



P R E C I S I O N   S C R E W   A S S E M B L I E S

Version 4.00.02



## NOOK HISTORY

In 1969, Joseph H. Nook Jr. founded Nook Industries, Inc., intending to become a global supplier of Linear Motion components. Ball screws, both rolled and ground, were the cornerstone products in the early 1970's, putting Nook Industries on the map as a successful business and a trusted company.

Through the years, Nook Industries has served as a solid manufacturer of engineering products. From the very first ball screws of the 1960's and 1970's to the very latest technologies, Nook Industries strives to provide customers with the highest quality products and proven technology.

Companies from around the world depend on the quality products provided by Nook to ensure their success, which is why Nook Industries offers one of the most complete Linear Motion product lines, serving many markets with a wide range of products for each market segment.

The Precision Screw Group offers an extensive line of acme screws, ball screws, roller screws, ball splines, linear bearings, end supports, and custom end machining.

The Precision Actuator Group offers modular linear actuators, machine screw jacks, profile rail systems, electric cylinders, linear bearings, linear shafting, and control systems.

## NOOK MISSION

Pairing traditional and proven design with the latest technology, Nook Industries manufactures products that customers value. The expansion of product lines and the development of application specific components and engineered systems have propelled Nook Industries to the forefront of the industry.

Nook Industries is committed to customer satisfaction and providing high-quality, high-value products that are delivered on time at a competitive price.

## NOOK MARKET SEGMENTS SERVED

- |             |                  |                      |                      |
|-------------|------------------|----------------------|----------------------|
| Aerospace   | Transportation   | Military and Defense | Chemical             |
| Packaging   | Tire Manufacture | Factory Automation   | Medical & Diagnostic |
| Automotive  | Entertainment    | Pulp & Paper         |                      |
| Electronics | Semiconductor    | Steel                |                      |

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## 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 Industries 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 Industries 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 also serves many customers in the Aerospace and Medical device markets and has complied with those Quality System Requirements as well.



### ITAR

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



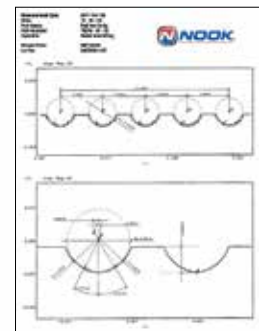
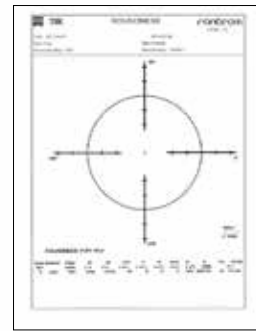
### INSPECTION CAPABILITY



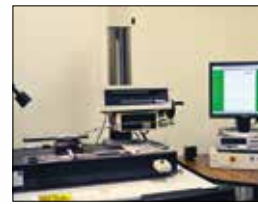
**Laser Lead Measurement** - Precise lead error gauging is utilized to validate processes to conform to Nook internal specifications and customer requirements.



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

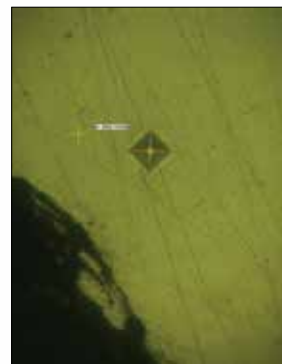


**Zeiss Contour Readers** - Prior to the start of any production run, thread form geometry is precisely measured to



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.

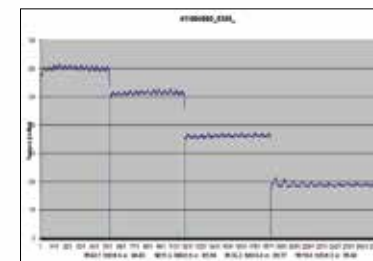


### QUALITY TOOLS:

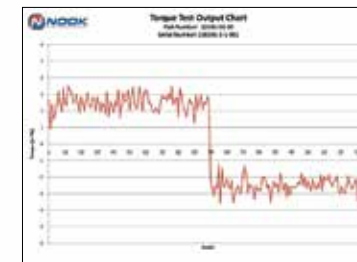
- Design for Six Sigma manufacturing
- D.O.E. (Design of Experiments)
- APQP (Advanced Product Quality Planning)
- DFMEA, PFMEA
- FEA (Finite Element Analysis)
- DVP&R (Design Verification Plan & Report)
- Reliability Testing
- Process validation to 21 CFR Part 82 (Medical Device)



### TESTING



**Efficiency Measurement** - Nook 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 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 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 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 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



Nook acme screws are used in a variety of military applications

# ACME SCREWS

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## ACME SCREWS AND NUTS MATERIALS & MANUFACTURING



Nook acme screws are used in a variety of packaging applications



Mobile rocket launching system



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

### ROLLED ACME SCREWS

Nook 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.



SCREW TYPE	MATERIAL	THREAD CLASS	LEAD ACCURACY	SCREW DIA.	SCREW LENGTHS
Rolled	Alloy	Centralizing 2C or Stub	± .0003"/ft up to 2½" dia.	¾" to 6"	Limited only by material availability
	Stainless	Centralizing 2C or Stub	± .0003"/ft 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 Brinell	170 Brinell
Tensile Ultimate Strength	95,000 psi	85,000 psi
Finish	Black Oxide	Natural



### 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 oxidized finish. See page 11 for Mounting and Pinning Acme Nut flange installation instructions.

Materials used in Nook 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 Bronze
- Tensile Yield: 50,000 psi
- Tensile Ultimate: 65,000 psi
- Hardness: HB75
- Dynamic co-efficient of friction: 0.125 with Nook Lubricant

Nut specifications can be found in the Quick References on pages 19 and 50. Flange and nut dimensions are listed with the appropriate screw data on pages 34-49 and 54-59.

**ACME THREAD FORM TERMS**

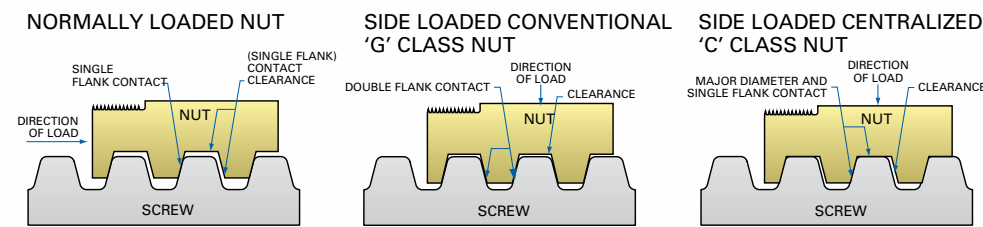
**THREAD TYPES** - The acme thread form, established over 100 years ago, replaced square thread screws, which had straight-sided flanks and were difficult to manufacture.

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  $0.50 \times \text{pitch}$  and have a  $29^\circ$  included thread angle. Some Nook sizes have  $40^\circ$  included angle. Trapezoidal thread forms have a  $30^\circ$  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.

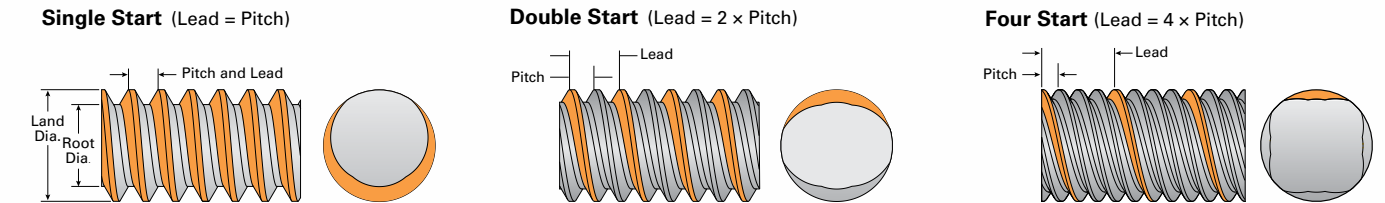
FIG. 1



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 x STARTS = LEAD**

**NOTE:** Nook Industries acme screw designations reference major diameter and effective turns per inch. For example:  $\frac{3}{4}$ "-4 RH requires four turns for one inch of travel. A  $\frac{3}{4}$ "-4 RH has 4 starts and a 0.062" pitch.

**0.062" PITCH x 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 x .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.



**GLOSSARY AND TECHNICAL DATA** continued

**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 Industries, 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 Industries 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.

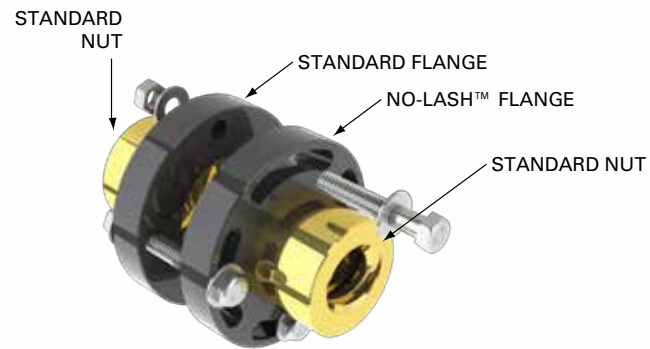
**EFFICIENCY** - Efficiency of PowerAc™ Acme Screw assemblies range from 15% to 85%. These efficiencies are dependent upon nut material, lubrication, lead and thread form. The efficiencies for each assembly are listed on the following pages.

**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.

FIG. 3 Adjustable backlash nut assembly



**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 Industries has developed several unique ways to reduce or remove the lash between the screw and nut.

For screw diameters over 5/8 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. 3)

For a complete PowerAc™ No-Lash™ Flange assembly order 2 standard nuts, 1 standard flange and 1 No-Lash™ Flange. For example a 3/4"-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 assembly should be replaced.

**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.

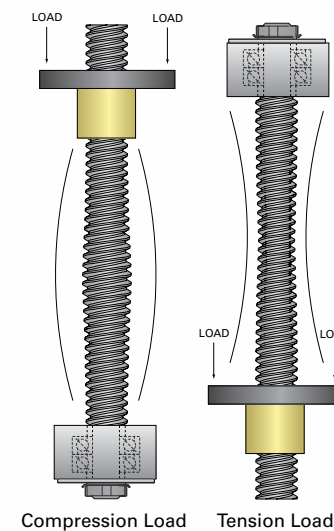
**DYNAMIC LOAD** - The maximum recommended thrust load which should be applied to the PowerAc™ Acme screw and nut assembly while in motion.

**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

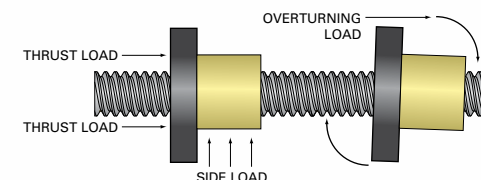


**THRUST LOAD** - A load parallel to and concentric with the axis of the screw. (See FIG. 5)

**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 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

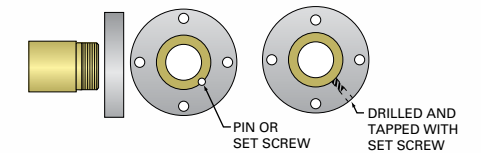


FIG. 7

DIAMETER	DESCRIPTION	QTY
.75 to 1.0	#10 - 24 x 1/4 Set Screw	1
1.125 to 1.375	1/4 - 20 x 1/4 Set Screw	2
1.5 to 3.0	5/16 - 18 x 1/2 Set Screw	2
3.375	3/8 - 16 x 3/4 Set Screw	2
4+	1/2 x 13 x 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 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.

**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.

$$.074 \text{ in-lb/lb} \times 1000 \text{ lb} = 74 \text{ in-lb}$$



**GLOSSARY AND TECHNICAL DATA** continued

**DESIGN CONSIDERATIONS** (Cont'd)

**TEMPERATURE**- With proper lubrication, PowerAc™ Acme Screws with bronze nuts operate efficiently between 15°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 Industries factory. Screws may be purchased machined to your specifications or to standard end machining designs shown on pages 192-194.

**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 Industries has designed precision end mounts to work specifically with acme screws. For a detailed description of these bearing supports, see pages 195-201. An EZZE-MOUNT™ can be shipped pre-assembled to a PowerAc™ Acme Screw. For complete PowerAc™ Acme Screw Assemblies refer to pages 20-29.

**OPTIONAL SURFACE COATINGS** - Consult Nook 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

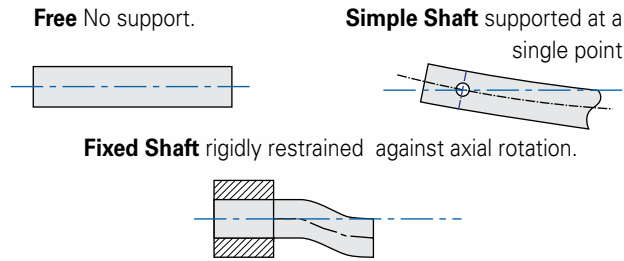
**LOAD** - The loads that need to be considered are the static loads, dynamic loads, reaction forces and any external forces affecting the screw. See Load definitions section on page 11 for details.

**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:

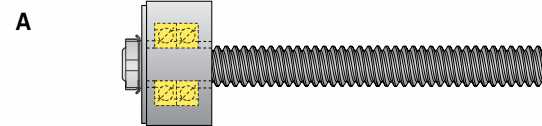
**Simple End** fixity can be provided through a single bearing support.



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

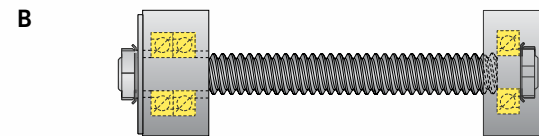
A screw can be supported with different combinations of end fixity. (See FIG. 8)

FIG. 8

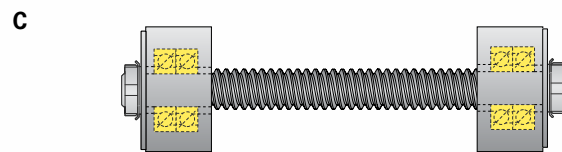


One end with a Double Bearing EZZE-MOUNT™, other end Free. Use Line A in reference to the charts shown on pages 16-17 and 52-53.

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



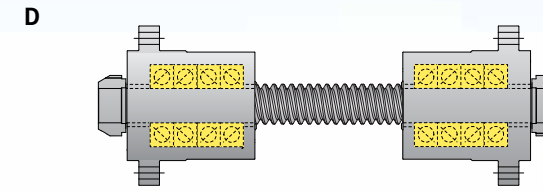
One end supported with a Double Bearing EZZE-MOUNT™, other supported with a Single Bearing EZZE-MOUNT™. Use Line B in reference to the charts shown on pages 16-17 and 52-53.



Both ends supported with a Double Bearing EZZE-MOUNT™. Use Line C in reference to the charts shown on pages 16-17 and 52-53.

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

FIG.8 (Cont'd)



Both ends supported with a Quad Bearing EZZE-MOUNT™. Use Line D in reference to the charts shown on pages 16-17 and 52-53.

**NOTE:** When supporting a screw with two Quad Bearing EZZE-MOUNT™s, 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 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:

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

WHERE:

- N = Critical Speed (rpm)
- d = Root Diameter of Screw (inch)
- L = Length Between Bearing Supports (inch)
- C<sub>s</sub> = 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 17 is provided to quickly determine the minimum screw size applicable for Nook 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 11), 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<sub>cr</sub> = Maximum Load (lb)
- F<sub>c</sub> = 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 16 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** - For plastic nuts, the PV value needs to be checked (see the PV load definition page 11) The operating load values for the plastic nuts are based on a pressure of 1,250 lb per square inch. Any loads less than the operating load can be evaluated by using the following formula:

$$P = \frac{\text{Actual Operating Load}}{\text{Chart Operating Load}} \times 1250$$

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

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

It is recommended that P × V be limited to values less than 2,700.



## APPLICATION EXAMPLE



Nook 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  $\pm 1/4$ "

#### 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.

$$F = \mu \times N$$

$\mu$  = coefficient of friction of the guidance system

Using Nook linear bearings in this application;

$$\mu = \text{Coefficient of Friction for lubricated Nook Linear Bearings} = .0013$$

$$N = \text{Load} = 5000 \text{ pounds}$$

$$F = \mu \times N$$

$$F = .0013 \times 5000 \text{ lb}$$

$$F = 6.5 \text{ lb}$$

#### 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

$$V_{avg} = D/t$$

$$V_{avg} = 36 \text{ in} / 10 \text{ sec.}$$

$$V_{avg} = 3.6 \text{ in} / \text{sec. or } 216 \text{ in/minute}$$

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.

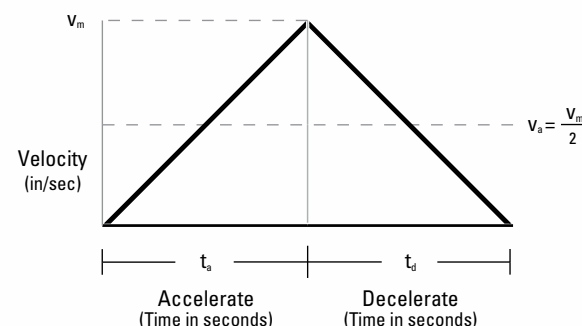
$$V_{peak} = 2 \times V_{avg}$$

$$V_{avg} = 3.6 \text{ in} / \text{sec. or } 216 \text{ in/minute}$$

$$V_{peak} = 2 \times V_{avg}$$

$$V_{peak} = 432 \text{ in/min}$$

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)

$$L_{total} = 36 \text{ in} + 4 \text{ in} = 40 \text{ inches}$$

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 12) 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 17.

$$\text{Max Travel Rate} = 432 \text{ in/min}$$

$$\text{End Fixity} = \text{Type C}$$

$$\text{Length Between Bearing Supports} = 40 \text{ inches}$$

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 16.

$$\text{Load} = 6.4 \text{ pounds}$$

$$\text{End Fixity} = \text{Type C}$$

$$\text{Length Between Bearing Supports} = 40 \text{ inches}$$

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 11:

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

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

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

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

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

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 31 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:

$$\text{One end Type 3K (drive end with keyway)} = 3.65 \text{"}$$

$$\text{One end Type 3N (no drive end)} = 2.33 \text{"}$$

$$40 \text{ inches between supports}$$

$$\text{Overall length is } 40 \text{"} + 3.65 \text{"} + 2.33 \text{"} = 45.98 \text{"}$$

#### 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:

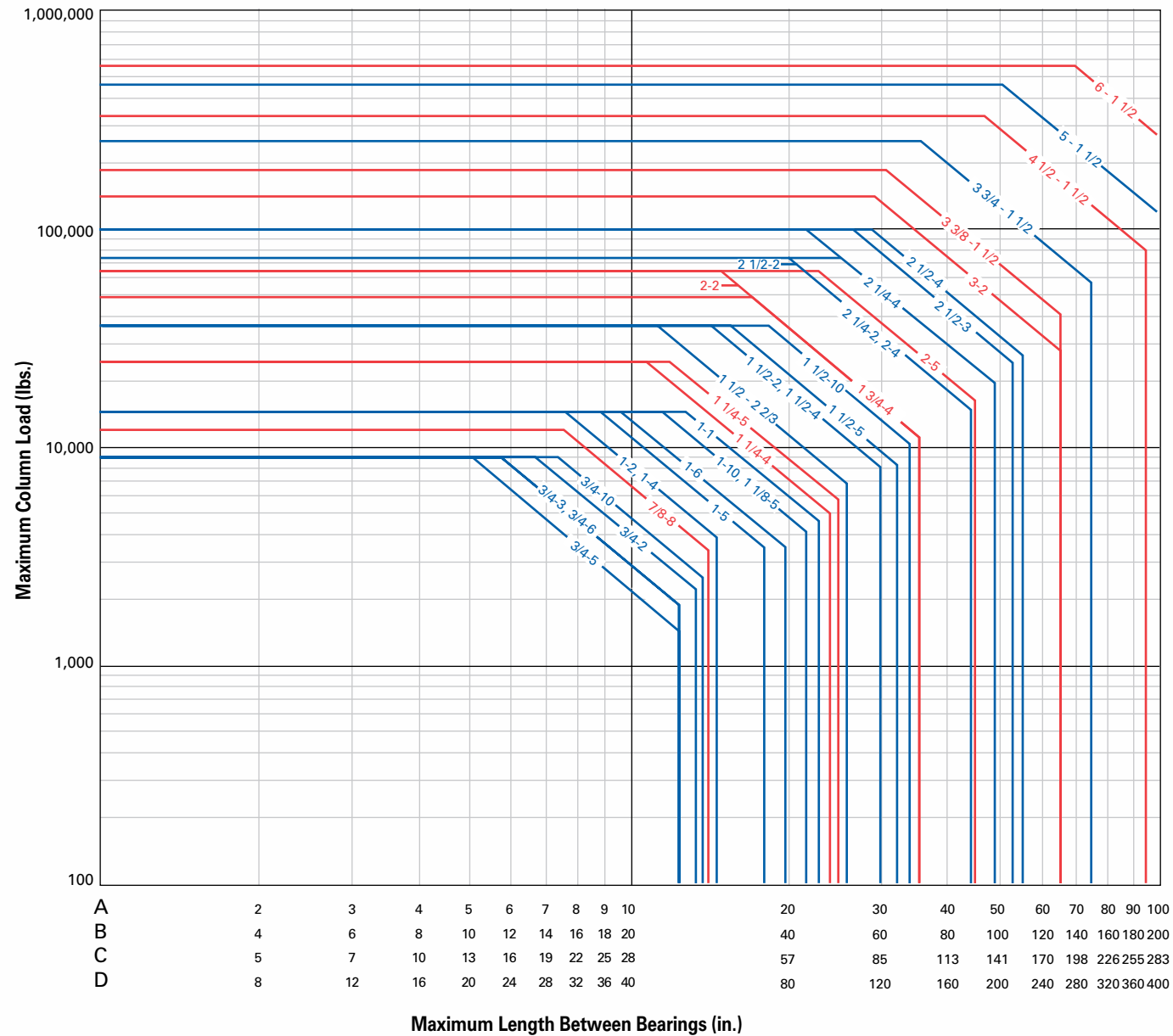
$$105 - RA/EK/EN/45.98/30105/FS$$

**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

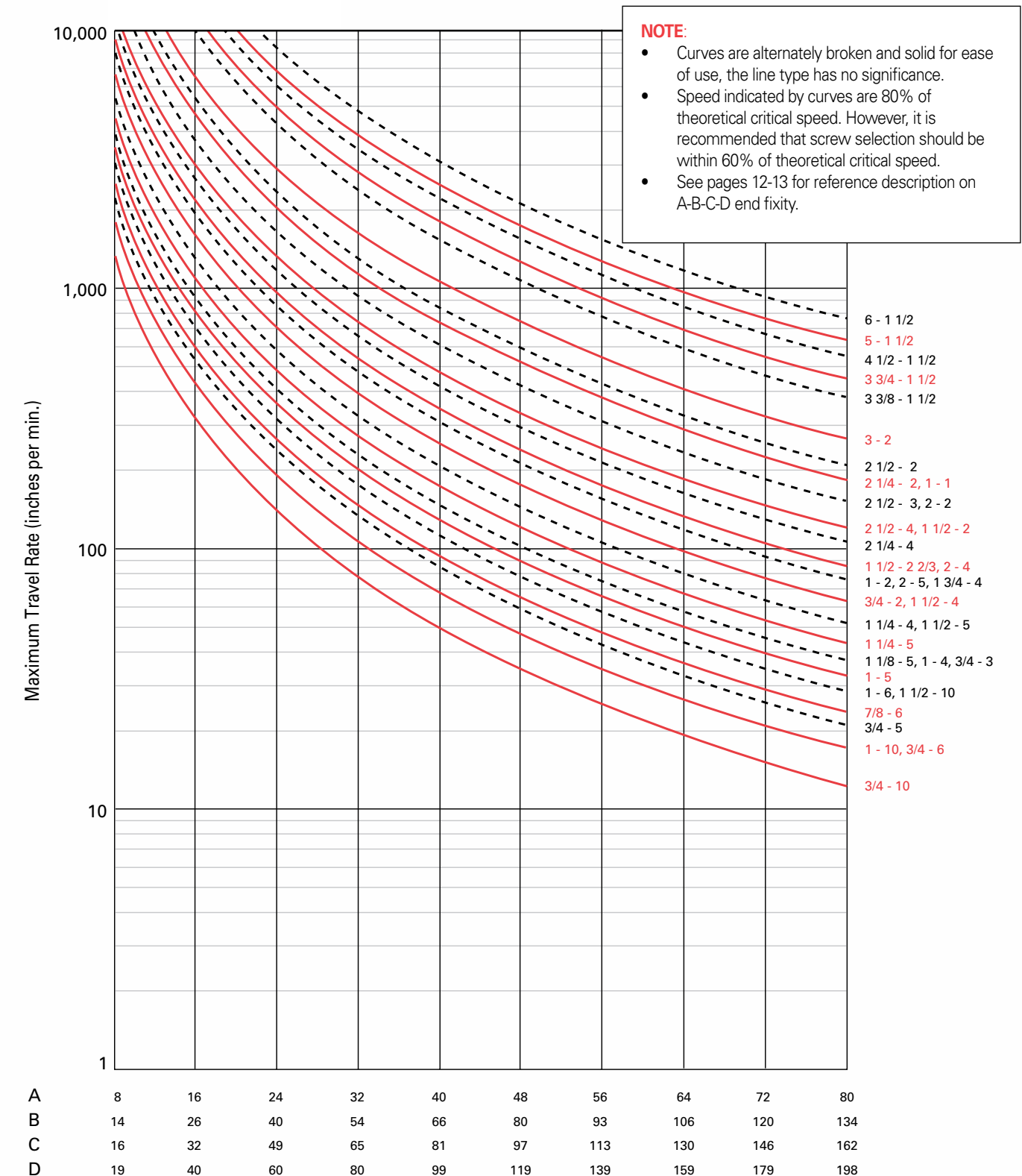
TO USE THIS CHART: Find a point at which the maximum length between bearing support and acme nut intersects the maximum load. Be sure the screw selected is above and to the right of that point.

Acme Screws are limited by both Maximum Static Load and Slenderness Ratio. See pages 12-13 for reference description on A-B-C-D end fixity.



## CRITICAL SPEED: ACME INCH SCREWS

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.



**QUICK REFERENCE:**  
**ACME INCH SCREWS AND NUTS**



**NUT SELECTION**

SCREW SIZES				BRONZE				PLASTIC				Back Lash (max)	Page ref	
				Load Rating		Torque to raise 1 lb (in-lb)	Efficiency %	Load Rating		Torque to raise 1 lb (in-lb)	Efficiency %			
SIZE DIA	Turns Per in	Lead	Pitch	Root Dia.	Static (lb)			Dynamic (lb)	Static lb			Dynamic lb		
3/4 - 2	.500	.125	.581	.906	9,000	2,812	.129	62	1,406	1,406	.118	68	.010	34
3/4 - 3	.333	.167	.537	.698	9,000	2,812	.099	54	1,406	1,406	.089	60	.009	34
3/4 - 5	.200	.200	.502	.698	9,000	2,812	.080	40	1,406	1,406	.066	48	.009	34
3/4 - 6	.166	.166	.537	.698	9,000	2,812	.073	36	1,406	1,406	.061	43	.008	34
3/4 - 10	.100	.100	.608	.698	9,000	2,812	.064	25	1,406	1,406	.052	30	.007	34
7/8 - 6	.166	.166	.661	.906	12,250	3,828	.083	32	1,914	1,914	.068	39	.009	34
1 - 1	1.000	.100	.906	1.355	16,000	5,000	.231	69	2,500	2,500	.216	74	.008	47
1 - 2	.500	.250	.698	1.066	16,000	5,000	.139	57	2,500	2,500	.127	63	.010	36
1 - 4	.250	.250	.698	1.066	16,000	5,000	.105	38	2,500	2,500	.086	46	.010	36
1 - 5	.200	.200	.750	1.066	16,000	5,000	.094	34	2,500	2,500	.079	40	.009	38
1 - 6	.167	.167	.786	1.066	16,000	5,000	.089	30	2,500	2,500	.074	36	.009	38
1 - 10	.100	.100	.857	1.066	16,000	5,000	.078	20	2,500	2,500	.065	24	.008	38
1 1/8 - 5	.200	.200	.875	1.355	20,500	6,330	.100	32	3,165	3,165	.085	37	.010	40
1 1/4 - 4	.250	.250	.947	1.355	25,000	7,812	.117	34	3,906	3,906	.099	40	.011	40
1 1/4 - 5	.200	.200	.999	1.355	25,000	7,812	.114	28	3,906	3,906	.092	35	.010	40
1 1/2 - 2	.500	.250	1.196	1.355	36,000	11,250	.173	46	—	—	—	—	.012	42
1 1/2 - 2 1/2	.375	.375	1.066	1.355	36,000	11,250	.149	40	—	—	—	—	.010	42
1 1/2 - 4	.250	.250	1.196	1.355	36,000	11,250	.133	30	—	—	—	—	.010	42
1 1/2 - 5	.200	.200	1.249	1.355	36,000	11,250	.127	25	—	—	—	—	.010	42
1 1/2 - 10	.100	.100	1.355	1.355	36,000	11,250	.110	15	—	—	—	—	.009	42
1 3/4 - 4	.250	.250	1.427	1.355	49,900	15,312	.153	26	—	—	—	—	.011	44
2 - 2	.500	.500	1.410	1.355	64,000	20,000	.199	40	—	—	—	—	.020	44
2 - 4	.250	.250	1.694	1.355	64,000	20,000	.166	24	—	—	—	—	.012	44
2 - 5	.200	.200	1.747	1.355	64,000	20,000	.159	20	—	—	—	—	.011	44
2 1/4 - 2	.500	.500	1.684	1.355	81,000	25,312	.215	37	—	—	—	—	.021	44
2 1/4 - 4	.250	.250	1.944	1.355	81,000	25,312	.181	22	—	—	—	—	.012	44
2 1/2 - 2	.500	.500	1.908	1.355	100,000	31,250	.234	34	—	—	—	—	.012	46
2 1/2 - 3	.333	.333	2.106	1.355	100,000	31,250	.212	25	—	—	—	—	.013	46
2 1/2 - 4	.250	.250	2.193	1.355	100,000	31,250	.199	20	—	—	—	—	.012	46
3 - 2	.500	.500	2.410	1.355	144,000	45,000	.265	30	—	—	—	—	.016	46
3 1/8 - 1 1/2	.666	.667	2.652	1.355	192,000	60,000	.312	34	—	—	—	—	.020	46
3 1/4 - 1 1/2	.666	.667	3.083	1.355	260,000	81,000	.345	30	—	—	—	—	.020	48
4 1/2 - 1 1/2	.666	.667	3.782	1.355	320,000	100,000	.379	28	—	—	—	—	.022	48
5 - 1 1/2	.666	.667	4.286	1.355	470,000	145,000	.398	26	—	—	—	—	.022	48
6 - 1 1/2	.666	.667	5.254	1.355	576,000	180,000	.474	22	—	—	—	—	.025	48



Acme Screw



Bronze Nut



Flange



End Machining



EZZE-MOUNT™ Bearing Mounts



EZZE-MOUNT™ Motor Mounts

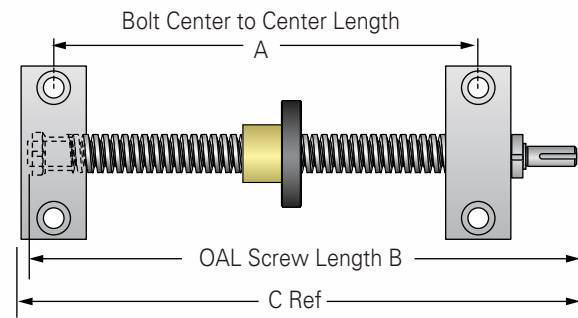
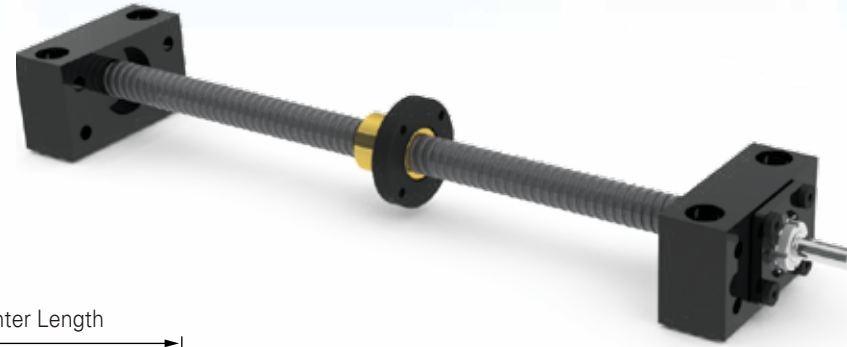


**NOOK ACME SCREW AND NUT ASSEMBLIES** provide ease of application, as all that is required is installation. Nook assemblies offer turn key solutions that only require a power source (hand operation or motor). All of the elements are available for quick delivery from shelf stock. Component and assembly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



Nook acme screws are used in a variety of printing applications

**ACME SCREW AND NUT ASSEMBLIES**  
**UNIVERSAL MOUNTS**

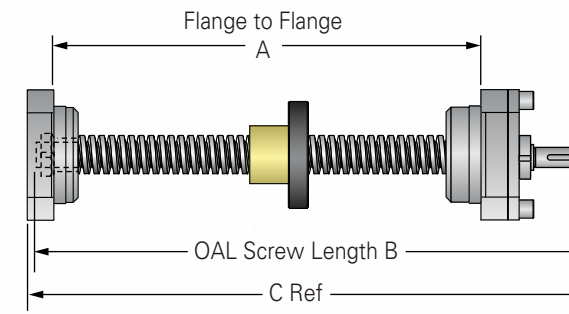
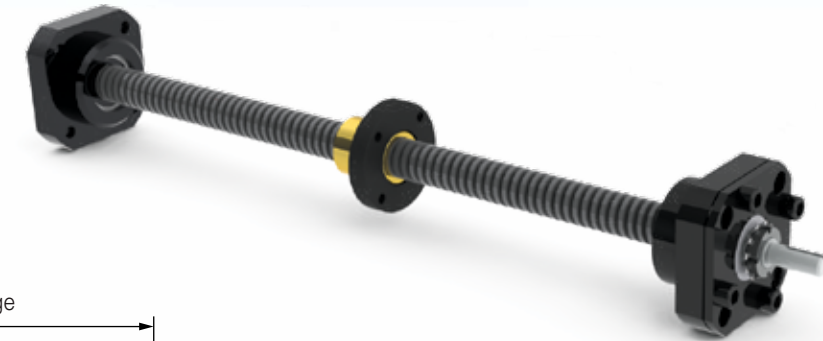


**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
3/4 - 2	3.63	6.68	6.92	34
3/4 - 3	3.63	6.68	6.92	34
3/4 - 5	3.63	6.68	6.92	34
3/4 - 6	3.63	6.68	6.92	34
3/4 - 10	3.63	6.60	7.13	34
7/8 - 6	3.88	6.85	7.38	34
1 - 1	4.22	8.14	8.25	36
1 - 2	4.18	7.45	7.84	36
1 - 4	4.18	7.45	7.84	36
1 - 5	4.18	7.45	7.84	38
1 - 6	4.18	7.45	7.84	38
1 - 10	4.22	8.14	8.25	38
1 1/8 - 5	4.28	8.14	8.25	40
1 1/4 - 4	4.47	8.39	8.50	40
1 1/4 - 5	4.69	8.84	9.14	40
1 1/2 - 2	5.24	9.84	10.10	42
1 1/2 - 2 2/3	5.24	9.39	9.69	42
1 1/2 - 4	5.24	9.84	10.10	42
1 1/2 - 5	5.24	9.84	10.10	42
1 1/2 - 10	5.24	9.84	10.10	42

