Precision Screw Assemblies

Acme Screws, Ball Screws, Roller Screws and Ball Splines

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Nook/Thomson - the Choice for Optimized Motion Solution

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.

Quickly Configure the Optimal Linear Motion Solutions

Nook/Thomson has several advantages that make us the supplier of choice for linear motion technology.

- Nook/Thomson owns 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 Nook/Thomson and gain access to more than 75 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 Regal Rexnord Corporation, 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/contact. Talk to us early in the design process to see how Nook/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.

Local Support Around the Globe

Table of Contents

QUALITY

HISTORY

Since 1969, Nook Industries, Inc. has relentlessly and continuously developed the capabilities and skills to deliver products of the highest quality. Knowledge of testing and design, coupled with this experience working with stringent customer requirements in aerospace, medical, energy and military applications has provided the background to be a reliable partner.

HIGH TECH QUALITY EXPERIENCE

When you select Nook/Thomson as a supplier, you can be assured that your product will be designed and tested to rigorous product planning. Pre-design activity includes understanding of customer requirements applied to predictive models, engineering calculations and linear modeling through prototype development, stereo-lithography samples of form, fit, and function that verify design criteria.

VALIDATION AND VERIFICATION

Through many years of rigorous development, Nook/Thomson has proven its designs and manufacturing processes against the most stringent standards and specifications. Design and process verification and validation tools are employed throughout the product life cycle.

CERTIFICATIONS

Nook Industries, Inc. is certified to ISO-9001-2008 Internationally Recognized Quality System. Nook/Thomson also serves many customers in the Aerospace and Medical device markets and has complied with those Quality System Requirements as well.

ITAR

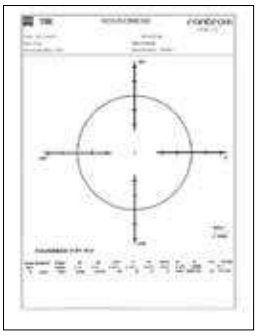
Nook/Thomson is registered with the Department Of State For International Traffic In Arms Compliance.

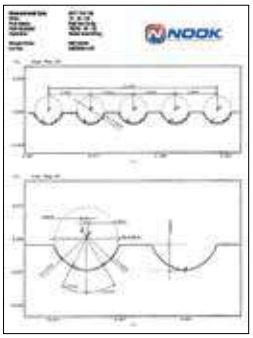
ITAR

INSPECTION CAPABILITY

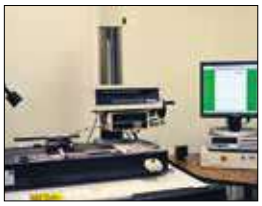
Laser Lead Measurement - Precise lead error gauging is utilized to validate processes to conform to Nook/Thomson internal specifications and customer requirements.

Zeiss Roundness Measurement - Critical to quality, characteristics such as roundness are monitored throughout the screw manufacturing process.





Zeiss Contour Readers - Prior to the start of any production run, thread form geometry is precisely measured to stringent engineering specifications.

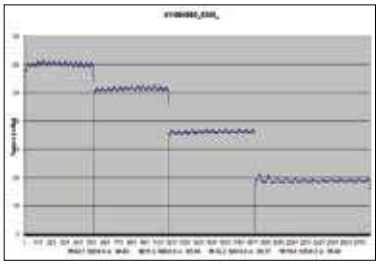


Metallurgical Lab - The metallurgical lab is capable of determining material composition from raw materials to final product. A micro hardness and case depth inspection is a routine check that validates the heat treat process.

QUALITY TOOLS:

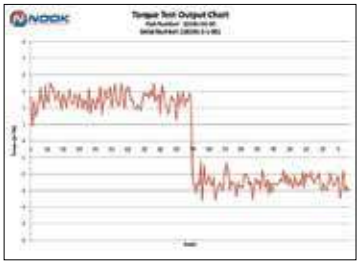
- Design for Six Sigma manufacturing
- D.O.E. (Design of Experiments)
- APQP (Advanced Product Quality Planning)
- DFMEA, PFEMA
- FEA (Finite Element Analysis)
- DVP&R (Design Verification Plan & Report)
- Reliability Testing
- Process validation to 21 CFR Part 82 (Medical Device)

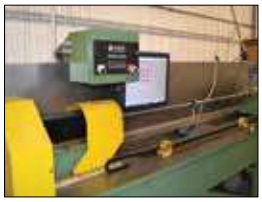
TESTING



Efficiency Measurement - Nook/Thomson Engineering has designed test machines to measure and validate screw assembly efficiency.

Torque Measurement - Preloaded ball screw assemblies are evaluated to determine compliance with engineering specifications utilizing a Dynamic Torque Testing Machine.





FUNCTIONAL TESTING

Nook/Thomson test systems and engineered testing processes perform analysis, verification, and solidification of life, durability, and performance. The functional testing defines operating limits in specifications and helps set defined targets in Product Launch Process and Assurance Plans.

The engineered testing provides predictive tools, generates data for prognostics, and validates performance wear models. Life tests help determine performance in multiple operating conditions as well. Nook/Thomson offers proof testing for customers developing new systems and actuators to help accelerate product release dates.

High Load Modular Test System
40,000 lb load - 100" CC

Convertible Test System
20,000 lb load - 100" CC

NOOK/THOMSON QUALITY EVOLUTION

DEVELOPED MANUFACTURING SYSTEMS

QUALITY SYSTEMS AND ACCREDITATIONS

SUPPLY CHAIN APPROVAL PROCESS

STATE OF THE ART MANAGEMENT SYSTEMS

APQP LAUNCH PROTOCOLS

SYSTEM AND PROCESS PROTOCOLS

ENGINEERING ANALYSIS AND PREDICTIVE TOOLS

CTQ/KPV ENGINEERING SPECIFICATION PROCESSES

RELIABILITY ENGINEERING AND TESTING

DVP&R AND TEST PLANNING

Nook/Thomson DESIGNED AND BUILT TEST MACHINES

CUSTOM ENGINEERED AND BUILT TEST INSTRUMENTATION

DESIGN AND TEST FOR FAULT TOLERANCE AND PROGNOSTICS

OVERLOAD/PROOF END OF LINE TESTING

CERTIFICATION TESTING

Power-ac™

PRECISION LEAD SCREW ASSEMBLIES

Nook/Thomson acme screws are used in a variety of military applications

ACME SCREWS

ACME SCREWS AND NUTS
MATERIALS & MANUFACTURING

Nook/Thomson acme screws are used in a variety of packaging applications

Nook/Thomson manufactures precision acme screws by thread rolling, thread milling, or thread grinding processes. Each process produces high precision screws. Nook/Thomson acme screw products feature centralizing thread forms for smooth, no-wedging performance.

ROLLED ACME SCREWS

Nook/Thomson offers the largest selection of rolled acme screw sizes in the industry. Rolled thread screws are cost effective and are stocked for quick delivery.

MILLED ACME SCREWS

Milled thread screws allow more variety in journal machining, particularly where a design requires the journal O.D. to be larger than the screw major diameter.

GROUND ACME SCREWS

Ground thread screws offer higher lead accuracy for applications where positioning tolerances are extremely critical.

POWER•AC™
ACME SCREW ENGINEERING

Mobile rocket launching system

SCREW TYPE	MATERIAL	THREAD CLASS	LEAD ACCURACY	SCREW DIA.	SCREW LENGTHS
Rolled	Alloy	Centralizing 2C or Stub	± .0003"/" up to 2½" dia.	¾" to 6"	Limited only by material availability
	Stainless	Centralizing 2C or Stub	± .0003"/" up to 1½" dia.	¾" to 1½"	Limited only by material availability
Milled	Alloy	Centralizing 2C or 3C	± .002"/ft	¾" to 3" (single starts)	up to 96"
	Stainless	Centralizing 2C or 3C	± .002"/ft	¾" to 3" (single starts)	up to 96"
Ground	Alloy	Centralizing 3C or 4C	± .0005"/ft	¾" to 4"	up to 120"
	Stainless	Centralizing 2C or 3C	± .0005"/ft	¾" to 4"	up to 120"

	ACME & TRAPEZOIDAL ALLOY	STAINLESS STEEL
Screw Material	4140	300 Series
Minimum Hardness	200 Brinnel	170 Brinnel
Tensile Ultimate Stength	95,000 psi	85,000 psi
Finish	Black Oxide	Natural

Materials used in Nook/Thomson acme nuts have been selected for low friction, minimum wear, long life, and clean operation.

BRONZE ACME & TRAPEZOIDAL NUT

Special high tensile bronze is selected for our smooth running, anti-wedging bronze nuts.

- Material: Nook/Thomson Bronze
- Tensile Yield: 50,000 psi
- Tensile Ultimate: 65,000 psi
- Hardness: HB75
- PV Limit: 25,000 lubricated
- Dynamic co-efficient of friction: 0.125 with Nook/Thomson Lubricant

Nut specifications can be found in the Quick References on pages 21 and 52. Flange and nut dimensions are listed with the appropriate screw data on pages 36-51 and 56-59.

PLASTIC ACME and TRAPEZOIDAL NUT

The high strength and inherent lubricity of plastic Acme and Trapezoidal nut material can result in product life that can equal or exceed conventional nut materials.

Plastic Nut

- Tensile Strength @70°F: 8,000 psi
- Compressive Strength @70°F: 16,000 psi
- PV Limit: 2,700 lubricated
- Co-efficient of friction: 0.10 lubricated

POWERAC™ FLANGES FOR BRONZE & PLASTIC NUTS

Made from carbon steel with black oxided finish. See page 13 for Mounting and Pinning Acme Nut flange installation instructions.

ACME THREAD FORM TERMS

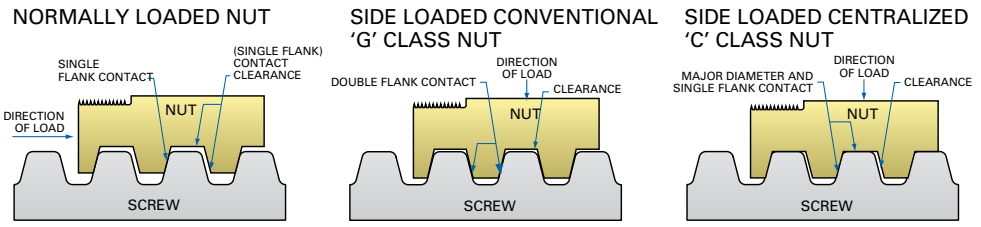
THREAD TYPES - The acme thread form, established over 100 years ago, replaced square thread screws, which had straight-sided flanks and were difficult to manufacture.

There are three main classes of Acme thread forms: General Purpose (G), Centralizing (C), and Stub Acme. The General Purpose and Centralizing thread forms have a nominal depth of thread of 0.50 × pitch and have a 29° included thread angle. Some Nook/Thomson sizes have 40° included angle. Trapezoidal thread forms have a 30° included thread angle.

When compared to general-purpose thread forms, centralizing threads are manufactured with tighter tolerances and reduced clearance on the major diameter.

Stub Acme threads follow the same basic design, but have a thread depth less than one half the pitch.

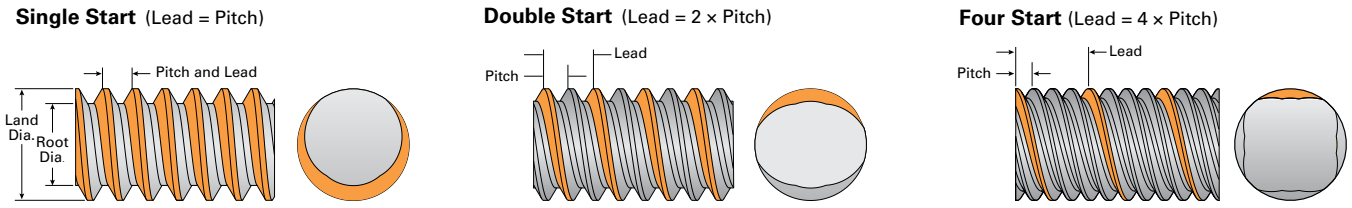
FIG. 1



If an acme nut is side loaded with a radial load, a "G" class will "wedge" when the nut thread flanks come in contact with the screw thread flanks. To prevent wedging, less clearance and tighter tolerances are allowed between the major diameter of the nut and the major diameter of the screw.

CAUTION - Although a side load will not cause a centralizing thread to wedge, the nut is not designed to operate with a side load such as a pulley, drive belt, etc. See "Load Definition" section for further information. (See FIG. 1)

FIG. 2



LAND (MAJOR) DIAMETER - The outside diameter of the screw.

PITCH DIAMETER - On an acme screw, this diameter is approximately halfway between the land diameter and the root diameter. It is the diameter at which the thread thickness is equal to the space between threads.

ROOT (MINOR) DIAMETER - The diameter of the screw measured at the bottom of the thread.

PITCH - The axial distance between threads. Pitch is equal to the lead in a single start screw.

LEAD - The axial distance the nut advances in one revolution of the screw. The lead is equal to the pitch times the number of starts.

PITCH × STARTS = LEAD

NOTE: Nook/Thomson acme screw designations reference major diameter and effective turns per inch. For example: ¾"–4 RH requires four turns for one inch of travel. A ¾"–4 RH has 4 starts and a 0.062" pitch.

0.062" PITCH × FOUR STARTS = 0.250" LEAD

SCREW STARTS - The number of independent threads on the screw shaft; example one, two or four. (See FIG. 2 above)

LEAD ACCURACY - Lead accuracy is the difference between the actual distance traveled versus the theoretical distance traveled based on lead. For example: A screw with a 0.5 inch lead and 0.004 inch per foot lead accuracy rotated 24 times theoretically moves the nut 12 inches.

(24 Revolutions × .500 inches per revolution = 12.000 inches of travel)

With a Lead accuracy of .0003"/inch, actual travel could be from 11.996 to 12.004 inches.

Refer to the listings in the design guide for the lead accuracy of a particular screw.

MATCHED LEAD - When multiple screws are used to move a load with precise synchronicity, screws of similar lead accuracy can be factory selected and supplied as sets. Consult factory for matched lead set tolerances.

STRAIGHTNESS - Although PowerAc™ Acme Screws are manufactured from straight, cylindrical material, internal stresses may cause the material to bend or yield.

When ordering random lengths or cut material without end machining, straightening is recommended. Handling or machining of screws can also cause the material to bend or yield. Before, during and after machining, additional straightening is required. When ordering screws with machined ends from Nook/Thomson, the following straightness tolerances can be expected:

PowerAc™ Rolled and Milled Acme Screws are straight within 0.010 inch/foot and will not exceed 0.030 inch in any 6-foot section, when shipped from the factory.

PowerAc™ Ground Acme Screws are straight within 0.001 inch/foot when shipped from the factory.

If tighter straightness tolerances are required, contact Nook/Thomson customer service.

LIFE - PowerAc™ Acme Screws are manufactured from high quality materials with excellent dynamic properties. Because of the variable effects of friction, lubrication and cleanliness, a specific life cannot be predicted. Proper lubrication, regular maintenance, and operation within specified limits will extend the life of PowerAc™ Acme Screws.

EFFICIENCY - Efficiency of PowerAc™ Acme Screw assemblies range from 15% to 85%. These efficiencies are dependent upon nut material, lubrication, lead and thread form. The efficiencies for each assembly are listed on the following pages.

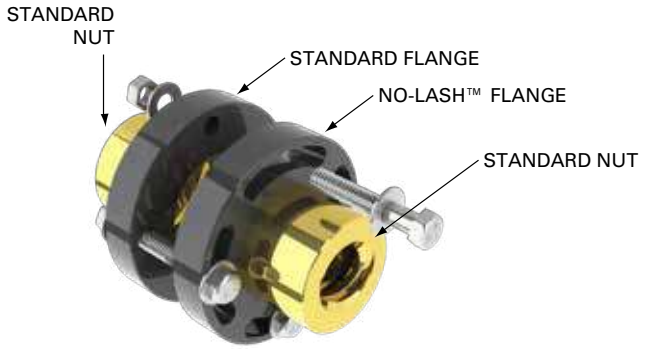
BACKDRIVING - Normally, acme screws are used to convert rotary motion into linear motion. Backdriving is the result of the load pushing axially on the screw or nut to create rotary motion.

Generally, a nut with efficiency greater than 50% will have a tendency to backdrive. If a selflocking assembly is required, select a nut with efficiency below 35%.

CAUTION - Vibration can cause any acme screw assembly to creep or backdrive. When using lead screws, applications should be analyzed to determine the necessity of a brake, especially when the possibility of injury may occur.

BACKLASH - Backlash (lash) is the relative axial clearance between a screw and nut without rotation of the screw or nut. Backlash information for PowerAc™ Acme Screws and Nuts is listed within the data section of this catalog. Lash will always increase with use. Nook/Thomson has developed several unique ways to reduce or remove the lash between the screw and nut.

FIG. 3a Adjustable backlash nut assembly



ADJUSTABLE BACKLASH NUT ASSEMBLY - For screw diameters over ⅝ inch, PowerAc™ No-Lash™ Flanges are available. The PowerAc™ No-Lash™ Flange is identical to a standard flange except for slotted mounting holes. The backlash can be removed by using a nut with a PowerAc™ No-Lash™ Flange in combination with a standard nut and flange. By rotating the slotted PowerAc™ No-Lash™ Flange and nut relative to the other, the thread in the second nut advances until the lash is reduced. As the nuts wear and backlash increases, loosen the mounting bolts and readjust the PowerAc™ No-Lash™ Flange and nut until the lash is minimized. (See FIG. 3a) For a complete PowerAc™ No-Lash™ Flange assembly order 2 standard nuts, 1 standard flange and 1 No-Lash™ Flange. For example a ¾"-2 assembly requires the following:

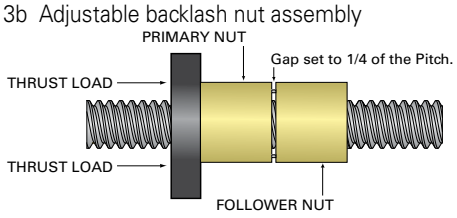
2 – 20072 Standard Nuts
1 – 70262 Standard Flange
1 – 73262 No-Lash™ Flange

CAUTION - When the uncompensated lash is equal to or greater than 0.25 times the pitch, the nut assembly should be replaced.

WEAR-INDICATOR NUTS - A wear-indicator nut is actually two nuts assembled together, a primary nut and a follower nut. The primary nut and follower nut is typically made out of a bronze material that is softer than steel. The follower nut is pinned to the primary nut and follows along. As gravity is applied, the primary nut will fall with respect to the second following nut as the thread of the pimary nut gets thinner due to normal wear. The second nut is not carrying any load but is only pinned to the primary nut to follow along. (See FIG. 3b)

The gap between the two nuts is factory set to 1/4 the pitch. As this gap closes, the primary nut should be replaced. A feeler gauge, or go-no gauge, is the preferred way to indicate when gap closure occurs.

FIG. 3b Adjustable backlash nut assembly



LOAD DEFINITIONS

STATIC LOAD - The maximum thrust load – including shock – that should be applied to a non-moving PowerAc™ Acme nut assembly. Actual maximum static load may be reduced based on end machining and screw mounting hardware.

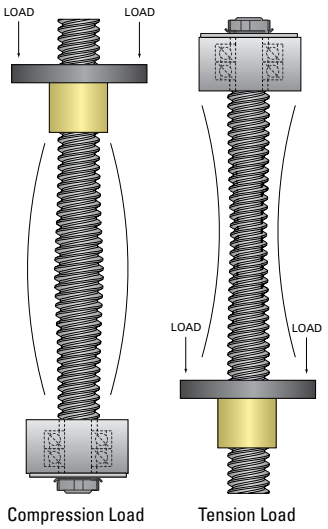
DYNAMIC LOAD - The maximum recommended thrust load which should be applied to the PowerAc™ Acme screw and nut assembly while in motion.

PV LOAD - Any material which carries a sliding load is limited by heat buildup caused by friction. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch of contact area and the surface velocity in feet per minute at the major diameter. The product of these factors provides a measure of the severity of an application.

TENSION LOAD - A load that tends to "stretch" the screw. (See FIG. 4)

COMPRESSION LOAD - A load that tends to "squeeze" the screw. (See FIG. 4)

FIG. 4

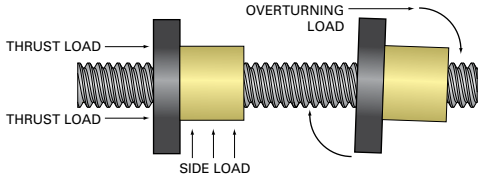


THRUST LOAD - A load parallel to and concentric with the axis of the screw. (See FIG. 5)

OVERTURNING LOAD - A load that tends to rotate the nut radially around the longitudinal axis of the screw. (See FIG. 5)

SIDE LOAD - A load that is applied radially to the nut. (See FIG. 5)

FIG. 5



DESIGN CONSIDERATIONS

MOUNTING AND PINNING OF ACME FLANGE

Flanges must be secured to acme nuts. The preferred method of locking a flange to a nut is a pin or set screw parallel to the screw which intersects the flange/nut mounting thread. Because of the dissimilarity of materials, the hole may need to be milled, not drilled.

Alternatively, the flange may be drilled and tapped radially for a set screw. After assembly of the flange to the nut, spot drill the nut threads through the flange and install a dog point set screw from the flange O.D. into the nut O.D. threads. Avoid getting metal chips in the nut when drilling. (See FIG. 6 and 7 for pin size)

FIG. 6

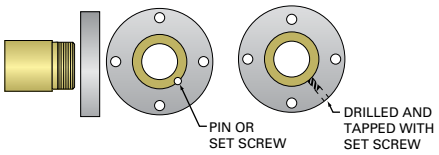


FIG. 7

DIAMETER	DESCRIPTION	QTY
.75 to 1.0	#10 - 24 × ¼ Set Screw	1
1.125 to 1.375	¼ - 20 × ¼ Set Screw	2
1.5 to 3.0	5/16 -18 × ½ Set Screw	2
3.375	⅜ - 16 × ¾ Set Screw	2
4+	½ × 13 × 1 Set Screw	2

Commercially available thread adhesives may be used for light load applications. Follow the manufacturers' recommendations to ensure a satisfactory bond. Avoid getting the adhesive onto the acme screw thread.

LUBRICATION - Proper lubrication must be provided to achieve satisfactory service life. Nook/Thomson PowerAc™ lubricant (E-100 spray lube or PAG-1 grease) is recommended for applications using PowerAc™ nuts. Lubrication intervals are determined by the application. It is required that screw assemblies are lubricated often enough to maintain a film of lubricant on the screw. It is not uncommon to have lubrication intervals as frequent as several hundred cycles.

DRIVING TORQUE - Driving torque is the torque required to move a load and is calculated by multiplying the force needed by the "Torque to raise one lb" value listed in the technical data section for each screw and nut size.

EXAMPLE: To lift a 1,000 lb load using a 1"- 6 RH acme screw with plastic nut, 74 in lb of torque are required.

.074 in-lb/lb × 1000 lb = 74 in·lb

DESIGN CONSIDERATIONS (Cont'd)

TEMPERATURE- With proper lubrication, PowerAc™ Acme Screws with bronze nuts operate efficiently between15°F and 350°F, and plastic nuts between 15°F and 175°F. Consult the factory for low temperature applications.

END MACHINING - To obtain optimum performance of your acme screw assembly, it is recommended that the machining be performed at the Nook/Thomson factory. Screws may be purchased machined to your specifications or to standard end machining designs shown on pages 174-176.

EZZE-MOUNT™- Acme screws in operation generate an axial load and a radial load; therefore, end mounts must be designed to accommodate these loads. Nook/Thomson has designed precision end mounts to work specifically with acme screws. For a detailed description of these bearing supports, see pages 177-183. An EZZE-MOUNT™ can be shipped pre-assembled to a PowerAc™ Acme Screw. For complete PowerAc™ Acme Screw Assemblies refer to pages 22-31.

OPTIONAL SURFACE COATINGS - Consult Nook/Thomson engineers for specific surface coatings for anti-corrosion and lubrication.

BOOTS AND BELLOWS - For contaminated environments, use of a boot or metal cover to protect the acme screw assembly is recommended.

ACME SCREW SELECTION

The selection of the correct acme screw and nut for a particular application involves four interrelated factors. Before attempting to determine the acme screw and nut combination, the following values must be known:

- Axial load measured in pounds or newtons
- Speed measured in inches or millimeters per minute
- Length between bearings measured in inches or millimeters
- End fixity type

LOAD - The loads that need to be considered are the static loads, dynamic loads, reaction forces and any external forces affecting the screw. See Load definitions section on page 13 for details.

SPEED - The travel rate (linear speed) is the rpm at which the screw or nut is rotating multiplied by the lead of the screw.

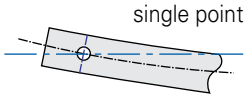
LENGTH - The unsupported length of the screw.

END FIXITY - End fixity refers to the method by which the ends of the screw are supported. The degree of end fixity is related to the amount of restraint of the ends of the screw. Examples of the three basic types of end fixity are:

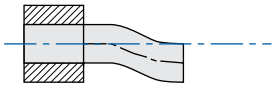
Simple End fixity can be provided through a single bearing support.

Free No support.

Simple Shaft supported at a single point



Fixed Shaft rigidly restrained against axial rotation.

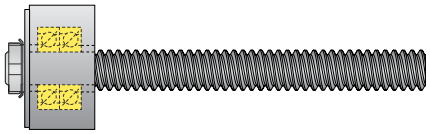


Multiple or spaced pairs of bearings are more rigid than a "Simple" support, but because of their compliance are not truly "Fixed".

A screw can be supported with different combinations of end fixity. (See FIG. 8)

FIG. 8

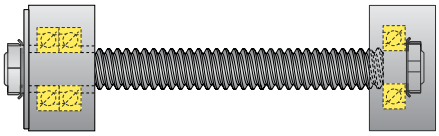
A



One end with a Double Bearing EZZE-MOUNT™, other end Free. Use Line A in reference to the charts shown on pages 18-19 and 54-55.

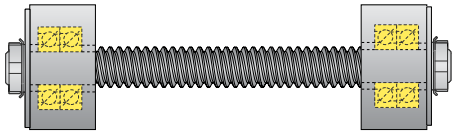
NOTE: Not recommended for any application other than short travels and slow speeds.

B



One end supported with a Double Bearing EZZE-MOUNT™, other supported with a Single Bearing EZZE-MOUNT™. Use Line B in reference to the charts shown on pages 18-19 and 54-55.

C

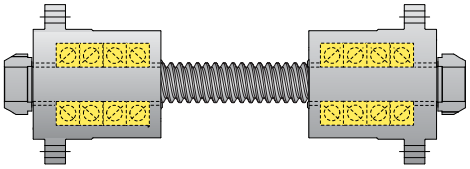


Both ends supported with a Double Bearing EZZE-MOUNT™. Use Line C in reference to the charts shown on pages 118-119 and 54-55.

CAUTION: When using fixed bearing mounts on both ends, contact Nook/Thomson Engineering to determine the mount-to-mount length tolerance of the final assembly.

FIG.8 (Cont'd)

D



Both ends supported with a Quad Bearing EZRF Ezze mount. Use Line D in reference to the charts shown on pages 18-19 and 54-55.

NOTE: When supporting a screw with two Quad Bearing EZRF Mounts, the screw is highly ridged and extra care should be taken to insure compliance in the assembly design.

CAUTION: When using fixed bearing mounts on both ends, contact Nook/Thomson Engineering to determine the mount-to-mount length tolerance of the final assembly.

CRITICAL SPEED - Once the load, speed, length and end fixity are identified, the next factor to consider is the critical speed. The speed that excites the natural frequency of the screw is referred to as the critical speed. Resonance at the natural frequency of the screw will occur regardless of the screw orientation (vertical, horizontal etc.) or if the system is designed so the nut rotates about the screw. The critical speed will vary with the diameter, unsupported length, end fixity and rpm. Since critical speed can also be affected by shaft straightness and assembly alignment, it is recommended that the maximum speed be limited to 80% of the calculated critical speed. The theoretical formula to calculate critical speed in rpm is:

WHERE:

N = Critical Speed (rpm)

$$N = \frac{C_s \times 4.76 \times 10^6 \times d}{L^2}$$

d = Root Diameter of Screw (inch)

L = Length Between Bearing Supports (inch)

C_S = 0.36 for one end fixed, one end free
1.00 for both ends simple
1.47 for one end fixed, one end simple
2.23 for both ends fixed

The critical speed chart on page 19 is provided to quickly determine the minimum screw size applicable for Nook/Thomson EZZE-MOUNT™ designs. If the selected Acme screw does not meet critical speed criteria, consider the following options:

a) Increase screw lead and reduce rpm
b) Change end fixity (e.g. simple to fixed)
c) Increase screw diameter

COLUMN STRENGTH - When a screw is loaded in compression (see compression load definition on page 13), its limit of elastic stability can be exceeded and the screw will fail through bending or buckling. The theoretical formula to calculate the column strength in pounds is:

WHERE:

$$P_{cr} = \frac{14.03 \times 10^6 \times F_c \times d^4}{L^2}$$

P_{cr} = Maximum Load (lb)

F_C = End Fixity Factor
0.25 for one end fixed, one end free
1.00 for both ends supported
2.00 for one end fixed, one end simple
4.00 for both ends rigid

d = Root Diameter of Screw (inch)

L = Distance between nut and load carrying bearing (inch)

The column strength chart on page 18 may be used to verify that the screw can carry the required load without buckling.

The charts show the theoretical limitations of each screw on a separate line. The lines are limited horizontally by the slenderness ratio and vertically by the maximum static capacity of the bronze nut. Actual load is limited by the maximum nut capacity.

If the selected screw does not meet compression load criteria, consider the following options:

a) Change end fixity (e.g. simple to fixed)
b) Design to use screw in tension
c) Increase screw diameter

PV VALUE - The PV value needs to be checked to insure excessive nut wear will not occur. (see the PV load definition page 13) P is the pressure per square inch. The PV value can be evaluated by using the following formula:

$$P = \frac{\text{Actual Operating Load}}{\text{Dynnamic Load Rating}} \times C_{LOAD}$$

V is the relative speed between the nut and the screw in feet per minute. V can be calculated by using the following formula:

$$V = \frac{\text{Outside Dia. (in) of the Screw} \times \pi \times \text{Operating Speed (rpm)}}{12}$$

It is recommended that P × V be limited to values less than the value shown in the chart below. The PV value is based on a lubricated screw using PAG-1 grease, and run times less than 5 minutes. Using an alternative lubricant or excessive run times may require monitoring nut temperatures to maintain below 250°F.

NUT MATERIAL	C_{LOAD}	PV
BRONZE	2,500	25,000
PLASTIC	1,250	2,700

APPLICATION EXAMPLE

Nook/Thomson acme screw used in a manual lathe

APPLICATION

Given the following requirements, select an acme screw for an application which uses Acme screws for an automatic part feeder on a machine.

Specifications:

- 5,000 lb load supported and guided on linear bearings moving horizontally
- 36" travel
- Complete 36" travel in 10 seconds
- Bearing Support Undecided
- Positioning accuracy ±¼"

STEP 1

Find the axial force required to move load. The axial force is determined by multiplying the coefficient of friction of the guidance system by the load.

$F = \mu \times N$

μ = coefficient of friction of the guidance system

Using Nook/Thomson linear bearings in this application;

μ = Coefficient of Friction for lubricated Nook/Thomson Linear Bearings
= .0013

N = Load = 5000 pounds

$F = \mu \times N$

$F = .0013 \times 5000$ lb

F = 6.5 lb

Therefore:

The Axial Force the screw must produce to move the load is 6.5 lb

STEP 2

Find Average Travel Rate.

The average travel rate is determined by dividing travel distance by travel time.

V avg = D/t
D = distance = 36 inches
t = total time = 10 seconds
V avg = D/t
V avg = 36 in / 10 sec.
V avg = 3.6 in / sec. or 216 in/minute

Therefore, the average travel rate is 216 in/min.

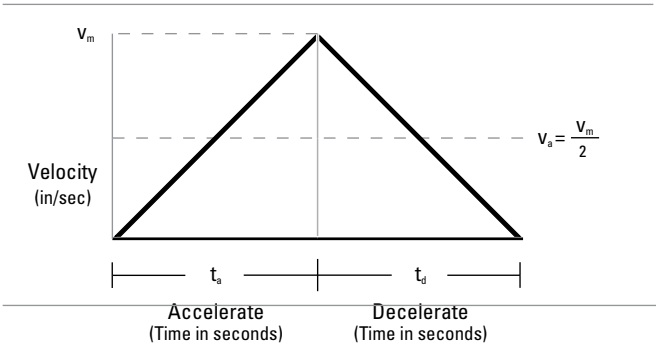
STEP 3

Find Maximum Travel Rate. When considering critical speed, peak velocity should be used. Using a basic triangular motion profile (acceleration = deceleration with no constant velocity travel), the peak velocity equals twice the average velocity.

V peak = 2 × V avg

V avg = 3.6 in / sec. or 216 in/minute
V peak = 2 × V avg.
V peak = 432 in/min

The Maximum Travel Rate is 432 in/min during the traverse of 36 inches in 10 seconds.



STEP 4

Determine total unsupported length. Total Travel is given as 36 inches, but extra screw length should be considered for travel nut, carriage, and or any extra screw length for over-travel. Based on the travel nut and attachment of the nut to the carriage in this application, it is determined an extra 4" of screw length will be required. (Refer to the dimensional information of the particular nut used)

L total = 36 in + 4 in = 40 inches

The total unsupported length to be used for critical speed and column loading calculations is 40 inches.

STEP 5

Determining end fixity. The layout of the application shows that adequate space is available to use a double bearing EZZE-MOUNT™ at each end. (See end fixity definitions on page 14) End Fixity = Type C

STEP 6

Select a screw based on the critical speed. Use previously determined values with the Critical Speed chart on page 19.

Max Travel Rate = 432 in/min
End Fixity = Type C
Length Between Bearing Supports = 40 inches

Based on the Critical Speed Chart, a 1"- 5 Acme Screw (1 inch diameter, 5 threads per inch) is selected.

STEP 7

Check Column Strength of screw. Use previously determined values with the Column Strength chart on page 18.

Load = 6.4 pounds
End Fixity = Type C
Length Between Bearing Supports = 40 inches

Based on the Column Strength Chart, the load is within the column strength of this screw.

NOTE: If this were a vertical application, the full 5,000 pound load would be used. Also, under high acceleration conditions, the inertia load must be determined and added to the total load for column considerations.

STEP 8

Check the PV Value. This relates the pressure load to the speed of the nut. First find the actual P value based on the calculation. Using the formulas from page 13:

$$P = \frac{\text{Actual Operating Load}}{\text{Nut Dynamic Load Capacity}} \times 1250 \text{ psi}$$

$$\frac{6.5 \text{ pounds}}{2{,}500 \text{ pounds}} \times 1250 \text{ psi} = 3.2 \text{ psi}$$

Next the "V" value or maximum relative speed between the screw and nut is:

$$V = \frac{\text{Outside Dia. (in.) of the Screw} \times \pi \times \text{Operating Speed (rpm)}}{12"/\text{ft.}} \quad \text{(ft./min)}$$

$$\frac{1" \times \pi \times 2160 \text{ rpm}}{12"/\text{ft.}} = 565 \text{ ft/per minute}$$

This results in a PV value of 3.2 times 565 or 1,808 below the maximum recommended value of 2,700.

STEP 9

Create a reference number for the assembly. See page 33 for Reference Number System Chart. The 1"- 5 Acme Screw is thread form code 105. The screw material is right-hand thread, alloy steel. The end code used for machining this screw is end code 17. The type of machining will be a Type 3 on both ends of screw to allow for mounting a double bearing.

EZZE-MOUNT™. One end will have a section to attach a coupling, the other will not. To determine the overall length of the assembly, add up the length of the ends plus the unsupported length:

One end Type 3K (drive end with keyway) = 3.65"
One end Type 3N (no drive end) = 2.33"
40 inches between supports
Over-all length is 40" + 3.65"+ 2.33" = 45.98"

The Part List Includes:

One Plastic Acme Nut – 30105
One Steel Flange - 70275
EZZE-MOUNT™ Bearing blocks (2 req'd) - EZM-3017

To receive an assembly of these components with the EZZE-MOUNT™, nut, and flange installed on the screw, the order reference number is:

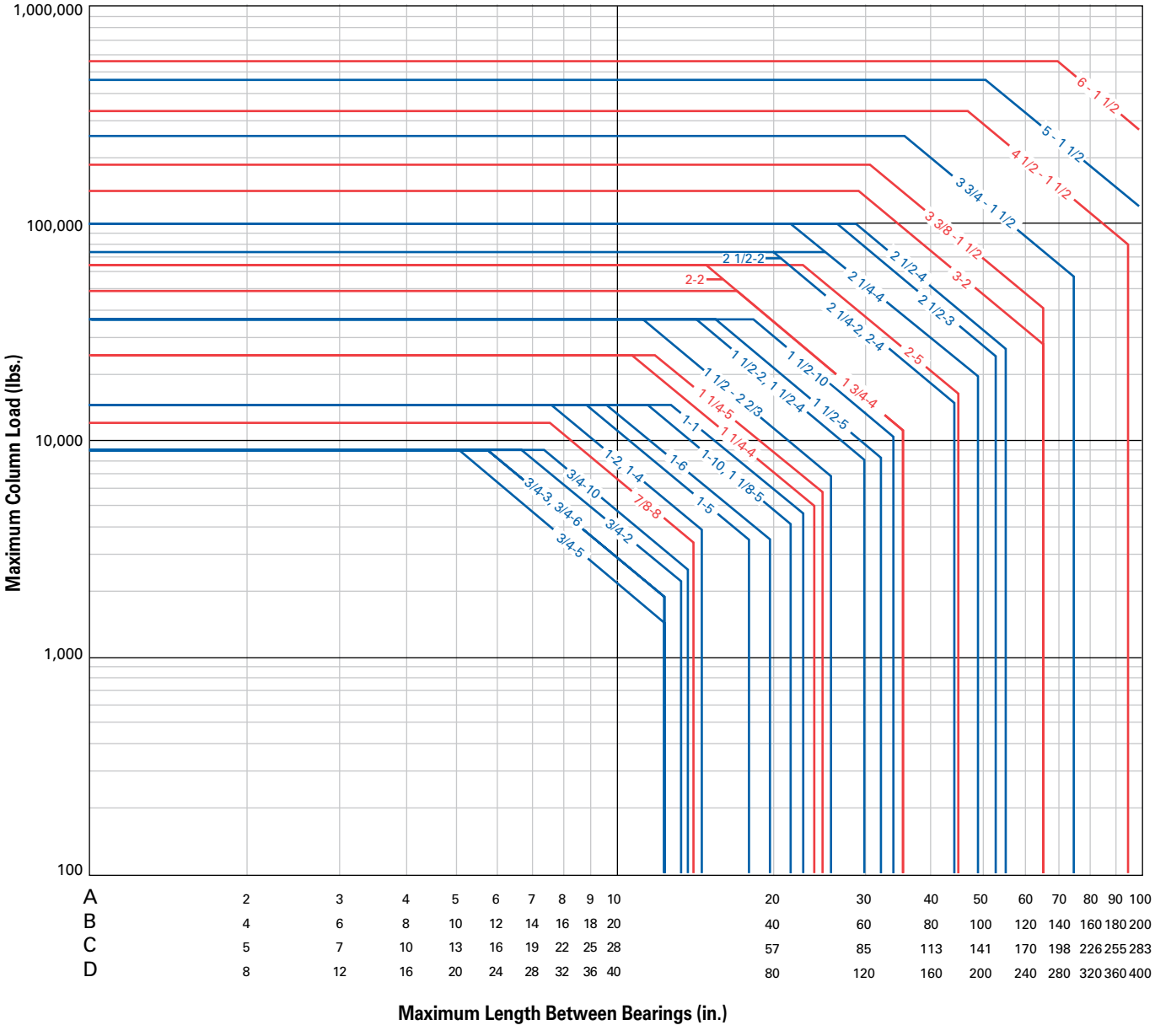
105 - RA/EK/EN/45.98/30105/FS

NOTE: The nut will be installed with the flange facing toward the first specified end. In this example, the EK end.

COLUMN STRENGTH: ACME INCH SCREWS

TO USE THIS CHART: Find a point at which the maximum length between bearing support and acme nut intersects the maximum load. Be sure the screw selected is above and to the right of that point.

Acme Screws are limited by both Maximum Static Load and Slenderness Ratio.
See pages 14-15 for reference description on A-B-C-D end fixity.



CRITICAL SPEED: ACME INCH SCREWS

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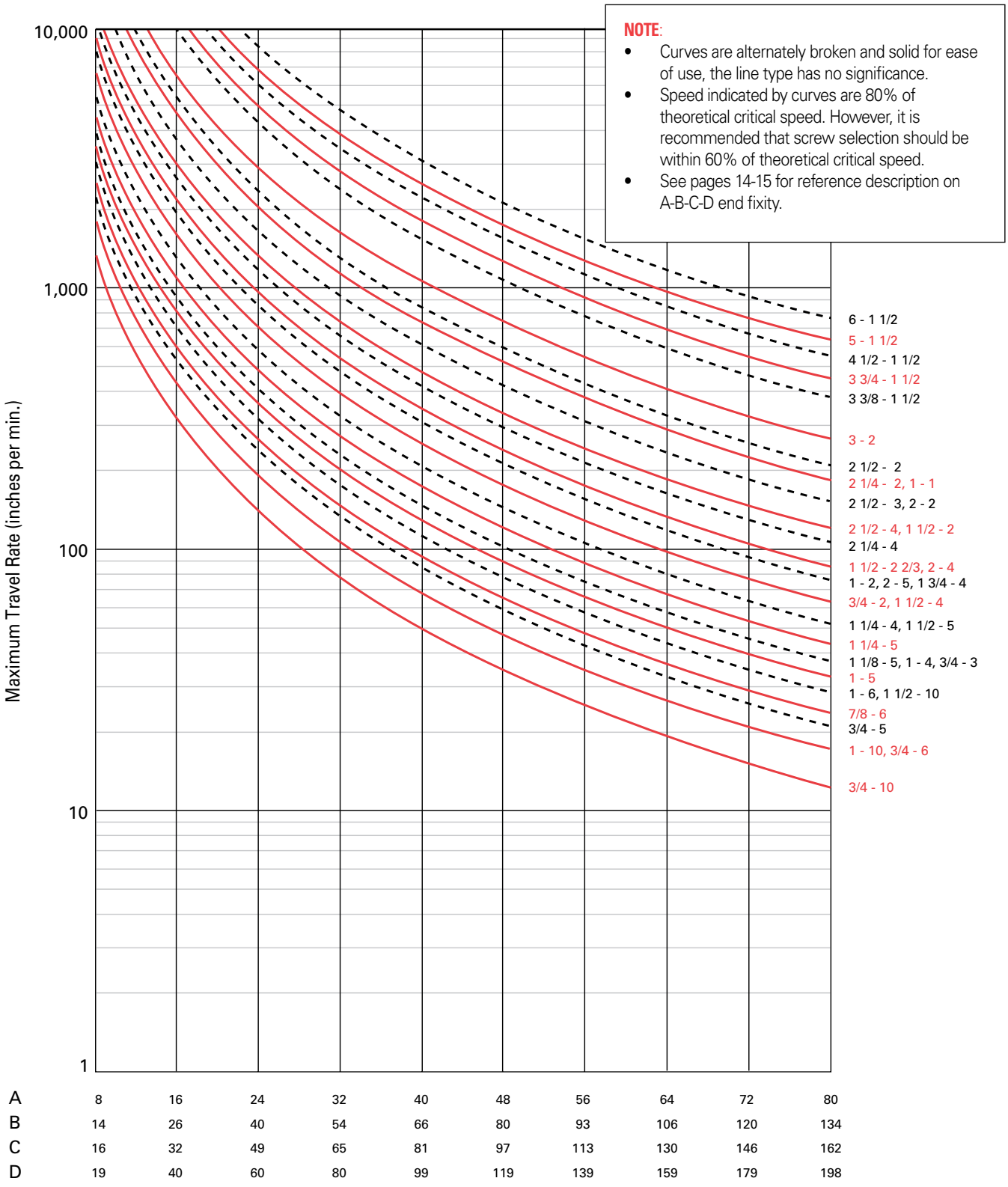
ACME SCREW ENGINEERING

TO USE THIS CHART: Determine maximum travel rate required. Determine screw length L. Find point at which travel rate and screw length intersect and select a screw above and to the right of that point.



A	8	16	24	32	40	48	56	64	72	80
B	14	26	40	54	66	80	93	106	120	134
C	16	32	49	65	81	97	113	130	146	162
D	19	40	60	80	99	119	139	159	179	198

QUICK REFERENCE:
ACME INCH SCREWS AND NUTS

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ACME SCREW ENGINEERING

SCREW SIZES				NUT SELECTION									
				BRONZE				PLASTIC					
				Load Rating		Torque to raise 1 lb (in·lb)	Efficiency %	Load Rating		Torque to raise 1 lb (in·lb)	Efficiency %	Back Lash (max)	Page ref
SIZE DIA Turns Per in	Lead	Pitch	Root Dia.	Static (lb)	Dynamic (lb)			Static lb	Dynamic lb				
¾ - 2	.500	.125	.581	9,000	2,812	.129	62	1,406	1,406	.118	68	.010	36
¾ - 3	.333	.167	.537	9,000	2,812	.099	54	1,406	1,406	.089	60	.009	36
¾ - 5	.200	.200	.502	9,000	2,812	.080	40	1,406	1,406	.066	48	.009	36
¾ - 6	.166	.166	.537	9,000	2,812	.073	36	1,406	1,406	.061	43	.008	36
¾ - 10	.100	.100	.608	9,000	2,812	.064	25	1,406	1,406	.052	30	.007	36
⅞ - 6	.166	.166	.661	12,250	3,828	.083	32	1,914	1,914	.068	39	.009	36
1 - 1	1.000	.100	.906	16,000	5,000	.231	69	2,500	2,500	.216	74	.008	38
1 - 2	.500	.250	.698	16,000	5,000	.139	57	2,500	2,500	.127	63	.010	38
1 - 4	.250	.250	.698	16,000	5,000	.105	38	2,500	2,500	.086	46	.010	38
1 - 5	.200	.200	.750	16,000	5,000	.094	34	2,500	2,500	.079	40	.009	40
1 - 6	.167	.167	.786	16,000	5,000	.089	30	2,500	2,500	.074	36	.009	40
1 - 10	.100	.100	.857	16,000	5,000	.078	20	2,500	2,500	.065	24	.008	40
1⅛ - 5	.200	.200	.875	20,500	6,330	.100	32	3,165	3,165	.085	37	.010	42
1¼ - 4	.250	.250	.947	25,000	7,812	.117	34	3,906	3,906	.099	40	.011	42
1¼ - 5	.200	.200	.999	25,000	7,812	.114	28	3,906	3,906	.092	35	.010	42
1½ - 2	.500	.250	1.196	36,000	11,250	.173	46	—	—	—	—	.012	44
1½ - 2⅔	.375	.375	1.066	36,000	11,250	.149	40	—	—	—	—	.010	44
1½ - 4	.250	.250	1.196	36,000	11,250	.133	30	—	—	—	—	.010	44
1½ - 5	.200	.200	1.249	36,000	11,250	.127	25	—	—	.—	—	.010	44
1½ - 10	.100	.100	1.355	36,000	11,250	.110	15	—	—	—	—	.009	44
1¾ - 4	.250	.250	1.427	49,900	15,312	.153	26	—	—	—	—	.011	46
2 - 2	.500	.500	1.410	64,000	20,000	.199	40	—	—	—	—	.020	46
2 - 4	.250	.250	1.694	64,000	20,000	.166	24	—	—	—	—	.012	46
2 - 5	.200	.200	1.747	64,000	20,000	.159	20	—	—	—	—	.011	46
2¼ - 2	.500	.500	1.684	81,000	25,312	.215	37	—	—	—	—	.021	46
2¼ - 4	.250	.250	1.944	81,000	25,312	.181	22	—	—	—	—	.012	46
2½ - 2	.500	.500	1.908	100,000	31,250	.234	34	—	—	—	—	.012	48
2½ - 3	.333	.333	2.106	100,000	31,250	.212	25	—	—	—	—	.013	48
2½ - 4	.250	.250	2.193	100,000	31,250	.199	20	—	—	—	—	.012	48
3 - 2	.500	.500	2.410	144,000	45,000	.265	30	—	—	—	—	.016	48
3⅜ - 1½	.666	.667	2.652	192,000	60,000	.312	34	—	—	—	—	.020	48
3¾ - 1½	.666	.667	3.083	260,000	81,000	.345	30	—	—	—	—	.020	50
4½ - 1½	.666	.667	3.782	320,000	100,000	.379	28	—	—	—	—	.022	50
5 - 1½	.666	.667	4.286	470,000	145,000	.398	26	—	—	—	—	.022	50
6 - 1½	.666	.667	5.254	576,000	180,000	.474	22	—	—	—	—	.025	50

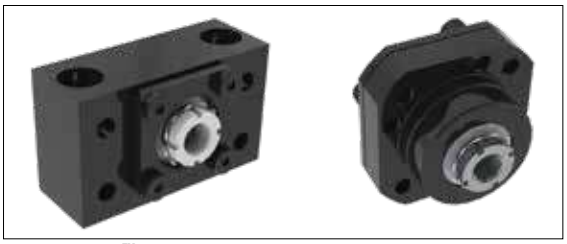
STANDARD NOOK/THOMSON COMPONENTS AND SERVICES

Acme Screw

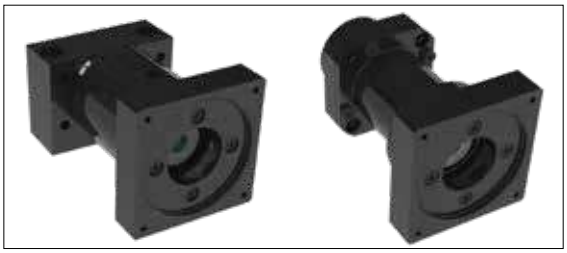
Bronze Nut

Flange

End Machining



EZZE-MOUNT™ Bearing Mounts



EZZE-MOUNT™ Motor Mounts

Nook/Thomson ACME SCREW AND NUT ASSEMBLIES provide ease of application, as all that is required is installation. Nook/Thomson assemblies offer turn key solutions that only require a power source (hand operation or motor). All of the elements are available for quick delivery from shelf stock. Component and assembly drawings are available from CAD drawings that can be configured online. Contact sales engineers for assistance.

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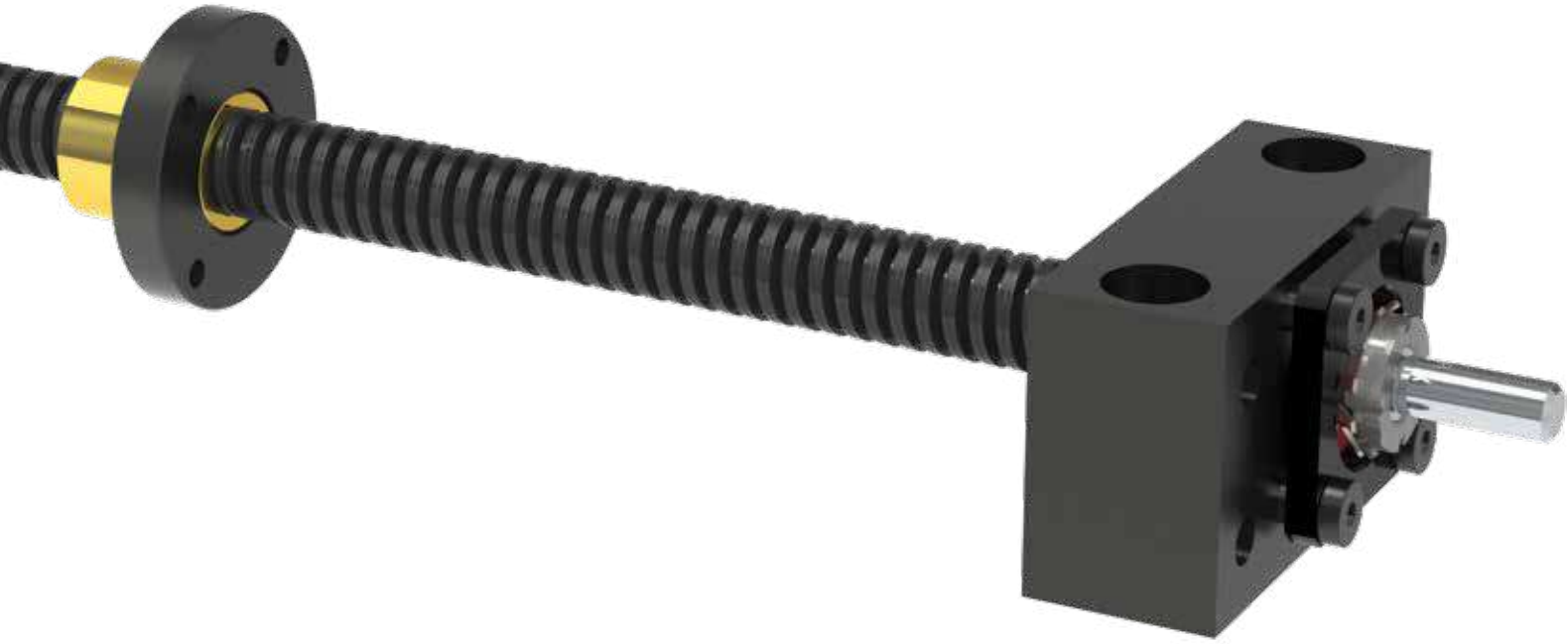
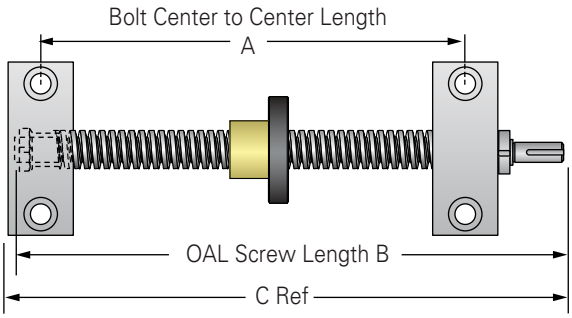
ACME SCREW ASSEMBLIES



Nook/Thomson acme screws are used in a variety of printing applications

ACME SCREW AND NUT ASSEMBLIES

UNIVERSAL MOUNTS



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
¾ - 2	3.63	6.68	6.92	36
¾ - 3	3.63	6.68	6.92	36
¾ - 5	3.63	6.68	6.92	36
¾ - 6	3.63	6.68	6.92	36
¾ - 10	3.63	6.60	7.13	36
⅞ - 6	3.88	7.17	7.38	36
1 - 1	4.22	8.14	8.25	38
1 - 2	4.18	7.45	7.84	38
1 - 4	4.18	7.45	7.84	38
1 - 5	4.18	7.45	7.84	40
1 - 6	4.18	7.45	7.84	40
1 - 10	4.22	8.14	8.25	40
1⅛ - 5	4.28	8.14	8.25	42
1¼ - 4	4.47	8.39	8.50	42
1¼ - 5	4.69	8.84	9.14	42
1½ - 2	5.24	9.84	10.10	44
1½ - 2⅔	5.24	9.39	9.69	44
1½ - 4	5.24	9.84	10.10	44
1½ - 5	5.24	9.84	10.10	44
1½ - 10	5.24	9.84	10.10	44

NOTE: Larger screw sizes with EZZE-MOUNT™ bearing mounts are available. Consult factory engineers for details.

