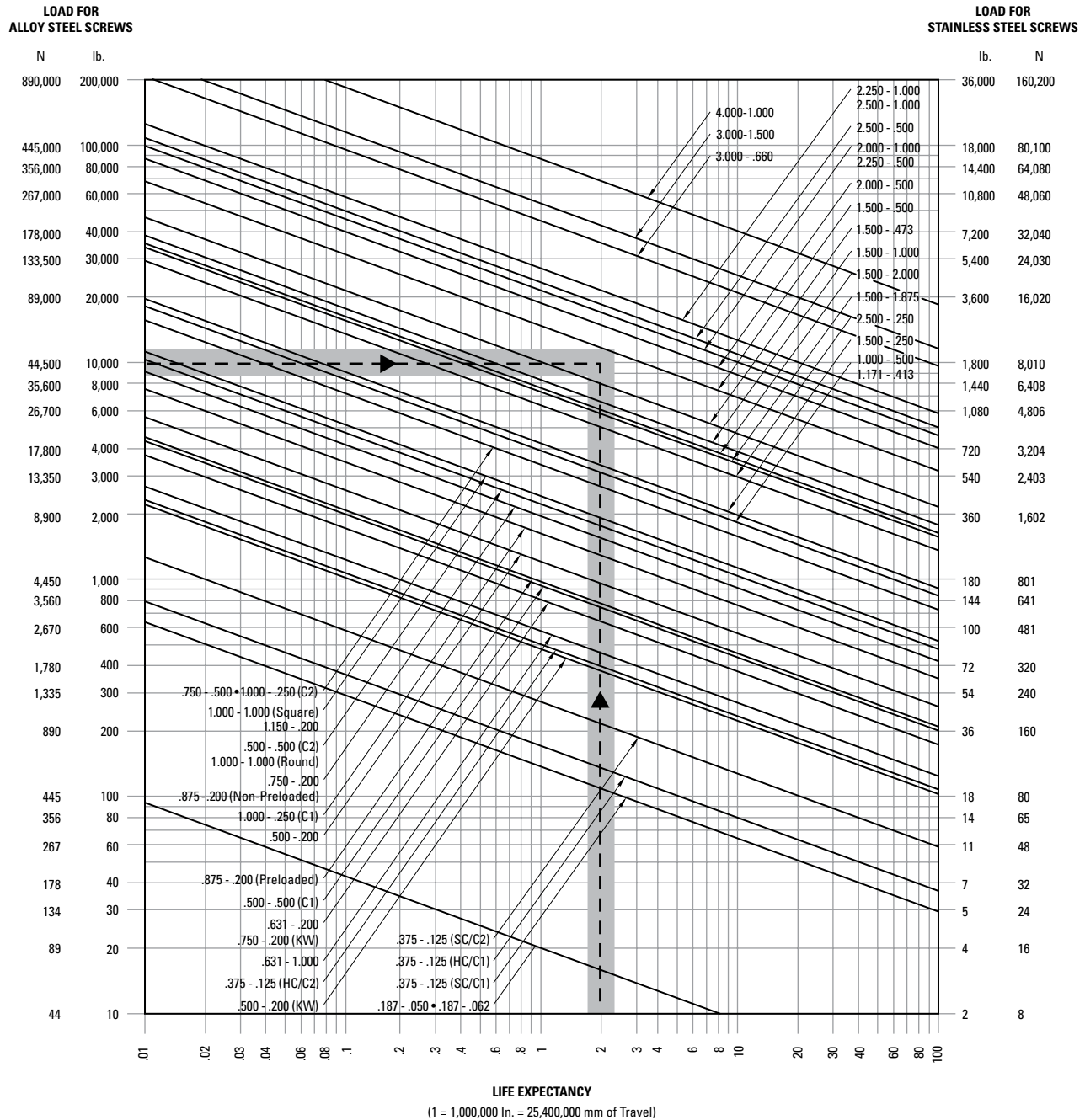
Example: Travel rate of 400 rpm.
 Unsupported length of 85 in. (2159mm).
 End fixity of one end fixed, other end supported.

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



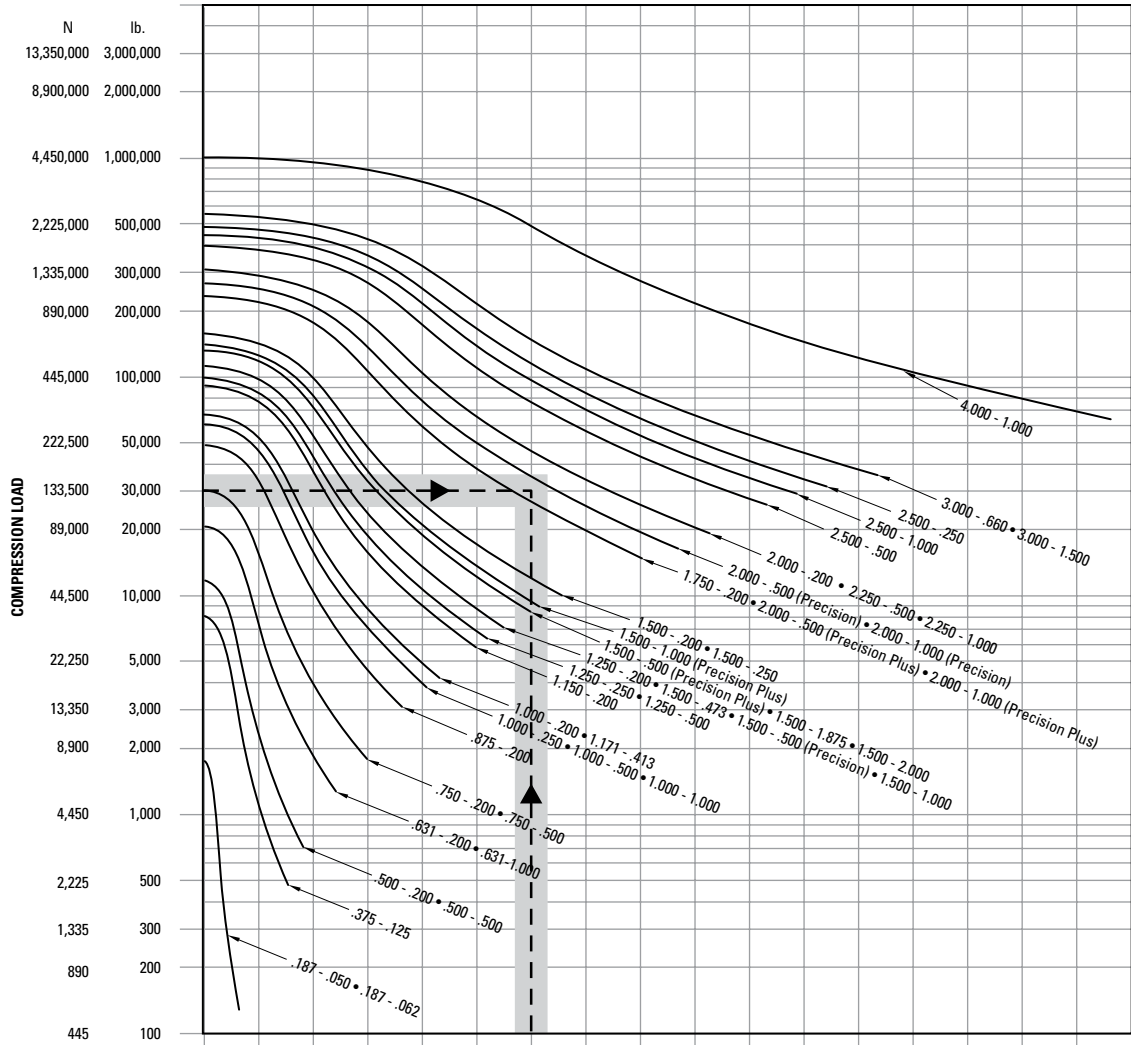
C1 = Single Circuit C2 = Double Circuit SC = Standard Capacity HC = High Capacity

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 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.

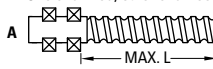
Engineering Guidelines for Inch Series Ball Screws

Compression Load vs. Length for Designated Ball Screws



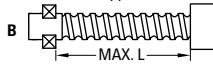
END SUPPORT TYPE

One end fixed, other end free



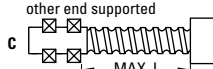
Inches	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
mm	127	254	381	508	635	762	889	1016	1143	1270	1397	1524	1651	1778	1905	2032	2159

Both ends supported



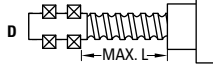
Inches	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
mm	254	508	762	1016	1270	1524	1778	2032	2286	2540	2794	3048	3302	3556	3810	4064	4318

One end fixed, other end supported



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

Both ends fixed



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.

Engineering Guidelines for Metric Series Ball Screws

Selecting a Ball Screw Assembly for Your Application — Metric Series

Below is a list of the most common (but not complete) design considerations used to select a ball screw assembly.