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

**FLANGE MOUNTS, PILOT FACING IN**

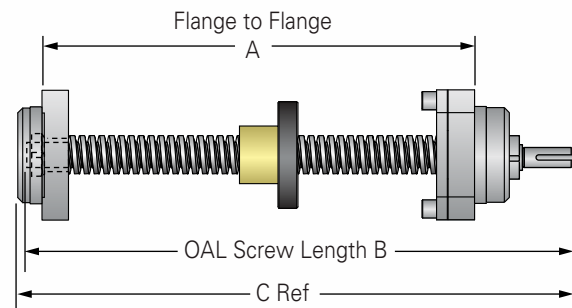
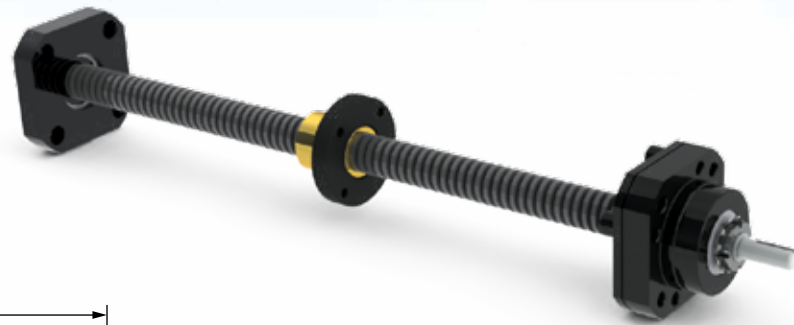


**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
3/4 - 2	3.57	6.48	6.69	34
3/4 - 3	3.57	6.48	6.69	34
3/4 - 5	3.57	6.48	6.69	34
3/4 - 6	3.57	6.48	6.69	34
3/4 - 10	3.78	6.79	7.00	34
7/8 - 6	4.03	7.04	7.25	34
1 - 1	4.27	7.79	8.00	36
1 - 2	4.09	7.27	7.47	36
1 - 4	4.09	7.27	7.47	36
1 - 5	4.09	7.27	7.47	38
1 - 6	4.09	7.27	7.47	38
1 - 10	4.27	7.79	8.00	38
1 1/8 - 5	4.27	7.79	8.00	40
1 1/4 - 4	4.52	8.04	8.25	40
1 1/4 - 5	4.72	8.57	8.87	40
1 1/2 - 2	5.26	9.57	9.83	42
1 1/2 - 2 2/3	5.27	9.12	9.42	42
1 1/2 - 4	5.26	9.57	9.83	42
1 1/2 - 5	5.26	9.57	9.83	42
1 1/2 - 10	5.26	9.57	9.83	42

**ACME SCREW AND NUT ASSEMBLIES**

**FLANGE MOUNTS, PILOT FACING OUT**

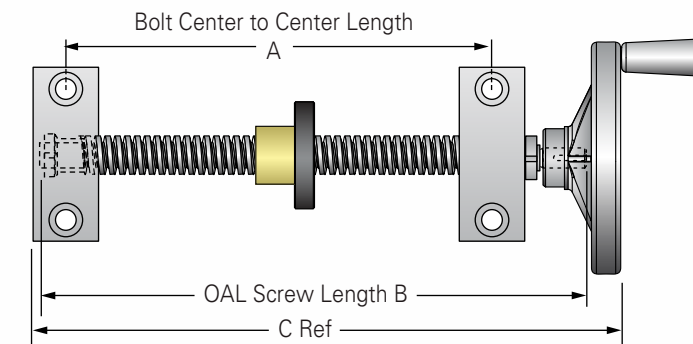
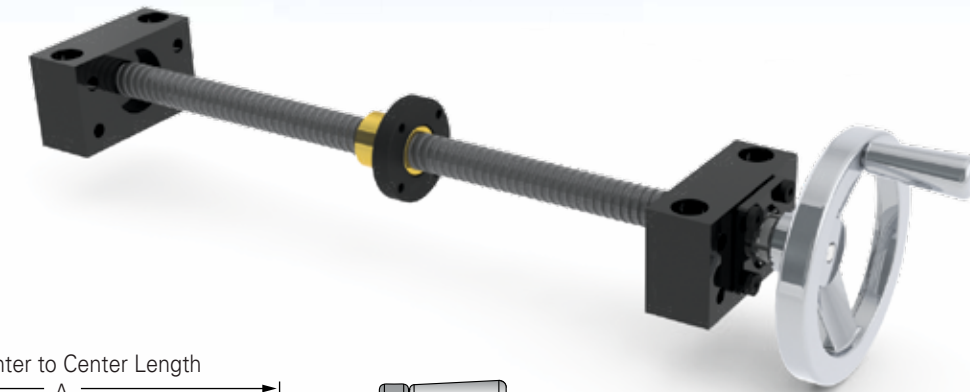


**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

Dia-Turns Per In	A (in)	B (in)	C (in)	Page
3/4 - 2	3.69	6.48	6.69	34
3/4 - 3	3.69	6.48	6.69	34
3/4 - 5	3.69	6.48	6.69	34
3/4 - 6	3.57	6.48	6.69	34
3/4 - 10	3.72	6.79	7.00	34
7/8 - 6	3.97	7.04	7.25	34
1 - 1	4.22	7.79	8.00	36
1 - 2	4.2	7.27	7.47	36
1 - 4	4.2	7.27	7.47	36
1 - 5	4.2	7.27	7.47	38
1 - 6	4.2	7.27	7.47	38
1 - 10	4.22	7.79	8.00	38
1 1/8 - 5	4.22	7.79	8.00	40
1 1/4 - 4	4.47	8.04	8.25	40
1 1/4 - 5	4.85	8.57	8.87	40
1 1/2 - 2	5.41	9.57	9.83	42
1 1/2 - 2 1/2	5.4	9.12	9.42	42
1 1/2 - 4	5.41	9.57	9.83	42
1 1/2 - 5	5.41	9.57	9.83	42
1 1/2 - 10	5.41	9.57	9.83	42

**ASSEMBLIES WITH HANDWHEEL**

**UNIVERSAL MOUNTS**



**NOTE:** Dimensions reflect a 1/2" 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
3/4 - 2	3.63	6.68	7.42	4"	HO43*	34
3/4 - 3	3.63	6.68	7.42	4"	HO43*	34
3/4 - 5	3.63	6.68	7.42	4"	HO43*	34
3/4 - 6	3.63	6.68	7.42	4"	HO43*	34
3/4 - 10	3.63	6.60	7.31	4"	HO44	34
7/8 - 6	3.88	6.85	7.81	6"	HO64	34
1 - 1	4.22	8.14	9.00	6"	HO65**	36
1 - 2	4.18	7.45	8.59	6"	HO64	36
1 - 4	4.18	7.45	8.59	6"	HO64	36
1 - 5	4.18	7.45	8.59	6"	HO64	38

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 - 6	4.18	7.45	8.59	6"	HO64	38
1 - 10	4.22	8.14	9.00	6"	HO65**	38
1 1/8 - 5	4.22	8.14	9.00	6"	HO65**	40
1 1/4 - 4	4.47	8.39	9.25	6"	HO65**	40
1 1/4 - 5	4.69	8.14	9.89	8"	HO86	40
1 1/2 - 2	5.24	9.84	10.85	8"	HO88	42
1 1/2 - 2 1/2	5.24	9.39	10.44	8"	HO86	42
1 1/2 - 4	5.24	9.84	10.85	8"	HO88	42
1 1/2 - 5	5.24	9.84	10.85	8"	HO88	42
1 1/2 - 10	5.24	9.84	10.85	8"	HO88	42

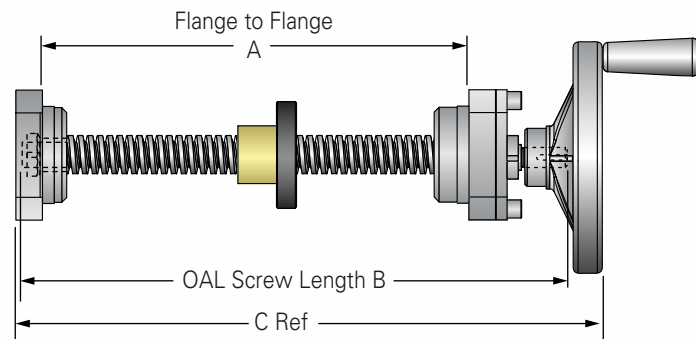
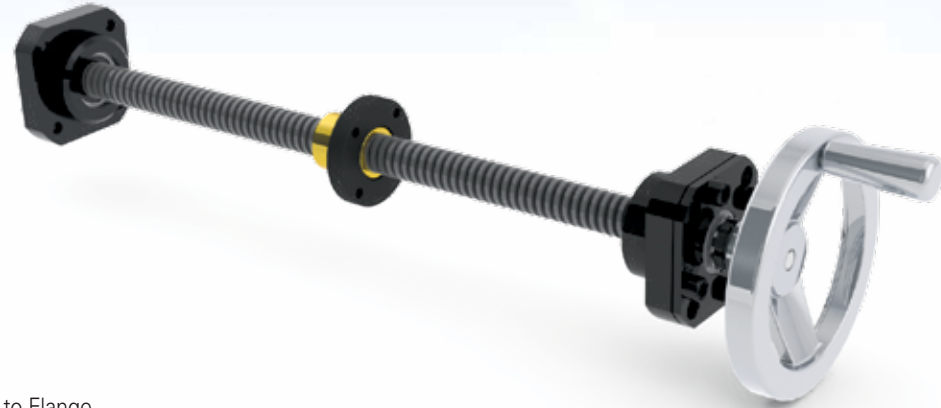
\* Indicates modified Type 3 end machining required

\*\* 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**



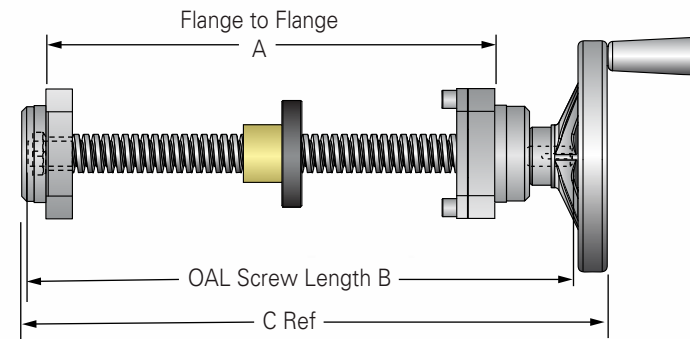
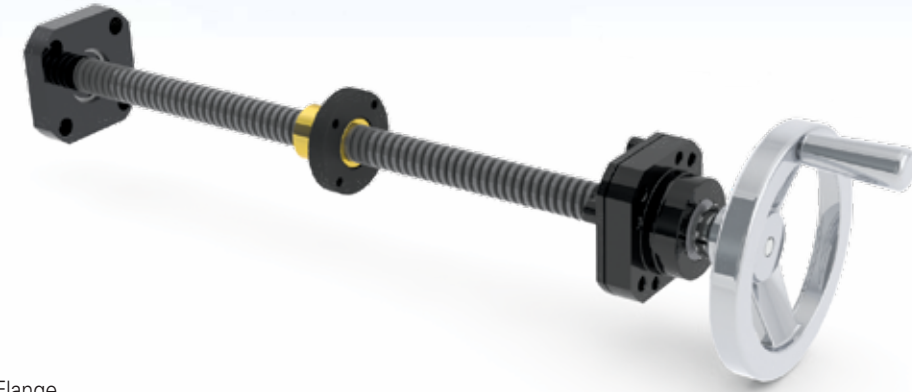
**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
3/4 - 2	3.57	6.48	6.24	4"	H043*	34
3/4 - 3	3.57	6.48	6.24	4"	H043*	34
3/4 - 5	3.57	6.48	6.24	4"	H043*	34
3/4 - 6	3.57	6.48	6.24	4"	H043*	34
3/4 - 10	3.78	6.79	7.55	4"	H044	34
7/8 - 6	4.03	7.04	8.17	6"	H064	34
1 - 1	4.27	7.79	8.92	6"	H065**	36
1 - 2	4.09	7.27	8.39	6"	H064	36
1 - 4	4.09	7.27	8.39	6"	H064	36
1 - 5	4.09	7.27	8.39	6"	H064	38

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 - 6	4.09	7.27	8.39	6"	H064	38
1 - 10	4.27	7.79	8.92	6"	H065**	38
1 1/8 - 5	4.27	7.79	8.92	6"	H065**	40
1 1/4 - 4	4.52	8.04	9.17	6"	H065**	40
1 1/4 - 5	4.72	8.57	9.92	8"	H086	40
1 1/2 - 2	5.26	9.57	10.88	8"	H088	42
1 1/2 - 2 2/3	5.27	9.12	10.47	8"	H086	42
1 1/2 - 4	5.26	9.57	10.88	8"	H088	42
1 1/2 - 5	5.26	9.57	10.88	8"	H088	42
1 1/2 - 10	5.26	9.57	10.88	8"	H088	42

\* Indicates modified Type 3 end machining required  
\*\* HO65 handwheel has the same outer dimensions as HO64 but different bore

**FLANGE MOUNTS, PILOT FACING OUT**



**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

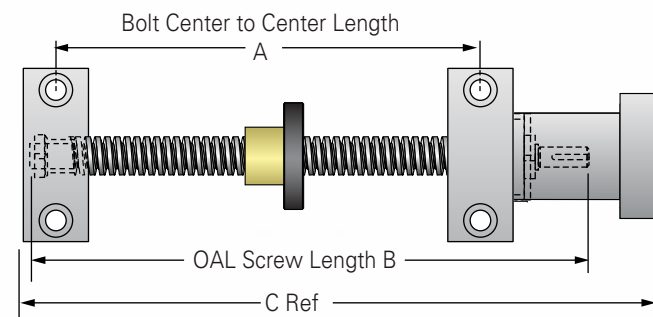
Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
3/4 - 2	6.48	3.69	7.24	4"	H043*	34
3/4 - 3	6.48	3.69	7.24	4"	H043*	34
3/4 - 5	6.48	3.69	7.24	4"	H043*	34
3/4 - 6	6.48	3.69	7.24	4"	H043*	34
3/4 - 10	6.79	3.72	7.55	4"	H044	34
7/8 - 6	7.04	3.97	8.17	6"	H064	34
1 - 1	7.79	4.22	8.92	6"	H065**	36
1 - 2	7.27	4.20	8.39	6"	H064	36
1 - 4	7.27	4.20	8.39	6"	H064	36
1 - 5	7.27	4.20	8.39	6"	H064	38

Dia -Turns per inch	A (in)	B (in)	C (in)	Size	Part No.	Page
1 - 6	7.27	4.20	8.39	6"	H064	38
1 - 10	7.79	4.22	8.92	6"	H065**	38
1 1/8 - 5	7.79	4.22	8.92	6"	H065**	40
1 1/4 - 4	8.04	4.47	9.17	6"	H065**	40
1 1/4 - 5	8.57	4.85	9.92	8"	H086	40
1 1/2 - 2	9.57	5.41	10.88	8"	H088	42
1 1/2 - 2 2/3	9.12	5.4	10.47	8"	H086	42
1 1/2 - 4	9.57	5.41	10.88	8"	H088	42
1 1/2 - 5	9.57	5.41	10.88	8"	H088	42
1 1/2 - 10	9.57	5.41	10.88	8"	H088	42

\* Indicates modified Type 3 end machining required  
\*\* HO65 handwheel has the same outer dimensions as HO64 but different bore



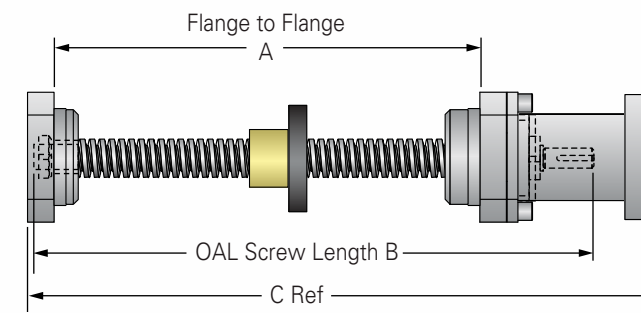
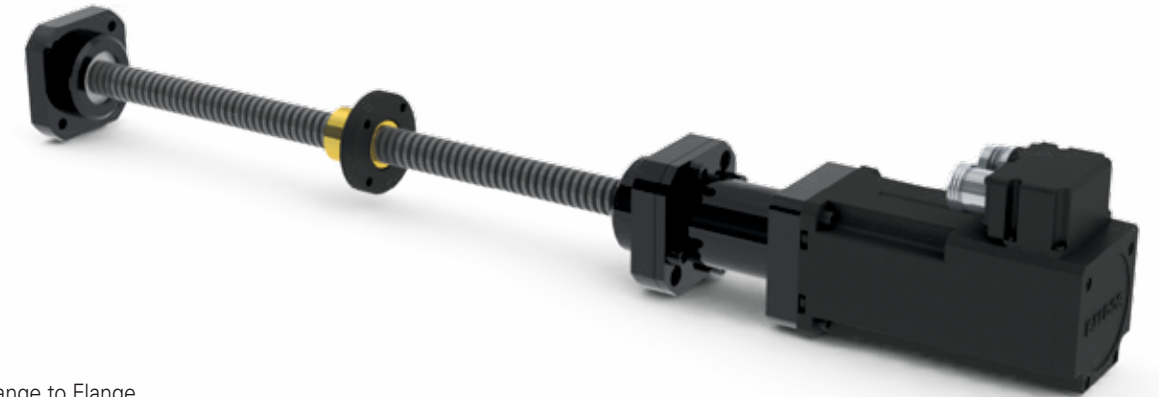
**ASSEMBLIES WITH MOTOR MOUNTS**  
**UNIVERSAL MOUNTS**



**NOTE:** Dimensions reflect a 1/2" 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
3/4 - 2	3.63	6.68	8.55	EZM-3012-34	34
3/4 - 3	3.63	6.68	8.55	EZM-3012-23	34
3/4 - 5	3.63	6.68	8.55	EZM-3012-23	34
3/4 - 6	3.63	6.68	8.55	EZM-3012-23	34
3/4 - 10	3.63	6.60	8.76	EZM-3015-34	34
7/8 - 6	3.88	6.85	9.01	EZM-3015-34	34
1 - 1	4.22	8.14	10.18	EZM-2020-34	36
1 - 2	4.18	7.45	9.75	EZM-3017-34	36
1 - 4	4.18	7.45	9.75	EZM-3017-34	36
1 - 5	4.18	7.45	9.75	EZM-3017-34	38
1 - 6	4.18	7.45	9.75	EZM-3017-34	38
1 - 10	4.22	8.14	10.18	EZM-2020-34	38
1 1/8 - 5	4.28	8.14	10.18	EZM-2020-34	40
1 1/4 - 4	4.47	8.39	10.43	EZM-2020-34	40
1 1/4 - 5	4.69	8.84	11.13	EZM-3025-34	40
1 1/2 - 2	5.24	9.84	12.21	EZM-2030-34	42
1 1/2 - 2 2/3	5.24	9.39	11.68	EZM-3025-34	42
1 1/2 - 4	5.24	9.84	12.21	EZM-2030-34	42
1 1/2 - 5	5.24	9.84	12.21	EZM-2030-34	42
1 1/2 - 10	5.24	9.84	12.21	EZM-2030-34	42

**ASSEMBLIES WITH MOTOR MOUNTS**  
**FLANGE MOUNT, PILOT FACING IN**



**NOTE:** Dimensions reflect a 1/2" 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
3/4 - 2	3.57	6.48	6.87	EZF-3012-34	34
3/4 - 3	3.57	6.48	6.87	EZF-3012-23	34
3/4 - 5	3.57	6.48	6.87	EZF-3012-23	34
3/4 - 6	3.57	6.48	6.87	EZF-3012-23	34
3/4 - 10	3.78	6.79	9.01	EZF-3015-34	34
7/8 - 6	4.03	7.04	9.26	EZF-3015-34	34
1 - 1	4.27	7.79	9.94	EZF-2020-34	36
1 - 2	4.09	7.27	9.4	EZF-3017-34	36
1 - 4	4.09	7.27	9.4	EZF-3017-34	36
1 - 5	4.09	7.27	9.4	EZF-3017-34	38
1 - 6	4.09	7.27	9.4	EZF-3017-34	38
1 - 10	4.27	7.79	9.94	EZF-2020-34	38
1 1/8 - 5	4.27	7.79	9.94	EZF-2020-34	40
1 1/4 - 4	4.52	8.04	10.19	EZF-2020-34	40
1 1/4 - 5	4.72	8.57	10.87	EZF-3025-34	40
1 1/2 - 2	5.26	9.57	11.96	EZF-2030-34	42
1 1/2 - 2 2/3	5.27	9.12	11.42	EZF-3025-34	42
1 1/2 - 4	5.26	9.57	11.96	EZF-2030-34	42
1 1/2 - 5	5.26	9.57	11.96	EZF-2030-34	42
1 1/2 - 10	5.26	9.57	11.96	EZF-2030-34	42

**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 assemblies. Use E-100 spray and PAG-1 grease lubricants to maximize life of your acme screw assembly.



**BENEFITS**

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

**Oil Viscosity**

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



High speed trains use precision screws

**ACME SCREW ASSEMBLIES  
REFERENCE NUMBER SYSTEM**



**105 — RA / EK / 4N / 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 = Right Hand Thread  
L = Left Hand Thread

**R A**

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.

**EZZE-MOUNT™**

**End Machining**

(see pages 204 - 207)

- 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

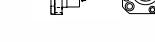
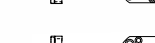
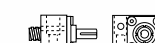
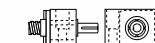
F = Flanged Double Bearing Support Flange Facing Screw Thread

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

**EK** EK = Universal Double Bearing Support, with Keyway



**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.10)  
Z = Two Acme Nuts with NO-Lash Round Flange (see pg.10)

**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

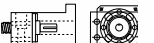
**SECOND END CONFIGURATION**

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

**Shaft Extension (see pages 204-206)**

- N = No Shaft
- Q = Handwheel
- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway

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).

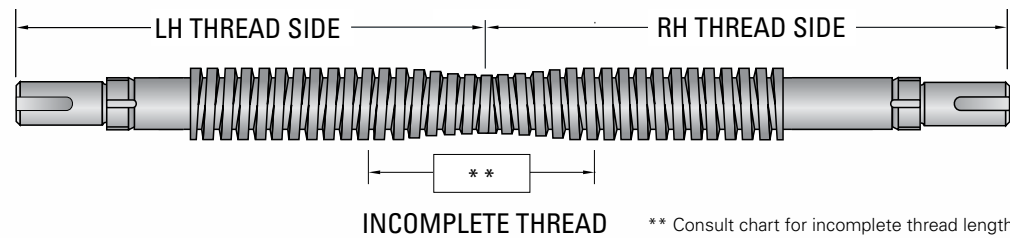
TWIN-LEAD ACME SCREW ASSEMBLIES



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 oxidized for protection and can be assembled with Nook PowerAc™ acme nuts, flanges and EZZE-MOUNT™ bearing supports (see pages 192-194) 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 33 to complete your part number.



\*\* 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
3/4 - 3	.537	72	35.00	2.00	34
3/4 - 5	.502	72	35.00	2.00	34
3/4 - 6	.537	72	35.00	2.00	34
3/4 - 10	.608	72	35.00	2.00	34
7/8 - 6	.661	72	35.00	2.00	34
1 - 1	.906	72	35.00	2.00	36
1 - 4	.689	72	34.75	2.50	36
1 - 5	.750	72	34.75	2.50	38
1 - 6	.786	72	34.75	2.50	38

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	38
1 1/4 - 4	.947	144	70.75	2.50	40
1 1/4 - 5	.999	144	70.75	2.50	40
1 1/2 - 2 2/3	1.066	144	70.50	3.00	42
1 1/2 - 4	1.196	144	70.75	2.50	42
1 1/2 - 5	1.249	144	70.75	2.50	42
1 1/2 - 10	1.355	144	71.00	2.00	42
1 3/4 - 4	1.427	144	70.50	3.00	44
2 - 4	1.694	144	70.50	3.00	44



TWIN-LEAD ACME SCREW ASSEMBLIES



REFERENCE NUMBER SYSTEM

105 - TA / EK / 4N / 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.

EZZE-MOUNT™ / End Machining

- 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

EK = Universal Double Bearing Support, with Keyway

Shaft Extension (see page 204-206)

- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway
- N = No Shaft
- Q = Handwheel

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).

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 32

RIGHT HAND THREAD  
Length in inches, 2 place decimal  
Note: See figure on page 32

LEFT HAND ACME NUT  
000000 = No Nut

RIGHT HAND ACME NUT  
000000 = No Nut

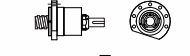
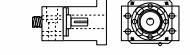
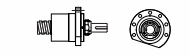
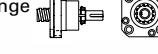
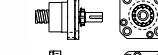
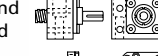
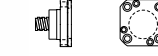
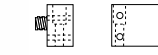
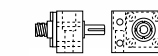
Note: To Select the Nut Direction After Nut Part # Add

A = Nut Thread or Flange installed toward center of screw

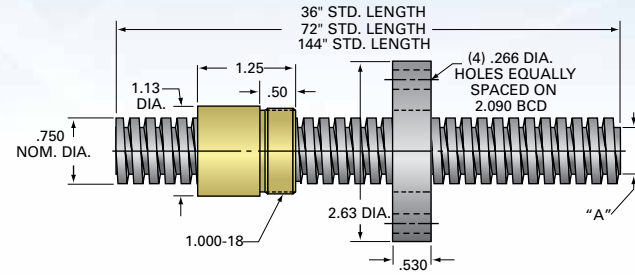
B = Nut Thread or Flange installed toward end of screw

MODIFIER LIST

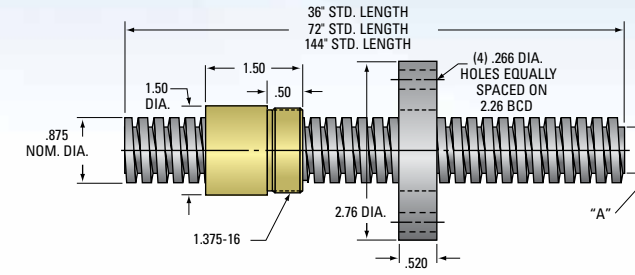
- F = Round Flange
- S or M Required
- S = Standard, no additional description required
- M = Modified, additional description required



3/4 inch diameter  
7/8 inch diameter



3/4" ACME THREAD  
Lead Accuracy 0.0003 in/in

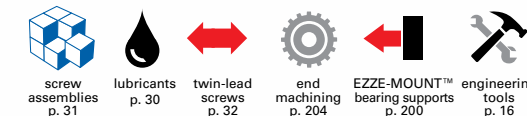


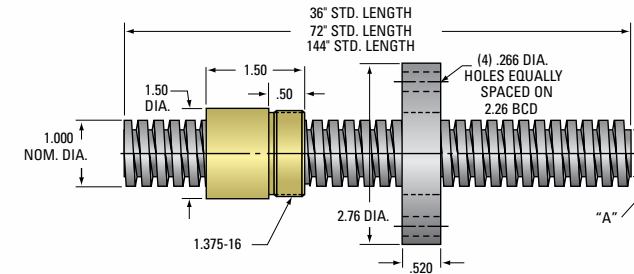
7/8" ACME THREAD  
Lead Accuracy 0.0003 in/in

Screw Size	ACME SCREW												BRONZE NUT					PLASTIC NUT					FLANGE							
	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	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™ (lb)	Wt. (lb)					
3/4" - 2	11072**	—	36	1018	.500	.125	4	8	.010	.581	1.18	072	2C	20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
	12072**	—	72	1018	.500	.125	4	8	.010	.581	1.18	072	2C	20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
	13072**	—	144	1018	.500	.125	4	8	.010	.581	1.18	072	2C	20072	—	62	.129	2,812	9,000	.23	30072	—	68	.118	1,406	1,406	.03	70262	73262	.78
3/4" - 3	11075	51073	36	4140	.333	.167	2	6	.009	.537	1.17	073	2C	20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
	12073	52073	72	4140	.333	.167	2	6	.009	.537	1.17	073	2C	20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
	13073	53073	144	4140	.333	.167	2	6	.009	.537	1.17	073	2C	20073	80073	54	.099	2,812	9,000	.23	30073	—	60	.089	1,406	1,406	.03	70262	73262	.78
3/4" - 5	11075	51075	36	4140	.200	.200	1	5	.009	.502	1.23	075	2C	20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
	91075	94075	36	SS	.200	.200	1	5	.009	.502	1.23	075	2C	20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
	12075	52075	72	4140	.200	.200	1	5	.009	.502	1.23	075	2C	20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
	92075	95075	72	SS	.200	.200	1	5	.009	.502	1.23	075	2C	20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
	13075	53075	144	4140	.200	.200	1	5	.009	.502	1.23	075	2C	20075	80075	40	.080	2,812	9,000	.24	30075	—	48	.066	1,406	1,406	.03	70262	73262	.78
3/4" - 6	11076	51076	36	4140	.166	.166	1	6	.008	.537	1.17	076	2C	20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
	91076	94076	36	SS	.166	.166	1	6	.008	.537	1.17	076	2C	20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
	12076	52076	72	4140	.166	.166	1	6	.008	.537	1.17	076	2C	20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
	92076	95076	72	SS	.166	.166	1	6	.008	.537	1.17	076	2C	20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
	13076	53076	144	4140	.166	.166	1	6	.008	.537	1.17	076	2C	20076	80076	36	.073	2,812	9,000	.23	30076	40076	43	.061	1,406	1,406	.03	70262	73262	.78
3/4" - 10	11070	51070	36	4140	.100	.100	1	10	.007	.608	1.29	070	2C	20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
	91070	94070	36	SS	.100	.100	1	10	.007	.608	1.29	070	2C	20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
	12070	52070	72	4140	.100	.100	1	10	.007	.608	1.29	070	2C	20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
	92070	95070	72	SS	.100	.100	1	10	.007	.608	1.29	070	2C	20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
	13070	53070	144	4140	.100	.100	1	10	.007	.608	1.29	070	2C	20070	80070	25	.064	2,812	9,000	.22	30070	—	30	.052	1,406	1,406	.03	70262	73262	.78
7/8" - 6	11086	51086	36	4140	.166	.166	1	6	.009	.661	1.65	086	2C	20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85
	12086	52086	72	4140	.166	.166	1	6	.009	.661	1.65	086	2C	20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85
	13086	53086	144	4140	.166	.166	1	6	.009	.661	1.65	086	2C	20086	80086	32	.083	3,828	12,250	.57	—	—	39	.068	1,914	1,914	.08	FLG8281	73275	.85

\*\* These screws are made with low carbon steel

\* Torque required to raise 1 lb



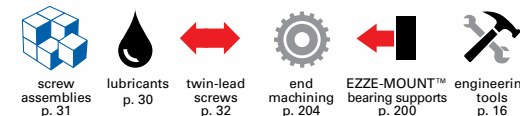


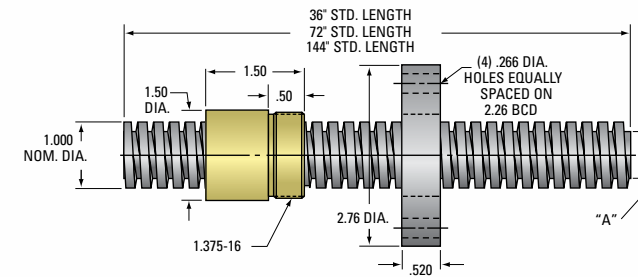
1" ACME THREAD  
Lead Accuracy 0.0003 in/in

Screw Size	ACME SCREW												BRONZE NUT					PLASTIC NUT					FLANGE							
	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	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)
<b>1" - 1</b>	<b>11111</b>	<b>51111</b>	36	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub	<b>20111</b>	<b>80111</b>	69	.231	5,000	16,000	.46	<b>30111</b>	—	74	.216	2,500	2,500	.07	<b>FLG8281</b>	<b>73275</b>	.85
	<b>12111</b>	<b>52111</b>	72	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub	<b>20111</b>	<b>80111</b>	69	.231	5,000	16,000	.46	<b>30111</b>	—	74	.216	2,500	2,500	.07	<b>FLG8281</b>	<b>73275</b>	.85
	<b>13111</b>	<b>53111</b>	144	4140	1.00	.100	10	10	.008	.906	2.38	111	Stub	<b>20111</b>	<b>80111</b>	69	.231	5,000	16,000	.46	<b>30111</b>	—	74	.216	2,500	2,500	.07	<b>FLG8281</b>	<b>73275</b>	.85
<b>1" - 2</b>	<b>11112</b>	—	36	4140	.500	.250	2	4	.010	.698	2.22	112	2C	<b>20112</b>	—	57	.139	5,000	16,000	.52	<b>30112</b>	—	63	.127	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>12112</b>	—	72	4140	.500	.250	2	4	.010	.698	2.22	112	2C	<b>20112</b>	—	57	.139	5,000	16,000	.52	<b>30112</b>	—	63	.127	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>13112</b>	—	144	4140	.500	.250	2	4	.010	.698	2.22	112	2C	<b>20112</b>	—	57	.139	5,000	16,000	.52	<b>30112</b>	—	63	.127	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
<b>1" - 4</b>	<b>11104</b>	<b>51104</b>	36	4140	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>91104</b>	<b>94104</b>	36	SS	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>12104</b>	<b>52104</b>	72	4140	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>92104</b>	<b>95104</b>	72	SS	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>13104</b>	<b>53104</b>	144	4140	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85
	<b>93104</b>	<b>54104</b>	144	SS	.250	.250	1	4	.010	.698	2.22	104	2C	<b>20104</b>	<b>80104</b>	38	.105	5,000	16,000	.52	<b>30104</b>	—	46	.086	2,500	2,500	.08	<b>FLG8281</b>	<b>73275</b>	.85