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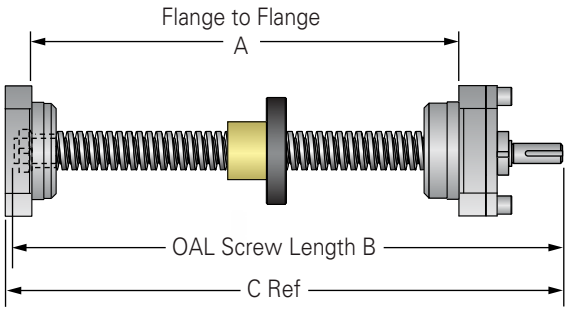
ACME SCREW ASSEMBLIES

FLANGE MOUNTS, PILOT FACING IN

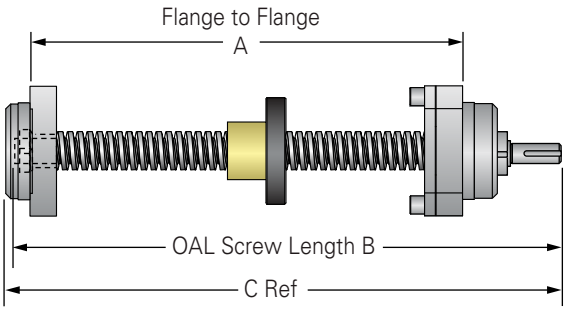


NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
¾ - 2	3.57	6.48	6.69	36
¾ - 3	3.57	6.48	6.69	36
¾ - 5	3.57	6.48	6.69	36
¾ - 6	3.57	6.48	6.69	36
¾ - 10	3.78	6.79	7.00	36
⅞ - 6	4.03	7.04	7.25	36
1 - 1	4.27	7.79	8.00	38
1 - 2	4.09	7.27	7.47	38
1 - 4	4.09	7.27	7.47	38
1 - 5	4.09	7.27	7.47	40
1 - 6	4.09	7.27	7.47	40
1 - 10	4.27	7.79	8.00	40
1⅛ - 5	4.27	7.79	8.00	42
1¼ - 4	4.52	8.04	8.25	42
1¼ - 5	4.72	8.57	8.87	42
1½ - 2	5.26	9.57	9.83	44
1½ - 2⅔	5.27	9.12	9.42	44
1½ - 4	5.26	9.57	9.83	44
1½ - 5	5.26	9.57	9.83	44
1½ - 10	5.26	9.57	9.83	44

ACME SCREW AND NUT ASSEMBLIES

FLANGE MOUNTS, PILOT FACING OUT

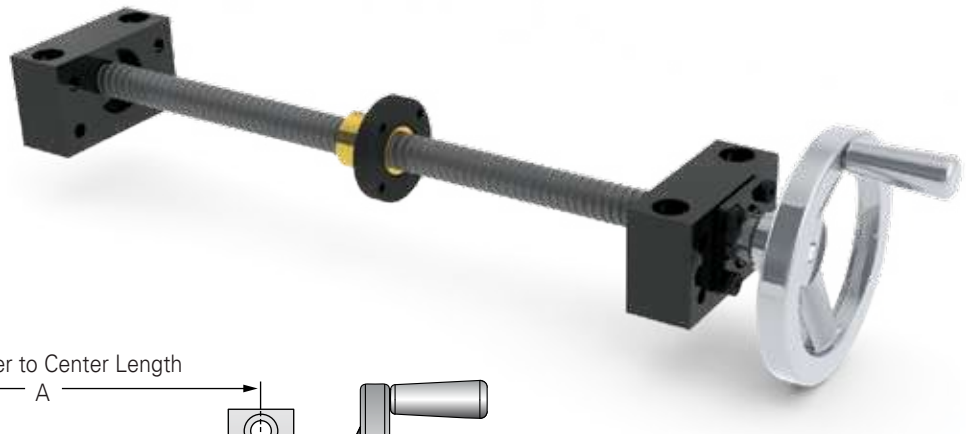


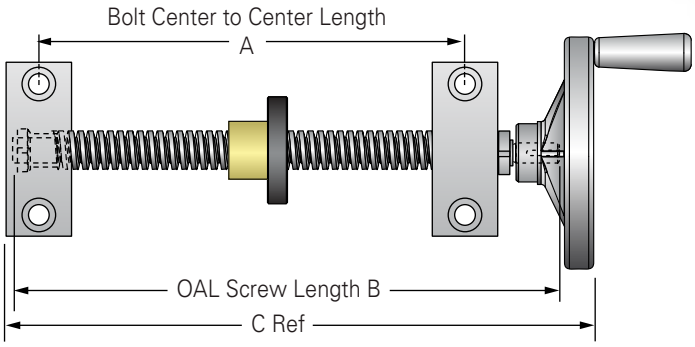
NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
¾ - 2	3.69	6.48	6.69	36
¾ - 3	3.69	6.48	6.69	36
¾ - 5	3.69	6.48	6.69	36
¾ - 6	3.57	6.48	6.69	36
¾ - 10	3.72	6.79	7.00	36
⅞ - 6	3.97	7.04	7.25	36
1 - 1	4.22	7.79	8.00	38
1 - 2	4.2	7.27	7.47	38
1 - 4	4.2	7.27	7.47	38
1 - 5	4.2	7.27	7.47	40
1 - 6	4.2	7.27	7.47	40
1 - 10	4.22	7.79	8.00	40
1⅛ - 5	4.22	7.79	8.00	42
1¼ - 4	4.47	8.04	8.25	42
1¼ - 5	4.85	8.57	8.87	42
1½ - 2	5.41	9.57	9.83	44
1½ - 2⅔	5.4	9.12	9.42	44
1½ - 4	5.41	9.57	9.83	44
1½ - 5	5.41	9.57	9.83	44
1½ - 10	5.41	9.57	9.83	44

ASSEMBLIES WITH HANDWHEEL
UNIVERSAL MOUNTS

POWER•AC™
ACME SCREW ASSEMBLIES





NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
¾ - 2	3.63	6.68	7.42	4"	HO43*	36
¾ - 3	3.63	6.68	7.42	4"	HO43*	36
¾ - 5	3.63	6.68	7.42	4"	HO43*	36
¾ - 6	3.63	6.68	7.42	4"	HO43*	36
¾ - 10	3.63	6.60	7.31	4"	HO44	36
⅞ - 6	3.88	7.17	7.81	6"	HO64	36
1 - 1	4.22	8.14	9.00	6"	HO65**	38
1 - 2	4.18	7.45	8.59	6"	HO64	38
1 - 4	4.18	7.45	8.59	6"	HO64	38
1 - 5	4.18	7.45	8.59	6"	HO64	40

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 - 6	4.18	7.45	8.59	6"	HO64	40
1 - 10	4.22	8.14	9.00	6"	HO65**	40
1⅛ - 5	4.22	8.14	9.00	6"	HO65**	42
1¼ - 4	4.47	8.39	9.25	6"	HO65**	42
1¼ - 5	4.69	8.14	9.89	8"	HO86	42
1½ - 2	5.24	9.84	10.85	8"	HO88	44
1½ - 2⅔	5.24	9.39	10.44	8"	HO86	44
1½ - 4	5.24	9.84	10.85	8"	HO88	44
1½ - 5	5.24	9.84	10.85	8"	HO88	44
1½ - 10	5.24	9.84	10.85	8	HO88	44

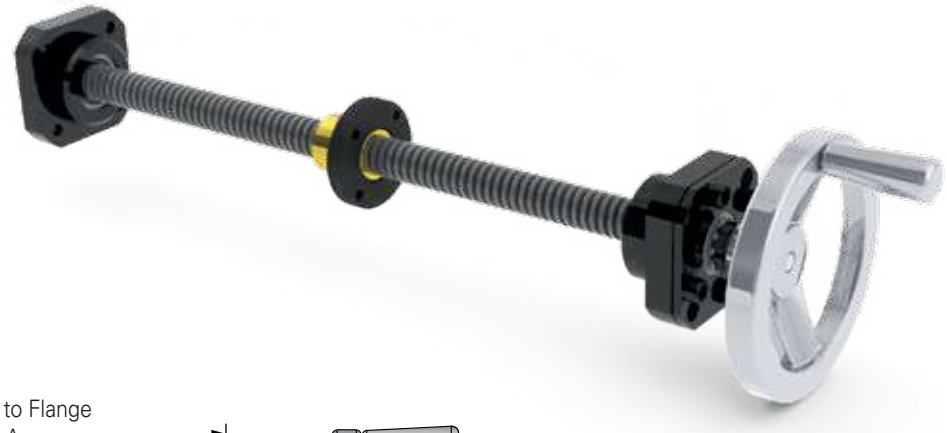
* Indicates modified Type 3 end machining required

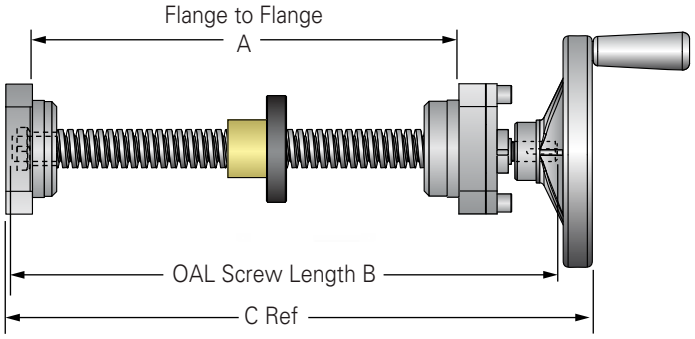
** HO65 handwheel has the same outer dimensions as HO64 but different bore

NOTE: Larger screw sizes with EZZE-MOUNT™ bearing mounts are available. Consult factory engineers for details.

ASSEMBLIES WITH HANDWHEEL

FLANGE MOUNTS, PILOT FACING IN





NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
¾ – 2	3.57	6.48	6.24	4"	HO43*	36
¾ – 3	3.57	6.48	6.24	4"	HO43*	36
¾ – 5	3.57	6.48	6.24	4"	HO43*	36
¾ – 6	3.57	6.48	6.24	4"	HO43*	36
¾ – 10	3.78	6.79	7.55	4"	HO44	36
⅞ – 6	4.03	7.04	8.17	6"	HO64	36
1 – 1	4.27	7.79	8.92	6"	HO65 **	38
1 – 2	4.09	7.27	8.39	6"	HO64	38
1 – 4	4.09	7.27	8.39	6"	HO64	38
1 – 5	4.09	7.27	8.39	6	HO64	40

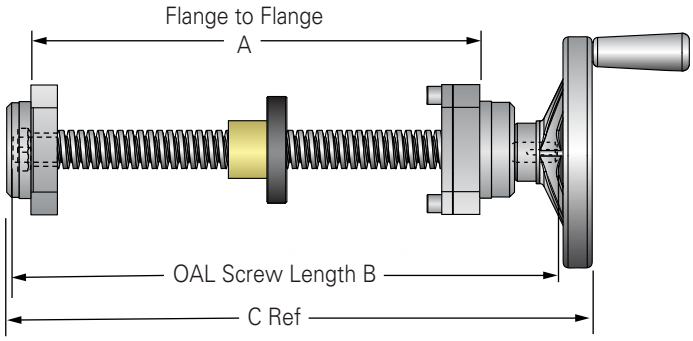
Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 – 6	4.09	7.27	8.39	6"	HO64	40
1 – 10	4.27	7.79	8.92	6"	HO65**	40
1⅛ – 5	4.27	7.79	8.92	6"	HO65**	42
1¼ – 4	4.52	8.04	9.17	6"	HO65**	42
1¼ – 5	4.72	8.57	9.92	8"	HO86	42
1½ – 2	5.26	9.57	10.88	8"	HO88	44
1½ - 2⅔	5.27	9.12	10.47	8"	HO86	44
1½ – 4	5.26	9.57	10.88	8"	HO88	44
1½ – 5	5.26	9.57	10.88	8"	HO88	44
1½ – 10	5.26	9.57	10.88	8"	HO88	44

* Indicates modified Type 3 end machining required

** HO65 handwheel has the same outer dimensions as HO64 but different bore

POWER • AC™
ACME SCREW ASSEMBLIES

FLANGE MOUNTS, PILOT FACING OUT



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

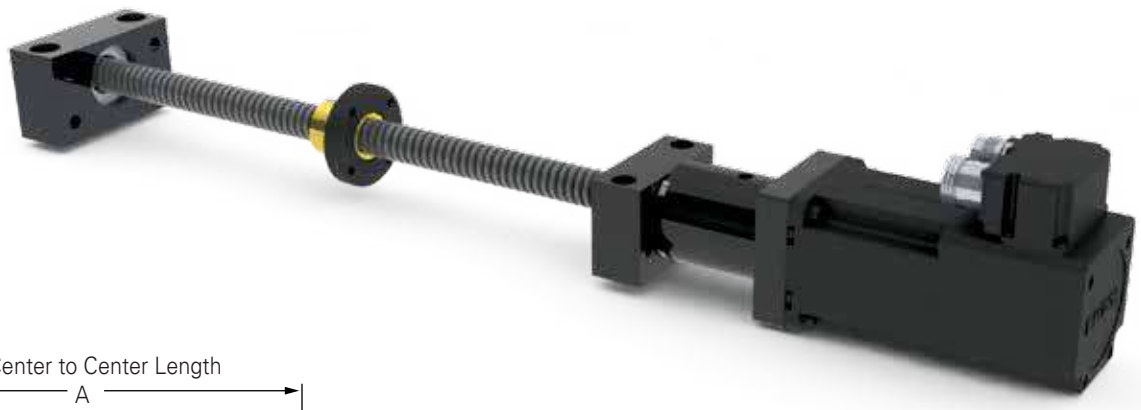
Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
¾ – 2	6.48	3.69	7.24	4"	HO43*	36
¾ – 3	6.48	3.69	7.24	4"	HO43*	36
¾ – 5	6.48	3.69	7.24	4"	HO43*	36
¾ – 6	6.48	3.69	7.24	4"	HO43*	36
¾ – 10	6.79	3.72	7.55	4"	HO44	36
⅞ – 6	7.04	3.97	8.17	6"	HO64	36
1 – 1	7.79	4.22	8.92	6"	HO65**	38
1 – 2	7.27	4.20	8.39	6"	HO64	38
1 – 4	7.27	4.20	8.39	6"	HO64	38
1 – 5	7.27	4.20	8.39	6"	HO64	40

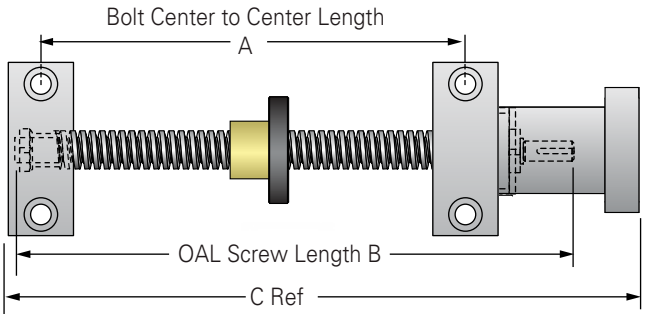
Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 – 6	7.27	4.20	8.39	6"	HO64	40
1 – 10	7.79	4.22	8.92	6"	HO65**	40
1⅛ – 5	7.79	4.22	8.92	6"	HO65**	42
1¼ – 4	8.04	4.47	9.17	6"	HO65**	42
1¼ – 5	8.57	4.85	9.92	8"	HO86	42
1½ – 2	9.57	5.41	10.88	8"	HO88	44
1½ - 2⅔	9.12	5.4	10.47	8"	HO86	44
1½ – 4	9.57	5.41	10.88	8"	HO88	44
1½ – 5	9.57	5.41	10.88	8"	HO88	44
1½ – 10	9.57	5.41	10.88	8"	HO88	44

* Indicates modified Type 3 end machining required

** HO65 handwheel has the same outer dimensions as HO64 but different bore

ASSEMBLIES WITH MOTOR MOUNTS
UNIVERSAL MOUNTS



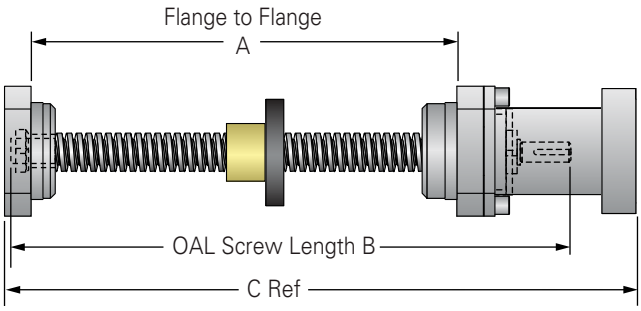


NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia -Turns per inch	A (in)	B (in)	C (in)	Motor Mount	Page
¾ - 2	3.63	6.68	8.55	EZM-3012-34	36
¾ - 3	3.63	6.68	8.55	EZM-3012-23	36
¾ - 5	3.63	6.68	8.55	EZM-3012-23	36
¾ - 6	3.63	6.68	8.55	EZM-3012-23	36
¾ - 10	3.63	6.60	8.76	EZM-3015-34	36
⅞ - 6	3.88	7.17	9.01	EZM-3015-34	36
1 - 1	4.22	8.14	10.18	EZM-2020-34	38
1 - 2	4.18	7.45	9.75	EZM-3017-34	38
1 - 4	4.18	7.45	9.75	EZM-3017-34	38
1 - 5	4.18	7.45	9.75	EZM-3017-34	40
1 - 6	4.18	7.45	9.75	EZM-3017-34	40
1 - 10	4.22	8.14	10.18	EZM-2020-34	40
1⅛ - 5	4.28	8.14	10.18	EZM-2020-34	42
1¼ - 4	4.47	8.39	10.43	EZM-2020-34	42
1¼ - 5	4.69	8.84	11.13	EZM-3025-34	42
1½ - 2	5.24	9.84	12.21	EZM-2030-34	44
1½ - 2⅔	5.24	9.39	11.68	EZM-3025-34	44
1½ - 4	5.24	9.84	12.21	EZM-2030-34	44
1½ - 5	5.24	9.84	12.21	EZM-2030-34	44
1½ - 10	5.24	9.84	12.21	EZM-2030-34	44

ASSEMBLIES WITH MOTOR MOUNTS
FLANGE MOUNT, PILOT FACING IN

POWER•AC™
ACME SCREW ASSEMBLIES



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Dia -Turns per inch	A (in)	B (in)	C (in)	Motor Mount	Page
¾ – 2	3.57	6.48	6.87	EZF-3012-34	36
¾ – 3	3.57	6.48	6.87	EZF-3012-23	36
¾ – 5	3.57	6.48	6.87	EZF-3012-23	36
¾ – 6	3.57	6.48	6.87	EZF-3012-23	36
¾ – 10	3.78	6.79	9.01	EZF-3015-34	36
⅞ – 6	4.03	7.04	9.26	EZF-3015-34	36
1 – 1	4.27	7.79	9.94	EZF-2020-34	38
1 – 2	4.09	7.27	9.4	EZF-3017-34	38
1 – 4	4.09	7.27	9.4	EZF-3017-34	38
1 – 5	4.09	7.27	9.4	EZF-3017-34	40
1 – 6	4.09	7.27	9.4	EZF-3017-34	40
1 – 10	4.27	7.79	9.94	EZF-2020-34	40
1⅛ – 5	4.27	7.79	9.94	EZF-2020-34	42
1¼ – 4	4.52	8.04	10.19	EZF-2020-34	42
1¼ – 5	4.72	8.57	10.87	EZF-3025-34	42
1½ – 2	5.26	9.57	11.96	EZF-2030-34	44
1½ - 2⅔	5.27	9.12	11.42	EZF-3025-34	44
1½ – 4	5.26	9.57	11.96	EZF-2030-34	44
1½ – 5	5.26	9.57	11.96	EZF-2030-34	44
1½ – 10	5.26	9.57	11.96	EZF-2030-34	44

NOTE: Larger screw sizes with EZZE-MOUNT™ bearing mounts are available. Consult factory engineers for details.

ACME SCREW ASSEMBLIES
LUBRICANTS

Prolong Acme Screw Assembly Reliability and Life

Proper lubrication is the key to continued performance and reliability of acme screw assembles. Use E-100 spray and PAG-1 grease lubricants to maximize life of your acme screw assembly.

BENEFITS

- Sheer Stability
- High Temperature Resistant
- Corrosion Protection
- Separation Resistant
- Extreme Pressure Properties
- Shelf Stable
- Water Resistant

Oil Viscosity

Product Name	NLGI Grade Number	Pene-tration (worked)	Dropping Point	Thickener Agent	Net Contents per Unit	cst @40°C	cst @100°C	Temp. Range	Quantity	Part No.	Total Weight
PAG-1 Grease	2	285	300°C	Sulfonate	1 lb	216	18.8	15°F to 400°F	1	NLU-1001	1.25 lb
									Case of 12	NLU-2001	18 lb
E-100 Spray	2	285	550°C	Calcium	12 oz	96	113	15°F to 400°F	1	NLU-1002	1 lb
									Case of 12	NLU-2002	15 lb

High speed trains use precision screws

ACME SCREW ASSEMBLIES
REFERENCE NUMBER SYSTEM

POWER•AC™
ACME SCREW ASSEMBLIES

105 — RA / EKS / 4NX / 41.87 / 20105 / FS

ACME SCREW
Thread Form Codes

072 = 3/4"– 2
073 = 3/4"– 3
075 = 3/4"– 5
076 = 3/4"– 6
070 = 3/4"– 10
086 = 7/8"– 6
111 = 1"– 1
112 = 1"– 2
104 = 1"– 4
105 = 1"– 5
106 = 1"– 6
110 = 1"– 10
115 = 1-1/8"– 5
124 = 1-1/4"– 4
125 = 1-1/4"– 5
152 = 1-1/2"– 2
153 = 1-1/2"– 2-2/3
154 = 1-1/2"– 4
155 = 1-1/2"– 5
150 = 1-1/2"– 10
174 = 1-3/4"– 4
202 = 2"– 2
204 = 2"– 4
205 = 2"– 5
222 = 2-1/4"– 2
224 = 2-1/4"– 4
252 = 2-1/2"– 2
253 = 2-1/2"– 3
254 = 2-1/2"– 4
302 = 3"– 2
332 = 3-3/8"– 1-1/2
372 = 3-3/4"– 1-1/2
452 = 4-1/2"– 1-1/2
552 = 5"– 1-1/2
602 = 6"– 1-1/2

MATERIAL

R A

R = Right Hand Thread
L = Left Hand Thread

A = Alloy Steel, Rolled
B = Alloy Steel, Milled
C = Alloy Steel, Ground
S = Stainless, Rolled
T = Stainless, Milled
U = Stainless, Ground

Note: Not all materials are available for all sizes.

FIRST END CONFIGURATION
Note: Both Ends must be specified.

Single Bearing Supports are used in conjunction with Type 1N end machining.

Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

Flanged Fixed Bearing Mounts are used in conjunction with Type 5 end machining.

MODIFIER LIST
S or M Required
- S = Standard, no additional description required
- M = Modified, additional description required

F, V or Z are Optional
- F = Round Flange
- V = Single Acme Nut with NO-Lash Round Flange (see pg.12)
- Z = Two Acme Nuts with NO-Lash Round Flange (see pg.12)

ACME NUT
Nut will be installed with flange or threaded end toward first end designation.
(000000 = No Nut)

OVERALL LENGTH (OAL)
Length in inches, 2 place decimal

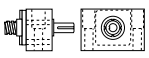
SECOND END CONFIGURATION
Refer to the First End Configuration section
Note: Both Ends must be specified.

EK S — EK = Universal Double Bearing Support, with Keyway

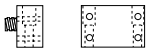
EZZE-MOUNT™ End Machining
(see pages 174-176)

1 = Type 1
2 = Type 2
3 = Type 3
4 = Type 4
5 = Type 5

B = Universal Double Bearing Support End Cap Facing Screw Thread

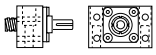


C = Universal Single Bearing Support

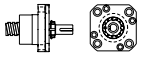


D = Flanged Single Bearing Support Flange Facing Screw Thread

E = Universal Double Bearing Support End Cap Facing Away From Screw Thread

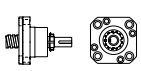


F = Flanged Double Bearing Support Flange Facing Screw Thread

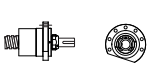


G = Flanged Single Bearing Support Flange Facing Away From Screw Thread

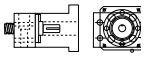
H = Flanged Double Bearing Support Flange Facing Away From Screw Thread



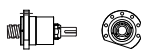
R = Flanged Fixed Bearing Support Flange Facing Screw Thread



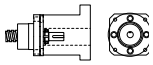
U = Universal Double Bearing Support with Motor Mount



V = Flanged Fixed Bearing Support Flange Facing Away From Screw Thread



Y = Flanged Double Bearing Support with Motor Mount



00 = No End Machining (Screw will be cut to desired length).

XX = Custom Machining (Print or specified data must be provided).

Bearing Mount Install
S = Bearing Mount Installed
N = Bearing Mount Shipped Loose
X = No Bearing Mount

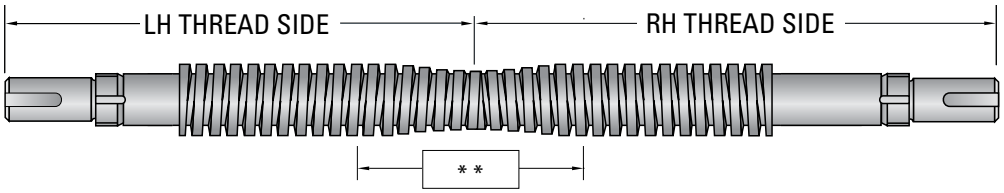
Shaft Extension (see pages 174-176)
N = No Shaft
Q = Handwheel
K = Shaft Extension with Keyway
L = Shaft Extension without Keyway

TWIN-LEAD ACME SCREW ASSEMBLIES

Twin-lead acme screws offer dual opposing motion using a single drive system. These one-piece high performance acme screws are made from high alloy steel that is black oxided for protection and can be assembled with Nook/Thomson PowerAc™ acme nuts, flanges and EZZE-MOUNT™ bearing supports (see page 170) to form cost effective systems. Twin-lead acme screws can be used in molding machines, packaging equipment, food processing machinery, robotics, material handling equipment, tire manufacturing and assembly applications.

Twin-Lead screws stocked for delivery without machined ends are listed in the chart below. To order a twin-lead cut to a custom length and/or with machined ends, select a size from the chart below, determine OAL, LH and RH thread length, nut, flange and, if required, EZZE-MOUNT™ bearing support.

Consult the Twin-Lead Reference Number System on page 35 to complete your part number.



INCOMPLETE THREAD ** Consult chart for incomplete thread length

Screw Size Dia. - Lead	Root Dia (Min)	Max Overall Length	Max Usable LH/RH Thread	Incomplete Overlapping Thread Count	Pg
¾ - 3	.537	72	35.00	2.00	36
¾ - 5	.502	72	35.00	2.00	36
¾ - 6	.537	72	35.00	2.00	36
¾ - 10	.608	72	35.00	2.00	36
⅞ - 6	.661	72	35.00	2.00	36
1 - 1	.906	72	35.00	2.00	38
1 - 4	.689	72	34.75	2.50	38
1 - 5	.750	72	34.75	2.50	40
1 - 6	.786	72	34.75	2.50	40

Screw Size Dia-Lead	Root Dia (Min)	Max Overall Length	Max Usable LH/RH Thread	Incomplete Overlapping Thread Count	Pg
1 - 10	857	72	35.00	2.00	40
1¼ - 4	.947	144	70.75	2.50	42
1¼ - 5	.999	144	70.75	2.50	42
1½ - 2⅔	1.066	144	70.50	3.00	44
1½ - 4	1.196	144	70.75	2.50	44
1½ - 5	1.249	144	70.75	2.50	44
1½ - 10	1.355	144	71.00	2.00	44
1¾ - 4	1.427	144	70.50	3.00	46
2 - 4	1.694	144	70.50	3.00	46

TWIN-LEAD ACME SCREW ASSEMBLIES
REFERENCE NUMBER SYSTEM

POWER•AC™
ACME SCREW ASSEMBLIES

105 - TA / EKS / 4NX / 33.50 / 16.75 / 16.75 / 80105A / 20105A / FS

TWIN-LEAD ACME SCREW
Thread Form Codes

Part	Dia. - Lead	Part	Dia. - Lead
073 =	3/4"-3	**106** =	1"-6
075 =	3/4"-5*	**110** =	1"-10*
076 =	3/4"-6	**124** =	1-1/4"-4
070 =	3/4"-10	**125** =	1-1/4"-5*
086 =	7/8"-6	**154** =	1-1/2"-4*
111 =	1"-1	**155** =	1-1/2"-5
104 =	1"-4	**150** =	1-1/2"-10
105 =	1"-5*	**174** =	1-3/4"-4
		204 =	2"-4*

* These twin-lead screws are stocked without end machining

MATERIAL
T A

T = Twin Lead

A = Alloy Steel, Rolled
B = Alloy Steel, Milled
C = Alloy Steel, Ground
S = Stainless, Rolled
T = Stainless, Milled
U = Stainless, Ground

Note: Not all materials are available for all sizes.

FIRST END CONFIGURATION (LH thread)
Note: Both Ends must be specified.

Single Bearing Supports are used in conjunction with Type 1N end machining.

Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

Flanged Fixed Bearing Mounts are used in conjunction with Type 5 end machining.

SECOND END CONFIGURATION (RH thread)
Refer to the First End Configuration section on the Left.
Note: Both Ends must be specified.

OVER-ALL-LENGTH (OAL)
Length in inches, 2 place decimal

LEFT HAND THREAD
Length in inches, 2 place decimal
Note: See figure on page 34

RIGHT HAND THREAD
Length in inches, 2 place decimal
Note: See figure on page 34

LEFT HAND ACME NUT
000000 = No Nut

RIGHT HAND ACME NUT
000000 = No Nut

Note: To Select the Nut Direction After Nut Part # Add

A = Nut Thread or Flange installed toward center of screw

B = Nut Thread or Flange installed toward end of screw

MODIFIER LIST
F = Round Flange

S or M Required

S = Standard. no additional description required
M = Modified, additional description required

EK S

EK = Universal Double Bearing Support, with Keyway

EZZE-MOUNT™ / End Machining
(see page 174-176)

1 = Type 1
2 = Type 2
3 = Type 3
4 = Type 4
5 = Type 5

Bearing Mount Install
S = Bearing Mount Installed
N = Bearing Mount Shipped Loose
X = No Bearing Mount

Shaft Extension (see page 174-176)
K = Shaft Extension with Keyway
L = Shaft Extension without Keyway
N = No Shaft
Q = Handwheel

B = Universal Double Bearing Support End Cap Facing Screw Thread

C = Universal Single Bearing Support

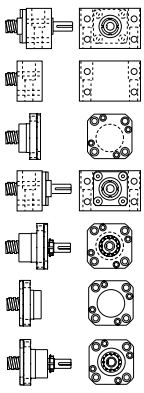
D = Flanged Single Bearing Support Flange Facing Screw Thread

E = Universal Double Bearing Support End Cap Facing Away From Screw Thread

F = Flanged Double Bearing Support Flange Facing Screw Thread

G = Flanged Single Bearing Support Flange Facing Away From Screw Thread

H = Flanged Double Bearing Support Flange Facing Away From Screw Thread

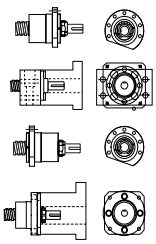


R = Flanged Fixed Bearing Support Flange Facing Screw Thread

U = Universal Double Bearing Support with Motor Mount

V = Flanged Fixed Bearing Support Flange Facing Away From Screw Thread

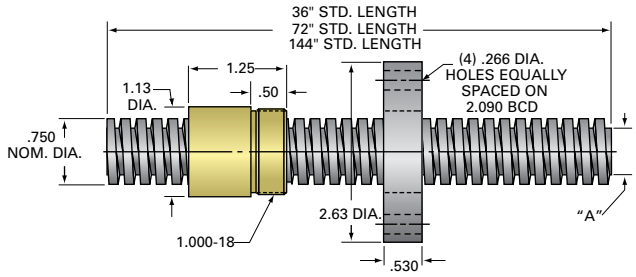
Y = Flanged Double Bearing Support with Motor Mount



00 = No End Machining (Screw will be cut to desired length).

XX = Custom Machining (Print or specified data must be provided).

¾ inch diameter
⅞ inch diameter

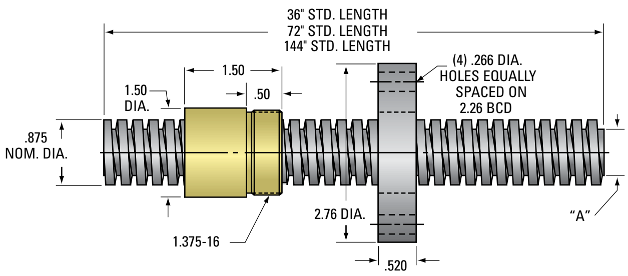


¾" ACME THREAD
Lead Accuracy 0.0003 in/in

Screw Size	ACME SCREW												
	Part Number RH	Part Number LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
¾" – 2	11072**	—	36	4140	.500	.125	4	8	.010	.581	1.18	072	2C
	12072**	—	72	4140	.500	.125	4	8	.010	.581	1.18	072	2C
	13072**	—	144	4140	.500	.125	4	8	.010	.581	1.18	072	2C
¾" – 3	11075	51073	36	4140	.333	.167	2	6	.009	.537	1.17	073	2C
	12073	52073	72	4140	.333	.167	2	6	.009	.537	1.17	073	2C
	13073	53073	144	4140	.333	.167	2	6	.009	.537	1.17	073	2C
¾" – 5	11075	51075	36	4140	.200	.200	1	5	.009	.502	1.23	075	2C
	91075	94075	36	SS	.200	.200	1	5	.009	.502	1.23	075	2C
	12075	52075	72	4140	.200	.200	1	5	.009	.502	1.23	075	2C
	92075	95075	72	SS	.200	.200	1	5	.009	.502	1.23	075	2C
	13075	53075	144	4140	.200	.200	1	5	.009	.502	1.23	075	2C
	93075	96075	144	SS	.200	.200	1	5	.009	.502	1.23	075	2C
¾" – 6	11076	51076	36	4140	.166	.166	1	6	.008	.537	1.17	076	2C
	91076	94076	36	SS	.166	.166	1	6	.008	.537	1.17	076	2C
	12076	52076	72	4140	.166	.166	1	6	.008	.537	1.17	076	2C
	92076	95076	72	SS	.166	.166	1	6	.008	.537	1.17	076	2C
	13076	53076	144	4140	.166	.166	1	6	.008	.537	1.17	076	2C
	93076	96076	144	SS	.166	.166	1	6	.008	.537	1.17	076	2C
¾" – 10	11070	51070	36	4140	.100	.100	1	10	.007	.608	1.29	070	2C
	91070	94070	36	SS	.100	.100	1	10	.007	.608	1.29	070	2C
	12070	52070	72	4140	.100	.100	1	10	.007	.608	1.29	070	2C
	92070	95070	72	SS	.100	.100	1	10	.007	.608	1.29	070	2C
	13070	53070	144	4140	.100	.100	1	10	.007	.608	1.29	070	2C
	93070	96070	144	SS	.100	.100	1	10	.007	.608	1.29	070	2C
⅞" – 6	11086	51086	36	4140	.166	.166	1	6	.009	.661	1.65	086	2C
	12086	52086	72	4140	.166	.166	1	6	.009	.661	1.65	086	2C
	13086	53086	144	4140	.166	.166	1	6	.009	.661	1.65	086	2C

** These screws are made with low carbon steel

POWER•AC™
ACME SCREWS AND NUTS



⅞" ACME THREAD
Lead Accuracy 0.0003 in/in

BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85
20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85
20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85

* Torque required to raise 1 lb

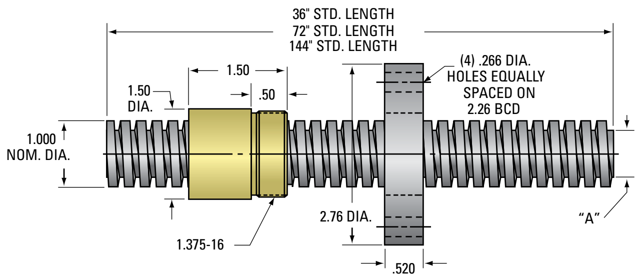
1 inch diameter

Screw Size	ACME SCREW												
	Part Number RH	Part Number LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
1"–1	**11111**	**51111**	36	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub
	12111	**52111**	72	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub
	13111	**53111**	144	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub
1"–2	**11112**	—	36	4140	.500	.250	2	4	.010	.698	2.22	112	2C
	12112	—	72	4140	.500	.250	2	4	.010	.698	2.22	112	2C
	13112	—	144	4140	.500	.250	2	4	.010	.698	2.22	112	2C
1"–4	**11104**	**51104**	36	4140	.250	.250	1	4	.010	.698	2.22	104	2C
	91104	**94104**	36	SS	.250	.250	1	4	.010	.698	2.22	104	2C
	12104	**52104**	72	4140	.250	.250	1	4	.010	.698	2.22	104	2C
	92104	**95104**	72	SS	.250	.250	1	4	.010	.698	2.22	104	2C
	13104	**53104**	144	4140	.250	.250	1	4	.010	.698	2.22	104	2C
	93104	**54104**	144	SS	.250	.250	1	4	.010	.698	2.22	104	2C

1" ACME THREAD SCREW ASSEMBLIES
CONTINUED ON NEXT PAGE

POWER•AC™

ACME SCREWS AND NUTS



1" ACME THREAD
Lead Accuracy 0.0003 in/in

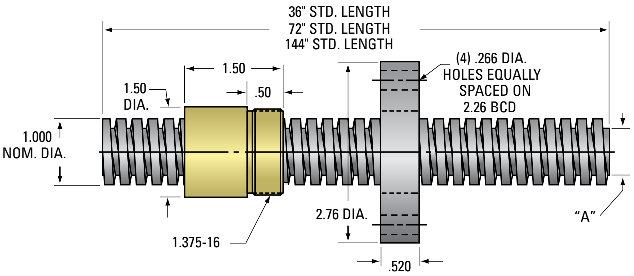
BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	Part Number LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Load Capacity (lb) Static	Wt. (lb)	Part Number RH	Part Number LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Load Capacity (lb) Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20111	80111	69	.231	5,000	16,000	.46	30111	—	74	.216	2,500	2,500	.07	FLG8281	73275	.85
20111	80111	69	.231	5,000	16,000	.46	30111	—	74	.216	2,500	2,500	.07	FLG8281	73275	.85
20111	80111	69	.231	5,000	16,000	.46	30111	—	74	.216	2,500	2,500	.07	FLG8281	73275	.85
20112	—	57	.139	5,000	16,000	.52	30112	—	63	.127	2,500	2,500	.08	FLG8281	73275	.85
20112	—	57	.139	5,000	16,000	.52	30112	—	63	.127	2,500	2,500	.08	FLG8281	73275	.85
20112	—	57	.139	5,000	16,000	.52	30112	—	63	.127	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85
20104	80104	38	.105	5,000	16,000	.52	30104	—	46	.086	2,500	2,500	.08	FLG8281	73275	.85

* Torque required to raise 1 lb

1 inch diameter (cont.)

Screw Size	ACME SCREW												
	Part Number RH	Part Number LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
1"–5	**11105**	**51105**	36	4140	.200	.200	1	5	.009	.750	2.16	105	2C
	91105	—	36	SS	.200	.200	1	5	.009	.750	2.16	105	2C
	12105	**52105**	72	4140	.200	.200	1	5	.009	.750	2.16	105	2C
	92105	—	72	SS	.200	.200	1	5	.009	.750	2.16	105	2C
	13105	**53105**	144	4140	.200	.200	1	5	.009	.750	2.16	105	2C
	93105	—	144	SS	.200	.200	1	5	.009	.750	2.16	105	2C
1"–6	**11106**	**51106**	36	4140	.167	.167	1	6	.009	.786	2.16	106	2C
	91106	**94106**	36	SS	.167	.167	1	6	.009	.786	2.16	106	2C
	12106	**52106**	72	4140	.167	.167	1	6	.009	.786	2.16	106	2C
	92106	**95106**	72	SS	.167	.167	1	6	.009	.786	2.16	106	2C
	13106	**13106**	144	4140	.167	.167	1	6	.009	.786	2.16	106	2C
	93106	**96106**	144	SS	.167	.167	1	6	.009	.786	2.16	106	2C
1"–10	**11110**	**51110**	36	4140	.100	.100	1	10	.008	.857	2.10	110	2C
	91110	—	36	SS	.100	.100	1	10	.008	.857	2.10	110	2C
	12110	**52110**	72	4140	.100	.100	1	10	.008	.857	2.10	110	2C
	92110	—	72	SS	.100	.100	1	10	.008	.857	2.10	110	2C
	13110	**53110**	144	4140	.100	.100	1	10	.008	.857	2.10	110	2C
	93110	—	144	SS	.100	.100	1	10	.008	.857	2.10	110	2C

POWER•AC™
ACME SCREWS AND NUTS

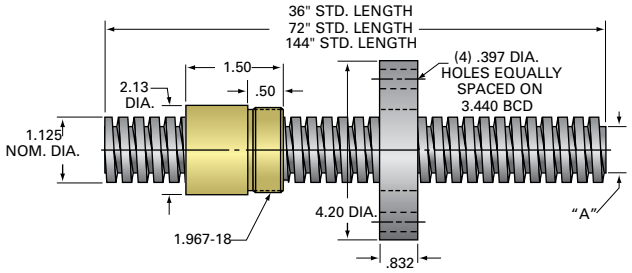


1" ACME THREAD
Lead Accuracy 0.0003 in/in

BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20105	80105	34	.094	5,000	16,000	.50	30105	40105	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20105	—	34	.094	5,000	16,000	.50	30105	—	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20105	80105	34	.094	5,000	16,000	.50	30105	40105	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20105	—	34	.094	5,000	16,000	.50	30105	—	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20105	80105	34	.094	5,000	16,000	.50	30105	40105	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20105	—	34	.094	5,000	16,000	.50	30105	—	40	.079	2,500	2,500	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20106	80106	30	.089	5,000	16,000	.49	—	—	—	—	—	—	.07	FLG8281	73275	.85
20110	80110	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85
20110	—	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85
20110	80110	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85
20110	—	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85
20110	80110	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85
20110	—	20	.078	5,000	16,000	.47	30110	—	24	.065	2,500	2,500	.07	FLG8281	73275	.85

* Torque required to raise 1 lb

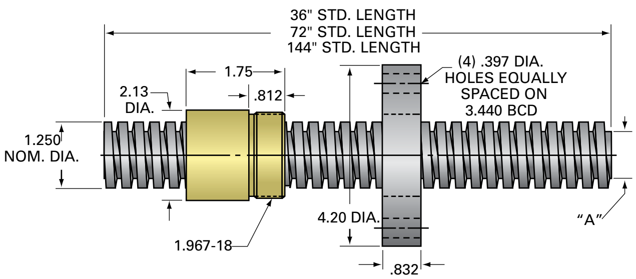
1 ⅛ inch diameter
1 ¼ inch diameter



1⅛" ACME THREAD 1/4
Lead Accuracy 0.0003 in/in

Screw Size	ACME SCREW Part Number RH	LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
1⅛"–5	11115	—	36	4140	.200	.200	1	5	.010	.875	2.80	115	2C
	12115	—	72	4140	.200	.200	1	5	.010	.875	2.80	115	2C
	13115	—	144	4140	.200	.200	1	5	.010	.875	2.80	115	2C
1¼"–4	11124	51124	36	4140	.250	.250	1	4	.011	.947	3.34	124	2C
	91124	—	36	SS	.250	.250	1	4	.011	.947	3.34	124	2C
	12124	52124	72	4140	.250	.250	1	4	.011	.947	3.34	124	2C
	92124	—	72	SS	.250	.250	1	4	.011	.947	3.34	124	2C
	13124	53124	144	4140	.250	.250	1	4	.011	.947	3.34	124	2C
	93124	—	144	SS	.250	.250	1	4	.011	.947	3.34	124	2C
1¼"–5	11125	51125	36	4140	.200	.200	1	5	.010	.999	3.49	125	2C
	91125	94125	36	SS	.200	.200	1	5	.010	.999	3.49	125	2C
	12125	52125	72	4140	.200	.200	1	5	.010	.999	3.49	125	2C
	92125	95125	72	SS	.200	.200	1	5	.010	.999	3.49	125	2C
	13125	53125	144	4140	.200	.200	1	5	.010	.999	3.49	125	2C
	93125	96125	144	SS	.200	.200	1	5	.010	.999	3.49	125	2C

POWER•AC™
ACME SCREWS AND NUTS



1¼" ACME THREAD
Lead Accuracy 0.0003 in/in

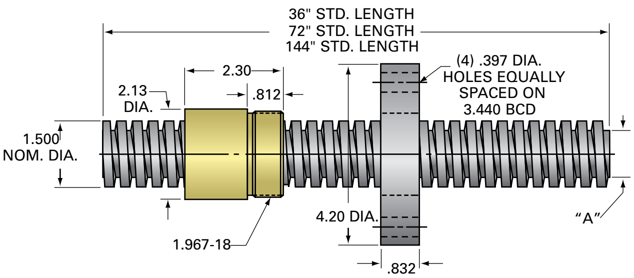
BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	—	FLG7572	73420	3.19
20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	—	FLG7572	73420	3.19
20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19
20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19

* Torque required to raise 1 lb

1 ½ inch diameter

Screw Size	ACME SCREW												
	Part Number RH	Part Number LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
1½"– 2	**11152**	—	36	4140	.500	.250	2	4	.012	1.196	4.95	152	2C
	12152	—	72	4140	.500	.250	2	4	.012	1.196	4.95	152	2C
	13152	—	144	4140	.500	.250	2	4	.012	1.196	4.95	152	2C
1½"– 2⅔	**11153**	**51153**	36	4140	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
	91153	—	36	SS	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
	12153	**52153**	72	4140	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
	92153	—	72	SS	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
	13153	**53153**	144	4140	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
	93153	—	144	SS	.375	.375	1	2⅔	.010	1.066	4.55	153	40°
1½"– 4	**11154**	**51154**	36	4140	.250	.250	1	4	.010	1.196	4.99	154	2C
	91154	**94154**	36	SS	.250	.250	1	4	.010	1.196	4.99	154	2C
	12154	**52154**	72	4140	.250	.250	1	4	.010	1.196	4.99	154	2C
	92154	**95154**	72	SS	.250	.250	1	4	.010	1.196	4.99	154	2C
	13154	**53154**	144	4140	.250	.250	1	4	.010	1.196	4.99	154	2C
	93154	**96154**	144	SS	.250	.250	1	4	.010	1.196	4.99	154	2C
1½"– 5	**11155**	**51155**	36	4140	.200	.200	1	5	.010	1.249	4.90	155	2C
	91155	**94155**	36	SS	.200	.200	1	5	.010	1.249	4.90	155	2C
	12155	**52155**	72	4140	.200	.200	1	5	.010	1.249	4.90	155	2C
	92155	**95155**	72	SS	.200	.200	1	5	.010	1.249	4.90	155	2C
	13155	**53155**	144	4140	.200	.200	1	5	.010	1.249	4.90	155	2C
	93155	**96155**	144	SS	.200	.200	1	5	.010	1.249	4.90	155	2C
1½"– 10	**11150**	**51150**	36	4140	.100	.100	1	10	.009	1.355	5.47	150	2C
	12150	**52150**	72	4140	.100	.100	1	10	.009	1.355	5.47	150	2C
	13150	**53150**	144	4140	.100	.100	1	10	.009	1.355	5.47	150	2C

POWER•AC™
ACME SCREWS AND NUTS



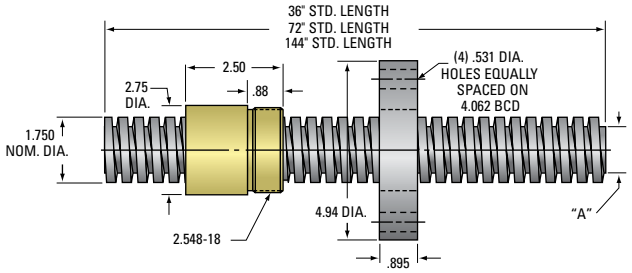
1½" ACME THREAD
Lead Accuracy 0.0003 in/in

Load Capacity (lb)

BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20152	—	46	.173	11,250	36,000	1.38	—	—	—	—	—	—	—	FLG7572	73420	3.19
20152	—	46	.173	11,250	36,000	1.38	—	—	—	—	—	—	—	FLG7572	73420	3.19
20152	—	46	.173	11,250	36,000	1.38	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	80153	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	—	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	80153	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	—	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	80153	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20153	—	40	.149	11,250	36,000	1.49	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20154	80154	30	.133	11,250	36,000	1.53	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20155	80155	25	.127	11,250	36,000	1.35	—	—	—	—	—	—	—	FLG7572	73420	3.19
20150	80150	15	.110	11,250	36,000	1.28	—	—	—	—	—	—	—	FLG7572	73420	3.19
20150	80150	15	.110	11,250	36,000	1.28	—	—	—	—	—	—	—	FLG7572	73420	3.19
20150	80150	15	.110	11,250	36,000	1.28	—	—	—	—	—	—	—	FLG7572	73420	3.19

* Torque required to raise 1 lb

1¾ inch diameter
2 inch diameter
2¼ inch diameter

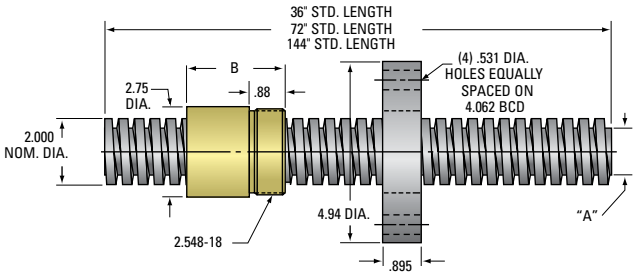


1¾" ACME THREAD
Lead Accuracy 0.0003 in/in

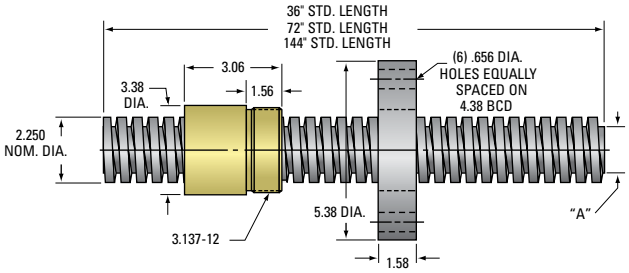
Screw Size	ACME SCREW Part Number RH	LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
1¾"–4	11174	51174	36	4140	.250	.250	1	4	.011	1.427	6.97	174	2C
	12174	52174	72	4140	.250	.250	1	4	.011	1.427	6.97	174	2C
	13174	53174	144	4140	.250	.250	1	4	.011	1.427	6.97	174	2C
2"–2 (see table below for nut body length)	11202	—	36	4140	.500	.500	1	2	.020	1.410	8.09	202	40°
	12202	—	72	4140	.500	.500	1	2	.020	1.410	8.09	202	40°
	13202	—	144	4140	.500	.500	1	2	.020	1.410	8.09	202	40°
2"–4 (see table below for nut body length)	11204	51204	36	4140	.250	.250	1	4	.012	1.694	9.28	204	2C
	12204	52204	72	4140	.250	.250	1	4	.012	1.694	9.28	204	2C
	13204	53204	144	4140	.250	.250	1	4	.012	1.694	9.28	204	2C
2"–5 (see table below for nut body length)	11205	—	36	4140	.200	.200	1	5	.011	1.747	9.53	205	2C
	12205	—	72	4140	.200	.200	1	5	.011	1.747	9.53	205	2C
	13205	—	144	4140	.200	.200	1	5	.011	1.747	9.53	205	2C
2¼"–2	11222	—	36	4140	.500	.500	1	2	.021	1.684	10.58	222	40°
	12222	—	72	4140	.500	.500	1	2	.021	1.684	10.58	222	40°
	13222	—	144	4140	.500	.500	1	2	.021	1.684	10.58	222	40°
2¼"–4	11224	—	36	4140	.250	.250	1	4	.012	1.944	11.29	224	2C
	12224	—	72	4140	.250	.250	1	4	.012	1.944	11.29	224	2C
	13224	—	144	4140	.250	.250	1	4	.012	1.944	11.29	224	2C

	"B" NUT BODY LENGTH
2"–2	2.75
2"–4	3.47
2"–5	2.75

POWER•AC™
ACME SCREWS AND NUTS



2" ACME THREAD
Lead Accuracy 0.0003 in/in

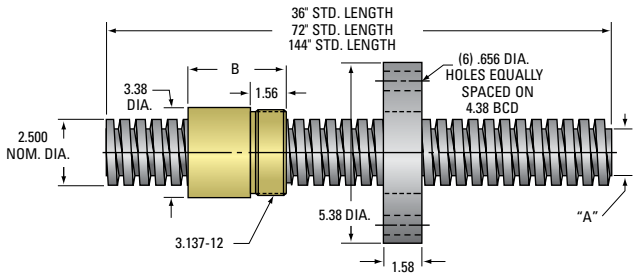


2¼" ACME THREAD
Lead Accuracy 0.0003 in/in

BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	FLG7573	73500	4.73
20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	FLG7573	73500	4.73
20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	FLG7573	73500	4.73
20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	FLG7573	73500	4.73
20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	FLG7573	73500	4.73
20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	FLG7573	73500	4.73
20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	FLG7573	73500	4.73
20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	FLG7573	73500	4.73
20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	FLG7573	73500	4.73
20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	FLG7573	73500	4.73
20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	FLG7573	73500	4.73
20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	FLG7573	73500	4.73
20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	FLG7574	73540	9.88
20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	FLG7574	73540	9.88
20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	FLG7574	73540	9.88
20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	FLG7574	73540	9.88
20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	FLG7574	73540	9.88
20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	FLG7574	73540	9.88

* Torque required to raise 1 lb

2½ inch diameter
3 inch diameter
3⅜ inch diameter

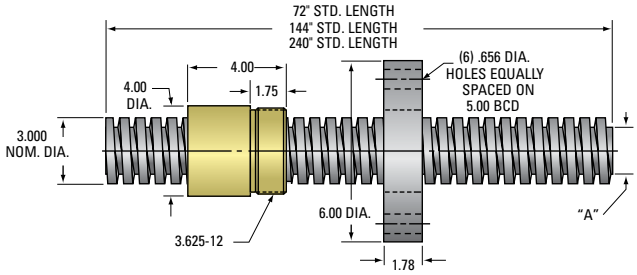


2½" ACME THREAD
Lead Accuracy 0.0003 in/in

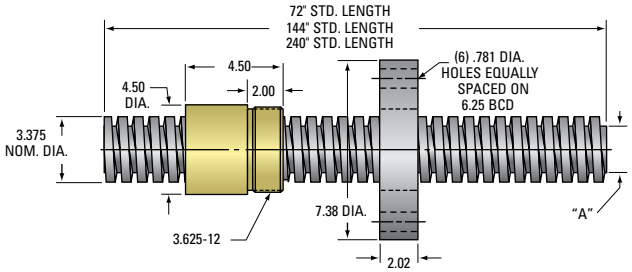
Screw Size	ACME SCREW													
	Part Number RH	LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
2½"–2 (see table below for nut body length)	**11252**	—	36	4140	.500	.500	1	2	.012	1.908	13.41	252	40°
	12252	—	72	4140	.500	.500	1	2	.012	1.908	13.41	252	40°
	13252	—	144	4140	.500	.500	1	2	.012	1.908	13.41	252	40°
2½"–3 (see table below for nut body length)	**11253**	—	36	4140	.333	.333	1	3	.013	2.106	14.38	253	2C
	12253	—	72	4140	.333	.333	1	3	.013	2.106	14.38	253	2C
	13253	—	144	4140	.333	.333	1	3	.013	2.106	14.38	253	2C
2½"–4 (see table below for nut body length)	**11254**	—	36	4140	.250	.250	1	4	.012	2.193	14.89	254	2C
	12254	—	72	4140	.250	.250	1	4	.012	2.193	14.89	254	2C
	13254	—	144	4140	.250	.250	1	4	.012	2.193	14.89	254	2C
3"–2	**12302**	—	72	4140	.500	.500	1	2	.016	2.410	19.96	302	2C
	13302	—	144	4140	.500	.500	1	2	.016	2.410	19.96	302	2C
	10302	—	240	4140	.500	.500	1	2	.016	2.410	19.96	302	2C
3⅜"–1½	**12332**	—	72	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G
	13332	—	144	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G
	10332	—	240	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G

	"B" NUT BODY LENGTH
2½"–2	3.38
2½"–3	4.25
2½"–4	3.38

POWER•AC™
ACME SCREWS AND NUTS



3" ACME THREAD
Lead Accuracy 0.0006 in/in

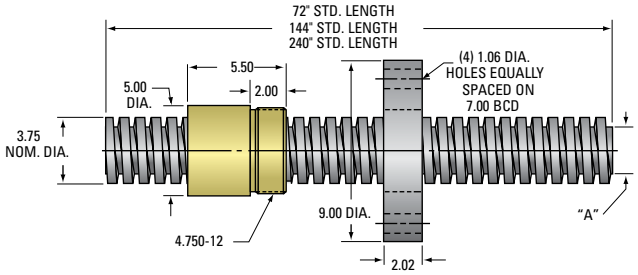


3⅜" ACME THREAD
Lead Accuracy 0.0006 in/in

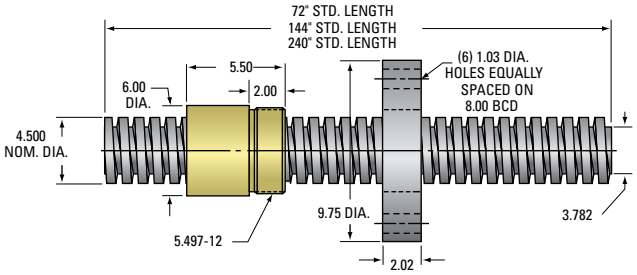
BRONZE NUT							PLASTIC NUT							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	—	FLG7574	73540	9.88
20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	—	FLG7574	73540	9.88
20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	—	FLG7574	73540	9.88
20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	FLG7574	73540	9.88
20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	FLG7574	73540	9.88
20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	FLG7574	73540	9.88
20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	FLG7574	73540	9.88
20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	FLG7574	73540	9.88
20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	FLG7574	73540	9.88
20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	70600	73302	13.83
20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	70600	73302	13.83
20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	70600	73302	13.83
20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	70740	73332	11.62
20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	70740	73332	11.62
20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	70740	73332	11.62

* Torque required to raise 1 lb

3¾ inch diameter
4½ inch diameter
5 inch diameter
6 inch diameter



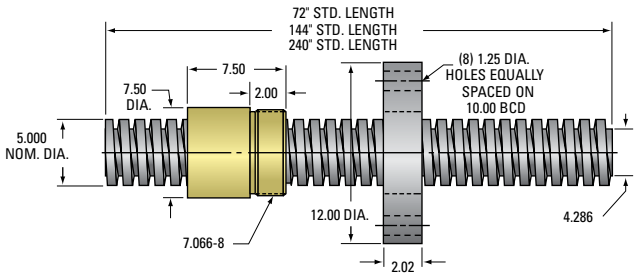
3¾" ACME THREAD
Lead Accuracy 0.0006 in/in



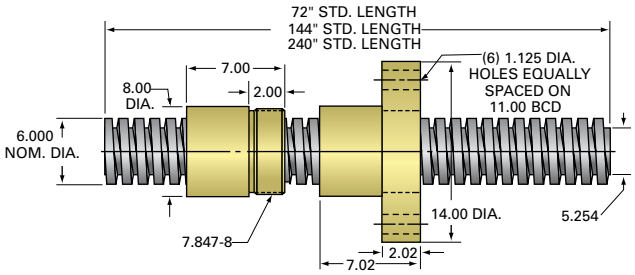
4½" ACME THREAD
Lead Accuracy 0.0006 in/in

	ACME SCREW												
Screw Size	Part Number RH	LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form
3¾"– 1½	**12372**	—	72	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G
	13372	—	144	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G
	10372	—	240	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G
4½"– 1½	**12452**	—	72	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G
	13452	—	144	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G
	10452	—	240	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G
5"– 1½	**12552**	—	72	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G
	13552	—	144	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G
	10552	—	240	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G
6"– 1½	**12602**	—	72	4140	.667	.667	1	1½	.025	5.254	87	602	2G
	13602	—	144	4140	.667	.667	1	1½	.025	5.254	87	602	2G
	10602	—	240	4140	.667	.667	1	1½	.025	5.254	87	602	2G

POWER•AC™
ACME SCREWS AND NUTS



5" ACME THREAD
Lead Accuracy 0.0006 in/in



6" ACME THREAD
Lead Accuracy 0.0006 in/in

BRONZE NUT							BRONZE NUT WITH INTEGRAL FLANGE							FLANGE		
Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Part Number RH	LH	% Efficiency	Torque* (in·lb)	Load Capacity (lb) Dynamic	Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)
20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	—	—	70775	73372	23.82
20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	—	—	70775	73372	23.82
20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	—	—	70775	73372	23.82
20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	FLG3307	73452	26.00
20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	FLG3307	73452	26.00
20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	FLG3307	73452	26.00
20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	75000	73552	38.00
20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	75000	73552	38.00
20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	75000	73552	38.00
20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—
20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—
20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—

* Torque required to raise 1 lb

TRAPEZOIDAL SCREW ASSEMBLIES

With over forty years of experience manufacturing precision acme screws, Nook/Thomson has expanded the PowerAc™ offering to include metric lead screws providing design engineers a globally accepted product. Trapezoidal lead screws are available in many diameters, leads, and pitches. Trapezoidal screws use bronze or plastic nuts with optional steel flanges.