- Compression and/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, maximum linear velocity, and positional accuracy desired should be the known inputs and are used to calculate the minimum diameter, lead, and needed 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 154). Backlash is the linear independent motion between the ball screw and the ball nut and can be controlled by preloading the ball nut (page 159). The manufacturing process, rolled screws versus ground screws, dictates the accuracy (page 155).
2. Determine how you plan to mount the ball screw assembly into your machine (see page 156). 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 153) or use the Compression Loading Chart (page 158) 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 151).
5. The ball nut life can then be calculated using the Dynamic Load Rating (C_{am}) provided in the catalog detail pages. Since multiple ball nuts may be available for a given diameter and lead, use the catalog pages for specified diameter and lead 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 153) or use the Acceptable Speed Chart (page 157) 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 156). The assembly should also be properly aligned with the drive system, bearing supports, and load to achieve optimal performance (page 156). The ball screw assembly should never be run without proper lubrication. Many lubricants are available depending on the application and environment (page 156).

Note: Application and customer service support is available to assist in the selection of your ball screw assembly. Please contact your local Thomson representative or the customer support center (1-540-633-3549 — TCS) 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 mm

Life: 2.5×10^4 meters

1. Accuracy (pages 154 and 155)

No Preload and Standard Rolled ($\pm 50 \mu\text{m}$ per 300mm)

2. End Supports (page 153)

Fixed/Supported

3. Determine Screw Diameter

From Chart (page 158): $\varnothing 50\text{mm}$

From Equation (page 157): $133,440 / .8 = \frac{1.47 \times 9.687 \times 10^4 \times d_r^4}{(2159)^2}$

therefore, $d_r = 44.8\text{mm}$

4. Determine Lead

Lead = $\frac{5.08 \text{ meter/min.}}{400 \text{ rpm}}$ therefore, Lead = 12.7mm, Use 10mm

5. Determine Life

From Catalog (page 102): Dynamic Load = 66,400 N

$$\text{Life (revolutions)} = \left[\frac{66,400}{44,480} \right]^3 \times 10^6$$

therefore, Life = 3.3×10^6 revs (3.3×10^4 meters)

6. Determine Critical Speed

From Catalog (page 102): Screw Root Diameter is 43.0mm

From Equation (page 153): $.8 \times 1.47 \times 1.2 \times 10^6 \times \frac{d_r}{l^2}$

therefore, Speed = 1,301.8 rpm

Verified via Chart (page 157)

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:

Ball Nut: P/N KGF-D-5010-RH-KK

Engineering Guidelines for Metric Series Ball Screws

Design Formulas

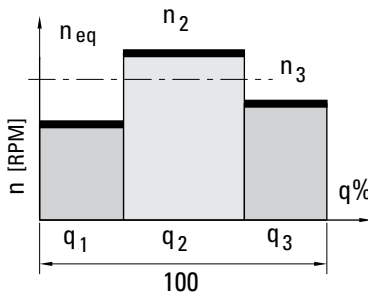
These formulas allow you to calculate a number of important factors which govern the application of Thomson ball screws.

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).

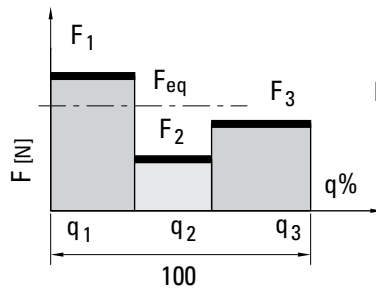
Functional life should be determined by approximating equivalent rotational speed and loading force over typical performance cycles.

Simple rotational speed profile



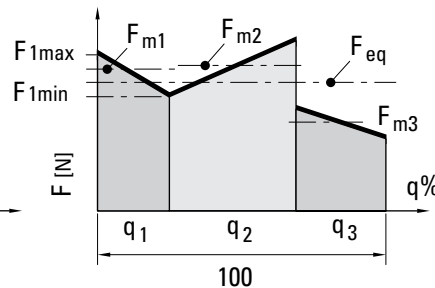
$$n_{eq} [\text{min}^{-1}] = \sum_{i=1}^n n_i \times \frac{q_i}{100}$$

Simple loading profile (1)



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

Simple loading profile (2)



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

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

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

3. Machine Service Life

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

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

Engineering Guidelines for Metric Series Ball Screws

4. Torque

a. Driving torque: $T_d \text{ (N}\cdot\text{m)} = \frac{F_{eq} \times P}{2\pi e} = 1.77 \times 10^{-4} \times F_{eq} \times P$

b. Backdrive torque: $T_b \text{ (N}\cdot\text{m)} = \frac{F_{eq} \times P \times e}{2\pi} = 1.43 \times 10^{-4} \times F_{eq} \times P$

(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

$P_d \text{ (W)} = \frac{F_{eq} \times P}{(2\pi) e} \times \frac{n}{9.546 \times 10^3} = \frac{F_{eq} \times P \times n}{5.398 \times 10^4}$

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

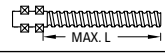
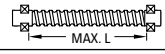
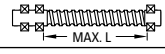

6. Permissible Rotational Speed

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 157.

$n_c = C_s \times 1.2 \times 10^8 \times \frac{d_r}{l^2}$ n_c = Critical Speed (rpm)
 $n_s = n_c \times S$ 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).

$DN = d_0 n$

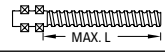
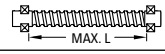
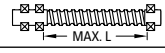
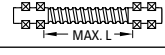
where

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_c = Critical Buckling Force (N)
 $F_s = F_c \times S$ 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

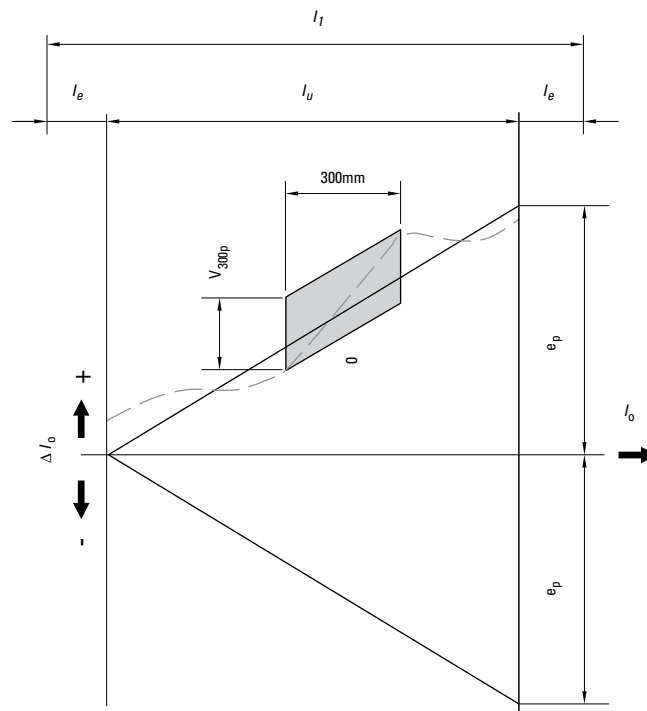
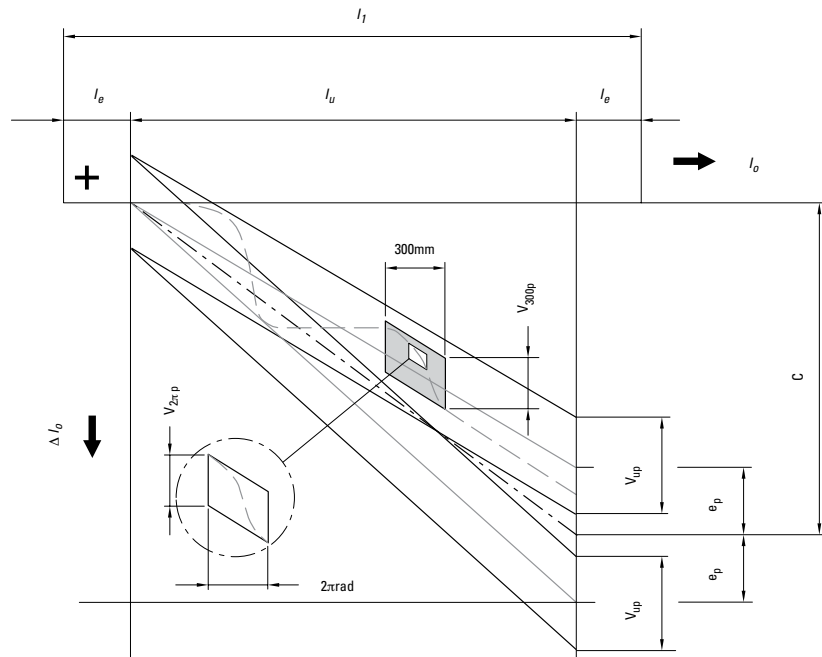
Accuracy is a measure of how closely a motion system will approach a command position. Perfect accuracy, for example, means that advancing a ball nut a precise amount from a given point on the screw always requires exactly the theoretically predicted number of revolutions.

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.