1" ACME THREAD SCREW ASSEMBLIES  
CONTINUED ON NEXT PAGE

\* Torque required to raise 1 lb

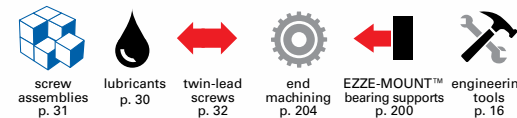


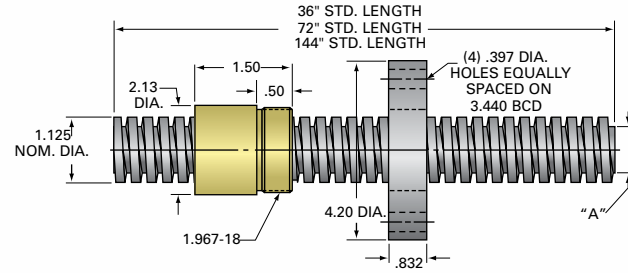


1" ACME THREAD  
Lead Accuracy 0.0003 in/in

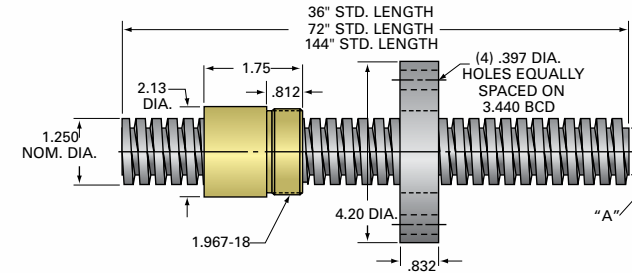
Screw Size	ACME SCREW													BRONZE NUT					PLASTIC NUT					FLANGE		
	Part Number RH LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Std.	No- Lash™	Wt. (lb)	
1"– 5	11105 51105	36	4140	.200	.200	1	5	.009	.750	2.16	105	2C	20105 80105	34	.094	5,000 16,000	.50	30105 40105	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
	91105 —	36	SS	.200	.200	1	5	.009	.750	2.16	105	2C	20105 —	34	.094	5,000 16,000	.50	30105 —	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
	12105 52105	72	4140	.200	.200	1	5	.009	.750	2.16	105	2C	20105 80105	34	.094	5,000 16,000	.50	30105 40105	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
	92105 —	72	SS	.200	.200	1	5	.009	.750	2.16	105	2C	20105 —	34	.094	5,000 16,000	.50	30105 —	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
	13105 53105	144	4140	.200	.200	1	5	.009	.750	2.16	105	2C	20105 80105	34	.094	5,000 16,000	.50	30105 40105	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
	93105 —	144	SS	.200	.200	1	5	.009	.750	2.16	105	2C	20105 —	34	.094	5,000 16,000	.50	30105 —	40	.079	2,500 2,500	.07	FLG8281 73275		.85	
1"– 6	11106 51106	36	4140	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
	91106 94106	36	SS	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
	12106 52106	72	4140	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
	92106 95106	72	SS	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
	13106 13106	144	4140	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
	93106 96106	144	SS	.167	.167	1	6	.009	.786	2.16	106	2C	20106 80106	30	.089	5,000 16,000	.49	— —	— —	— —	.07	FLG8281 73275		.85		
1"– 10	11110 51110	36	4140	.100	.100	1	10	.008	.857	2.10	110	2C	20110 80110	20	.078	5,000 16,000	.47	30110 —	24	.065	2,500 2,500	.07	FLG8281 73275		.85	
	91110 —	36	SS	.100	.100	1	10	.008	.857	2.10	110	2C	20110 —	20	.078	5,000 16,000	.47	30110 —	24	.065	2,500 2,500	.07	FLG8281 73275		.85	
	12110 52110	72	4140	.100	.100	1	10	.008	.857	2.10	110	2C	20110 80110	20	.078	5,000 16,000	.47	30110 —	24	.065	2,500 2,500	.07	FLG8281 73275		.85	
	92110 —	72	SS	.100	.100	1	10	.008	.857	2.10	110	2C	20110 —	20	.078	5,000 16,000	.47	30110 —	24	.065	2,500 2,500	.07	FLG8281 73275		.85	
	13110 53110	144	4140	.100	.100	1	10	.008	.857	2.10	110	2C	20110 80110	20	.078	5,000 16,000	.47	30110 —	24	.065	2,500 2,500	.07	FLG8281 73275		.85	
	93110 —	144	SS	.100	.100	1	10	.008	.857	2.10	110	2C	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





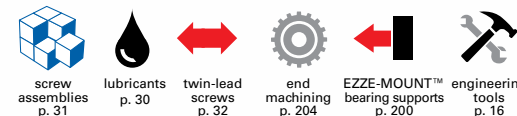
1 1/8" ACME THREAD 1/4  
Lead Accuracy 0.0003 in/in



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

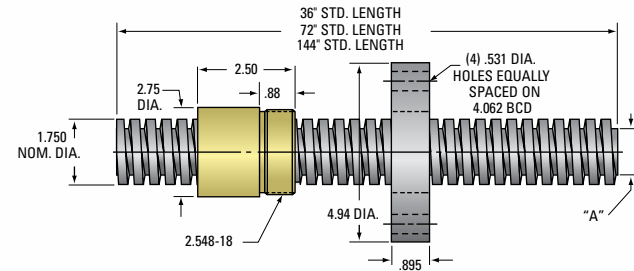
Screw Size	ACME SCREW												BRONZE NUT					PLASTIC NUT					FLANGE								
	Part Number RH LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Std.	No- Lash™	Wt. (lb)						
1 1/8"- 5	11115	—	36	4140	.200	.200	1	5	.010	.875	2.80	115	2C	20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	FLG7572	73420	3.19		
	12115	—	72	4140	.200	.200	1	5	.010	.875	2.80	115	2C	20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	—	—	—		
	13115	—	144	4140	.200	.200	1	5	.010	.875	2.80	115	2C	20115	—	32	.100	6,330	20,500	1.21	30115	—	—	—	—	—	—	—	—	—	
1 1/4"- 4	11124	51124	36	4140	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	
	91124	—	36	SS	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	—
	12124	52124	72	4140	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	—
	92124	—	72	SS	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	—
	13124	53124	144	4140	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	—
	93124	—	144	SS	.250	.250	1	4	.011	.947	3.34	124	2C	20124	80124	34	.117	7,812	25,000	1.32	30124	—	—	—	—	—	—	—	—	—	—
1 1/4"- 5	11125	51125	36	4140	.200	.200	1	5	.010	.999	3.49	125	2C	20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19	
	91125	94125	36	SS	.200	.200	1	5	.010	.999	3.49	125	2C	20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19	
	12125	52125	72	4140	.200	.200	1	5	.010	.999	3.49	125	2C	20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19	
	92125	95125	72	SS	.200	.200	1	5	.010	.999	3.49	125	2C	20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19	
	13125	53125	144	4140	.200	.200	1	5	.010	.999	3.49	125	2C	20125	80125	28	.114	7,812	25,000	1.29	30125	40125	35	.092	3,906	3,906	.19	FLG7572	73420	3.19	
	93125	96125	144	SS	.200	.200	1	5	.010	.999	3.49	125	2C	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

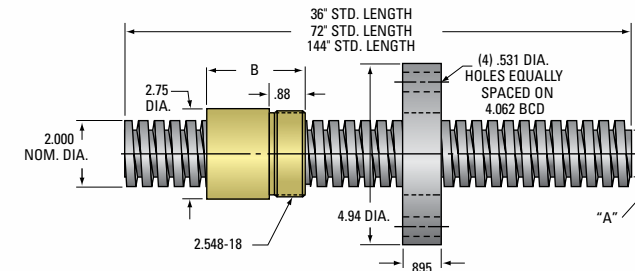




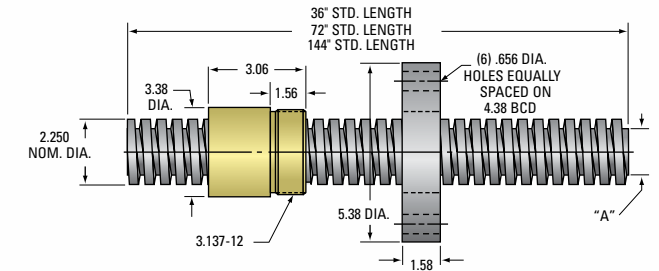
1 3/4 inch diameter  
2 inch diameter  
2 1/4 inch diameter



1 3/4" ACME THREAD  
Lead Accuracy 0.0003 in/in



2" ACME THREAD  
Lead Accuracy 0.0003 in/in

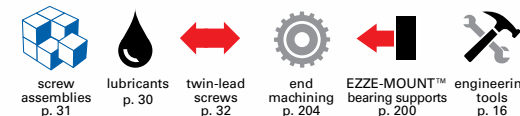


2 1/4" ACME THREAD  
Lead Accuracy 0.0003 in/in

Screw Size	ACME SCREW												BRONZE NUT					PLASTIC NUT					FLANGE																
	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	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)									
1 3/4" - 4	11174	51174	36	4140	.250	.250	1	4	.011	1.427	6.97	174	2C	20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73							
	12174	52174	72	4140	.250	.250	1	4	.011	1.427	6.97	174	2C	20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73					
	13174	53174	144	4140	.250	.250	1	4	.011	1.427	6.97	174	2C	20174	80174	26	.153	15,312	49,900	3.05	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73				
2" - 2 (see table below for nut body length)	11202	—	36	4140	.500	.500	1	2	.020	1.410	8.09	202	40°	20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73				
	12202	—	72	4140	.500	.500	1	2	.020	1.410	8.09	202	40°	20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73			
	13202	—	144	4140	.500	.500	1	2	.020	1.410	8.09	202	40°	20202	—	40	.199	20,000	64,000	2.87	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73			
2" - 4 (see table below for nut body length)	11204	51204	36	4140	.250	.250	1	4	.012	1.694	9.28	204	2C	20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73			
	12204	52204	72	4140	.250	.250	1	4	.012	1.694	9.28	204	2C	20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73		
	13204	53204	144	4140	.250	.250	1	4	.012	1.694	9.28	204	2C	20204	80204	24	.166	20,000	64,000	2.59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73		
2" - 5 (see table below for nut body length)	11205	—	36	4140	.200	.200	1	5	.011	1.747	9.53	205	2C	20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73		
	12205	—	72	4140	.200	.200	1	5	.011	1.747	9.53	205	2C	20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73	
	13205	—	144	4140	.200	.200	1	5	.011	1.747	9.53	205	2C	20205	—	20	.159	20,000	64,000	2.53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7573	73500	4.73	
2 1/4" - 2	11222	—	36	4140	.500	.500	1	2	.021	1.684	10.58	222	40°	20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88		
	12222	—	72	4140	.500	.500	1	2	.021	1.684	10.58	222	40°	20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88	
	13222	—	144	4140	.500	.500	1	2	.021	1.684	10.58	222	40°	20222	—	37	.215	25,312	81,000	5.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88	
2 1/4" - 4	11224	—	36	4140	.250	.250	1	4	.012	1.944	11.29	224	2C	20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88	
	12224	—	72	4140	.250	.250	1	4	.012	1.944	11.29	224	2C	20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88
	13224	—	144	4140	.250	.250	1	4	.012	1.944	11.29	224	2C	20224	—	22	.181	25,312	81,000	4.98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FLG7574	73540	9.88

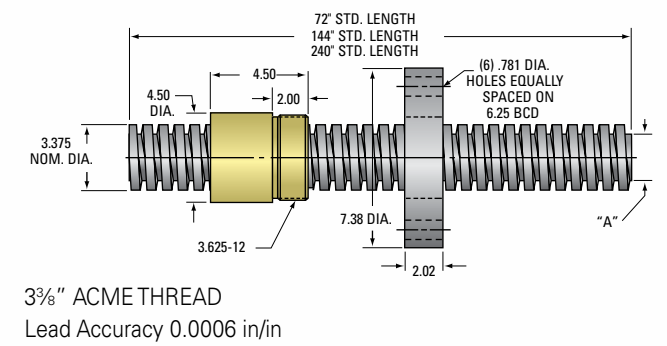
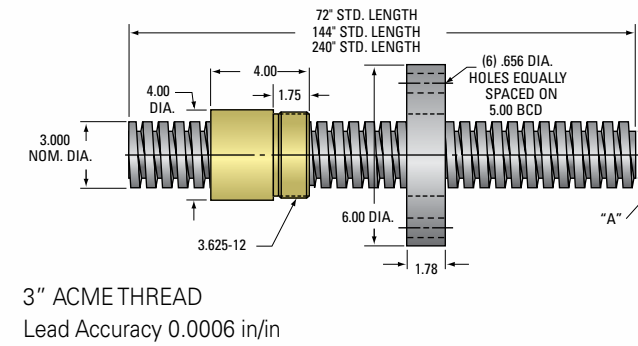
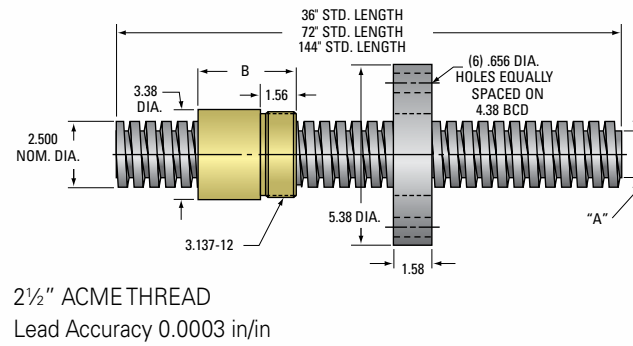
\* Torque required to raise 1 lb

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





2½ inch diameter  
3 inch diameter  
3¾ inch diameter

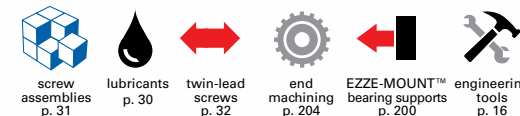


Screw Size	ACME SCREW													BRONZE NUT					PLASTIC NUT					FLANGE							
	Part Number RH LH	Length (in)	Material	Lead (in)	Pitch (in)	Starts	Threads per in	Lash (max axial)	"A" Dia (in)	Wt. (lb/ft)	Thread Code	Form	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Part Number RH LH	% Efficiency	Torque* (in-lb)	Load Capacity (lb) Dynamic Static	Wt. (lb)	Std.	No-Lash™	Wt. (lb)						
2½" - 2 (see table below for nut body length)	11252	—	36	4140	.500	.500	1	2	.012	1.908	13.41	252	40°	20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	FLG7574	73540	9.88		
	12252	—	72	4140	.500	.500	1	2	.012	1.908	13.41	252	40°	20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	—	—	—	—	
	13252	—	144	4140	.500	.500	1	2	.012	1.908	13.41	252	40°	20252	—	34	.234	31,250	100,000	5.00	—	—	—	—	—	—	—	—	—	—	—
2½" - 3 (see table below for nut body length)	11253	—	36	4140	.333	.333	1	3	.013	2.106	14.38	253	2C	20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	—	—	—	
	12253	—	72	4140	.333	.333	1	3	.013	2.106	14.38	253	2C	20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	—	—	—	—
	13253	—	144	4140	.333	.333	1	3	.013	2.106	14.38	253	2C	20253	—	25	.215	31,250	100,000	5.91	—	—	—	—	—	—	—	—	—	—	—
2½" - 4 (see table below for nut body length)	11254	—	36	4140	.250	.250	1	4	.012	2.193	14.89	254	2C	20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	—	—	—	—
	12254	—	72	4140	.250	.250	1	4	.012	2.193	14.89	254	2C	20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	—	—	—	—
	13254	—	144	4140	.250	.250	1	4	.012	2.193	14.89	254	2C	20254	—	20	.199	31,250	100,000	4.55	—	—	—	—	—	—	—	—	—	—	—
3" - 2	12302	—	72	4140	.500	.500	1	2	.016	2.410	19.96	302	2C	20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	—	—	—	—
	13302	—	144	4140	.500	.500	1	2	.016	2.410	19.96	302	2C	20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	—	—	—	—
	10302	—	240	4140	.500	.500	1	2	.016	2.410	19.96	302	2C	20302	—	30	.265	45,000	144,000	7.85	—	—	—	—	—	—	—	—	—	—	—
3¾" - 1½	12332	—	72	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G	20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	—	—	—	—
	13332	—	144	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G	20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	—	—	—	—
	10332	—	240	4140	.667	.667	1	1½	.020	2.652	20.15	332	2G	20332	—	34	.312	60,000	192,000	11.62	—	—	—	—	—	—	—	—	—	—	—

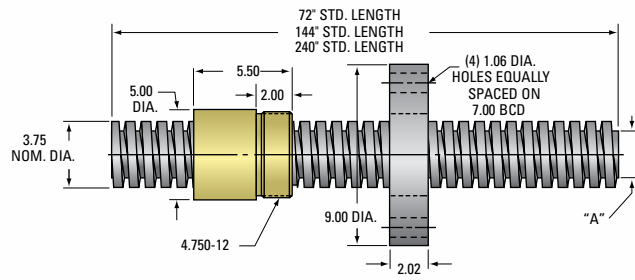
\* Torque required to raise 1 lb

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

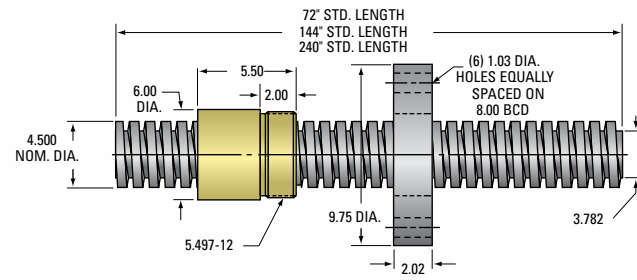
2D/3D CAD ONLINE



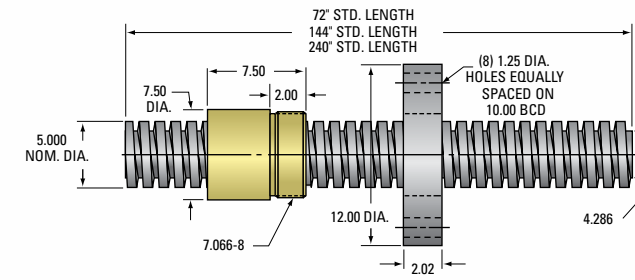
3¾ inch diameter  
 4½ inch diameter  
 5 inch diameter  
 6 inch diameter



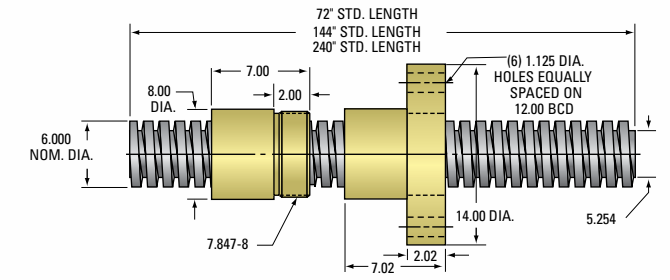
¾" ACME THREAD  
 Lead Accuracy 0.0006 in/in



4½" ACME THREAD  
 Lead Accuracy 0.0006 in/in



5" ACME THREAD  
 Lead Accuracy 0.0006 in/in

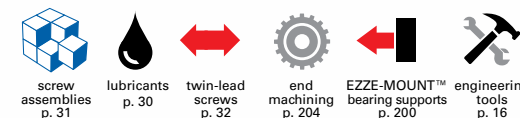


6" ACME THREAD  
 Lead Accuracy 0.0006 in/in

Screw Size	ACME SCREW												BRONZE NUT					BRONZE NUT WITH INTEGRAL FLANGE					FLANGE											
	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	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)									
¾" - 1½"	12372	—	72	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G	20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	70775	73372	23.82						
	13372	—	144	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G	20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	70775	73372	23.82						
	10372	—	240	4140	.667	.667	1	1½	.020	3.009	38.30	372	2G	20372	—	30	.345	81,000	260,000	16.89	—	—	—	—	—	70775	73372	23.82						
4½" - 1½"	12452	—	72	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G	20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	—	FLG3307	73452	26.00			
	13452	—	144	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G	20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	—	—	FLG3307	73452	26.00		
	10452	—	240	4140	.667	.667	1	1½	.022	3.782	45.00	452	2G	20452	—	28	.379	100,000	320,000	25.85	—	—	—	—	—	—	—	—	—	—	FLG3307	73452	26.00	
5" - 1½"	12552	—	72	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G	20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	—	—	—	75000	73552	38.00	
	13552	—	144	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G	20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	—	—	—	—	75000	73552	38.00
	10552	—	240	4140	.667	.667	1	1½	.022	4.286	57.50	552	2G	20552	—	26	.398	145,000	470,000	60.59	—	—	—	—	—	—	—	—	—	—	—	75000	73552	38.00
6" - 1½"	12602	—	72	4140	.667	.667	1	1½	.025	5.254	87	602	2G	20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—	—	—	—	
	13602	—	144	4140	.667	.667	1	1½	.025	5.254	87	602	2G	20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—	—	—	—	—
	10602	—	240	4140	.667	.667	1	1½	.025	5.254	87	602	2G	20602	—	22	.474	180,000	567,000	52.5	6954-1	—	22	.474	180,000	567,000	100	—	—	—	—	—	—	—

\* Torque required to raise 1 lb

2D/3D CAD ONLINE



## TRAPEZOIDAL SCREW ASSEMBLIES

With over forty years of experience manufacturing precision acme screws, Nook Industries 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

Screw Sizes	Pitch (mm)	Lead (mm)	Starts	Root Dia. (mm)	BRONZE			PLASTIC			Page ref
					Dynamic Load Rating	Torque to Raise 1 kN (N-m)	Efficiency %	Dynamic Load Rating	Torque to Raise 1 kN (N-m)	Efficiency %	
Tr 20 x 4	4	4	1	14.9	13790	1.818	35	6895	1.580	40	54
Tr 26 x 6	6	6	1	17.84	23304	2.469	39	11652	2.164	44	54
Tr 40 x 7	7	7	1	30.95	55160	3.503	32	5516	3.022	37	56
Tr 55 x 12	12	12	1	40.00	104287	5.131	37	—	—	—	56
Tr 65 x 12	12	12	1	50.02	145651	5.775	33	—	—	—	56

## TRAPEZOIDAL SCREW ASSEMBLIES REFERENCE NUMBER SYSTEM



904 - RA / EK / 4N / 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

### MATERIAL

Material Code	Description
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.

### FIRST END CONFIGURATION

**Note:** Both Ends must be specified.

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

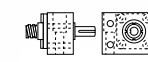
Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

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

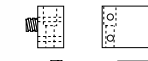
EZZE-MOUNT™ / End Machining (see page 204-207)

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

B = Universal Double Bearing Support End Cap Facing Screw Thread



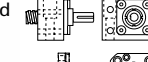
C = Universal Single Bearing Support



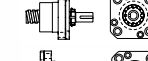
D = Flanged Single Bearing Support Flange Facing Screw Thread



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



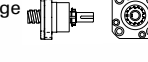
F = Flanged Double Bearing Support Flange Facing Screw Thread



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



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

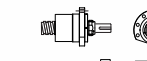


EK = Universal Double Bearing Support, with Keyway

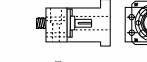
Shaft Extension (see page 204-206)

- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway
- N = No Shaft
- Q = Handwheel

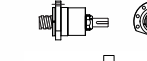
R = Flanged Fixed Bearing Support Flange Facing Screw Thread



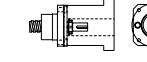
U = Universal Double Bearing Support with Motor Mount



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).

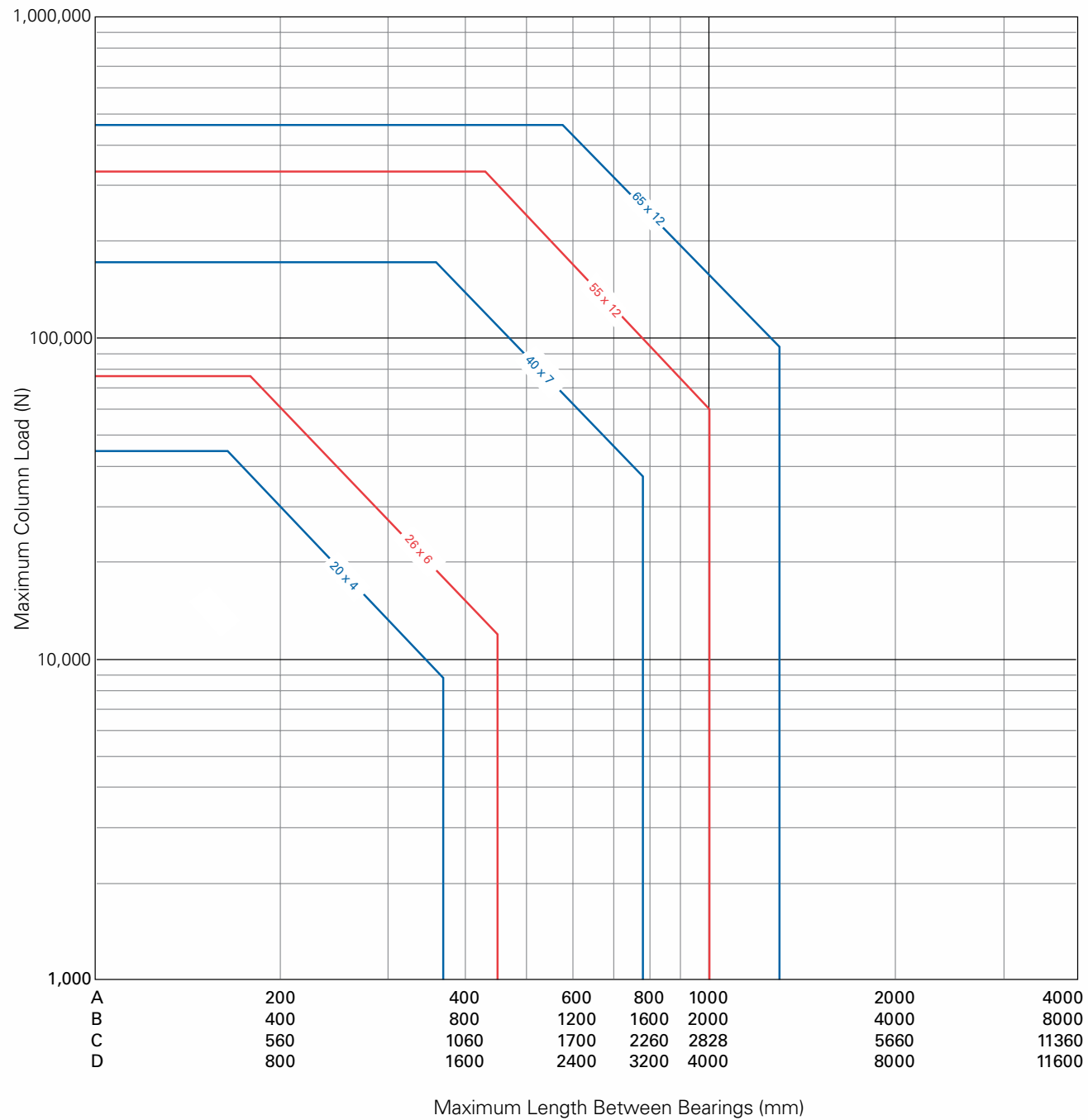
XX = Custom Machining (Print or specified data must be provided).

### COLUMN STRENGTH: TRAPEZOIDAL SCREWS



Metric Screws are limited by both Maximum Static Load and Slenderness Ratio.  
See pages 12-13 for reference description on A-B-C-D end fixity.

**Metric to Inch Conversion:** 1 Newton = .224 lbf      1mm = 0.039 in      1 N m = 8.85 in-lb



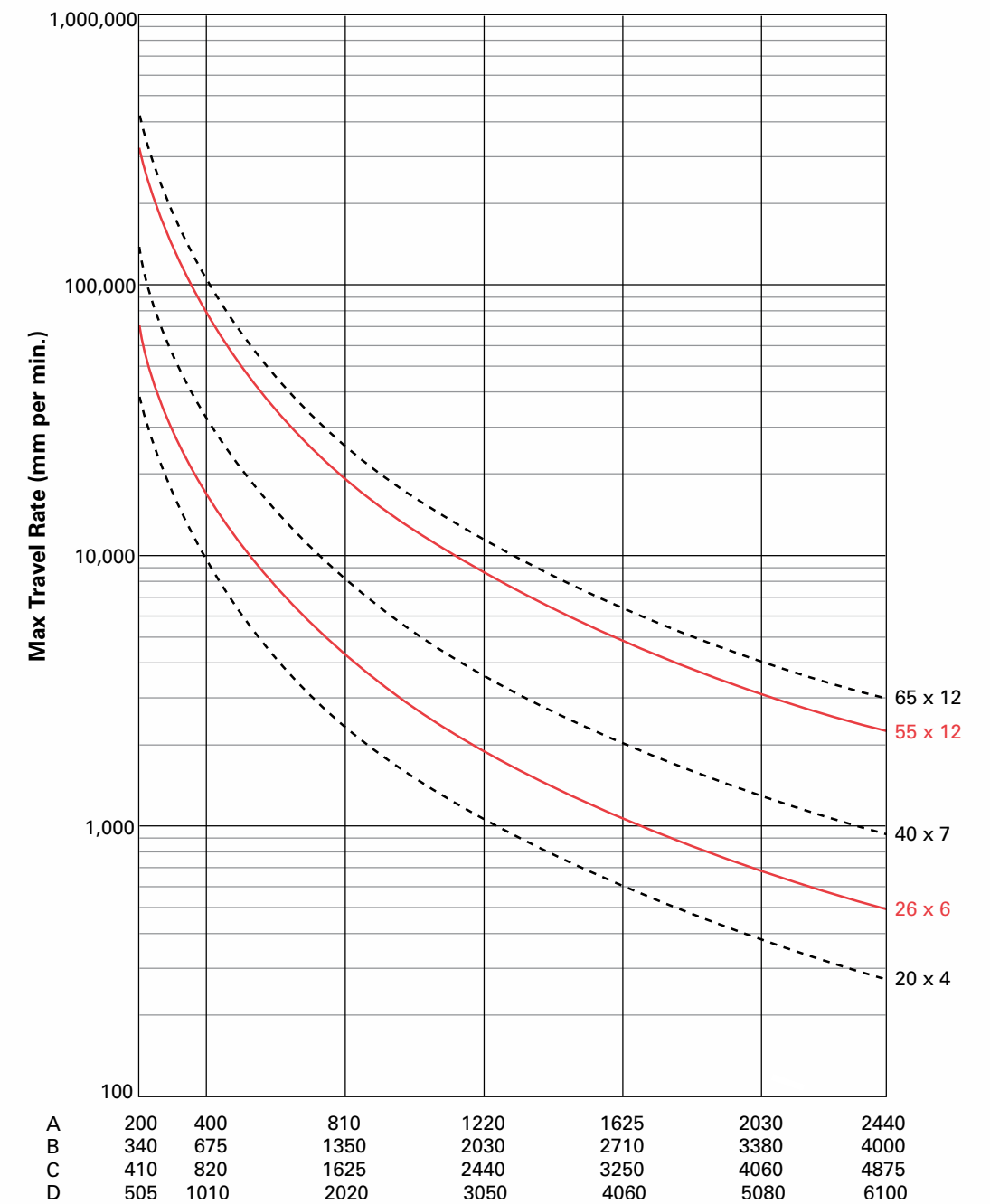
### CRITICAL SPEED: TRAPEZOIDAL SCREWS

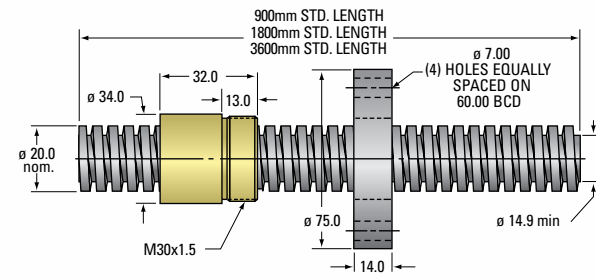


Curves are alternately broken and solid for ease of use. The line type has no significance.

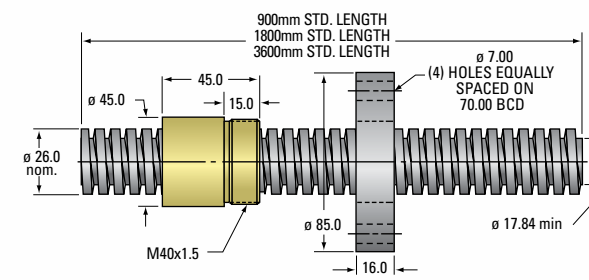
**NOTE:** Maximum Speed is limited to 80% of the calculated Critical Speed.  
See pages 12-13 for reference description on A-B-C-D end fixity.