TRAPEZOIDAL SCREW AND NUT

Similar in construction and materials to PowerAc™ Inch Acme Screws and Nuts, the Trapezoidal thread form has been enhanced to include a centralizing thread form to prevent wedging and binding. See the PowerAc™ technical data on pages 54-59 for additional screw and nut details.

Standard lead accuracy: is ±6.25µm / 25mm

Temperature Range: Plastic Nuts: -9° to +79° C
Bronze Nuts: -9° to +177° C

Stainless steel trapezoidal screw assemblies with bronze nuts

QUICK REFERENCE:
TRAPEZOIDAL SCREWS AND NUTS

					NUT SELECTION						
					BRONZE			PLASTIC			
Screw Sizes	Pitch (mm)	Lead (mm)	Starts	Root Dia. (mm)	Dynamic Load Rating	Torque to Raise 1 kN (N-m)	Efficiency %	Dynamic Load Rating	Torque to Raise 1 kN (N-m)	Efficiency %	Page ref
Tr 20 × 4	4	4	1	14.9	13790	1.818	35	6895	1.580	40	56
Tr 26 × 6	6	6	1	17.84	23304	2.469	39	11652	2.164	44	56
Tr 40 × 7	7	7	1	30.95	55160	3.503	32	5516	3.022	37	58
Tr 55 × 12	12	12	1	40.00	104287	5.131	37	—	—	—	58
Tr 65 × 12	12	12	1	50.02	145651	5.775	33	—	—	—	58

TRAPEZOIDAL SCREW ASSEMBLIES
REFERENCE NUMBER SYSTEM

POWER•AC™
TRAPEZOIDAL SCREW ASSEMBLIES

904 - RA / EKS / 4NX / 1063 / 20904 / FS

LEAD SCREW
Thread Form Codes

ISO	Dia. x Lead
903 =	20 x 4
904 =	26 x 6
905 =	40 x 7
906 =	55 x 12
907 =	65 x 12

MODIFIER LIST
S or M Required
F Optional
- S = Standard, not additional description required
- F = Round Flange
- M = Modified, additional description required

TRAVEL NUT
Nut will be installed with flange or threaded end toward first end designation. 000000 = No Nut

Use standard part number found in the Technical Data Section for Metric ISO Trapezoidal Screws.

Example: **20904** = 26 x 6 ISO Trapezoidal Nut

MATERIAL
R A

R =Right Hand Thread

- **A** = Alloy Steel
- **B** = Alloy Steel, Milled
- **C** = Alloy Steel, Ground
- **S** = Stainless Steel, Rolled
- **T** = Stainless Steel, Milled
- **U** = Stainless Steel, Ground

Note: Not all materials are available for all sizes.

OVERALL LENGTH (OAL)
Length in mm.

FIRST END CONFIGURATION
Note: Both Ends must be specified.

Single Bearing Supports are used in conjunction with Type 1N end machining.

Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

Flanged Fixed Bearing Mounts are used in conjunction with Type 5 end machining.

SECOND END CONFIGURATION
Refer to the First End Configuration section below
Note: Both Ends must be specified.

EK S EK = Universal Double Bearing Support, with Keyway

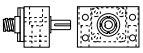
EZZE-MOUNT™ / End Machining
(see page 174-176)

1 = Type 1
2 = Type 2
3 = Type 3
4 = Type 4
5 = Type 5

Bearing Mount Install
- S = Bearing Mount Installed
- N = Bearing Mount Shipped Loose
- X = No Bearing Mount

Shaft Extension (see page 174-176)
- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway
- N = No Shaft
- Q = Handwheel

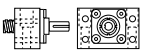
B = Universal Double Bearing Support End Cap Facing Screw Thread



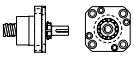
C = Universal Single Bearing Support

D = Flanged Single Bearing Support Flange Facing Screw Thread

E = Universal Double Bearing Support End Cap Facing Away From Screw Thread

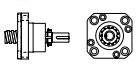


F = Flanged Double Bearing Support Flange Facing Screw Thread

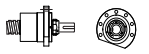


G = Flanged Single Bearing Support Flange Facing Away From Screw Thread

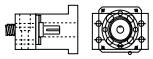
H = Flanged Double Bearing Support Flange Facing Away From Screw Thread



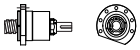
R = Flanged Fixed Bearing Support Flange Facing Screw Thread



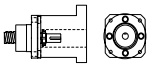
U = Universal Double Bearing Support with Motor Mount



V = Flanged Fixed Bearing Support Flange Facing Away From Screw Thread



Y = Flanged Double Bearing Support with Motor Mount



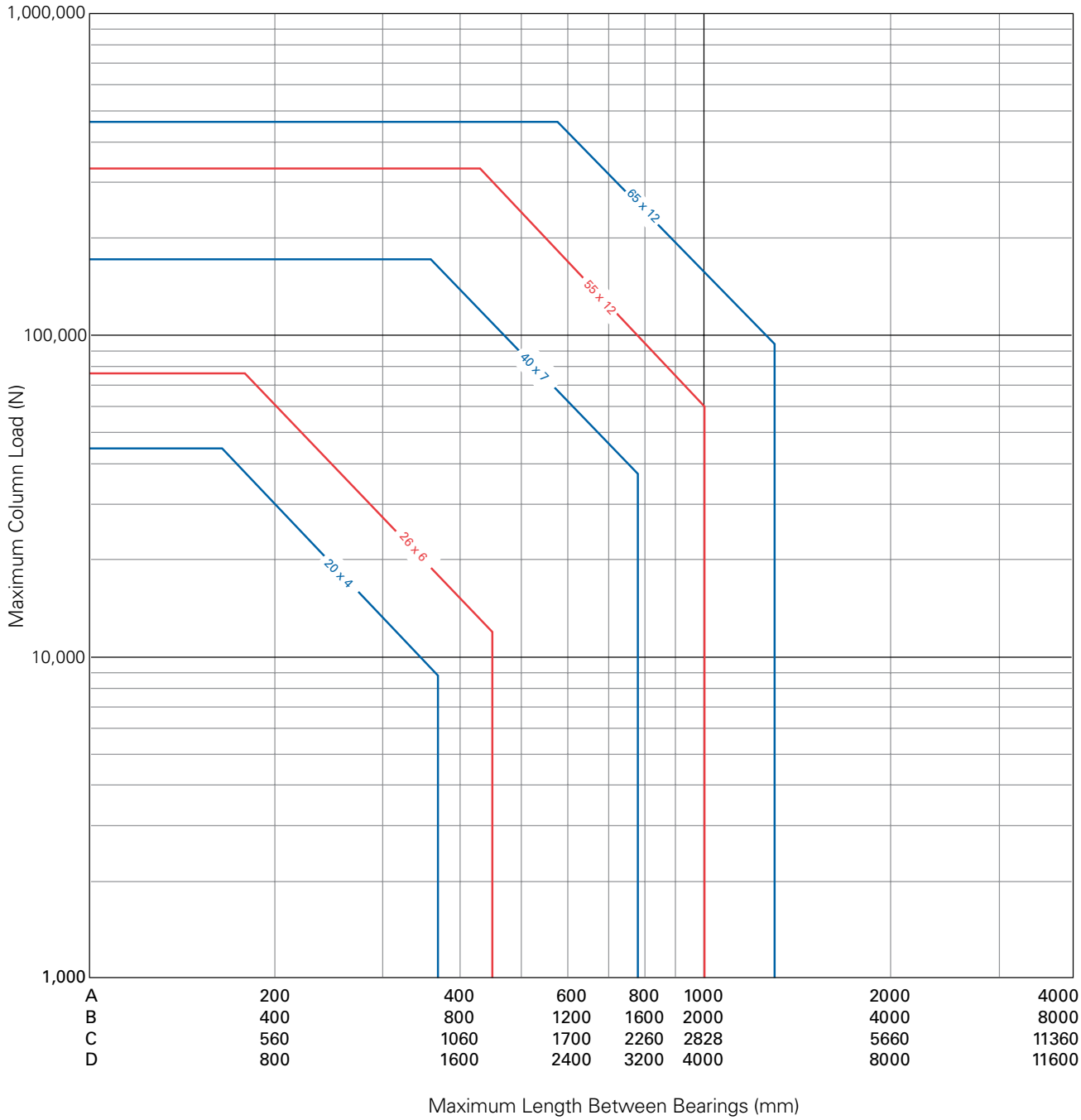
00 = No End Machining (Screw will be cut to desired length).

XX = Custom Machining (Print or specified data must be provided).

COLUMN STRENGTH:
TRAPEZOIDAL SCREWS

Metric Screws are limited by both Maximum Static Load and Slenderness Ratio.
See pages 14-15 for reference description on A-B-C-D end fixity.

Metric to Inch Conversion: 1 Newton = .224 lbf 1 mm = 0.039 in 1 Nm = 8.85 in·lb

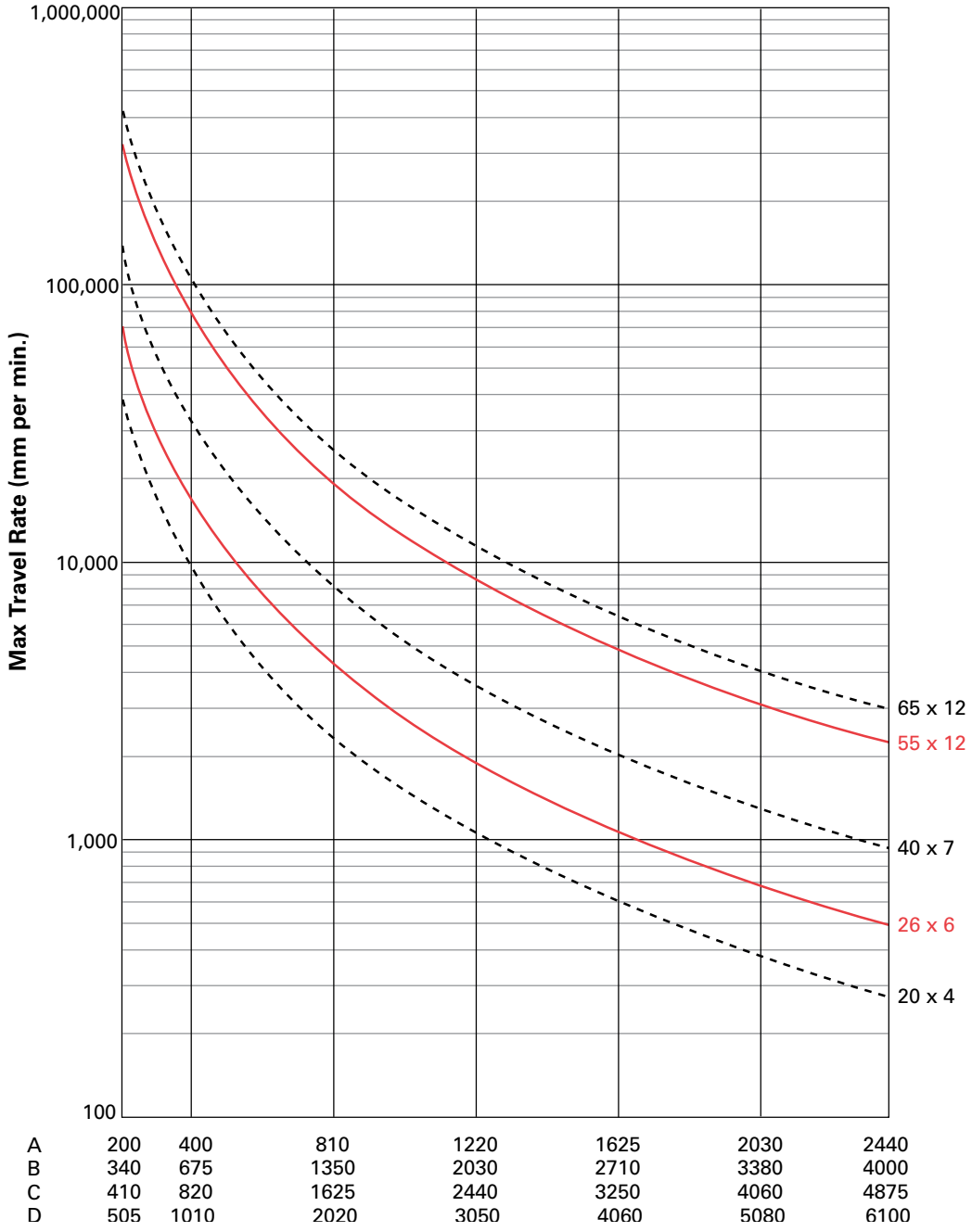


CRITICAL SPEED:
TRAPEZOIDAL SCREWS

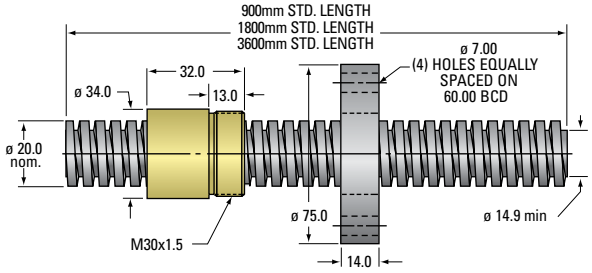
Curves are alternately broken and solid for ease of use. The line type has no significance.

NOTE: Maximum Speed is limited to 80% of the calculated Critical Speed.
See pages 14-15 for reference description on A-B-C-D end fixity.

Metric to Inch Conversion: 1 Newton = .224 lbf 1 mm = 0.039 in 1 Nm = 8.85 in·lb

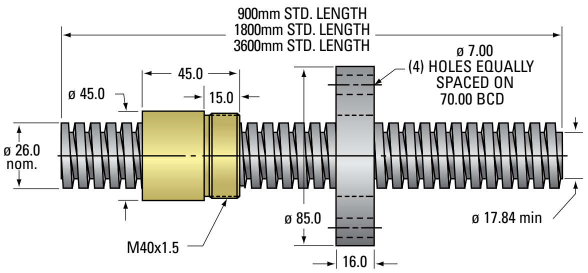


20 mm diameter
26 mm diameter



20 mm Trapezoidal Thread
Lead Accuracy ±6.25 µm/25 mm

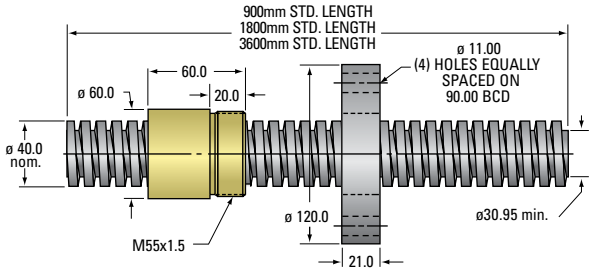
	TRAPEZOIDAL SCREW									
	Part Number									
Dia × Lead	RH	LH	Length (mm)	Material	Pitch (mm)	Starts	Dia (mm)	Thread Code	Wt. (kg/m)	Lash (mm)
Tr 20×4	**14903**	—	900	4140	4	1	20	903	2.00	0.24
	54903	—	900	SS	4	1	20	903	2.00	0.24
	15903	—	1800	4140	4	1	20	903	2.00	0.24
	55903	—	1800	SS	4	1	20	903	2.00	0.24
	16903	—	3600	4140	4	1	20	903	2.00	0.24
	56903	—	3600	SS	4	1	20	903	2.00	0.24
Tr 26×6	**14904**	—	900	4140	6	1	26	904	3.20	0.30
	54904	—	900	SS	6	1	26	904	3.20	0.30
	15904	—	1800	4140	6	1	26	904	3.20	0.30
	55904	—	1800	SS	6	1	26	904	3.20	0.30
	16904	—	3600	4140	6	1	26	904	3.20	0.30
	56904	—	3600	SS	6	1	26	904	3.20	0.30



26 mm Trapezoidal Thread
Lead Accuracy ±6.25 µm/25 mm

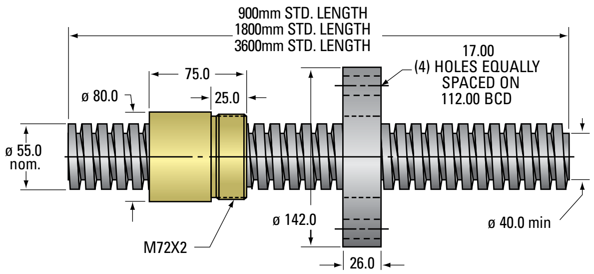
BRONZE NUT						PLASTIC NUT						FLANGE	
Part Number RH	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. (g)	Load capacity (N) Dynamic	Static	Part Number RH	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. g.	Load capacity (N) Dynamic	Static	Part Number	Wt. (kg)
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20903	.35	1.818	173	13,790	44,128	**30903**	40	1.580	11	6,895	6,895	**72003**	.39
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54
20904	39	2.469	440	23,304	74,573	**30904**	44	2.164	79	11,652	11,652	**72004**	.54

40 mm diameter
65 mm diameter

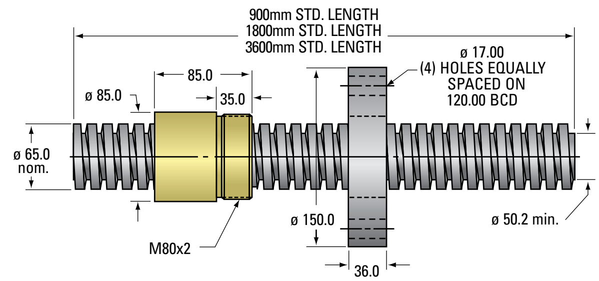


40 mm Trapezoidal Thread
Lead Accuracy ±6.25 µm/25 mm

	TRAPEZOIDAL SCREW									
	Part Number									
Dia × Lead	RH	LH	Length (mm)	Material	Pitch (mm)	Starts	Dia (mm)	Thread Code	Wt. (kg/m)	Lash (mm)
Tr 40×7	**14905**	—	900	4140	7	1	40	905	8.16	0.32
	54905	—	900	SS	7	1	40	905	8.16	0.32
	15905	—	1800	4140	7	1	40	905	8.16	0.32
	55905	—	1800	SS	7	1	40	905	8.16	0.32
	16905	—	3600	4140	7	1	40	905	8.16	0.32
	56905	—	3600	SS	7	1	40	905	8.16	0.32
Tr 55×12	**14906**	—	900	4140	12	1	55	906	14.7	0.42
	15906	—	1800	4140	12	1	55	906	14.7	0.42
	16906	—	3600	4140	12	1	55	906	14.7	0.42
Tr 65×12	**14907**	—	900	4140	12	1	65	907	21.3	0.42
	15907	—	1800	4140	12	1	65	907	21.3	0.42
	16907	—	3600	4140	12	1	65	907	21.3	0.42



55 mm Trapezoidal Thread
Lead Accuracy ±6.25 µm/ 25 mm



65 mm Trapezoidal Thread
Lead Accuracy ±6.25 µm/25 mm

BRONZE NUT						PLASTIC NUT						FLANGE	
Part Number RH	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. (g)	Load capacity (N) Dynamic	Static	Part Number RH	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. g.	Load capacity (N) Dynamic	Static	Part Number	Wt. (kg)
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20905	.32	3.503	900	55,160	176,512	**30905**	37	3.022	160	27,580	27,580	**72005**	1.40
20906	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	**72006**	2.20
20906	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	**72006**	2.20
20906	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	**72006**	2.20
20907	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	**72007**	3.30
20907	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	**72007**	3.30
20907	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	**72007**	3.30

PowerTrac™

PRECISION BALL SCREW ASSEMBLIES

Ball screws and linear actuators are used to adjust solar trackers

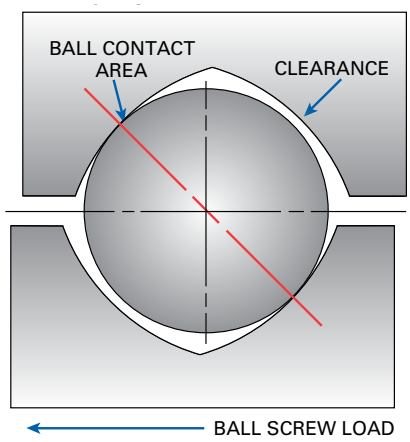
BALL SCREWS

BALL SCREW THREAD FORM TERMS

INTRODUCTION - Ball screws offer an efficient means of converting rotary motion to linear motion. A ball screw is an improvement over an acme screw just as an antifriction ball bearing is an improvement over a plain bushing.

Ball screw assemblies have a number of bearing balls that transfer the load between the nut and screw. The thread form in which the bearing balls ride is an ogival shape formed from two arcs of the same radius with offset centers. This form is also referred to as a gothic arch. (FIG. 1)

FIG. 1



BEARING BALL CIRCUIT - The closed path that the bearing balls follow through the ball nut. Ball nuts have one or more circuits.

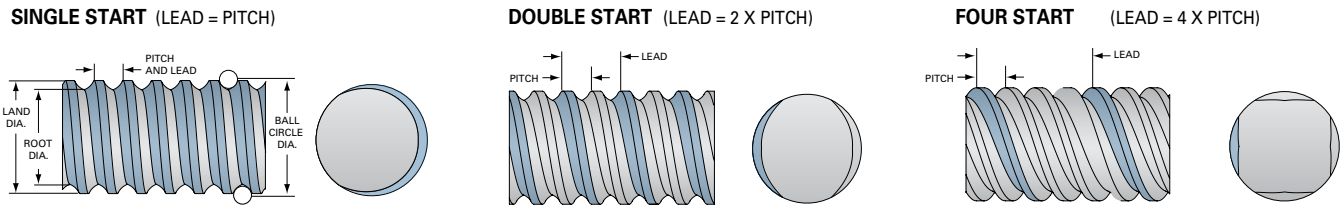
RETURN GUIDE - Component that allows the bearing ball to be picked up and returned to the beginning or end of the circuit.

LOAD CARRYING BALLS - The bearing balls in contact with ball nut and ball screw sharing the load.

LAND DIAMETER - The outside diameter of the screw. This diameter is less than the ball circle diameter.

POWER•TRAC™
BALL SCREW ENGINEERING

FIG. 2



BALL CIRCLE DIAMETER - The diameter of the circle generated by the center of the bearing balls when in contact with the screw and nut.

ROOT DIAMETER - The diameter of the screw measured at the bottom of the thread. This is the diameter used for column strength, critical speed calculations and end machining considerations.

PITCH - The axial distance between threads. Pitch is equal to the lead in a single start screw.

LEAD - The axial distance the nut advances in one revolution of the screw. The lead is equal to the pitch times the number of starts.

PITCH × STARTS = LEAD

SCREW STARTS - The number of independent threads on the screw shaft; typically one, two or four. (See FIG. 2)

LEAD ACCURACY - Lead accuracy is the difference between the actual distance traveled versus the theoretical distance traveled based on lead. For example: A screw with a .5 inch lead and ±.001 in/ft lead accuracy rotated 24 times theoretically moves the nut 12 inches.

24 Revolutions × .500 inches per revolution = 12.000 inches of travel with a Lead accuracy of .001 inch per foot, actual travel could be from 11.999 to 12.001 inches.

SRT Ball Screws will not deviate from nominal lead by more than ±.004 inch/foot on screws through 2½" diameter and ±.008 in/ft on screws 3" and over. Details on page 86.

XPR Ball Screws will not deviate from nominal lead by more than ±.001 inch/foot. Details on page 114.

SGT Ball Screws will not deviate from nominal lead by more than ±.0005 inch/foot. Details on page 128.

MATCHED LEAD - When multiple screws are used to move a load with precise synchronicity, screws of similar lead accuracy can be factory selected and supplied as sets. Consult factory for matched lead set tolerances.

Screw Type	Material	Surface	Lead Accuracy	Screw Dia.	Screw Lengths
SRT	Alloy	black	± .004 in/ft	0.375" to 2.500"	up to 24'
	Alloy	black	± .008 in/ft	3.000" to 4.000"	up to 24'
	Stainless	polished	± .004 in/ft	0.375" to 1.000"	up to 24'
XPR	Alloy	polished	± .001 in/ft	0.631" to 2.250"	up to 12'
SGT	Alloy	polished	± .0005 in/ft	0.631" to 2.250"	up to 10'

STRAIGHTNESS - Although PowerTrac™ Ball Screws are manufactured from straight, cylindrical material, internal stresses may cause the material to bend or yield. When ordering random lengths or cut material without end machining, straightening is recommended.

Handling or machining of screws can also cause the material to bend or yield. Before, during and after machining, additional straightening is required. When ordering screws with machined ends from Nook/Thomson, the following straightness tolerances can be expected:

PowerTrac™ SRT and **XPR Ball Screws** are straight within .010 inch/foot when shipped from the factory, and do not exceed .030 inch in any 6 foot section.

PowerTrac™ SGT Ball Screws are straight within .001 inch/foot when shipped from the factory.

LIFE - A ball screw assembly uses rolling elements to carry a load similar to an anti-friction (ball) bearing. These elements do not wear during normal use, but rather fatigue. Therefore, ball screw life is predictable and is determined by calculating the fatigue failure of the components.

Proper lubrication, regular maintenance, and operation within specified limits will allow PowerTrac™ Ball Screws to operate to the predicted life.

EFFICIENCY - The low coefficient of friction of the rolling elements of PowerTrac™ Ball Screws and Nuts results in an operating efficiency greater than 90%.

BACKDRIVING - Normally, ball screws are used to convert rotary motion into linear motion. Backdriving is the result of the load pushing axially on the screw or nut to create rotary motion.

All ball screws, due to their high efficiency, will backdrive. The resulting torque is known as "backdriving torque" and is the torque required to hold a load in position.

CAUTION - When using ball screws, applications should be analyzed to determine the necessity of a brake, especially when the possibility of injury may occur.

BACKLASH - Backlash (lash) is the relative axial movement between a screw and nut without rotation of the screw or nut. The axial movement between a new PowerTrac™ SBN or SGN ball nut and screw will range from .003" to .015" depending on size. Lash in ball screws will remain constant during normal use.

SELECTIVE FIT - When less than standard lash (listed above) is desired, SBN and SGN ball nuts can be custom-fit to a specific screw with selected bearing balls to minimize lash to .003" to .005" depending on ball size. Select fitting may result in lower life.

LOAD DEFINITIONS

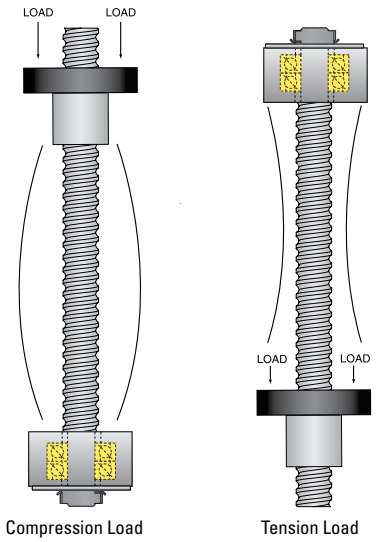
STATIC LOAD - The maximum thrust load – including shock – that can be applied to the ball nut without damaging the assembly.

DYNAMIC LOAD - The thrust load in pounds which, when applied to the ball nut and rotating screw assembly will result in a minimum life of 1,000,000 inches of travel. Metric screw designs are per ISO 3408 and show the load ratings in kilonewtons for 1 million revolutions.

TENSION LOAD - A load that tends to "stretch" the screw. (See FIG. 3)

COMPRESSION LOAD - A load that tends to "squeeze" the screw. (See FIG. 3)

FIG. 3

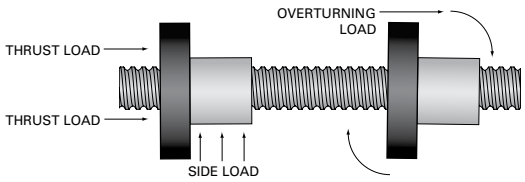


OVERTURNING LOAD - A load that tends to rotate the nut radially around the longitudinal axis of the screw. (See FIG. 4)

SIDE LOAD - A load that is applied radially to the nut. (See FIG. 4)

CAUTION - Although a side load will not prevent the ball screw from operating, the nut is not designed to operate with a side load, such as those generated from pulleys, drive belts, misalignment, etc.

FIG. 4

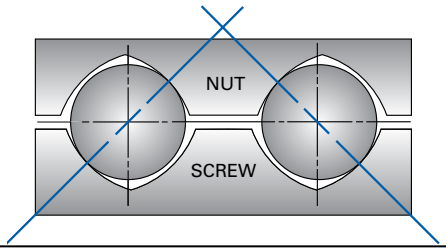


THRUST LOAD - A load parallel to and concentric with the axis of the screw. (See FIG. 4)

PRELOAD - Preload is an internal force introduced between a ball nut and screw assembly that eliminates free axial and radial lash. Preloaded assemblies provide excellent repeatability and increased system stiffness.

Preloading is achieved either by using two nuts and forcing them apart or by shifting the circuits within a single nut. Nook/Thomson has a variety of preloaded ball nut designs available. (See FIG. 5)

FIG. 5



DESIGN CONSIDERATIONS

MOUNTING AND PINNING OF BALL NUT FLANGE - If a flange is used, it must be permanently fixed to the nut. Since mounting methods usually require the disassembly of the ball nut from the screw, it is best to order the nut and flange factory assembled.

The preferred method of locking a flange to a nut is a pin or set screw parallel to the screw which intersects the flange/nut mounting thread. Because of the dissimilarity of materials, the hole may need to be milled, not drilled. (See FIG. 6 & 7)

FIG. 6

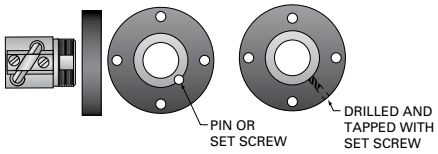


FIG. 7

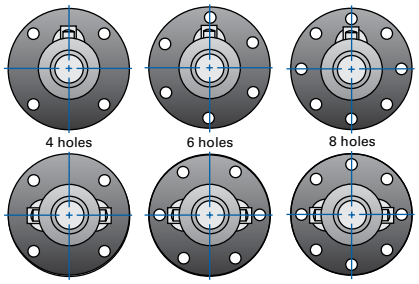
Diameter	Description	Qty
.375 to .631	⅛ × ¼ Slotted Spring Pin	1
.750 to .875	3⁄16 × ½ Slotted Spring Pin	1
1.000	3⁄16 × ½ Slotted Spring Pin	2
1.500-.200 to 1.500 -1.250	¼-20 × ¼ Set Screw	2
1.500-.473 to 1.500 -1.875	5⁄16-18 × ½ Set Screw	2
2.250 to 3.000	⅜-16 × ¾ Set Screw	2
4.000	½ × 13 × 1 Set Screw	2

Alternatively, the flange may be drilled and tapped radially for a set screw. After assembly of the flange to the nut, spot drill the nut threads through the flange and install a dog point set screw from the flange O.D. into the nut O.D. threads. Avoid getting metal chips in the nut when drilling.

Commercially available thread adhesives may be used for light load applications. Follow the manufacturer's recommendations to ensure a satisfactory bond. Avoid getting the adhesive onto the ball tracks.

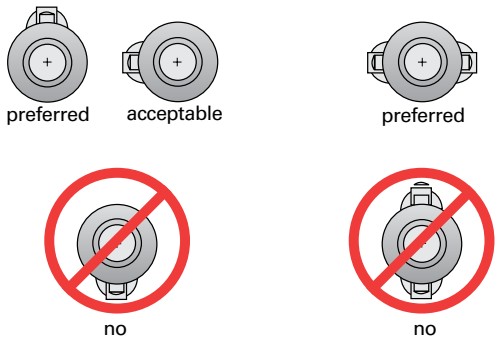
STANDARD FLANGE ORIENTATION - Standard flange orientation varies with the number of holes in the flange. Unless otherwise specified, a factory-assembled flange will be oriented on the nut as shown. (See FIG. 8)

FIG. 8



PROPER BALL NUT ORIENTATION - When a ball screw assembly is used in an orientation other than vertical, it is important to orient the return tubes to optimize ball nut operation. (See FIG. 9)

FIG. 9



TRANSFERRING BALL NUTS FROM SHIPPING ARBOR - When ordered individually, ball nuts are shipped on arbors. Transferring the ball nut from the arbor to the ball screw is achieved by placing the arbor against the end of the screw thread and carefully rotating the ball nut onto the screw from the arbor.

If the inside diameter of the arbor is too small to slip over the outside diameter of the journal, apply tape to the journal to bring the outside diameter up to the root diameter of the screw to prevent the bearing balls from falling out of the ball nut. The ball nut can then be transferred across the taped journal onto the ball screw. (See FIG. 10)

CAUTION - Removal of the arbor from the ball nut will result in the loss of the bearing balls. All of the bearing balls in a ball nut are matched. If any balls are lost during this transfer, they all must be replaced.

INSTALLING SEL, SAR, AND SAG BALL NUTS - These nuts must be transferred from the arbor to the screw without preload. Be sure to keep the ball return tubes aligned with each other and make sure the coupling tangs line up with the slots in the ball nut.

Center the adjusting nut on the coupling. Before preloading these ball nuts, all the coupling threads, spring washers/spacers and ball grooves should be lubricated.

Position the ball nut on the center of the screw shaft It is a good idea to place retainers (tape, tie-straps, etc.) on the screw to prevent the ball nut from over-traveling. With the ball return tubes facing upward, tighten the adjusting nut against the spring washer or spacer by hand until it cannot be turned. While holding the ball nut with tubes facing up, rotate the screw several turns in both directions.

Running torque can be measured by means of a spring scale. The force reading multiplied by the lever arm length yields the running torque value. Make adjustments to achieve desired preload and check running torque value up and down the screw shaft Do not tighten the adjusting nut to a point that fully collapses the spring washers. After the system is adjusted, secure the adjusting nut with the set screws provided.

LUBRICATION - Proper and frequent lubrication must be provided to achieve predicted service life. A 90% reduction in the ball screw life should be anticipated when operating the nut and screw without lubricants. Standard lubrication practices for antifriction bearings should be followed when lubricating ball screws. A light oil or grease is suitable for most applications. Lubricants containing additives such as molydisulfide or graphite should not be used. Lubrication intervals are determined by the application. It is required that screw assemblies are lubricated often enough to maintain a film of lubricant on the screw.

E-900, Nook/Thomson Ball Screw Lubricant, is oil that has been developed specifically for ball screws and is available as a spray or liquid. See page 76.

DRIVING TORQUE - Driving torque is the amount of torque required by the ball screw to move a load. To simplify this calculation a "torque to raise one pound or one kN" value is provided in the technical data for each ball screw size. (See FIG. 11)

To determine the required torque to move a load, multiply the load to be moved by the "torque to raise one pound or kN". For more information on drive torque, see the application example at the end of the section.

FIG. 10

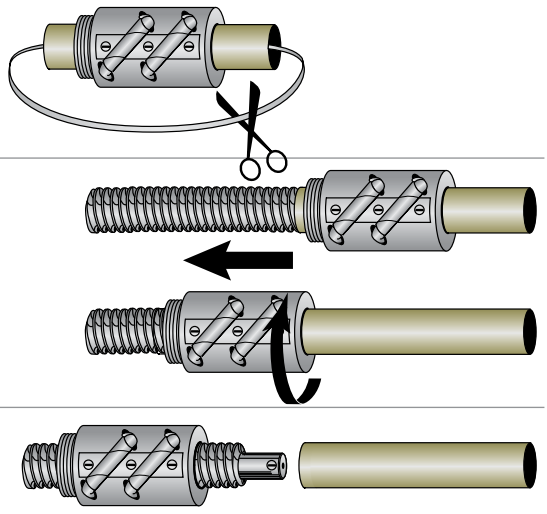
1. Remove ball nut retainer from arbor.
   Hold arbor firmly end to end with the screw.
   Make certain the arbor end is centered on the screw shaft end.

2. Slide the ball nut down the arbor and rotate counter 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.

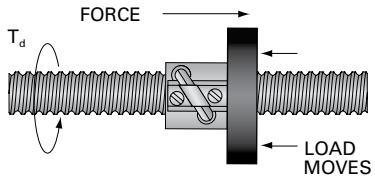
3. Remove the arbor.

   To transfer the ball nut from screw to arbor, reverse the above procedure.



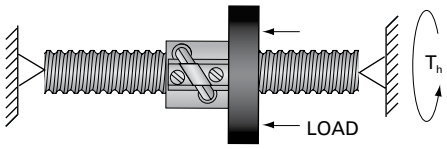
CAUTION - Extreme care must be take to prevent the ball nut from sliding off the end of the screw shaft during installation and handling. Temporary stops can be made by wrapping tape around the shaft balls grooves at each end. Be sure to remove tape and any residual adhesive after the ball screw assembly is properly installed.

FIG. 11 - Driving Torque



$$T_d = \frac{P \times L}{2\pi e} = .177\ P \times L$$

FIG. 12 - Holding Torque



$$T_h = \frac{P \times L \times e}{2\pi} = .143\ P \times L$$

Where:

- T_d = Drive Torque (pound-inches)
- T_h = Holding Torque (pound-inches)
- P = Load (lb)
- L = Screw Lead (inches/turn)
- e = Ball Bearing Screw Efficiency (90%)

HOLDING TORQUE - Due to the efficiency of a ball screw, a load applied to the ball nut will generate backdriving torque on the ball screw. The torque required to hold the load in position can be calculated by the following formula.(See FIG. 12)

TEMPERATURE - PowerTrac™ ball nuts will operate between -65°F and 300°F with proper lubrication. PowerTrac™ ball nuts equipped with elastomeric wipers are limited to operation between -20°F and 180°F.

END MACHINING - To obtain optimum performance of your ball screw assembly, it is recommended that the machining be performed at the Nook/Thomson factory. Screws may be purchased machined to your specifications or to standard end machining designs shown on pages 174-176.

Annealed ends can be provided on SRT screws to facilitate end machining of journals.

EZZE-MOUNT™ - Ball screws in operation generate an axial load and a radial load; therefore, end mounts must be designed to accommodate these loads. Nook/Thomson has designed precision end mounts to work specifically with ball screws. For a detailed description of these bearing supports see pages 177-183.

An EZZE-MOUNT™ can be shipped pre-assembled to a PowerTrac™ Ball Screw. For complete PowerTrac™ Ball Screw Assemblies refer to pages 77-81.

OPTIONAL SURFACE COATINGS - PowerTrac™ ball screws are available with optional corrosion resistant surface coatings. Consult Nook/Thomson for detailed specifications.

WIPER KITS - It is recommended that wipers be used with ball nuts to prevent contamination from foreign materials. The product pages detail the different types of wipers available for or that come standard with each ball nut. Brush wipers may require customer-supplied retention. For the different ways that this can be achieved (See FIG. 13).

BOOTS AND BELLOWS - For contaminated environments, use of a boot or metal cover to protect the ball screw assembly is recommended.

POWERTRAC™ MATERIAL SPECIFICATIONS - PowerTrac™ ball screws are manufactured from high quality alloy steel, induction hardened to Rc 58-62. PowerTrac™ ball nuts are manufactured from steel with ball tracks heat treated to Rc 58-62.

SRT ball screws less than 2" diameter and less than 16 ft are given a protective black oxide finish. SRT greater than 2" diameter, XPR and SGT ball screws are provided with a polished finish. Selected sizes are available in heat-treated stainless steel (Rc 40-45) for applications in corrosive environments. (See FIG. 14 on following page)

FIG. 13 - Some Examples of How to Attach Wiper to V-Thread End

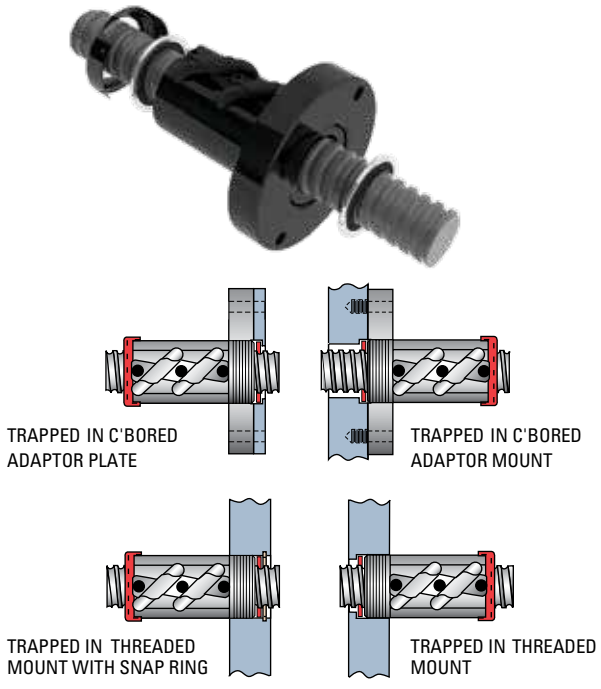


FIG. 14

	ALLOY			STAINLESS STEEL
	SRT	XPR	SGT	
Material	4150 Series	4150 Series	4150 Series	17-4 PH
Hardness	Rc 58-62 Case Hardened	Rc 58-62 Case Hardened	Rc 58-62 Case Hardened	Conditioned H900 Thru Hardened
Tensile	120,000 psi	120,000 psi	120,000 psi	150,000 psi
Finish	Roller Burnished, <2" diameter = Black Oxide Finish (16 ft or less); >2" diameter = Polished finish	Precision Roller Burnished	Precision Ground	Roller Burnished

BALL SCREW SELECTION

The selection of the correct ball screw and nut for a particular application involves five interrelated factors. Before attempting to determine the ball screw and nut combination, the following values must be known:

- Load measured in pounds or newtons
- Speed measured in inches or millimeters per minute
- Length between bearings measured in inches or millimeters
- Life expectancy
- End fixity type

LOAD - The loads that need to be considered are the static loads, dynamic loads, reaction forces and any external forces affecting the screw. See Load definitions section on page 64 for details.

SPEED - The travel rate (linear speed) is the rpm at which the screw or nut is rotating multiplied by the lead of the screw.

LENGTH - Unsupported length of the screw.

LIFE EXPECTANCY - The dynamic load ratings shown on the product specification pages indicate the load that can be carried for 1,000,000 inches of travel for inch screws and 1,000,000 revolutions for metric screws.

The charts on pages 72-73 relate life to load. In applications where the load is relatively constant over the entire stroke, use the highest load to select the ball screw to provide a factor of extra life. For applications where the loads vary significantly, an equivalent load can be calculated using the following formula:

$$L_m = \sqrt[3]{\frac{\%_1 (L_1)^3 + \%_2 (L_2)^3 + \%_3 (L_3)^3 + \ldots + \%_n (L_n)^3}{100}}$$

WHERE:

L_m = equivalent load
L_n = each increment of load
$\%_n$ = percent of stroke at load L_n

FOR EXAMPLE:

L_1 = 150# $\%_1$ = 30%
L_2 = 225# $\%_1$ = 45%
L_3 = 725# $\%_1$ = 25%

$$L_m = \sqrt[3]{\frac{30(150)^3 + 45(225)^3 + 25(725)^3}{100}}$$

L_m = 466 lbs.

The life required is determined by multiplying the total stroke in inches by the total number of strokes required for the designed life of the equipment. To calculate the travel life for a ball nut other than at rated load use the formula. (See FIG. 15)

FIG. 15

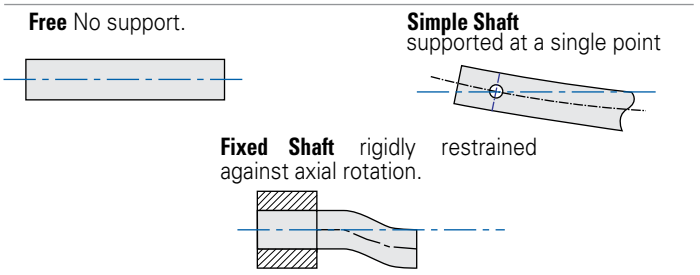
$$T_x = \left(\frac{F_r}{F_x}\right)^3 \times T_r$$

WHERE:

T_x = Travel other than rated load. Life is given in inches or meters.
F_r = Rated Load in pounds or kilonewtons.
F_x = Actual or Equivalent load in pounds or kilonewtons.
T_r = Rated Travel Life. For inch screws this is equal to 1,000,000 inches. For Metric Screws this is equal to the ball nut lead in meters times one million revolutions.

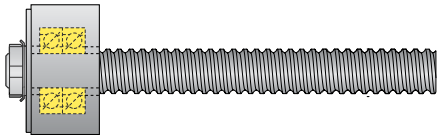
END FIXITY - End fixity refers to the method by which the ends of the screw are supported. The degree of end fixity is related to the amount of restraint of the ends of the screw.

Three basic types of end fixity are: "Simple" end fixity can be provided through a single bearing support.



Multiple or spaced pairs of bearings are more rigid than a "simple" support, but, because of their inherent compliance are not truly "fixed". A screw can be supported with different combinations of end fixity. (See FIG.16: A-D)

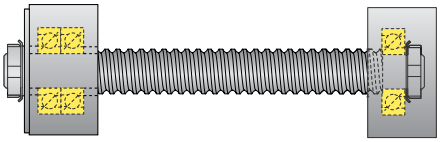
FIG.16:



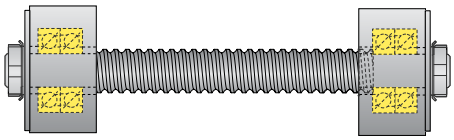
A: One end supported with a Double Bearing EZZE-MOUNT™, other end Free. Use Line A" in reference to the charts shown on pages 74-75.

NOTE: Not recommended for any application other than short travels and slow speeds.

FIG.16 (cont'd):

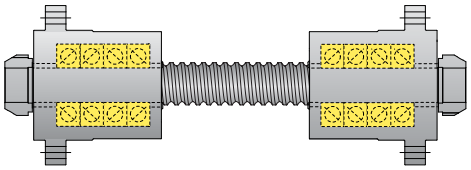


B: One end supported with a Double Bearing EZZE-MOUNT™, other supported with a Single Bearing EZZE-MOUNT™. Use Line B in reference to the charts shown on pages 74-75.



C: Both ends supported with a Double Bearing EZZE-MOUNT™. Use Line C in reference to the charts shown on pages 74-75.

CAUTION: When using double bearing mounts on both ends, contact Nook/Thomson Engineering to determine the mount-to-mount length tolerance of the final assembly.



D: Both ends supported with a Quad Bearing EZRF EZZE MOUNT™. Use Line D in reference to the charts shown on pages 74-75.

NOTE: When supporting a screw with two EZRF mounts, the screw is highly rigid. Extra care should be taken to ensure compliance in your assembly.

CAUTION: When using fixed bearing mounts on both ends, contact Nook/Thomson Engineering to determine the mount-to-mount length tolerance of the final assembly.

CRITICAL SPEED - The speed that excites the natural frequency of the screw is referred to as the critical speed. Resonance at the natural frequency of the screw will occur regardless of the screw orientation (vertical, horizontal etc.) or if the system is designed so the nut rotates about the screw.

The critical speed will vary with the diameter, unsupported length, end fixity and rpm. Since critical speed can also be affected by shaft straightness and assembly alignment, it is recommended the maximum speed be limited to 80% of the calculated critical speed. The theoretical formula to calculate critical speed in rpm is:

$$N = \frac{C_s \times 4.76 \times 10^6 \times d}{L^2}$$

WHERE: N = Critical Speed
d = Root Diameter of Screw (inch)
L = Length Between Bearing Supports (inch)
C_s = 0.36 for one end fixed, one end free
1.00 for both ends simple
1.47 for one end fixed, one end simple
2.23 for both ends fixed

The critical speed chart on page 75 is provided to quickly determine the minimum screw size applicable for Nook/Thomson EZZE-MOUNT™ designs. Maximum travel rate is also limited by ball velocity. The ball velocity is a function of the ball circle diameter and rotational speed. Ball velocity is limited by a maximum DN (ball circle diameter × rpm). The charts show the maximum speed based on the DN value for each screw in parentheses.

If the selected ball screw does not meet the speed criteria, consider the following options:

a) Increase screw lead (reduce rpm)
b) Change end fixity (e.g. simple to fixed)
c) Increase ball circle diameter

The final consideration should be to recheck the selected screw against all three of the design criteria: life, column strength and critical speed.

COLUMN STRENGTH - When a screw is loaded in compression (see compression load definition on page 64), its limit of elastic stability can be exceeded and the screw will fail through bending or buckling.

The theoretical formula to calculate the column strength in pounds is:

$$P_{cr} = \frac{14.03 \times 10^6 \times F_c \times d^4}{L^2}$$

WHERE: P_{cr} = Maximum Load

F_C = End Fixity Factor
.25 for one end fixed, one end free
1.00 for both ends supported
2.00 for one end fixed, one end simple
4.00 for both ends rigid

d = Root Diameter of Screw (inch)
L = Distance between nut and load carrying bearing (inch)

The column strength chart on page 74, may be used to verify that the screw can carry the required load without buckling.

The charts show the theoretical limitations of each screw on a separate line. The lines are limited horizontally by the slenderness ratio and vertically by the maximum static capacity of the nut. Actual load is limited by the maximum nut capacity or end mounting.

If the selected screw does not meet compression load criteria, consider the following options:

a) Change end fixity (e.g. simple to fixed)
b) Design to use screw in tension
c) Increase screw diameter

APPLICATION EXAMPLE

CNC milling machine using Nook/Thomson precision ball screws

APPLICATION

Given the following requirements, select a ball screw for this application.

Specifications:

- 5,000 lb load supported and guided on linear bearings moving horizontally
- 36" travel
- Complete 36" travel in 10 sec.
- Bearing Support Undecided
- Positioning accuracy ±¼"

STEP 1

Find the axial force required to move load. The axial force is determined by multiplying the coefficient of friction of the guidance system by the load.

$F = \mu \times N$

μ = coefficient of friction of the guidance system

Using Nook/Thomson linear bearings in this application:

μ = Coefficient of Friction for lubricated Nook/Thomson Linear Bearings = .0013

N = Load = 5,000 lb

$F = \mu \times N$

$F = .0013 \times 5{,}000$ lb

$F = 6.5$ lb

Therefore:

The Axial Force the screw must produce to move the load is 6.5 lb.

STEP 2

Find Average Travel Rate. The average travel rate is determined by dividing travel distance by travel time.

V average = D/t

D = distance = 36"

t = total time = 10 sec.

V avg. = D/t

V avg. = 36 in/10 sec.

V avg. = 3.6 in/sec. or 216 in/min

Therefore the average travel rate is 216 in/min.

STEP 3

Find Maximum Travel Rate. When considering critical speed, peak velocity should be used. Using a basic triangular motion profile (acceleration = deceleration with no constant velocity travel), the peak velocity equals twice the average velocity.

V peak = 2 × V avg.

V avg. = 3.6 in / sec. or 216 in/min

V peak = 2 × V avg.

V peak = 432 in/min

The Maximum Travel Rate is 432 in/min during the traverse of 36" in 10 sec.

STEP 4

Determine total unsupported length. Total Travel is given as 36", but extra screw length should be considered for travel nut, carriage, and any extra screw length for over travel.

Based on the travel nut and attachment of the nut to the carriage in this application it is determined that an extra 4" of screw length will be required.

(Refer to the dimensional information of the particular nut used)

L total = 36" + 4" = 40"

The total unsupported length to be used for critical speed and column loading calculations is 40".