P — Positioning Class Ball Screws

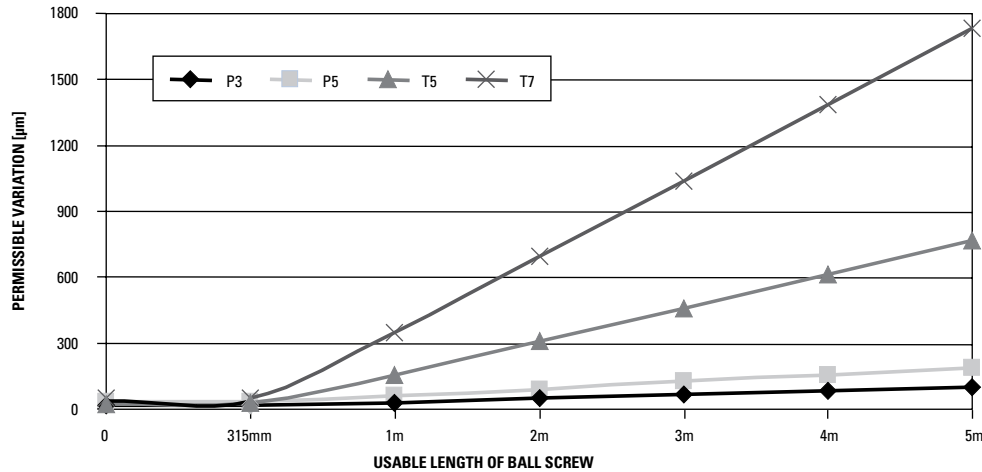
$$\text{Maximum error over useful length} = e_p + 1/2V_{up} + C$$



- 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
- $V_{2\pi p}$ = permissible travel deviation within 1 revolution

Engineering Guidelines for Metric Series Ball Screws

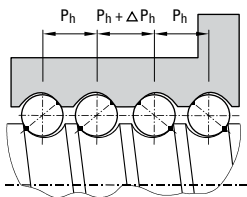
Permissible Travel Variation Over Usable Length



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	$\pm 12 \mu\text{m}/300\text{mm}$	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	$\pm 23 \mu\text{m}/300\text{mm}$	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	$\pm 23 \mu\text{m}/300\text{mm}$	e_p (µm)	23	$= 2 \times l_u / 300 \times V_{300p}$													
T7	$\pm 52 \mu\text{m}/300\text{mm}$	e_p (µm)	52	$= 2 \times l_u / 300 \times V_{300p}$													

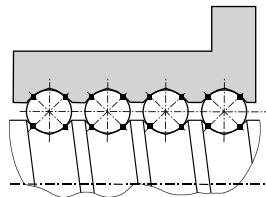
Preload Types

Precise Preload (Type Z0)
(Available with FL nut only)



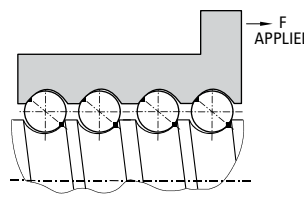
- The lead is offset within the ball nut to provide a precise preload.
- The preload is approximately 10% of dynamic load capacity, but can range from 2% to 13% as specified by customers.
- Typically used where both repeatability and high stiffness are required.

Preload (Type Z1)



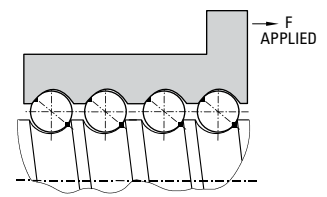
- Oversized balls slightly larger than the ball groove space are used to provide zero backlash between the screw and nut.
- The preload is approximately 1% to 2% of dynamic load capacity.
- Typically used for positioning applications where higher-level repeatability is desired.

No Preload (Type Z2)
(Standard lash)



- Axial play is present between screw and nut.
- Typically used for transport or vertical applications.

No Preload (Type Z3)
(Minimum lash)



- 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 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

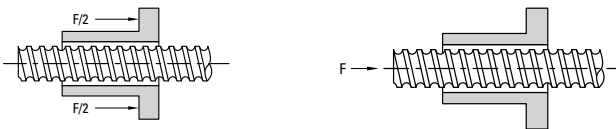
being used, the best results may be obtained by utilizing a continuous-drip type applicator.



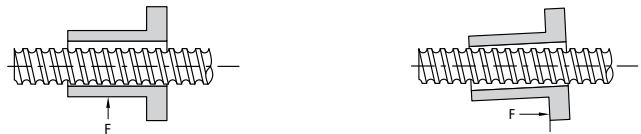
Nut Loading

Axial loading (on nut or screw) is optimal for performance and life. For applications requiring radial loads, please contact us.

Axial Loading: optimal



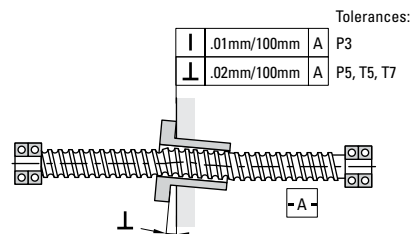
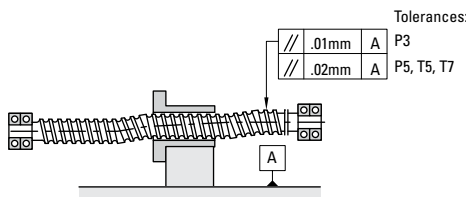
Radial Loading: detrimental*



* Minimize radial loading to less than 5% of the axial load.

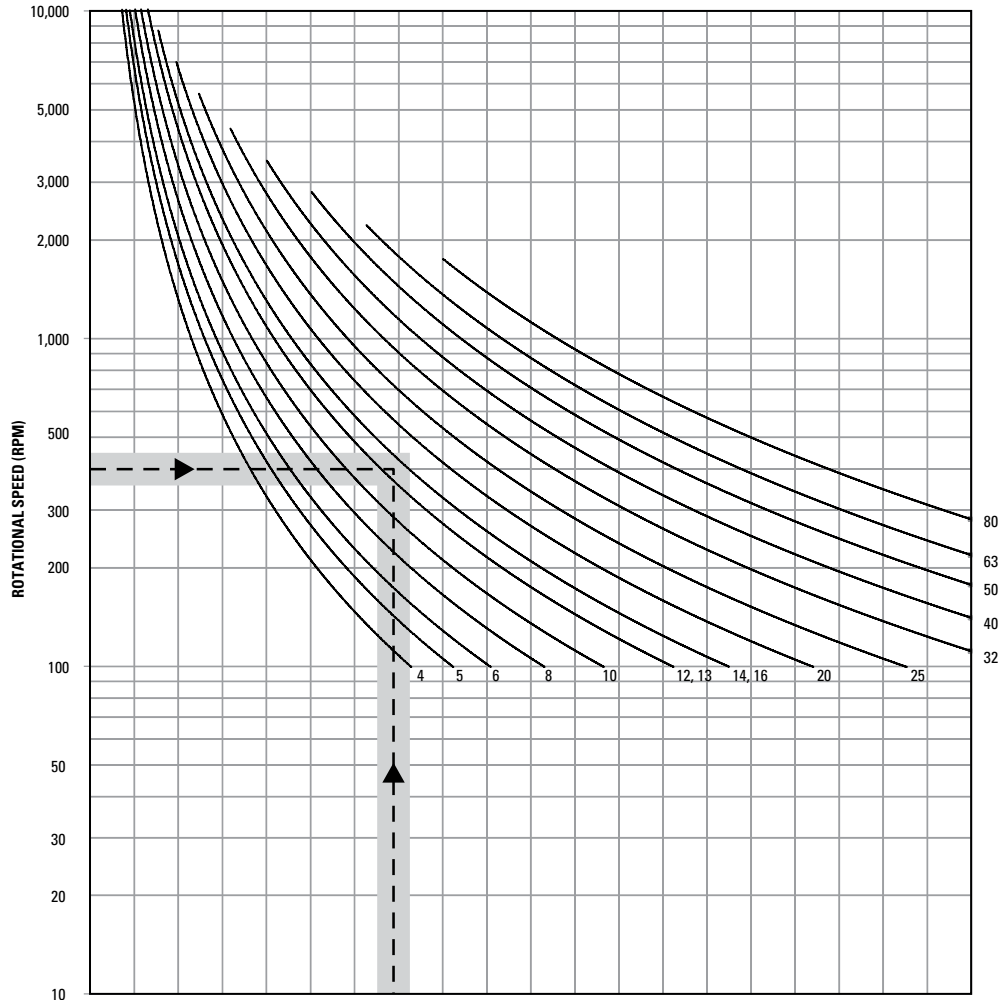
Nut Mounting

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

Support Type	Inches	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
A: One end fixed, other end free	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

Unsupported length of 85 in. (2159mm).