**Metric to Inch Conversion:** 1 Newton = .224 lbf      1mm = 0.039 in      1 N m = 8.85 in-lb



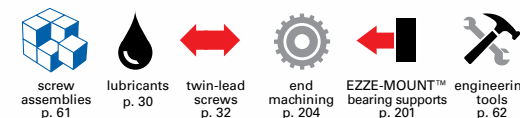


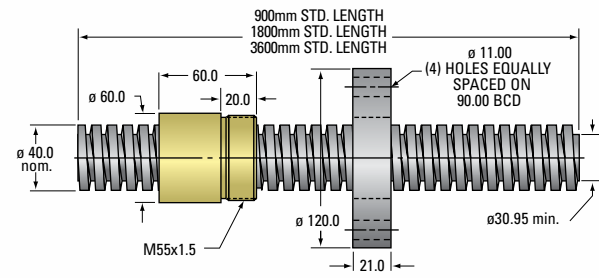
20mm Trapezoidal Thread  
Lead Accuracy  $\pm 6.25 \mu\text{m}/25\text{mm}$



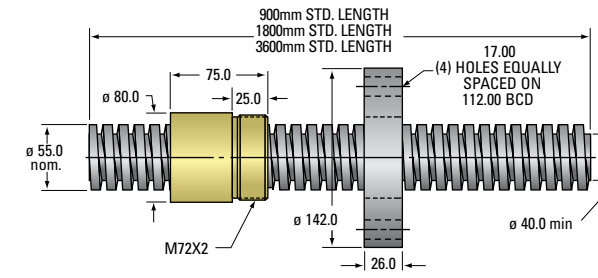
26mm Trapezoidal Thread  
Lead Accuracy  $\pm 6.25 \mu\text{m}/25\text{mm}$

Dia x Lead	TRAPEZOIDAL SCREW										BRONZE NUT				PLASTIC NUT				FLANGE					
	Part Number		Length (mm)	Material	Pitch (mm)	Starts	Dia (mm)	Thread Code	Wt. (kg/m)	Lash (mm)	Part Number	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. (g)	Load capacity (N)		Part Number	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. (g)	Load capacity (N)		Part Number	Wt. (kg)
	RH	LH													Dynamic	Static					RH	Efficiency		
<b>Tr 20x4</b>	<b>14903</b>	—	900	4140	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
	<b>54903</b>	—	900	SS	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
	<b>15903</b>	—	1800	4140	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
	<b>55903</b>	—	1800	SS	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
	<b>16903</b>	—	3600	4140	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
	<b>56903</b>	—	3600	SS	4	1	20	903	2.00	0.24	<b>20903</b>	.35	1.818	173	13,790	44,128	<b>30903</b>	40	1.580	11	6,895	6,895	<b>72003</b>	.39
<b>Tr 26x6</b>	<b>14904</b>	—	900	4140	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54
	<b>54904</b>	—	900	SS	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54
	<b>15904</b>	—	1800	4140	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54
	<b>55904</b>	—	1800	SS	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54
	<b>16904</b>	—	3600	4140	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54
	<b>56904</b>	—	3600	SS	6	1	26	904	3.20	0.30	<b>20904</b>	39	2.469	440	23,304	74,573	<b>30904</b>	44	2.164	79	11,652	11,652	<b>72004</b>	.54

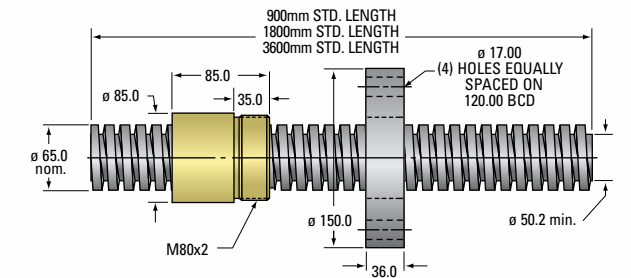




40mm Trapezoidal Thread  
Lead Accuracy  $\pm 6.25 \mu\text{m}/25\text{mm}$

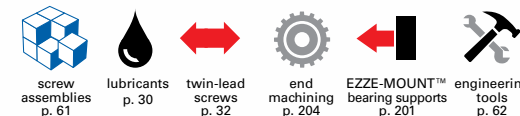


55mm Trapezoidal Thread  
Lead Accuracy  $\pm 6.25 \mu\text{m}/25\text{mm}$



65mm Trapezoidal Thread  
Lead Accuracy  $\pm 6.25 \mu\text{m}/25\text{mm}$

Dia x Lead	TRAPEZOIDAL SCREW										BRONZE NUT					PLASTIC NUT					FLANGE			
	Part Number		Length (mm)	Material	Pitch (mm)	Starts	Dia (mm)	Thread Code	Wt. (kg/m)	Lash (mm)	Part Number	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. (g)	Load capacity (N)		Part Number	% Efficiency	Torque to Raise 1 kN (N-m)	Wt. g.	Load capacity (N)		Part Number	Wt. (kg)
RH	LH	Dynamic													Static	Dynamic					Static			
<b>Tr 40x7</b>	<b>14905</b>	—	900	4140	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
	<b>54905</b>	—	900	SS	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
	<b>15905</b>	—	1800	4140	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
	<b>55905</b>	—	1800	SS	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
	<b>16905</b>	—	3600	4140	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
	<b>56905</b>	—	3600	SS	7	1	40	905	8.16	0.32	<b>20905</b>	.32	3.503	900	55,160	176,512	<b>30905</b>	37	3.022	160	27,580	27,580	<b>72005</b>	1.40
<b>Tr 55x12</b>	<b>14906</b>	—	900	4140	12	1	55	906	14.7	0.42	<b>20906</b>	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	<b>72006</b>	2.20
	<b>15906</b>	—	1800	4140	12	1	55	906	14.7	0.42	<b>20906</b>	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	<b>72006</b>	2.20
	<b>16906</b>	—	3600	4140	12	1	55	906	14.7	0.42	<b>20906</b>	.37	5.131	1900	104,287	333,718	—	—	—	—	—	—	<b>72006</b>	2.20
<b>Tr 65x12</b>	<b>14907</b>	—	900	4140	12	1	65	907	21.3	0.42	<b>20907</b>	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	<b>72007</b>	3.30
	<b>15907</b>	—	1800	4140	12	1	65	907	21.3	0.42	<b>20907</b>	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	<b>72007</b>	3.30
	<b>16907</b>	—	3600	4140	12	1	65	907	21.3	0.42	<b>20907</b>	.33	5.575	2100	145,651	466,084	—	—	—	—	—	—	<b>72007</b>	3.30



# PowerTrac™

## PRECISION BALL SCREW ASSEMBLIES



Ball screws and linear actuators are used to adjust solar trackers

# BALL SCREWS

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GLOSSARY AND TECHNICAL DATA

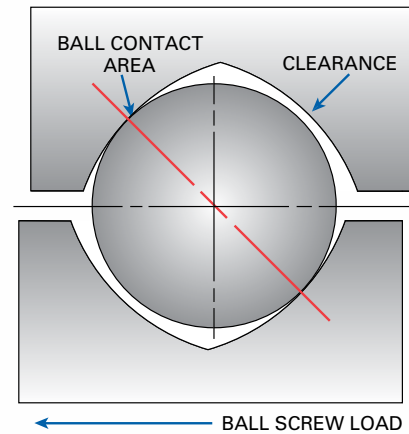


**BALL SCREW THREAD FORM TERMS**

**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



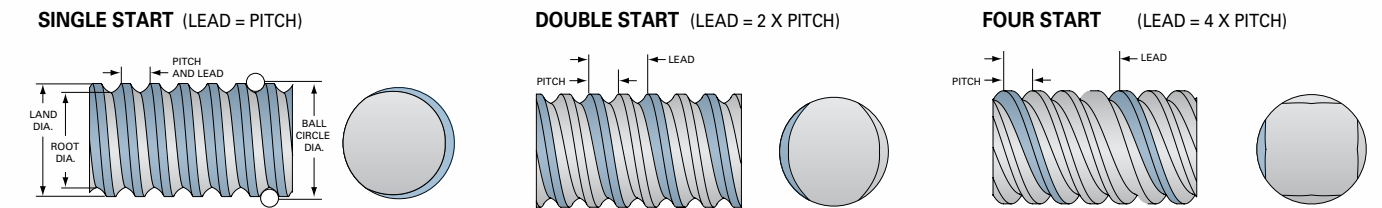
**BEARING BALL CIRCUIT** - The closed path that the bearing balls follow through the ball nut. Ball nuts have one or more circuits.

**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.

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 x 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 x .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 84.

**XPR Ball Screws** will not deviate from nominal lead by more than ±.001 inch/foot. Details on page 110.

**SGT Ball Screws** will not deviate from nominal lead by more than ±.0005 inch/foot. Details on page 124.

**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
<b>SRT</b>	Alloy	black	± .004 in/ft	0.375" to 2.500"	up to 24'
	Alloy	black	± .008 in/ft	3.000" to 6.000"	up to 24'
	Stainless	polished	± .004 in/ft	0.375" to 1.000"	up to 24'
<b>XPR</b>	Alloy	polished	± .001 in/ft	0.631" to 2.250"	up to 12'
<b>SGT</b>	Alloy	polished	± .0005 in/ft	0.631" to 2.250"	up to 10'





## GLOSSARY AND TECHNICAL DATA

**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 Industries, 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

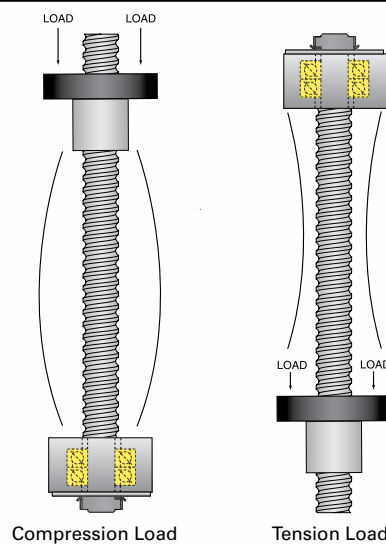
**STATIC LOAD** - The maximum thrust load – including shock – that can be applied to the ball nut without damaging the assembly.

**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

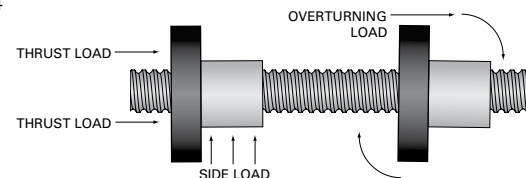


**OVERTURNING LOAD** - A load that tends to rotate the nut radially around the longitudinal axis of the screw. (See FIG. 4)

**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

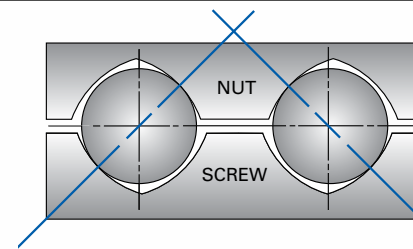


**THRUST LOAD** - A load parallel to and concentric with the axis of the screw. (See FIG. 4)

**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 Industries 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

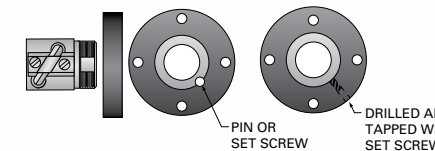


FIG. 7

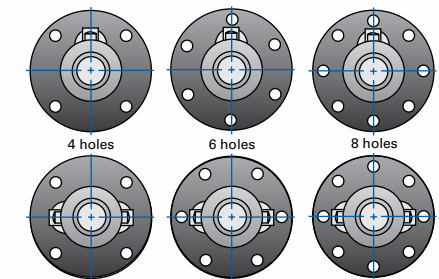
Diameter	Description	Qty
.375 to .631	1/8 x 1/4 Slotted Spring Pin	1
.750 to .875	3/16 x 1/2 Slotted Spring Pin	1
1.000	3/16 x 1/2 Slotted Spring Pin	2
1.500-.200 to 1.500 -1.250	1/4-20 x 1/4 Set Screw	2
1.500-.473 to 1.500 -1.875	5/16-18 x 1/2 Set Screw	2
2.250 to 3.000	3/8-16 x 3/4 Set Screw	2
4.000	1/2 x 13 x 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.

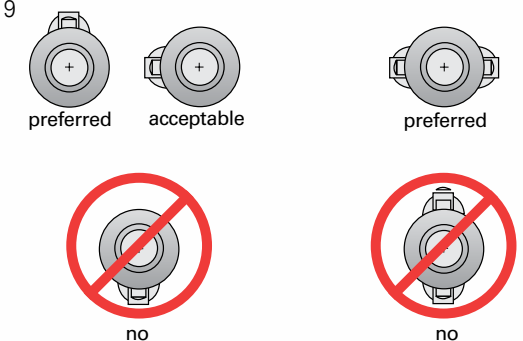
**STANDARD FLANGE ORIENTATION** - Standard flange orientation varies with the number of holes in the flange. Unless otherwise specified, a factory-assembled flange will be oriented on the nut as shown. (See FIG. 8)

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



## GLOSSARY AND TECHNICAL DATA

**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. Additional methods can be found online at [www.nookindustries.com](http://www.nookindustries.com).

**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.

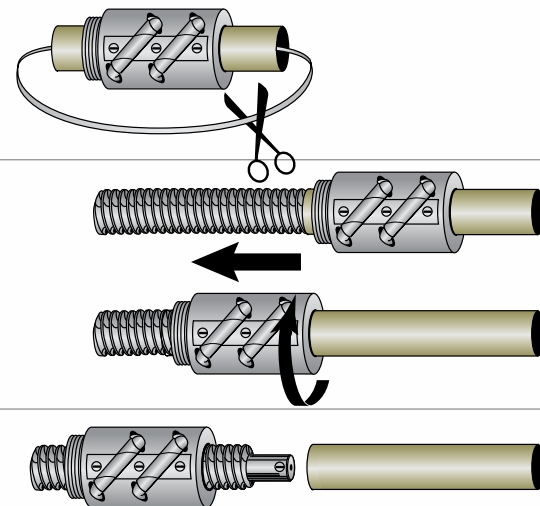
E-900, Nook Ball Screw Lubricant, is oil that has been developed specifically for ball screws and is available as a spray or liquid. See page 74.

**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 taken to prevent the ball nut from sliding off the end of the screw shaft during installation and handling. Temporary stops can be made by wrapping tape around the shaft 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

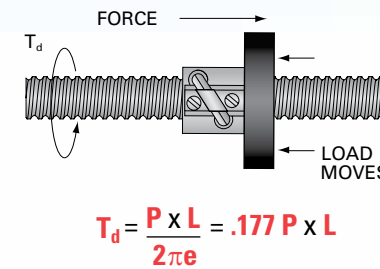
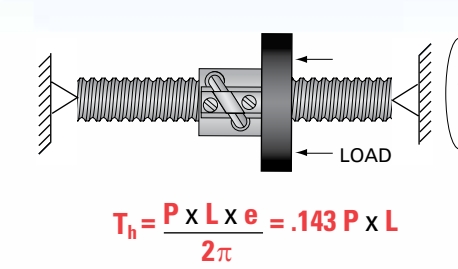


FIG. 12 - Holding Torque



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 Industries factory. Screws may be purchased machined to your specifications or to standard end machining designs shown on pages 192-194.

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 Industries has designed precision end mounts to work specifically with ball screws. For a detailed description of these bearing supports see pages 195-199.

An EZZE-MOUNT™ can be shipped pre-assembled to a PowerTrac™ Ball Screw. For complete PowerTrac™ Ball Screw Assemblies refer to pages 74-79.

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

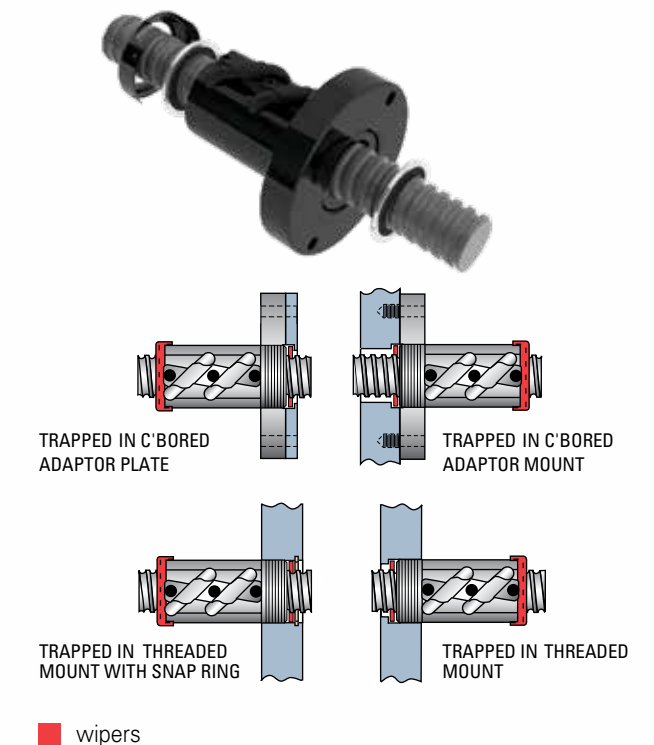
**WIPER KITS** - It is recommended that wipers be used with ball nuts to prevent contamination from foreign materials. The product pages detail the different types of wipers available for or that come standard with each ball nut. Brush wipers may require customer-supplied retention. For the different 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 16 ft are given a protective black oxide finish. 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



GLOSSARY AND TECHNICAL DATA

FIG. 14

	ALLOY			STAINLESS STEEL
	SRT	XPR	SGT	
<b>Material</b>	4150 Series	4150 Series	4150 Series	17-4 PH
<b>Hardness</b>	Rc 58-62 Case Hardened	Rc 58-62 Case Hardened	Rc 58-62 Case Hardened	Conditioned H900 Thru Hardened
<b>Tensile</b>	120,000 psi	120,000 psi	120,000 psi	150,000 psi
<b>Finish</b>	Roller Burnished, Black Oxide Finish (16 ft or less)	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 60 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 70-71 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:

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

WHERE:

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

FOR EXAMPLE:

- $L_1 = 150\#$   $\%_1 = 30\%$
- $L_2 = 225\#$   $\%_2 = 45\%$
- $L_3 = 725\#$   $\%_3 = 25\%$

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

$L_m = 466$  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

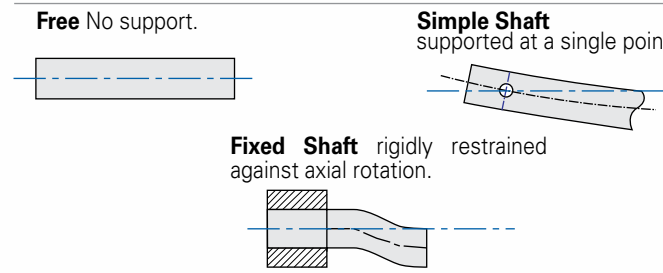
WHERE:

- $T_x$  = 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.

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

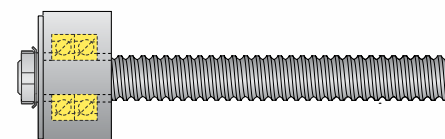
**END FIXITY** - End fixity refers to the method by which the ends of the screw are supported. The degree of end fixity is related to the amount of restraint of the ends of the screw.

**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)

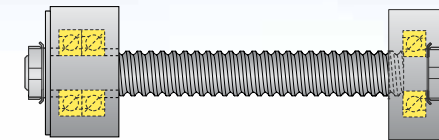
FIG.16:



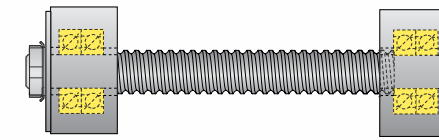
**A:** One end supported with a Double Bearing EZZE-MOUNT™, other end Free. Use Line A" in reference to the charts shown on pages 72-73 and 146-147.

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

FIG.16 (cont'd):

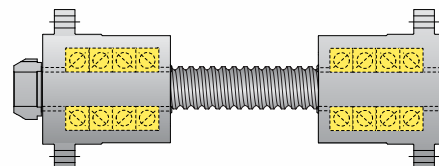


**B:** One end supported with a Double Bearing EZZE-MOUNT™, other supported with a Single Bearing EZZE-MOUNT™. Use Line B in reference to the charts shown on pages 72-73 and 146-147.



**C:** Both ends supported with a Double Bearing EZZE-MOUNT™. Use Line C in reference to the charts shown on pages 72-73 and 146-147.

**CAUTION:** When using fixed bearing mounts on both ends, contact Nook 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 72-73 and 146-147.

**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 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 73 or 147 is provided to quickly determine the minimum screw size applicable for Nook 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:

- Increase screw lead (reduce rpm)
- Change end fixity (e.g. simple to fixed)
- 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 62), 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 72, 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:

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

## APPLICATION EXAMPLE



CNC milling machine using Nook 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  $\pm 1/4$ "

#### 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.

$$F = \mu \times N$$

$\mu$  = coefficient of friction of the guidance system

Using Nook linear bearings in this application:

$$\mu = \text{Coefficient of Friction for lubricated Nook Linear Bearings} = .0013$$

$$N = \text{Load} = 5,000 \text{ lb}$$

$$F = \mu \times N$$

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

$$F = 6.5 \text{ lb}$$

#### 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.

$$V \text{ average} = D/t$$

$$D = \text{distance} = 36"$$

$$t = \text{total time} = 10 \text{ sec.}$$

$$V \text{ avg.} = D/t$$

$$V \text{ avg.} = 36 \text{ in}/10 \text{ sec.}$$

$$V \text{ avg.} = 3.6 \text{ in/sec. or } 216 \text{ in/min}$$

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.

$$V \text{ peak} = 2 \times V \text{ avg.}$$

$$V \text{ avg.} = 3.6 \text{ in / sec. or } 216 \text{ in/min}$$

$$V \text{ peak} = 2 \times V \text{ avg.}$$

$$V \text{ peak} = 432 \text{ in/min}$$

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)

$$L \text{ total} = 36" + 4" = 40"$$

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 66-67)

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 73.

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 81 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**

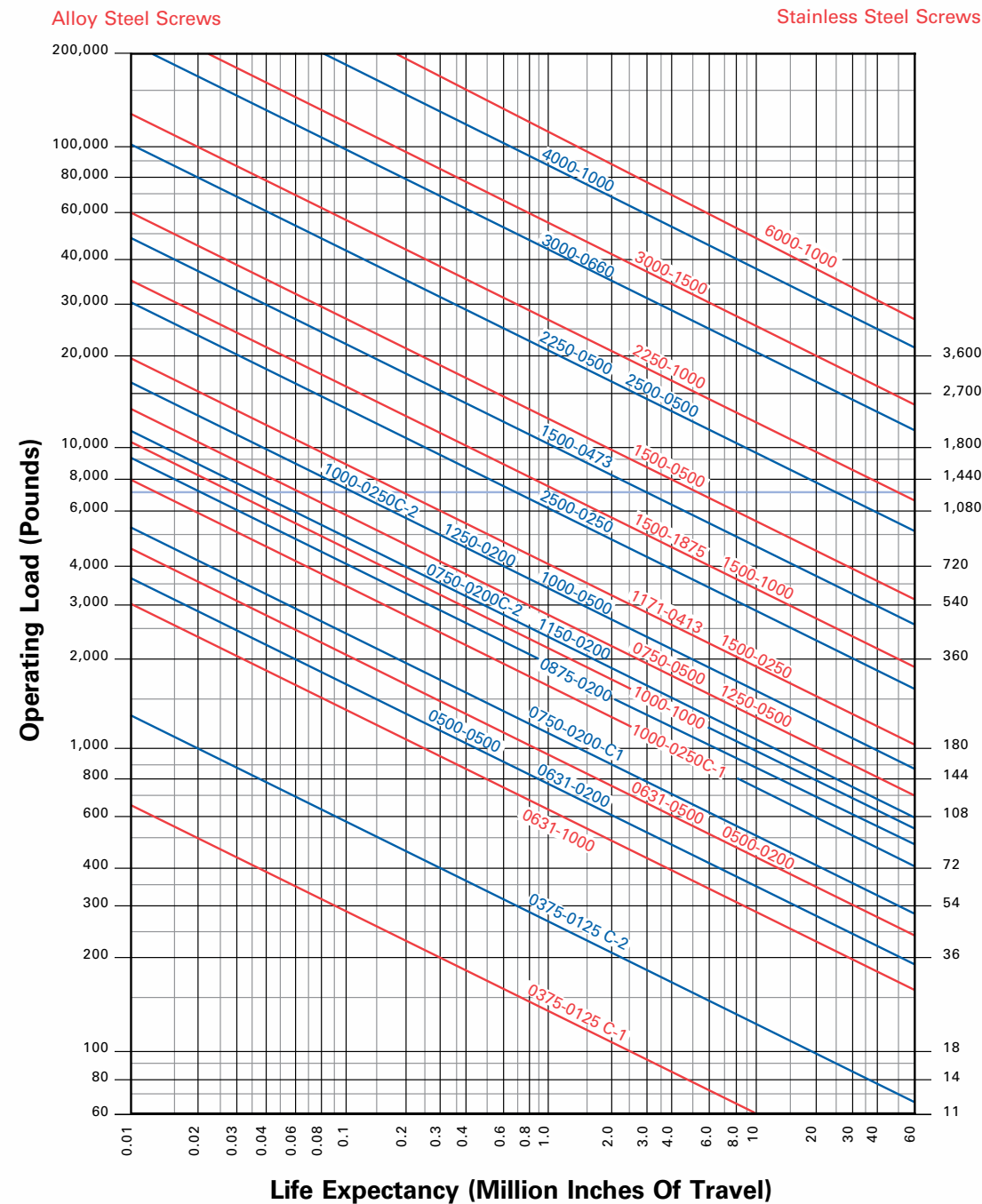


## LIFE EXPECTANCY: SRT ROLLED INCH SCREWS

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%.

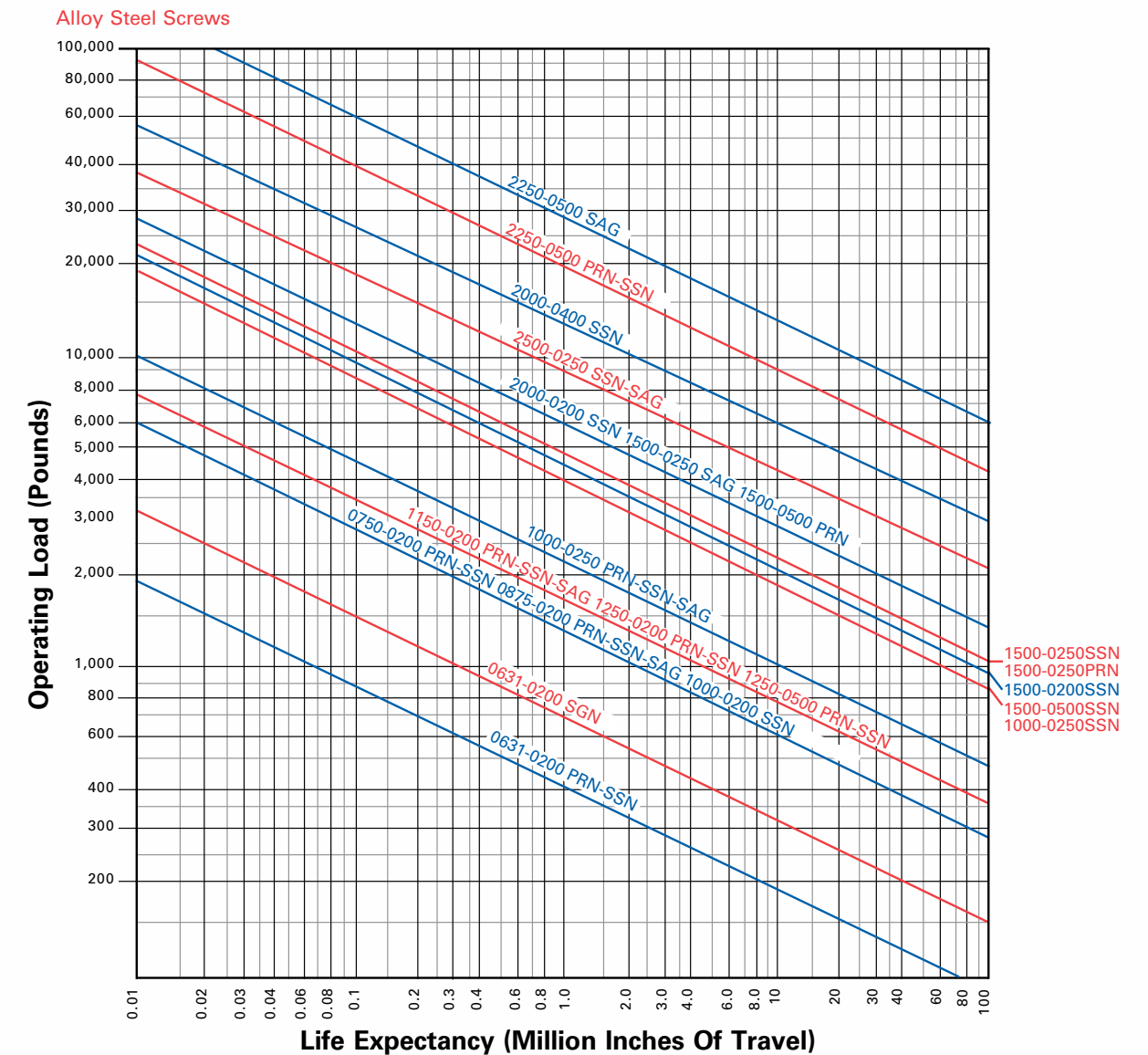


## LIFE EXPECTANCY: XPR PRECISION ROLLED AND SGT PRECISION GROUND INCH SCREWS

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%.

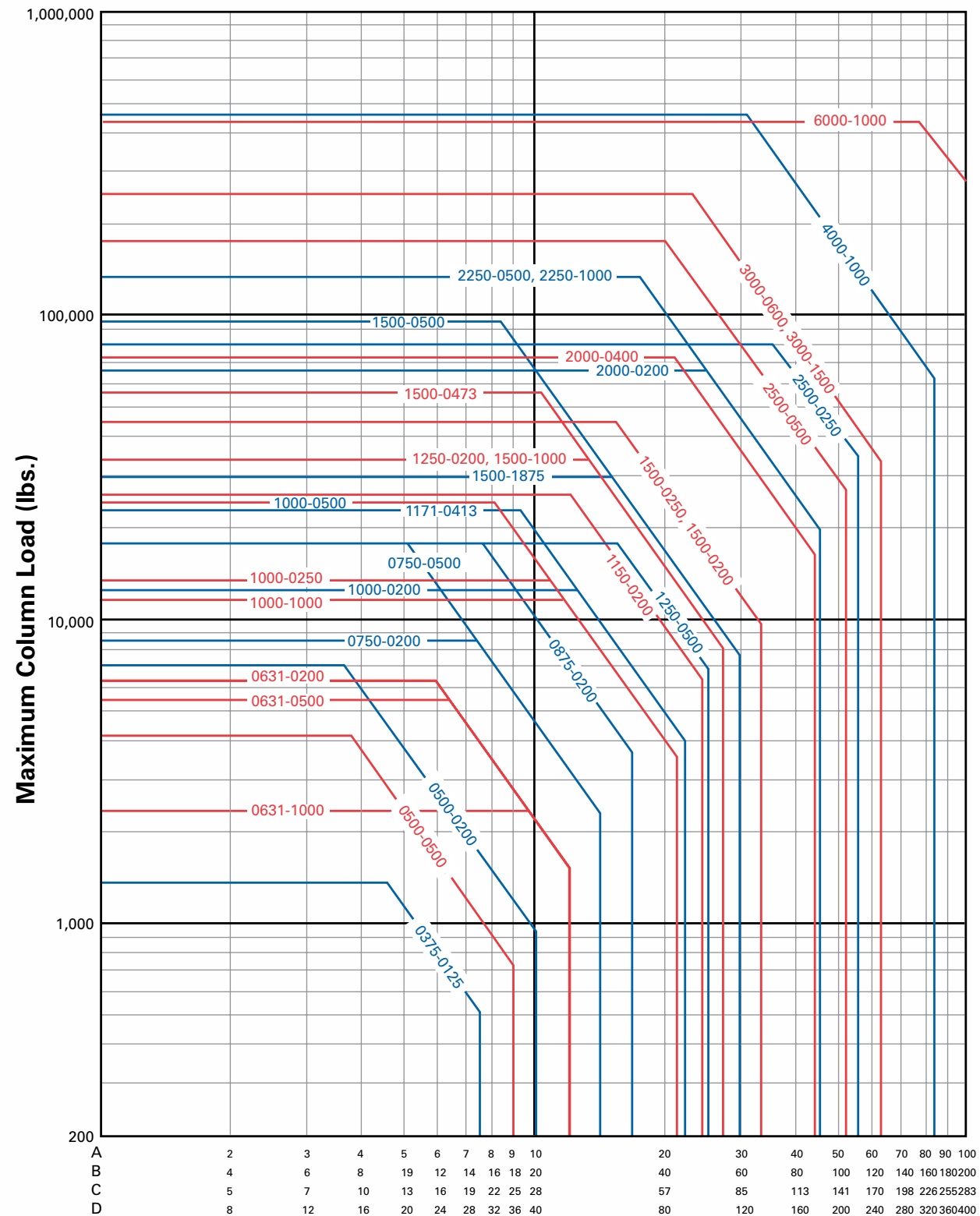


BALL SCREWS

### COLUMN STRENGTH: SRT, XPR AND SGT INCH SCREWS

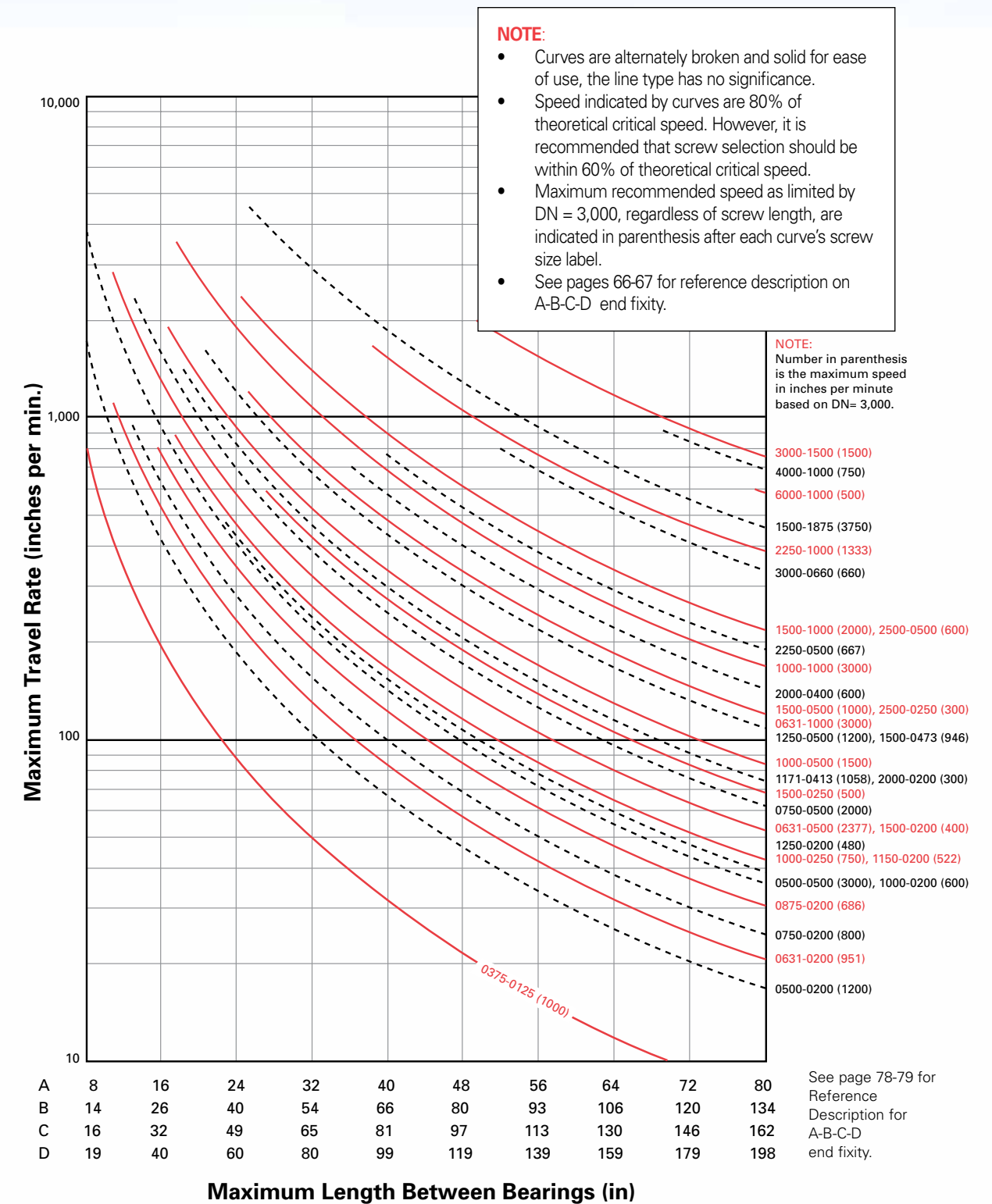
TO USE THIS CHART: Find a point at which the maximum length between bearing support and ball nut intersects the maximum load. Be sure the screw selected is above and to the right of that point.

See Page 66-67 for reference description on A-B-C-D end fixity.



### CRITICAL SPEED: BALL INCH SCREWS

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 66-67 for reference description on A-B-C-D end fixity.

**NOTE:**  
Number in parenthesis is the maximum speed in inches per minute based on DN= 3,000.

- 3000-1500 (1500)
- 4000-1000 (750)
- 6000-1000 (500)
- 1500-1875 (3750)
- 2250-1000 (1333)
- 3000-0660 (660)
- 1500-1000 (2000), 2500-0500 (600)
- 2250-0500 (667)
- 1000-1000 (3000)
- 2000-0400 (600)
- 1500-0500 (1000), 2500-0250 (300)
- 0631-1000 (3000)
- 1250-0500 (1200), 1500-0473 (946)
- 1000-0500 (1500)
- 1171-0413 (1058), 2000-0200 (300)
- 1500-0250 (500)
- 0750-0500 (2000)
- 0631-0500 (2377), 1500-0200 (400)
- 1250-0200 (480)
- 1000-0250 (750), 1150-0200 (522)
- 0500-0500 (3000), 1000-0200 (600)
- 0875-0200 (686)
- 0750-0200 (800)
- 0631-0200 (951)
- 0500-0200 (1200)

BALL SCREWS

## STANDARD NOOK COMPONENTS AND SERVICES

**NOOK BALL SCREW AND NUT ASSEMBLIES** provide ease of application, as all that is required is installation. Nook 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 sales engineers for assistance.