STEP 5

Determining end fixity. The layout of the application shows that adequate space is available to use a double bearing EZZE-MOUNT™ at each end. (See end fixity definitions on page 68-69)

End Fixity = Type C

STEP 6

Select a screw based on the critical speed. Use previously determined values with the Critical Speed chart on page 75.

Max Travel Rate = 432 in/min

End Fixity = Type C

Length between bearings = 40"

Based on the Critical Speed chart, the best choice, appears to be a 1000-0250 SRT. Since the lead of the 1000-0250 SRT ball screw is .250", the maximum rpm needed to achieve the maximum travel rate would be 1,728 rpm.

STEP 7

Check Column Strength of screw. Use previously determined values with the Column Strength Chart.

Load = 6.5 lb
End Fixity = Type C
Length Between Bearing Supports = 40"

Based on the Column Strength Chart the load is within the column strength of this screw.

NOTE: Note: If this were a vertical application the full 5,000 lb load would be used. Also, under high acceleration conditions the inertia load must be determined and added to the total load for column considerations.

STEP 8

Create a reference number for the assembly. See page 83 for Reference Number System Chart.

The 1000-0250 SRT thread form is desired in a right hand thread. The end code used for machining this screw is end code 20. The type of end machining will be a Type 3 on both ends of the screw to allow for the mounting of double bearing EZZE-MOUNT™. One of the ends will have an extension to attach a coupling, the other will not. To determine the overall length of the assembly, add up the length of the ends plus the unsupported length:

One end Type 3K (drive end with keyway) = 4.03"
One end Type 3N (no drive end) = 2.71"
40" between supports
Overall length: 40" + 4.03" + 2.71" = 46.74"

The Parts List Includes:

- 1000-0250 SRT Ball Screw
- Ball Nut Number: SBN10466
- Flange Number: FLG7571
- EZZE-MOUNT™: EZM-2020 – 2 required

To receive an assembly of these components with the EZZE-MOUNT™, nut, and flange installed on the screw, the order reference number is:

1000-0250 SRT RH/EK/EN/46.74/SBN10466/FS

LIFE EXPECTANCY: SRT ROLLED INCH SCREWS

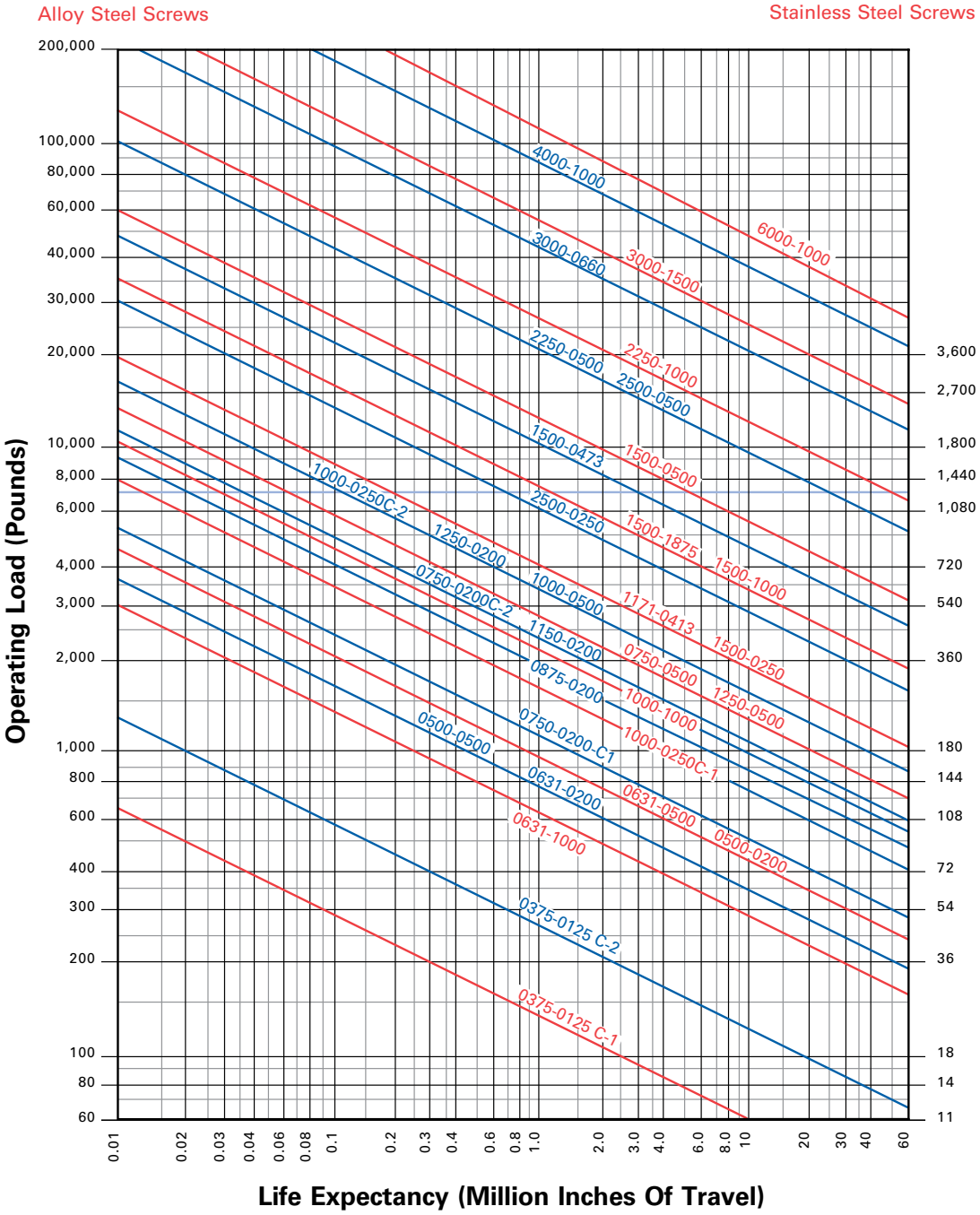
TO USE THIS CHART

1) Determine required Life (in million inches of travel) at equivalent operating load.

2) Find point at which load and life requirements intersect.

3) Select ball nut to the right or above the intersect point.

NOTE: IF USING A BALL SCREW WITHOUT LUBRICANT DE-RATE LIFE BY 90%.



LIFE EXPECTANCY: XPR PRECISION ROLLED AND SGT PRECISION GROUND INCH SCREWS

POWER•TRAC™
BALL SCREW ENGINEERING

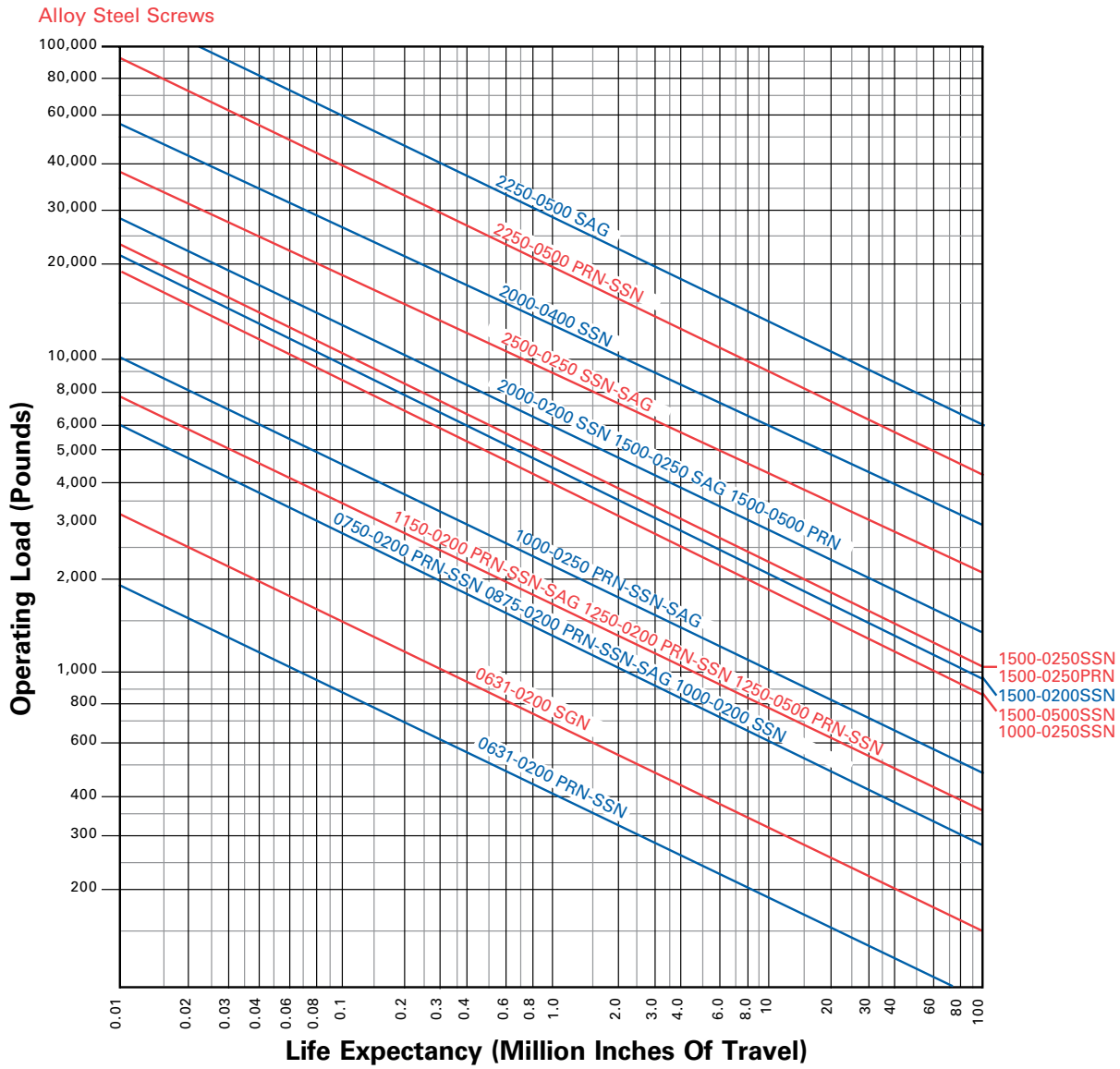
TO USE THIS CHART

1) Determine required Life (in million inches of travel) at equivalent operating load.

2) Find point at which load and life requirements intersect.

3) Select ball nut to the right or above the intersect point.

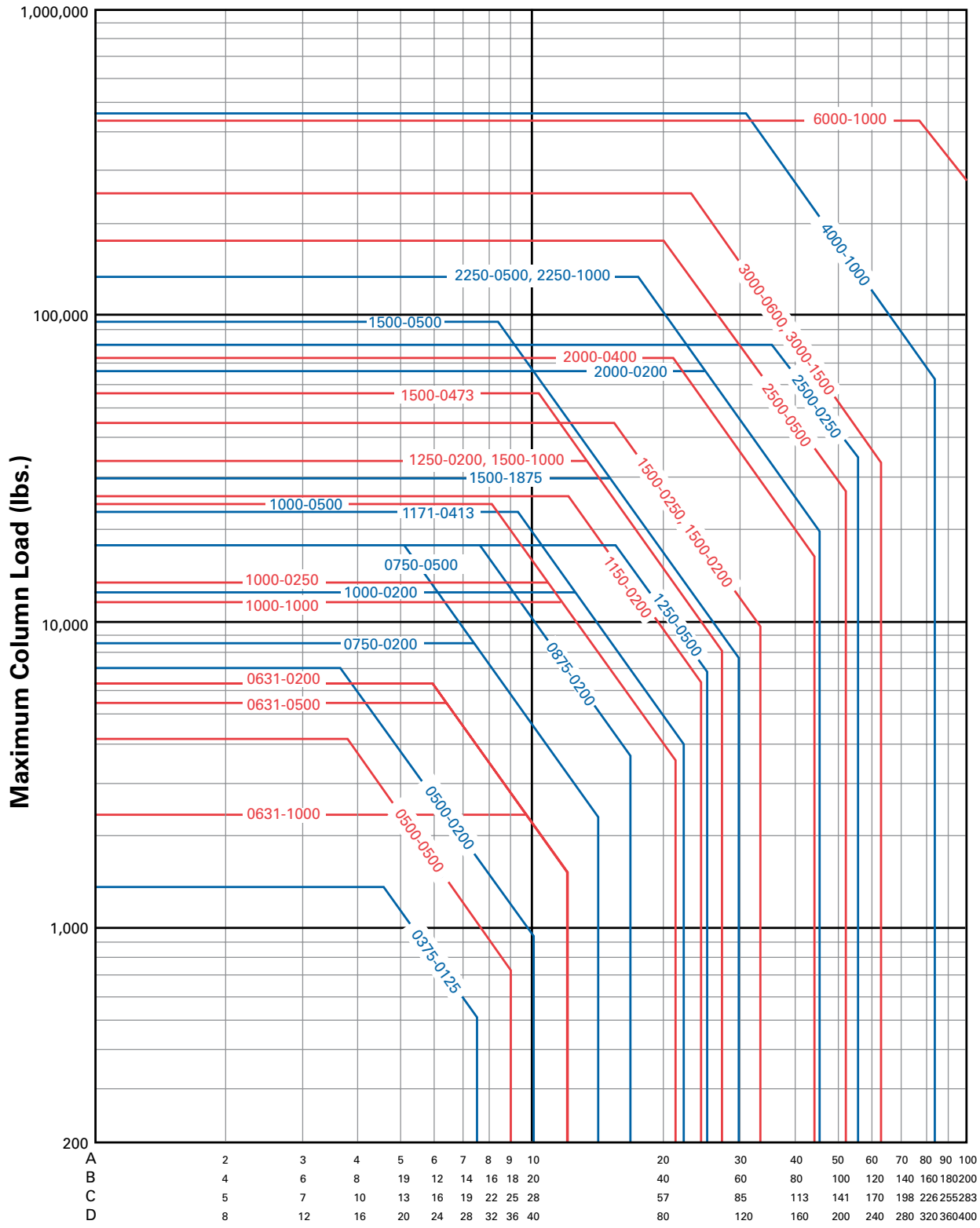
NOTE: IF USING A BALL SCREW WITHOUT LUBRICANT DE-RATE LIFE BY 90%.



COLUMN STRENGTH: SRT, XPR AND SGT INCH SCREWS

TO USE THIS CHART: Find a point at which the maximum length between bearing support and ball nut intersects the maximum load. Be sure the screw selected is above and to the right of that point.

See Page 68-69 for reference description on A-B-C-D end fixity.



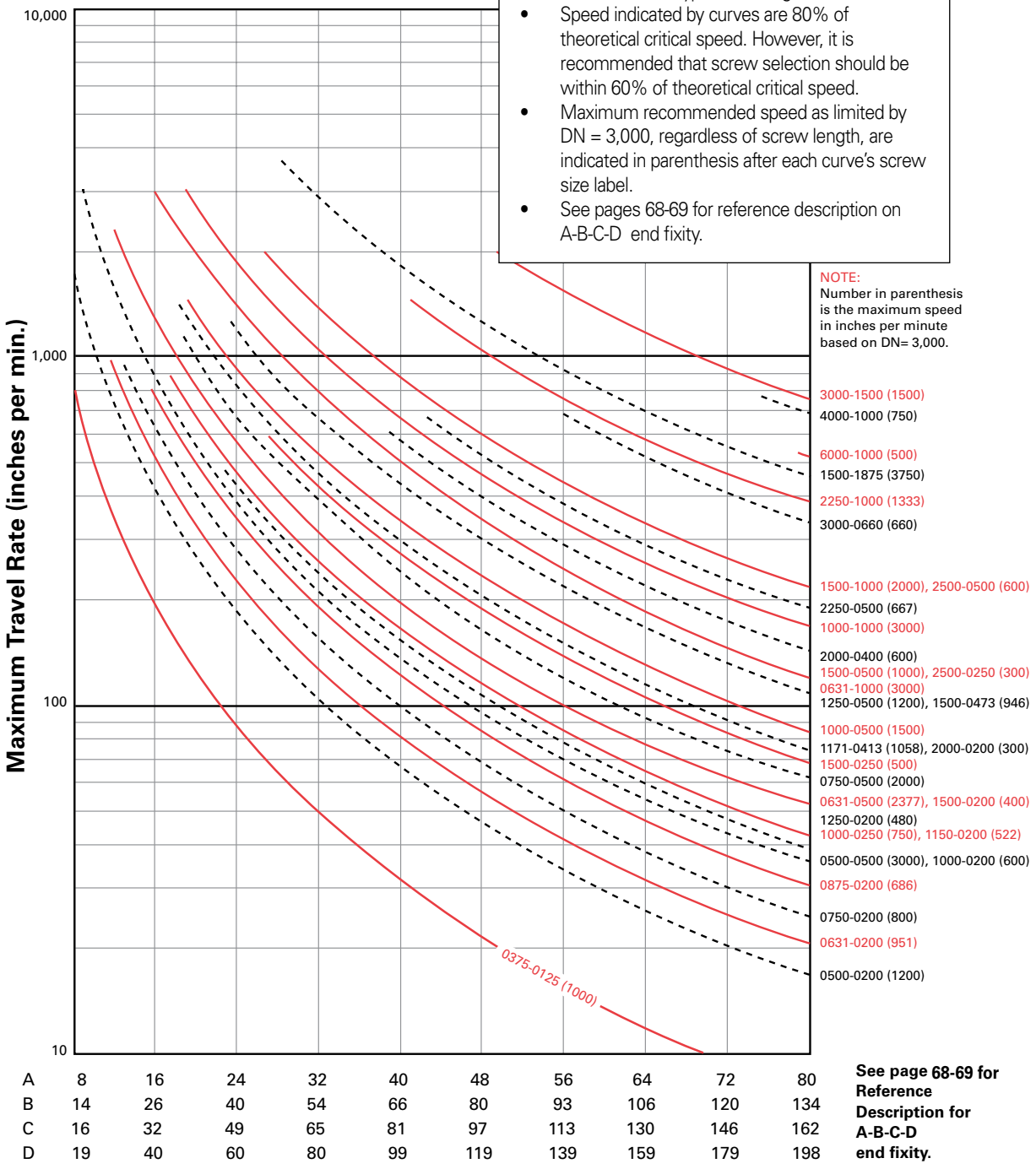
CRITICAL SPEED: BALL INCH SCREWS

POWER•TRAC™
BALL SCREW ENGINEERING

TO USE THIS CHART: Determine maximum travel rate required. Determine screw length L. Find point at which travel rate and screw length intersect and select a screw above and to the right of that point.

NOTE:

- Curves are alternately broken and solid for ease of use, the line type has no significance.
- Speed indicated by curves are 80% of theoretical critical speed. However, it is recommended that screw selection should be within 60% of theoretical critical speed.
- Maximum recommended speed as limited by DN = 3,000, regardless of screw length, are indicated in parenthesis after each curve's screw size label.
- See pages 68-69 for reference description on A-B-C-D end fixity.



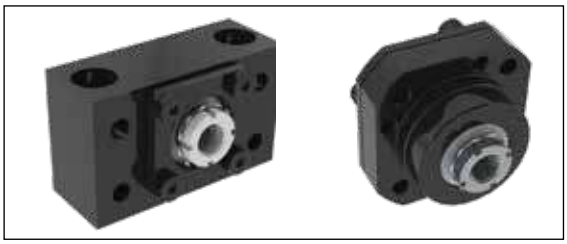
A	8	16	24	32	40	48	56	64	72	80
B	14	26	40	54	66	80	93	106	120	134
C	16	32	49	65	81	97	113	130	146	162
D	19	40	60	80	99	119	139	159	179	198

Maximum Length Between Bearings (in)

See page 68-69 for Reference Description for A-B-C-D end fixity.

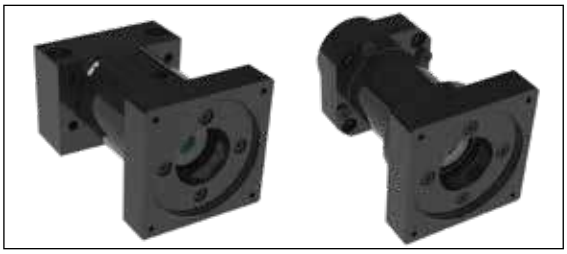
STANDARD NOOK/THOMSON COMPONENTS AND SERVICES

NOOK/THOMSON BALL SCREW AND NUT ASSEMBLIES provide ease of application, as all that is required is installation. Nook/Thomson assemblies offer turn key solutions that only require a power source (hand operation or motor). All of the elements are available for quick delivery from shelf stock. Component and assembly drawings are available from CAD drawings that can be configured and downloaded online. Contact Nook/Thomson sales engineers for assistance.



EZZE-MOUNT™ Bearing Mounts

Ball Screw



EZZE-MOUNT™ Motor Mounts

Ball Nut

Flange

End Machining

BALL SCREW AND NUT LUBRICATION

E-1000SP BALL SCREW LUBRICANT

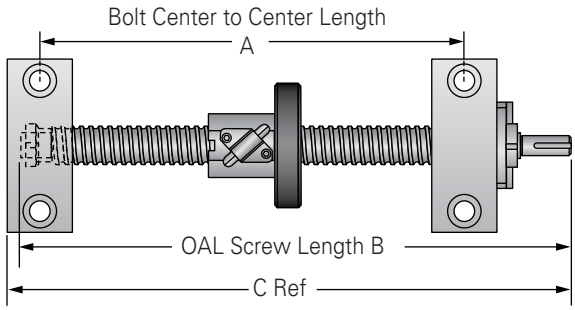
E-1000SP Ball Screw Supreme Performance Lubricant may be used on both rolled and precision ground thread ball screws. E-1000SP will provide outstanding protection of equipment, long oil life, and problem-free operation.

Scientifically engineered oils are formulated from base materials with an inherently high viscosity index. Additives enable E-1000SP to provide outstanding performance in extreme service at high and low temperatures and are resistant to shear in rolling bearing applications without loss of viscosity at both high and low speed.

E-1000SP SPRAY CAN	
Part Name	E-1000SP
Net Contents	12 oz. per can
NLU-1007	1 CAN - 1 lb
NLU-2007	1 CASE - with 12 cans - total weight of 14 lb
E-1000SPL LIQUID	
Part Name	E-1000SPL
NLU-1008	1 BOTTLE - weight of 32 oz.
NLU-2008	1 CASE - with 12 quarts - total weight of 32 lb oz.
VISCOCITY	
@ 40° C	97
@ 100° C	13.7

BALL SCREW AND NUT ASSEMBLIES
UNIVERSAL MOUNTS

POWER•TRAC™
BALL SCREW ASSEMBLIES



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

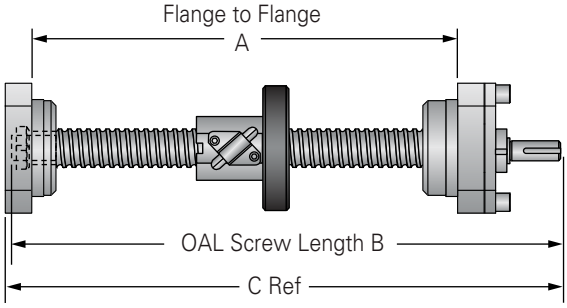
Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
0375-0125	0.125	3.02	4.78	5.00	88
0500-0200	0.200	4.58	7.01	7.13	88
0500-0500	0.500	3.90	5.75	5.94	88
0631-0200	0.200	4.11	7.14	7.38	90
0631-0500	0.500	4.11	7.14	7.38	90
0631-1000	1.000	4.11	7.14	7.38	90
0750-0200	0.200	4.28	7.55	7.76	92
0750-0500	0.500	5.33	8.60	8.81	92
0875-0200	0.200	5.40	8.65	9.04	92
1000-0250	0.250	5.09	8.99	9.10	94
1000-0500	0500	5.87	9.77	9.88	94

Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
1000-1000	1.000	5.74	9.64	9.75	96
1150-0200	0.200	5.46	9.59	9.89	96
1171-0413	0.413	6.12	10.02	10.125	98
1250-0200	0.200	6.25	10.38	10.678	98
1250-0500	0.500	6.54	10.67	10.97	98
1500-0250	0.250	5.84	10.42	10.675	100
1500-0473	0.413	7.27	11.40	11.702	100
1500-0500	0.500	8.55	12.68	12.98	102
1500-1000	1.000	6.59	10.72	11.018	102
1500-1875	1.875	7.96	12.54	12.8	102

NOTE: Larger screw sizes with EZZE-MOUNT™ bearing mounts are available. Consult factory engineers for details.

BALL SCREW AND NUT ASSEMBLIES

FLANGE MOUNTS, PILOT FACING IN



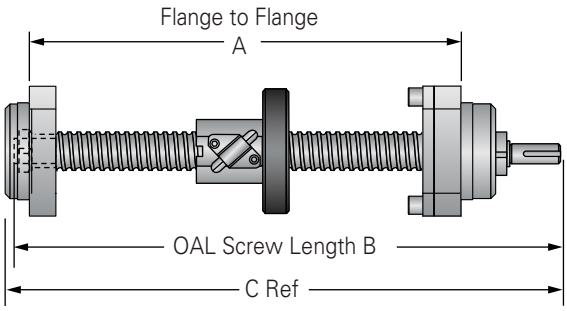
NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
0375-0125	0.125	2.92	4.72	4.94	88
0500-0200	0.200	4.607	6.757	6.937	88
0500-0500	0.500	3.795	5.685	5.875	88
0631-0200	0.200	4.03	6.94	7.15	90
0631-0500	0.500	4.03	6.94	7.15	90
0631-1000	1.000	4.03	6.94	7.15	90
0750-0200	0.200	4.405	7.415	7.625	92
0750-0500	0.500	5.457	8.467	8.677	92
0875-0200	0.200	5.294	8.474	8.674	92
1000-0250	0.250	5.12	8.64	8.85	94
1000-0500	0.500	5.9	9.42	9.63	94

Part number	Lead (in)	A (in)	B (in)	C (in)	Page
1000-1000	1.000	5.77	9.29	9.5	96
1150-0200	0.200	5.47	9.32	9.62	96
1171-0413	0.413	6.145	9.665	9.875	98
1250-0200	0.200	6.258	10.108	10.408	98
1250-0500	0.500	6.55	10.4	10.7	98
1500-0250	0.250	5.835	10.145	10.405	100
1500-0473	0.413	7.282	11.132	11.432	100
1500-0500	0.500	8.56	12.41	12.71	102
1500-1000	1.000	6.598	10.448	10.748	102
1500-1875	1.875	7.96	12.27	12.53	102

POWER•TRAC™
BALL SCREW ASSEMBLIES

FLANGE MOUNTS, PILOT FACING OUT

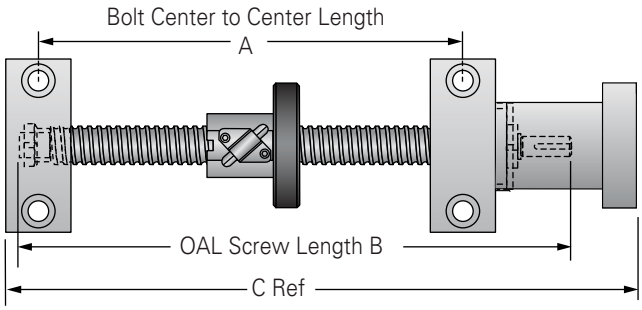


NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
0375-0125	0.125	3.18	4.72	4.94	88
0500-0200	0.200	4.64	6.76	6.94	88
0500-0500	0.500	4.06	5.69	5.88	88
0631-0200	0.200	4.15	6.94	7.15	90
0631-0500	0.500	4.15	6.94	7.15	90
0631-1000	1.000	4.15	6.94	7.15	90
0750-0200	0.200	4.35	7.42	7.63	92
0750-0500	0.500	5.40	8.47	8.68	92
0875-0200	0.200	5.40	8.47	8.67	92
1000-0250	0.250	5.07	8.64	8.85	94
1000-0500	0.500	5.85	9.42	9.63	94

Part number	Lead (in)	A (in)	B (in)	C (in)	Page
1000-1000	1.000	5.72	9.29	9.50	96
1150-0200	0.200	5.60	9.32	9.62	96
1171-0413	0.413	6.10	9.67	9.88	98
1250-0200	0.200	6.39	10.11	10.41	98
1250-0500	0.500	6.68	10.40	10.70	98
1500-0250	0.250	5.99	10.15	10.41	100
1500-0473	0.413	7.41	11.13	11.43	100
1500-0500	0.500	8.69	12.41	12.71	102
1500-1000	1.000	6.72	10.45	10.75	102
1500-1875	1.875	8.11	12.27	12.53	102

ASSEMBLIES WITH MOTOR MOUNTS
UNIVERSAL MOUNTS



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

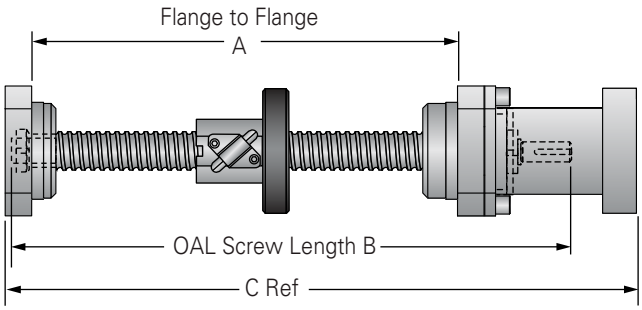
Part Number	Lead (in)	A (in)	B (in)	C (in)	Motor Mount	Page
0500-0200	0.200	4.577	7.007	8.727	EZM-3010-23	88
0500-0500	0.500	3.895	5.745	7.285	EZM-1008-17	88
0631-0200	0.200	4.11	7.14	9.01	EZM-3012-23	90
0631-0500	0.500	4.11	7.14	9.01	EZM-3012-23	90
0631-1000	1.000	4.11	7.14	9.01	EZM-3012-23	90
0750-0200	0.200	4.275	7.545	9.385	EZM-3015-34	92
0750-0500	0.500	5.327	8.597	10.437	EZM-3015-34	92
0875-0200	0.200	5.404	8.654	10.954	EZM-3017-34	92
1000-0250	0.250	5.09	8.99	11.03	EZM-2020-34	94
1000-0500	0.500	5.87	9.77	11.81	EZM-2020-34	94

Part Number	Lead (in)	A (in)	B (in)	C (in)	Motor Mount	Page
1000-1000	1.000	5.74	9.64	11.68	EZM-2020-34	96
1150-0200	0.200	5.46	9.59	11.88	EZM-3025-34	96
1171-0413	0.413	6.115	10.015	12.055	EZM-2020-34	98
1250-0200	0.200	6.248	10.378	12.668	EZM-3025-34	98
1250-0500	0.500	6.54	10.67	12.96	EZM-3025-34	98
1500-0250	0.250	5.835	10.415	12.785	EZM-2030-34	100
1500-0473	0.473	7.272	11.402	13.692	EZM-3025-34	100
1500-0500	0.500	8.55	12.68	14.97	EZM-3025-34	102
1500-1000	1.000	6.588	10.718	13.008	EZM-3025-34	102
1500-1875	1.875	7.96	12.54	14.91	EZM-2030-34	102

NOTE: Larger screw sizes with EZZE-MOUNT™ bearing mounts are available. Consult factory engineers for details.

POWER•TRAC™
BALL SCREW ASSEMBLIES

FLANGE MOUNTS, PILOT FACING IN



NOTE: Dimensions reflect a ½" over travel at each end. Add Travel to measurements below for total length.

Part Number	Lead (in)	A (in)	B (in)	C (in)	Motor Mount	Page
0500-0200	0.200	4.61	6.76	8.58	EZF-3010-23	88
0500-0500	0.500	3.80	5.69	7.23	EZF-1008-17	88
0631-0200	0.200	4.03	6.94	7.33	EZF-3012-23	90
0631-0500	0.500	4.03	6.94	7.33	EZF-3012-23	90
0631-1000	1.000	4.03	6.94	7.33	EZF-3012-23	90
0750-0200	0.200	4.41	7.42	9.63	EZF-3015-34	92
0750-0500	0.500	5.46	8.47	10.69	EZF-3015-34	92
0875-0200	0.200	5.29	8.47	10.60	EZF-3017-34	92
1000-0250	0.250	5.12	8.64	10.79	EZF-2020-34	94
1000-0500	0.500	5.90	9.42	11.57	EZF-2020-34	94

Part Number	Lead (in)	A (in)	B (in)	C (in)	Motor Mount	Page
1000-1000	1.000	5.77	9.29	11.44	EZF-2020-34	96
1150-0200	0.200	5.47	9.32	11.62	EZF-3025-34	96
1171-0413	0.413	6.145	9.67	11.82	EZF-2020-34	98
1250-0200	0.200	6.26	10.11	12.41	EZF-3025-34	98
1250-0500	0.500	6.55	10.40	12.70	EZF-3025-34	98
1500-0250	0.250	5.84	10.15	12.54	EZF-2030-34	100
1500-0473	0.473	7.28	11.13	13.43	EZF-3025-34	100
1500-0500	0.500	8.56	12.41	14.71	EZF-3025-34	102
1500-1000	1.000	6.60	10.45	12.75	EZF-3025-34	102
1500-1875	1.875	7.96	12.27	14.66	EZF-2030-34	102

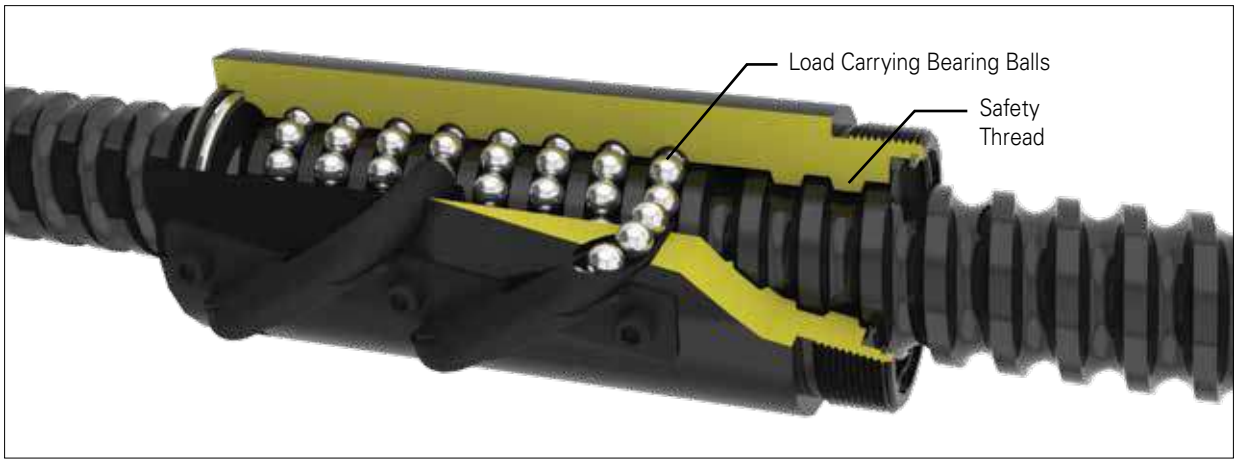
INTEGRAL SAFETY BALL NUT

The primary failure mode for ball nuts is fatigue of the bearing balls or thread surface. However, ball nuts can fail prematurely due to misalignment, impact loading, a lack of lubrication, contamination, or external damage to the return circuits. Premature failure may result in the loss of some or all of the balls between the nut and screw. When all the balls are lost the nut is no longer engaged with the screw and therefore may not move when the screw is rotated or, in vertical applications, will free fall along the screw.

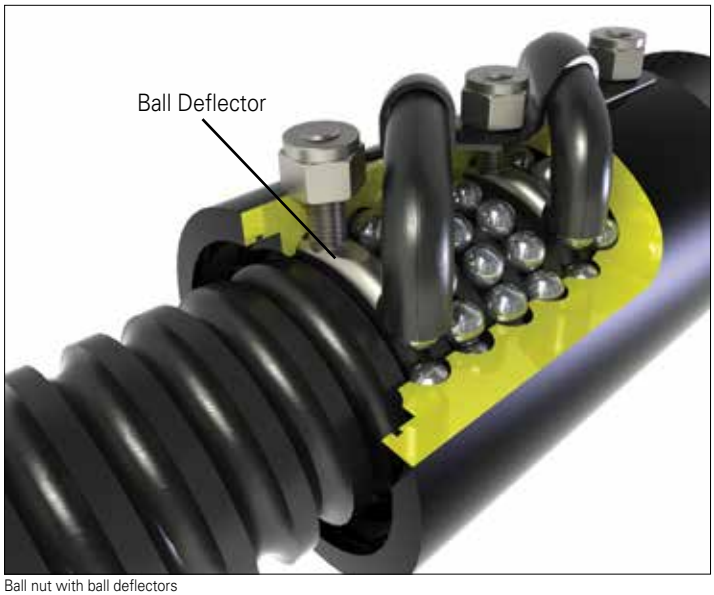
In applications where this loss of ball type failure could result in injury or death, this failure needs to be considered in the design. Possible preventative measures include the use of two or more screws supporting the load, use of nuts with multiple independent ball recirculation circuits, use of Ball Deflectors which prevent the balls from exiting the ball nut out the ends, or use of the Nook/Thomson Integral Safety Thread ball nut.

The Nook/Thomson Integral Safety Thread is a unique solution that provides the ball nut with a secondary safety thread – a reverse thread in the nut body itself. This special thread extends from the ID of the nut to below the OD of the screw without making contact. In the unlikely event that all the balls in the nut are lost, this "safety" thread will engage the screw and prevent free-fall. Although this thread can be used to lower the load to a safe position, it is not to be used otherwise. This can also be accomplished with the use of a special flange if the ball nut body cannot accommodate the Safety Thread feature.

Screw	Helix	Safety Thread	Ball Deflector
0631-0200	RH	SBN10583	–
1500-0500	RH	SBN10974	–
2250-0500	RH	SBN10629	SBN10074
2250-0500	LH	–	SBN10075
2250-1000	RH	–	SBN10260
3000-0660	RH	SBN10202	SBN10202
3000-0660	LH	–	SBN10257
3000-1500	RH	–	SBN4986
4000-1000	RH	SBN3258	SBN3258



Ball nut with integral safety thread



Ball nut with ball deflectors

BALL SCREW AND NUT ASSEMBLIES
REFERENCE NUMBER SYSTEM

POWER•TRAC™
BALL SCREW ASSEMBLIES

1000-0250 SRT RA / EKS / 4NX / 41.87 / SBN10466 / FS

BALL SCREW

Thread Form Codes

Part#	Dia. - Lead
0375-0125 =	0.375-0.125
0500-0200 =	0.500-0.200
0500-0500 =	0.500-0.500
0631-0200 =	0.631-0.200
0631-0500 =	0.631-0.500
0631-1000 =	0.631-1.000
0750-0200 =	0.750-0.200
0750-0500 =	0.750-0.500
0875-0200 =	0.875-0.200
1000-0200 =	1.000-0.200
1000-0250 =	1.000-0.250
1000-0500 =	1.000-0.500
1000-1000 =	1.000-1.000
1150-0200 =	1.150-0.200
1171-0413 =	1.171-0.413
1250-0200 =	1.250-0.200
1250-0500 =	1.250-0.500
1500-0200 =	1.500-0.200
1500-0250 =	1.500-0.250
1500-0473 =	1.500-0.473
1500-0500 =	1.500-0.500
1500-1000 =	1.500-1.000
1500-1875 =	1.500-1.875
2000-0200 =	2.000-0.200
2000-0400 =	2.000-0.400
2000-0500 =	2.000-0.500
2250-0500 =	2.250-0.500
2250-1000 =	2.250-1.000
2500-0250 =	2.500-0.250
2500-0500 =	2.500-0.500
2500-1000 =	2.500-1.000
3000-0660 =	3.000-0.660
3000-1500 =	3.000-1.500
4000-1000 =	4.000-1.000

PRECISION

SRT = Standard Rolled Thread ±0.004"/ft.

XPR = Precision Rolled Thread ±0.001"/ft.

SGT = Precision Ground Thread ±0.0005"/ft.

Note: Not all precisions are available for all sizes.

MATERIAL

R A

R = Right Hand Thread
L = Left Hand Thread

A = Alloy
S = Stainless

Note: Not all materials are available for all sizes.

FIRST END CONFIGURATION

Note: Both Ends must be specified.

Single Bearing Supports are used in conjunction with Type 1N end machining.

Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

Flanged Fixed Bearing Mounts are used in conjunction with Type 5 end machining.

EZZE-MOUNT™ / End Machining (see page 174 - 176)

EK S

EK = Universal Double Bearing Support, with Keyway

1 = Type 1
2 = Type 2
3 = Type 3
4 = Type 4
5 = Type 5

Shaft Extension (see page 174-176)
K = Shaft Extension with Keyway
L = Shaft Extension without Keyway
N = No Shaft

Bearing Mount Install
S = Bearing Mount Installed
N = Bearing Mount Shipped Loose
X = No Bearing Mount

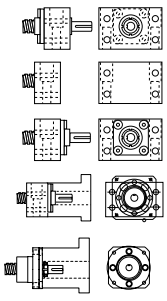
B = Universal Double Bearing Support End Cap Facing Screw Thread

C = Universal Single Bearing Support

E = Universal Double Bearing Support End Cap Facing Away From Screw Thread

U = Universal Double Bearing Support with Motor Mount

Y = Flanged Double Bearing Support with Motor Mount

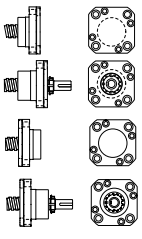


D = Flanged Single Bearing Support Flange Facing Screw Thread

F = Flanged Double Bearing Support Flange Facing Screw Thread

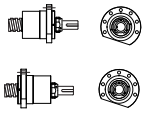
G = Flanged Single Bearing Support Flange Facing Away From Screw Thread

H = Flanged Double Bearing Support Flange Facing Away From Screw Thread



R = Flanged Fixed Bearing Support Flange Facing Screw Thread

V = Flanged Fixed Bearing Support Flange Facing Away From Screw Thread



00 = No End Machining (Screw will be cut to desired length).

XX = Custom Machining (Print or specified data must be provided).

MODIFIER LIST

S or M Required

S = Standard, no additional description required

M = Modified, additional description required

F, B,and/or W Optional

F = Round Flange
B = Boot
W = Wiper

BALL NUT

Nut will be installed with flange or threaded end toward first end designation.
000000 = No Nut

OVER - ALL - LENGTH (OAL)

Length in inches, 2 place decimal

SECOND END CONFIGURATION

Refer to the First End Configuration section below

Note: Both Ends must be specified.

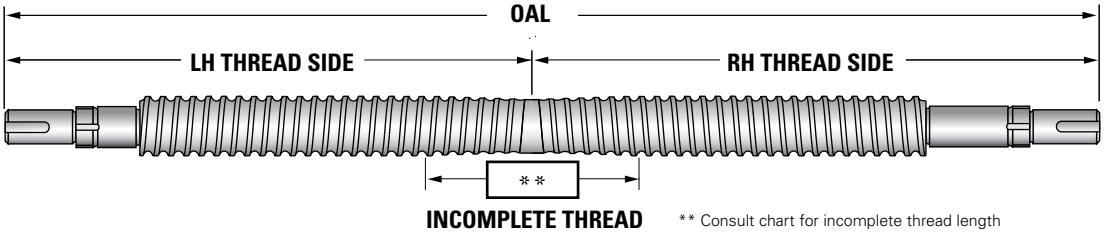
TWIN-LEAD BALL SCREW ASSEMBLIES

Twin-lead ball screws offer dual opposing motion using a single drive system. These one-piece, high performance ball screws are made from high alloy steel.

Twin-lead ball screw assemblies can be assembled with Nook/Thomson PowerTrac™ ball nuts, flanges and EZZE-MOUNT™ bearing supports (see page 177-181) to form cost effective systems. Twin-lead ball screws can be used in molding machines, packaging equipment, food processing machinery, robotics, material handling equipment, tire manufacturing and assembly applications.

- Lead accuracy of ±0.004"/foot is standard
- For a shorter unthreaded center section, contact Nook/Thomson customer service at 800-321-7800.

Twin-Lead screws are stocked for quick delivery without machined ends in the sizes in the chart below. To order a twin-lead cut to a custom length and/or with machined ends, select a size from the Twin-Lead chart to the right, determine OAL, LH and RH thread length, nut, flange and, if required, EZZE-MOUNT™ bearing support. Precision ground twin lead ball screws are also available. Contact a Nook/Thomson sales engineer for availability. Consult the Twin-Lead Reference Number System on the next page to complete your part number.



** Consult chart for incomplete thread length

Stocked Sizes without End Machining

Screw Size Dia. - Lead	Root Dia (Min)	Max Overall Length	Max Usable LH & RH Thread	Incomplete Overlapping Thread Count	Page number SRT	Page number SGT
0375-0125	0.300	36	17.00	2.00	86	-
0631-0200	0.500	72	34.75	2.50	88	-
1000-0250	0.820	96	46.75	2.50	92	-
1250-0200	1.115	108	52.75	2.50	96	136
1500-0250	1.320	108	52.50	3.00	98	-
1500-1000	1.140	192	94.00	4.00	100	-

Sizes Available On Order

Screw Size Dia. - Lead	Root Dia (Min)	Max Overall Length	Max Usable LH & RH Thread	Incomplete Overlapping Thread Count	Page number SRT	Page number SGT
2000-0200	1.849	140	69.00	0.25	-	140
2250-0500	1.850	192	93.50	4.00	106	-
3000-0660	2.480	192	93.50	6.00	112	-

Measurements in inches.

TWIN-LEAD BALL SCREW ASSEMBLIES
REFERENCE NUMBER SYSTEM

POWER•TRAC™
BALL SCREW ASSEMBLIES

1000-0250 SRT TA / EKS / 4NX / 33.50 / 16.75 / 16.75 / SBN10468A / SBN10466A / FS

TWIN-LEAD BALL SCREW
Thread Form Codes

Part#	Dia. - Lead
0375-0125	0.375-0.125
0631-0200	0.631-0.200
1000-0250	1.000-0.250
1250-0200	1.250-0.200
1500-0250	1.500-0.250
1500-1000	1.500-1.000
2000-0200	2.000-0.200
2250-0500	2.250-0.500
3000-0660	3.000-0.660

PRECISION
SRT = Standard Rolled Thread ±0.004"/ft.

SGT = Precision Ground Thread ±0.0005"/ft.

Note: Not all precisions are available for all sizes.

MATERIAL
TA =Twin-Lead Alloy

TS = Twin-Lead Stainless Steel

Note: Not all materials are available for all sizes.

MODIFIER LIST
S or M Required

S = Standard. no additional description required
F and/or W Optional
F = Round Flange = Wiper

M = Modified, additional description required

RIGHT HAND BALL NUT
000000 = No Nut

Note: To Select the Nut Direction After Nut Part number, add A or B

A = Nut Thread or Flange installed towards center of screw

B = Nut Thread or Flange installed towards end of screw

LEFT HAND BALL NUT
000000 = No Nut

FIRST END CONFIGURATION
Note: Both Ends must be specified.

Single Bearing Supports are used in conjunction with Type 1N end machining.

Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

Flanged Fixed Bearing Mounts are used in conjunction with Type 5 end machining.

RIGHT HAND THREAD
Length in inches, 2 place decimal
Note: See figure on page 94

LEFT HAND THREAD
Length in inches, 2 place decimal
Note: See figure on page 94

OVER - ALL - LENGTH (OAL)
Length in inches, 2 place decimal

SECOND END CONFIGURATION
Refer to the First End Configuration section on the Left.
Note: Both Ends must be specified.

EZZE-MOUNT™ / End Machining
(see page 174-176)

1 = Type 1
2 = Type 2
3 = Type 3
4 = Type 4
5 = Type 5

EK S

EK = Universal Double Bearing Support, with Keyway

Bearing Mount Install
S = Bearing Mount Installed
N = Bearing Mount Shipped Loose
X = No Bearing Mount

Shaft Extension (see page 174-176)
K = Shaft Extension with Keyway
L = Shaft Extension without Keyway
N = No Shaft Extension

B = Universal Double Bearing Support End Cap Facing Screw Thread

C = Universal Single Bearing Support

D = Flanged Single Bearing Support Flange Facing Screw Thread

E = Universal Double Bearing Support End Cap Facing Away From Screw Thread

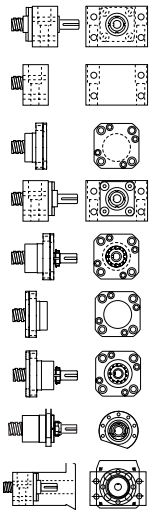
F = Flanged Double Bearing Support Flange Facing Screw Thread

G = Flanged Single Bearing Support Flange Facing Away From Screw Thread

H = Flanged Double Bearing Support Flange Facing Away From Screw Thread

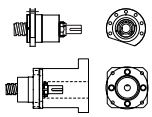
R = Flanged Fixed Bearing Support Flange Facing Screw Thread

U = Universal Double Bearing Support with Motor Mount



V = Flanged Fixed Bearing Support Flange Facing Away From Screw Thread

Y = Flanged Double Bearing Support with Motor Mount



00 = No End Machining (Screw will be cut to desired length)
XX = Custom Machining (Print or specified data must be provided)

BALL SCREWS

SRT ROLLED BALL SCREWS

SRT – Standard Rolled Thread (sometimes referred to as commercial or transport type) ball screws offer the low friction advantage of antifriction screws at lower cost. They are capable of higher speeds and longer predictable life when compared to similar acme type lead screws.

Offered in diameters from ⅜" to 4" and leads from .125" to 1.875" depending on diameter, they are manufactured from the same high quality materials and produced following the same ISO certified procedures as higher precision screws. Most SRT screws are rolled, induction heat treated and polished or black oxide coated (optional). Three sizes are also available in 17-4 PH stainless steel.

SRT screws are offered with OD threaded, non-preloaded ball nuts, with optional mounting flanges and wipers. Some sizes are also available with integral flange nuts and/or with double nuts. Double nuts have a spring loaded adjustable preloading feature for eliminating backlash.

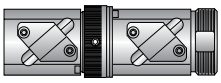
For convenience SRT screws can be supplied completely machined and assembled with nuts, flanges, wipers and EZZE-MOUNTS ready for assembly to your product. Should a standard assembly not fit the application, Nook/Thomson can machine the screw to your specific design requirements.

SRT BALL NUTS

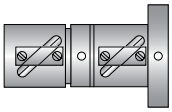
SBN Standard Ball Nut (no preload) – offers durable, low cost linear motion. Mounting flanges and wiper kits can be installed on the SBN nuts.

External Return Internal Return

SEL Standard Easy-Loc Adjustable Preload Ball Nut – designed to eliminate the axial play or movement associated with standard ball nuts. Mounting flanges and wiper kits can be installed on the SEL nuts.



SAR Standard Adjustable Preload Ball Nut (Ground Ball Groove, Integral Flange & Wipers) – offers the same high performance features found in precision ground thread ball nut assemblies with the added ability to run on rolled thread or ground thread screws. The SAR ball nut features adjustable preload, ground ball races, integral flange and wipers. The precision ground flange ensures alignment of the nut preventing unnecessary wear.



Precision ball screw assembly

SRT BALL SCREW QUICK REFERENCE

POWER•TRAC™
BALL SCREW ASSEMBLIES

Diameter-Lead	Nut	Screw Material	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in·lb)
			Dynamic	Static		
0.375-0.125	SBN	4150	136	1,415	0.300	0.022
	SBN	SS	24	255	0.300	0.022
	SBN*	4150	272	2,830	0.300	0.022
	SBN*	SS	50	509	0.300	0.022
0.500-0.200	SBN	4150	973	7,071	0.405	0.035
0.500-0.500	SBN	4150	786	4,131	0.350	0.088
0.631-0.200	SBN	4150	815	6,384	0.500	0.035
	SBN**	4150	712	5,250	0.500	0.035
	SEL	4150	815	6,384	0.500	0.035
0.631-0.500	SBN	4150	960	5,565	0.500	0.088
	SEL	4150	960	5,565	0.500	0.088
0.631-1.000	SBN	4150	620	2,580	0.500	0.177
0.750-0.200	SBN	4150	1,100	8,569	0.602	0.035
	SBN*	4150	2,200	17,138	0.602	0.035
	SEL	4150	2,200	17,138	0.602	0.035
0.750-0.500	SBN	4150	2,723	17,425	0.602	0.088
0.875-0.200	SBN	4150	1,942	18,063	0.735	0.035
1.000-0.250	SBN	4150	1,612	13,913	0.820	0.044
	SBN	SS	290	2,504	0.820	0.044
	SBN*	4150	3,224	27,826	0.820	0.044
	SEL	4150	1,612	13,913	0.820	0.044
	SAR	4150	1,612	13,913	0.820	0.044
1.000-0.500	SBN	4150	3,440	25,250	0.820	0.088
	SEL	4150	3,440	25,250	0.820	0.088
1.000-1.000	SBN	4150	2,142	11,925	0.820	0.177
1.150-0.200	SBN	4150	2,142	11,925	1.015	0.035
	SEL	4150	2,142	11,925	1.015	0.035
1.171-0.413	SBN	4150	3,894	22,917	0.870	0.073
1.250-0.200	SBN	4150	3,336	34,688	1.115	0.035
1.250-0.500	SBN	4150	2,745	17,235	1.050	0.088
1.500-0.250	SBN	4150	4,198	44,030	1.320	0.044
	SEL	4150	4,198	44,030	1.320	0.044
	SAR	4150	4,198	44,030	1.320	0.044
1.500-0.473	SBN	4150	10,050	57,770	1.140	0.084
1.500-0.500	SBN	4150	12,320	97,696	1.174	0.088
1.500-1.000	SBN	4150	7,560	34,662	1.140	0.176
	SEL	4150	7,560	34,662	1.140	0.176
1.500-1.875	SBN	4150	7,242	29,895	1.188	0.332
2.000-0.500	SBN	1050	18,500	154,653	1.720	1.42
	SEL	1050	18,500	154,653	1.720	0.088
2.250-0.500	SBN	4150	21,306	142,660	1.850	0.088
	SAR	4150	21,306	142,660	1.850	0.088
2.250-1.000	SBN	4150	26,538	142,660	1.850	0.177
	SAR	4150	26,538	142,660	1.850	0.177
2.500-0.250	SBN	4150	6,135	81,938	2.320	0.044
	SAR	4150	6,135	81,938	2.320	0.044
2.500-0.500	SBN	4150	21,200	186,660	2.320	0.088
2.500-1.000	SBN	4150	27,000	174,000	2.22	2.83
	SEL	4150	22,981	186,000	2.22	1.42
3.000-0.660	SBN	4150	44,316	271,733	2.480	0.117
3.000-1.500	SBN	4150	53,646	253,617	2.480	0.266
4.000-1.000	SBN	4150	85,758	476,970	3.338	0.177

* double circuit
** internal return

BALL SCREWS

0375-0125 SRT
0500-0200 SRT
0500-0500 SRT

	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0375-0125 SRT **single start** 0.375 Ball Circle Dia. (in) 0.125 Lead (in)	SBN9574	RH	0	136	1,415	60/60	0.0625	0.13	0.022
	SBN9576	LH	0	136	1,415	60/60	0.0625	0.13	0.022
	SBN9578	RHSS	0	24	255	60/60	0.0625	0.13	0.022
	SBN7502	RH	0	272	2,830	60/120	0.0625	0.21	0.022
	SBN8282	LH	0	272	2,830	60/120	0.0625	0.21	0.022
	SBN7643	RHSS	0	50	509	60/120	0.0625	0.21	0.022
	SEL0375	RH	10**	136	1,415	60/120	0.0625	0.21	0.022
0500-0200 SRT **single start** 0.500 Ball Circle Dia. (in) 0.200 Lead (in)	SBN10094	RH	0	973	7,071	40/80	0.125	0.51	0.035
0500-0500 SRT **double start** 0.500 Ball Circle Dia. (in) 0.500 Lead (in)	SBN9582	RH	0	786	4,131	30/60	0.125	0.27	0.088

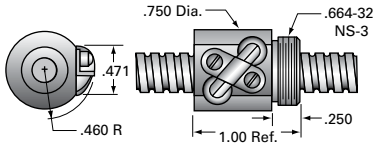
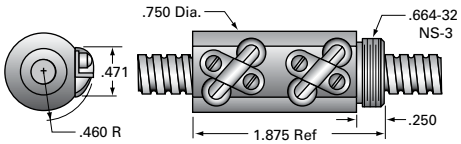
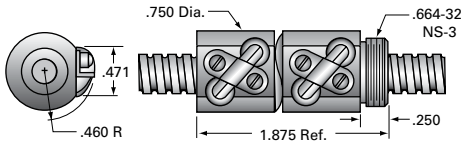
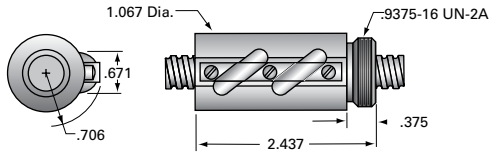
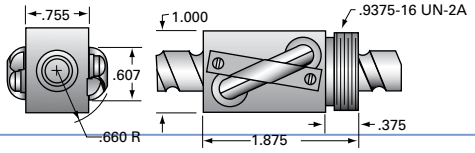
* Nut is nickel-plated, load rating calculated for stainless steel screw
** Not adjustible

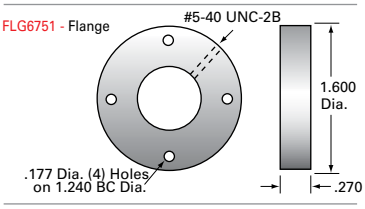
STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

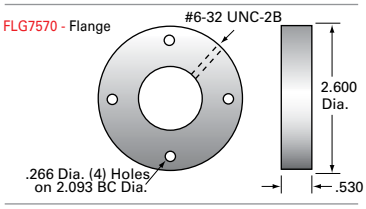
	0375-0125 RH	0375-0125 LH	0375-0125 RHSS	0500-0200 RH	0500-0500 RH
2 ft	SRT9420	SRT8528	SRT6536	SRT5224	SRT6736
4 ft	SRT7538	SRT8532	SRT6540	SRT5248	SRT6740
6 ft	—	—	—	SRT5272	SRT6744

For longer lengths, contact Customer Service.

POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
0.375	0.125	0.300	0.31	FLG6751	—	
0.375	0.125	0.300	0.31	FLG6751	—	
0.375	0.125	0.300	0.31	—	—	
0.375	0.125	0.300	0.31	FLG6751	—	
0.375	0.125	0.300	0.31	FLG6751	—	
0.375	0.125	0.300	0.31	—	—	
0.375	0.125	0.300	0.31	FLG6751	—	
0.500	0.200	0.405	0.50	FLG7570	—	
0.500	0.500	0.360	0.50	FLG7570	—	





0631-0200 SRT
0631-0500 SRT
0631-1000 SRT

0631-0200 SRT
single start

0.631 Ball Circle Dia. (in)
0.200 Lead (in)

0631-0500 SRT
double start

0.631 Ball Circle Dia. (in)
0.500 Lead (in)

0631-1000 SRT
four start

0.631 Ball Circle Dia. (in)
1.000 Lead (in)

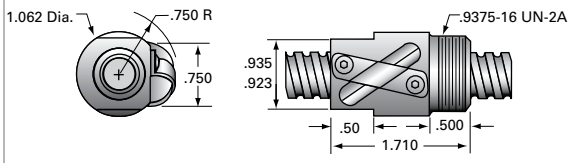
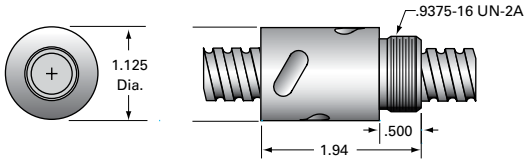
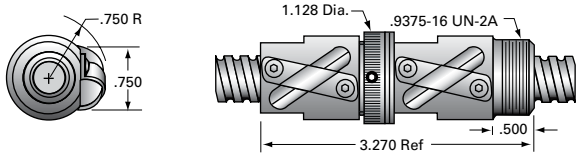
BALL NUT								
Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
SBN10325 SBN10583*	RH	0	815	6,384	68/68	0.125	0.27	0.035
SBN10409	LH	0	815	6,384	68/68	0.125	0.27	0.035
SBN10566	RH	0	712	5,250	60/60	0.125	0.27	0.035
SBN10264	LH	0	712	5,250	60/60	0.125	0.27	0.035
SEL10408	RH	233	815	6,384	68/136	0.125	0.65	0.035
SEL10410	LH	233	815	6,384	68/136	0.125	0.65	0.035
SBN10113	RH	0	960	5,565	37/74	0.125	0.27	0.088
SEL10182	RH	288	960	5,565	37/148	0.125	0.65	0.088
SBN10392	RH	0	620	2,580	21/42	0.125	0.28	0.177

STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

	0631-0200 RH	0631-0200 LH	0631-0500 RH	0631-1000 RH
2 ft	SRT9392	SRT9562	SRT6524	SRT6124
4 ft	SRT9987	SRT5092	SRT6548	SRT6148
6 ft	SRT7540	SRT7541	SRT6572	SRT6172

For longer lengths, contact Customer Service.
* Integral safety thread. See page 82.

POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
0.631	0.200	0.500	0.82	FLG7570	WKB10407	
0.631	0.200	0.500	0.82	FLG7570	WKB10407	
0.631	0.200	0.500	0.82	FLG7570	—	
0.631	0.200	0.500	0.82	FLG7570	—	
0.631	0.200	0.500	0.82	FLG7570	WKB10407	
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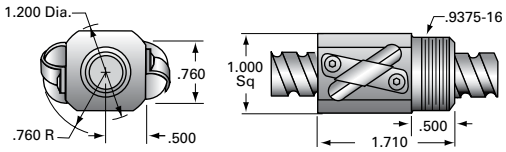
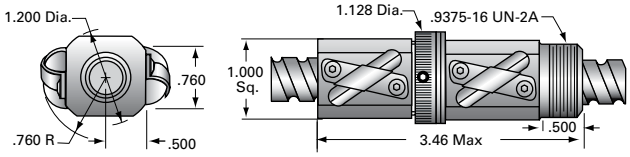
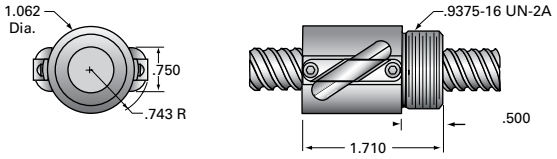
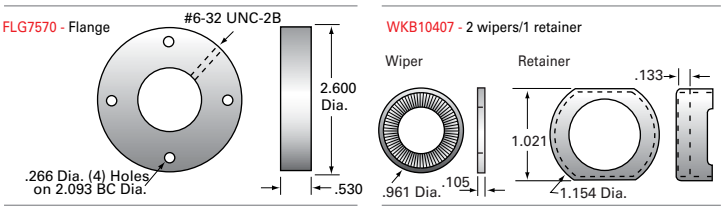
0.631	0.500	0.500	0.82	FLG7570	—	
0.631	0.500	0.500	0.82	FLG7570	—	
0.631	1.000	0.500	0.82	FLG7570	—	



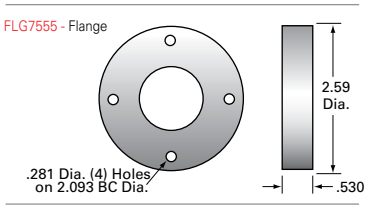
0750-0200 SRT
0750-0500 SRT
0875-0200 SRT

	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0750-0200 SRT **single start** 0.750 Ball Circle Dia. (in) 0.200 Lead (in)	SBN7201	RH	0	1,100	8,569	70/70	0.141	0.35	0.035
	SBN7202	RH	0	2,200	17,138	70/140	0.141	0.80	0.035
	SEL10057	RH	660	2,200	17,138	70/140	0.141	2.10	0.035
0750-0500 SRT **double start** 0.750 Ball Circle Dia. (in) 0.500 Lead (in)	SBN7500	RH	0	2,723	17,425	78/156	0.141	0.80	0.088
0875-0200 SRT **single start** 0.875 Ball Circle Dia. (in) 0.200 Lead (in)	SBN8277	RH	0	1,942	18,063	91/182	0.125	0.70	0.035

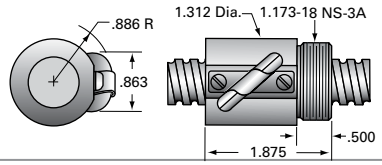
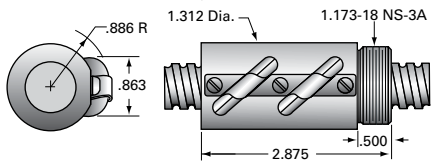
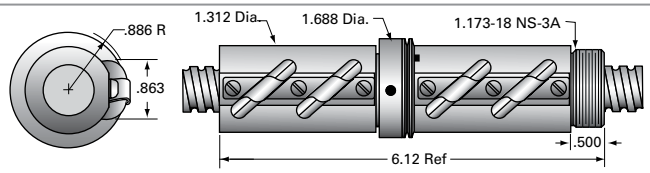
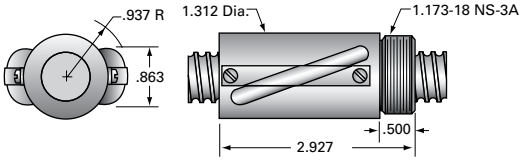
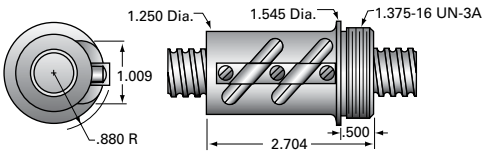
STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

	0750-0200 RH	0750-0500 RH	0875-0200 RH
4 ft	SRT7248	SRT7552	SRT8541
8 ft	SRT7296	SRT7596	SRT8553
12 ft	SRT7244	SRT7292	SRT8859

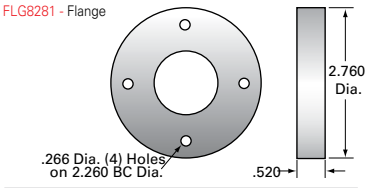
For longer lengths, contact Customer Service.



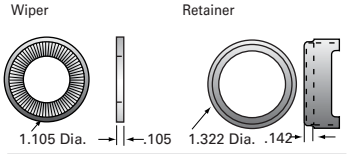
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
0.750	0.200	0.602	1.22	FLG7555	WKB7200	
0.750	0.200	0.602	1.22	FLG7555	WKB7200	
0.750	0.200	0.602	1.22	FLG7555	WKB7200	
0.750	0.500	0.602	1.22	FLG7555	WKB7200	
0.875	0.200	0.735	1.78	FLG8281	WKB2648	

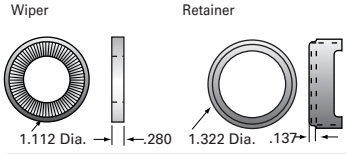
FLG8281 - Flange



WKB7200 - 2 wipers/1 retainer



WKB2648 - 2 wipers/1 retainer



1000-0250 SRT
1000-0500 SRT

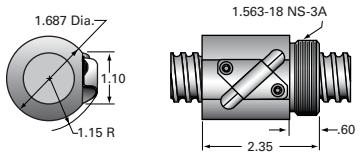
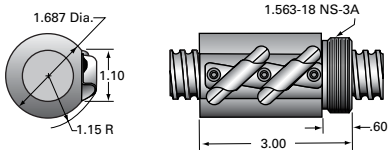
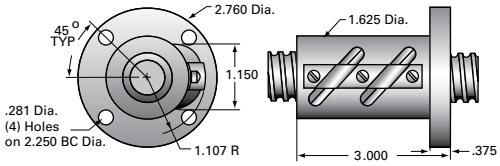
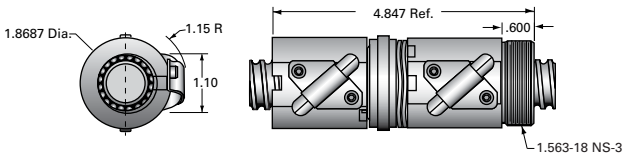
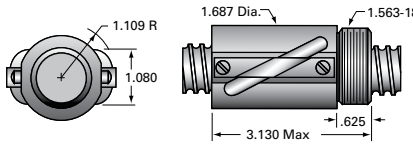
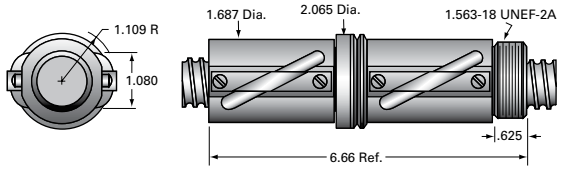
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1000-0250 SRT **single start** 1.000 Ball Circle Dia. (in) 0.250 Lead (in)	SBN10466	RH	0	1,612	13,913	86/86	0.156	0.8	0.044
	SBN10472	RH	0	3,224	27,826	86/172	0.156	1.2	0.044
	SBN8278	RH	0	3,224	27,826	86/172	0.156	1.5	0.044
	SBN8284	LH	0	3,224	27,826	86/172	0.156	1.5	0.044
	SEL10474	RH	330	1,612	13,913	86/172	0.156	1.9	0.044
1000-0500 SRT **double start** 1.000 Ball Circle Dia. (in) 0.500 Lead (in)	SBN1050	RH	0	3,440	25,250	91/182	0.156	1.2	0.088
	SEL10066	RH	817	3,440	25,250	91/364	0.156	2.6	0.088

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

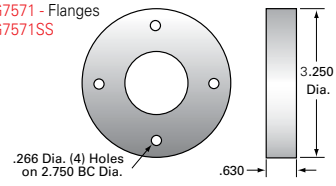
	1000-0250 RH	1000-0250 LH	1000-0500 RH
4 ft	SRT5005	SRT5499	SRT9990
8 ft	SRT5013	SRT5507	SRT9991
12 ft	SRT5021	SRT5515	SRT9992
16 ft	SRT5046	SRT5428	SRT9993

For longer lengths, contact Customer Service.

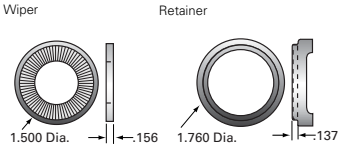
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.000	0.250	0.820	2.2	FLG7571	WKB1050	
1.000	0.250	0.820	2.2	FLG7571	WKB1050	
1.000	0.250	0.820	2.2	integral	WKB2651	
1.000	0.250	0.820	2.2	integral	WKB2651	
1.000	0.250	0.820	2.2	FLG7571	WKB1050	
1.000	0.500	0.820	2.2	FLG7571	WKB1050	
1.000	0.500	0.820	2.2	FLG7571	WKB1050	

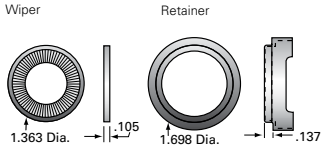
FLG7571 - Flanges
FLG7571SS



WKB1050 - 2 wipers/1 retainer



WKB2651 - 2 wipers/1 retainer



1000-1000 SRT
1150-0200 SRT

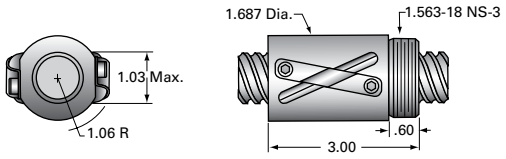
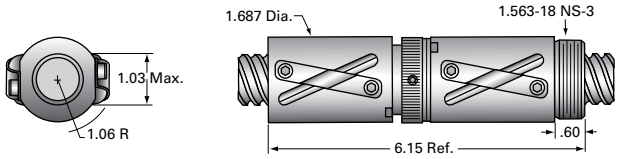
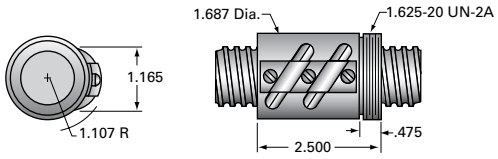
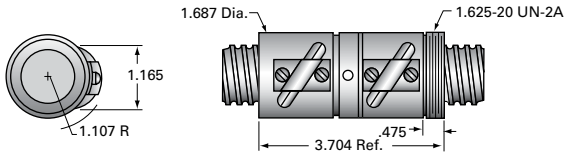
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1000-1000 SRT **four start** 1.000 Ball Circle Dia. (in) 1.000 Lead (in)	SBN10461	RH	0	2,142	11,925	50/100	0.156	1.11	0.177
	SEL10462	RH	300	2,142	11,925	50/200	0.156	2.50	0.177
1150-0200 SRT **single start** 1.150 Ball Circle Dia. (in) 0.200 Lead (in)	SBN1566	RH	0	2,370	26,180	121/242	0.125	0.90	0.035
	SEL4270	RH	240	1,185	13,090	121/242	0.125	1.34	0.035

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

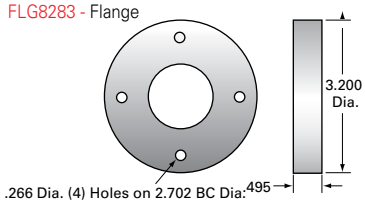
	1000-1000 RH	1150-0200 RH
4 ft	SRT6814	SRT8738
8 ft	SRT6822	SRT8746
12 ft	SRT6830	SRT8753
16 ft	SRT0429	SRT0430

For longer lengths, contact Customer Service.

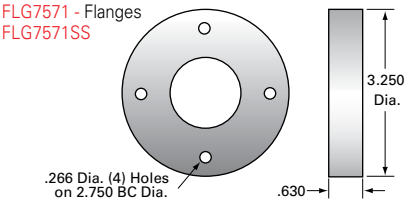
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.000	1.000	0.820	2.20	FLG7571	WKB1050	
1.000	1.000	0.820	2.20	FLG7571	WKB1050	
1.150	0.200	1.015	3.18	FLG8283	WKB2652	
1.150	0.200	1.015	3.18	FLG8283	WKB2652	

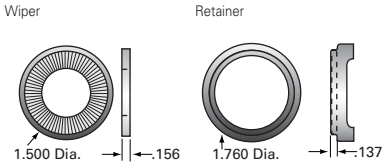
FLG8283 - Flange



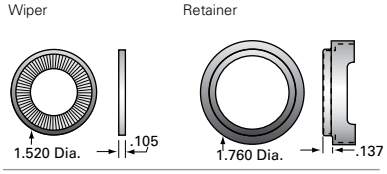
FLG7571 - Flanges
FLG7571SS



WKB1050 - 2 wipers/1 retainer



WKB2652 - 2 wipers/1 retainer



1171-0413 SRT
1250-0200 SRT
1250-0500 SRT

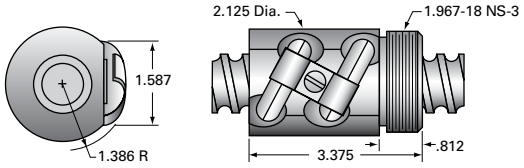
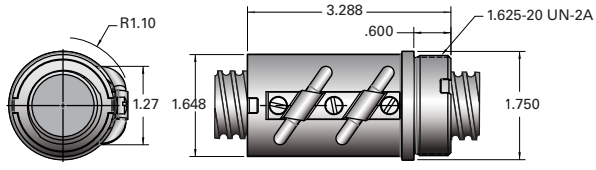
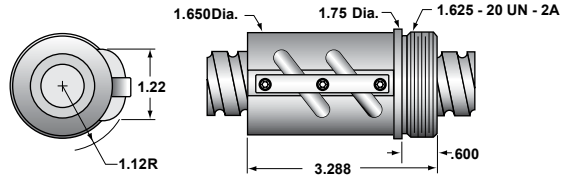
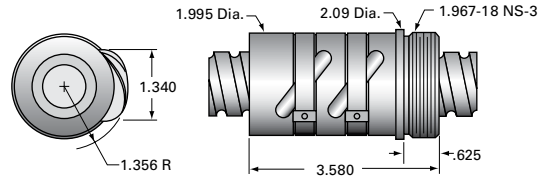
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1171-0413 SRT **single start** 1.171 Ball Circle Dia. (in) 0.413* Lead (in) * actual lead is 0.41302	SBN7511	RH	0	3,894	22,917	28/56	0.281	1.90	0.073
1250-0200 SRT **single start** 1.250 Ball Circle Dia. (in) 0.200 Lead (in)	SBN10627	RH	0	3,336	34,688	130/260	0.125	1.8	0.035
	SBN10189	LH	0	3,336	34,688	130/260	0.125	1.8	0.035
1250-0500 SRT **single start** 1.250 Ball Circle Dia. (in) 0.500 Lead (in)	SBN10104	RH	0	2,745	17,235	46/92	0.188	1.8	0.088

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

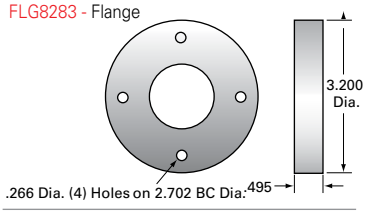
	1171-0413 RH	1250-0200 RH	1250-0200 LH	1250-0500 RH
4 ft	SRT9569	SRT1224	SRT1223	SRT1254
8 ft	SRT5035	SRT1228	SRT1227	SRT1258
12 ft	SRT5043	SRT1222	SRT1221	SRT1252
16 ft	SRT0432	SRT1226	SRT1225	SRT1256

For longer lengths, contact Customer Service.

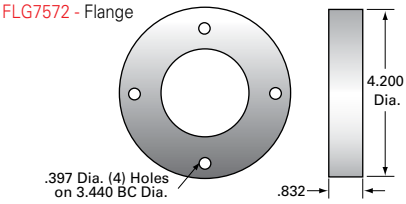
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.171	0.413	0.870	2.77	FLG7572	WKB2653	
1.250	0.200	1.115	3.7	FLG8283	integral (elastomer)	
1.250	0.200	1.115	3.7	FLG8283	integral (elastomer)	
1.250	0.500	1.050	3.7	FLG7572	integral (elastomer)	

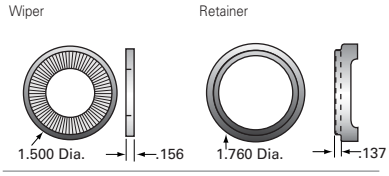
FLG8283 - Flange



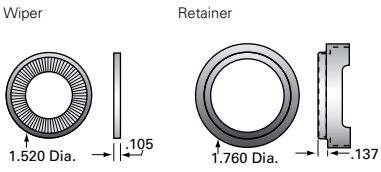
FLG7572 - Flange



WKB1050 - 2 wipers/1 retainer



WKB2652 - 2 wipers/1 retainer



1500-0250 SRT
1500-0473 SRT

	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1500-0250 SRT **single start** 1.500 Ball Circle Dia. (in) 0.250 Lead (in)	SBN9587	RH	0	4,198	44,030	125/250	0.156	1.7	0.044
	SBN1990	LH	0	4,198	44,030	125/250	0.156	1.7	0.044
	SEL4271	RH	920	4,198	44,030	125/500	0.156	3.0	0.044
	SEL4573	LH	920	4,198	44,030	125/500	0.156	3.0	0.044
	SAR3043	RH	920	4,198	44,030	125/500	0.156	6.0	0.044
1500-0473 SRT **single start** 1.500 Ball Circle Dia. (in) 0.473* Lead (in)	SBN7513	RH	0	10,050	57,770	43/86	0.344	3.9	0.084
	SBN8345	RH	0	10,050	57,770	43/86	0.344	3.9	0.084

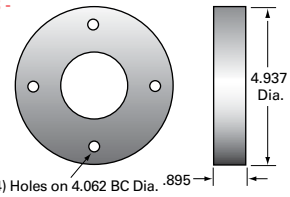
* actual lead is 0.47368

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

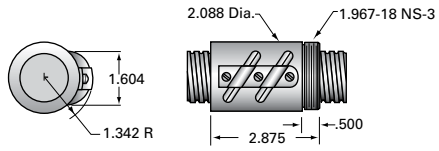
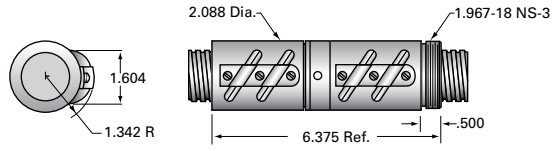
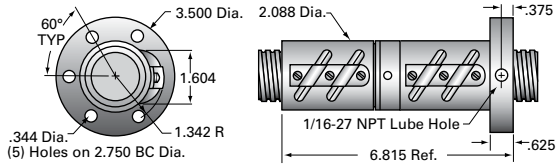
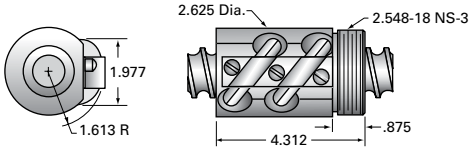
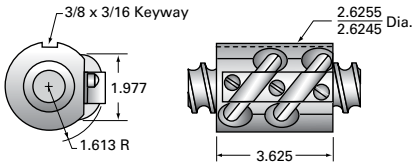
	1500-0250 RH	1500-0250 LH	1500-0473 RH
4 ft	SRT7012	SRT3252	SRT9610
8 ft	SRT7020	SRT3253	SRT9127
12 ft	SRT7028	SRT3254	SRT9624
16 ft	SRT0433	SRT0434	SRT0435
20 ft	SRT0595	SRT0596	SRT0597

For longer lengths, contact Customer Service.

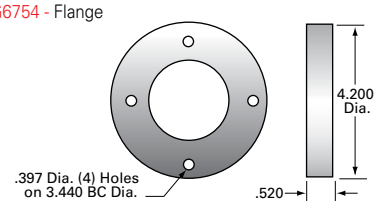
FLG7573 - Flange



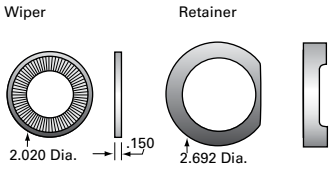
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.500	0.250	1.320	5.16	FLG6754	WKB2654	
1.500	0.250	1.320	5.16	FLG6754	WKB2654	
1.500	0.250	1.320	5.16	FLG6754	WKB2654	
1.500	0.250	1.320	5.16	FLG6754	WKB2654	
1.500	0.250	1.320	5.16	integral	integral (brush)	
1.500	0.473*	1.140	4.47	FLG7573	WKB2655	
1.500	0.473*	1.140	4.47	—	WKB2656	

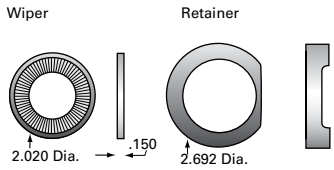
FLG6754 - Flange



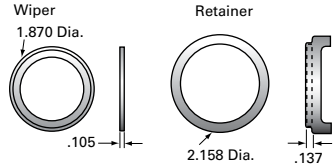
WKB2656 - 2 wipers/1 retainer



WKB2655 - 2 wipers/1 retainer/c 1 retaining ring



WKB2654 - 2 wipers/1 retainer



1500-0500 SRT
1500-1000 SRT
1500-1875 SRT

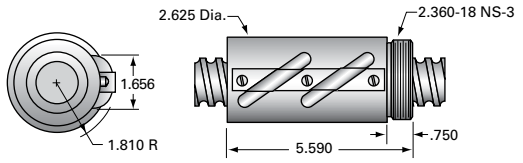
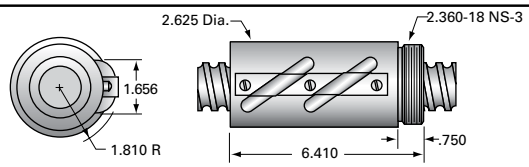
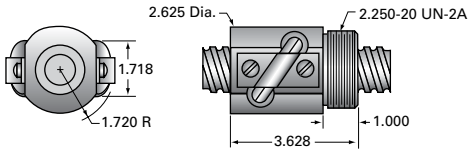
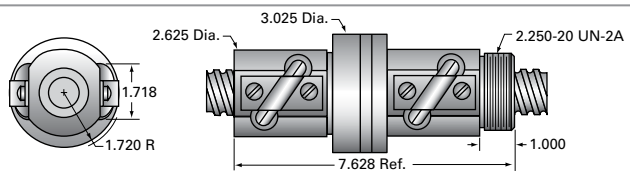
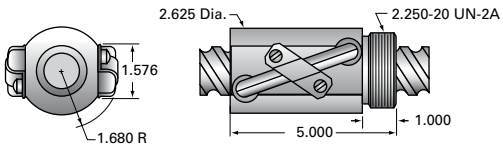
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1500-0500 SRT **single start** 1.500 Ball Circle Dia. (in) 0.500 Lead (in)	SBN1550	RH	0	12,320	97,696	65/130	0.312	5.2	0.088
	SBN10974*	RH	0	12,320	97,696	65/130	0.312	5.2	0.088
1500-1000 SRT **double start** 1.500 Ball Circle Dia. (in) 1.000 Lead (in)	SBN8280	RH	0	7,560	34,662	30/60	0.344	3.9	0.176
	SBN1995	LH	0	7,560	34,662	30/60	0.344	3.9	0.176
	SEL0698	RH	1650	7,560	34,662	30/120	0.344	9.1	0.176
	SEL0697	LH	1650	7,560	34,662	30/120	0.344	9.1	0.176
1500-1875 SRT **four start** 1.500 Ball Circle Dia. (in) 1.875 Lead (in)	SBN7654	RH	0	7,242	29,895	44/88	0.281	4.2	0.332

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

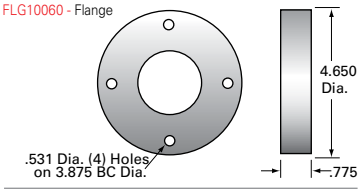
	1500-0500 RH	1500-1000 RH	1500-1000 LH	1500-1875 RH
4 ft	SRT9994	SRT8837	SRT1991	SRT7702
8 ft	SRT9995	SRT8845	SRT1992	SRT7710
12 ft	SRT9996	SRT8853	SRT2203	SRT7718
16 ft	SRT9997	SRT0436	SRT0437	SRT0438
20 ft	SRT9998	SRT0598	SRT0615	SRT0599

For longer lengths, contact Customer Service.
* Integral safety thread. See page 82.

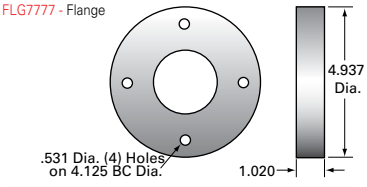
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.500	0.500	1.174	5.25	FLG10060	integral (brush)	
1.500	0.500	1.174	5.25	FLG10060	integral (brush)	
1.500	1.000	1.140	4.47	FLG7777	WKB2657	
1.500	1.000	1.140	4.47	FLG7777	WKB2657	
1.500	1.000	1.140	4.47	FLG7777	WKB2657	
1.500	1.000	1.140	4.47	FLG7777	WKB2657	
1.500	1.875	1.188	5.25	FLG7777	WKB2657	

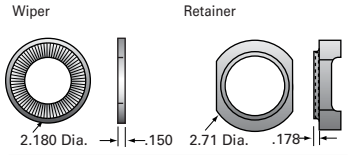
FLG10060 - Flange



FLG7777 - Flange



WKB2657 - 2 wipers/1 retainer



2000-0500

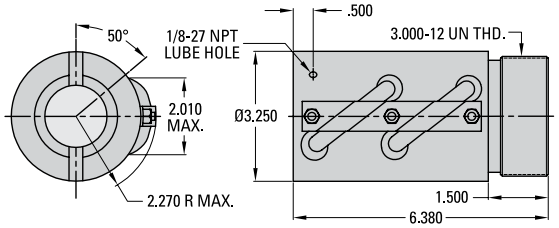
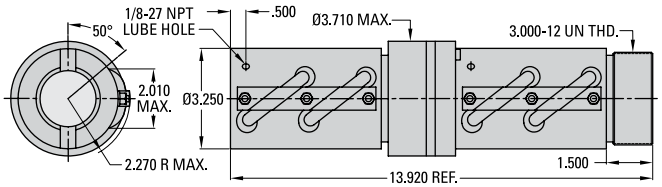
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2000-0500 **double start** 2.000 Ball Circle Dia. (in) 0.500 Lead (in)	SBN11231	RH	0	18,500	154,653	75/150	0.375	8.00	1.42
	SBN11234	LH	0	18,500	154,653	75/150	0.375	8.00	1.42
2000-0500 **preloaded, double start** 2.000 Ball Circle Dia. (in) 0.500 Lead (in)	SEL11233	RH	1.915	18,500	154,653	75/300	0.375	19.25	0.088
	SEL11236	LH	1.915	18,500	154,653	75/300	0.375	19.25	0.088

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

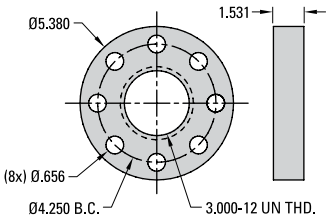
	2000-0500 RH	2000-0500 LH
12 ft	SRT2106	SRT2109
24 ft	SRT2156	SRT2159

For longer lengths, contact Customer Service.

POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
2.000	0.500	1.72	9.8	8120-448-002	integral	
2.000	0.500	1.72	9.8	8120-448-002	integral	
2.000	0.500	1.72	9.8	8120-448-002	integral	
2.000	0.500	1.72	9.8	8120-448-002	integral	

8120-448-002 - Flange



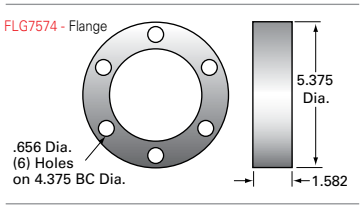
2250-0500 SRT
2250-1000 SRT

	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2250-0500 SRT **single start** 2.250 Ball Circle Dia. (in) 0.500 Lead (in)	SBN7516 SBN10074*	RH	0	21,306	142,660	78/156	0.375	9.0	0.088
	SBN10629**	RH	0	21.306	142.660	48/156	0.375	9.0	0.088
	SAR3044	RH	6390	21,306	142,660	78/312	0.375	24.2	0.088
2250-1000 SRT **double start** 2.250 Ball Circle Dia. (in) 1.000 Lead (in)	SBN4555 SBN10260*	RH	0	26,538	142,660	83/166	0.375	9.0	0.177
	SAR2210	RH	7,960	26,538	142,660	83/332	0.375	9.0	0.177

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

	2250-0500 RH	2250-1000 RH
4 ft	SRT5051	SRT4556
8 ft	SRT5059	SRT4557
12 ft	SRT5067	SRT4558
16 ft	SRT0439	SRT0441
20 ft	SRT0600	SRT0604

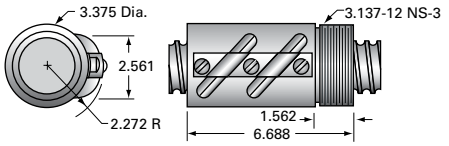
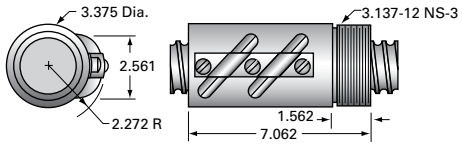
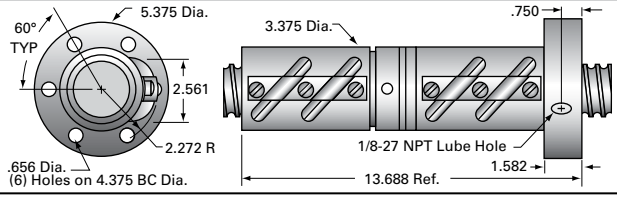
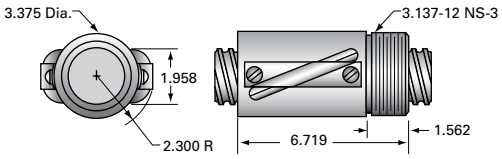
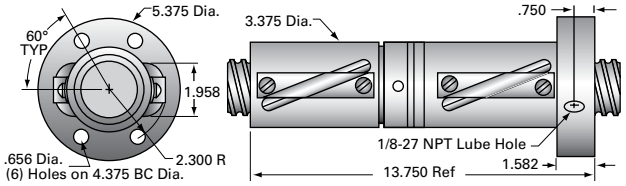
For longer lengths, contact Customer Service.



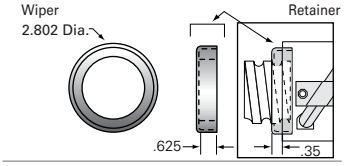
* Ball nuts with solid deflectors. See page 82.

** Ball nuts with integral safety thread and solid deflectors. See page 82.

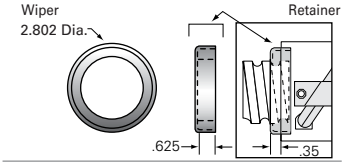
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
2.250	0.500	1.850	10.9	FLG7574	WKB2659 WKF3890	
2.250	0.500	1.850	10.9	FLG7574	WKB2659 WKF3890	
2.250	0.500	1.850	10.9	integral	integral (brush)	
2.250	1.000	1.850	10.9	FLG7574	WKB2659 WKF0457	
2.250	1.000	1.850	10.9	integral	integral (brush)	

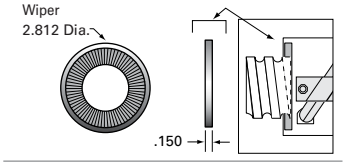
WKF3890 - 2 felt wipers/2 retainers



WKF0457 - 2 felt wipers/2 retainers



WKB2659 - 2 wipers/2 retainer rings



2500-0250 SRT
2500-0500 SRT

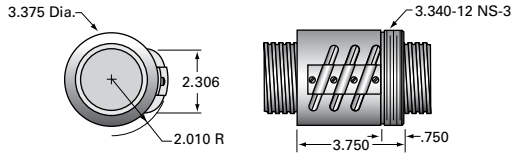
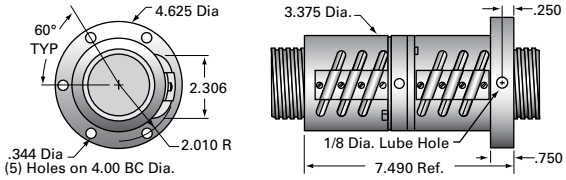
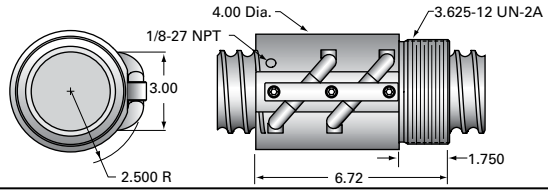
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2500-0250 SRT **single start** 2.500 Ball Circle Dia. (in) 0.250 Lead (in)	SBN3243	RH	0	6,135	81,938	158/474	0.156	4.7	0.044
	SAR3242	RH	1,895	6,135	81,938	158/948	0.156	9.9	0.044
2500-0500 SRT **single start** 2.500 Ball Circle Dia. (in) 0.500 Lead (in)	SBN10316	RH	0	25,927	186,660	88/176	0.375	4.7	0.088

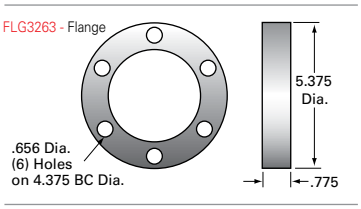
STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

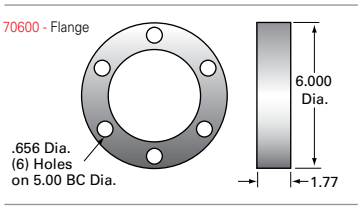
	2500-0250 RH	2500-0500 RH
4 ft	SRT3255	SRT0405
8 ft	SRT3256	SRT0406
12 ft	SRT3257	SRT0407
16 ft	SRT0442	SRT0408
20 ft	SRT0606	SRT0409

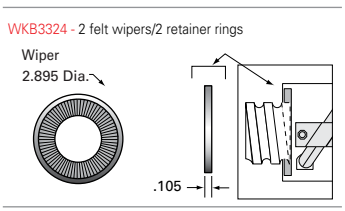
For longer lengths, contact Customer Service.

POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
2.500	0.250	2.320	15.45	FLG3263	WKB3324	
2.500	0.250	2.320	15.45	integral	integral (brush)	
2.500	0.500	2.116	15.45	70600	WKP10337	







2500-1000

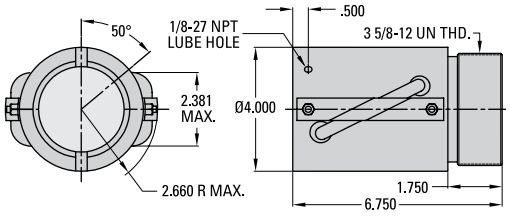
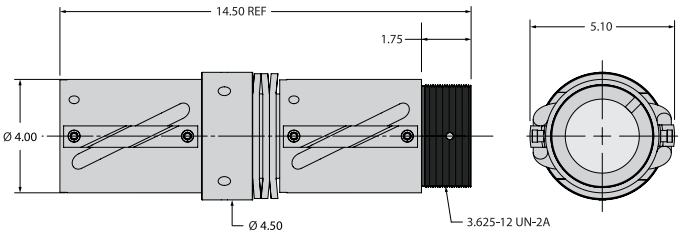
	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2500-1000 **load lock, double start** 2.500 Ball Circle Dia. (in) 1.000 Lead (in)	**SBN11237**	**RH**	0	27,000	174,000	97/194	0.375	13.00	2.83
2500-1000 **preloaded, load lock, double start** 2.500 Ball Circle Dia. (in) 1.000 Lead (in)	**SEL11239**	**RH**	2,690	22,981	186,000	97/388	0.375	13.00	1.42

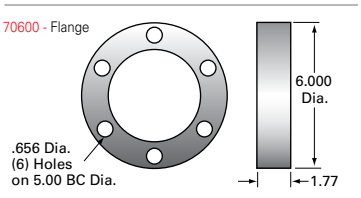
STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

	2500-1000 RH
12 ft	SRT5104
24 ft	SRT5108

For longer lengths, contact Customer Service.

POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
2.500	1.000	2.22	15.0	70600	integral	
2.500	1.000	2.22	15.0	70600	integral	



3000-0660 SRT
3000-1500 SRT
4000-1000 SRT

	BALL NUT								
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
3000-0660 SRT **single start** 3.000 Ball Circle Dia. (in) 0.660 Lead (in)	SBN10202*	RH	0	44,316	271,733	57/171	0.500	26	0.117
	SBN8347	RH	0	44,316	271,733	57/171	0.500	22	0.117
3000-1500 SRT **double start** 3.000 Ball Circle Dia. (in) 1.500 Lead (in)	SBN4986	RH	0	53,646	253,617	83/166	0.500	27.2	0.266
4000-1000 SRT **single start** 4.000 Ball Circle Dia. (in) 1.000 Lead (in)	SBN3258*	RH	0	85,758	476,970	62/186	0.625	53.5	0.177

STANDARD SCREW LENGTHS (Custom cut lengths available up to 24')

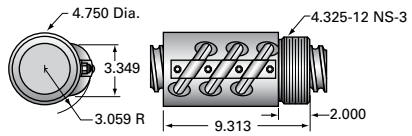
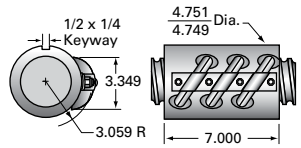
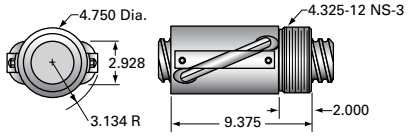
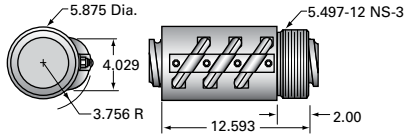
	3000-0660 RH	3000-1500 RH	4000-1000 RH
4 ft	SRT5073	SRT4987	SRT3259
8 ft	SRT5080	SRT4988	SRT3260
12 ft	SRT5087	SRT4989	SRT3261
16 ft	SRT0443	SRT0444	SRT0624
20 ft	SRT0607	SRT0609	SRT3262

For longer lengths, contact Customer Service.

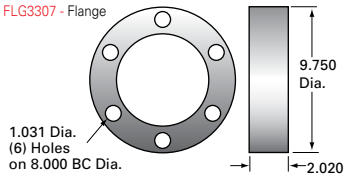
All 3-inch and 4-inch B.C.D. nuts are equipped with solid deflectors. See page 82.

* Integral safety thread. See page 82.

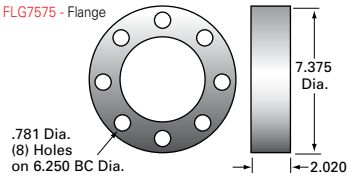
POWER•TRAC™
BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
3.000	0.660	2.480	19.6	FLG7575	WKB2661 WKF3891	
3.000	0.660	2.480	19.6	—	—	
3.000	1.500	2.480	19.3	FLG7575	WKB2661 WKF0458	
4.000	1.000	3.338	34.4	FLG3307	WKB3306 WKF4057	

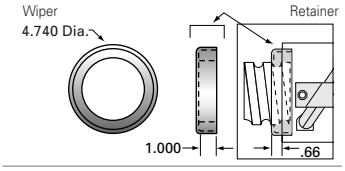
FLG3307 - Flange



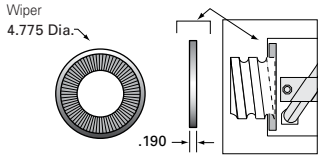
FLG7575 - Flange



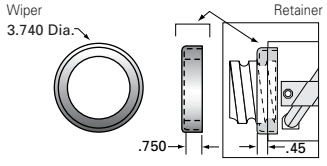
WKF4057 - 2 felt wipers/2 retainers



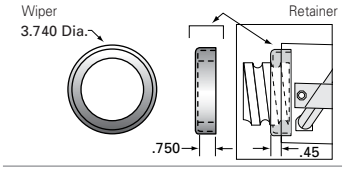
WKB3306 - 2 wipers/2 retainer rings



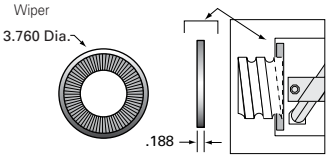
WKF3891 - 2 felt wipers/2 retainers



WKF0458 - 2 felt wipers/2 retainers



WKB2661 - 2 wipers/2 retainer rings



XPR PRECISION ROLLED BALL SCREWS

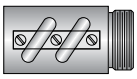
XPR – Precision Rolled thread ball screws are offered from ⅝" to 2¼" diameters with leads of 0.200" to 0.500" depending on diameter. Nook/Thomson uses the latest in CNC thread rolling technology and state of the art CNC induction heat treatment to manufacture a rolled screw with accuracy approaching precision ground at a substantially lower cost.

XPR screws fill the need for applications that don't warrant the expense for ground screws but still require more precise positioning than that offered by commercial grade screws. All are offered with internally preloaded non-adjustable ball nuts with either an integral flange or an OD thread which allows for the use of a custom flange to fit a specific need.

For convenience, XPR screws can be supplied completely machined and assembled with nuts and EZZE-MOUNTS ready for assembly to your product. Should a standard assembly not fit the application, Nook/Thomson can machine the screw to your specific design requirements.

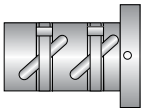
XPR BALL NUTS

SGN Standard Ground Nuts (V-thread, no preload) are similar to SBN style ball nuts and have internal threads that are ground into the ball nut body. These nuts provide smooth, precise operation on rolled thread or ground thread ball screws.

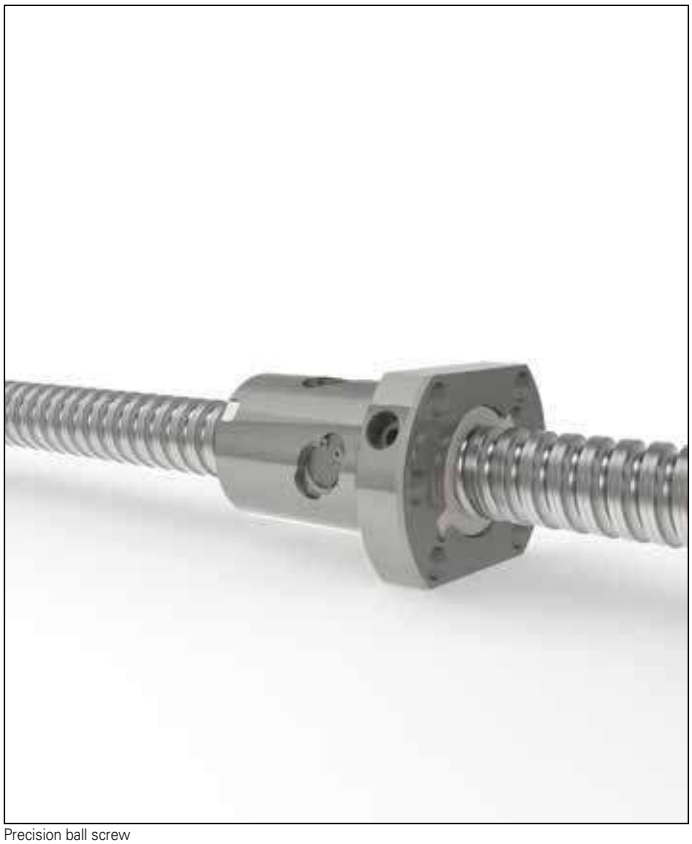


PRN Standard Internal Preload Nuts (V-thread end with wipers) have a preload that is created by shifted internal threads that are ground. The resulting concentricity ensures uniform preload. PRN ball nuts are compact and stiff due to the single nut integral preload configuration. Factory fitting on ball screws provides a backlash-free system with uniform torque, high stiffness and long life.

SSN Standard Internal Preload Nuts (Integral flange and wipers) have the same features as the PRN nut design while incorporating an integral flange



When loading an SSN or PRN style ball nuts on an XPR ball screw, depending on the length of the ball screw, the preload condition may vary. The fit between the ball nut and ball screw will range from a slight clearance (~.0005") to no-lash clearance throughout the travel, which may cause a minimal variation in tare drag torque. If a full preload is required select an SGT ground ball screw instead.