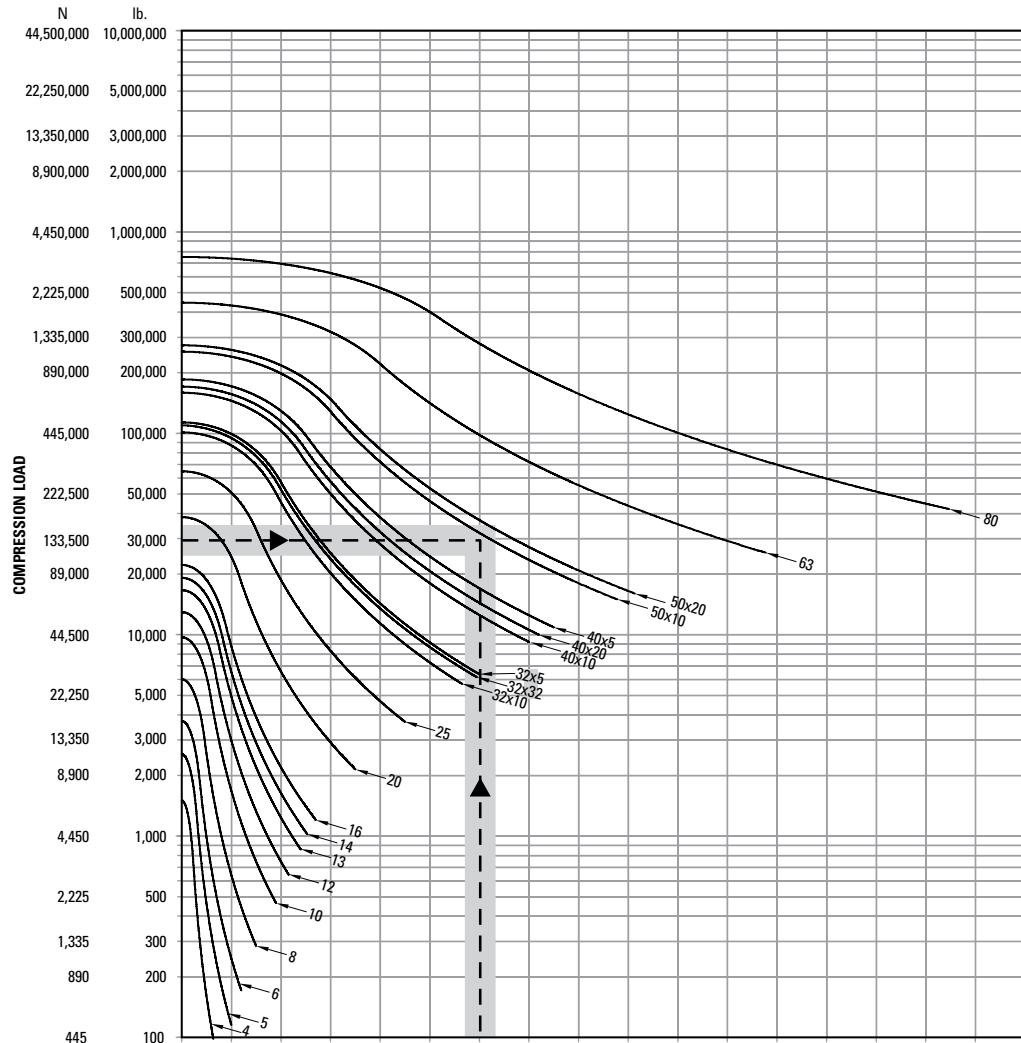
End fixity of one end fixed, other end supported.

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.

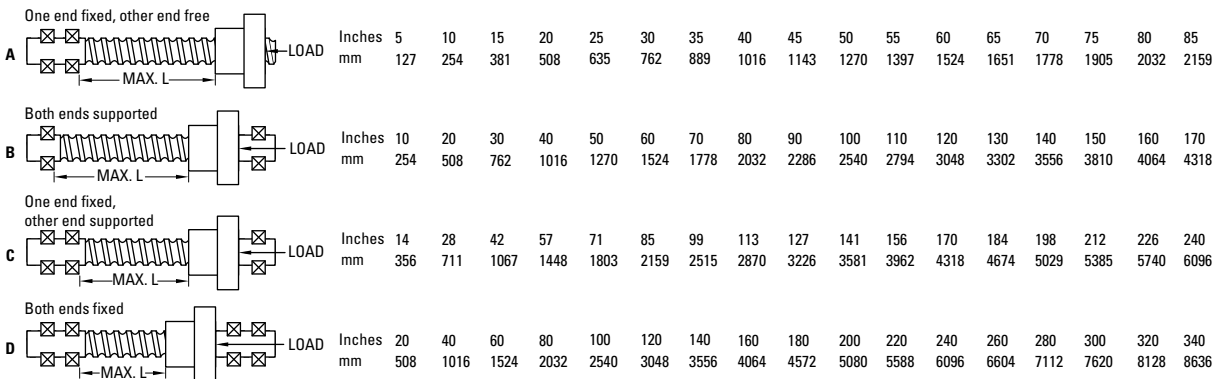
†80% of critical speed

Engineering Guidelines for Metric Series Ball Screws

Compression Load vs. Length for Designated Ball Screws



END SUPPORT TYPE



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.

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 116, 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 165. 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 146). 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 161, plot the point for your specific application.

Design Formulas

Life Ratings

$$L_{10} [\text{in.}] = \left[\frac{C_{am}}{T} \right]^3 \times 10^6$$




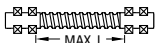
Parameters:

- 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)

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

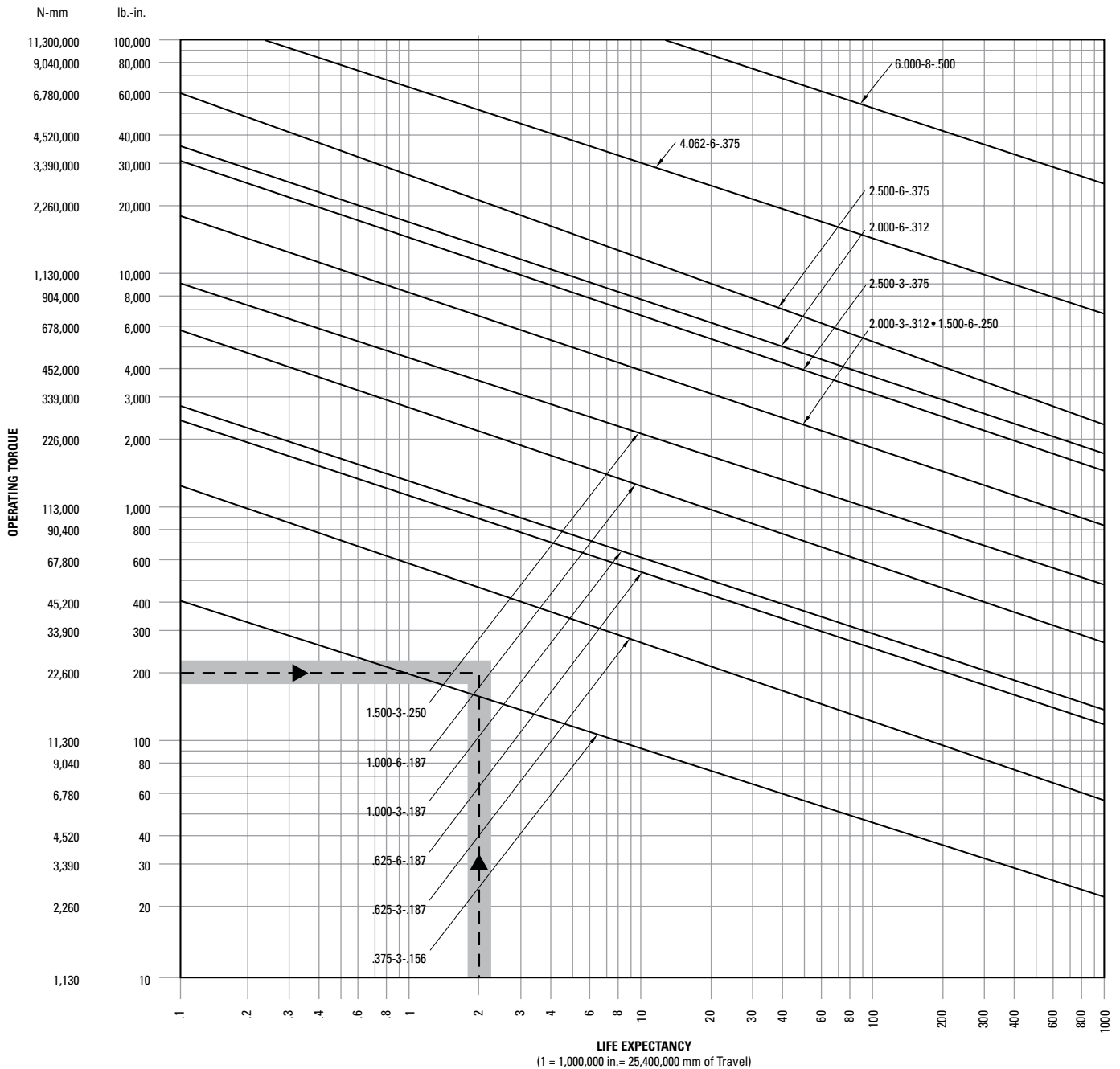
n_c = Critical Speed (rpm)
 n_s = Safe Drive Speed
 d_r = Root Diameter (in.)
 l = Length between Bearing Supports (in.)
 S = Safety Factor (0.8 maximum)
 C_s = End Fixity Factor