Ball Screw



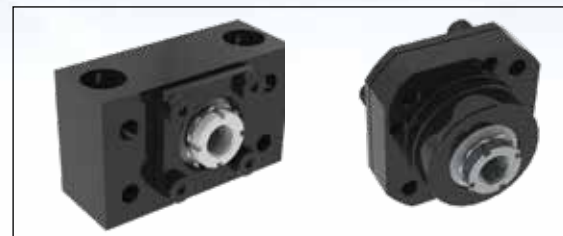
Ball Nut



Flange



End Machining



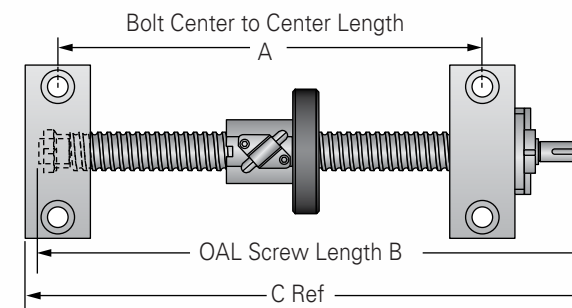
EZZE-MOUNT™ Bearing Mounts



EZZE-MOUNT™ Motor Mounts



## BALL SCREW AND NUT ASSEMBLIES UNIVERSAL MOUNTS



**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

## BALL SCREW AND NUT LUBRICATION



### Protects Against Inter-ball Friction, Wear and Corrosion

E-900 Ball Screw Lubricant may be used on both rolled and ground thread ball screws. E-900 will provide a lasting film for wear protection and resistance to corrosion. With an operating range of -65° to +375°F, E-900 has low starting torque characteristics and helps reduce inter-ball friction in ball screw assemblies. For optimum results the ball screw should be in good repair and free of dirt and grease. Used regularly, E-900 will extend the life of ball screw assemblies. It should be applied generously on the entire length of the screw. In addition, E-900 will prolong the useful life of ball bearing splines, bearings, anti-friction bearings, and other rolling element products.



### E-900 SPRAY CAN

PART NAME	E-900
NET CONTENTS PER UNIT	12 oz.
PART # NLU-1003	1 CAN weight of 1 lb
PART # NLU-2003	1 CASE with 12 cans - total weight of 13 lb

### E-900 LIQUID

PART NAME	E-900L
PART # NLU-1004	1 BOTTLE weight of 32 oz.
PART # NLU-2004	1 CASE with 12 quarts - total weight of 25 lb 5 oz.

Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
<a href="#">0375-0125</a>	0.125	3.02	4.78	5.00	86
<a href="#">0500-0200</a>	0.200	4.58	7.01	7.13	86
<a href="#">0500-0500</a>	0.500	3.90	5.75	5.94	86
<a href="#">0631-0200</a>	0.200	4.11	7.14	7.38	88
<a href="#">0631-0500</a>	0.500	4.11	7.14	7.38	88
<a href="#">0631-1000</a>	1.000	4.11	7.14	7.38	88
<a href="#">0750-0200</a>	0.200	4.28	7.55	7.76	86
<a href="#">0750-0500</a>	0.500	5.33	8.60	8.81	86
<a href="#">0875-0200</a>	0.200	5.40	8.65	9.04	86
<a href="#">1000-0250</a>	0.250	5.09	8.99	9.10	92
<a href="#">1000-0500</a>	0500	5.87	9.77	9.88	92

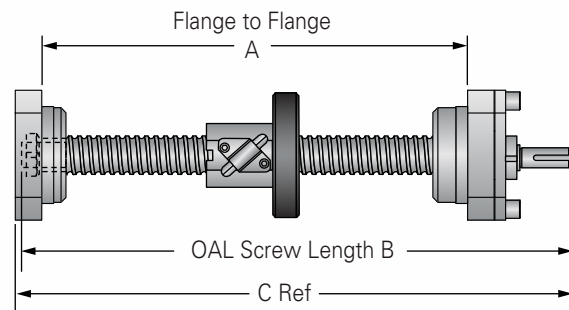
Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
<a href="#">1000-1000</a>	1.000	5.74	9.64	9.75	94
<a href="#">1150-0200</a>	0.200	5.46	9.59	9.89	94
<a href="#">1171-0413</a>	0.413	6.12	10.02	10.125	96
<a href="#">1250-0200</a>	0.200	6.25	10.38	10.678	96
<a href="#">1250-0500</a>	0.500	6.54	10.67	10.97	96
<a href="#">1500-0250</a>	0.250	5.84	10.42	10.675	98
<a href="#">1500-0473</a>	0.413	7.27	11.40	11.702	98
<a href="#">1500-0500</a>	0.500	8.55	12.68	12.98	100
<a href="#">1500-1000</a>	1.000	6.59	10.72	11.018	100
<a href="#">1500-1875</a>	1.875	7.96	12.54	12.8	100

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

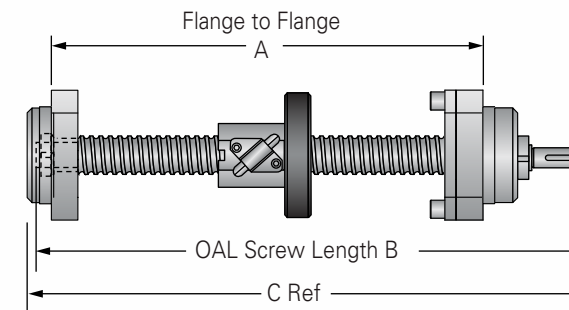


**BALL SCREW AND NUT ASSEMBLIES**  
**FLANGE MOUNTS, PILOT FACING IN**

**FLANGE MOUNTS, PILOT FACING OUT**



**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.



**NOTE:** Dimensions reflect a 1/2" 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	86
0500-0200	0.200	4.607	6.757	6.937	86
0500-0500	0.500	3.795	5.685	5.875	86
0631-0200	0.200	4.03	6.94	7.15	88
0631-0500	0.500	4.03	6.94	7.15	88
0631-1000	1.000	4.03	6.94	7.15	88
0750-0200	0.200	4.405	7.415	7.625	86
0750-0500	0.500	5.457	8.467	8.677	86
0875-0200	0.200	5.294	8.474	8.674	86
1000-0250	0.250	5.12	8.64	8.85	92
1000-0500	0.500	5.9	9.42	9.63	92

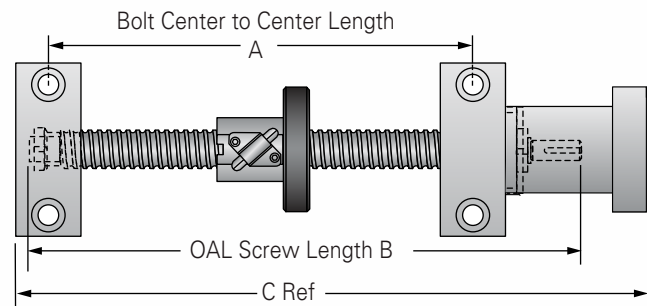
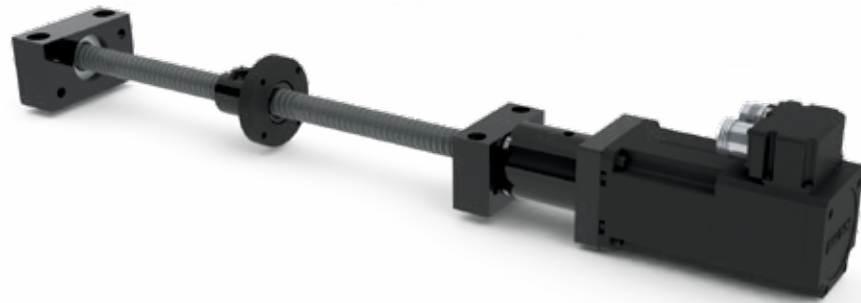
Part number	Lead (in)	A (in)	B (in)	C (in)	Page
1000-1000	1.000	5.77	9.29	9.5	94
1150-0200	0.200	5.47	9.32	9.62	94
1171-0413	0.413	6.145	9.665	9.875	96
1250-0200	0.200	6.258	10.108	10.408	96
1250-0500	0.500	6.55	10.4	10.7	96
1500-0250	0.250	5.835	10.145	10.405	98
1500-0473	0.413	7.282	11.132	11.432	98
1500-0500	0.500	8.56	12.41	12.71	100
1500-1000	1.000	6.598	10.448	10.748	100
1500-1875	1.875	7.96	12.27	12.53	100

Part Number	Lead (in)	A (in)	B (in)	C (in)	Page
0375-0125	0.125	3.18	4.72	4.94	86
0500-0200	0.200	4.64	6.76	6.94	86
0500-0500	0.500	4.06	5.69	5.88	86
0631-0200	0.200	4.15	6.94	7.15	88
0631-0500	0.500	4.15	6.94	7.15	88
0631-1000	1.000	4.15	6.94	7.15	88
0750-0200	0.200	4.35	7.42	7.63	86
0750-0500	0.500	5.40	8.47	8.68	86
0875-0200	0.200	5.40	8.47	8.67	86
1000-0250	0.250	5.07	8.64	8.85	92
1000-0500	0.500	5.85	9.42	9.63	92

Part number	Lead (in)	A (in)	B (in)	C (in)	Page
1000-1000	1.000	5.72	9.29	9.50	94
1150-0200	0.200	5.60	9.32	9.62	94
1171-0413	0.413	6.10	9.67	9.88	96
1250-0200	0.200	6.39	10.11	10.41	96
1250-0500	0.500	6.68	10.40	10.70	96
1500-0250	0.250	5.99	10.15	10.41	98
1500-0473	0.413	7.41	11.13	11.43	98
1500-0500	0.500	8.69	12.41	12.71	100
1500-1000	1.000	6.72	10.45	10.75	100
1500-1875	1.875	8.11	12.27	12.53	100



**ASSEMBLIES WITH MOTOR MOUNTS**  
**UNIVERSAL MOUNTS**



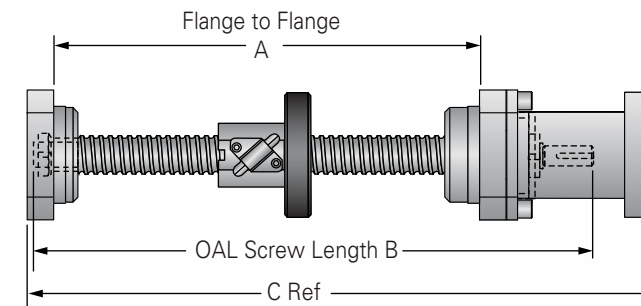
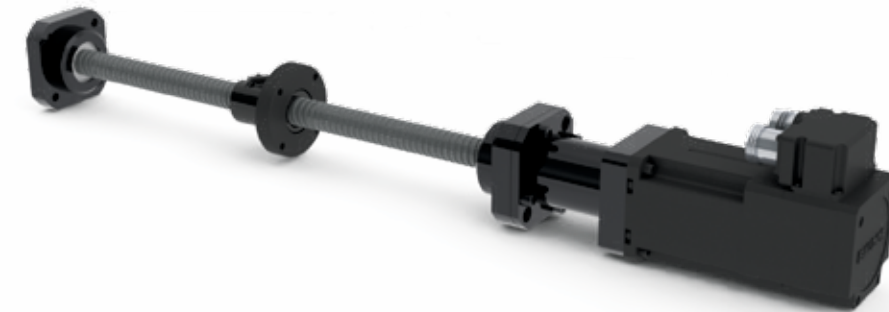
**NOTE:** Dimensions reflect a 1/2" over travel at each end. Add Travel to measurements below for total length.

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	86
0500-0500	0.500	3.895	5.745	7.285	EZM-1008-17	86
0631-0200	0.200	4.11	7.14	9.01	EZM-3012-23	88
0631-0500	0.500	4.11	7.14	9.01	EZM-3012-23	88
0631-1000	1.000	4.11	7.14	9.01	EZM-3012-23	88
0750-0200	0.200	4.275	7.545	9.385	EZM-3015-34	90
0750-0500	0.500	5.327	8.597	10.437	EZM-3015-34	90
0875-0200	0.200	5.404	8.654	10.954	EZM-3017-34	90
1000-0250	0.250	5.09	8.99	11.03	EZM-2020-34	92
1000-0500	0.500	5.87	9.77	11.81	EZM-2020-34	92

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	94
1150-0200	0.200	5.46	9.59	11.88	EZM-3025-34	94
1171-0413	0.413	6.115	10.015	12.055	EZM-2020-34	96
1250-0200	0.200	6.248	10.378	12.668	EZM-3025-34	96
1250-0500	0.500	6.54	10.67	12.96	EZM-3025-34	96
1500-0250	0.250	5.835	10.415	12.785	EZM-2030-34	98
1500-0473	0.473	7.272	11.402	13.692	EZM-3025-34	98
1500-0500	0.500	8.55	12.68	14.97	EZM-3025-34	100
1500-1000	1.000	6.588	10.718	13.008	EZM-3025-34	100
1500-1875	1.875	7.96	12.54	14.91	EZM-2030-34	100

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

**FLANGE MOUNTS, PILOT FACING IN**



**NOTE:** Dimensions reflect a 1/2" 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	86
0500-0500	0.500	3.80	5.69	7.23	EZF-1008-17	86
0631-0200	0.200	4.03	6.94	7.33	EZF-3012-23	88
0631-0500	0.500	4.03	6.94	7.33	EZF-3012-23	88
0631-1000	1.000	4.03	6.94	7.33	EZF-3012-23	88
0750-0200	0.200	4.41	7.42	9.63	EZF-3015-34	90
0750-0500	0.500	5.46	8.47	10.69	EZF-3015-34	90
0875-0200	0.200	5.29	8.47	10.60	EZF-3017-34	90
1000-0250	0.250	5.12	8.64	10.79	EZF-2020-34	92
1000-0500	0.500	5.90	9.42	11.57	EZF-2020-34	92

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	94
1150-0200	0.200	5.47	9.32	11.62	EZF-3025-34	94
1171-0413	0.413	6.145	9.67	11.82	EZF-2020-34	96
1250-0200	0.200	6.26	10.11	12.41	EZF-3025-34	96
1250-0500	0.500	6.55	10.40	12.70	EZF-3025-34	96
1500-0250	0.250	5.84	10.15	12.54	EZF-2030-34	98
1500-0473	0.473	7.28	11.13	13.43	EZF-3025-34	98
1500-0500	0.500	8.56	12.41	14.71	EZF-3025-34	100
1500-1000	1.000	6.60	10.45	12.75	EZF-3025-34	100
1500-1875	1.875	7.96	12.27	14.66	EZF-2030-34	100

## INTEGRAL SAFETY BALL NUT

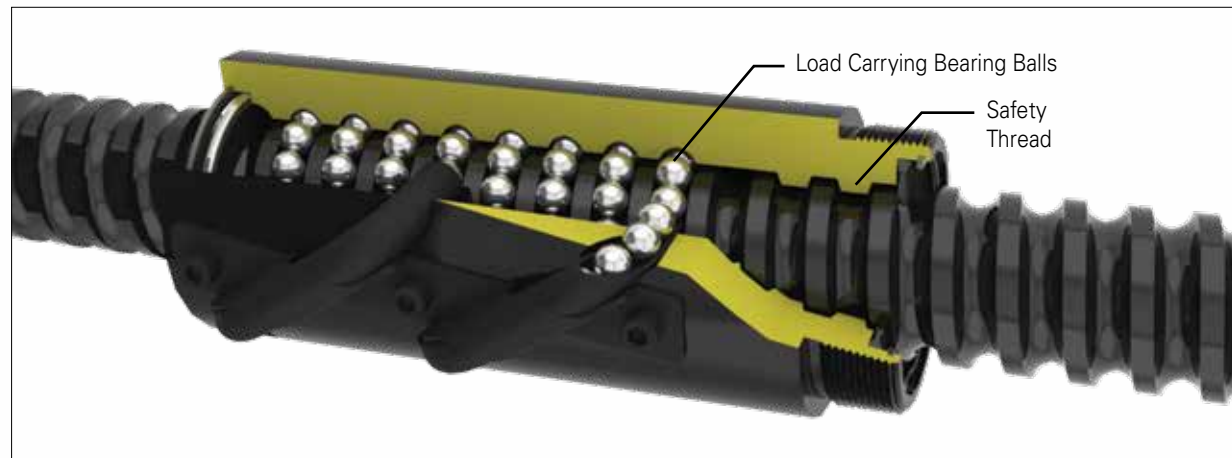
The primary failure mode for ball nuts is fatigue of the bearing balls or thread surface. However, ball nuts can fail prematurely due to misalignment, impact loading, a lack of lubrication, contamination, or external damage to the return circuits. Premature failure may result in the loss of some or all 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 Integral Safety Thread ball nut.

The Nook 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
<b>0631-0200</b>	RH	SBN10583	-
<b>1500-0500</b>	RH	SBN10974	-
<b>2250-0500</b>	RH	SBN10629	SBN10074
<b>2250-0500</b>	LH	-	SBN10075
<b>2250-1000</b>	RH	-	SBN10260
<b>3000-0660</b>	RH	SBN10202	SBN10202
<b>3000-0660</b>	LH	-	SBN10257
<b>3000-1500</b>	RH	-	SBN4986
<b>4000-1000</b>	RH	SBN3258	SBN3258



Ball nut with integral safety thread



Ball nut with ball deflectors

## BALL SCREW AND NUT ASSEMBLIES REFERENCE NUMBER SYSTEM



**1000-0250 SRT RA / EK / 4N / 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
- 2250-0500 = 2.250-0.500
- 2250-1000 = 2.250-1.000
- 2500-0250 = 2.500-0.250
- 2500-0500 = 2.500-0.500
- 3000-0660 = 3.000-0.660
- 3000-1500 = 3.000-1.500
- 4000-1000 = 4.000-1.000
- 6000-1000 = 6.000-1.000

#### 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 = 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.

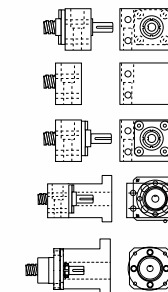
Double Bearing Supports are used in conjunction with Type 3K, 3L, or 3N end machining.

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

#### EZZE-MOUNT™ / End Machining (see page 207 & 204-206)

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

EK = Universal Double Bearing Support, with Keyway



- 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

#### Shaft Extension (see page 204-206)

- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway
- N = No Shaft Extension

- 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.

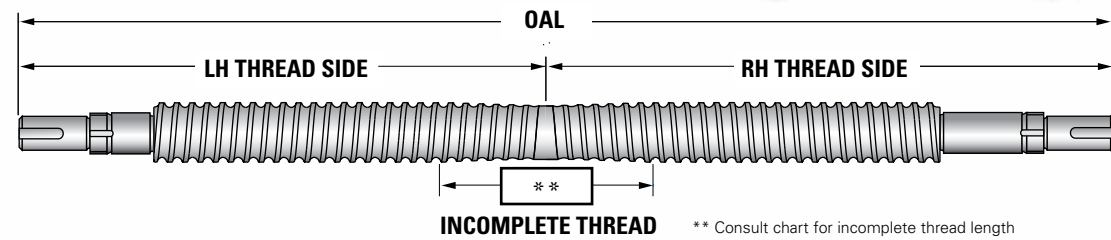
## TWIN-LEAD BALL SCREW ASSEMBLIES

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 that is black oxidized for protection.

Twin-lead ball screw assemblies can be assembled with Nook PowerTrac™ ball nuts, flanges and EZZE-MOUNT™ bearing supports (see page 171-201) 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 Industries 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 sales engineer for availability. Consult the Twin-Lead Reference Number System on the next page to complete your part number.



### 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	SGT
<b>0375-0125</b>	0.300	36	17.00	2.00	86	-
<b>0631-0200</b>	0.500	72	34.75	2.50	88	-
<b>1000-0250</b>	0.820	96	46.75	2.50	92	-
<b>1250-0200</b>	1.115	108	52.75	2.50	96	122
<b>1500-0250</b>	1.320	108	52.50	3.00	98	-
<b>1500-1000</b>	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	SGT
<b>2000-0200</b>	1.849	140	69.00	0.25	-	136
<b>2250-0500</b>	1.850	192	93.50	4.00	102	-
<b>2500-0250</b>	2.320	192	94.00	4.00	104	-
<b>3000-0660</b>	2.480	192	93.50	6.00	106	-

Measurements in inches.



## TWIN-LEAD BALL SCREW ASSEMBLIES REFERENCE NUMBER SYSTEM

### 1000-0250 SRT TA / EK / 4N / 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
2500-0250	= 2.500-0.250
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.

#### 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 204-207)

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

#### EK

**EK** = Universal Double Bearing Support, with Keyway

**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

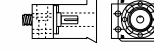
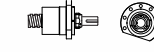
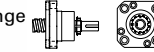
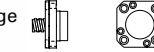
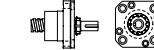
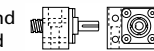
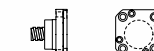
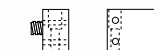
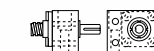
**F** = Flanged Double Bearing Support Flange Facing Screw Thread

**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



#### Shaft Extension (see page 204-206)

- K** = Shaft Extension with Keyway
- L** = Shaft Extension without Keyway
- N** = No Shaft Extension

**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)

#### MODIFIER LIST

**S** or **M** Required  
**S** = Standard, no additional description required  
**F** and/or **W** Optional  
**F** = Round Flange **W** = 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

#### 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.

## 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.

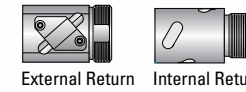
Offered in diameters from 3/8" to 6" and leads from .125" to 1.875" depending on diameter, they are manufactured from the same high quality materials and produced following the same ISO certified procedures as higher precision screws. Most SRT screws are rolled, induction heat treated and black oxide coated. 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 can machine the screw to your specific design requirements.

## SRT BALL NUTS

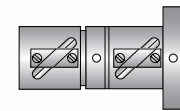
**SBN Standard Ball Nut** (no preload) – offers durable, low cost linear motion. Mounting flanges and wiper kits can be installed on the SBN nuts.



**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

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
0.500-0.200	SBN*	SS	50	509	0.300	0.022
	SBN	4150	973	7,071	0.405	0.035
0.500-0.500	SBN	4150	786	4,131	0.350	0.088
	SBN	SS	141	744	0.350	0.088
0.631-0.200	SBN	4150	815	6,384	0.500	0.035
	SBN	SS	140	1,149	0.500	0.035
	SBN**	4150	712	5,250	0.500	0.035
0.631-0.500	SEL	4150	815	6,384	0.500	0.035
	SBN	4150	960	5,565	0.500	0.088
0.631-1.000	SEL	4150	960	5,565	0.500	0.088
	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
	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

Diameter-Lead	Nut	Screw Material	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in-lb)
			Dynamic	Static		
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
	SBN	4150	4,198	44,030	1.320	0.044
1.500-0.250	SEL	4150	4,198	44,030	1.320	0.044
	SAR	4150	4,198	44,030	1.320	0.044
	SBN	4150	10,050	57,770	1.140	0.084
1.500-0.473	SBN	4150	12,320	97,696	1.174	0.088
1.500-0.500	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
2.250-0.500	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
2.500-0.500	SAR	4150	6,135	81,938	2.320	0.044
	SBN	4150	21,200	186,660	2.320	0.088
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
6.000-1.000	SBN	4150	115,507	443,548	5.232	0.177

\* double circuit  
\*\* internal return

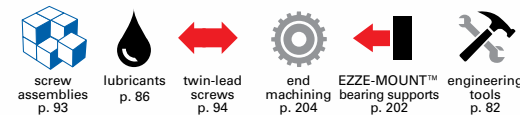
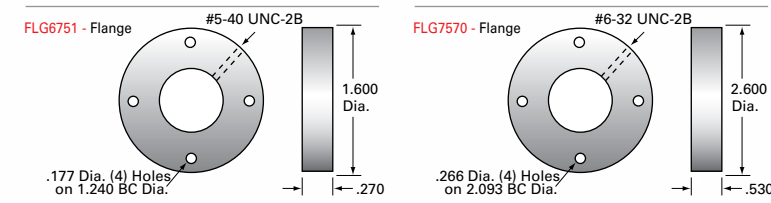
BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper		
<b>0375-0125 SRT single start</b>																
0.375 Ball Circle Dia. (in) 0.125 Lead (in)																
<b>SBN9574</b>	<b>RH</b>	0	136	1,415	60/60	0.0625	0.13	0.022	0.375	0.125	0.300	0.31	<b>FLG6751</b>	—		
<b>SBN9576</b>	<b>LH</b>	0	136	1,415	60/60	0.0625	0.13	0.022	0.375	0.125	0.300	0.31	<b>FLG6751</b>	—		
<b>SBN9578</b>	<b>RHSS</b>	0	24	255	60/60	0.0625	0.13	0.022	0.375	0.125	0.300	0.31	—	—		
<b>SBN7502</b>	<b>RH</b>	0	272	2,830	60/120	0.0625	0.21	0.022	0.375	0.125	0.300	0.31	<b>FLG6751</b>	—		
<b>SBN8282</b>	<b>LH</b>	0	272	2,830	60/120	0.0625	0.21	0.022	0.375	0.125	0.300	0.31	<b>FLG6751</b>	—		
<b>SBN7643</b>	<b>RHSS</b>	0	50	509	60/120	0.0625	0.21	0.022	0.375	0.125	0.300	0.31	—	—		
<b>SEL0375</b>	<b>RH</b>	10**	136	1,415	60/120	0.0625	0.21	0.022	0.375	0.125	0.300	0.31	<b>FLG6751</b>	—		
<b>0500-0200 SRT single start</b>																
0.500 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>SBN10094</b>	<b>RH</b>	0	973	7,071	40/80	0.125	0.51	0.035	0.500	0.200	0.405	0.50	<b>FLG7570</b>	—		
<b>SBN9582</b>	<b>RH</b>	0	786	4,131	30/60	0.125	0.27	0.088	0.500	0.500	0.360	0.50	<b>FLG7570</b>	—		
<b>SBN9582E*</b>	<b>RHSS</b>	0	141*	744*	30/60	0.125	0.27	0.088	0.500	0.500	0.360	0.50	<b>FLG7570SS</b>	—		

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

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

	<b>0375-0125 RH</b>	<b>0375-0125 LH</b>	<b>0375-0125 RHSS</b>	<b>0500-0200 RH</b>	<b>0500-0500 RH</b>	<b>0500-0500 RHSS</b>
2 ft	SRT9420	SRT8528	SRT6536	SRT5224	SRT6736	SRT6700
4 ft	SRT7538	SRT8532	SRT6540	SRT5248	SRT6740	SRT6704
6 ft	—	—	—	SRT5272	SRT6744	SRT6846

For longer lengths, contact Customer Service.



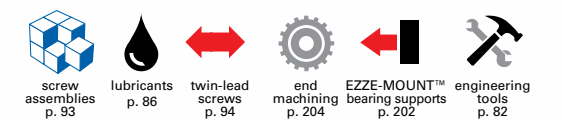
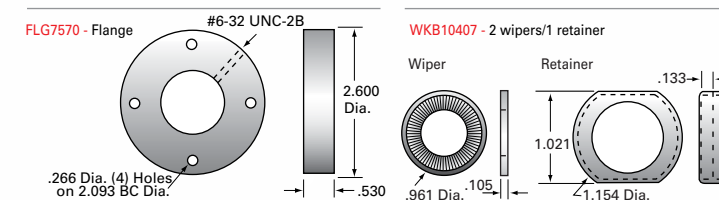
BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0631-0200 SRT single start</b>															
0.631 Ball Circle Dia. (in) 0.200 Lead (in)															
SBN7645	RHSS	0	140	1,149	68/68	0.125	0.27	0.035	0.631	0.200	0.500	0.82	FLG7570SS	—	
SBN10325 SBN10583*	RH	0	815	6,384	68/68	0.125	0.27	0.035	0.631	0.200	0.500	0.82	FLG7570	WKB10407	
SBN10409	LH	0	815	6,384	68/68	0.125	0.27	0.035	0.631	0.200	0.500	0.82	FLG7570	WKB10407	
SBN10566	RH	0	712	5,250	60/60	0.125	0.27	0.035	0.631	0.200	0.500	0.82	FLG7570	—	
SBN10264	LH	0	712	5,250	60/60	0.125	0.27	0.035	0.631	0.200	0.500	0.82	FLG7570	—	
SEL10408	RH	233	815	6,384	68/136	0.125	0.65	0.035	0.631	0.200	0.500	0.82	FLG7570	WKB10407	
SEL10410	LH	233	815	6,384	68/136	0.125	0.65	0.035	0.631	0.200	0.500	0.82	FLG7570	WKB10407	
<b>0631-0500 SRT double start</b>															
0.631 Ball Circle Dia. (in) 0.500 Lead (in)															
SBN10113	RH	0	960	5,565	37/74	0.125	0.27	0.088	0.631	0.500	0.500	0.82	FLG7570	—	
SEL10182	RH	288	960	5,565	37/148	0.125	0.65	0.088	0.631	0.500	0.500	0.82	FLG7570	—	
<b>0631-1000 SRT four start</b>															
0.631 Ball Circle Dia. (in) 1.000 Lead (in)															
SBN10392	RH	0	620	2,580	21/42	0.125	0.28	0.177	0.631	1.000	0.500	0.82	FLG7570	—	

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

	0631-0200 RHSS	0631-0200 RH	0631-0200 LH	0631-0500 RH	0631-1000 RH
2 ft	SRT5359	SRT9392	SRT9562	SRT6524	SRT6124
4 ft	SRT5648	SRT9987	SRT5092	SRT6548	SRT6148
6 ft	SRT5378	SRT7540	SRT7541	SRT6572	SRT6172

For longer lengths, contact Customer Service.

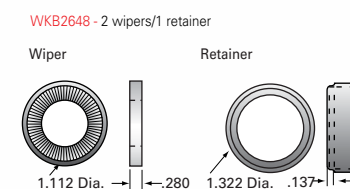
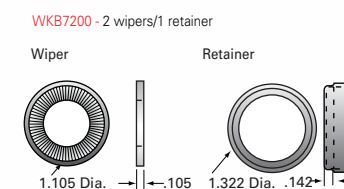
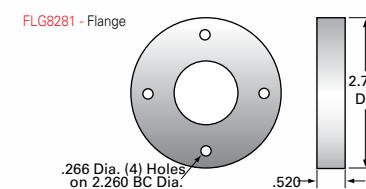
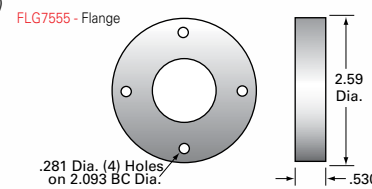
\* Integral safety thread. See page 80.



Ball Nut Number	BALL NUT								SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	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)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0750-0200 SRT single start</b>															
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	0.750	0.200	0.602	1.22	FLG7555	WKB7200	
SBN7202	RH	0	2,200	17,138	70/140	0.141	0.80	0.035	0.750	0.200	0.602	1.22	FLG7555	WKB7200	
SEL10057	RH	660	2,200	17,138	70/140	0.141	2.10	0.035	0.750	0.200	0.602	1.22	FLG7555	WKB7200	
<b>0750-0500 SRT double start</b>															
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	0.750	0.200	0.602	1.22	FLG7555	WKB7200	
<b>0875-0200 SRT single start</b>															
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	0.875	0.200	0.735	1.78	FLG8281	WKB2648	

**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.

	BALL NUT								SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS	
	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)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange		Wiper
<b>1000-0250 SRT single start</b>  1.000 Ball Circle Dia. (in) 0.250 Lead (in)	<b>SBN10466</b>	<b>RH</b>	0	1,612	13,913	86/86	0.156	0.8	0.044	1.000	0.250	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
	<b>SBN10468</b>	<b>LH</b>	0	1,612	13,913	86/86	0.156	0.8	0.044	1.000	0.250	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
	<b>SBN10470</b>	<b>RHSS</b>	0	290	2,504	86/86	0.156	0.8	0.044	1.000	0.250	0.820	2.2	<b>FLG7571SS</b>	<b>WKB1050</b>	
	<b>SBN10472</b>	<b>RH</b>	0	3,224	27,826	86/172	0.156	1.2	0.044	1.000	0.250	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
	<b>SBN8278</b>	<b>RH</b>	0	3,224	27,826	86/172	0.156	1.5	0.044	1.000	0.250	0.820	2.2	integral	<b>WKB2651</b>	
	<b>SBN8284</b>	<b>LH</b>	0	3,224	27,826	86/172	0.156	1.5	0.044	1.000	0.250	0.820	2.2	integral	<b>WKB2651</b>	
	<b>SEL10474</b>	<b>RH</b>	330	1,612	13,913	86/172	0.156	1.9	0.044	1.000	0.250	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
	<b>SEL10477</b>	<b>LH</b>	330	1,612	13,913	86/172	0.156	1.9	0.044	1.000	0.250	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
	<b>SAR3041</b>	<b>RH</b>	330	1,612	13,913	86/172	0.156	2.0	0.044	1.000	0.250	0.820	2.2	integral	—	
	<b>SBN1050</b>	<b>RH</b>	0	3,440	25,250	91/182	0.156	1.2	0.088	1.000	0.500	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	
<b>1000-0500 SRT double start</b>  1.000 Ball Circle Dia. (in) 0.500 Lead (in)	<b>SEL10066</b>	<b>RH</b>	817	3,440	25,250	91/364	0.156	2.6	0.088	1.000	0.500	0.820	2.2	<b>FLG7571</b>	<b>WKB1050</b>	

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

	1000-0250 RH	1000-0250 LH	1000-0250 RHSS	1000-0500 RH
4 ft	SRT5005	SRT5499	SRT6668	SRT9990
8 ft	SRT5013	SRT5507	SRT6676	SRT9991
12 ft	SRT5021	SRT5515	SRT6684	SRT9992
16 ft	SRT5046	SRT5428	—	SRT9993

For longer lengths, contact Customer Service.

**FLG7571 - Flanges**  
FLG7571SS

**WKB1050 - 2 wipers/1 retainer**  
Wiper Retainer

**WKB2651 - 2 wipers/1 retainer**  
Wiper Retainer

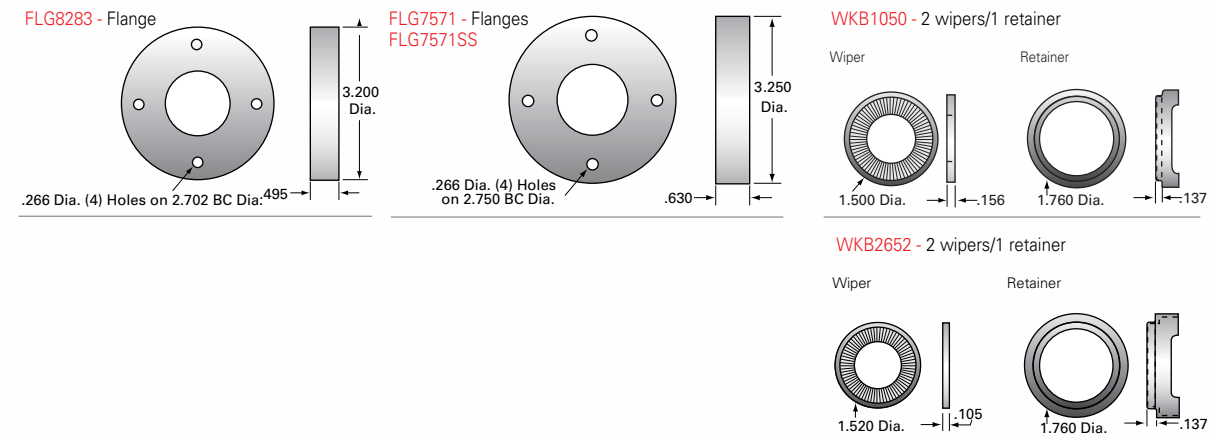


Ball Nut Number	Helix	BALL NUT				Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
		Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut				Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1000-1000 SRT four start</b>															
1.000 Ball Circle Dia. (in) 1.000 Lead (in)															
<b>SBN10461</b>	<b>RH</b>	0	2,142	11,925	50/100	0.156	1.11	0.177	1.000	1.000	0.820	2.20	<b>FLG7571</b>	<b>WKB1050</b>	
<b>SEL10462</b>	<b>RH</b>	300	2,142	11,925	50/200	0.156	2.50	0.177	1.000	1.000	0.820	2.20	<b>FLG7571</b>	<b>WKB1050</b>	
<b>1150-0200 SRT single start</b>															
1.150 Ball Circle Dia. (in) 0.200 Lead (in)															
<b>SBN1566</b>	<b>RH</b>	0	2,370	26,180	121/242	0.125	0.90	0.035	1.150	0.200	1.015	3.18	<b>FLG8283</b>	<b>WKB2652</b>	
<b>SEL4270</b>	<b>RH</b>	240	1,185	13,090	121/242	0.125	1.34	0.035	1.150	0.200	1.015	3.18	<b>FLG8283</b>	<b>WKB2652</b>	

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

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

For longer lengths, contact Customer Service.