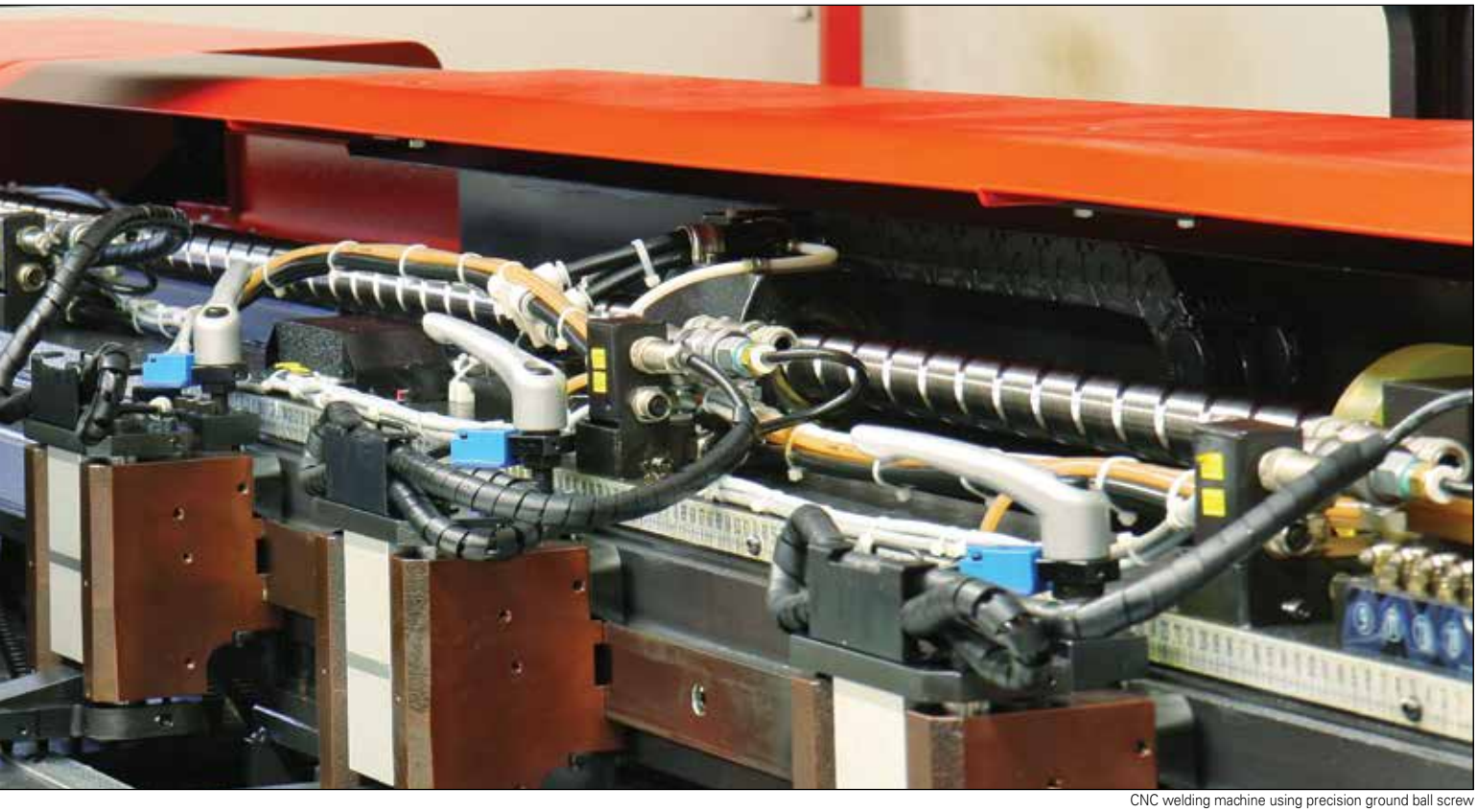
Precision ball screw

XPR BALL SCREW
QUICK REFERENCE

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

Diameter-Lead	Nut	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in·lb)
		Dynamic	Static		
0.631-0.200	PRN*	440	2,110	0.500	0.035
	SSN	440	2,110	0.500	0.035
0.750-0.200	PRN	1,473	9,916	0.602	0.035
	SSN	1,473	9,916	0.602	0.035
0.875-0.200	PRN**	1,375	10,780	0.735	0.035
	SSN	1,375	10,780	0.735	0.035
1.000-0.250	PRN	2,285	15,815	0.820	0.044
	SSN	2,285	15,815	0.820	0.044
1.150-0.200	PRN	1,680	14,886	1.015	0.035
	SSN	1,680	14,886	1.015	0.035
1.250-0.200	PRN	1,668	17,344	1.115	0.035
	SSN	1,668	17,344	1.115	0.035
1.500-0.250	PRN	5,075	27,250	1.320	0.044
	SSN	5,075	27,250	1.320	0.044
1.500-0.500	PRN	5,650	35,522	1.174	0.088
2.250-0.500	PRN	20,106	108,325	1.850	0.088
	SSN	20,106	108,325	1.850	0.088

* preloaded nut with wipers
** internal return nut



CNC welding machine using precision ground ball screw

0631-0200 XPR

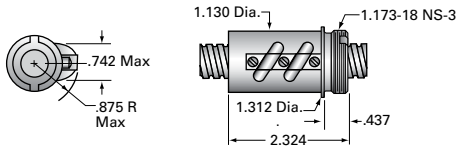
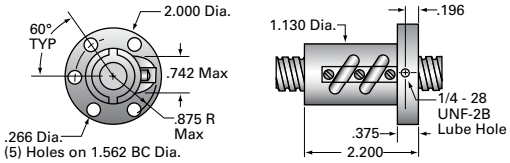
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate $\times 10^6$ (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0631-0200 XPR **single start** 0.631 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10108**	**RH**	yes	440	2,110	1.6	30/60	0.125	0.98	0.035
	SSN0389	**RH**	yes	440	2,110	1.6	30/60	0.125	1.20	0.035

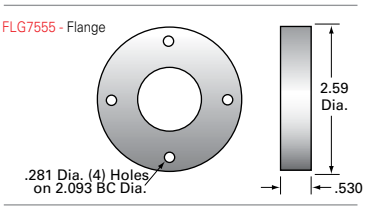
STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

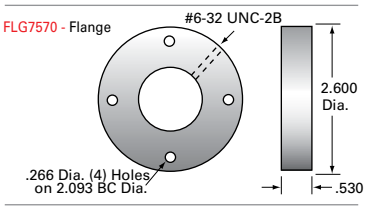
	0631-0200 RH
4 ft	XPR6320R48
6 ft	XPR6320R72

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
0.631	0.200	0.500	0.86	FLG7555	integral (elastomer)	
0.631	0.200	0.500	0.86	integral	integral (elastomer)	





0750-0200 XPR
0875-0200 XPR

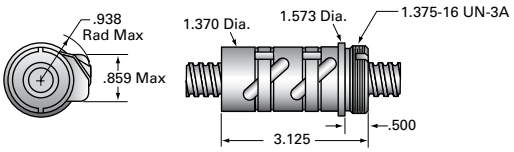
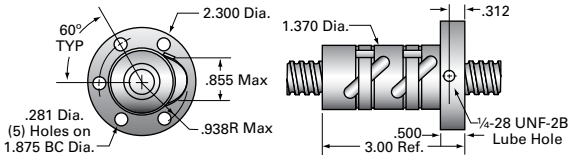
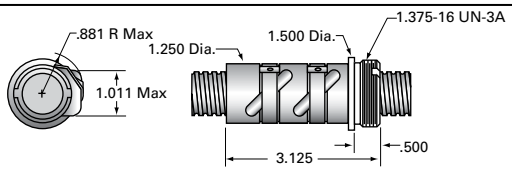
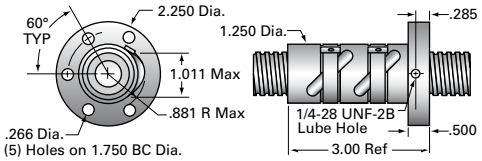
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0750-0200 XPR **single start** 0.750 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10109**	**RH**	yes	1,473	9,916	2.75	71/142	0.141	0.8	0.035
	SSN0390	**RH**	yes	1,473	9,916	2.75	71/142	0.141	0.8	0.035
0875-0200 XPR **single start** 0.875 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10110**	**RH**	yes	1,375	10,780	1.10	93/186	0.125	1.10	0.035
	SSN0388	**RH**	yes	1,375	10,780	3.10	93/186	0.125	0.14	0.035

STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

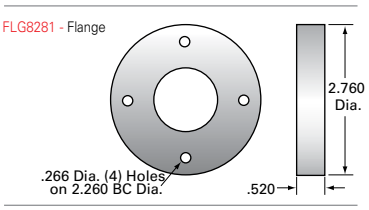
	0750-0200 RH	0875-0200 RH
4 ft	XPR7520R48	XPR8720R48
6 ft	XPR7520R72	XPR8720R96

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
0.750	0.200	0.602	1.22	FLG8281	integral (elastomer)	
0.750	0.200	0.602	1.22	integral	integral (elastomer)	
0.875	0.200	0.735	1.80	FLG8281	integral (elastomer)	
0.875	0.200	0.735	1.80	integral	integral (elastomer)	

FLG8281 - Flange



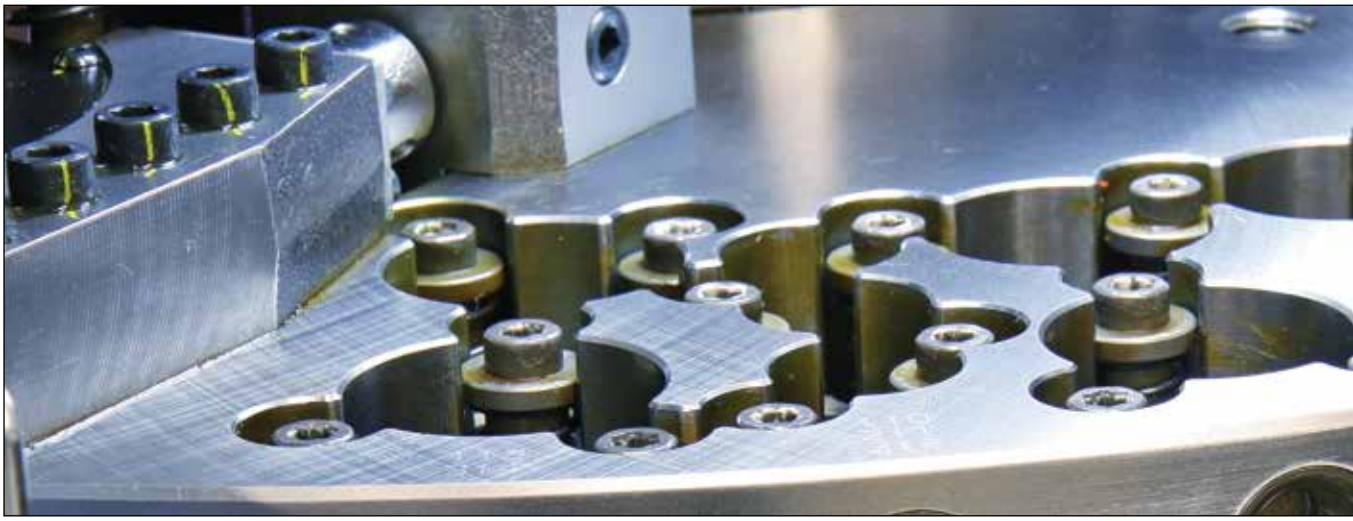
1000-0250 XPR

	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1000-0250 XPR **single start** 1.000 Ball Circle Dia. (in) 0.250 Lead (in)	**PRN10115**	**RH**	yes	2,285	15,815	2.50	86/172	0.156	1.10	0.044
	SSN10570	**RH**	yes	2,285	15,815	3.50	86/172	0.156	2.00	0.044

STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

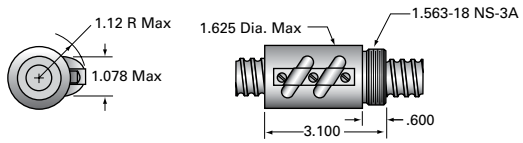
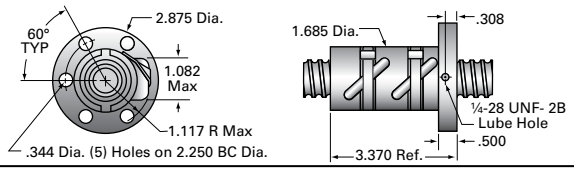
	1000-0250 RH
6 ft	XPR10025R72
12 ft	XPR10025R144

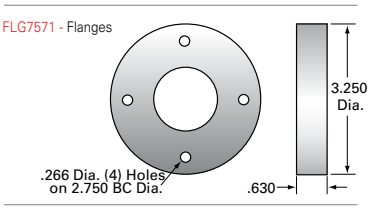
For longer lengths, contact Customer Service.



Nook/Thomson precision ball screws are used widely in tooling applications

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.000	0.250	0.820	2.20	FLG7571	–	
1.000	0.250	0.820	2.20	integral	integral (elastomer)	



Nook/Thomson ball screws in a laser marking application

1150-0200 XPR
1250-0200 XPR

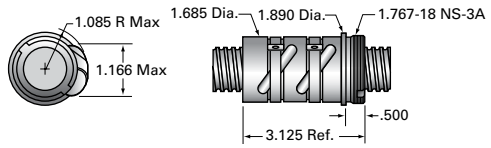
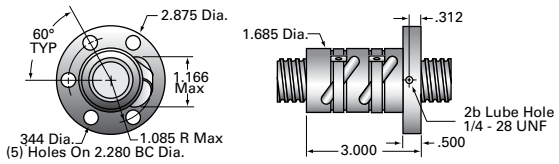
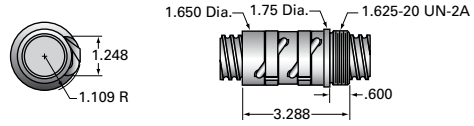
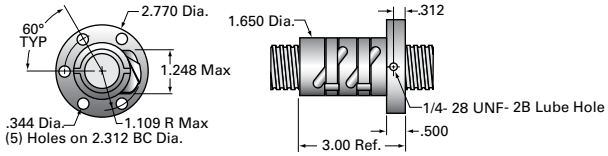
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1150-0200 XPR **single start** 1.150 Ball Circle Dia. (in) 0.200 Lead (in)	PRN10112	**RH**	yes	1,680	14,886	4.25	121/242	0.125	1.45	0.035
	SSN0392	**RH**	yes	1,680	14,886	4.25	121/242	0.125	2.00	0.035
1250-0200 XPR **single start** 1.250 Ball Circle Dia. (in) 0.200 Lead (in)	PRN10191	**RH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035
	SSN0393	**RH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035

STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

	1150-0200 RH	1250-0200 RH
6 ft	XPR11520R72	XPR12520R72
12 ft	XPR11520R144	XPR12520R144

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.150	0.200	1.015	3.18	—	integral (elastomer)	
1.150	0.200	1.015	3.18	integral	integral (elastomer)	
1.250	0.200	1.115	3.70	—	integral (elastomer)	
1.250	0.200	1.115	3.70	integral	integral (elastomer)	

1500-0250 XPR

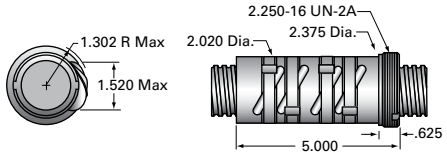
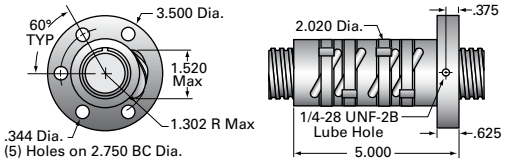
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1500-0250 XPR **single start** 1.500 Ball Circle Dia. (in) 0.250 Lead (in)	**PRN10113**	**RH**	yes	5,075	27,250	5.0	95/380	0.156	2.70	0.044
	SSN0400	**RH**	yes	5,075	27,250	5.0	95/380	0.156	3.80	0.044

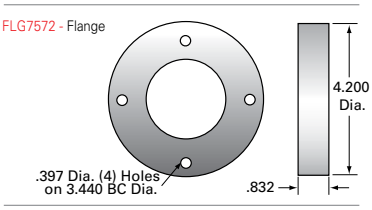
STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

	1500-0250 RH
6 ft	XPR15025R72
12 ft	XPR15025R144

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.500	0.250	1.320	5.41	—	integral (elastomer)	
1.500	0.250	1.320	5.41	integral	integral (elastomer)	



1500-0500 XPR
2250-0500 XPR

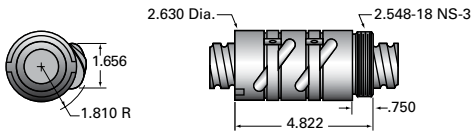
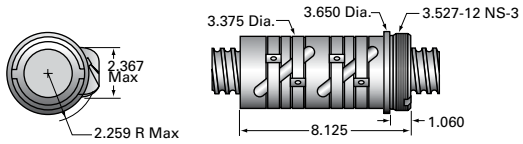
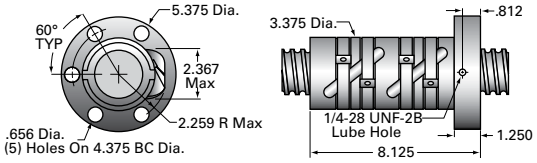
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1500-0500 XPR **single start** 1.500 Ball Circle Dia. (in) 0.500 Lead (in)	**PRN10114**	**RH**	yes	5,650	35,522	5.2	48/96	0.312	3.5	0.088
2250-0500 XPR **single start** 2.250 Ball Circle Dia. (in) 0.500 Lead (in)	**PRN10089**	**RH**	yes	20,106	108,325	7.25	99/198	0.375	10.5	0.088
	SSN0402	**RH**	yes	20,106	108,325	7.25	99/198	0.375	15.2	0.088

STANDARD SCREW LENGTHS (Custom cut lengths available up to 12')

	1500-0500 RH	2250-0500 RH
6 ft	XPR15050R72	XPR22550R72
12 ft	XPR15050R144	XPR22550R144

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION ROLLED BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.500	0.500	1.174	5.3	—	integral (elastomer)	
2.250	0.500	1.850	10.8	—	integral (elastomer)	
2.250	0.500	1.850	10.8	integral	integral (elastomer)	

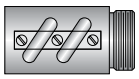
SGT PRECISION GROUND BALL SCREWS

SGT – Standard Ground Thread screws are available in diameters from ⅝" to 2½" in lengths up to 120". Threads are ground from high carbon alloy steel that has been induction heat treated to a depth greater than the thread. Standard stocked screws have a lead accuracy tolerance of ±0.0005 in/ft and are supplied with internally preloaded nuts which must be factory assembled. Ground screws are used for applications that require smooth operation, precise positioning, and repeatability.

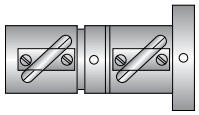
For convenience, SGT screws can be supplied completely machined and assembled with nuts and EZZE-MOUNTS ready for assembly. Should a standard assembly not fit the application, Nook/Thomson can machine the screw to your specific design requirements. Ball nut configurations can be engineered to application requirements.

SGT BALL NUTS

SGN Standard Ground Nuts (V-thread, no preload) – are similar to SBN style ball nuts and have internal threads that are ground into the ball nut body. These nuts provide smooth, precise operation on rolled thread or ground thread ball screws.

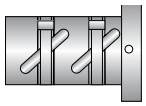


SAG Standard Adjustable Preload Ball Nuts (Ground Ball Groove, Integral Flange and Wipers) – offer the precision tolerances of ground ball screw systems with the flexibility of adjustable preload.



PRN or PGN Standard Internal Preload Nuts (V-thread end with wipers) have a preload that is created by shifted internal threads that are ground in a single set-up. The resulting concentricity ensures uniform preload. The PRN ball nuts are compact and stiff due to the single nut integral preload configuration. Factory fitting on ball screws provides a backlash-free system with uniform torque, high stiffness and long life.

SSN Standard Internal Preload Nuts (Integral flange and wipers) – have the same features as the PRN nut design while incorporating an integral flange.



Nook/Thomson precision ball screws are used widely in the aerospace industry

SGT BALL SCREW
QUICK REFERENCE

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

Diameter-Lead	Nut	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in·lb)
		Dynamic	Static		
0631-0200	PRN*	440	2,110	0.500	0.035
	SSN	440	2,110	0.500	0.035
0750-0200	PRN	1,473	9,916	0.602	0.035
	SSN	1,473	9,916	0.602	0.035
0875-0200	PRN	1,375	10,780	0.735	0.035
	SSN	1,375	10,780	0.735	0.035
1000-0200	SSN	1,565	13.073	0.865	0.035
1000-0250	PRN	2,285	15,815	0.820	0.044
	SSN	2,285	15,815	0.820	0.044
	SAG	2,285	15,815	0.820	0.044
1150-0200	PRN	1,680	14,886	1.015	0.035
	SSN	1,680	14,886	1.015	0.035
1250-0200	PRN	1,668	17,344	1.115	0.035
	SSN	1,668	17,344	1.115	0.035

Diameter-Lead	Nut	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in·lb)
		Dynamic	Static		
1500-0200	SSN	4,745	45,073	1.349	0.035
1500-0250	PRN	5,075	27,250	1.320	0.044
	SSN	5,075	27,250	1.320	0.044
	SAG	5,950	44,030	1.320	0.044
2000-0200	SSN	6,181	65,903	1.849	0.035
2250-0500	PRN	20,106	108,325	1.850	0.088
	SSN	20,106	108,325	1.850	0.088
	SAG	30,000	142,660	1.850	0.088
2500-0250	SAG	8,945	93,165	2.333	0.044
	SSN	8,945	93,165	2.333	0.044

* preloaded nut with wipers
** internal return nut

Nook/Thomson 2.00" diameter ball nuts

0631-0200 SGT

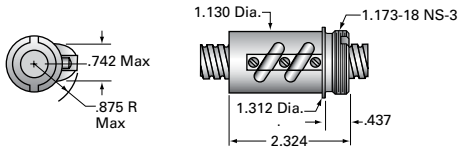
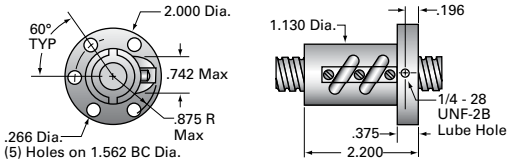
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0631-0200 SGT **single start** 0.631 Ball Circle Dia. (in) 0.200 Lead (in)	PRN10108	RH	yes	440	2,110	1.6	30/60	0.125	0.98	0.035
	SSN0389	RH	yes	440	2,110	1.6	30/60	0.125	1.20	0.035

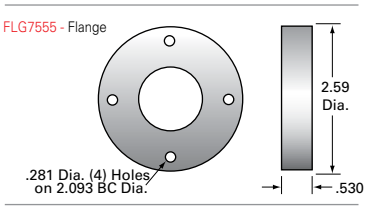
STANDARD SCREW LENGTHS (Custom cut lengths available up to 8')

	0631-0200 RH
4 ft	GT06320R48

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
0.631	0.200	0.500	0.86	FLG7555	integral (elastomer)	
0.631	0.200	0.500	0.86	integral	integral (elastomer)	



0750-0200 SGT
0875-0200 SGT

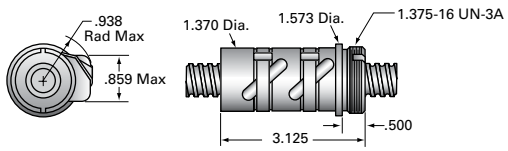
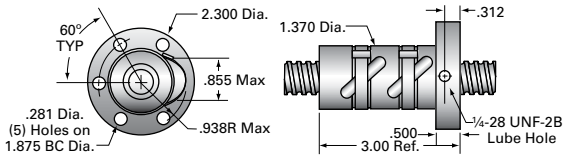
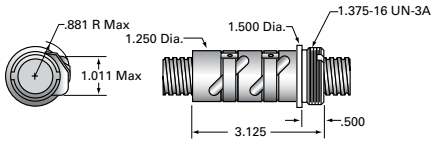
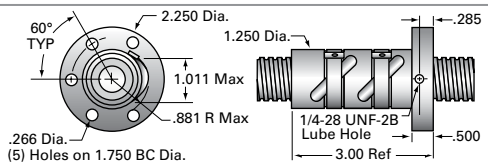
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
0750-0200 SGT **single start** 0.750 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10109**	**RH**	yes	1,473	9,916	2.75	71/142	0.141	1.0	0.035
	SSN0390	**RH**	yes	1,473	9,916	2.75	71/142	0.141	1.2	0.035
0875-0200 SGT **single start** 0.875 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10110**	**RH**	yes	1,375	10,780	3.10	93/186	0.125	1.1	0.035
	SSN0388	**RH**	yes	1,375	10,780	3.10	93/186	0.125	1.4	0.035

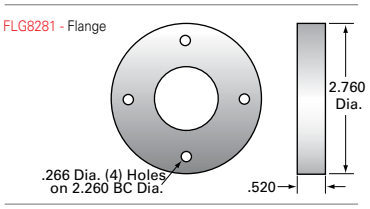
STANDARD SCREW LENGTHS (Custom cut lengths available up to 8')

	0750-0200 RH	0875-0200 RH
4 ft	GT07520R48	GT08720R48

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
0.750	0.200	0.602	1.22	FLG8281	integral (elastomer)	
0.750	0.200	0.602	1.22	integral	integral (elastomer)	
0.875	0.200	0.735	1.80	FLG8281	integral (elastomer)	
0.875	0.200	0.735	1.80	integral	integral (elastomer)	



1000-0200 SGT
1000-0250 SGT

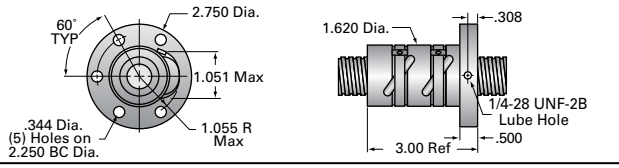
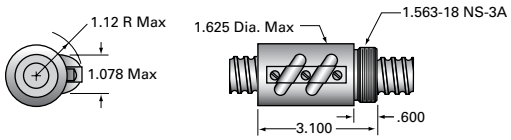
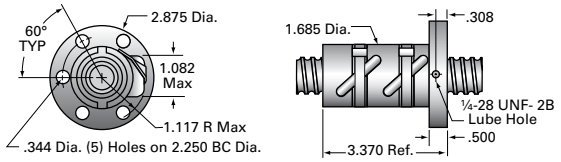
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1000-0200 SGT **single start** 1.000 Ball Circle Dia. (in) 0.200 Lead (in)	**SSN0391**	**RH**	yes	1,565	13,073	3.50	107/214	0.125	1.50	0.035
1000-0250 SGT **single start** 1.000 Ball Circle Dia. (in) 0.250 Lead (in)	**PGN11172**	**RH**	yes	2,285	15,815	2.50	86/172	0.156	1.10	0.044
	SSN0404	**RH**	yes	2,285	15,815	3.50	86/172	0.156	2.00	0.044

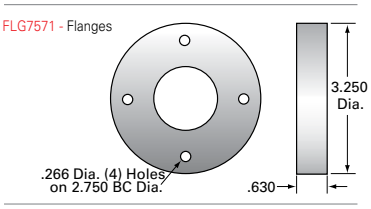
STANDARD SCREW LENGTHS (Custom cut lengths available up to 9')

	1000-0250 RH
6 ft	GT10025R72

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.000	0.200	0.865	2.20	integral	integral (elastomer)	
1.000	0.250	0.820	2.20	FLG7571	—	
1.000	0.250	0.820	2.20	integral	integral (elastomer)	



1150-0200 SGT
1250-0200 SGT

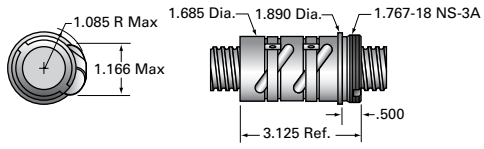
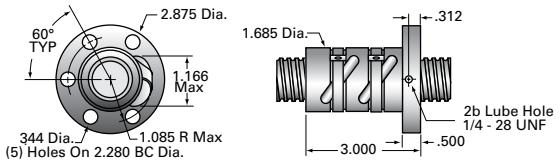
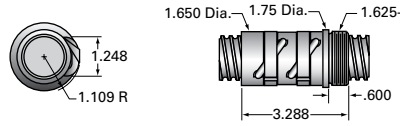
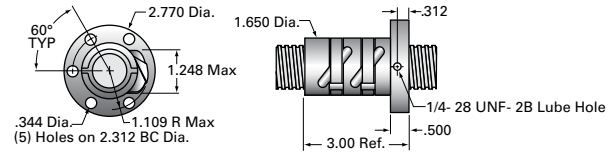
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1150-0200 SGT **single start** 1.150 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10112**	**RH**	yes	1,680	14,886	4.25	121/242	0.125	1.45	0.035
	SSN0392	**RH**	yes	1,680	14,886	4.25	121/242	0.125	2.00	0.035
1250-0200 SGT **single start** 1.250 Ball Circle Dia. (in) 0.200 Lead (in)	**PRN10191**	**RH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035
	PRN10193	**LH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035
	SSN0393	**RH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035
	SSN0398	**LH**	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035

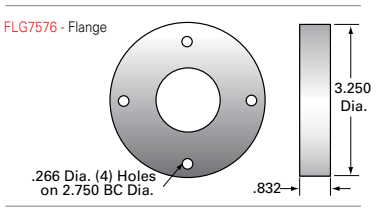
STANDARD SCREW LENGTHS (Custom cut lengths available up to 9')

	1150-0200 RH	1250-0200 RH	1250-0200 LH
6 ft	GT11520R72	GT12520R72	GT12520L72

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
1.150	0.200	1.015	3.18	FLG7576	integral (elastomer)	
1.150	0.200	1.015	3.18	integral	integral (elastomer)	
1.250	0.200	1.115	3.70	—	integral (elastomer)	
1.250	0.200	1.115	3.70	—	integral (elastomer)	
1.250	0.200	1.115	3.70	integral	integral (elastomer)	
1.250	0.200	1.115	3.70	integral	integral (elastomer)	



1500-0200 SGT
1500-0250 SGT

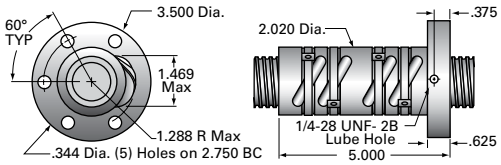
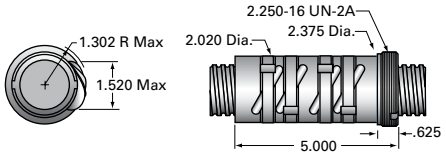
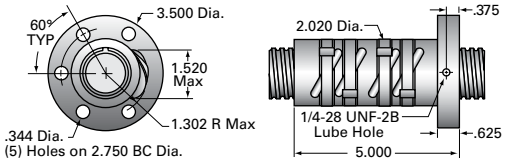
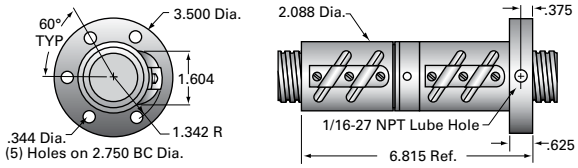
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
1500-0200 SGT **single start** 1.500 Ball Circle Dia. (in) 0.200 Lead (in)	**SSN0394**	**RH**	yes	4,745	45,073	5.0	137/548	0.141	3.80	0.035
1500-0250 SGT **single start** 1.500 Ball Circle Dia. (in) 0.250 Lead (in)	**PRN10113**	**RH**	yes	5,075	27,250	5.0	95/380	0.156	2.70	0.044
	SSN0400	**RH**	yes	5,075	27,250	5.0	95/380	0.156	3.80	0.044
	SAG0705	**RH**	920 max.	5,950	44,030	—	95/380	0.156	6.00	0.044

STANDARD SCREW LENGTHS (Custom cut lengths available up to 10')

	1500-0200 RH	1500-0250 RH
6 ft	GT15020R72	GT15025R72
10 ft	GT15020R120	GT15025R120

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
1.500	0.200	1.349	5.65	integral	integral (elastomer)	
1.500	0.250	1.320	5.41	—	integral (elastomer)	
1.500	0.250	1.320	5.41	integral	integral (elastomer)	
1.500	0.250	1.320	5.41	integral	integral (brush)	

2000-0200 SGT

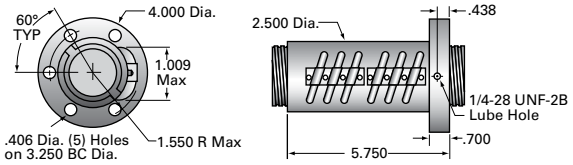
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2000-0200 SGT **single start** 2.000 Ball Circle Dia. (in) 0.200 Lead (in)	**SSN0396**	**RH**	yes	6,181	65,903	6.50	138/828	0.141	4.50	0.035

STANDARD SCREW LENGTHS (Custom cut lengths available up to 10')

	2000-0200 RH
6 ft	GT20020R72
10 ft	GT20020R120

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
2.000	0.200	1.849	9.9	integral	integral (elastomer)	

2250-0500 SGT
2500-0250 SGT

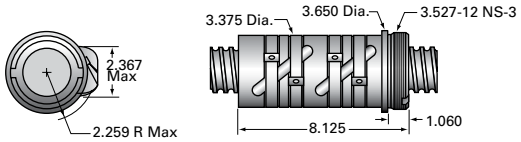
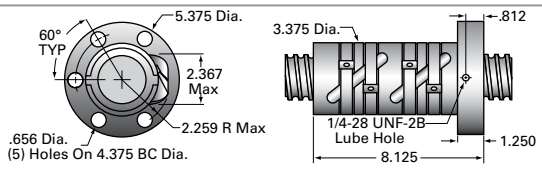
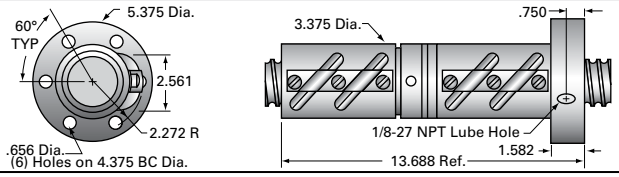
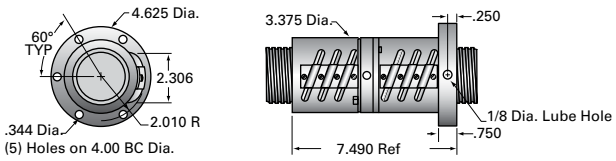
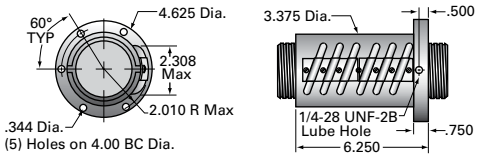
	BALL NUT									
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10^6 (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in·lb)
2250-0500 SGT **single start** 2.250 Ball Circle Dia. (in) 0.500 Lead (in)	**PRN10089**	**RH**	yes	20,106	108,325	7.25	99/198	0.375	10.5	0.088
	SSN0402	**RH**	yes	20,106	108,325	7.25	99/198	0.375	15.2	0.088
	SAG0706	**RH**	6,390 max	30,000	142,660	—	99/396	0.375	24.2	0.088
2500-0250 SGT **single start** 2.500 Ball Circle Dia. (in) 0.500 Lead (in)	**SAG0707**	**RH**	1,895 max.	8,945	93,165	—	158/948	0.156	9.9	0.044
	SSN0403	**RH**	yes	8,945	93,165	8.00	158/948	0.156	9.0	0.044

STANDARD SCREW LENGTHS (Custom cut lengths available up to 10')

	2250-0500 RH	2500-0250 RH
6 ft	GT22550R72	GT25025R72
10 ft	GT22550R120	GT25025R120

For longer lengths, contact Customer Service.

POWER•TRAC™
PRECISION GROUND BALL SCREWS AND NUTS

SCREW				BALL NUT ACCESSORIES		
Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	BALL NUT DIMENSIONS
2.250	0.500	1.850	10.8	—	integral (elastomer)	
2.250	0.500	1.850	10.8	integral	integral (elastomer)	
2.250	0.500	1.850	10.8	integral	integral (brush)	
2.500	0.250	2.333	15.45	integral	integral (brush)	
2.500	0.250	2.333	15.45	integral	integral (elastomer)	

Nook/Thomson NRS™

PLANETARY ROLLER SCREW ASSEMBLIES

Nook/Thomson planetary roller screws have many uses in the aerospace industry

ROLLER SCREWS

NRS™ PLANETARY ROLLER SCREW
APPLICATION AND DESIGN

Nook/Thomson Planetary Roller Screws (NRS), a member of the lead screw family, are remarkable devices designed to convert rotary motion into axial force or vice versa.

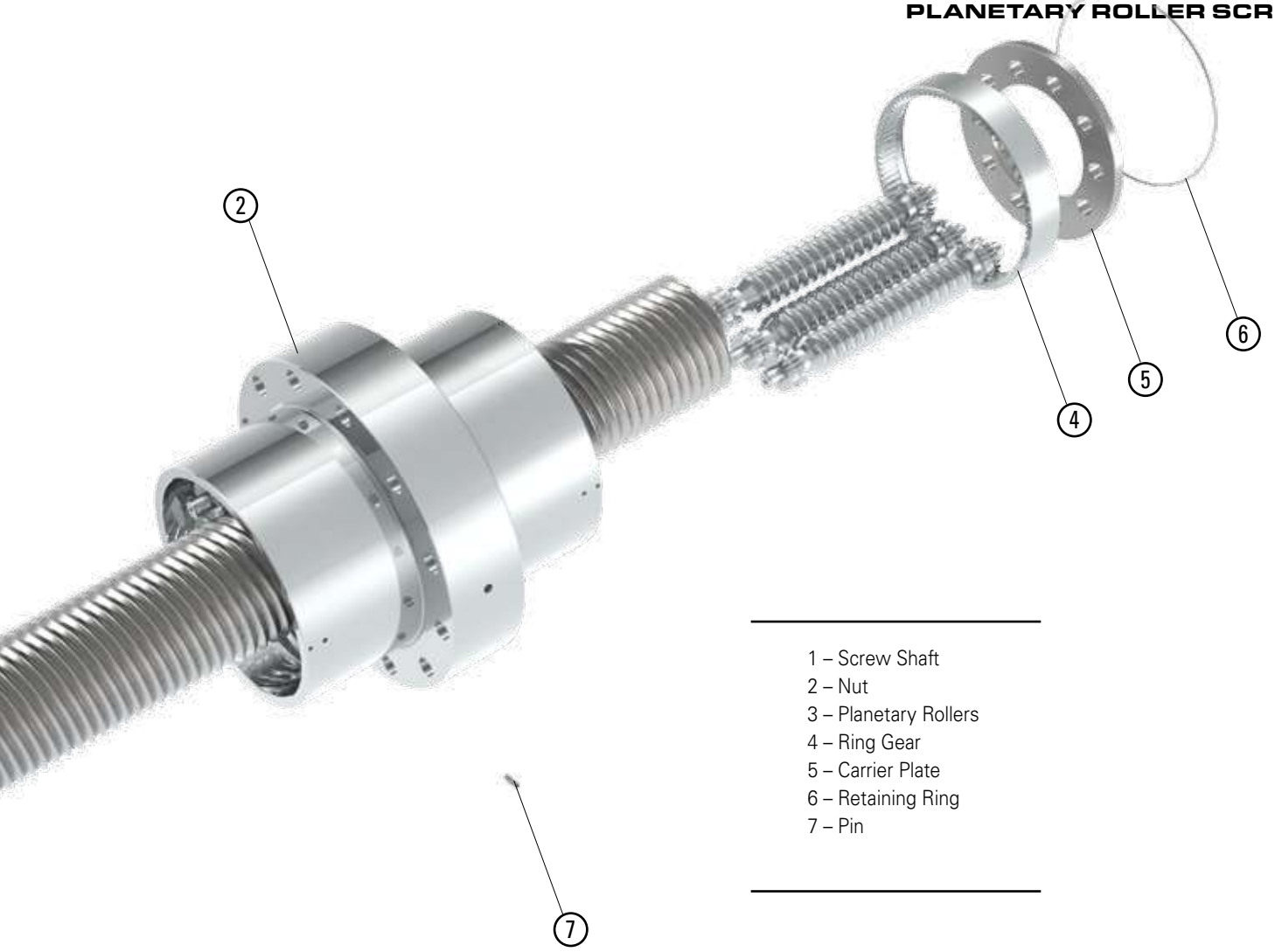
The NRS design offers multiple advantages and reliability for the most demanding applications when compared with other lead screw types due to its rolling motion. NRS offers high efficiency even in relatively shallow lead designs. The multitude of contact points can carry large loads and provide very high resolution (small axial movement) when using very shallow leads. NRS produces high rotational speeds with faster acceleration without adverse effects.

NRS planetary roller screws shown in the following pages cover a large spectrum of possibilities and application demands. Nook/Thomson engineers are at your disposal to suggest the suitable product for your application requirements.

NRS PLANETARY ROLLER SCREWS ARE USED IN:

- Aerospace & Outer Space Applications
- Machine Tools
- Measuring Equipment
- Positioning Systems
- Optical Equipment
- Photography Equipment
- Ordnance
- High Force Actuators
- Plastic Machinery
- Transportation (Train Tilt Mechanisms)

Nook/Thomson NRS™
PLANETARY ROLLER SCREWS



1 – Screw Shaft
2 – Nut
3 – Planetary Rollers
4 – Ring Gear
5 – Carrier Plate
6 – Retaining Ring
7 – Pin

PRELOADED NRS - Split nuts are installed with two halves pushed against each other and the clearance removed for preload. Due to the large number of contacts and great rigidity, a planetary roller screw does not require high preload amounts to perform backlash-free in most application conditions. Split nuts only carry load on a reduced length of thread (half-length minus the half-thickness of the calibrated spacer).

NON-PRELOADED NRS - One-piece solid nuts do not have a calibrated spacer to remove backlash. One-piece nuts have larger load ratings since all threads of the nut can carry load.

NRS MATERIALS - NRS planetary roller screws are made of high strength materials. The screw shaft is made of medium carbon induction hardenable alloy steel. The rollers and nut are manufactured from high grade bearing steel. All rolling surfaces are heat treated to a surface hardness not less than 56 HRC with a case depth suitably chosen to carry the load. Other materials, such as stainless steel, can be provided upon request.

Reduced load ratings should be considered when designing stainless steel roller screws.

ROLLER SCREW
CALCULATION AND SELECTION


44 × 12 precision roller screw

HIGH STATIC AND DYNAMIC CAPACITY - Transmission of the load from the nut to the roller screw shaft is provided through the planetary rollers' engagement. The number of contact points is larger, therefore the load-carrying capacity of roller screws is much higher than that of ball screws.

WIDE VARIETY OF LEADS - Roller screws are also available with a wide variety of Lead × Pitch combinations, with leads as small as 2 mm.

OTHER ADVANTAGES - Roller screws can be used with high acceleration and deceleration rates as well as with a high rotational speed. Additionally, there is no problem with losing bearing balls - the nut can be easily removed from the screw shaft frequently.

CALCULATION AND SELECTION

Basic dynamic load ratings C and L_{10} life

Dynamic load rating is used to calculate the fatigue life of a NRS planetary roller screw. The dynamic load rating is defined as a load, constant in magnitude and direction under which 90% of a statistically significant number of apparently identical planetary roller screws reach an operating life of 10^6 revolutions (L_{10}).

Static load ratings (C_o) and safety factors (S_o)

Static load rating C_o is a load that would cause a permanent deformation at the most heavily loaded contact equal to 0.0001 of the curvature diameter of the rolling element. In order to prevent deformations that could impair the proper function and the operating noise of the planetary roller screw, a safety factor S_o should be used when selecting a roller screw on the basis of its static load rating.

The S_o factor should not be less than 3. For operations with quasi-static load applications (i.e. presses) where the load occurs primarily on the same portion of the stroke, it is recommended to use higher S_o. If size constraints prevent the use of larger screws and the operation of the device is such that the S_o approaches 1, please contact our engineering department.

Theoretical life

Theoretical life L_{10} or L_h is the operating time reached by 90% of a group of apparently identical planetary roller screws operating under the same conditions. The theoretical life is calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^3$$

If operation reliability higher than 90% is required, then the theoretical life must be corrected by using a reliability factor (a_n) according to the table.

$$L_n = L_{10} \times a_n$$

Reliability (%)	$-a_0$
90	1
95	0.62
96	0.53
97	0.44
98	0.33
99	0.21

Equivalent load

Operating loads can be defined by physical characteristics (i.e. masses, inertia, etc.) that operate on the screw. For systems with varying conditions, such as changes of load magnitude and duration as well as speed, the simple calculation cannot be employed and an equivalent load should be assessed. The equivalent load is a calculated mean operating load used for determining life and is dependent upon load pattern.

The equivalent load can be computed using the following formula:

$$P = \sqrt[3]{\frac{q_1 \times n_1 \times F_{ax1}^{\ 3} + q_2 \times n_2 \times F_{ax2}^{\ 3} + \ldots + q_n \times n_n \times F_{axn}^{\ 3}}{q_1 \times n_1 + q_2 \times n_2 + \ldots + q_n \times n_n}}$$

The equivalent speed can be computed as follows:

$$n_{eq} = \frac{(q_1 \times n_1 + q_2 \times n_2 + \ldots + q_n \times n_n)}{100}$$

Where:

$F_{ax(1,2,n)}$ = applied load in the individual time step

$n_{(1,2,n)}$ = screw rotational speed (RPM) in the individual load steps

$q_{(1,2,n)}$ = time step in (%)

Preload

Preloaded nuts are used to eliminate axial lash and to increase system rigidity. Preload is detrimental to the operating life and should be selected carefully. The preload magnitude should be accounted for in the equivalent load calculation so its impact on the system life can be determined.

Preload magnitude should be selected as a function of the operating conditions. In case the varying steps cannot be easily identified, the preload magnitude can be assessed as follows:

$$F_p = \frac{F_{max}}{2.83}$$

The resulting load (inclusive of preload and operating load) can be calculated as follows:

Loaded nut (or half-nut)

$$P = F_p - 0.65 \times F_{ax} \ (\text{for } F_{ax} < 2.83 \times F_p) \ (\text{N})$$

$$P = 0 \ (\text{for } F_{ax} \geq 2.83 \times F_p) \ (\text{N})$$

Relieved nut (or half-nut)

$$P = F_p - 0.35 \times F_{ax} \ (\text{for } F_{ax} < 2.83 \times F_p)$$

$$P = 0 \ (\text{for } F_{ax} \geq 2.83 \times F_p)$$

Where:

P = resulting equivalent load (N)

F_p = preload magnitude (N)

F_{ax} = applied load (N)

Rigidity of a roller screw

The rigidity of a roller screw assembly is a function of several parameters, such as: nut rigidity, bearing support rigidity, screw shaft rigidity, mounting housing rigidity as well as the mounting arrangement. If known, all of the parameters can be assembled in a formula as follows:

$$C_{\delta t} = \left(\frac{1}{C_{\delta s}} + \frac{1}{C_{\delta n}} + \frac{1}{C_{\delta b}} + \frac{1}{C_{\delta h}} \right)^{-1}$$

Where:

$C_{\delta t}$ = total system rigidity (N/µm)

$C_{\delta s}$ = screw shaft rigidity (N/µm)

$C_{\delta n}$ = screw nut rigidity (N/µm)

$C_{\delta b}$ = support bearing rigidity (N/µm)

$C_{\delta h}$ = housing rigidity (N/µm)

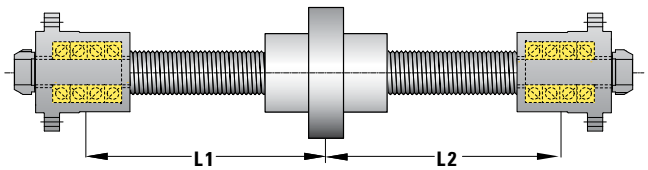
The screw rigidity can be calculated as follows:

$C_{\delta s} = 165 \times d_0^2 \times f_e$

Where:

f_e = factor dependent on end-support configuration (see Fig. 1)

Fixed-fixed: $f_e = (1/L1 + 1/L2)$



Fixed-free: $f_e = 1/L$

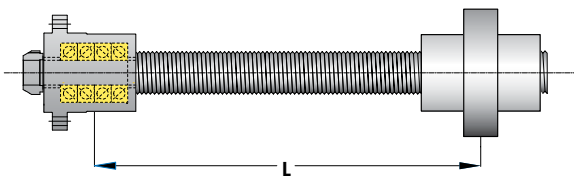


Fig. 1

ROLLER SCREW CALCULATIONS AND SELECTION continued

The nut rigidity can be calculated as follows:

$$C_{\delta n} = f_n \times \sqrt[3]{F_{ax}}$$

The factor f_n can be supplied upon request. The customer must determine the rigidity of the bearings and housing.

COLUMN STRENGTH

If the screw is subjected to compressive loads, then a verification of its suitability to the loading conditions can be performed as follows:

$$F_{ax\ allowed} = \frac{f_{sc} \times d_o^{\,4} \times 10^{\,4}}{L^2}$$

Where:

F_{ax} = compressed load (N)

f_{sc} = factor dependent on end-support configuration (SEE FIG. 2)

d_o = screw nominal diameter (mm)

L = free-length (mm)

CRITICAL SPEED

The maximum achievable rotational velocity of planetary roller screws is affected by the following parameters:

- Rotational speed capability of the nut (and planetary train)
- Diameter and free length of the screw (for rotating screw shafts)
- End support configuration (for rotating screws)
- Rotation member (nut or screw)

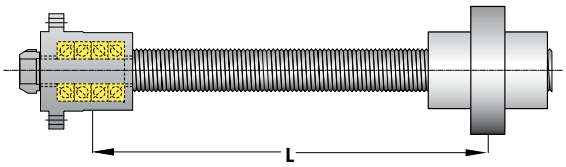
While the rotational capability of the nut can be easily assessed since it depends upon the maximum rotational factor DMn (mean diameter of the planetary train x rotational velocity n), the critical speed of the screw shaft must be calculated for each application. This value is normally considered the threshold at which the screw will start to resonate (1st order). The nut DMn factor equals 140,000.

The critical speed is calculated as follows:

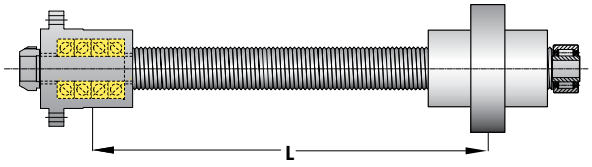
$$n_{max} = \frac{f_{sn} \times d_o \times 10^{\,7}}{L^2}\ (RPM)$$

Fig. 2 - Column Strength fsc Factor

Fixed - Free: fsc = 0.84



Fixed - Supported: fsc = 7



Fixed - Fixed: fsc = 13.7

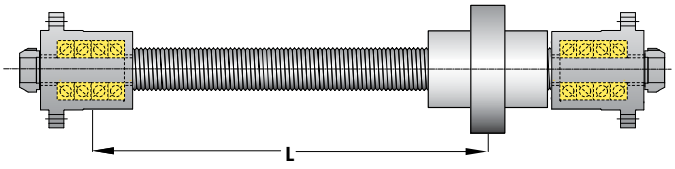
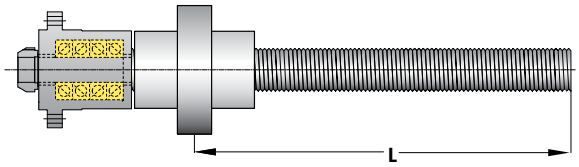
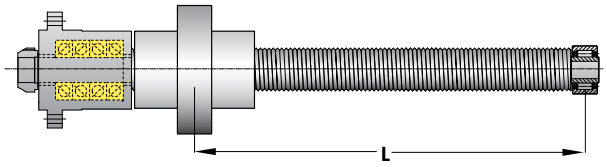


Fig. 3 - Critical Speed fsc Factor

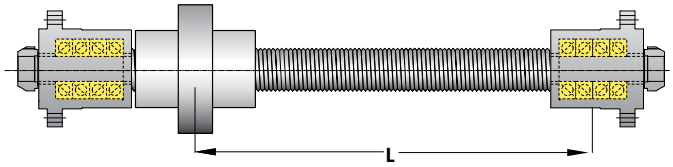
Fixed - Free: fsn = 3.5



Fixed - Supported: fsn = 15.3



Fixed - Fixed: fsn = 22.3



Where:

n_{max} = allowable screw rotational velocity (RPM)
f_{sn} = factor dependent upon the end-support configuration (see FIG. 3)
d_o = screw nominal diameter (mm)
L = screw free-length (mm)

EFFICIENCY AND DRIVING TORQUE

Efficiency of the NRS planetary roller screw is dependent upon its operating parameters. The friction of the system is dependent upon varying factors that cannot be easily summarized here. To simplify the selection of the screw size, the following formulae can be used.

$$\eta_1 = \frac{1}{1 + \left(\frac{f_f \times d_o}{p_{ho}}\right)}$$

(for transforming rotary motion into axial motion)

$$\eta_2 = 1 - \left(\frac{f_f \times d_o}{p_{ho}}\right)$$

(for transforming axial motion into rotary motion)

Where:

f_f = friction factor (mean value = 0.038)
P_{ho} = screw lead

Torque required

To move an axial load at constant speed, the screw will require a motor torque and its magnitude can be calculated as follows:

$$M_t = \frac{F_{ax} \times p_{ho} \times 10^{-3}}{2 \times \pi \times \eta_1}$$

M_t = drive torque (N • m)

By contrast, to restrain an axial load, the screw must be equipped with a brake and the restraining torque is calculated as follows:

$$M_b = \frac{F_{ax} \times p_{ho} \times \eta_2 \times 10^{-3}}{2 \times \pi}$$

M_b = brake torque (N • m)

Note: The start-up torque required will be greater than the calculated value M_t above.

LUBRICATION & MAINTENANCE

NRS planetary roller screws, like all rolling element systems, must be lubricated in order to operate properly.

The screws can be lubricated with oil or grease. The application demands will dictate which media is more suited for the task.

Grease lubrication

Typically NLGI Grade 2 greases are used for roller screws The grease used must not contain solid additives in any form. Greases suitable for lubricating screws must contain EP additives as well as anti-wear additives.

The lubricant characteristics, the amount to be used and its replenishment interval are a function of the application. Factors such as load, stroke length, operating temperature, environment cleanliness, and operating speed will impact the lubricant suitability and durability.

Nook/Thomson engineers will gladly provide guidance on the selection of suitable grease as well as the maintenance interval.

Oil lubrication

Nook/Thomson E-900L is available in a 32 oz. bottle for applications that require oil lubrication (see page 76). Applications that operate with high speeds and continuous motion may operate only with oil lubrication. The basic oil viscosity, the presence of additives and the lubricant flow should be assessed during the design phase.

Nook/Thomson engineers will gladly provide guidance on the selection of a suitable oil, as well as the proper flow, to insure the system operates as intended.

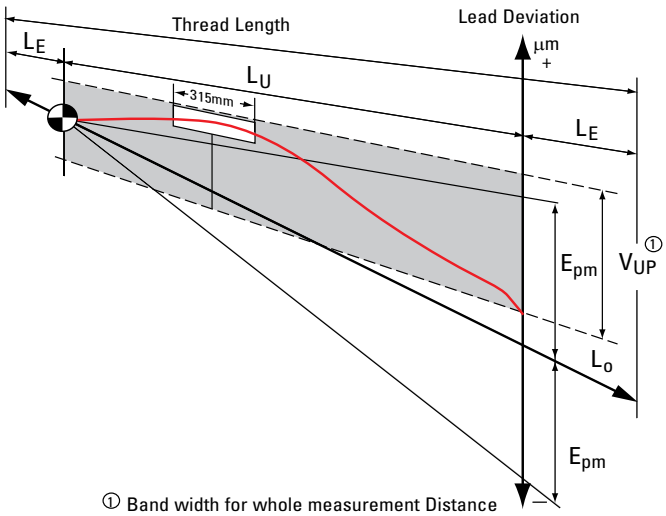
ROLLER SCREW ACCURACY AND INSTALLATION

ACCURACY

NRS planetary roller screws are produced in quality classes according to ISO 1, 3 and 5 standards. The summary of the characteristics and their allowable error are reported below

Accuracy Class	Tolerance* (µm)
G1	±6
G3	±12
G5	±23

*Measured on a thread length of 315 mm



EFFECTIVE THREAD LENGTH L_u		ACCURACY CLASS					
from (mm)	to (mm)	G1		G3		G5	
		Epm (µm)	Vup (µm)	Epm (µm)	Vup (µm)	Epm (µm)	Vup (µm)
0	315	6	6	12	12	23	23
315	400	7	6	13	12	25	25
400	500	8	7	15	13	27	26
500	630	9	7	16	14	30	29
630	800	10	8	18	16	35	31
800	1000	11	9	21	17	40	35
1000	1250	13	10	24	19	46	39
1250	1600	15	11	29	22	54	44
1600	1800	-	-	35	25	65	51

INSTALLATION

NRS planetary roller screws are precision components. They must be handled with care before and during installation to prevent the units from carrying radial loads or moments since either of these will impair the proper functioning and reduce the life of the system, or even cause the system to fail.

Nook/Thomson engineers are at your disposal to address any concerns for the design of the adjacent construction and the bearing arrangement to maximize the usefulness of the NRS planetary roller screws.

ROLLER SCREW
REFERENCE NUMBER SYSTEM

Nook/Thomson NRS™
PLANETARY ROLLER SCREWS

NRS B 15×2 / 500 / 2W / R / G5 / VKS / 5KX / S

NOOK ROLLER SCREW

NUT STYLE
B: one-piece cylindrical nut
S: split cylindrical nut
BF: one-piece flanged nut
SF: split flanged nut

Note: Not all nut styles are available for all sizes.

SIZE
Thread Form Codes

Dia. - Lead	Dia. - Lead
NRS 8×2	NRS 30×25
NRS 8×4	NRS 39×5
NRS 12×2	NRS 39×10
NRS 12×4	NRS 39×15
NRS 12×5	NRS 39×20
NRS 15×2	NRS 44×12
NRS 15×4	NRS 44×18
NRS 15×5	NRS 44×24
NRS 20×2	NRS 44×30
NRS 20×4	NRS 48×5
NRS 20×5	NRS 48×10
NRS 20×6	NRS 48×20
NRS 21×5	NRS 60×10
NRS 21×8	NRS 60×15
NRS 21×10	NRS 60×20
NRS 23×2	NRS 64×30
NRS 23×4	NRS 64×36
NRS 23×8	NRS 64×42
NRS 25×5	NRS 75×10
NRS 25×10	NRS 75×20
NRS 27×2	NRS 75×30
NRS 27×4	NRS 75×40
NRS 27×8	NRS 80×24
NRS 30×5	NRS 100×25
NRS 30×10	NRS 100×50
NRS 30×15	NRS 120×25
NRS 30×20	

OVER-ALL LENGTH (OAL)
Length in millimeters

WIPERS
NW: without wipers
2W: with 2 wipers
1W: with 1 wiper

THREAD
R = Right Hand Thread
L = Left Hand Thread

ACCURACY CLASS
G5: ISO 5 (standard accuracy)
G3: ISO 3
G1: ISO 1

FIRST END CONFIGURATION
Note: Both Ends must be specified.
Bearing Supports are used in conjunction with Type 5K, 5L, or 5N end machining.

MODIFIER
S: Standard
M: Modified

SECOND END CONFIGURATION
Refer to the First End Configuration section below.
Note: Both Ends must be specified.

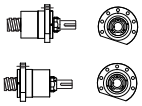
EZZE-MOUNT™ / End Machining
(see page 162 - 163)

V K S

VK = Flanged Fixed Bearing Support
Flange Facing Away From Screw Thread
With Keyway

Bearing Mount Install
S = Bearing Mount Installed
N = Bearing Mount Shipped Loose
X = No Bearing Mount

5 = Type 5
R = Flanged Fixed Bearing Support
Flange Facing Screw Thread
V = Flanged Fixed Bearing Support
Flange Facing Away From Screw Thread
00 = No End Machining (Screw will be cut to desired length)
XX= Custom Machining (Print or specified data must be provided)



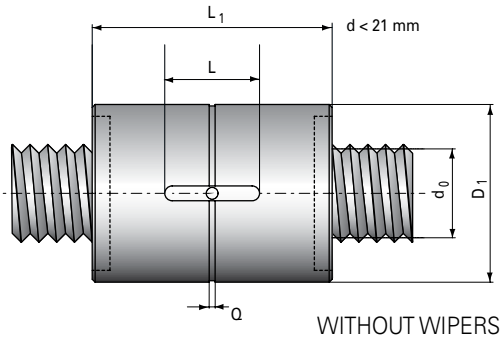
Shaft Extension (see page 163)
K = Shaft Extension with Keyway
L = Shaft Extension without Keyway
N = No Shaft Extension

ROLLER SCREWS

NRS 8mm > 27 mm Ø
one-piece and split cylindrical nut

100 × 50 roller screw with cylindrical nut

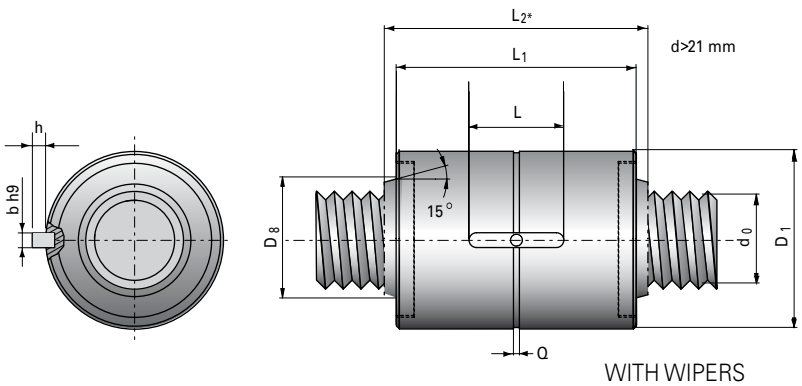
Nook/Thomson NRS Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points, a roller screw provides stiffness and higher load ratings compared to a ball screw.