$$n_s = n_c \times S$$

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

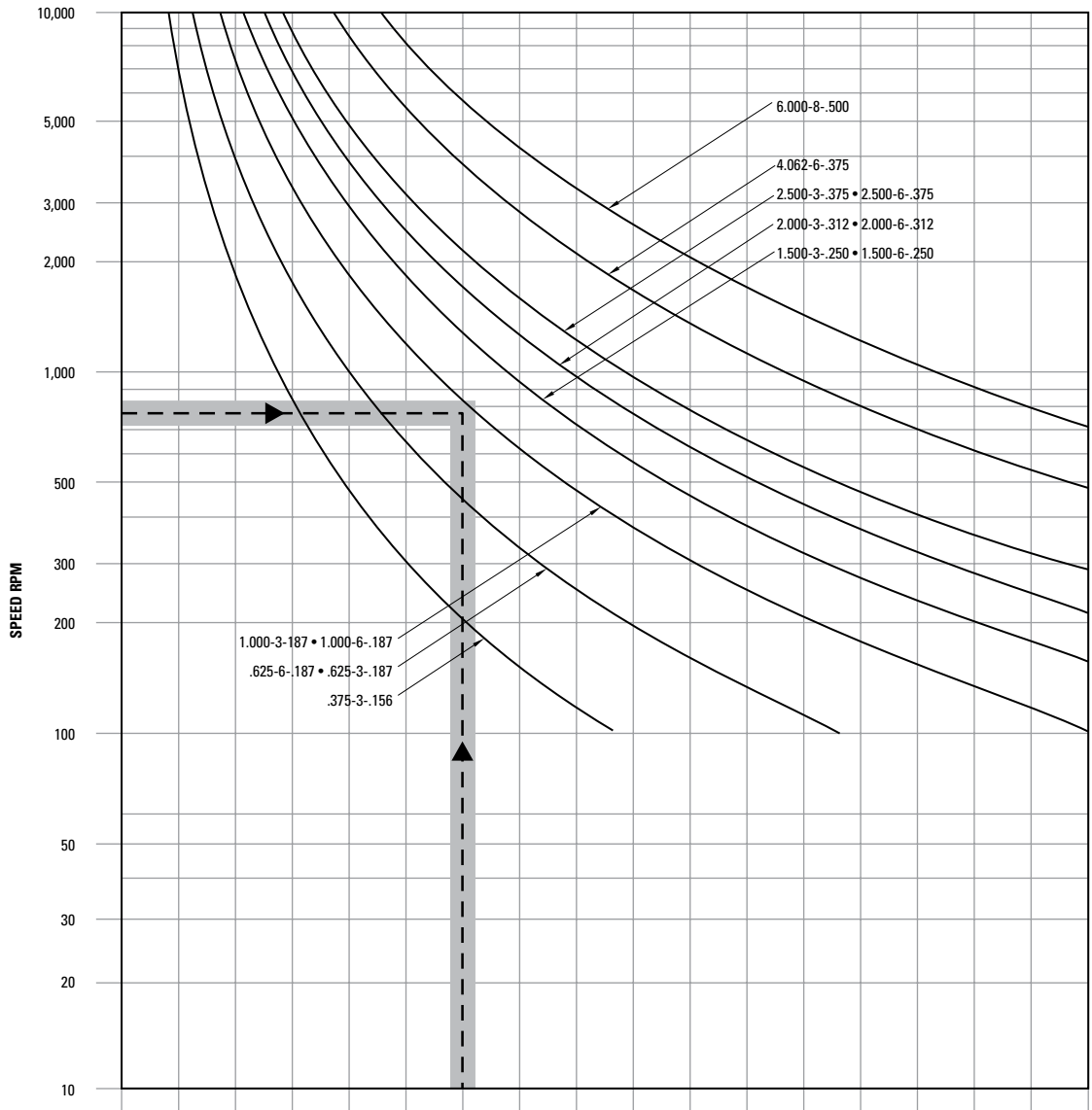


Example: Desired life of 2 million in.
(50.8 million mm).
Operating torque is 200 lb-in.
(22.6 N · mm)

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

Support Type	Series	6 in	12 in	18 in	24 in	30 in	36 in	42 in	48 in	54 in	60 in	66 in	72 in	78 in	84 in	90 in	96 in	102 in
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.

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 the method 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. Face shoulder on ball nut with lathe to achieve proper orientation.
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.

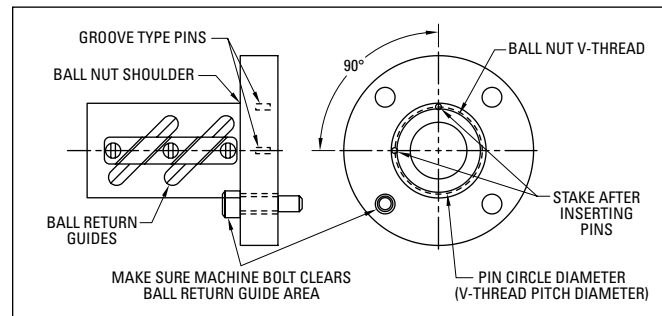


Figure 1

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).

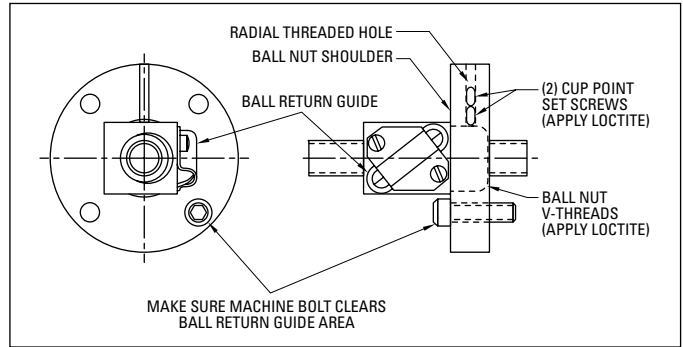


Figure 2

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

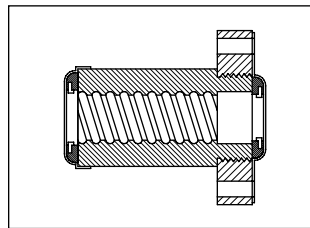
Wipers are available for most units as optional items. Precision inch ball nuts typically do not include wipers but they may be added as an option. Precision Plus inch ball nuts and all metric ball nuts include wipers as standard. Wipers generally fall into two categories: one style is internally mounted 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.

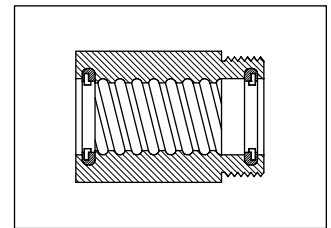
For wipers with flange retainer: 1) Select end of screw to install ball nut (typically end with shortest journal length). 2) Orient ball nut with flange facing desired direction. 3) Install wiper holder and wiper for leading end of ball nut to ball screw. Then follow the ball nut installation procedure, STEP THREE, page 220) Install wiper holder onto trailing end of ball nut once the ball nut is installed on the ball screw.



Brush Wiper

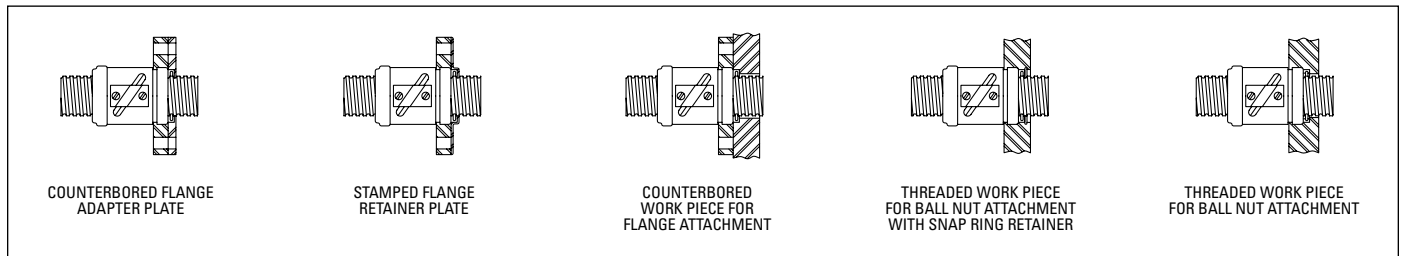


Wiper with Flange Retainer



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.)

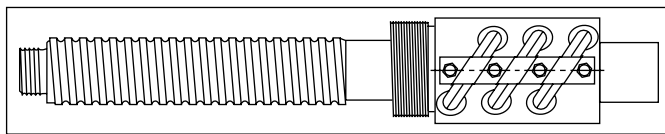


Figure 3

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.)

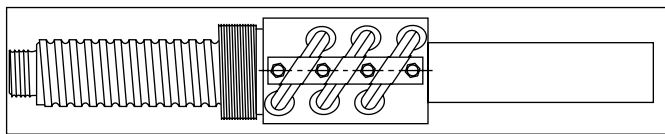


Figure 4

3. Remove the arbor. (See Figure 5.)

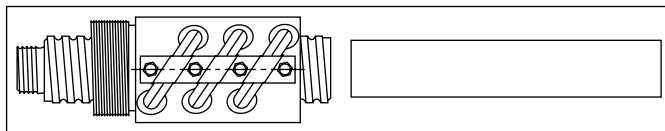


Figure 5

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.