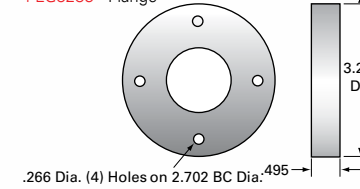
	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1171-0413 SRT</b> <b>single start</b> 1.171 Ball Circle Dia. (in) 0.413* Lead (in) * actual lead is 0.41302	<b>SBN7511</b>	<b>RH</b>	0	3,894	22,917	28/56	0.281	1.90	0.073	1.171	0.413	0.870	2.77	<b>FLG7572</b>	<b>WKB2653</b>	
<b>1250-0200 SRT</b> <b>single start</b> 1.250 Ball Circle Dia. (in) 0.200 Lead (in)	<b>SBN10627</b>	<b>RH</b>	0	3,336	34,688	130/260	0.125	1.8	0.035	1.250	0.200	1.115	3.7	<b>FLG8283</b>	integral (elastomer)	
<b>1250-0500 SRT</b> <b>single start</b> 1.250 Ball Circle Dia. (in) 0.500 Lead (in)	<b>SBN10104</b>	<b>RH</b>	0	2,745	17,235	46/92	0.188	1.8	0.088	1.250	0.500	1.050	3.7	<b>FLG7572</b>	integral (elastomer)	

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

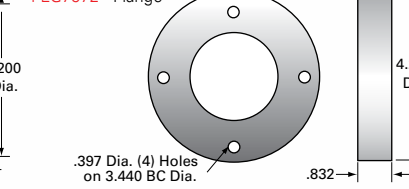
	<b>1171-0413 RH</b>	<b>1250-0200 RH</b>	<b>1250-0200 LH</b>	<b>1250-0500 RH</b>
4 ft	SRT9569	SRT1224	SRT1223	SRT1254
8 ft	SRT5035	SRT1228	SRT1227	SRT1258
12 ft	SRT5043	SRT1222	SRT1221	SRT1252
16 ft	SRT0432	SRT1226	SRT1225	SRT1256

For longer lengths, contact Customer Service.

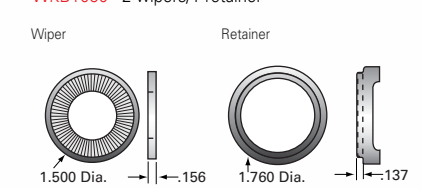
FLG8283 - Flange



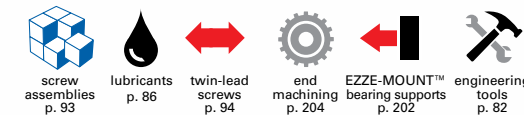
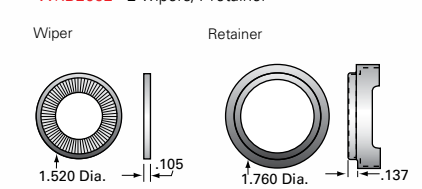
FLG7572 - Flange



WKB1050 - 2 wipers/1 retainer



WKB2652 - 2 wipers/1 retainer

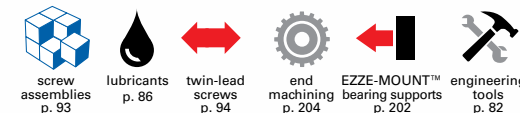
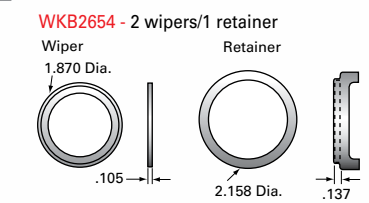
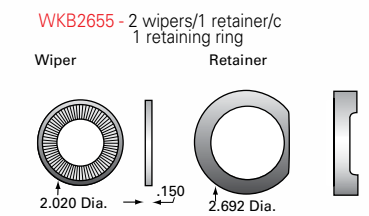
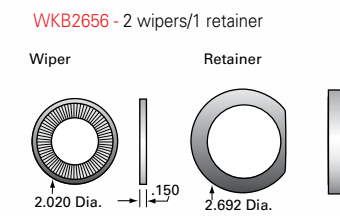
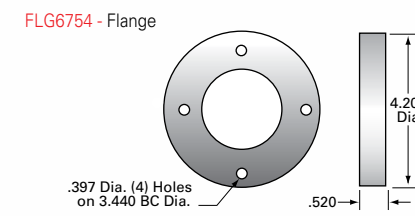
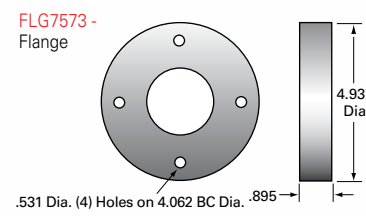


	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1500-0250 SRT</b> single start  1.500 Ball Circle Dia. (in) 0.250 Lead (in)	<b>SBN9587</b>	<b>RH</b>	0	4,198	44,030	125/250	0.156	1.7	0.044	1.500	0.250	1.320	5.16	<b>FLG6754</b>	<b>WKB2654</b>	
	<b>SBN1990</b>	<b>LH</b>	0	4,198	44,030	125/250	0.156	1.7	0.044	1.500	0.250	1.320	5.16	<b>FLG6754</b>	<b>WKB2654</b>	
	<b>SEL4271</b>	<b>RH</b>	920	4,198	44,030	125/500	0.156	3.0	0.044	1.500	0.250	1.320	5.16	<b>FLG6754</b>	<b>WKB2654</b>	
	<b>SEL4573</b>	<b>LH</b>	920	4,198	44,030	125/500	0.156	3.0	0.044	1.500	0.250	1.320	5.16	<b>FLG6754</b>	<b>WKB2654</b>	
	<b>SAR3043</b>	<b>RH</b>	920	4,198	44,030	125/500	0.156	6.0	0.044	1.500	0.250	1.320	5.16	integral	integral (brush)	
<b>1500-0473 SRT</b> single start  1.500 Ball Circle Dia. (in) 0.473* Lead (in)  * actual lead is 0.47368	<b>SBN7513</b>	<b>RH</b>	0	10,050	57,770	43/86	0.344	3.9	0.084	1.500	0.473*	1.140	4.47	<b>FLG7573</b>	<b>WKB2655</b>	
	<b>SBN8345</b>	<b>RH</b>	0	10,050	57,770	43/86	0.344	3.9	0.084	1.500	0.473*	1.140	4.47	—	<b>WKB2656</b>	

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

	1500-0250 RH	1500-0250 LH	1500-0473 LH
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.



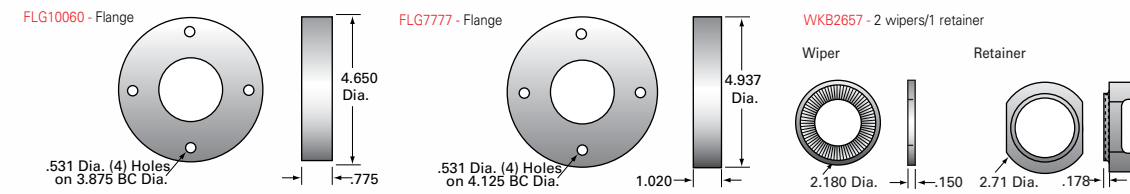
	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1500-0500 SRT single start</b>  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	1.500	0.500	1.174	5.25	FLG10060	integral (brush)	
	SBN10974*	RH	0	12,320	97,696	65/130	0.312	5.2	0.088	1.500	0.500	1.174	5.25	FLG10060	integral (brush)	
<b>1500-1000 SRT double start</b>  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	1.500	1.000	1.140	4.47	FLG7777	WKB2657	
	SBN1995	LH	0	7,560	34,662	30/60	0.344	3.9	0.176	1.500	1.000	1.140	4.47	FLG7777	WKB2657	
	SEL0698	RH	1650	7,560	34,662	30/120	0.344	9.1	0.176	1.500	1.000	1.140	4.47	FLG7777	WKB2657	
	SEL0697	LH	1650	7,560	34,662	30/120	0.344	9.1	0.176	1.500	1.000	1.140	4.47	FLG7777	WKB2657	
<b>1500-1875 SRT four start</b>  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	1.500	1.875	1.188	5.25	FLG7777	WKB2657	

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

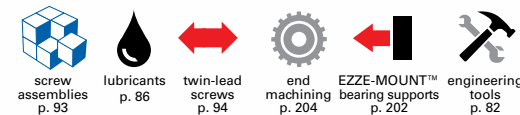
	1500-0500 RH	1500-1000 RH	1500-1000 LH	1500-1875 RH
4 ft	SRT9994	SRT8837	SRT1991	SRT7702
8 ft	SRT9995	SRT8845	SRT1992	SRT7710
12 ft	SRT9996	SRT8853	SRT2203	SRT7718
16 ft	SRT9997	SRT0436	SRT0437	SRT0438
20 ft	SRT9998	SRT0598	SRT0615	SRT0599

For longer lengths, contact Customer Service.

\* Integral safety thread. See page 80.



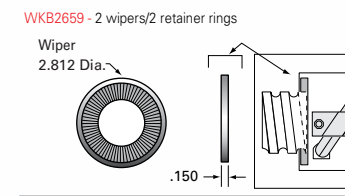
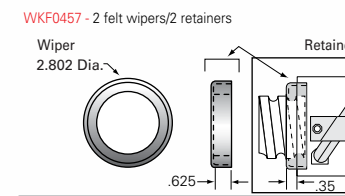
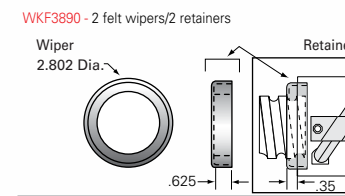
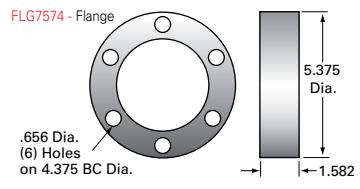
BALL SCREWS



	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	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)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>2250-0500 SRT single start</b>  2.250 Ball Circle Dia. (in) 0.500 Lead (in)	<b>SBN7516</b> <b>SBN10074*</b>	RH	0	21,306	142,660	78/156	0.375	9.0	0.088	2.250	0.500	1.850	10.9	<b>FLG7574</b>	<b>WKB2659</b> <b>WKF3890</b>	
	<b>SBN4000</b> <b>SBN10075*</b>	LH	0	21,306	142,660	78/156	0.375	9.0	0.088	2.250	0.500	1.850	10.9	<b>FLG7574</b>	<b>WKB2659</b>	
	<b>SBN10629**</b>	RH	0	21,306	142,660	48/156	0.375	9.0	0.088	2.250	0.500	1.850	10.9	<b>FLG7574</b>	<b>WKB2659</b> <b>WKF3890</b>	
<b>2250-1000 SRT double start</b>  2.250 Ball Circle Dia. (in) 1.000 Lead (in)	<b>SBN4555</b> <b>SBN10260*</b>	RH	0	26,538	142,660	83/166	0.375	9.0	0.177	2.250	1.000	1.850	10.9	<b>FLG7574</b>	<b>WKB2659</b> <b>WKF0457</b>	
	<b>SAR3044</b>	RH	6390	21,306	142,660	78/312	0.375	24.2	0.088	2.250	0.500	1.850	10.9	integral	integral (brush)	
	<b>SAR2210</b>	RH	7960	26,538	142,660	83/332	0.375	9.0	0.177	2.250	1.000	1.850	10.9	integral	integral (brush)	

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

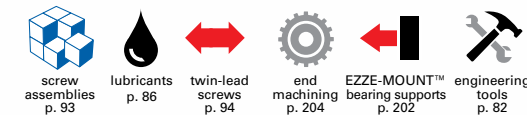
	2250-0500 RH	2250-0500 LH	2250-1000 RH
4 ft	SRT5051	SRT4001	SRT4556
8 ft	SRT5059	SRT4002	SRT4557
12 ft	SRT5067	SRT4003	SRT4558
16 ft	SRT0439	SRT0440	SRT0441
20 ft	SRT0600	SRT0602	SRT0604



For longer lengths, contact Customer Service.

\* Ball nuts with solid deflectors. See page 80.

\*\* Ball nuts with integral safety thread and solid deflectors. See page 80.

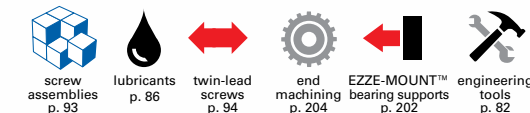
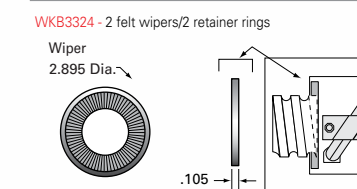
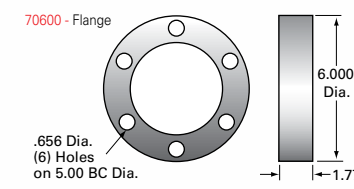
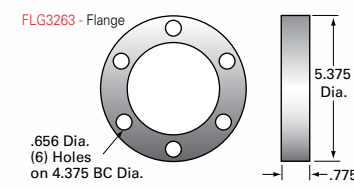


	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>2500-0250 SRT</b> <b>single start</b>  2.500 Ball Circle Dia. (in) 0.250 Lead (in)	<b>SBN3243</b>	<b>RH</b>	0	6,135	81,938	158/474	0.156	4.7	0.044	2.500	0.250	2.320	15.45	<b>FLG3263</b>	<b>WKB3324</b>	
	<b>SBN10329</b>	<b>LH</b>	0	6,135	81,938	158/474	0.156	4.7	0.044	2.500	0.250	2.320	15.45	<b>FLG3263</b>	<b>WKB3324</b>	
	<b>SAR3242</b>	<b>RH</b>	1,895	6,135	81,938	158/948	0.156	9.9	0.044	2.500	0.250	2.320	15.45	integral	integral (brush)	
<b>2500-0500 SRT</b> <b>single start</b>  2.500 Ball Circle Dia. (in) 0.500 Lead (in)	<b>SBN10316</b>	<b>RH</b>	0	25,927	186,660	88/176	0.375	4.7	0.088	2.500	0.500	2.320	15.45	<b>70600</b>	—	

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

	2500-0250 RH	2500-0250 LH	2500-0500 RH
4 ft	SRT3255	SRT0400	SRT0405
8 ft	SRT3256	SRT0401	SRT0406
12 ft	SRT3257	SRT0402	SRT0407
16 ft	SRT0442	SRT0403	SRT0408
20 ft	SRT0606	SRT0404	SRT0409

For longer lengths, contact Customer Service.



	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	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)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>3000-0660 SRT single start</b>  3.000 Ball Circle Dia. (in) 0.660 Lead (in)	<b>SBN10202*</b>	<b>RH</b>	0	44,316	271,733	57/171	0.375	26	0.117	3.000	0.660	2.480	19.6	<b>FLG7575</b>	<b>WKB2661</b> <b>WKF3891</b>	
	<b>SBN10257</b>	<b>LH</b>	0	44,316	271,733	57/171	0.375	26	0.117	3.000	0.660	2.480	19.6	<b>FLG7575</b>	<b>WKB2661</b>	
	<b>SBN8347</b>	<b>RH</b>	0	44,316	271,733	57/171	0.375	22	0.117	3.000	0.660	2.480	19.6	—	—	
<b>3000-1500 SRT double start</b>  3.000 Ball Circle Dia. (in) 1.500 Lead (in)	<b>SBN4986</b>	<b>RH</b>	0	53,646	253,617	83/166	0.500	272	0.266	3.000	1.500	2.480	19.3	<b>FLG7575</b>	<b>WKB2661</b> <b>WKF0458</b>	
<b>4000-1000 SRT single start</b>  4.000 Ball Circle Dia. (in) 1.000 Lead (in)	<b>SBN3258*</b>	<b>RH</b>	0	85,758	476,970	62/186	0.625	53.5	0.177	4.000	1.000	3.338	34.4	<b>FLG3307</b>	<b>WKB3306</b> <b>WKF4057</b>	

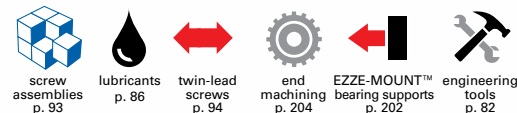
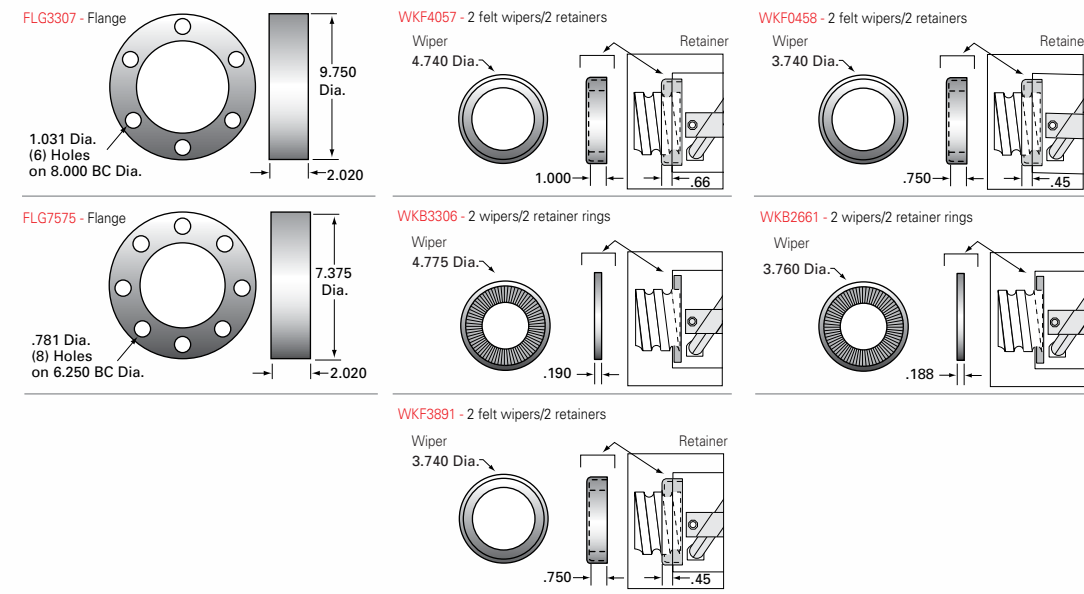
**STANDARD SCREW LENGTHS** (Custom cut lengths available up to 24')

	<b>3000-0660 RH</b>	<b>3000-0660 LH</b>	<b>3000-1500 RH</b>	<b>4000-1000 RH</b>
4 ft	SRT5073	SRT0410	SRT4987	SRT3259
8 ft	SRT5080	SRT0411	SRT4988	SRT3260
12 ft	SRT5087	SRT0412	SRT4989	SRT3261
16 ft	SRT0443	SRT0413	SRT0444	SRT0624
20 ft	SRT0607	SRT0414	SRT0609	SRT3262

For longer lengths, contact Customer Service.

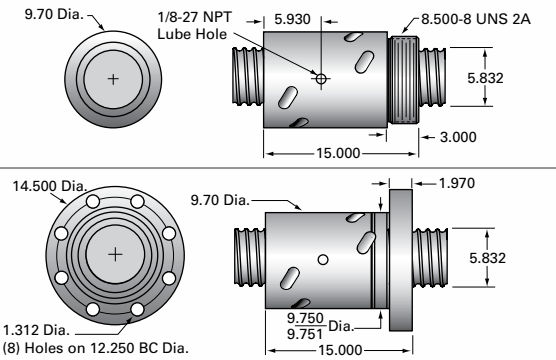
All 3-inch and 4-inch B.C.D. nuts are equipped with solid deflectors. See page 80.

\* Integral safety thread. See page 80.



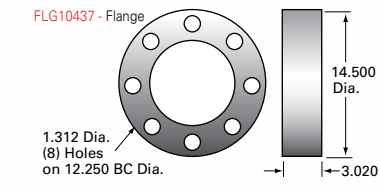
BALL NUT									SCREW				BALL NUT ACCESSORIES	
Ball Nut Number	Helix	Max. Adj. Preload (lb)	Dynamic Load (lb)	Static Load (lb)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper
<b>6000-1000 SRT single start</b>														
6.000 Ball Circle Dia. (in) 1.000 Lead (in)														
±0.008 in/ft lead accuracy														
<b>SBN10438</b>	<b>RH</b>	0	115,507	443,548	25/200	0.750	170	0.177	6.000	1.000	5.232	34.4	<b>FLG10437</b>	<b>WKB10441</b>
<b>SBN10442</b>	<b>RH</b>	0	115,507	443,548	25/200	0.750	225	0.177	6.000	1.000	5.232	34.4	integral	integral (plastic)

**BALL NUT DIMENSIONS**



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

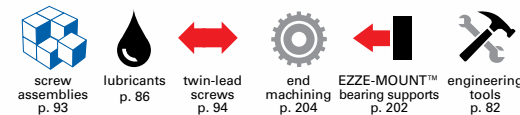
No standard screw lengths.  
All lengths will be quoted per drawing.  
For longer lengths, contact Customer Service.



Nook precision ball screws are used widely in the aerospace industry



Nook ball screws are used in a wide variety of shipping applications





## XPR PRECISION ROLLED BALL SCREWS

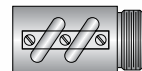
XPR – Precision Rolled thread ball screws are offered from 5/8" to 2 1/4" diameters with leads of 0.200" to 0.500" depending on diameter. Nook Industries uses the latest in CNC thread rolling technology and state of the art CNC induction heat treatment to manufacture a rolled screw with accuracy approaching 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 can machine the screw to your specific design requirements.

## XPR BALL NUTS

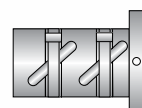
**SGN Standard Ground Nuts** (V-thread, no preload) are similar to SBN style ball nuts and have internal threads that are ground into the ball nut body. These nuts provide smooth, precise operation on rolled thread or ground thread ball screws.



**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.

## XPR BALL SCREW QUICK REFERENCE

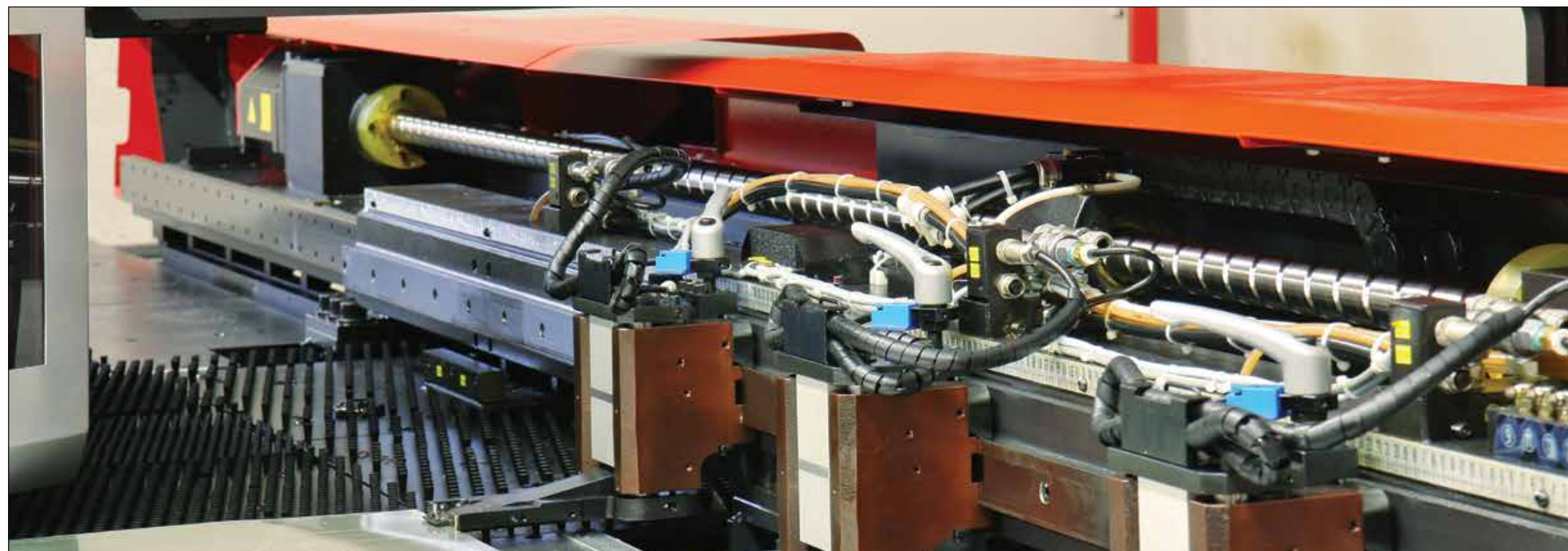
Diameter-Lead	Nut	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in-lb)
		Dynamic	Static		
0.631-0.200	PRN*	440	2,110	0.500	0.035
	SGN	700	3,360	0.500	0.035
	PRN	350	1,690	0.500	0.035
	SSN	440	2,110	0.500	0.035
0.750-0.200	PRN	1,473	9,916	0.602	0.035
	SSN	1,473	9,916	0.602	0.035
0.875-0.200	PRN	1,375	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

Diameter-Lead	Nut	Load Rating		Root Dia. (in)	Torque to Raise 1 lb (in-lb)
		Dynamic	Static		
1.250-0.200	PRN	1,668	17,344	1.115	0.035
	SSN	1,668	17,344	1.115	0.035
1.250-0.500	PRN	1,765	11,080	1.050	0.088
	SSN	1,765	11,080	1.050	0.088
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
	SSN	20,106	108,325	1.850	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



Precision ball screw



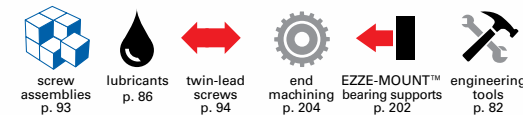
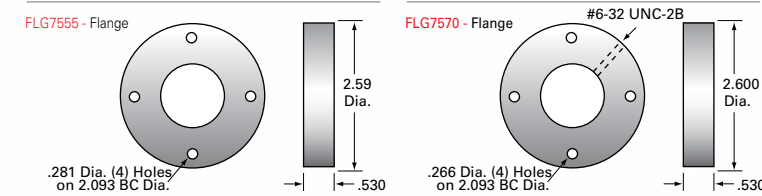
CNC welding machine using precision ground ball screw

BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0631-0200 XPR single start</b>																
0.631 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10108</b>	<b>RH</b>	yes	440	2,110	1.6	30/60	0.125	0.98	0.035	0.631	0.200	0.500	0.86	<b>FLG7555</b>	integral (elastomer)	
<b>SGN10083</b>	<b>RH</b>	no	700	3,360	—	30/60	0.125	0.80	0.035	0.631	0.200	0.500	0.86	<b>FLG7570</b>	—	
<b>PRN10106</b>	<b>RH</b>	yes	350	1,690	1.0	30/60	0.125	0.80	0.035	0.631	0.200	0.500	0.86	<b>FLG7570</b>	—	
<b>SSN0389</b>	<b>RH</b>	yes	440	2,110	1.6	30/60	0.125	1.20	0.035	0.631	0.200	0.500	0.86	integral	integral (elastomer)	
<b>SSN10304</b>	<b>RH</b>	yes	450	2,115	1.5	64/64	0.125	0.45	0.035	0.631	0.200	0.500	0.86	integral	integral (elastomer)	

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

<b>0631-0200 RH</b>	
4 ft	XPR6320R48
6 ft	XPR6320R72

For longer lengths, contact Customer Service.

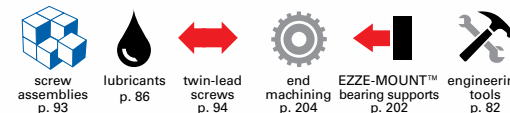
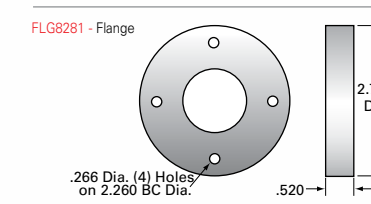


Ball Nut Number	BALL NUT									SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0750-0200 XPR single start</b>																
0.750 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10109</b>	<b>RH</b>	yes	1,473	9,916	2.75	71/142	0.141	0.8	0.035	0.750	0.200	0.602	1.22	<b>FLG8281</b>	integral (elastomer)	
<b>SSN0390</b>	<b>RH</b>	yes	1,473	9,916	2.75	71/142	0.141	0.8	0.035	0.750	0.200	0.602	1.22	integral	integral (elastomer)	
<b>0875-0200 XPR single start</b>																
0.875 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10110</b>	<b>RH</b>	yes	1,375	10,780	1.10	93/186	0.125	1.10	0.035	0.875	0.200	0.735	1.80	<b>FLG8281</b>	integral (elastomer)	
<b>SSN0388</b>	<b>RH</b>	yes	1,375	10,780	3.10	93/186	0.125	0.14	0.035	0.875	0.200	0.735	1.80	integral	integral (elastomer)	

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

	<b>0750-0200 RH</b>	<b>0875-0200 RH</b>
4 ft	XPR7520R48	XPR8720R48
6 ft	XPR7520R72	XPR8720R96

For longer lengths, contact Customer Service.

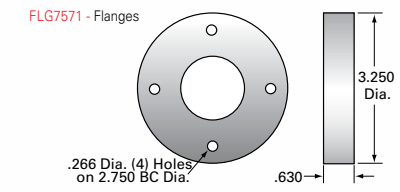


BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1000-0250 XPR single start</b>																
1.000 Ball Circle Dia. (in) 0.250 Lead (in)																
<b>PRN10115</b>	<b>RH</b>	yes	2,285	15,815	2.50	86/172	0.156	1.10	0.044	1.000	0.250	0.820	2.20	<b>FLG7571</b>	-	
<b>SSN10570</b>	<b>RH</b>	yes	2,285	15,815	3.50	86/172	0.156	2.00	0.044	1.000	0.250	0.820	2.20	integral	integral (elastomer)	

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

1000-0250 RH	
6 ft	XPR10025R72
12 ft	XPR10025R144

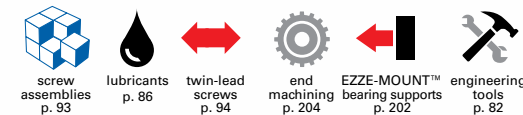
For longer lengths, contact Customer Service.



Nook precision ball screws are used widely in tooling applications



Nook ball screws in a laser marking application



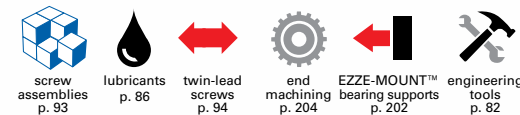
BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1150-0200 XPR single start</b>																
1.150 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10112</b>	<b>RH</b>	yes	1,680	14,886	4.25	121/242	0.125	1.45	0.035	1.150	0.200	1.015	3.18	—	integral (elastomer)	
<b>SSN0392</b>	<b>RH</b>	yes	1,680	14,886	4.25	121/242	0.125	2.00	0.035	1.150	0.200	1.015	3.18	integral	integral (elastomer)	
<b>1250-0200 XPR single start</b>																
1.250 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10191</b>	<b>RH</b>	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	—	integral (elastomer)	
<b>SSN0393</b>	<b>RH</b>	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	integral	integral (elastomer)	

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

	<b>1150-0200 RH</b>	<b>1250-0200 RH</b>
6 ft	XPR11520R72	XPR12520R72
12 ft	XPR11520R144	XPR12520R144

For longer lengths, contact Customer Service.

BALL SCREWS

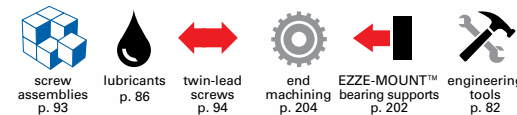
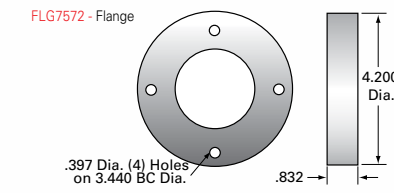


BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1250-0500 XPR single start</b>																
1.250 Ball Circle Dia. (in) 0.500 Lead (in)																
<b>PRN10087</b>	<b>RH</b>	yes	1,765	11,080	4.25	46/92	0.188	2.75	0.088	1.250	0.500	1.050	3.70	<b>FLG7572</b>	integral (elastomer)	
<b>SSN0399</b>	<b>RH</b>	yes	1,765	11,080	4.25	46/92	0.188	3.20	0.088	1.250	0.500	1.050	3.70	integral	integral (elastomer)	
<b>1500-0250 XPR single start</b>																
1.500 Ball Circle Dia. (in) 0.250 Lead (in)																
<b>PRN10113</b>	<b>RH</b>	yes	5,075	27,250	5.0	95/380	0.156	2.70	0.044	1.500	0.250	1.320	5.41	—	integral (elastomer)	
<b>SSN0400</b>	<b>RH</b>	yes	5,075	27,250	5.0	95/380	0.156	3.80	0.044	1.500	0.250	1.320	5.41	integral	integral (elastomer)	

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

	<b>1250-0500 RH</b>	<b>1500-0250 RH</b>
6 ft	XPR12550R72	XPR15025R72
12 ft	XPR12550R144	XPR15025R144

For longer lengths, contact Customer Service.

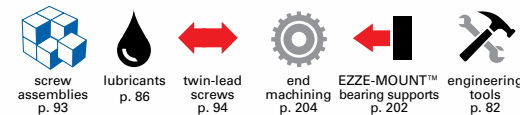


BALL NUT											SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper		
<b>1500-0500 XPR single start</b> 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	1.500	0.500	1.174	5.3	—	integral (elastomer)		
<b>2250-0500 XPR single start</b> 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	2.250	0.500	1.850	10.8	—	integral (elastomer)		
SSN0402	RH	yes	20,106	108,325	7.25	99/198	0.375	15.2	0.088	2.250	0.500	1.850	10.8	integral	integral (elastomer)		

**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.



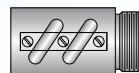
## SGT PRECISION GROUND BALL SCREWS

SGT – Standard Ground Thread screws are available in diameters from 5/8" to 2 1/2" 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.

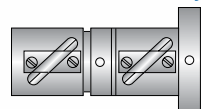
For convenience, SGT screws can be supplied completely machined and assembled with nuts and EZZE-MOUNTS ready for assembly. Should a standard assembly not fit the application, Nook can machine the screw to your specific design requirements. Ball nut configurations can be engineered to application requirements.