WITHOUT WIPERS

Nominal Screw Dia. d_0	Dia. × Lead	Lead (mm)	D_1 (g6) (mm)	Q (mm)	D_8 (mm)
8	NRS 8×2	2	21	3	-
	NRS 8×4	4	21	3	-
12	NRS 12×2	2	26	3	-
	NRS 12×4	4	26	3	-
	NRS 12×5	5	26	3	-
15	NRS 15×2	2	34	3	-
	NRS 15×4	4	34	3	-
	NRS 15×5	5	34	3	-
20	NRS 20×2	2	42	5	-
	NRS 20×4	4	42	5	-
	NRS 20×5	5	42	5	-
	NRS 20×6	6	42	5	-
21	NRS 21×5	5	45	5	26
	NRS 21×8	8	45	5	26
	NRS 21×10	10	45	5	26
23	NRS 23×2	2	45	4	30
	NRS 23×4	4	45	5	30
	NRS 23×8	8	45	5	30
25	NRS 25×5	5	53	5	32
	NRS 25×10	10	53	5	32
27	NRS 27×2	2	53	4	35
	NRS 27×4	4	53	5	35
	NRS 27×8	8	53	5	35

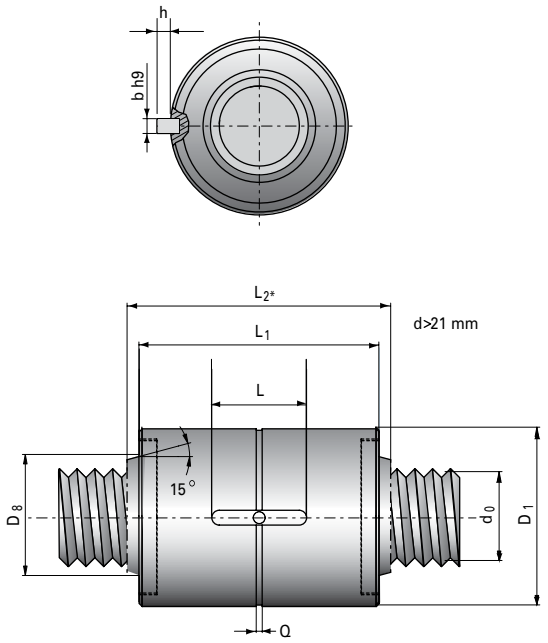
Nook/Thomson NRS™



WITH WIPERS

L1 (mm)	L2 (mm)	Keyway L × b × h (mm)	ONE-PIECE NUT Load Rating Dynamic Ca (kN)	ONE-PIECE NUT Load Rating Static C0a (kN)	backlash (mm)	SPLIT NUT Load Rating Dynamic Ca (kN)	SPLIT NUT Load Rating Static C0a (kN)	Locknut	End Code Type 5	EZZE-Mount
31	-	10×3×1.2	6.98	17.91	0.02	4.19	8.90	–	–	–
31	-	10×3×1.2	5.43	18.63	0.02	3.26	9.31	–	–	
31	-	14×4×1.5	10.24	26.72	0.02	6.14	13.36	–	–	–
31	-	14×4×1.5	8.92	27.74	0.02	5.35	13.87	–	–	–
31	-	14×4×1.5	8.31	31.00	0.02	4.88	15.50	–	–	–
35	-	14×4×1.5	13.47	31.74	0.02	8.08	15.87	SFZ 12×1	12	EZRF-3012
35	-	14×4×1.5	11.94	33.00	0.02	7.16	16.50	SFZ 12×1	12	EZRF-3012
35	-	14×4×1.5	11.20	36.90	0.02	6.72	18.45	SFZ 12×1	12	EZRF-3012
65	-	20×4×1.5	33.00	66.00	0.02	19.80	33.00	SFZ 15×1	15	EZRF-3015
65	-	20×4×1.5	29.54	68.63	0.02	17.72	34.31	SFZ 15×1	15	EZRF-3015
65	-	20×4×1.5	27.80	56.29	0.02	16.68	28.15	SFZ 15×1	15	EZRF-3015
65	-	20×4×1.5	26.42	65.17	0.02	15.91	39.13	SFZ 15×1	15	EZRF-3015
64	72	20×5×2	40.70	68.70	0.02	24.40	34.20	SFZ 17×1	17	EZRF-3017
64	72	20×5×2	44.20	69.00	0.02	26.50	34.50	SFZ 17×1	17	EZRF-3017
64	72	20×5×2	47.90	69.50	0.02	28.70	35.00	SFZ 17×1	17	EZRF-3017
55	65	20×5×2	40.89	66.80	0.02	24.63	33.40	SFZ 17×1	17	EZRF-3017
55	65	20×5×2	40.12	64.38	0.02	24.17	32.19	SFZ 17×1	17	EZRF-3017
55	65	20×5×2	38.41	69.02	0.04	23.14	34.51	SFZ 17×1	17	EZRF-3017
78	90	25×6×2.5	52.70	92.00	0.02	31.60	46.00	SFZ 20×1	20	EZRF-3020
78	90	25×6×2.5	60.50	88.51	0.04	36.30	44.20	SFZ 20×1	20	EZRF-3020
55	69	20×5×2	44.32	77.66	0.02	26.70	38.83	SFZ 25×1.5	20	EZRF-3025
55	69	20×5×2	40.34	80.76	0.02	24.30	40.38	SFZ 25×1.5	20	EZRF-3025
55	69	20×5×2	42.10	99.26	0.04	25.36	49.63	SFZ 25×1.5	20	EZRF-3025

NRS 30mm > 120 mm Ø
one-piece and split cylindrical nut



WITH WIPERS

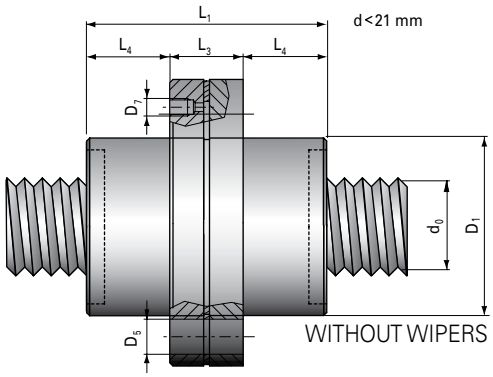
Nominal Screw Dia. d_0	Dia. × Lead	Lead (mm)	D_1 (g6) (mm)	Q (mm)	D_8 (mm)
30	NRS 30×2	2	64	5	45
	NRS 30×5	5	64	5	45
	NRS 30×10	10	64	5	45
	NRS 30×15	15	64	5	45
	NRS 30×20	20	64	5	45
	NRS 30×25	25	64	5	45
39	NRS 39×5	5	80	7	50
	NRS 39×10	10	80	7	50
	NRS 39×15	15	80	7	50
	NRS 39×20	20	80	7	50
44	NRS 44×12	12	80	7	56
	NRS 44×18	18	80	7	56
	NRS 44×24	24	80	7	56
	NRS 44×30	30	80	7	56
48	NRS 48×5	5	100	7	63
	NRS 48×10	10	100	7	63
	NRS 48×20	20	100	7	63
60	NRS 60×10	10	130	10.5	77
	NRS 60×15	15	130	10.5	77
	NRS 60×20	20	130	10.5	77
64	NRS 64×30	30	115	7	75
	NRS 64×36	36	115	7	75
	NRS 64×42	42	115	7	75
75	NRS 75×10	10	150	10.5	98
	NRS 75×20	20	150	10.5	98
	NRS 75×30	30	150	10.5	98
	NRS 75×40	40	160	10.5	98
	NRS 80×24	24	150	10.5	98
100	NRS 100×25	25	200	13	122.5
	NRS 100×50	50	200	13	122.5
120	NRS 120×25	25	240	15	176

L_1 (mm)	L_2 (mm)	Keyway L × b × h (mm)	ONE-PIECE NUT Load Rating Dynamic C_a (kN)	ONE-PIECE NUT Load Rating Static C_{0a} (kN)	backlash (mm)	SPLIT NUT Load Rating Dynamic C_a (kN)	SPLIT NUT Load Rating Static C_{0a} (kN)	Locknut	End Code Type 5	EZZE-Mount
85	99	32×6×2.5	58.70	133.00	0.02	35.20	66.50	-	25	EZRF-3025
85	99	32×6×2.5	76.70	122.30	0.02	46.00	61.15	-	25	EZRF-3025
85	99	32×6×2.5	88.60	122.30	0.04	53.20	61.15	-	25	EZRF-3025
85	99	32×6×2.5	96.40	119.40	0.07	57.80	59.70	-	25	EZRF-3025
85	99	32×6×2.5	99.80	128.80	0.07	59.80	64.40	-	25	EZRF-3025
85	99	32×6×2.5	102.40	143.20	0.07	61.40	71.60	-	25	EZRF-3025
110	126	40×8×3	107.70	228.50	0.02	64.60	114.30	-	35	EZRF-3035
110	126	40×8×3	127.30	230.30	0.04	76.30	115.10	-	35	EZRF-3035
110	126	40×8×3	138.30	228.10	0.04	82.80	114.00	-	35	EZRF-3035
110	126	40×8×3	144.70	214.60	0.04	86.70	107.30	-	35	EZRF-3035
90	106	32×6×2.5	115.90	217.20	0.04	69.50	108.60	-	40	EZRF-3040
90	106	32×6×2.5	127.40	215.00	0.07	76.40	107.50	-	40	EZRF-3040
90	106	32×6×2.5	136.50	221.40	0.07	81.90	110.70	-	40	EZRF-3040
90	106	32×6×2.5	133.80	206.30	0.07	80.20	103.10	-	40	EZRF-3040
127	142	45×8×3	165.10	334.30	0.02	99.00	167.15	-	45	EZRF-3045
127	142	45×8×3	193.00	403.80	0.04	115.80	201.90	-	45	EZRF-3045
127	142	45×8×3	215.10	369.00	0.07	129.00	184.50	-	45	EZRF-3045
162	180	45×10×3	282.30	662.60	0.04	169.40	331.30	SFZ 55×2	55	EZRF-3055
162	180	45×10×3	307.00	656.30	0.07	184.20	328.20	SFZ 55×2	55	EZRF-3055
162	180	45×10×3	325.00	558.90	0.07	195.00	279.45	SFZ 55×2	55	EZRF-3055
129	151	45×8×3	260.90	515.00	0.07	156.50	257.50	SFZ 60×2	60	EZRF-3060
129	151	45×8×3	260.00	493.10	0.07	156.00	246.50	SFZ 60×2	60	EZRF-3060
129	151	45×8×3	258.20	471.40	0.07	154.90	235.70	SFZ 60×2	60	EZRF-3060
191	211	63×10×3	411.10	969.40	0.04	246.00	484.70	SFZ 70×2	70	EZRF-3070
191	211	63×10×3	483.40	816.20	0.07	290.00	408.10	SFZ 70×2	70	EZRF-3070
206	224	63×10×3	461.40	866.90	0.07	276.80	433.45	SFZ 70×2	70	EZRF-3070
200	218	63×10×3	595.80	906.10	0.07	-	-	SFZ 70×2	70	EZRF-3070
200	224	63×10×3	650.90	1,078.00	0.07	-	-	SFZ 75×2	70	EZRF-3075
270	288	100×16×4	960.5	1412	0.07	-	-	-	-	-
270	288	100×16×4	822.1	1292	0.07	-	-	-	-	-
280	304	100×16×4	1510	2376	0.07	-	-	-	-	-

NRS 8mm > 27 mm Ø
one-piece and split flanged nut

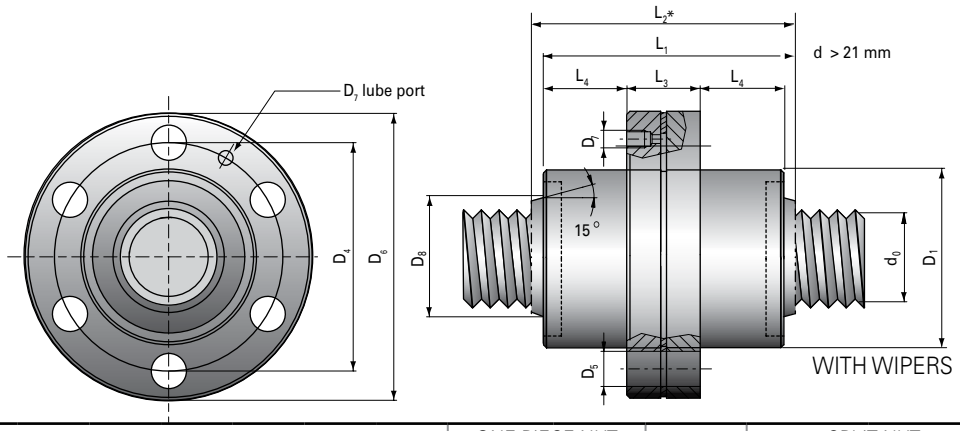
100 x 50 roller screw with flanged nut

Nook/Thomson NRS Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points, a roller screw provides stiffness and higher load ratings compared to a ball screw.



Nominal Screw Dia. d_0	Dia. x Lead	Lead (mm)	D_1 (g6) (mm)	D_4 (mm)	n×D_5 (mm)	D_6 (mm)
8	NRS 8×2	2	21	31	6×4.5	41
	NRS 8×4	4	21	31	6×4.5	41
12	NRS 12×2	2	26	36	6×4.5	46
	NRS 12×4	4	26	36	6×4.5	46
	NRS 12×5	5	26	36	6×4.5	46
15	NRS 15×2	2	34	45	6×5	56
	NRS 15×4	4	34	45	6×5	56
	NRS 15×5	5	34	45	6×5	56
20	NRS 20×2	2	42	53	6×6	64
	NRS 20×4	4	42	53	6×6	64
	NRS 20×5	5	42	53	6×6	64
	NRS 20×6	6	42	53	6×6	64
21	NRS 21×5	5	45	56	6×6	68
	NRS 21×8	8	45	56	6×6	68
	NRS 21×10	10	45	56	6×6	68
23	NRS 23×2	2	45	56	6×7	67
	NRS 23×4	4	45	56	6×7	67
	NRS 23×8	8	45	56	6×7	67
25	NRS 25×5	5	53	70	6×7	84
	NRS 25×10	10	53	70	6×7	84
27	NRS 27×2	2	53	68	6×7	83
	NRS 27×4	4	53	68	6×7	83
	NRS 27×8	8	53	68	6×7	83

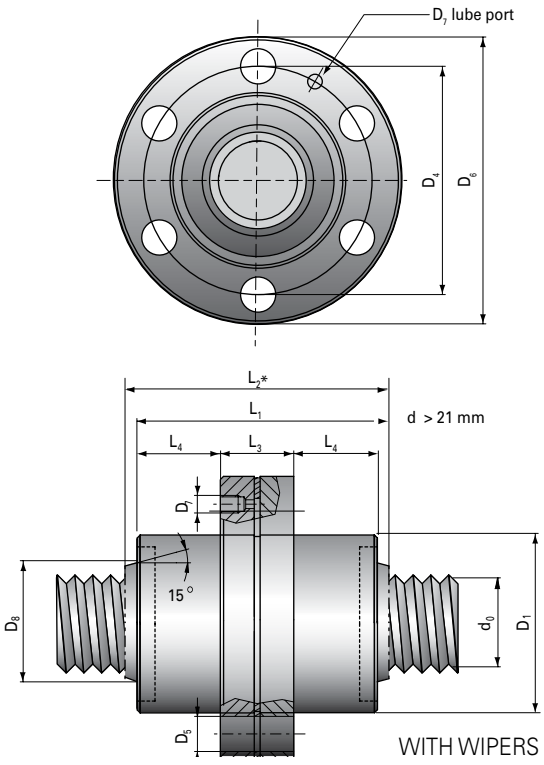
Nook/Thomson NRS™



lube port						ONE-PIECE NUT Load Rating			SPLIT NUT Load Rating				
						Dynamic	Static		Dynamic	Static			
D_7 (mm)	D_8 (mm)	L_1 (mm)	L_2 (mm)	L_3 (mm)	L_4 (mm)	C_a (kN)	C_{0a} (kN)	backlash (mm)	C_a (kN)	C_{0a} (kN)	Locknut	End Code Type 5	EZZE-Mount
M4	-	31	41	13	14	6.98	17.91	0.02	4.19	8.90	–	–	–
M4	-	31	41	13	14	5.43	18.63	0.02	3.26	9.31	–	–	–
M4	-	31	41	13	14	10.24	26.72	0.02	6.14	13.36	–	–	–
M4	-	31	41	13	14	8.92	27.74	0.02	5.35	13.87	–	–	–
M4	-	31	41	13	14	8.31	31.00	0.02	4.88	15.50	–	–	–
M5	-	35	51	18	16.5	13.47	31.74	0.02	8.80	15.87	SFZ 12×1	12	EZRF-3012
M5	-	35	51	18	16.5	11.94	33.00	0.02	7.16	16.50	SFZ 12×1	12	EZRF-3012
M5	-	35	51	18	16.5	11.20	36.90	0.02	6.72	18.45	SFZ 12×1	12	EZRF-3012
M6	-	55	65	20	22.5	33.00	66.00	0.02	19.80	33.00	SFZ 15×1	15	EZRF-3015
M6	-	55	65	20	22.5	29.54	68.63	0.02	17.72	34.31	SFZ 15×1	15	EZRF-3015
M6	-	55	65	20	22.5	27.80	56.29	0.02	16.68	28.15	SFZ 15×1	15	EZRF-3015
M6	-	55	65	20	22.5	26.42	65.17	0.02	15.91	39.13	SFZ 15×1	15	EZRF-3015
M6	26	64	72	18	23	40.70	68.70	0.02	24.40	34.20	SFZ 17×1	17	EZRF-3017
M6	26	64	72	18	23	44.20	69.00	0.02	26.50	34.50	SFZ 17×1	17	EZRF-3017
M6	26	64	72	18	23	47.90	69.50	0.02	28.70	35.00	SFZ 17×1	17	EZRF-3017
M6	30	55	65	20	22.5	24.63	33.40	0.02	24.63	33.40	SFZ 17×1	17	EZRF-3017
M6	30	55	65	20	22.5	24.17	32.19	0.02	24.17	32.19	SFZ 17×1	17	EZRF-3017
M6	30	55	65	20	22.5	23.14	34.51	0.04	23.14	34.51	SFZ 17×1	17	EZRF-3017
M6	32	78	90	20	29	52.70	92.00	0.02	31.60	46.00	SFZ 20×1	20	EZRF-3020
M6	32	78	90	20	29	60.50	88.51	0.04	36.30	44.20	SFZ 20×1	20	EZRF-3020
M6	35	55	69	22	23.5	44.32	77.66	0.02	26.70	38.83	SFZ 25×1.5	25	EZRF-3025
M6	35	55	69	22	23.5	40.34	80.76	0.02	24.30	40.38	SFZ 25×1.5	25	EZRF-3025
M6	35	55	69	22	23.5	42.10	99.26	0.04	25.36	49.63	SFZ 25×1.5	25	EZRF-3025

NRS 30mm > 100 mm Ø

one-piece and split flanged nut



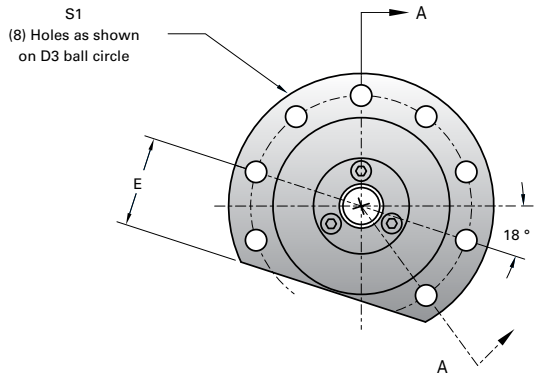
Nominal Screw Dia. d_0	Dia. × Lead	Lead (mm)	D_1 (g6) (mm)	D_4 (mm)	n×D_5 (mm)	D_6 (mm)
30	NRS 30×2	2	64	81	6×9	98
	NRS 30×5	5	64	81	6×9	98
	NRS 30×10	10	64	81	6×9	98
	NRS 30×15	15	64	81	6×9	98
	NRS 30×20	20	64	81	6×9	98
	NRS 30×25	25	64	81	6×9	98
39	NRS 39×5	5	80	102	6×11	124
	NRS 39×10	10	80	102	6×11	124
	NRS 39×15	15	80	102	6×11	124
	NRS 39×20	20	80	102	6×11	124
44	NRS 44×12	12	80	102	6×11	124
	NRS 44×18	18	80	102	6×11	124
	NRS 44×24	24	80	102	6×11	124
	NRS 44×30	30	80	102	6×11	124
48	NRS 48×5	5	100	127	6×13.5	150
	NRS 48×10	10	100	127	6×13.5	150
	NRS 48×20	20	100	127	6×13.5	150
60	NRS 60×10	10	130	160	8×16.75	190
	NRS 60×15	15	130	160	8×16.75	190
	NRS 60×20	20	130	160	8×16.75	190
64	NRS 64×30	30	115	150	8×16.75	180
	NRS 64×36	36	115	150	8×16.75	180
	NRS 64×42	42	115	150	8×16.75	180
75	NRS 75×10	10	150	180	8×16.75	210
	NRS 75×20	20	150	180	8×16.75	210
	NRS 75×30	30	150	180	8×16.75	210
	NRS 75×40	40	160	180	8×16.75	210
80	NRS 80×24	24	150	180	8×16.75	210
100	NRS 100×25	25	200	245	12×17.5	275
	NRS 100×50	50	200	245	12×17.5	275

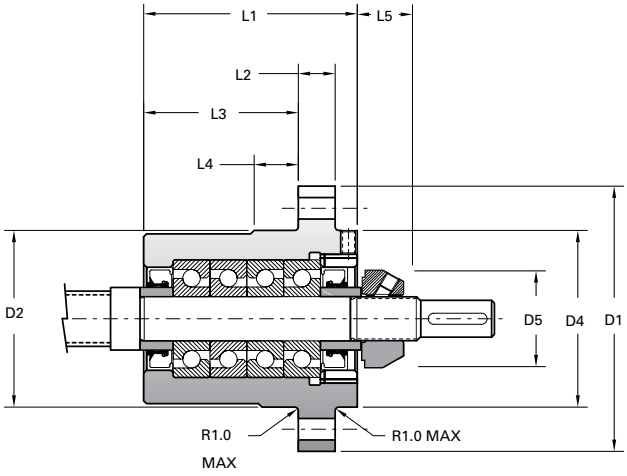
Nook/Thomson NRS™

lube port D_7 (mm)	D_8 (mm)	L_1 (mm)	L_2 (mm)	L_3 (mm)	L_4 (mm)	ONE-PIECE NUT Load Rating Dynamic C_a (kN)	ONE-PIECE NUT Load Rating Static C_{0a} (kN)	backlash mm	SPLIT NUT Load Rating Dynamic C_a (kN)	SPLIT NUT Load Rating Static C_{0a} (kN)	Locknut	End Code Type 5	EZZE-Mount
M6	45	85	99	27	29	58.70	133.00	0.02	35.20	66.50	SFZ 25×1.5	25	EZRF-3025
M6	45	85	99	27	29	76.70	122.30	0.02	46.00	61.15	SFZ 25×1.5	25	EZRF-3025
M6	45	85	99	27	29	88.60	122.30	0.04	53.20	61.15	SFZ 25×1.5	25	EZRF-3025
M6	45	85	99	27	29	96.40	119.40	0.07	57.80	59.70	SFZ 25×1.5	25	EZRF-3025
M6	45	85	99	27	29	99.80	128.80	0.07	59.80	64.40	SFZ 25×1.5	25	EZRF-3025
M6	45	85	99	27	29	102.40	143.20	0.07	61.40	71.60	SFZ 25×1.5	25	EZRF-3025
M6	54	110	126	33	38.5	107.70	228.50	0.02	64.60	114.30	SFZ 35×1.5	35	EZRF-3035
M6	54	110	126	33	38.5	127.30	230.30	0.04	76.30	115.10	SFZ 35×1.5	35	EZRF-3035
M6	54	110	126	33	38.5	138.30	228.10	0.04	82.80	114.00	SFZ 35×1.5	35	EZRF-3035
M6	54	110	126	33	38.5	144.70	214.60	0.04	86.70	107.30	SFZ 35×1.5	35	EZRF-3035
M8×1	56	90	106	33	28.5	115.90	217.20	0.04	69.50	108.60	SFZ 40×1.5	40	EZRF-3040
M8×1	56	90	106	33	28.5	127.40	215.00	0.07	76.40	107.50	SFZ 40×1.5	40	EZRF-3040
M8×1	56	90	106	33	33.5	136.50	221.40	0.07	81.90	110.70	SFZ 40×1.5	40	EZRF-3040
M8×1	56	90	106	33	33.5	133.80	206.30	0.07	80.20	103.10	SFZ 40×1.5	40	EZRF-3040
M8×1	63	127	142	37	45	165.10	334.30	0.02	99.00	167.15	SFZ 45×1.5	40	EZRF-3045
M8×1	63	127	142	37	45	193.00	403.80	0.04	115.80	201.90	SFZ 45×1.5	40	EZRF-3045
M8×1	63	127	142	37	45	215.10	369.00	0.07	129.00	184.50	SFZ 45×1.5	40	EZRF-3045
M8×1	79	162	180	45	58.5	282.30	662.60	0.04	169.40	331.30	SFZ 55×2	55	EZRF-3055
M8×1	79	162	180	45	58.5	307.00	656.30	0.07	184.20	328.20	SFZ 55×2	55	EZRF-3055
M8×1	79	162	180	45	58.5	325.00	558.90	0.07	195.00	279.45	SFZ 55×2	55	EZRF-3055
M8×1	75	129	151	45	42	260.90	515.00	0.07	156.50	257.50	SFZ 60×2	60	EZRF-3060
M8×1	75	129	151	45	42	260.00	493.10	0.07	156.00	246.50	SFZ 60×2	60	EZRF-3060
M8×1	75	129	151	45	42	258.20	471.40	0.07	154.90	235.70	SFZ 60×2	60	EZRF-3060
M8×1	98	191	211	45	73	411.10	969.40	0.04	246.00	484.70	SFZ 70×2	70	EZRF-3070
M8×1	98	191	211	45	73	483.40	816.20	0.07	290.00	408.10	SFZ 70×2	70	EZRF-3070
M8×1	98	206	224	45	80.5	461.40	866.90	0.07	276.80	433.45	SFZ 70×2	70	EZRF-3070
M8×1	98	200	218	45	77.5	820.00	980.00	0.07	-	-	SFZ 70×2	70	EZRF-3070
M8×1	98	200	224	45	77.5	840.00	1,260.00	0.07	-	-	SFZ 75×2	75	EZRF-3075
M8×1	122.5	270	288	65	102.5	960.5	1412	0.07	-	-	-	-	-
M8×1	122.5	270	288	65	102.5	822.1	1292	0.07	-	-	-	-	-

EZRF BEARING SUPPORTS FOR
NRS 15×2 - NRS 80×24

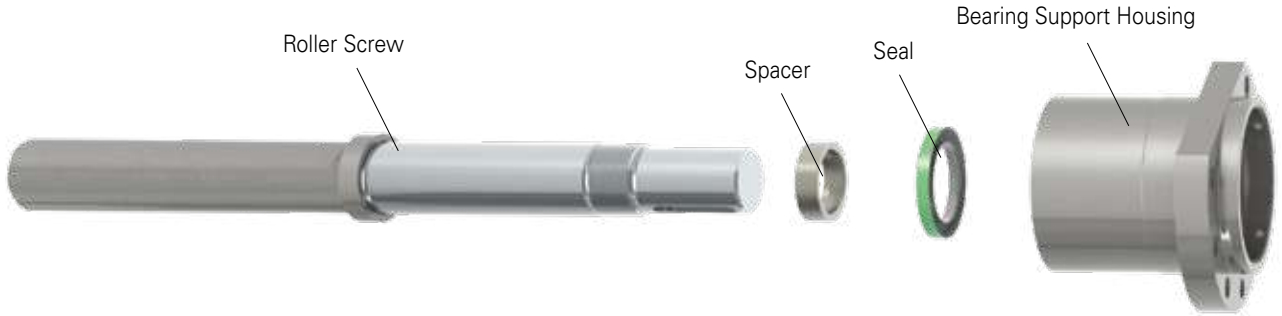
Roller screw high load ratings and extreme performance characteristics place large demands on end support units. Nook/Thomson has developed support units capable of handling these demands. Nook/Thomson series EZRF end support units are matched to the roller screw (see dimension table below) and are designed to provide high load carrying capacity, precision, speed, rigidity, low friction, and ease of maintenance and installation. EZRF supports include a SFZ locknut.





Part No.	Roller Screw	L1	L2	L3	L4	L5	D1	D2 g6	D3	D4	D5	E	S
EZRF-3012	NRS 15	67	10	51	14	15	72	48	60	48	30	25	5.8
EZRF-3015	NRS 20	72	10	55.5	15	17	82	54	68	54	33	28	6.8
EZRF-3017	NRS 21	78	12	59	16	19	92	64	78	64	37	33	6.8
	NRS 23	78	12	59	16	19	92	64	78	64	37	33	6.8
EZRF-3020	NRS 25	82	12	62	17	19	100	64	82	64	40	33	8.8
EZRF-3025	NRS 27	93	15	69.5	19	21	116	80	98	80	44	41	8.8
	NRS 30	93	15	69.5	19	21	116	80	98	80	44	41	8.8
EZRF-3035	NRS 39	115	20	83.5	23	23	140	100	120	100	54	51	10.8
EZRF-3040	NRS 44	125	20	90.5	25	23	160	112	136	112	65	57	12.8
EZRF-3045	NRS 48	135	20	99.5	27	23	174	125	150	125	70	63.5	12.8
EZRF-3055	NRS 60	152	25	111.5	31	26	214	150	182	150	85	76	16.8
EZRF-3060	NRS 64	169	25	127.5	33	27	226	162	194	162	90	82	16.8
EZRF-3070	NRS 75	186	30	137.5	37	29	268	188	228	188	100	95	20.8
EZRF-3075	NRS 80	196	30	146.5	39	29	290	211	251	211	105	109	20.8

all dimensions in millimeters



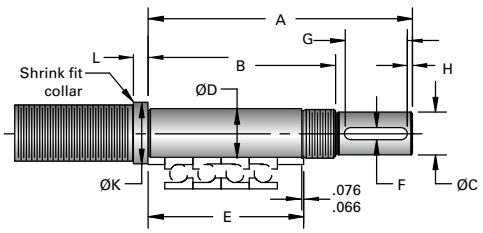
TYPE 5 END MACHINING
USED WITH EZRF BEARING MOUNTS

Nook/Thomson NRS™
PLANETARY ROLLER SCREWS

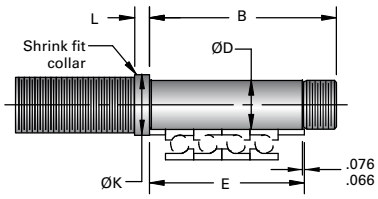
Specifying standard machined ends results in quicker deliveries. The machined ends shown below represent designs that are compatible with common application requirements for fixed bearing support.

Dimensional data for Type 5 ends is provided in the chart. Included in the chart are the locknut and lockwasher identification. These standard ends may be machined and ground to finish size.

TYPE 5K (with keyway)
TYPE 5L (without keyway)

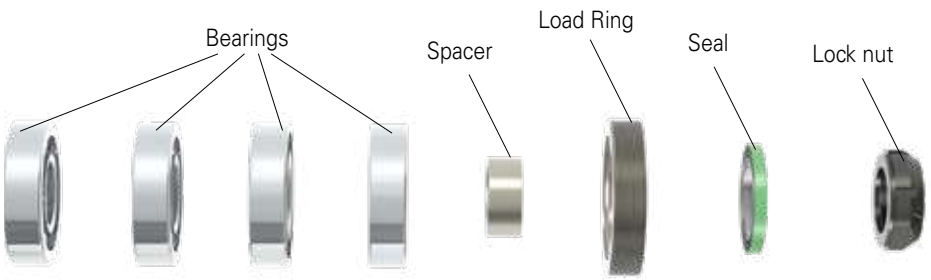


TYPE 5N



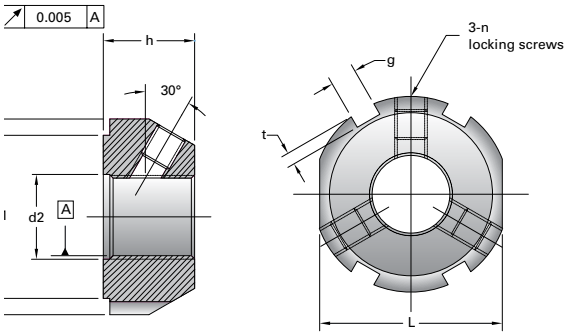
Machine End Codes	COMMON DIMENSIONS FOR TYPE 5 (K,L,N) (mm)						TYPE 5 (K,L) (mm)				
	B	D	E	K	L	Locknut	A	C	F	G	H
12	85	12.008/11.997	69	18	8	SFZ 12 × 1	117	10.00/9.97	3	26	2
15	93	15.008/14.997	74	22	9	SFZ 15 × 1	133	12.00/11.97	4	33	3
17	101	17.008/16.997	80	24	9	SFZ 17 × 1	141	15.00/14.97	5	33	3
20	105	20.009/19.996	84	28	9	SFZ 20 × 1	151	17.00/16.97	5	37	4
25	119	25.009/24.996	95	32	10	SFZ 25 × 1.5	170	20.00/19.97	6	41	5
35	143	35.011/34.995	117	45	10	SFZ 35 × 1.5	205	30.00/29.97	8	51	4
40	153	40.011/39.995	127	50	12	SFZ 40 × 1.5	216	35.00/34.97	10	51	4
45	163	45.011/44.995	137	55	12	SFZ 45 × 1.5	228	40.00/39.97	12	51	5
55	184	55.012/54.993	154	65	14	SFZ 55 × 2	265	50.00/49.97	14	64	6
60	202	60.012/59.993	171	75	16	SFZ 60 × 2	291	55.00/54.97	16	71	6
70	222	70.012/69.993	188	85	18	SFZ 70 × 2	334	60.00/59.97	18	91	7
75	232	75.012/74.993	198	90	18	SFZ 75 × 2	346	65.00/64.97	18	91	8

all dimensions in millimeters



SFZ LOCKNUTS FOR
NRS 15×2 TO NRS 80×24

Precision ground locknuts



SFZ10 - SFZ75

Conventional locknuts may not be suitable in a typical roller screw application due to the high axial load generated. Nook/Thomson series SFZ locknuts are designed to carry high axial forces while minimizing the rotational inertia, an important benefit in high dynamic applications. SFZ locknuts are designed to carry high axial load, have high loosening torque and are manufactured with high accuracy to optimize the load on the thread interface.

Nook/Thomson NRS™
PLANETARY ROLLER SCREWS

SFZ Locknut on an EZRF bearing mount

Part No. Size × Pitch	Roller Screw	Dimensions in mm							Locking Screws		Allowable Axial Load (Ca)	Loosening Torque (T)
		D	h	g	t	d1	d2	L	DIN	Max Tightening Torque (T) (N•m)	kN	(N•m)
SFZ 12×1	NRS 15	30	14	4	2	25	13	27	M5	4.7	40	18
SFZ 15×1	NRS 20	33	16	4	2	28	16	30	M5	4.7	60	20
SFZ 17×1	NRS 21	37	18	5	2	33	18	34	M6	8	80	25
SFZ 20×1	NRS 25	40	18	5	2	35	21	36	M6	8	90	35
SFZ 25×1.5	NRS 27	44	20	5	2	39	26	41	M6	8	130	45
SFZ 35×1.5	NRS 39	54	22	5	2	49	38	50	M6	8	190	65
SFZ 40×1.5	NRS 44	65	22	6	2.5	59	42	60	M8	18.6	210	80
SFZ 45×1.5	NRS 48	70	22	6	2.5	64	48	65	M8	18.6	240	95
SFZ 55×2	NRS 60	85	25	7	3	78	58	80	M8	18.6	340	225
SFZ 60×2	NRS 64	90	26	8	3.5	82	62	85	M8	18.6	380	245
SFZ 70×2	NRS 75	100	28	8	3.5	92	72	95	M8	18.6	490	285
SFZ 75×2	NRS 80	105	28	8	3.5	97	77	100	M8	18.6	520	305

EZZE-MOUNT™

PRECISION SCREW SUPPORTS

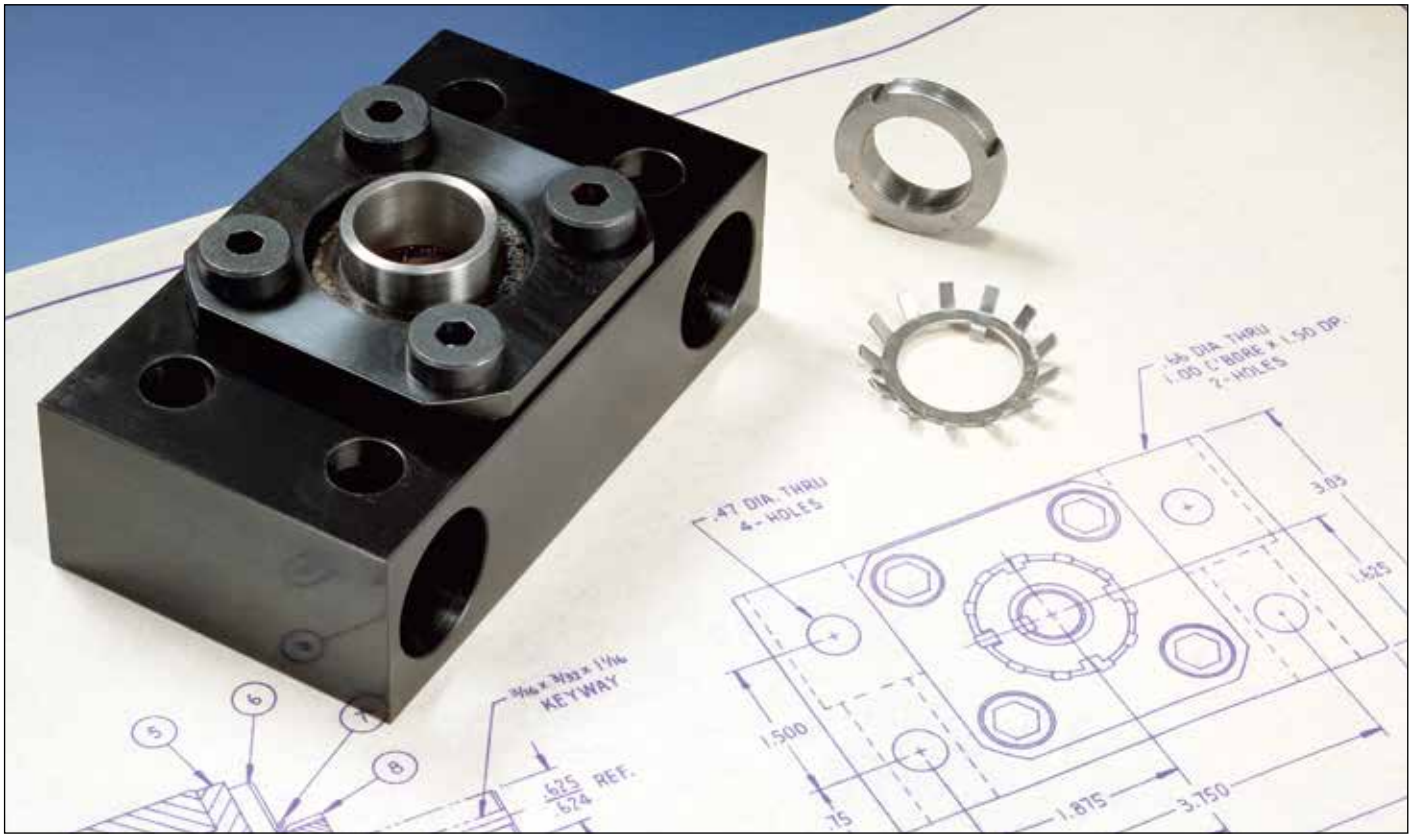
Nook/Thomson EZZE-MOUNT™ bearing blocks

BEARING MOUNTS END MACHINING

EZZE-MOUNT™ AND END MACHINING

INTRODUCTION

Linear motion applications utilizing a ball screw or an acme screw require this screw end machining matched with precision bearing mounts. Nook/Thomson Industries, Inc. offers both the bearing mounts and end machining as a complete assembly.



Nook/Thomson can provide the following end machining services:

- Screws cut to precision lengths
- Annealing
- Straightening
- CNC turning and milling
- Grinding
- Assembly of bearing mounts
- Inspection
- Specialized material handling and packaging

Bearing mounts must be designed to withstand both the radial and the thrust loads generated by the application screw assembly.

Nook/Thomson offers EZZE-MOUNT™ precision bearing blocks, that can be assembled to precision machined screws, providing a complete solution for most linear motion applications.

EZZE-MOUNT™ bearing mounts are available with integral motor mounts to offer complete motorized systems.

Motor mounts are available for standard (17, 23, 34, 42), as well as, IEC frames for servo and stepper motor applications.

GLOSSARY AND DEFINITIONS

EZZE-MOUNT™

EZZE-MOUNT™ bearing blocks contain precision anti-friction bearings and are designed to be used with both ball screws and acme screws. Single and double bearing base mount and flange mount versions of EZZE-MOUNT™ bearing blocks are available.

STANDARD ENDS

For each screw size, Nook/Thomson has designed a family of standard machined ends applicable to a variety of bearing arrangements.

The use of standard machined end designs offer quick deliveries. See page 174-176 for details.

LAND DIAMETER

The land diameter is the outside diameter of the screw. The difference between the land diameter and the bearing journal is the resulting bearing shoulder.

ROOT DIAMETER

The diameter of the screw measured at the bottom of the thread. This diameter is used for determining journal sizes. If the bearing journal diameter is larger than the root diameter, thread tracings may be visible. Generally, these tracings do not have an effect on bearing performance.

JOURNAL

A smooth diameter machined on the end of screw used as a mounting surface for bearings, couplings, pulleys, gears, etc.

STRAIGHTNESS

Although Nook/Thomson PowerAc™ and PowerTrac™ screws are manufactured from straight, cylindrical material, internal stresses may cause the material to bend. When ordering random lengths or cut material without end machining, straightening is recommended. Handling or machining of screws can also cause the material to bend. Before, during and after machining, additional straightening is required.

ANNEALING

Annealing is a process which softens the steel to allow for easier end machining. Annealing is usually required to machine the ends of ball screws. Due to its effect on the precision lead accuracies of XPR and SGT ball screws, annealing is not recommended for these products. Hard turning will allow the screw hardened thread to be removed. Acme screws typically do not require annealing before end machining.

END FIXITY

End fixity refers to the method by which the ends of the screw are supported. The degree of end fixity is related to the amount of restraint of the ends of the screw.

The three basic types of end fixity are:

Free	No support
Simple	Shaft restrained against radial and/or axial loads
Fixed	Shaft rigidly restrained against radial, axial and moment loads

See pages 14-15 and 68-69 for a more detailed definition of end fixity.

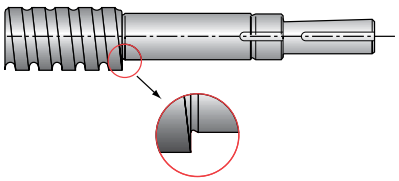
LOCKNUT THREADS

Locknut threads are machined to allow the bearing retention on the screw shaft by means of a locknut. The thread used on standard machined ends follows American National Form NS Class 3. Precision ground locknuts are available from Nook/Thomson on special order.

UNDERCUTS AND RADII

Whenever a shaft changes diameter, an undercut or a radius is machined into the transition to minimize stress concentration. Undercuts are preferred for bearing shoulders because they allow clearance for the corner of the bearing. (See FIG. 1)

FIG. 1



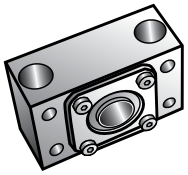
CONCENTRICITY

Concentricity refers to multiple diameters sharing the same center. For end machining, close concentricity allows all components to rotate around the same axis resulting in smooth operation and long operating life.

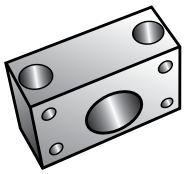
APPROVAL DRAWINGS

If custom ends or special dimensions are desired, an approval drawing can be developed after the order is entered. These drawings will show all the critical dimensions with appropriate tolerance and require customer signature prior to manufacture.

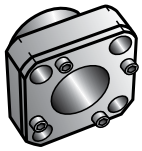
QUICK REFERENCE:
MACHINED ENDS BEARING SUPPORTS
ACME SCREWS



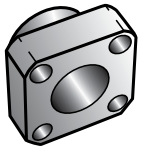
Universal Mount
Double Bearing



Universal Mount
Single Bearing



Flange Mount
Double Bearing



Flange Mount
Single Bearing

NOMINAL DIA-LEAD	END CODE TYPE		EZZE-MOUNT™			
			UNIVERSAL MOUNTS		FLANGE MOUNTS	
	1,2,3	4	Double	Single	Double	Single
¾ - 2	12	8	EZM-3102	EZM-4012	EZF-3012	EZF-4012
¾ - 3	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
¾ - 5	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
¾ - 6	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
¾ - 10	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
⅞ - 6	15	10	EZM-3015	EZM-4015	EZF-3015	EZF-4015
1 - 1	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1 - 2	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
1 - 4	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
1 - 5	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
1 - 6	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
1 - 10	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1⅛ - 5	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1¼ - 4	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1¼ - 5	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1½ - 2	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1½ - 2⅔	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1½ - 4	30	19	EZM-2030	EZM-2030	EZF-2030	EZF-2030
1½ - 5	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1½ - 10	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1¾ - 4	35	19	—	—	—	—
2 - 2	35	19	—	—	—	—
2 - 4	40	22	—	—	—	—
2 - 5	40	28	—	—	—	—
2¼ - 2	40	24	—	—	—	—
2¼ - 4	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2½ - 2	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2½ - 3	50	32	—	—	—	—
2½ - 4	50	32	—	—	—	—
3 - 2	60	39	EZM-3060	EZM-4060	—	—
3⅜ -1½	65	39*	—	—	—	—
3¾ -1½	75	48	—	—	—	—
4½ -1½	95	55	—	—	—	—
5 -1½	105	67	—	—	—	—
6 -1½	—	—	—	—	—	—

* Some journals may show tracings of the thread

See PowerAc™ pages 36-51 for screw dimensions. Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177.

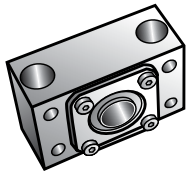
QUICK REFERENCE:
MACHINED ENDS BEARING SUPPORTS
TRAPEZOIDAL SCREWS

EZZE-MOUNT™
SCREW SUPPORTS

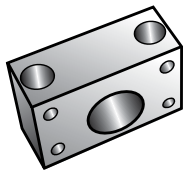
NOMINAL DIA-LEAD	END CODE TYPE 1,2,3	END CODE TYPE 4	EZZE-MOUNT™ UNIVERSAL MOUNTS Double	EZZE-MOUNT™ UNIVERSAL MOUNTS Single	EZZE-MOUNT™ FLANGE MOUNTS Double	EZZE-MOUNT™ FLANGE MOUNTS Single
Tr 20×4	12	8	EZM-3017	EZM-3017	EZF-3017	EZF-3017
Tr 12×3	7	4	EZM-1007	EZM-4007	EZF-1007	EZF-4007
Tr 16×4	10	6	EZM-3010	EZM-4010	EZF-3010	EZF-4010
Tr 20×4	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
Tr 26×6	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
Tr 40×7	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
Tr 55×12	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
Tr 65×12	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045

* Some journals may show tracings of the thread

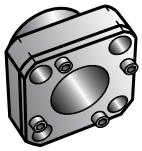
See PowerAc™ pages 56-59 for screw dimensions. Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177.



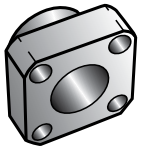
Universal Mount
Double Bearing



Universal Mount
Single Bearing

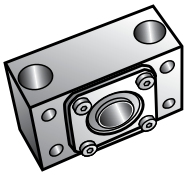


Flange Mount
Double Bearing

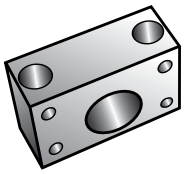


Flange Mount
Single Bearing

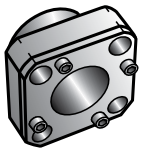
QUICK REFERENCE:
MACHINED ENDS BEARING SUPPORTS
INCH SRT, XPR AND SGT PRECISION BALL SCREWS



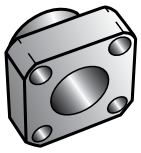
Universal Mount
Double Bearing



Universal Mount
Single Bearing



Flange Mount
Double Bearing



Flange Mount
Single Bearing

NOMINAL DIA-LEAD	END CODE TYPE		EZZE-MOUNT™			
			UNIVERSAL MOUNTS		FLANGE MOUNTS	
	1,2,3	4	Double	Single	Double	Single
0375-0125	7	4	EZM-1007	EZM-4007	EZF-1007	EZF-4007
0500-0200	10	6	EZM-3010	EZM-4010	EZF-3010	EZF-4010
0500-0500	8	6	EZM-1008	EZM-4008	EZF-1008	EZF-4008
0631-0200	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
0631-0500	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
0631-1000	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
0750-0200	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
0750-0500	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
0875-0200	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
1000-0200	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1000-0250	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1000-0500	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1000-1000	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1150-0200	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1171-0413	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1250-0200	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1250-0500	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1500-0200	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1500-0250	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1500-0473	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1500-0500 SRT	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1500-0500 XPR	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1500-0500 SGT	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1500-1000	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1500-1875	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
2000-0200	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2000-0400	45*	28*	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2250-0500	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2250-1000	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2500-0250	50	32	—	—	—	—
2500-0500	50	32	—	—	—	—
3000-0660	60	39	EZM-3060	EZM-4060	—	—
3000-1500	60	39	EZM-3060	EZM-4060	—	—
4000-1000	80	48	EZM-3080	—	—	—
6000-1000	—	—	—	—	—	—

* Some journals may show tracings of the thread

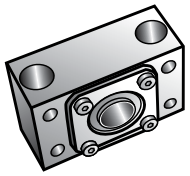
Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered.

QUICK REFERENCE:
MACHINED ENDS BEARING SUPPORTS
METRIC BALL SCREWS

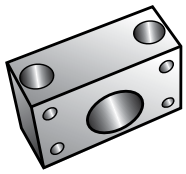
EZZE-MOUNT™
SCREW SUPPORTS

NOMINAL DIA-LEAD	END CODE TYPE 1,2,3	END CODE TYPE 4	EZZE-MOUNT™ UNIVERSAL MOUNTS Double	EZZE-MOUNT™ UNIVERSAL MOUNTS Single	EZZE-MOUNT™ FLANGE MOUNTS Double	EZZE-MOUNT™ FLANGE MOUNTS Single
16 × 5	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
20 × 5	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
25 × 5	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
40 × 10	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
40 × 40	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
50 × 10	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
50 × 50	40	24	—	—	—	—
63 × 12	50	32	—	—	—	—

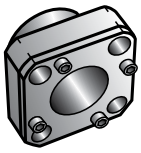
Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered.



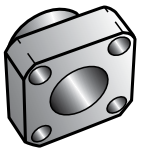
Universal Mount
Double Bearing



Universal Mount
Single Bearing



Flange Mount
Double Bearing

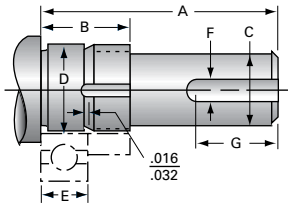


Flange Mount
Single Bearing

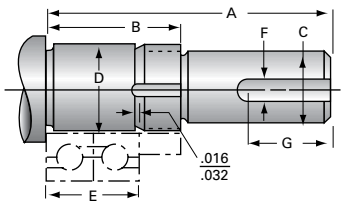
MACHINED ENDS
DRAWINGS AND CODES

Specifying standard machined ends results in quicker deliveries. The machined ends shown below represent designs that are compatible with common application requirements for either simple or fixed bearing support. Included in the chart are the locknut and lockwasher identication. These standard ends may be machined and ground to finish size. NOTE: A Type 1N end is required for single bearing EZZE-MOUNT™. A Type 3 K, L, or N end is required for double bearing EZZE-MOUNT™

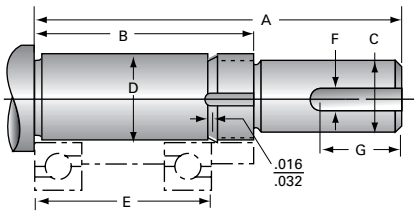
Type 1K (with keyway)
Type 1L (without keyway)



Type 2K (with keyway)
Type 2L (without keyway)



Type 3K (with keyway)
Type 3L (without keyway)

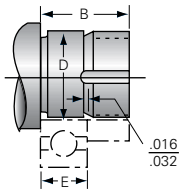


Machine End Code	TYPE 1 (K, L, N) Typical Journal for Single Bearing			TYPE 2 (K, L, N) Typical Journal for Duplexed Bearing			TYPE 3 (K, L, N) Typical Journal for Multiple Sets of Duplexed Bearing			COMMON DIMENSIONS FOR TYPE 1, 2, 3 (K, L, N)					
	A	B	E	A	B	E	A	B	E	C	D	F	G	Locknut	Lock-washer
3	0.63	0.36	0.156	0.75	0.52	0.312	1.09	0.83	0.624	.093/.092	.1251/.1248	N/A	N/A	#5-40	N/A
5	0.88	0.55	0.236	1.09	0.78	0.472	1.56	1.26	0.944	.125/.124	.1970/.1967	N/A	N/A	#10-32	N/A
6	0.88	0.55	0.236	1.09	0.78	0.472	1.56	1.26	0.944	.125/.124	.2363/.2360	N/A	N/A	#10-32	N/A
7	1.12	0.65	0.276	1.41	0.93	0.552	1.94	1.48	1.104	.187/.186	.2757/.2754	0.063	0.34	¼-20	N/A
8	1.31	0.68	0.276	1.56	0.96	0.552	2	1.44	1.06	.250/.249	.3151/.3148	0.094	0.46	5⁄16-24	N/A
9	1.38	0.72	0.315	1.69	1.04	0.63	2.38	1.81	1.438	.250/.249	.3544/.3541	0.094	0.46	5⁄16-24	N/A
10	1.37	0.69	0.315	1.67	1	0.63	2.5	1.81	1.438	.312/.311	.3939/.3936	0.125	0.5	N-00	W-00
12	2.11	0.81	0.394	2.5	1.2	0.788	3.29	1.99	1.576	.406/.405	.4726/.4723	0.125	1	N-01	W-01
12-SP*	2.11	0.81	0.394	2.5	1.2	0.788	3.29	1.99	1.576	.375/.374	.4726/.4723	0.125	1	N-01	W-01
15	2.15	0.84	0.433	2.59	1.27	0.866	3.5	2.18	1.732	.500/.499	.5908/.5905	0.125	1	N-02	W-02
17	2.23	0.92	0.472	2.71	1.39	0.944	3.65	2.33	1.888	.500/.499	.6695/.6692	0.125	1	N-03	W-03
20	2.37	1.06	0.551	2.93	1.61	1.102	4.03	2.71	2.204	.625/.624	.7877/.7873	0.188	1	N-04	W-04
25	2.68	1.12	0.591	3.27	1.71	1.182	4.45	2.89	2.364	.750/.749	.9846/.9842	0.188	1	N-05	W-05
30	2.97	1.16	0.63	3.6	1.79	1.26	4.86	3.05	2.52	1.000/.999	1.1814/1.1810	0.25	1.50	N-06	W-06
35	3.33	1.23	0.669	4	1.9	1.338	5.34	3.24	2.676	1.250/1.249	1.3784/1.3779	0.25	1.50	N-07	W-07
40	3.65	1.46	0.906	4.55	2.37	1.812	6.37	4.18	3.624	1.375/1.374	1.5752/1.5747	0.313	1.5	N-08	W-08
45	3.73	1.54	0.984	4.71	2.52	1.968	6.68	4.49	3.936	1.375/1.374	1.7721/1.7716	0.313	1.5	N-09	W-09
50	4.56	1.68	1.063	5.62	2.75	2.126	7.75	4.87	4.252	1.750/1.749	1.9689/1.9684	0.375	2.3	N-10	W-10
60	5.56	1.88	1.221	6.78	3.1	2.442	9.22	5.54	4.884	2.250/2.249	2.3627/2.3621	0.5	2.75	N-12	W-12
65	6.71	1.96	1.299	7.99	3.24	2.598	10.59	5.84	5.197	2.375/2.374	2.5591/2.5585	0.625	3.7	N-13	W-13
75	7.68	2.18	1.457	9.14	3.64	2.914	11.33	6.56	5.828	2.750/2.749	2.9533/2.9527	0.625	3.7	AN-15	W-15
80	6.95	2.26	1.535	8.49	3.8	3.07	11.56	6.87	6.14	3.000/2.998	3.1501/3.1495	0.75	3.9	AN-16	W-16
95	9.6	2.6	1.772	11.37	4.37	3.544	14.92	7.92	7.088	3.500/3.499	3.7402/3.7394	0.875	6	AN-19	W-19
105	10.84	2.84	1.929	12.76	4.76	3.858	16.62	8.62	7.716	4.000/3.999	4.1345/4.1338	1	6.75	AN-21	W-21

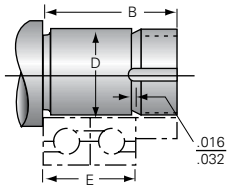
* End Code avialiable on request.