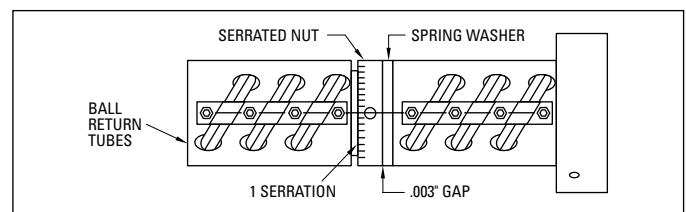


Figure 6

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	7823585/7833677	220 (979)	1.5 (170)
1.000 x .250	5704167 / 5704168	330 (1468)	2.0 (226)
1.000 x .250	7820428	330 (1468)	2.0 (226)
1.000 x .250	7820426	330 (1468)	2.0 (226)
1.000 x .250	7823586	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)
1.500 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.

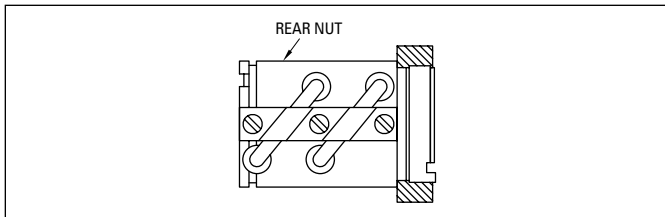


Figure 7. Assembly of locknut to rear nut.

Turn the front nut onto the screw as shown in Figure 10. Insert the tapered sleeve into position against the front nut with preload springs oriented as shown in Figure 8.

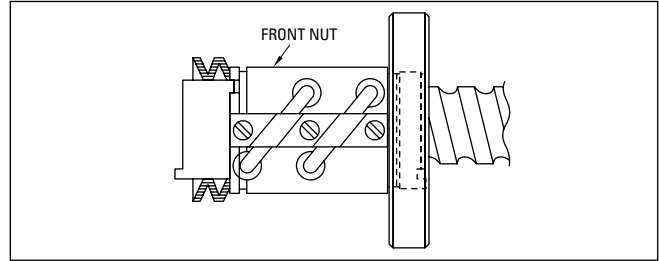


Figure 8. Preload spring orientation.

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 bellville springs. (See Figure 9.)

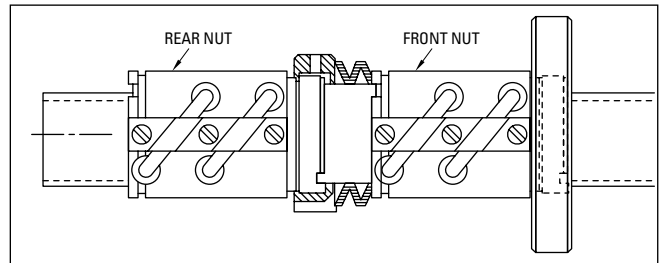


Figure 9. Assembly of rear nut to preload spring.

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.

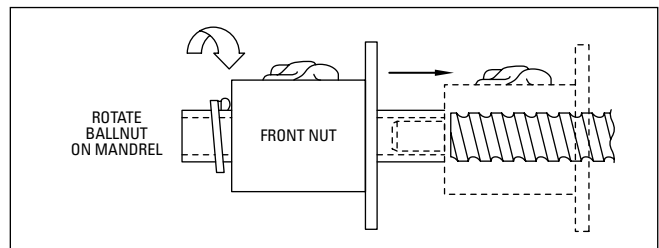


Figure 10. Transfer of front nut to screw.

Installation

Method C (Continued)

Bring the rear nut on its mandrel to position for turning onto the screw. (See Figure 11.)

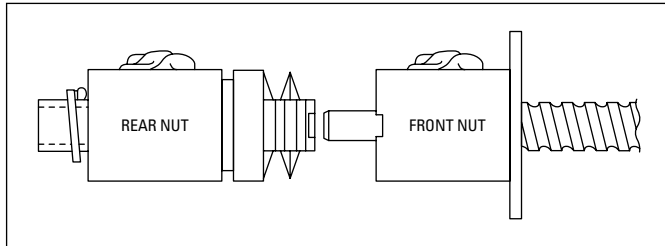


Figure 11. Positioning rear nut for mounting.

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.

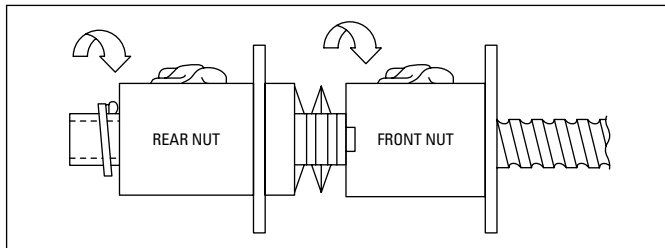


Figure 12. Mounting rear nut.

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.)

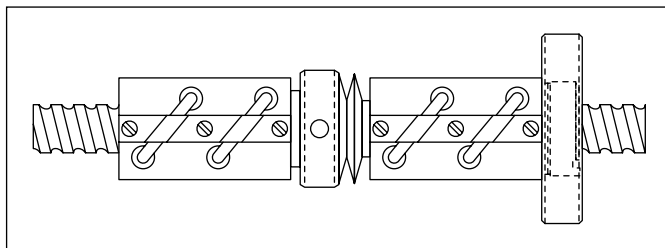


Figure 13. Assembled preload ready for setting.

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 223 for the Number of Circuits, 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 221 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.

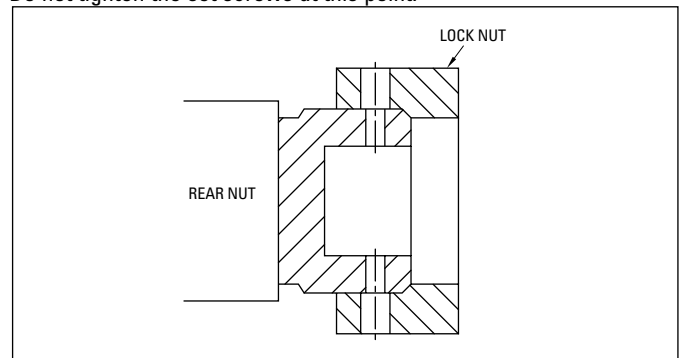


Figure 14. Assembly of locknut to rear nut.

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.

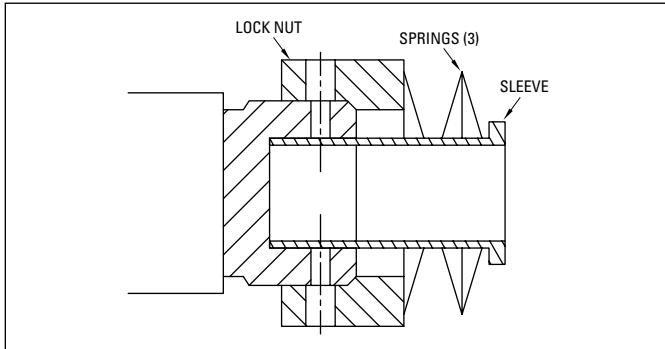


Figure 15. Assembly of sleeve and preload springs.

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.

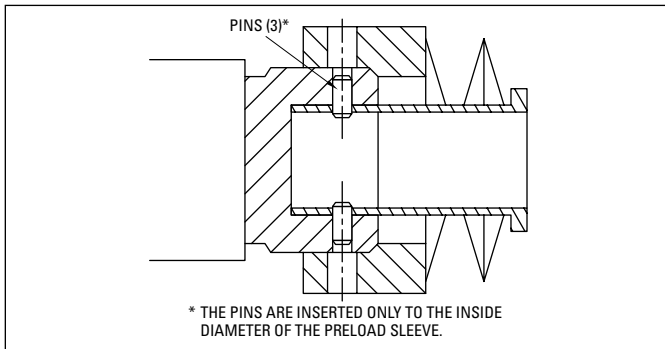


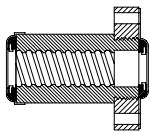
Figure 16. Inserting retainer pin.

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
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

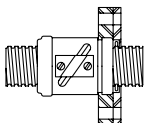
STEP FOUR: Complete Installation of the Wiper Kit

If applicable, complete wiper kit installation.

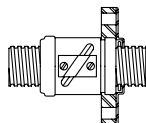
Wiper with Flange Retainer



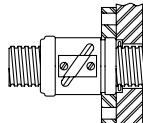
Wiper without Flange Retainer



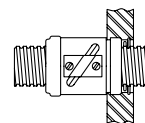
COUNTERBORED FLANGE ADAPTER PLATE



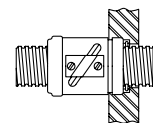
STAMPED FLANGE RETAINER PLATE



COUNTERBORED WORK PIECE FOR FLANGE ATTACHMENT



THREADED WORK PIECE FOR BALL NUT ATTACHMENT WITH SNAP RING RETAINER



THREADED WORK PIECE FOR BALL NUT ATTACHMENT

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

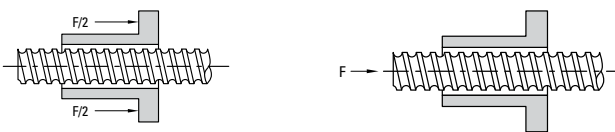
A ball nut flange is the recommended means of attaching a ball nut to a load. The ball screw assembly should be mounted into a system or machine as shown in the figures below. Axial loading of the nut is optimal for performance and life and side loading installations or applications should be avoided.