## 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.



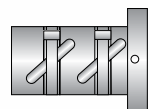
**SAG Standard Adjustable Preload Ball Nuts** (Ground Ball Groove, Integral Flange and Wipers) – offer the precision tolerances of ground ball screw systems with the flexibility of adjustable preload.



**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.



## SGT BALL SCREW QUICK REFERENCE

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
	SGN	700	3,360	0.500	0.035
	PRN	350	1,690	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		
1250-0500	PRN	1,765	11,080	1.050	0.088
	SSN	1,765	11,080	1.050	0.088
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
1500-0500	SSN	4,250	35,770	1.123	0.088
2000-0200	SSN	6,181	65,903	1.849	0.035
2000-0400	SSN	12,830	72,360	1.742	0.070
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 precision ball screws are used widely in the aerospace industry



Nook 2.00" diameter ball nuts

BALL SCREWS

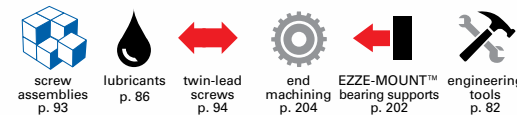
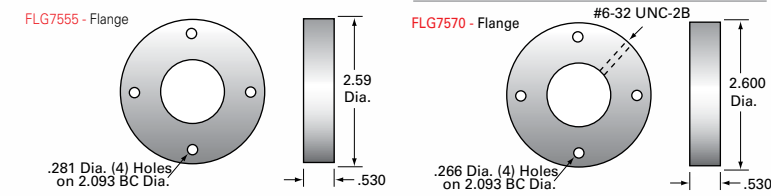


Ball Nut Number	Helix	Preload	BALL NUT							SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
			Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0631-0200 SGT single start</b>																
0.631 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>PRN10108</b>	<b>RH</b>	yes	440	2,110	1.6	30/60	0.125	0.98	0.035	0.631	0.200	0.500	0.86	<b>FLG7555</b>	integral (elastomer)	
<b>SGN10083</b>	<b>RH</b>	no	700	3,360	—	30/60	0.125	0.80	0.035	0.631	0.200	0.500	0.86	<b>FLG7570</b>	—	
<b>PRN10106</b>	<b>RH</b>	yes	350	1,690	1.0	30/60	0.125	0.80	0.035	0.631	0.200	0.500	0.86	<b>FLG7570</b>	—	
<b>SSN0389</b>	<b>RH</b>	yes	440	2,110	1.6	30/60	0.125	1.20	0.035	0.631	0.200	0.500	0.86	integral	integral (elastomer)	
<b>SSN10304</b>	<b>RH</b>	288	450	2,115	1.5	64/64	0.125	0.45	0.035	0.631	0.200	0.500	0.86	integral	integral (elastomer)	

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

0631-0200 RH	
4 ft	GT06320R48

For longer lengths, contact Customer Service.

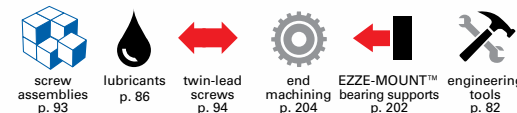
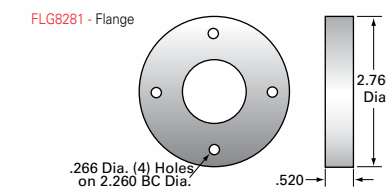


BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>0750-0200 SGT single start</b>																
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	0.750	0.200	0.602	1.22	FLG8281	integral (elastomer)	
SSN0390	RH	yes	1,473	9,916	2.75	71/142	0.141	1.2	0.035	0.750	0.200	0.602	1.22	integral	integral (elastomer)	
<b>0875-0200 SGT single start</b>																
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	0.875	0.200	0.735	1.80	FLG8281	integral (elastomer)	
SSN0388	RH	yes	1,375	10,780	3.10	93/186	0.125	1.4	0.035	0.875	0.200	0.735	1.80	integral	integral (elastomer)	

**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.

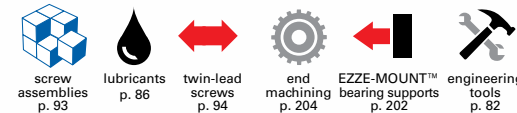
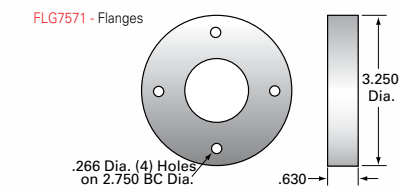


	BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
	Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<p><b>1000-0200 SGT single start</b></p> <p>1.000 Ball Circle Dia. (in) 0.200 Lead (in)</p>	<b>SSN0391</b>	<b>RH</b>	yes	1,565	13,073	3.50	107/214	0.125	1.50	0.035	1.000	0.200	0.865	2.20	integral	integral (elastomer)	
<p><b>1000-0250 SGT single start</b></p> <p>1.000 Ball Circle Dia. (in) 0.250 Lead (in)</p>	<b>PGN11172</b>	<b>RH</b>	yes	2,285	15,815	2.50	86/172	0.156	1.10	0.044	1.000	0.250	0.820	2.20	<b>FLG7571</b>	—	
	<b>SSN0404</b>	<b>RH</b>	yes	2,285	15,815	3.50	86/172	0.156	2.00	0.044	1.000	0.250	0.820	2.20	integral	integral (elastomer)	

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

1000-0250 RH	
6 ft	GT10025R72

For longer lengths, contact Customer Service.

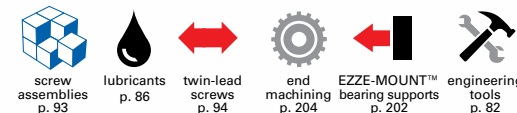
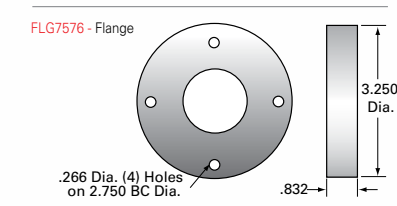


Ball Nut Number	Helix	Preload	BALL NUT							SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
			Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1150-0200 SGT single start</b>																
PRN10112	RH	yes	1,680	14,886	4.25	121/242	0.125	1.45	0.035	1.150	0.200	1.015	3.18	FLG7576	integral (elastomer)	
<b>1250-0200 SGT single start</b>																
SSN0392	RH	yes	1,680	14,886	4.25	121/242	0.125	2.00	0.035	1.150	0.200	1.015	3.18	integral	integral (elastomer)	
PRN10191	RH	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	—	integral (elastomer)	
PRN10193	LH	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	—	integral (elastomer)	
SSN0393	RH	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	integral	integral (elastomer)	
SSN0398	LH	yes	1,668	17,344	4.25	130/260	0.125	1.80	0.035	1.250	0.200	1.115	3.70	integral	integral (elastomer)	

**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.



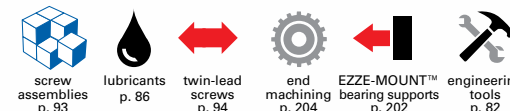
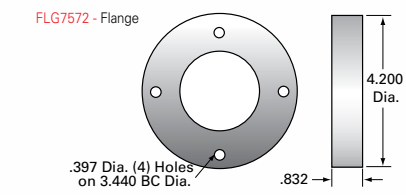
1250-0500 SGT  
1500-0200 SGT  
1500-0250 SGT

BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1250-0500 SGT single start</b>																
1.250 Ball Circle Dia. (in) 0.500 Lead (in)																
<b>PRN10087</b>	<b>RH</b>	yes	1,765	11,080	4.25	46/92	0.188	2.75	0.088	1.250	0.500	1.050	3.70	<b>FLG7572</b>	integral (elastomer)	
<b>SSN0399</b>	<b>RH</b>	yes	1,765	11,080	4.25	46/92	0.188	3.20	0.088	1.250	0.500	1.050	3.70	integral	integral (elastomer)	
<b>1500-0200 SGT single start</b>																
1.500 Ball Circle Dia. (in) 0.200 Lead (in)																
<b>SSN0394</b>	<b>RH</b>	yes	4,745	45,073	5.0	137/548	0.141	3.80	0.035	1.500	0.200	1.349	5.65	integral	integral (elastomer)	
<b>1500-0250 SGT single start</b>																
1.500 Ball Circle Dia. (in) 0.250 Lead (in)																
<b>PRN10113</b>	<b>RH</b>	yes	5,075	27,250	5.0	95/380	0.156	2.70	0.044	1.500	0.250	1.320	5.41	—	integral (elastomer)	
<b>SSN0400</b>	<b>RH</b>	yes	5,075	27,250	5.0	95/380	0.156	3.80	0.044	1.500	0.250	1.320	5.41	integral	integral (elastomer)	
<b>SAG0705</b>	<b>RH</b>	920 max.	5,950	44,030	—	95/380	0.156	6.00	0.044	1.500	0.250	1.320	5.41	integral	integral (brush)	

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

	<b>1250-0500 RH</b>	<b>1500-0200 RH</b>	<b>1500-0250 RH</b>
6 ft	GT12550R72	GT15020R72	GT15025R72
10 ft	—	GT15020R120	GT15025R120

For longer lengths, contact Customer Service.



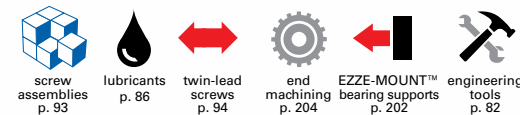
BALL SCREWS

BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate x 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>1500-0500 SGT single start</b>																
SSN0401	RH	yes	4,250	35,770	5.0	48/96	0.250	3.80	0.088	1.500	0.500	1.123	5.30	integral	integral (elastomer)	
<b>2000-0200 SGT single start</b>																
SSN0396	RH	yes	6,181	65,903	6.50	138/828	0.141	4.50	0.035	2.000	0.200	1.849	9.9	integral	integral (elastomer)	
SSN10267	LH	yes	6,181	65,903	6.50	138/828	0.141	4.50	0.035	2.000	0.200	1.849	9.9	integral	integral (elastomer)	

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

	1500-0500 RH	2000-0200 RH	2000-0200 LH
6 ft	GT15050R72	GT20020R72	GT20020L72
10 ft	GT15050R120	GT20020R120	GT20020L120

For longer lengths, contact Customer Service.

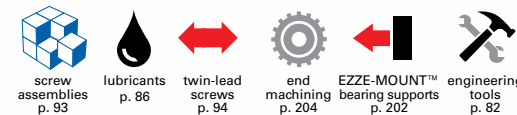


BALL NUT										SCREW				BALL NUT ACCESSORIES		BALL NUT DIMENSIONS
Ball Nut Number	Helix	Preload	Dynamic Load (lb)	Static Load (lb)	Spring Rate × 10 <sup>6</sup> (lb/in)	Balls per Circuit/Nut	Nominal Ball Dia. (in)	Nut Wt. (lb)	Torque to Raise 1 lb (in-lb)	Ball Circle Dia. (in)	Lead (in)	Root Dia. (in)	Screw Wt. (lb/ft)	Flange	Wiper	
<b>2250-0500 SGT single start</b>																
2.250 Ball Circle Dia. (in) 0.500 Lead (in)																
<b>PRN10089</b>	<b>RH</b>	yes	20,106	108,325	7.25	99/198	0.375	10.5	0.088	2.250	0.500	1.850	10.8	—	integral (elastomer)	
<b>SSN0402</b>	<b>RH</b>	yes	20,106	108,325	7.25	99/198	0.375	15.2	0.088	2.250	0.500	1.850	10.8	integral	integral (elastomer)	
<b>SAG0706</b>	<b>RH</b>	6,390 max	30,000	142,660	—	99/396	0.375	24.2	0.088	2.250	0.500	1.850	10.8	integral	integral (brush)	
<b>2500-0250 SGT single start</b>																
2.500 Ball Circle Dia. (in) 0.500 Lead (in)																
<b>SAG0707</b>	<b>RH</b>	1,895 max.	8,945	93,165	—	158/948	0.156	9.9	0.044	2.500	0.250	2.333	15.45	integral	integral (brush)	
<b>SSN0403</b>	<b>RH</b>	yes	8,945	93,165	8.00	158/948	0.156	9.0	0.044	2.500	0.250	2.333	15.45	integral	integral (elastomer)	

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

	<b>2250-0500 RH</b>	<b>2500-0250 RH</b>
6 ft	GT22550R72	GT25025R72
10 ft	GT22550R120	GT25025R120

For longer lengths, contact Customer Service.



BALL SCREWS

## SMALL DIAMETER METRIC BALL SCREWS

With four decades of experience in the precision manufacturing world, Nook Industries has expanded its PowerTrac™ product offering to include standard small diameter metric ball screws. Our small diameter screws are available in both alloy and stainless steel and provide design engineers a globally accepted product for smaller footprint applications where high accuracy, repeatability, and durability are required.

Nook Industries produces many custom small diameter ball screws and nuts for the aerospace and medical industries each year. As a result of this experience, Nook offers standard miniature ball screws and nuts for the commercial market.



Nook miniature ball screws are used to guide missiles and rockets

MINI BALL SCREWS



6 x 1.25 mm precision ball screw



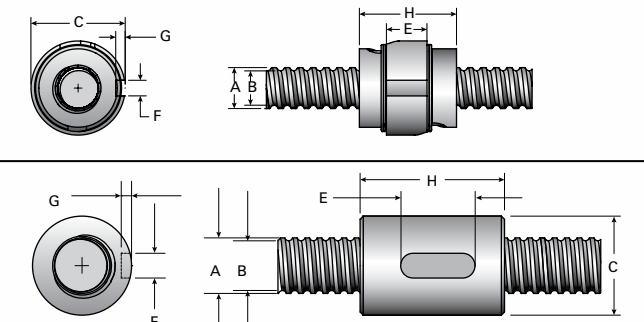
Nook miniature ball screws are used in medical devices



KEYED  
VERSION

BALL NUT											SCREW						
Dia. x Lead (mm)	Ball Nut Number	Screw Material	Helix	Dynamic Load (N)	Static Load (N)	C (mm)	H (mm)	E (mm)	F (mm)	G (mm)	Lash	Nut Wt. (g)	Torque to Raise 1 kN (N·m)	Reference number	A (mm)	B (mm)	Screw Wt. (g/m)
6 x 1.25	MBN10727	SS	RH	258	253	13.0	17.2	8.61	2.0	1.20	0.025	9.5	0.221	6x1.25 MRT RH SS	6.2	5.6	215
8 x 2.5	MBN10828	4150	RH	1,407	1,638	18.0	18.6	7.7	3.0	1.80	0.045	20	0.443	8x2.5 MRT RH	7.8	6.6	321
8 x 2.5	MBN10729	SS	RH	480	623	18.0	18.6	7.7	3.0	1.80	0.045	20	0.443	8x2.5 MRT RH SS	7.8	6.6	321
10 x 2	MBN10832	4150	RH	1,259	1,514	20.0	22	12.0	3.0	1.80	0.038	29	0.354	10x2 MRT RH	9.5	8.2	464
10 x 2	MBN10733	SS	RH	1,259	1,514	20.0	22	12.0	3.0	1.80	0.038	29	0.354	10x2 MRT RH	9.5	8.2	464
14 x 3	MBN11125	4150	RH	5,812	10,340	24.0	40	20.0	5.0	3.00	0.076	110	0.472	14x3 MRT RH	13.5	11.9	1021

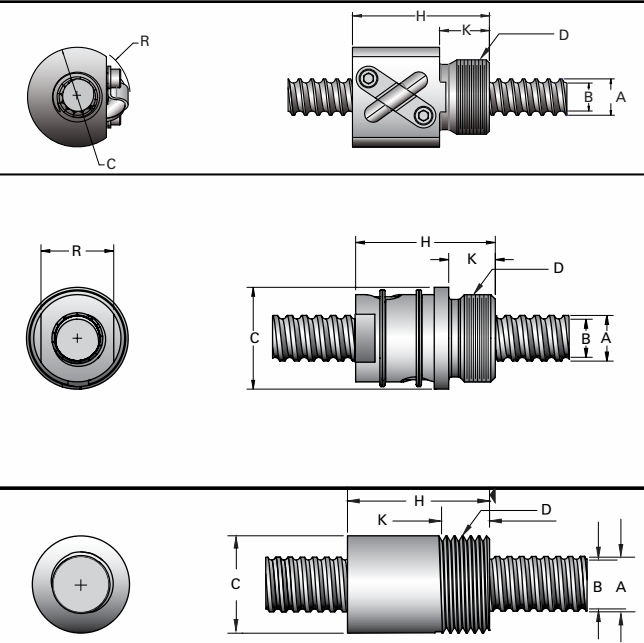
BALL NUT DIMENSIONS



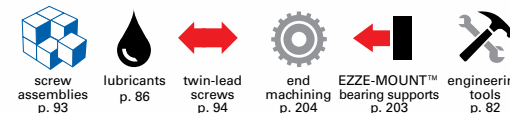
V-THREAD  
VERSION

BALL NUT											SCREW						
Dia. x Lead (mm)	Ball Nut Number	Screw Material	Helix	Dynamic Load (N)	Static Load (N)	C (mm)	D (mm)	H (mm)	K (mm)	R (mm)	Lash	Nut Wt. (g)	Torque to Raise 1 kN (N·m)	Reference number	A (mm)	B (mm)	Screw Wt. (g/m)
6 x 2	MBN10922	SS	RH	751	719	16.0	M12 x 1	22.0	8.0	8.5	0.076	18	0.354	6x2 MRT RH SS	5.8	4.5	161
6 x 1.25	MBN10636	SS	RH	258	253	14.5	M12 x 1	17.2	6.1	9.32	0.025	8.6	0.221	6x1.25 MRT RH SS	6.2	5.6	215
8 x 2.5	MBN10830	4150	RH	1,407	1,638	17.5	M15 x 1	24.0	8.0	12.3	0.045	20	0.443	8x2.5 MRT RH	7.8	6.6	338
8 x 2.5	MBN10731	SS	RH	480	623	17.5	M15 x 1	24.0	8.0	12.3	0.045	20	0.443	8x2.5 MRT RH SS	7.8	6.6	338
8 x 6	MBN10961	4150	RH	1,343	1,632	17.5	M15 x 1	24.0	8.0	12.3	0.076	25.4	1.060	8x6 MRT RH	7.8	6.6	329
8 x 6	MBN10924	SS	RH	592	480	17.5	M15 x 1	24.0	8.0	12.3	0.076	25.4	1.060	8x6 MRT RH SS	7.8	6.6	329
10 x 2	MBN10834	4150	RH	1,259	1,514	19.5	M17 x 1	22.0	8.0	15.7	0.038	21.7	0.354	10x2 MRT RH	9.5	8.2	464
10 x 2	MBN10757	SS	RH	560	444	19.5	M17 x 1	22.0	8.0	15.7	0.038	21.7	0.354	10x2 MRT RH SS	9.5	8.2	464
12 x 2.5	MBN11112	4150	RH	2,980	4,960	25.5	M20 x 1.5	39.0	8.0	—	0.076	99.0	0.443	12x2.5 MRT RH	11.75	10.2	763
14 x 3	MBN1123	4150	RH	5,812	10,340	24.0	M24 x 2	35.0	12.0	—	0.076	105.0	0.478	14x3 MRT RH	13.5	11.9	1021

BALL NUT DIMENSIONS



◀ shoulder against this face for mounting





Precision heat-treatment of ball screws

## METRIC BALL SCREWS

Nook Industries has expanded the PowerTrac™ offering to include metric ball screws, providing design engineers a globally accepted product. Metric ball screws are available in many diameters, leads, and pitches.

Metric ball screws are available with internal, low profile external, or external return guide ball nuts. Several Nook metric products are available with preloaded ball nut systems. See the metric ball screw product technical data pages on 149-161 for additional detail.

### MRT and PMT BALL SCREWS

These screw assemblies are similar in construction and materials to PowerTrac™ Inch Ball Screws and Nuts.

**MRT Standard lead accuracy:**  $\pm 100\mu\text{m} / 300\text{mm}$

**PMT Standard lead accuracy:**  $\pm 25\mu\text{m} / 300\text{mm}$

**Temperature Range:** For standard applications:  $-20^\circ$  to  $+80^\circ\text{C}$

**Wipers:** Plastic



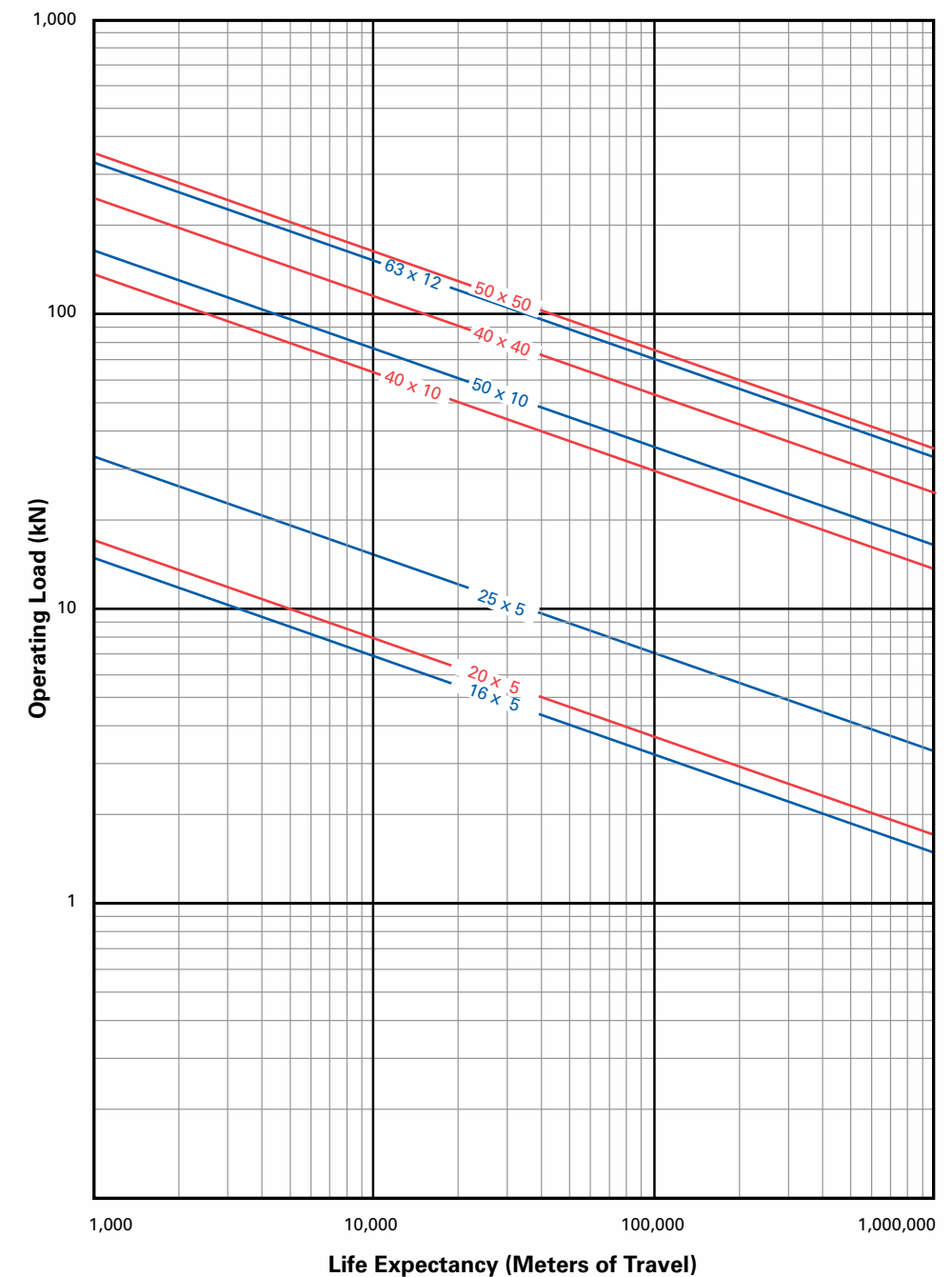
50 x 10 precision metric ball screw

## LIFE EXPECTANCY: METRIC MRT AND PMT BALL SCREWS

TO USE THIS CHART:

1. Determine required Life (in meters of travel) at equivalent operation 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: METRIC MRT AND PMT SCREWS

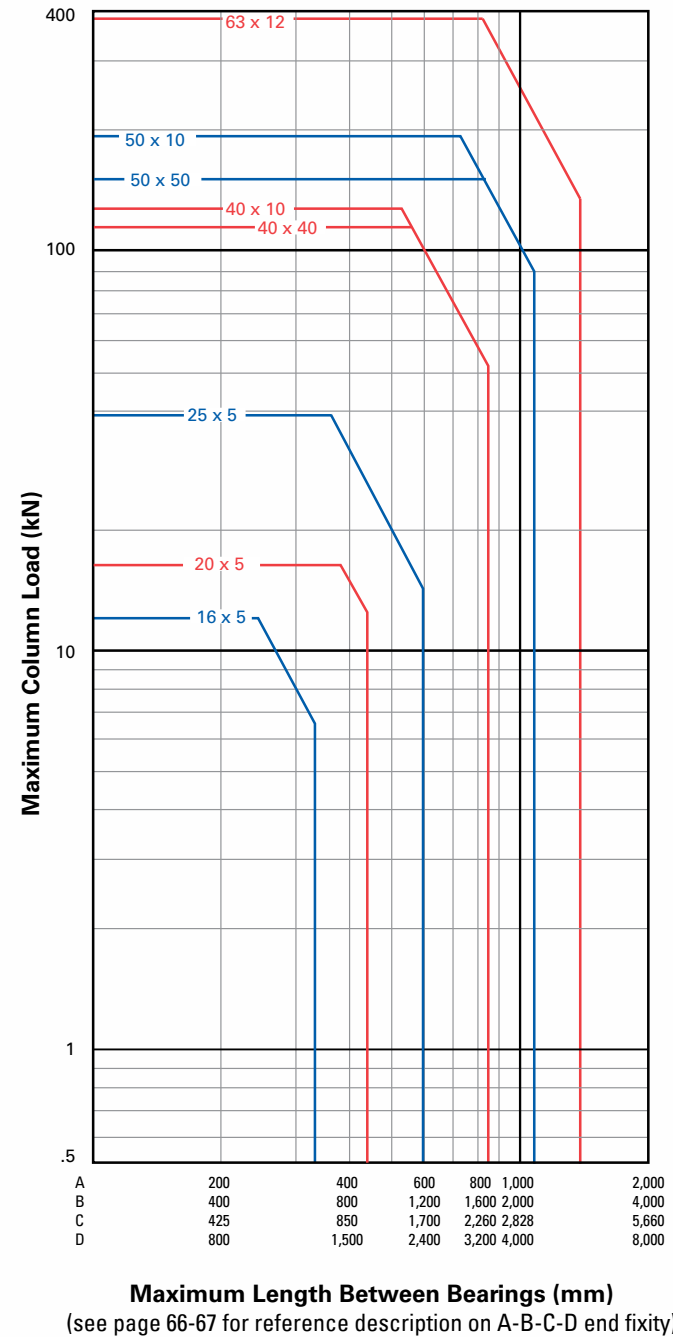


Use this chart to verify the screw selected has sufficient column strength for your load.

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

**Metric to Inch Conversion:**

- 1 Newton = .224 lbf
- 1mm = 0.039 in
- 1 N•m = 8.85 in-lb

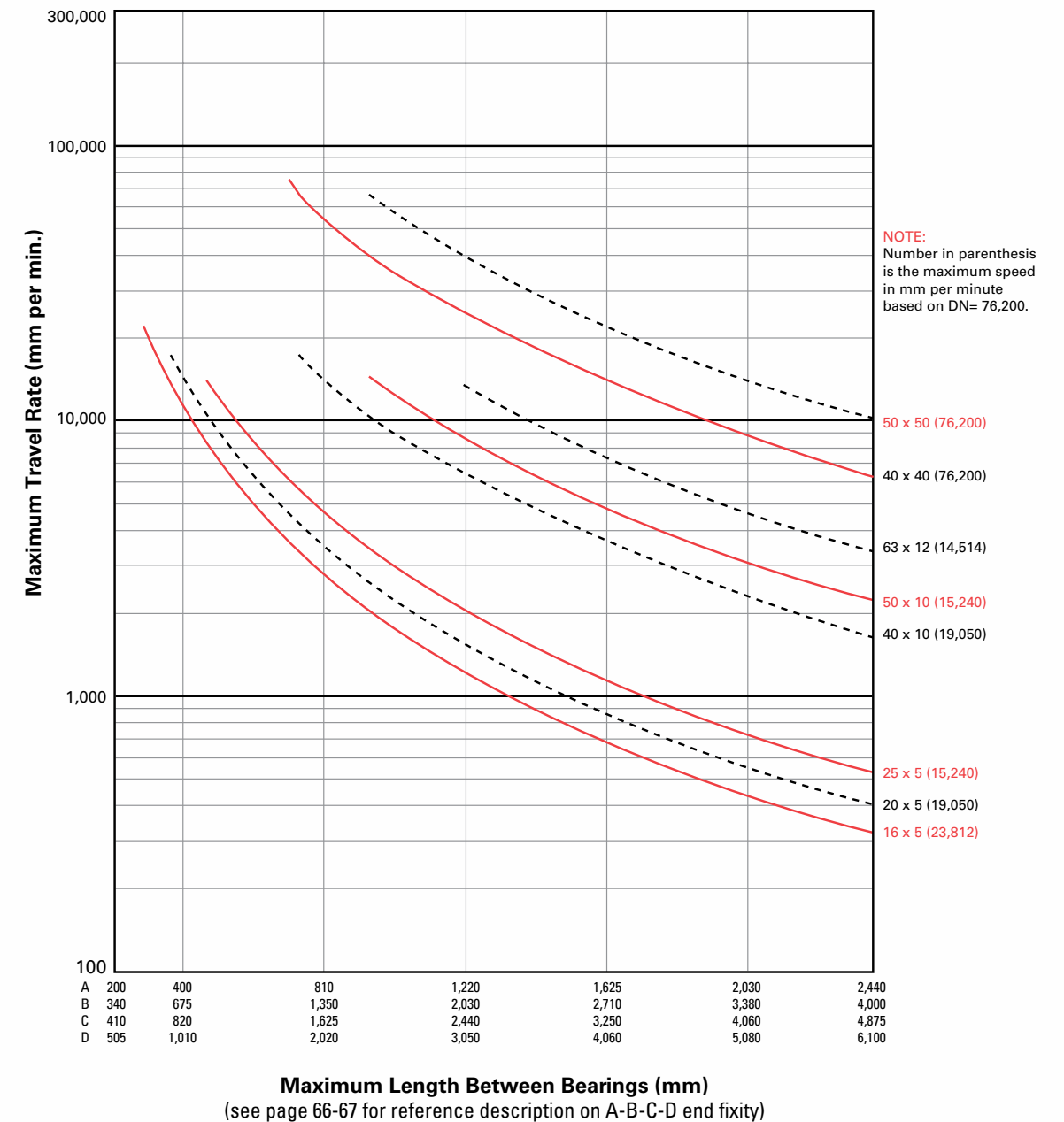


### CRITICAL SPEED: METRIC MRT AND PMT SCREWS



TO USE THIS CHART

1. Determine maximum travel rate required.
2. Determine screw length "L"
3. Find point at which travel rate and screw length intersect. Select a screw above and to the right of that point.



# MRT AND PMT SCREW AND NUT ASSEMBLIES

## REFERENCE NUMBER SYSTEM



**MRT-25x5 - RA / EK / 4N / 1063 / MBN-10436 / S**

### BALL SCREW

#### Thread Form Codes

MRT/PMT Dia. x Lead (mm)

- MRT 16x5 = 16 x 5
- MRT 20x5 = 20 x 5
- MRT 25x5 = 25 x 5
- MRT 40x10 = 40 x 10
- MRT 40x40 = 40 x 40
- MRT 50x10 = 50 x 10
- MRT 50x50 = 50 x 50
- MRT 63x12 = 63 x 12
- PMT 16x5 = 16 x 5
- PMT 20x5 = 20 x 5
- PMT 25x5 = 25 x 5
- PMT 40x10 = 40 x 10
- PMT 50x10 = 50 x 10
- PMT 63x12 = 63 x 12

### MATERIAL

**R A**

R = Right Hand Thread    A = Alloy

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 204-207)

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

**EK**

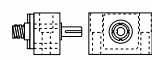
EK = Universal Double Bearing Support, with Keyway

#### Shaft Extension

(see page 204-206)

- N = No Shaft Extension
- K = Shaft Extension with Keyway
- L = Shaft Extension without Keyway

B = Universal Double Bearing Support End Cap Facing Screw Thread



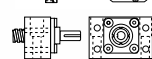
C = Universal Single Bearing Support



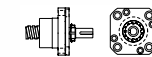
D = Flanged Single Bearing Support Flange Facing Screw Thread



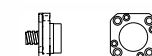
E = Universal Double Bearing Support End Cap Facing Away From Screw Thread



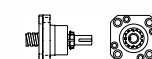
F = Flanged Double Bearing Support Flange Facing Screw Thread



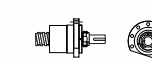
G = Flanged Single Bearing Support Flange Facing Away From Screw Thread



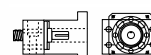
H = Flanged Double Bearing Support Flange Facing Away From Screw Thread



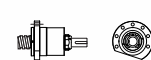
R = Flanged Fixed Bearing Support Flange Facing Screw Thread



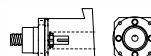
U = Universal Double Bearing Support with Motor Mount



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)

### MODIFIER LIST

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

### TRAVEL NUT

**MBN or MPN Nut**  
Use standard part number found in the Technical Data Section for Metric Ball Screws

**Example:**  
**MBN 10206** = 16 x 5 MRT Nut

**Nut will be installed with flange or threaded end toward first end designation. 00000 = No Nut**

### OVERALL LENGTH (OAL)

Length in mm.

### SECOND END CONFIGURATION

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

# MRT ROLLED BALL SCREWS

MRT Rolled Ball Screw assemblies feature 100µm / 300mm lead accuracy ball screws with precision ball nuts that are an economical, high-performance alternative to ground thread ball screw assemblies. MRT Rolled Ball Screws are manufactured under tightly controlled conditions in the rolling process. Uniform heat treatment is monitored by temperature sensors to ensure high quality and accurate lead. The ball nut assemblies ensure accuracy, zero backlash, consistent repeatability, and high system stiffness at low running torque.

Ball nuts can be assembled with a selective fit to minimize lash.

Nook Industries provides quality end machining of the rolled ball screw to standard configurations or to your specifications. Precision rolled ball screw assemblies may be fitted to Nook EZZE MOUNTS for simple system integration.

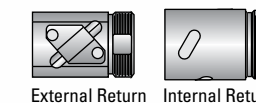
# MRT SCREWS & NUTS

## METRIC QUICK REFERENCE:

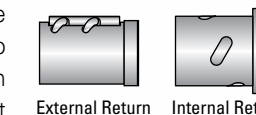
Nominal Dia. - Lead	Dynamic Load Rating (N)	Static Load Rating (N)	Root Diameter (mm)	Torque to Raise 1kN (N•m)	Nut
<b>16 x 5</b>	7.6	12.4	12.90	0.880	MBN
<b>20 x 5</b>	13	24.4	17.50	0.880	MBN
<b>25 x 5</b>	18.5	39.4	22.60	0.880	MBN
<b>40 x 10</b>	62.5	136.2	34.79	1.778	MBN
<b>40 x 40</b>	75.3	121.4	33.79	7.080	MPN
<b>50 x 10</b>	75.5	189.3	45.20	1.778	MBN
<b>50 x 50</b>	92.6	152.4	43.02	7.080	MPN
<b>63 x 12</b>	140	386	56.98	2.124	MBN

# MRT BALL NUTS

**MBN Metric Ball Nut** (no preload) - offers durable, low cost linear motion. Mounting flanges and wiper kits can be installed on the MBN nuts.