EZZE-MOUNT™ SCREW SUPPORTS

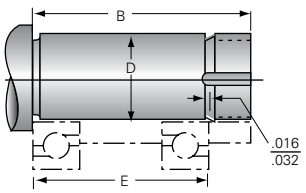
Type 1N



Type 2N



Type 3N



END TYPES

- 1K, 2K, 3K and 4K are designed with a shaft extension and keyway for square keys.
- 1L, 2L, 3L and 4L are designed with a shaft extension without a keyway.
- 1N, 2N, 3N and 4N are designed to be a non-driven support end.
- Double bearing supports use a Type 3N, 3L and 3K.
- Single bearing supports use Type 1N.

Where standard ends do not satisfy the application requirements, special ends may be machined to customer specifications. Please submit a print for a prompt and competitive quotation.

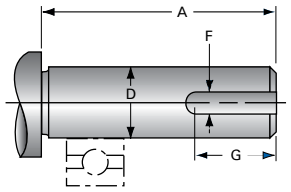
PRECISION LOCKNUTS

Nook/Thomson offers precision ground locknuts for extreme applications requiring ground face and precision ground thread with extra thread engagement. These locknuts have radial thread set screws to ensure secure positioning. Please request a catalog.

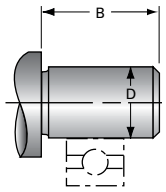
Examples of custom end machining

MACHINED ENDS
DRAWINGS AND CODES continued

Type 4K (with keyway)
Type 4L (without keyway)



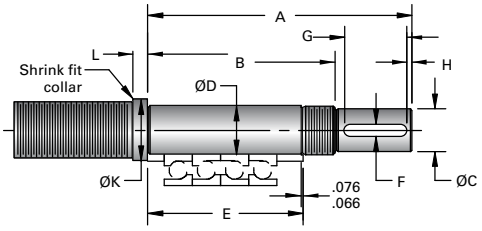
Type 4N



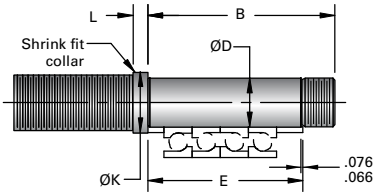
TYPE 4 (K, L, N)

Machine End Code	Typical Journal for Pillow Block A	B	D	F	G
2	.75	.25	.1251 / .1248	N/A	N/A
4	1.38	.50	.2501 / .2498	.063	.63
6	1.50	.75	.3751 / .3748	.125	.75
8	2.63	1.00	.5000 / .4995	.125	1.50
10	2.63	1.25	.6250 / .6245	.188	1.50
12	2.72	1.50	.7500 / .7495	.188	1.50
16	2.84	1.50	1.0000 / .9995	.250	1.50
19	3.25	1.78	1.1875 / 1.1870	.250	1.75
22	4.44	2.06	1.3750 / 1.3745	.313	1.87
24	4.56	2.25	1.5000 / 1.4995	.313	3.00
28	4.94	2.63	1.7500 / 1.7495	.375	3.00
32	5.19	3.50	2.0000 / 1.9995	.500	3.00
39	7.25	3.66	2.4375 / 2.4365	.625	4.69
42	7.75	3.94	2.6250 / 2.6240	.625	4.75
48	8.25	4.50	3.0000 / 2.9990	.750	4.88
55	8.50	5.16	3.4375 / 3.4365	.875	5.00
60	9.38	5.63	3.7500 / 3.7490	1.000	5.38
67	12.13	6.28	4.1875 / 4.1865	1.000	7.00

Type 5K (with keyway)
Type 5L (without keyway)



Type 5N



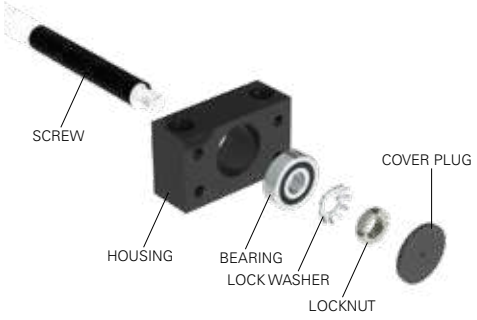
Machine End Code	TYPE 5 (K, L) Typical Journal for EZRF Bearing Block (in) A	C	F	G	H	COMMON DIMENSIONS FOR TYPE 5 (K L N) (in) B	D	E	K	L	LOCK NUT
12	4.61	.394/.393	0.118	1.02	0.08	3.35	.4728/.4723	2.717	0.71	0.31	SFZ 12 × 1
15	5.24	.472/.471	0.157	1.30	0.12	3.66	.5909/.5904	2.913	0.87	0.35	SFZ 15 × 1
17	5.55	.591/.590	0.197	1.30	0.12	3.98	.6696/.6692	3.150	0.94	0.35	SFZ 17 × 1
20	5.94	.669/.668	0.197	1.46	0.16	4.13	.7878/.7872	3.307	1.10	0.35	SFZ 20 × 1
25	6.69	.787/.786	0.236	1.61	0.20	4.69	.9846/.9841	3.740	1.26	0.39	SFZ 25 × 1.5
35	8.07	1.181/1.180	0.315	2.01	0.16	5.63	1.3784/1.3778	4.606	1.77	0.39	SFZ 35 × 1.5
40	8.50	1.378/1.377	0.394	2.01	0.16	6.02	1.5752/1.5746	5.000	1.97	0.47	SFZ 40 × 1.5
45	8.98	1.575/1.574	0.472	2.01	0.20	6.42	1.7721/1.7715	5.394	2.17	0.47	SFZ 45 × 1.5
55	10.43	1.969/1.968	0.551	2.52	0.24	7.24	2.1658/2.1651	6.063	2.56	0.55	SFZ 55 × 2
60	11.46	2.165/2.164	0.630	2.80	0.24	7.94	2.3627/2.3619	6.732	2.95	0.63	SFZ 60 × 2
70	13.15	2.362/2.361	0.709	3.58	0.28	8.74	2.7564/2.7556	7.402	3.35	0.71	SFZ 70 × 2
75	13.62	2.559/2.558	0.709	3.58	0.31	9.13	2.9532/2.9525	7.795	3.54	0.71	SFZ 75 × 2

CAUTION: When using fixed bearing mounts on both ends, contact Nook/Thomson Engineering to determine the mount-to-mount length tolerance of the final assembly.

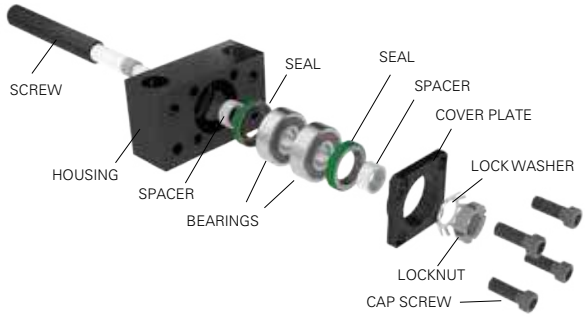
EZZE-MOUNT™
END BEARING IDENTIFICATION

EZZE-MOUNT™
SCREW SUPPORTS

EZM SINGLE BEARING



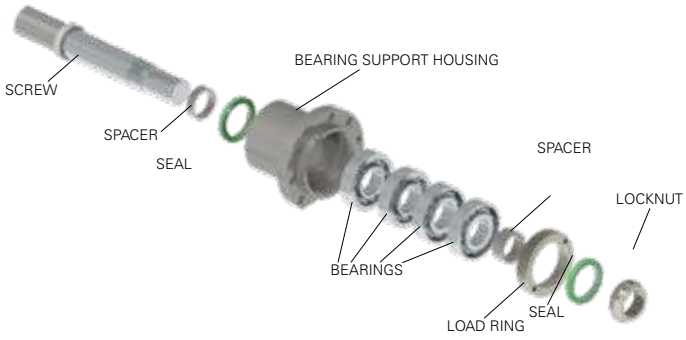
EZM DOUBLE BEARING



EZM Part#	Bearing	Locknut No.	Locknuts Max Axial Load Lb
EZM-1007* EZF-1007*	627-2RS1	¼"-20	1800
EZM-1008* EZF-1008*	608-2RS1	5⁄16"-24	2300
EZM-1009* EZF-1009*	629-2RS1	5⁄16"-24	2300
EZM-3010* EZF-3010*	6000-2RS1	N-00	4100
EZM-3012 EZF-3012	7301	N-01	6900
EZM-3015 EZF-3015	7302	N-02	8100
EZM-3017 EZF-3017	7303	N-03	9900
EZM-2020 EZF-2020	7204	N-04	13200
EZM-3025 EZF-3025	7305	N-05	16200
EZM-2030 EZF-2030	7206	N-06	17500
EZM-3045 EZF-3045	7309	N-09	26500
EZM-3060	7312	N-12	37000
EZM-3080	7316	AN-16	53700

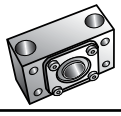
*Use (2) deep groove ball bearings, all others - use (2) angular contact (40 deg.) Universal ground ball bearings in back-to back configuration.

EZRF

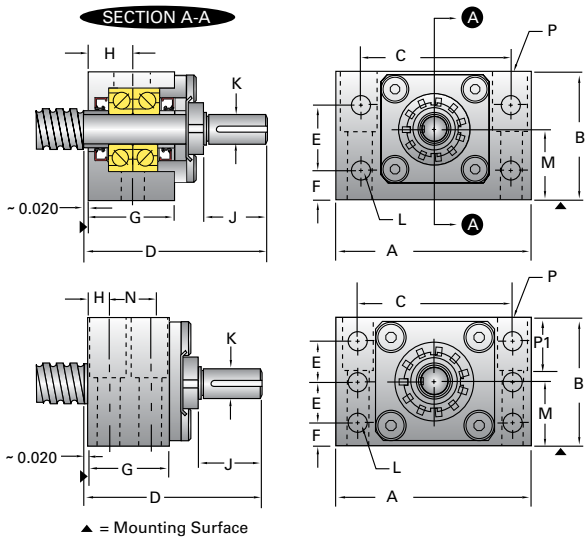


EZRF Part#	Bearing	Locknut No.	Locknuts Max Axial Load kN
EZRF-3012	7301	SFZ 12×1	40
EZRF-3015	7302	SFZ 15×1	60
EZRF-3017	7303	SFZ 17×1	80
EZRF-3020	7304	SFZ 20×1	90
EZRF-3025	7305	SFZ 25×1.5	130
EZRF-3035	7307	SFZ 35×1.5	190
EZRF-3040	7308	SFZ 40×1.5	210
EZRF-3045	7309	SFZ 45×1.5	240
EZRF-3055	7311	SFZ 55×2	340
EZRF-3060	7312	SFZ 60×2	380
EZRF-3070	7314	SFZ 70×2	490
EZRF-3075	7315	SFZ 75×2	520

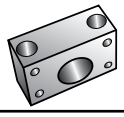
EZZE-MOUNT™
UNIVERSAL MOUNT SINGLE AND DOUBLE BEARING SUPPORT



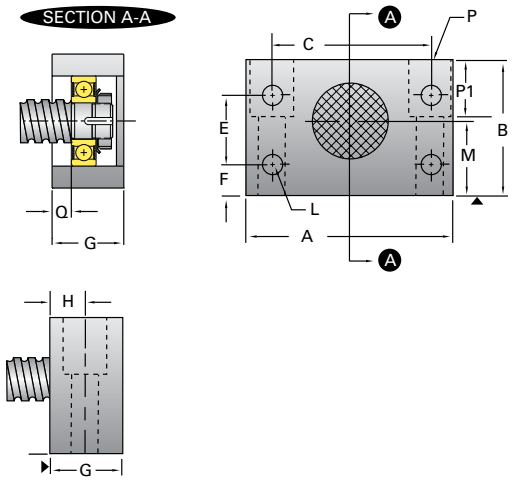
Universal-Mount Double
Double Angular Contact Bearing, which should be used with Type 3 Standard Ends



Double Part No.	A	B	C	D	E
EZM-1007	2.00	1.38	1.50	1.94	0.88
EZM-1008	2.00	1.38	1.50	2.00	0.88
EZM-1009	2.75	2.00	2.00	2.38	1.38
EZM-3010	2.75	2.00	2.00	2.50	1.38
EZM-3012	3.50	2.22	2.75	3.29	1.25
EZM-3015	3.50	2.52	2.75	3.50	1.25
EZM-3017	4.50	2.69	3.38	3.65	1.38
EZM-2020	5.00	3.03	3.75	4.03	1.50
EZM-3025	6.50	3.69	4.75	4.45	2.00
EZM-2030	6.50	3.69	4.75	4.86	2.00
EZM-3045	8.50	5.62	6.62	6.68	1.81
EZM-3060	10.00	7.50	8.00	9.22	2.50
EZM-3080	12.50	8.50	10.00	11.56	2.75



Universal-Mount Single
Single Radial Bearing, which should be used with Type 1 Standard Ends



Single Part No.	A	B	C	D	E
EZM-4007	2.00	1.38	1.50	—	0.88
EZM-4008	2.00	1.38	1.50	—	0.88
EZM-4009	2.75	2.00	2.00	—	1.38
EZM-4010	2.75	2.00	2.00	—	1.38
EZM-4012	3.50	2.22	2.75	—	1.25
EZM-4015	3.50	2.52	2.75	—	1.25
EZM-4017	4.50	2.69	3.38	—	1.38
EZM-4020	5.00	3.03	3.75	—	1.50
EZM-4025	6.50	3.69	4.75	—	2.00
EZM-4030	6.50	3.69	4.75	—	2.00
EZM-4045	8.50	5.62	6.62	—	1.81
EZM-4060	10.00	7.50	8.00	—	2.50

F	G	H	J	K Shaft Dia.	L Thru (4 or 6)	M	N	P Bolt Size (2 or 4)	P Thru	P C'Bore	P P1	Q	End Code
0.25	1.06	0.50	0.46	0.187 0.186	0.22(4)	0.687	—	¼ × 1⅜(2)	0.28	0.41	0.41	–	7
0.25	1.06	0.50	0.56	0.250 0.249	0.22(4)	0.687	—	¼ × 1⅜(2)	0.28	0.41	0.41	–	8
0.31	1.19	0.56	0.56	0.250 0.249	0.28(4)	1.000	—	5⁄16 × 2(2)	0.34	0.50	0.56	–	9
0.31	1.19	0.56	0.69	0.312 0.311	0.28(4)	1.000	—	5⁄16 × 2(2)	0.34	0.50	0.56	–	10
0.50	1.38	0.69	1.30	0.406 0.405	0.28(4)	1.187	—	⅜ × 1¾(2)	0.41	0.62	1.00	–	12
0.80	1.38	0.69	1.30	0.500 0.499	0.28(4)	1.438	—	⅜ × 2⅛(2)	0.41	0.62	1.00	–	15
0.62	1.69	0.84	1.30	0.500 0.499	0.41(4)	1.500	—	½ × 2¼(2)	0.53	0.88	1.25	–	17
0.75	1.72	0.86	1.30	0.625 0.624	0.47(4)	1.625	—	⅝ × 2½(2)	0.66	1.00	1.50	–	20
0.88	1.94	0.97	1.61	0.750 0.749	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	–	25
0.88	1.94	0.97	1.81	1.000 0.999	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	–	30
1.00	3.47	0.88	2.19	1.375 1.374	0.81(6)	2.812	1.71	1 × 5(4)	1.03	1.56	2.13	–	45
1.50	4.19	1.03	3.68	2.250 2.249	1.03(6)	4.000	2.13	1 × 5(4)	1.03	1.56	4.00	–	60
1.75	5.13	1.219	4.69	3.000 2.998	1.28(6)	4.500	2.68	1¼ × 4¾(4)	1.28	1.94	4.75	–	80

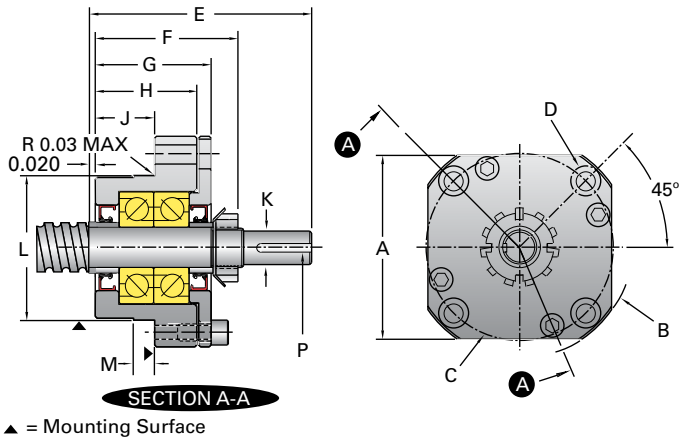
F	G	H	J	K Shaft Dia.	L Thru (4 or 6)	M	N	P Bolt Size (2 or 4)	P Thru	P C'Bore	P P1	Q	End Code
0.25	1.06	0.50	—	—	0.22(4)	0.687	—	¼ × 1⅜(2)	0.28	0.41	0.41	0.19	7
0.25	1.06	0.50	—	—	0.22(4)	0.687	—	¼ × 1⅜(2)	0.28	0.41	0.41	0.19	8
0.31	1.19	0.56	—	—	0.28(4)	1.000	—	5⁄16 × 2(2)	0.34	0.50	0.56	0.38	9
0.31	1.19	0.56	—	—	0.28(4)	1.000	—	5⁄16 × 2(2)	0.34	0.50	0.56	0.38	10
0.50	1.38	0.69	—	—	0.28(4)	1.187	—	⅜ × 1¾(2)	0.41	0.62	1.00	0.33	12
0.80	1.38	0.69	—	—	0.28(4)	1.438	—	⅜ × 2⅛(2)	0.41	0.62	1.00	0.33	15
0.62	1.69	0.84	—	—	0.41(4)	1.500	—	½ × 2¼(2)	0.53	0.88	1.25	0.38	17
0.75	1.72	0.86	—	—	0.47(4)	1.625	—	⅝ × 2½(2)	0.66	1.00	1.50	0.5	20
0.88	1.94	0.97	—	—	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	0.52	25
0.88	1.94	0.97	—	—	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	0.52	30
1.00	3.47	0.88	—	—	0.81(6)	2.812	1.71	1 × 5(4)	1.03	1.56	2.13	0.98	45
1.50	4.19	1.03	—	—	1.03(6)	4.000	2.13	1 × 5(4)	1.03	1.56	4.00	1.22	60

Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177

EZZE-MOUNT™
FLANGE-MOUNT SINGLE AND DOUBLE BEARING SUPPORT

Flange-Mount Double

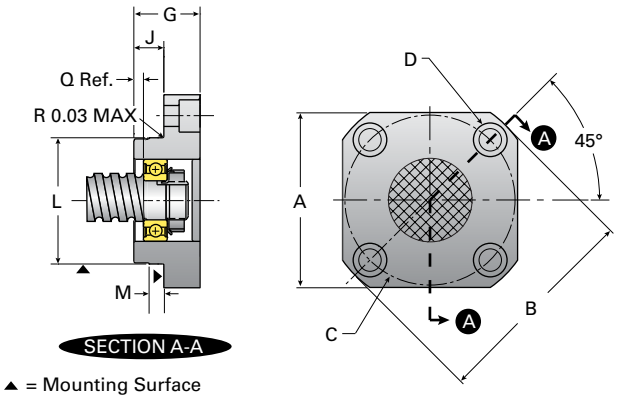
Double Angular Contact Bearing, which should be used with Type 3 Standard Ends



Double Part No.	A	B	C	D Thru	C'bore
EZF-1007	1.88	2.44	1.875	0.266	0.44
EZF-1008	1.88	2.44	1.875	0.266	0.44
EZF-1009	2.00	2.60	2.000	0.266	0.44
EZF-3010	2.00	2.60	2.000	0.266	0.44
EZF-3012	2.50	3.17	2.500	0.266	0.44
EZF-3015	2.70	3.27	2.750	0.281	0.44
EZF-3017	3.38	4.03	3.250	0.344	0.53
EZF-2020	3.38	4.03	3.250	0.344	0.53
EZF-3025	4.38	5.31	4.250	0.531	0.81
EZF-2030	4.38	5.31	4.250	0.531	0.81
EZF-3045	6.50	7.88	6.313	0.781	1.25

Flange-Mount Single

Single Radial Bearing, which should be used with Type 1 Standard Ends



Single Part No.	A	B	C	D Thru	C'bore
EZF-4007	1.88	2.44	1.875	0.266	0.44
EZF-4008	1.88	2.44	1.875	0.266	0.44
EZF-4009	2.00	2.60	2.000	0.266	0.44
EZF-4010	2.00	2.60	2.000	0.266	0.44
EZF-4012	2.50	3.17	2.500	0.266	0.44
EZF-4015	2.70	3.27	2.750	0.281	0.44
EZF-4017	3.38	4.03	3.250	0.344	0.53
EZF-4020	3.38	4.03	3.250	0.344	0.53
EZF-4025	4.38	5.31	4.250	0.531	0.81
EZF-4030	4.38	5.31	4.250	0.531	0.81
EZF-4045	6.50	7.88	6.313	0.781	1.25

Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177.

EZZE-MOUNT™
SCREW SUPPORTS

E	F	G	H	J	K Shaft Dia.	L	M	P	Q	END CODE
1.94	1.44	1.06	0.82	0.50	0.187-0.186	1.3775-1.3770	0.188	0.063	—	7
2.00	1.44	1.06	0.82	0.50	0.250-0.249	1.3775-1.3770	0.188	0.094	—	8
2.38	1.81	1.33	1.09	0.71	0.250-0.249	1.4957-1.4951	0.188	0.094	—	9
2.50	1.81	1.33	1.09	0.71	0.312-0.311	1.4957-1.4951	0.190	0.125	—	10
3.29	1.99	1.57	1.38	0.75	0.406-0.405	1.8894-1.8888	0.312	0.125	—	12
3.50	2.10	1.71	1.50	0.88	0.500-0.499	2.1256-2.1250	0.312	0.125	—	15
3.65	2.33	1.93	1.63	0.94	0.500-0.499	2.5193-2.5185	0.312	0.125	—	17
4.03	2.71	1.98	1.72	1.03	0.625-0.624	2.5193-2.5185	0.312	0.188	—	20
4.45	2.89	2.36	1.94	1.19	0.750-0.749	3.1492-3.1482	0.375	0.188	—	25
4.86	3.05	2.36	1.94	1.19	0.999-1.000	3.1492-3.1482	0.375	0.250	—	30
6.68	4.47	4.01	3.22	1.97	1.375-1.374	4.8025-4.8015	0.500	0.313	—	45

E	F	G	H	J	K Shaft Dia.	L	M	P	Q	END CODE
—	—	1.00	—	0.40	—	1.3775 1.3770	0.188	—	0.13	7
—	—	1.00	—	0.40	—	1.3775 1.3770	0.188	—	0.13	8
—	—	1.00	—	0.44	—	1.4957 1.4951	0.188	—	0.13	9
—	—	1.00	—	0.44	—	1.4957 1.4951	0.190	—	0.13	10
—	—	1.15	—	0.55	—	1.8894 1.8888	0.312	—	0.13	12
—	—	1.25	—	0.63	—	2.1256 2.1250	0.312	—	0.20	15
—	—	1.32	—	0.63	—	2.5193 2.5185	0.312	—	0.20	17
—	—	1.47	—	0.72	—	2.5193 2.5185	0.312	—	0.20	20
—	—	1.67	—	0.76	—	3.1492 3.1482	0.375	—	0.25	25
—	—	1.67	—	0.76	—	3.1492 3.1482	0.375	—	0.25	30
—	—	2.50	—	1.25	—	4.8025-4.8015	0.500	—	0.50	45

EZZE-MOUNT™
UNIVERSAL MOUNT BEARING SUPPORT
WITH MOTOR MOUNT

Universal Mount with motor mount includes an EZZE-MOUNT™ block with a motor mount for easy, accurate installation of ball screw and acme screw assemblies.

Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177.

EXAMPLE:

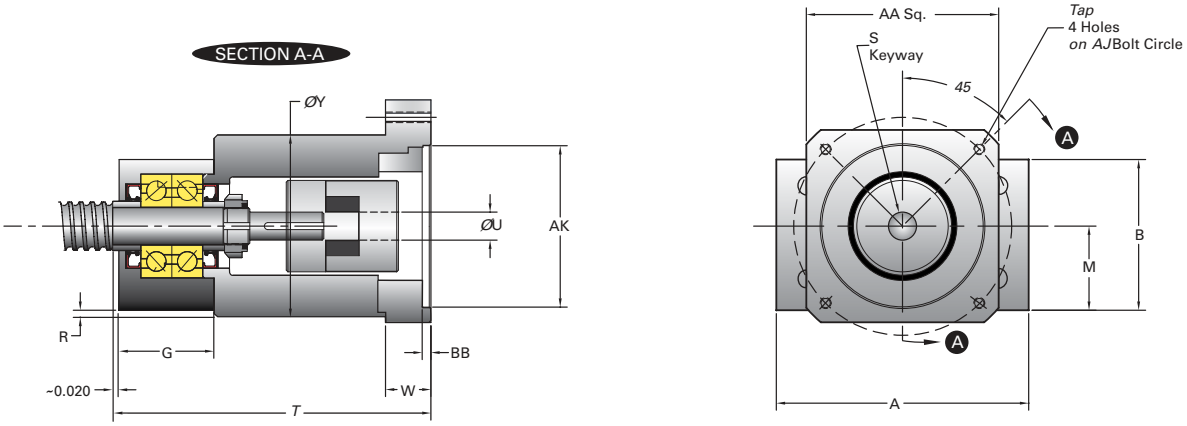
1000-0250 SRT RH / U3 / 4N / 41.87 / SBN7508 / FS

EZM-2020-34

EXAMPLES OF EZM DESIGNATIONS:

U1, U2, U3 or U4 = Standard Mount available above
UX = modified, further explanation needed (i.e.: Special Frame)

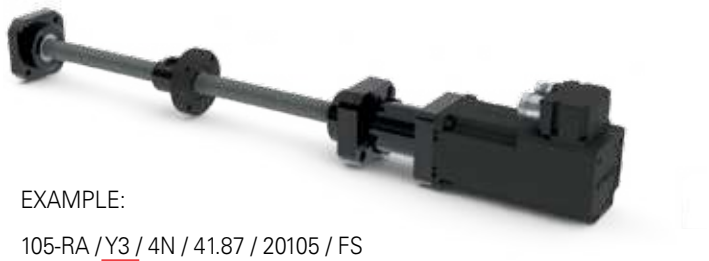
Part No.	Ref. Code	Nema Frame Ref.	AA	BB	T	U	S	Y	W	AK	AJ	TAP	R
EZM-1008-17	U1	17	1.75	0.25	3.35	0.25	0.094	1.75	0.52	.868/.871	1.725	#8-32	0.19
EZM-1009-23	U2	23	2.50	0.19	4.10	0.38	0.125	2.50	0.38	1.503/1.506	2.625	#10-32	0.26
EZM-3010-23	U2	23	2.50	0.19	4.10	0.38	0.125	2.50	0.38	1.503/1.506	2.625	#10-32	0.26
EZM-3012-23	U2	23	2.50	0.19	4.48	0.38	0.125	2.50	0.38	1.503/1.506	2.625	#10-32	0.10
EZM-3012-34	U3	34	3.25	0.16	4.92	0.50	0.125	2.50	0.81	2.878/2.882	3.875	#10-32	0.10
EZM-3015-23	U2	23	2.50	0.19	4.90	0.38	0.125	2.50	0.54	1.503/1.506	2.625	#10-32	–
EZM-3015-34	U3	34	3.25	0.16	5.13	0.50	0.125	2.50	0.81	2.878/2.882	3.875	#10-32	0.19
EZM-3017-34	U3	34	3.44	0.16	5.56	0.50	0.125	3.12	0.81	2.878/2.882	3.875	#10-32	0.13
EZM-3017-42	U4	42	4.50	0.19	6.31	0.63	0.188	3.12	1.56	2.504/2.508	5.000	¼"-20	0.13
EZM-2020-34	U3	34	3.44	0.16	5.96	0.50	0.125	3.44	0.81	2.878/2.882	3.875	#10-32	0.10
EZM-2020-42	U4	42	4.50	0.19	6.71	0.63	0.188	3.44	1.56	2.504/2.508	5.000	¼"-20	0.10
EZM-3025-34	U3	34	4.00	0.16	6.44	0.50	0.125	4.38	0.81	2.878/2.882	3.875	#10-32	0.31
EZM-3025-42	U4	42	4.50	0.19	7.17	0.63	0.188	4.38	1.56	2.504/2.508	5.000	¼"-20	0.31
EZM-2030-34	U3	34	4.00	0.16	6.97	0.50	0.125	4.38	0.81	2.878/2.882	3.875	#10-32	0.31
EZM-2030-42	U4	42	4.50	0.19	7.72	0.63	0.188	4.38	1.56	2.504/2.508	5.000	¼"-20	0.31
EZM-2030-56	U5	56C	6.63	0.19	7.78	0.63	0.188	4.38	1.62	4.502/4.506	5.875	0.41 dia. thru	0.31
EZM-3045-56	U5	56C	6.63	0.19	9.51	0.63	0.188	6.00	2.50	4.502/4.506	5.875	0.41 dia. thru	0.31



NOTE: For complete EZZE-MOUNT™ measurements see chart on page 178 - 181.

EZZE-MOUNT™
FLANGE MOUNT BEARING SUPPORT
WITH MOTOR MOUNT

EZZE-MOUNT™
SCREW SUPPORTS



Flange Mount with motor mount includes an EZZE-MOUNT™ block with a motor mount for easy, accurate installation of ball screw and acme screw assemblies.

Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 177.

EXAMPLE:

105-RA / Y3 / 4N / 41.87 / 20105 / FS

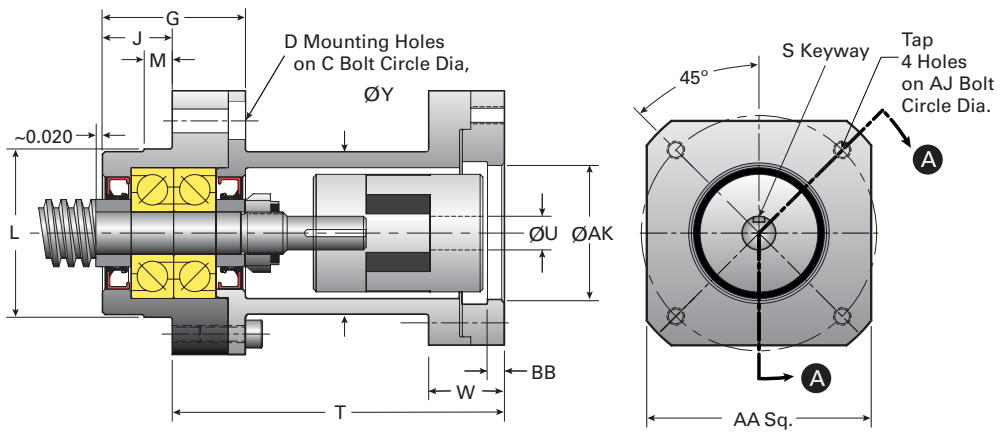
EZF-3017-34

EXAMPLES OF EZF DESIGNATIONS:

Y1, Y2, Y3, Y4 = Standard Mount available above
YX = modified, further description needed (i.e.: Special Frame)

Part No.	Ref. Code	Nema Frame Ref.	AA	BB	T	U	S	Y	W	AK	AJ	TAP
EZF-1008-17	Y1	17	1.75	0.25	2.84	0.25	0.094	2.2	0.52	.868/.871	1.725	#8-32
EZF-1009-23	Y2	23	2.50	0.19	3.41	0.38	0.125	2.1	0.88	1.503/1.506	2.625	#10-32
EZF-3010-23	Y2	23	2.50	0.19	3.41	0.38	0.125	2.1	0.88	1.503/1.506	2.625	#10-32
EZF-3012-23	Y2	23	2.50	0.19	3.70	0.38	0.125	1.81	0.88	1.503/1.506	2.625	#10-32
EZF-3012-34	Y3	34	3.25	0.16	4.14	0.50	0.125	1.81	1.31	2.878/2.882	3.875	#10-32
EZF-3015-23	Y2	23	2.50	0.19	3.84	0.38	0.125	1.98	0.88	1.503/1.506	2.625	#10-32
EZF-3015-34	Y3	34	3.25	0.16	4.36	0.50	0.125	1.98	1.31	2.878/2.882	3.875	#10-32
EZF-3017-34	Y3	34	3.25	0.16	4.62	0.50	0.125	2.25	1.67	2.878/2.882	3.875	#10-32
EZF-3017-42	Y4	42	4.50	0.19	5.37	0.63	0.188	2.25	2.41	2.504/2.508	5.000	¼"-20
EZF-2020-34	Y3	34	3.44	0.16	4.92	0.50	0.125	2.37	1.67	2.878/2.882	3.875	#10-32
EZF-2020-42	Y4	42	4.50	0.19	5.67	0.63	0.188	2.37	2.41	2.504/2.508	5.000	¼"-20
EZF-3025-34	Y3	34	4.00	0.16	5.24	0.50	0.125	3.00	1.67	2.878/2.882	3.875	#10-32
EZF-3025-42	Y4	42	4.50	0.19	5.98	0.63	0.188	3.00	2.41	2.504/2.508	5.000	¼"-20
EZF-2030-34	Y3	34	4.00	0.16	5.78	0.50	0.125	3.00	1.67	2.878/2.882	3.875	#10-32
EZF-2030-42	Y4	42	4.50	0.19	6.53	0.63	0.188	3.00	2.41	2.504/2.508	5.000	¼"-20
EZF-2030-56	Y5	56C	6.63 dia.	0.19	6.60	0.63	0.188	3.00	2.42	4.502/4.506	5.875	0.41 dia. thru
EZF-3045-56	Y5	56C	6.63 dia.	0.19	7.54	0.63	0.188	4.50	2.50	4.502-4.506	5.875	0.41 dia. thru

SECTION A-A



EZZE-MOUNTS™

Power•Torq™

PRECISION BALL SPLINE ASSEMBLIES

Power•Torq™ splines are used in many paper manufacturing applications

BALL SPLINES

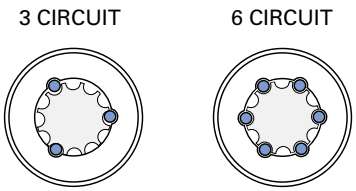
GLOSSARY AND TECHNICAL DATA

PowerTorq™ Ball Splines are convenient and efficient devices that allow friction free linear motion while transmitting torque. Because of their reliability and high efficiency, they are utilized to replace conventional splines. In a ball spline assembly, recirculating bearing balls carry the load between the rotating member (inner race) and the rotating/translating member (outer race).

BALL SPLINE TERMS

ACTIVE CIRCUITS - The closed path that the bearing balls follow through the outer race is referred to as a circuit. The number of potential circuits varies with the diameter of the spline shaft. When a circuit is loaded with bearing balls, it is referred to as an "active circuit". PowerTorq™ Ball Splines may have three or six active circuits. (See FIG. 1)

FIG. 1



RETURN GUIDES - The outer race component through which the bearing balls are recirculated is referred to as the return guide. PowerTorq™ outer races are available with stamped return guides or high performance solid return guides.

BALL CIRCLE DIAMETER - The ball circle diameter is the diameter of the circle generated by the center of the bearing balls when in contact with the inner and outer race.

LAND DIAMETER - The land diameter is the outside diameter of the inner race. This diameter is less than the ball circle diameter.

ROOT DIAMETER - The root diameter is the diameter of the inner race measured at the bottom of the groove. This is the diameter used for critical speed calculations.

STRAIGHTNESS - Although PowerTorq™ Ball Splines are manufactured from straight, cylindrical material, internal stresses may cause the material to bend. When ordering random lengths or cut material without end machining, straightening is recommended. Handling or machining of splines can also cause the material to bend. Before, during and after machining, additional straightening may be required.

When ordering splines with machined ends from Nook/Thomson, the following straightness tolerances can be expected:

PowerTorq™ Ball Splines are straight within .010 in/ft when shipped from the factory, and do not exceed .030 inch in any 6 foot section. Twist is limited to .015 in/ft at the ball circle diameter.

LIFE - A ball spline assembly uses rolling elements to carry a load similar to an anti-friction (ball) bearing. These elements do not wear when properly lubricated during normal use. Therefore, ball spline life is predictable and is determined by calculating the fatigue failure of the components.

Proper lubrication, regular maintenance, and operation within specified limits will allow PowerTorq™ Ball Splines to operate to the predicted life. See page 191 for life calculations.

FRICTION - The use of rolling elements in a PowerTorq™ Ball Spline result in a low coefficient of friction.

ROTATIONAL LASH - Backlash or lash is the relative rotational movement of an outer race with no rotation of the inner race (or vice versa). Rotational backlash for the PowerTorq™ Ball Splines is limited to a range of .005" to .009" at the ball circle diameter.

SELECTIVE FIT - When less than standard lash is required and a preloaded outer race cannot be used, outer races can be custom-fit to a specific inner race with bearing balls selected to minimize rotational (angular) lash.

POWER•TORQ™

LOAD DEFINITIONS

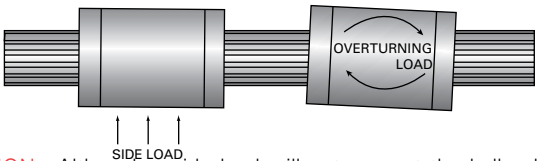
DYNAMIC TORQUE LOAD - The torque load which, when applied to the ball spline assembly, will allow a minimum life of 1,000,000 inches of travel.

STATIC TORQUE LOAD - The maximum torque load (including shock)that can be applied to the spline assembly without damaging the assembly.

OVERTURNING LOAD - A load that rotates the outer race around the longitudinal axis of the inner race. (See FIG. 2)

SIDE LOAD - A load that is applied radially to the outer race. (See FIG. 2)

FIG. 2



CAUTION - Although a side load will not prevent the ball spline from operating, the outer race is not designed to operate with a side load, such as those generated from pulleys, drive belts or misalignment.

OPTIONAL STANDARD KEYWAYS - Typically, outer races are mounted by machining a keyway into the outer race, inserting a key, and then sliding the outer race into a keyed bore. Standard machined keyways are available. See product pages 192-195 for details.

TRANSFERRING OUTER RACES FROM SHIPPING ARBOR

STANDARD RACES

PowerTorq™ Ball Spline outer races are shipped on arbors. Transferring the outer race from the arbor to the ball spline can be achieved by placing the arbor against the end of the spline and carefully sliding the outer race onto the inner race.

If the I.D. of the arbor is not able to slip over the O.D. of the end journal, apply tape to the journal to bring the O.D. up to the root diameter. The outer race can then be transferred across the taped journal onto the ball spline.

CAUTION - Removal of the arbor from the outer race will result in the loss of the bearing balls.

NOTE: The set screw is used for transportation only and needs to be completely removed after installation.

POWERTORQ™ MATERIAL SPECIFICATION

PowerTorq™ inner races are made of high quality 4150 alloy steel, induction hardened to Rc 56-60. PowerTorq™ outer races are made of hardened steel with ball tracks heat treated to Rc 56-60. PowerTorq™ ball spline inner and outer races are protected with a black oxide finish.

LUBRICATION - Proper and frequent lubrication must be provided to achieve predicted service life. A 90% reduction in the ball spline life should be anticipated when operating without lubricants.

Standard lubrication practices for antifriction bearings should be followed when lubricating ball splines. A light oil or grease (lithium-based) is suitable for most applications. Lubricants containing solid additives such as molydisulfide or graphite should not be used.

E-1000SP Ball Screw Lubricant is oil that has been developed specifically for ball screws and ball splines and is available as a spray or liquid. See page 76 for details.

Lubrication intervals are determined by the application. It is required that spline assemblies are lubricated often enough to maintain a film of lubricant on the inner race.

TEMPERATURE - PowerTorq™ Ball Splines will operate between -65°F and 300°F with proper lubrication.

END MACHINING - To obtain optimum performance of your ball spline assembly, it is recommended that the machining be performed at the Nook/Thomson factory. Splines may be purchased machined to your specifications.

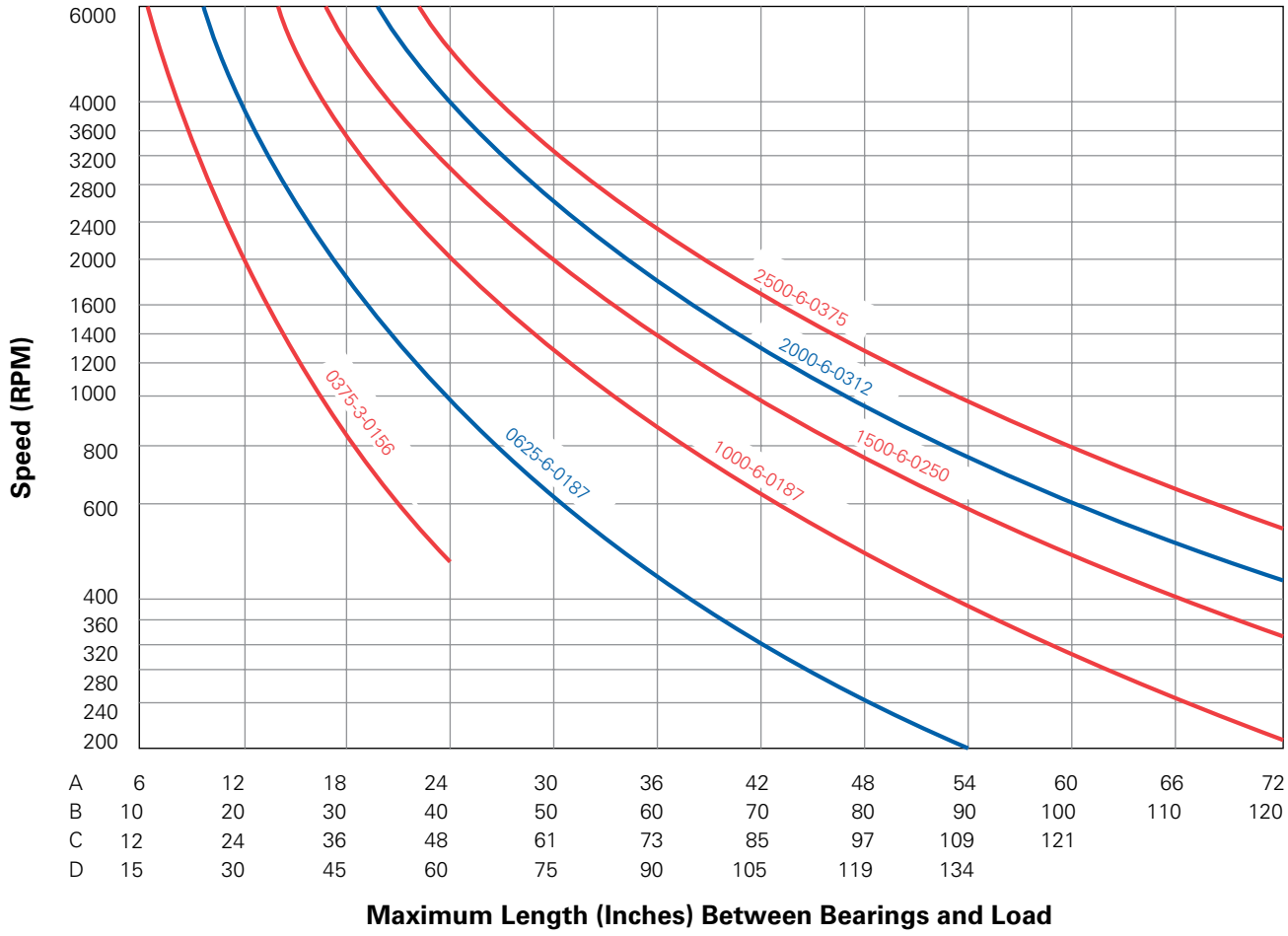
Annealed ends can be provided on precision ball splines to facilitate end machining of journals.

END FIXITY - End fixity refers to the method by which the ends of the spline are supported. See the Ball Screw technical section for a further explanation of end fixity, page 68-69.

CRITICAL SPEED - The speed that excites the natural frequency of the spline inner race is referred to as the critical speed. Resonance at the natural frequency of the inner race will occur regardless of orientation (vertical, horizontal, etc.).

The critical speed will vary with the diameter, unsupported length, end fixity and rpm. Since critical speed can also be affected by shaft straightness and assembly alignment, it is recommended that the maximum speed be limited to 80% of the calculated valve. The formula used to calculate critical speed is found on page 190. The critical speed chart can also be used to quickly determine the minimum diameter.

CRITICAL SPEED: PRECISION BALL SPLINES



See page 68-69 for a description on A-B-C-D end fixity.

The final factor to verify is the critical speed. The following formula is used to calculate critical speed in r.p.m.

$$N = \frac{C_s \times 4.76 \times 10^{6} \times d}{L^2}$$

Where N = Critical speed
d = Root diameter of inner race
L = Length between bearing supports
CS = .36 for one end fixed, one end free
1.00 for both ends simple
1.47 for one end fixed, one end simple
2.23 for both ends fixed

Critical speed can also be affected by shaft straightness and assembly alignment, it is recommended the maximum speed be limited to 80% of the calculated value.

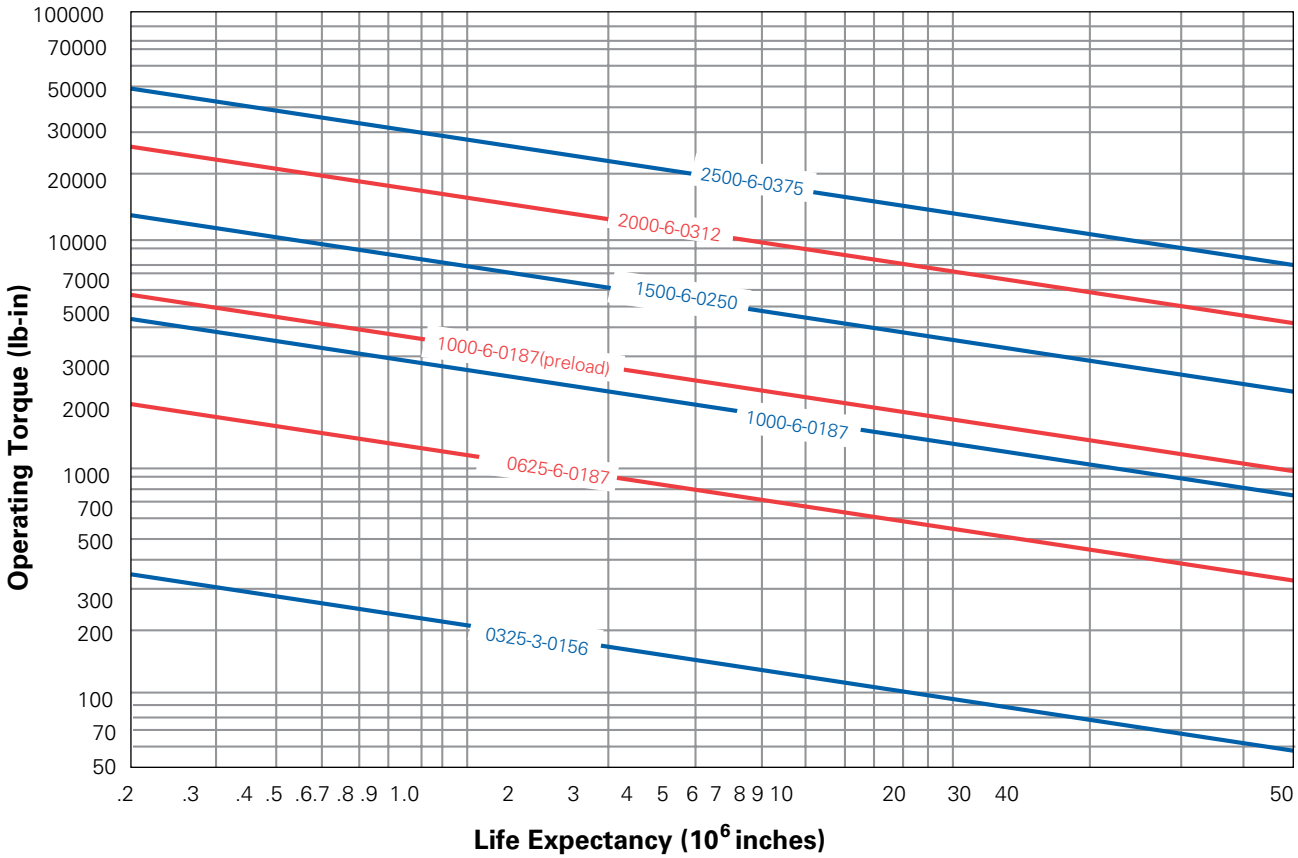
To use this chart:

[1] Determine the maximum RPM.
[2] Determine the maximum length between bearings.
[3] Determine end fixity.
[4] Find point at which length and speed intersect.
[5] Choose spline direction to the right or above the intersecting point.

LIFE EXPECTANCY:
PRECISION BALL SPLINES

POWER•TORQ™

The selection of the correct inner and outer race involves two interrelated factors. A change in one may affect the other. Before attempting to choose the size of a ball spline, the designer must know the equivalent torque measured in pound-inches, the required life measured in linear inches of travel, speed measured in revolutions per minute and length between bearing supports measured in inches.



Use the chart to determine the correct size spline which will give the life required at the equivalent torque. The chart relates life to torque.

When the torque is relatively constant over the entire stroke, use the highest torque value to select an outer race. For applications where the torques vary significantly, an equivalent torque can be calculated using the following formula:

$$T_m = \sqrt[3]{\frac{\%_1 (T_1)^3 + \%_2 (T_2)^3 + \%_3 (T_3)^3 + \ldots + \%_n (T_n)^3}{100}}$$

WHERE:

T_m = equivalent load

T_n = each increment of load

$\%_n$ = percent of stroke at load T_n

FOR EXAMPLE:

T_1 = 150 pound-inch

T_2 = 225 pound-inch

T_3 = 725 pound-inch

$$T_m = \sqrt[3]{\frac{30 (150)^3 + 45 (225)^3 + 25 (725)^3}{100}}$$

The life required is determined by multiplying the total stroke in inches by the total number of strokes required for the designed life of the equipment.

To use this chart:

[1] Determine required life (in million inches of travel).
[2] Find point at which torque and life requirement intersect.
[3] Select spline to the right or above the intersect point.

0375-3-0156
0625-6-0187
1000-6-0187

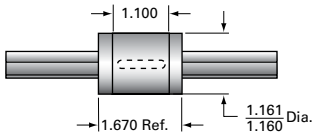
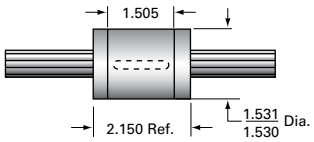
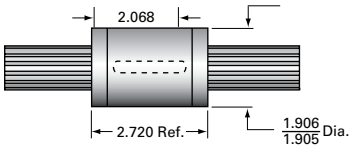
	Outer Race Number	Active Circuits	Performance	Dynamic Torque (in-lb)	Static Torque (in-lb)	Optional Keyway	OuterRace Wt. (lb)	Balls per outer race
0375-3-0156 0.375 Nominal Size (in) 0.156 Nominal Ball Dia (in)	HPR6900	3	high performance	200	656	3⁄16 × 3⁄32 × 1	0.32	54
0625-6-0187 0.625 Nominal Size (in) 0.187 Nominal Ball Dia (in)	HPR8943	6	high performance	1770	3540	1⁄4 × 1⁄8 × 1.125	0.98	120
1000-6-0187 1.000 Nominal Size (in) 0.187 Nominal Ball Dia (in)	HPR8944	6	high performance	2600	7880	1⁄4 × 1⁄8 × 1.625	4.00	156

STANDARD INNER RACE LENGTHS

	375-3-0156	0625-6-0187	1000-6-0187
2 ft	SRR7547	—	—
4 ft	—	SRR7548	SRR6068
8 ft	—	—	SRR6076
12 ft	—	—	SRR6084

For longer lengths, contact Customer Service.

POWER•TORQ™

Ball Return	Max custom inner race length	Nominal size (in)	Root Dia. (in)	Nominal Ball Dia. (in)	Inner Race Wt. (lb/ft)		
Cast	2′	0.375	0.200	0.156	0.310		
Cast	4′	0.625	0.425	0.187	1.400		
Cast	12′	1.000	0.800	0.187	2.200		

BALL SPLINES

1500-6-0250
2000-6-0312
2500-6-0375

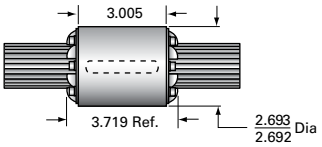
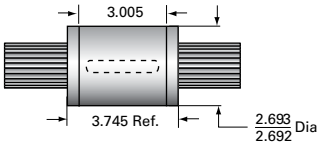
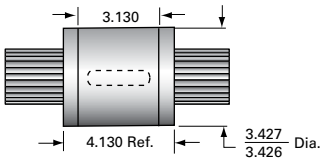
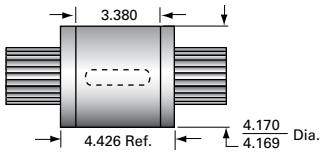
	Outer Race Number	Active Circuits	Performance	Dynamic Torque (in-lb)	Static Torque (in-lb)	Optional Keyway	Outer race wt (lb)	Balls per outer race
1500-6-0250 1.500 Nominal Size (in) 0.250 Nominal Ball Dia (in)	**SOR8945**	**6**	standard	8,400	23,170	3/8 × 3/16 × 2.00	3.42	168
	HPR8945	**6**	high performance	8,400	23,170	3/8 × 3/16 × 2.00	4.00	168
2000-6-0312 2.000 Nominal Size (in) 0.312 Nominal Ball Dia (in)	**HPR8946**	**6**	high performance	16,000	40,270	1/2 × 7/32 × 2.50	4.48	144
2500-6-0375 2.500 Nominal Size (in) 0.375 Nominal Ball Dia (in)	**HPR8947**	**6**	high performance	27,000	62,250	1/2 × 1/4 3.00	6.60	132

STANDARD INNER RACE LENGTHS

	1500-3-0250 1500-6-0250	2000-3-0312 2000-6-0312	2500-3-0375 2500-6-0375
4 ft	SRR6372	SRR6420	SRR6468
8 ft	SRR6380	SRR6428	SRR6476
12 ft	SRR6388	SRR6436	SRR6484

For longer lengths, contact Customer Service.

POWER•TORQ™

Ball Return	Max custom inner race length	Nominal size (in)	Root Dia (in)	Nominal Ball Dia. (in)	Inner Race Wt. (lb/ft)		
Stamped	12′	1.500	1.250	0.250	5.25		
Cast	12′	1.500	1.250	0.250	5.25		
Cast	12′	2.000	1.670	0.312	9.90		
Cast	12′	2.500	2.100	0.375	15.80		

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