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



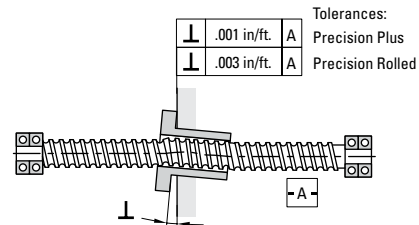
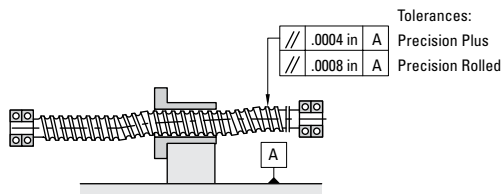
Radial Loading: detrimental*



* Minimize radial loading to less than 5% of the axial load.

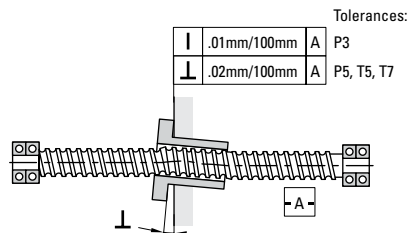
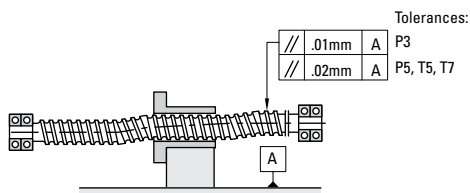
Nut Mounting (Inch)

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.

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.

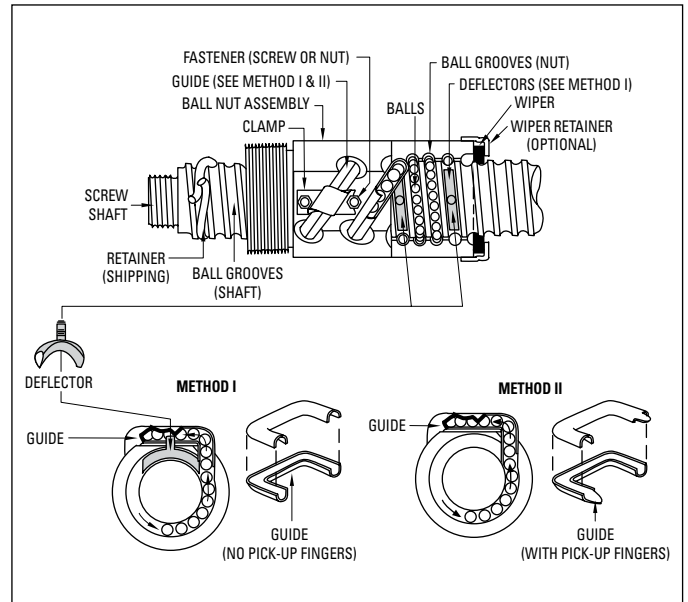


Figure 17

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 (Inch)	Number of Balls
0.375 x 0.125	8103-448-003	0.078	108
0.375 x 0.125	8103-448-013	0.078	108
0.375 x 0.125	8103-448-017	0.078	49
0.375 x 0.125	8103-448-018	0.078	49
0.500 x 0.200	8105-448-023	0.125	46
0.500 x 0.200	8105-448-013	0.125	96
0.500 x 0.200	8105-448-008	0.125	192
0.500 x 0.500	8105-448-014	0.125	108
0.500 x 0.500	8105-448-011	0.125	146
0.500 x 0.500	8105-448-016	0.125	146
0.631 x 0.200	8106-448-022	0.125	68
0.631 x 0.200	8106-448-026	0.125	68
0.631 x 0.200	8106-448-045	0.125	67
0.631 x 0.200	8106-448-009	0.125	70
0.631 x 0.200	8106-448-008	0.125	70
0.631 x 0.200	8106-448-015	0.125	140
0.631 x 0.200	8106-448-019	0.125	140
0.631 x 0.200	8106-448-012	0.125	140
0.631 x 0.200	8106-448-036	0.125	136
0.631 x 0.200	8106-448-036	0.125	136
0.631 x 10.000	8106-448-037	0.125	74
0.631 x 10.000	8106-448-041	0.125	46
0.631 x 10.000	8106-448-042	0.125	92
0.750 x 0.200	8107-448-018	0.125	86
0.750 x 0.200	8107-448-026	0.125	86
0.750 x 0.200	8107-448-047	0.125	86
0.750 x 0.200	8107-448-016	0.125	86
0.750 x 0.200	8107-448-027	0.125	172
0.750 x 0.200	8107-448-046	0.125	172
0.750 x 0.200	8107-448-025	0.125	172
0.750 x 0.500	8107-448-014	0.156	152
0.750 x 0.500	8107-448-020	0.156	152
0.750 x 0.500	8107-448-049	0.156	152
0.750 x 0.500	8107-448-048	0.156	152
0.750 x 0.500	8107-448-011	0.156	304
0.875 x 0.200	8109-448-001	0.125	184
0.875 x 0.200	8109-448-003	0.125	168
1.000 x 0.250	8110-448-091	0.156	86
1.000 x 0.250	8110-448-055	0.156	86
1.000 x 0.250	8110-448-032	0.156	89
1.000 x 0.250	8110-448-030	0.156	89
1.000 x 0.250	8110-448-056	0.156	171
1.000 x 0.250	8110-448-026	0.156	182
1.000 x 0.250	8110-448-024	0.156	182
1.000 x 0.250	8110-448-087	0.156	182
1.000 x 0.250	8110-448-088	0.156	182
1.000 x 0.250	8110-448-017	0.156	182
1.000 x 0.250	8110-448-100	0.156	86
1.000 x 0.500	8110-448-022	0.156	196
1.000 x 0.500	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	107
1.000 x 1.000	8110-448-034	0.156	107

Size (Inches)	Part Number	Nominal Diameter (Inch)	Number of Balls
1.150 x 0.200	8111-448-006	0.125	252
1.150 x 0.200	8111-448-004	0.125	504
1.171 x 0.413	8111-448-015	0.281	60
1.500 x 0.250	8111-448-083	0.156	260
1.500 x 0.250	8111-448-020	0.156	260
1.500 x 0.250	8111-448-012	0.156	560
1.500 x 0.473	8111-448-081	0.344	86
1.500 x 0.500	8115-448-016	0.312	140
1.500 x 0.500	8115-448-018	0.312	140
1.500 x 0.500	8115-448-006	0.312	280
1.500 x 1.000	8115-448-014	0.344	68
1.500 x 1.000	8115-448-080	0.344	60
1.500 x 1.000	8115-448-011	0.344	136
1.500 x 1.000	8115-448-049	0.344	68
1.500 x 1.875	8115-448-082	0.281	83
1.500 x 1.875	8115-448-087	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 0.500	8120-448-011	0.375	150
2.000 x 0.500	8120-448-013	0.375	150
2.000 x 0.500	8120-448-006	0.375	300
2.000 x 0.500	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 0.500	8122-448-005	0.374	170
2.250 x 0.500	8122-448-007	0.374	154
2.500 x 1.000	8122-448-006	0.375	164
2.500 x 0.250	8125-448-021	0.156	468
2.500 x 0.500	8125-448-010	0.375	184
2.500 x 1.000	8125-448-008	0.375	194
3.000 x 0.660	8130-448-007	0.500	186
3.000 x 1.500	8130-448-018	0.625	186
4.000 x 1.000	8140-448-001	0.623	186
.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

Maintenance and Service

Size (mm)	Part Number	Nominal Diameter (mm)	Number of Balls
16 x 5	KGF-D-1605-RH-KK	3.500	42
20 x 5	KGF-D-2005-RH-KK	3.500	54
20 x 20	KGF-D-2020-RH-KK	3.500	100
25 x 5	KGF-D-2505-RH-KK	3.500	66
25 x 10	KGF-D-2510-RH-KK	3.500	164
25 x 25	KGF-D-2525-RH-KK	3.500	120
32 x 5	KGF-D-3205-RH-KK	3.500	116
32 x 10	KGF-D-3210-RH-KK	5.556	54
32 x 20	KGF-D-3220-RH-KK	5.556	136
32 x 32	KGF-D-3232-RH-KK	3.969	124
40 x 5	KGF-D-4005-RH-KK	3.500	180
40 x 10	KGF-D-4010-RH-KK	7.144	72
40 x 20	KGF-D-4020-RH-KK	5.556	156
40 x 40	KGF-D-4040-RH-KK	7.144	96
50 x 10	KGF-D-5010-RH-KK	7.144	88
50 x 20	KGF-D-5020-RH-KK	6.350	164
63 x 10	KGF-D-6310-RH-KK	7.144	140
63 x 20	KGF-D-6320-RH-KK	7.144	186
80 x 10	KGF-D-8010-RH-KK	7.144	210
16 x 5	KGF-L-1605-RH-E-KK	3.500	56
20 x 5	KGF-L-2005-RH-E-KK	3.500	108
25 x 5	KGF-L-2505-RH-E-KK	3.500	132
32 x 5	KGF-L-3205-RH-E-KK	3.500	232
32 x 10	KGF-L-3210-RH-E-KK	5.500	108
40 x 5	KGF-L-4005-RH-E-KK	3.500	360
40 x 10	KGF-L-4010-RH-E-KK	6.350	160
50 x 10	KGF-L-5010-RH-E-KK	7.144	176
63 x 10	KGF-L-6319-RH-E-KK	7.144	280
80 x 10	KGF-L-8010-RH-E-KK	7.144	420
16 x 5	7106-448-061	3.500	45
16 x 10	7106-448-062	3.000	102
20 x 5	7107-448-063	3.500	48
25 x 5	7110-448-064	3.500	63
25 x 10	7110-448-065	3.500	75
25 x 20	7110-448-066	3.500	80
25 x 25	7110-448-067	3.500	130
25 x 50	7110-448-068	3.500	130
32 x 5	7112-448-069	3.500	140
32 x 10	7112-448-070	7.140	42
32 x 20	7112-448-071	5.000	84
32 x 32	7112-448-072	3.969	124
40 x 5	7115-448-073	3.500	180
40 x 10	7115-448-074	7.140	54
40 x 20	7115-448-075	5.000	104
40 x 40	7115-448-076	3.500	360
50 x 10	7120-448-077	7.140	115
50 x 20	7120-448-078	7.140	100
63 x 10	7125-448-001	7.144	140
63 x 20	7125-448-002	7.140	96

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
80 x 10	KGF-D-8010-RH-EE	7.144	175
12 x 10	KGM-D-1210-RH-EE	2.000	63
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
50 x 10	KGM-D-5010-RH-EE	7.144	155
63 x 10	KGM-D-6310-RH-EE	7.144	140
63 x 20	KGM-D-6320-RH-EE	7.140	96
12 x 5	KGM-N-1205-RH-00	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
63 x 10	KGM-D-6310-RH-EE	7.144	140
80 x 10	KGM-D-8010-RH-EE	7.144	175
12 x 4	KGM-G-1204-RH-00	1.984	57
16 x 5	KGF-D-1605-RH-KK	3.500	56
20 x 5	KGM-G-2005-RH-KK	3.500	72
25 x 5	KGM-G-2505-RH-KK	3.500	110
25 x 10	KGM-G-2510-RH-KK	3.500	55
32 x 5	KGM-G-3205-RH-KK	3.500	145
32 x 10	KGM-G-3210-RH-KK	5.556	72
40 x 5	KGM-G-4005-RH-KK	3.500	180
40 x 10	KGM-G-4010-RH-KK	7.144	90
40 x 20	KGM-G-4020-RH-KK	5.556	80
50 x 10	KGM-G-5010-RH-KK	7.144	132
63 x 10	KGM-G-6310-RH-KK	7.144	168
80 x 10	KGM-G-8010-RH-KK	7.144	210

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, W_p , can be determined by measuring torque, T_p , using the following formula:

$$W_p = \frac{T_p}{.007}$$

where: W_p = Preload force, in lb.
 T_p = 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 T_p (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.

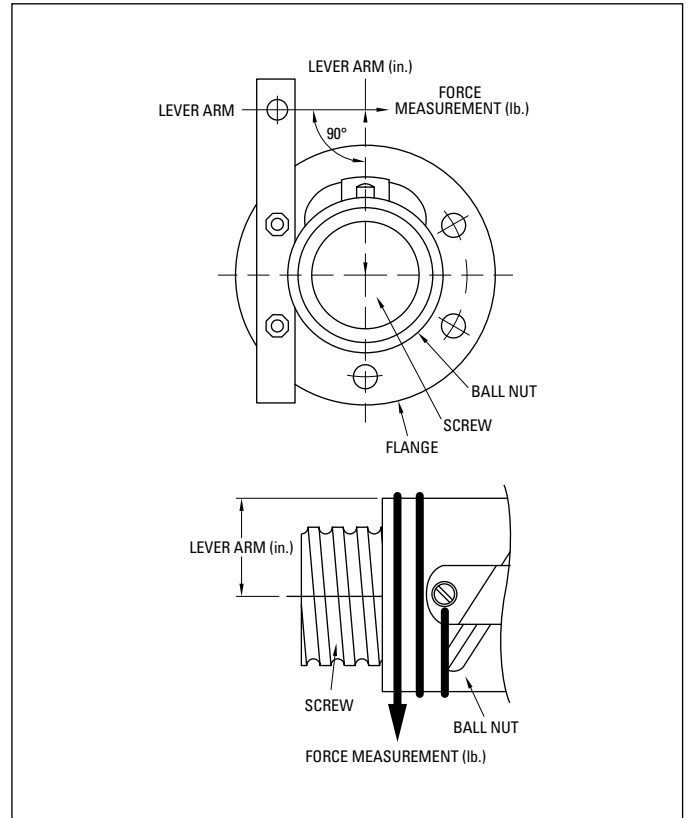


Figure 18

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, W_p , can be determined by measuring torque, T_p , after the desired preload has been established using the following formula:

$$T_p = .007 \times W_p$$

where: T_p = torque, lb-in. (due to preload only)
 W_p = 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 ⁻³ torr	4x10 ⁻³ 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.

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

$$\text{Torque (in lbs)} = \frac{\text{Load (lbs)} \times \text{Lead (inches)}}{2\pi \times \text{efficiency}^*}$$

* 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

$$\text{Torque (in lbs)} = \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

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

$$\text{hp} = \frac{\text{Torque (in lbs)} \times \text{rpm}}{63,000}$$

Horsepower to Torque

$$\text{Torque} = \frac{63,000 \times \text{hp}}{\text{rpm}}$$

Column Load Strength*

(Based on Eulers Formula)

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

P_{Cr} = maximum loads (lbs)

F_c = end support factor

.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

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

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

Custom Capabilities

The Thomson 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 70+ 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



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 <input type="checkbox"/>	0.005"/ft <input type="checkbox"/>	50µ/300mm <input type="checkbox"/>	23µ/300mm <input type="checkbox"/>	12µ/300mm <input type="checkbox"/>
Diameter		Lead					
Screw P/N		Overall Length*					
Ball Nut P/N		Flange P/N		Wiper P/N			

3. Bearing Supports

Right End	<input type="checkbox"/> None	<input type="checkbox"/> Floating	<input type="checkbox"/> Quick Mount
Left End	<input type="checkbox"/> None	<input type="checkbox"/> Floating	<input type="checkbox"/> Quick Mount

4. End Machining*

Right End	<input type="checkbox"/> BK	<input type="checkbox"/> BF	<input type="checkbox"/> FK	<input type="checkbox"/> FF	<input type="checkbox"/> QK	<input type="checkbox"/> QF	<input type="checkbox"/> Cut to Length Only
	<input type="checkbox"/> BK1	<input type="checkbox"/> BF1	<input type="checkbox"/> FK1	<input type="checkbox"/> FF1	<input type="checkbox"/> QK1	<input type="checkbox"/> QF1	<input type="checkbox"/> Annealed _____ (specify length annealed)

5. Configuration*

<input type="checkbox"/> Ball Nut (V-Thread/Flange) Facing Left End	<input type="checkbox"/> Ball Nut (V-Thread/Flange) Facing Right End	<input type="checkbox"/> Modified Flange (Attach Print)
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* 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@thomsonlinear.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?		<input type="checkbox"/> lbs	<input type="checkbox"/> kg
		<input type="checkbox"/> N	<input type="checkbox"/> Other (please specify)
What is your MOTION?		<input type="checkbox"/> Vertical	<input type="checkbox"/> Horizontal
		<input type="checkbox"/> Other (please specify)	

Accuracy Requirements	0.004"/ft <input type="checkbox"/>	0.005"/ft <input type="checkbox"/>	52μ/300mm <input type="checkbox"/>	23μ/300mm <input type="checkbox"/>	12μ/300mm <input type="checkbox"/>	Other (please specify)
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Backlash Requirements	0.000" <input type="checkbox"/>	0.002" <input type="checkbox"/>	0.010" <input type="checkbox"/>	0.05mm <input type="checkbox"/>	0.2mm <input type="checkbox"/>	Other (please specify)
------------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	-----------------------------------	------------------------

Bearing Supports?	<input type="checkbox"/> Fixed/Fixed	<input type="checkbox"/> Fixed/Free	<input type="checkbox"/> Fixed/Simple
	<input type="checkbox"/> Other (please specify)		

Motor Cube Required?	<input type="checkbox"/> NEMA 17	<input type="checkbox"/> NEMA 23	<input type="checkbox"/> Other (please specify)
	<input type="checkbox"/> NEMA 42	<input type="checkbox"/> NEMA 34	

Quantity Required?		<input type="checkbox"/> per Week	<input type="checkbox"/> per Month
		<input type="checkbox"/> per Year	<input type="checkbox"/> Other (please specify)

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