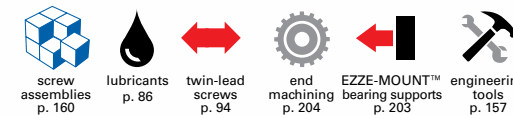
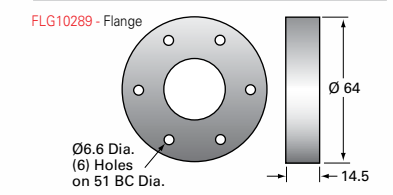
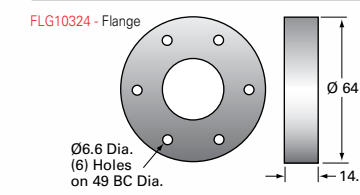
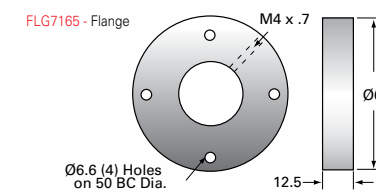


**MPN Metric Preload Ball Nut** - has a light preload which is produced by shifting the internal threads slightly in the center of the nut. The threads are ground to give extra precision and to ensure uniform preload. MPN ball nuts offer a compact profile and extra stiffness over standard clearance ball nuts. Special care is taken when custom fitting MPN ball nuts on their matching ballscrews. This extra care in manufacturing and assembly provides a backlash-free system with uniform torque, high stiffness and long life.



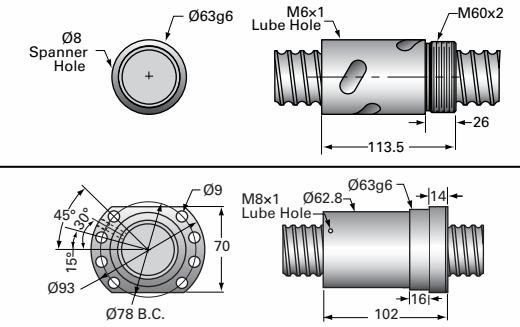
	BALL NUT								SCREW					BALL NUT ACCESSORIES		BALL NUT DIMENSIONS (mm)	
	Ball Nut Number	Helix	Dynamic Load (kN)	Static Load (kN)	Spring Rate x 10 <sup>6</sup> (kN/μm)	Nominal Ball Dia. (mm)	Nut Wt. (g)	Torque to Raise 1 kN (N•m)	Return Style	Ball Circle Dia. (mm)	Lead (mm)	Root Dia (mm)	Screw Wt. (g/m)	Part Number	Flange		Wiper
<b>16x5 MRT single start</b> Lead Accuracy: ±100μm/300 mm	MBN10436	RH	7.6	12.4	—	3.175	123	0.88	external	16	5.0	12.9	1222	16x5 MRT	FLG7165	—	
<b>20x5 MRT single start</b> Lead Accuracy: ±100μm/300 mm	MBN10295	RH	13	24.4	—	3.175	238	0.88	internal	20	5.0	17.5	2170	20x5 MRT	FLG10324	—	
<b>25x5 MRT single start</b> Lead Accuracy: ±100μm/300 mm	MBN10281	RH	18.5	39.4	—	3.175	280	0.88	internal	25.75	5.0	22.6	3452	25x5 MRT	FLG10289	integral (elastomer)	

Custom cut lengths available up to 7M.  
For longer lengths, contact Customer Service.

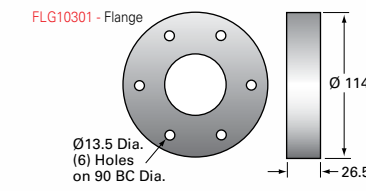


BALL NUT									SCREW					BALL NUT ACCESSORIES	
Ball Nut Number	Helix	Dynamic Load (kN)	Static Load (kN)	Spring Rate × 10 <sup>6</sup> (kN/μm)	Nominal Ball Dia. (mm)	Nut Wt. (g)	Torque to Raise 1 kN (N•m)	Return Style	Ball Circle Dia. (mm)	Lead (mm)	Root Dia. (mm)	Screw Wt. (g/m)	Part Number	Flange	Wiper
<b>40x10 MRT single start</b>															
Lead Accuracy: ±100μm/300 mm															
<b>MBN10291</b>	<b>RH</b>	62.5	136.2	—	7.144	1177	1.778	internal	42.1	10.0	34.79	8566	<b>40x10 MRT</b>	<b>FLG10301</b>	—
<b>40x40 MRT double start</b>															
Lead Accuracy: ±100μm/300 mm															
<b>MPN10429</b>	<b>RH</b>	75.3	121.4	—	6.35	1560	7.08	internal	40.28	40.0	33.79	8315	<b>40x40 MRT</b>	integral	integral (plastic)

BALL NUT DIMENSIONS (mm)



Custom cut lengths available up to 7M.  
For longer lengths, contact Customer Service.

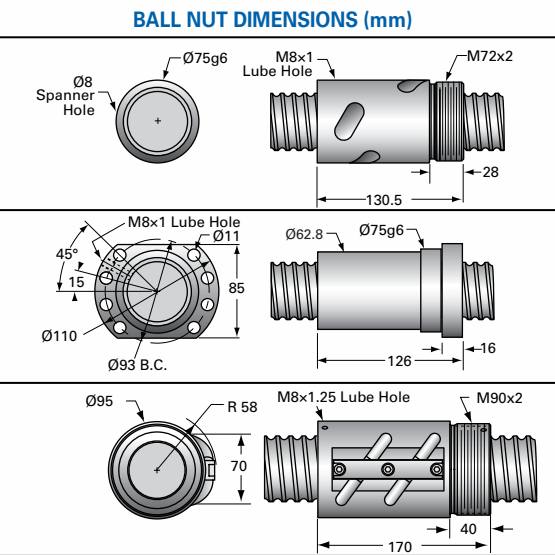


Nook ball screws are used in many paper manufacturing applications

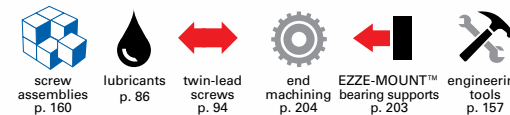
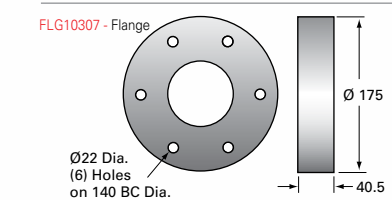
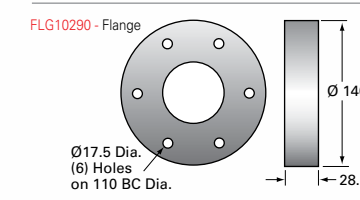


Nook ball screws used in a textile manufacturing application

BALL NUT										SCREW					BALL NUT ACCESSORIES	
Ball Nut Number	Helix	Dynamic Load (kN)	Static Load (kN)	Spring Rate × 10 <sup>6</sup> (kN/μm)	Nominal Ball Dia. (mm)	Nut Wt. (g)	Torque to Raise 1 kN (N•m)	Return Style	Ball Circle Dia. (mm)	Lead (mm)	Root Dia (mm)	Screw Wt. (g/m)	Part Number	Flange	Wiper	
<b>50x10 MRT single start</b>																
MBN10285	RH	75.5	189.3	—	6.35	1,952	1.778	internal	51.7	10.0	45.2	13,880	50x10 MRT	FLG10290	integral (elastomer)	
Lead Accuracy: ±100μm/300 mm																
<b>50x50 MRT double start</b>																
MPN10432	RH	92.6	152.4	—	6.35	2,960	7.080	internal	49.5	40.0	43.02	13900	50x50 MRT	integral	integral (plastic)	
Lead Accuracy: ±100μm/300 mm																
<b>63x12 MRT single start</b>																
MBN10297	RH	140	386	—	7.94	4451	2.124	internal	65.1	12.0	56.98	22046	63x12 MRT	FLG10307	integral (plastic)	
Lead Accuracy: ±100μm/300 mm																



Custom cut lengths available up to 7M.  
For longer lengths, contact Customer Service.



## PMT PRECISION ROLLED METRIC BALL SCREWS

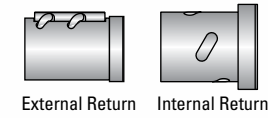
PMT Precision Rolled Ball Screw assemblies feature 25µm/300mm lead accuracy ball screws with precision ground preloaded ball nuts that are an economical, high-performance alternative to ground thread ball screw assemblies. PMT Precision Rolled Ball Screw are manufactured under tightly controlled conditions in the rolling process. Uniform heat treatment is monitored by temperature sensors to ensure high quality and accurate lead. The preloaded ball nut assemblies ensure accuracy, zero backlash, consistent repeatability, and high system stiffness at low running torque.

Ball nuts feature a unique solid preload that enhances system smoothness, and are factory-fit on the ball screws, providing a backlash-free system for long life.

Nook Industries provides quality end machining of the rolled ball screw to standard configurations or to your specifications. Precision rolled ball screw assemblies may be fit to Nook EZZE MOUNTS for simple system integration.

## PMT BALL NUTS

**MPN Metric Preload Ball Nut** - has a light preload which is produced



by shifting the internal threads slightly in the center of the nut. The threads are precision-ground to ensure uniform preload. MPN ball nuts offer a compact profile and extra stiffness over standard clearance ball nuts. Special care is taken when custom fitting MPN ball nuts on their matching ballscrews. This extra care in manufacturing and assembly provides a backlash-free system with uniform torque, high stiffness and long life.

## PMT SCREWS & NUTS METRIC QUICK REFERENCE:

Nominal Dia. - Lead	Dynamic Load Rating (N)	Static Load Rating (N)	Root Diameter (mm)	Torque to Raise 1 kN	Nut
16 × 5	5.7	8.6	12.90	0.880	MPN
20 × 5	7.2	12.2	17.50	0.880	MPN
25 × 5	8.4	15.7	22.60	0.880	MPN
40 × 10	28.4	54.4	34.79	1.778	MPN
50 × 10	41.6	94.6	45.20	1.778	MPN
63 × 12	76.91	193	56.98	2.124	MPN



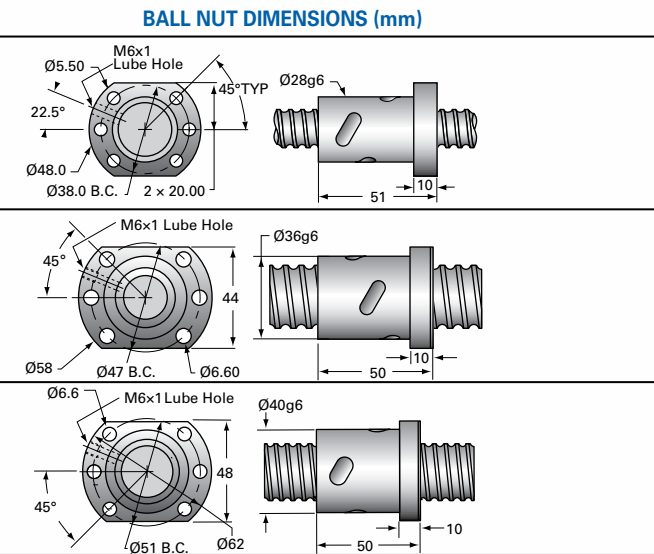
40 x 10 precision ball screw



Nook ball screws are used in numerous maritime applications



BALL NUT									SCREW				BALL NUT ACCESSORIES			
Ball Nut Number	Helix	Dynamic Load (kN)	Static Load (kN)	Spring Rate x 10 <sup>6</sup> (kN/μm)	Nominal Ball Dia. (mm)	Nut Wt. (g)	Torque to Raise 1 kN (N•m)	Return Style	Ball Circle Dia. (mm)	Lead (mm)	Root Dia (mm)	Screw Wt. (g/m)	Part Number	Flange	Wiper	
<b>16x5 PMT single start</b> Lead Accuracy: ±25μm/300 mm	<b>MPN11102</b>	<b>RH</b>	5.7	8.6	0.22	3.175	190	0.88	internal	16	5.0	12.9	1222	<b>16x5 PMT</b>	integral	integral (elastomer)
<b>20x5 PMT single start</b> Lead Accuracy: ±25μm/300 mm	<b>MPN10332</b>	<b>RH</b>	7.2	12.2	0.28	3.175	307	0.88	internal	20	5.0	17.5	2170	<b>20x5 PMT</b>	integral	integral (elastomer)
<b>25x5 PMT single start</b> Lead Accuracy: ±25μm/300 mm	<b>MPN10333</b>	<b>RH</b>	8.4	15.7	0.35	3.175	340	0.88	internal	25.75	5.0	22.6	3452	<b>25x5 PMT</b>	integral	integral (elastomer)



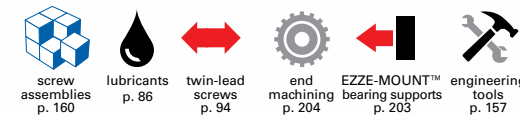
Custom cut lengths available up to 7M.  
For longer lengths, contact Customer Service.



Nook ball screws are used in MRI applications



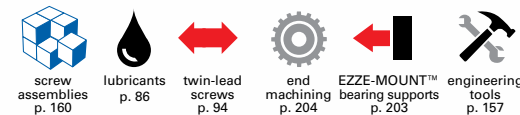
Nook ball screws are used in many conveyor operations



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	BALL NUT									SCREW					BALL NUT ACCESSORIES		BALL NUT DIMENSIONS (mm)
	Ball Nut Number	Helix	Dynamic Load (kN)	Static Load (kN)	Spring Rate × 10 <sup>6</sup> (kN/μm)	Nominal Ball Dia. (mm)	Nut Wt. (g)	Torque to Raise 1 kN (N•m)	Return Style	Ball Circle Dia. (mm)	Lead (mm)	Root Dia (mm)	Screw Wt. (g/m)	Part Number	Flange	Wiper	
<b>40x10 PMT single start</b> Lead Accuracy: ±25μm/300 mm	MPN10305	RH	28.4	54.5	0.55	7.144	1182	1.778	internal	42.1	10.0	34.79	8566	40x10 PMT	integral	integral (elastomer)	
<b>50x10 PMT single start</b> Lead Accuracy: ±25μm/300 mm	MPN10334	RH	41.6	94.6	0.97	6.35	1,778	1.778	internal	51.7	10.0	45.2	13880	50x10 PMT	integral	integral (elastomer)	
<b>63x12 PMT single start</b> Lead Accuracy: ±25μm/300 mm	MPN10335	RH	76.91	193	0.97	7.94	4915	2.124	internal	65.1	12.0	56.98	22046	63x12 PMT	integral	integral (plastic)	

Custom cut lengths available up to 7M.  
For longer lengths, contact Customer Service.



# NOOK NRS™

## PLANETARY ROLLER SCREW ASSEMBLIES



Nook planetary roller screws have many uses in the aerospace industry

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ROLLER SCREWS

# ROLLER SCREWS

## NRS™ PLANETARY ROLLER SCREW APPLICATION AND DESIGN

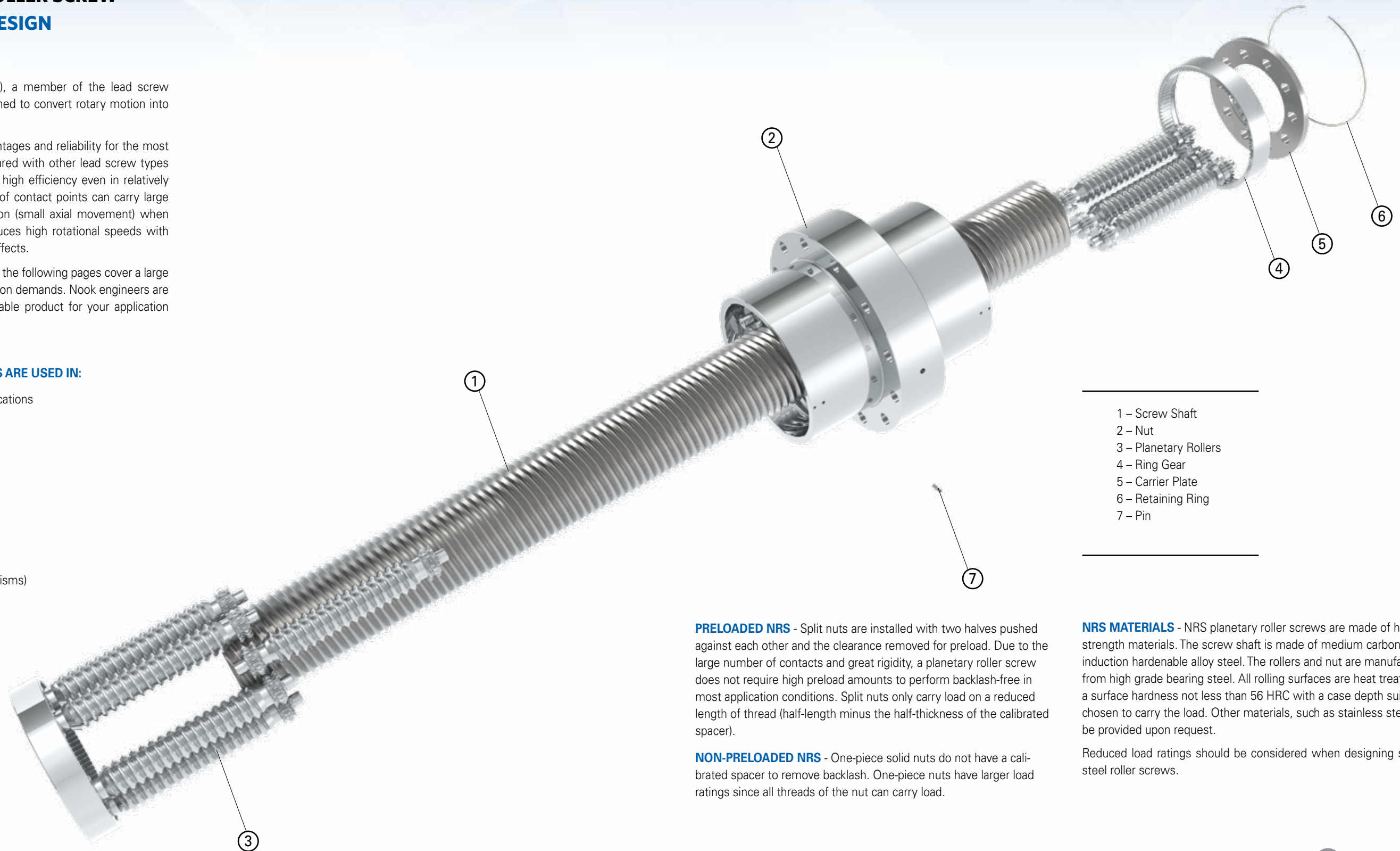
Nook Planetary Roller Screws (NRS), a member of the lead screw family, are remarkable devices designed to convert rotary motion into axial force or vice versa.

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 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)



- 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.





44 x 12 precision roller screw

## CALCULATION AND SELECTION

### Basic dynamic load ratings C and L<sub>10</sub> 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<sup>6</sup> revolutions (L<sub>10</sub>).

### Static load ratings (C<sub>0</sub>) and safety factors (S<sub>0</sub>)

Static load rating C<sub>0</sub> 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<sub>0</sub> should be used when selecting a roller screw on the basis of its static load rating.

The S<sub>0</sub> 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<sub>0</sub>. If size constraints prevent the use of larger screws and the operation of the device is such that the S<sub>0</sub> approaches 1, please contact our engineering department.

### Theoretical life

Theoretical life L<sub>10</sub> or L<sub>n</sub> 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<sub>n</sub>) according to the table.

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

Reliability (%)	-a <sub>0</sub>
90	1
95	0.62
96	0.53
97	0.44
98	0.33
99	0.21

## ROLLER SCREW CALCULATION AND SELECTION

**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 x Pitch combinations, with leads as small as 2mm.

**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.



### 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:

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

The equivalent speed can be computed as follows:

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

Where:

F<sub>ax(1,2,n)</sub> = applied load in the individual time step

n<sub>(1,2,n)</sub> = screw rotational speed (RPM) in the individual load steps

q<sub>(1,2,n)</sub> = time step in (%)

### Preload

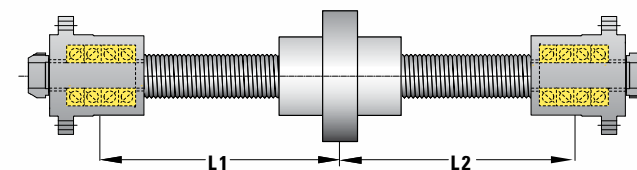
Preloaded nuts are used to eliminate axial lash and to increase system rigidity. Preload is detrimental to the operating life and should be selected carefully. The preload magnitude should be accounted for in the equivalent load calculation so its impact on the system life can be determined.

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:

Fixed-fixed: f<sub>e</sub> = (1/L1 + 1/L2)



Fixed-free: f<sub>e</sub> = 1/L

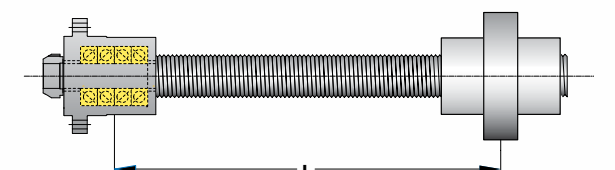


Fig. 1

### Loaded nut (or half-nut)

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

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

### Relieved nut (or half-nut)

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

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

Where:

P = resulting equivalent load (N)

F<sub>p</sub> = preload magnitude (N)

F<sub>ax</sub> = 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<sub>δt</sub> = total system rigidity (N/μm)

C<sub>δs</sub> = screw shaft rigidity (N/μm)

C<sub>δn</sub> = screw nut rigidity (N/μm)

C<sub>δb</sub> = support bearing rigidity (N/μm)

C<sub>δh</sub> = 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<sub>e</sub> = factor dependent on end-support configuration (see Fig. 1)

The nut rigidity can be calculated as follows:

$$C_{\text{dn}} = f_n \times \sqrt[3]{F_{\text{ax}}}$$

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

**COLUMN STRENGTH**

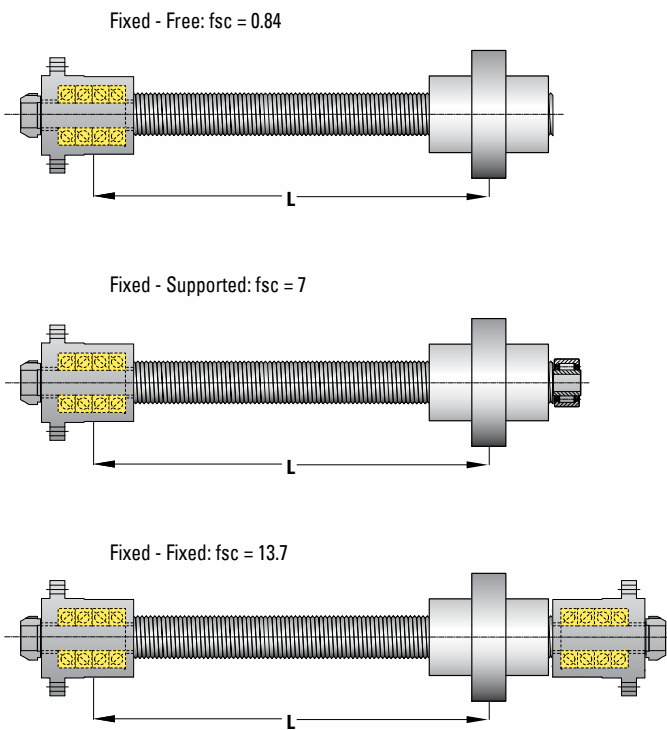
If the screw is subjected to compressive loads, then a verification of its suitability to the loading conditions can be performed as follows:

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

Where:

- $F_{\text{ax}}$  = compressed load (N)
- $f_{\text{sc}}$  = factor dependent on end-support configuration (SEE FIG. 2)
- $d_o$  = screw nominal diameter (mm)
- $L$  = free-length (mm)

**Fig. 2 - Column Strength fsc Factor**



**CRITICAL SPEED**

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

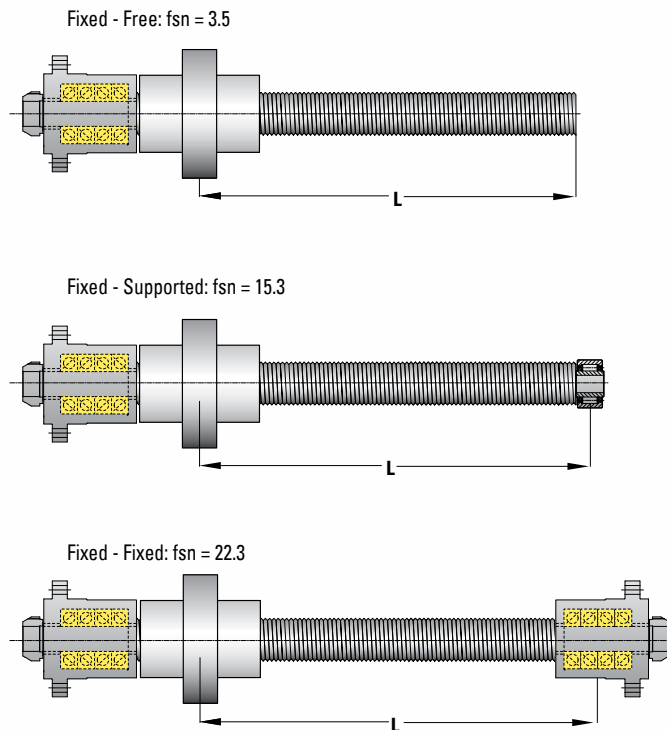
- Rotational speed capability of the nut (and planetary train)
- Diameter and free length of the screw (for rotating screw shafts)
- End support configuration (for rotating screws)
- Rotation member (nut or screw)

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:

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

**Fig. 3 - Critical Speed fsc Factor**



Where:

- $n_{\text{max}}$  = allowable screw rotational velocity (RPM)
- $f_{\text{sn}}$  = 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.

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

(for transforming rotary motion into axial motion)

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

(for transforming axial motion into rotary motion)

Where:

- $f_f$  = friction factor (mean value = 0.038)
- $P_{\text{ho}}$  = 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:

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

$M_t$  = 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:

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

$M_b$  = 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 engineers will gladly provide guidance on the selection of suitable grease as well as the maintenance interval.

**Oil lubrication**

Nook E-900L is available in a 32 oz. bottle for applications that require oil lubrication (see page 74). 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 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.

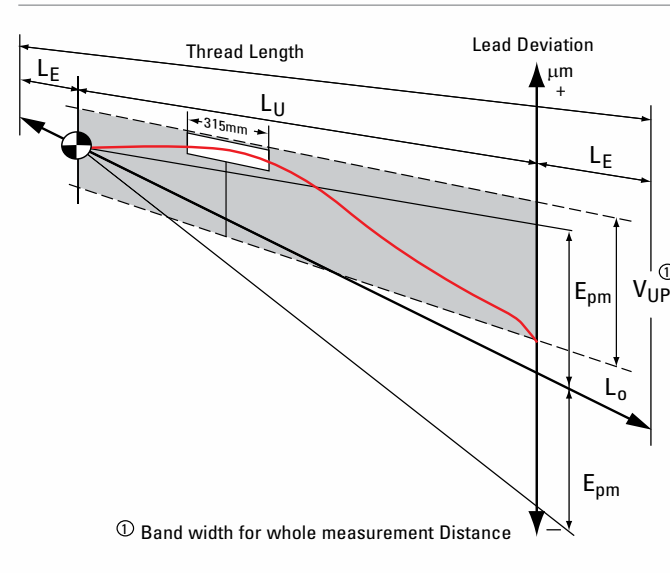
## ROLLER SCREW ACCURACY AND INSTALLATION

### 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 315mm



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 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



**NRS B 15x2 / 500 / 2W / R / G5 / VK / 5K / 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 8x2   | NRS 30x25  |
| NRS 8x4   | NRS 39x5   |
| NRS 12x2  | NRS 39x10  |
| NRS 12x4  | NRS 39x15  |
| NRS 12x5  | NRS 39x20  |
| NRS 15x2  | NRS 44x12  |
| NRS 15x4  | NRS 44x18  |
| NRS 15x5  | NRS 44x24  |
| NRS 20x2  | NRS 44x30  |
| NRS 20x4  | NRS 48x5   |
| NRS 20x5  | NRS 48x10  |
| NRS 20x6  | NRS 48x20  |
| NRS 21x5  | NRS 60x10  |
| NRS 21x8  | NRS 60x15  |
| NRS 21x10 | NRS 60x20  |
| NRS 23x2  | NRS 64x30  |
| NRS 23x4  | NRS 64x36  |
| NRS 23x8  | NRS 64x42  |
| NRS 25x5  | NRS 75x10  |
| NRS 25x10 | NRS 75x20  |
| NRS 27x2  | NRS 75x30  |
| NRS 27x4  | NRS 75x40  |
| NRS 27x8  | NRS 80x24  |
| NRS 30x5  | NRS 100x25 |
| NRS 30x10 | NRS 100x50 |
| NRS 30x15 | NRS 120x25 |
| NRS 30x20 |            |

#### 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.

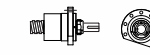
EZZE-MOUNT™ / End Machining  
(see page 206 - 207)

**VK**

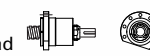
VK = Flanged Fixed Bearing Support  
Flange Facing Away From Screw Thread  
With Keyway

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)

#### MODIFIER

**S:** Standard  
**M:** Modified

#### SECOND END CONFIGURATION

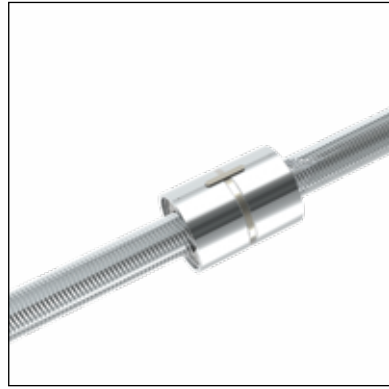
Refer to the First End Configuration section below.

**Note:** Both Ends must be specified.

Shaft Extension (see page 207)

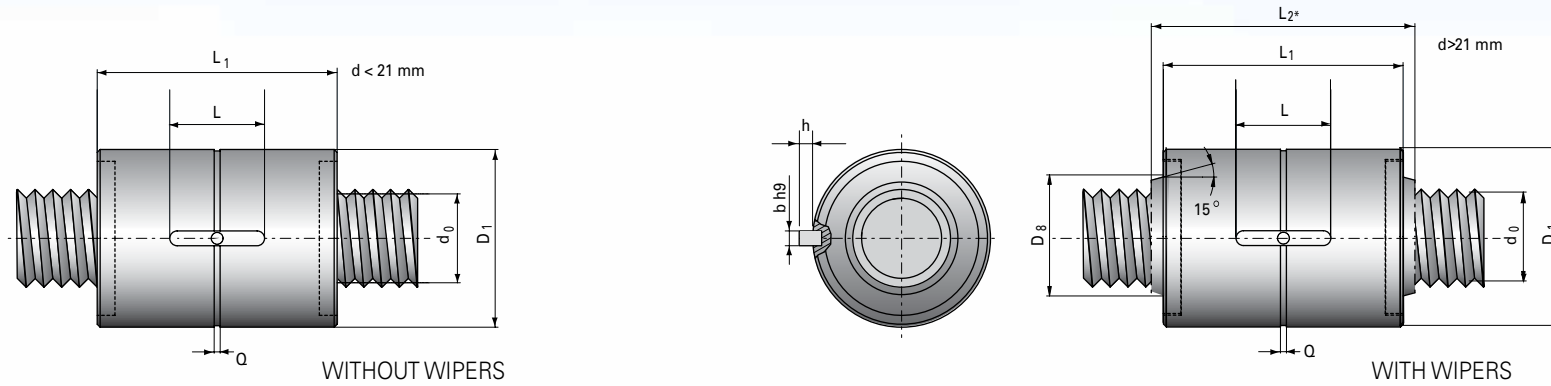
K = Shaft Extension with Keyway  
L = Shaft Extension without Keyway  
N = No Shaft Extension



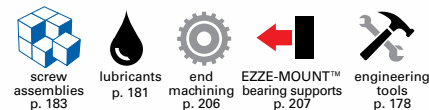


100 x 50 roller screw with cylindrical nut

Nook 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.

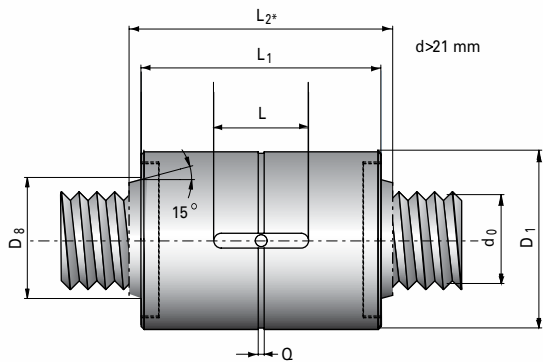
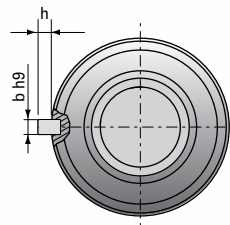


Nominal Screw Dia. d <sub>0</sub>	Dia. x Lead	Lead (mm)	D <sub>1</sub> (g6) (mm)	Q (mm)	D <sub>8</sub> (mm)	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)	Keyway L x b x h (mm)	ONE-PIECE NUT Load Rating		backlash (mm)	SPLIT NUT Load Rating		Locknut	End Code Type 5	EZZE-Mount
									Dynamic C <sub>a</sub> (kN)	Static C <sub>0a</sub> (kN)		Dynamic C <sub>a</sub> (kN)	Static C <sub>0a</sub> (kN)			
8	NRS 8x2	2	21	3	-	31	-	10x3x1.2	6.98	17.91	0.02	4.19	8.90	-	-	-
	NRS 8x4	4	21	3	-	31	-	10x3x1.2	5.43	18.63	0.02	3.26	9.31	-	-	-
12	NRS 12x2	2	26	3	-	31	-	14x4x1.5	10.24	26.72	0.02	6.14	13.36	-	-	-
	NRS 12x4	4	26	3	-	31	-	14x4x1.5	8.92	27.74	0.02	5.35	13.87	-	-	-
	NRS 12x5	5	26	3	-	31	-	14x4x1.5	8.31	31.00	0.02	4.88	15.50	-	-	-
15	NRS 15x2	2	34	3	-	35	-	14x4x1.5	13.47	31.74	0.02	8.08	15.87	SFZ 12x1	12	EZRF-3012
	NRS 15x4	4	34	3	-	35	-	14x4x1.5	11.94	33.00	0.02	7.16	16.50	SFZ 12x1	12	EZRF-3012
	NRS 15x5	5	34	3	-	35	-	14x4x1.5	11.20	36.90	0.02	6.72	18.45	SFZ 12x1	12	EZRF-3012
20	NRS 20x2	2	42	5	-	65	-	20x4x1.5	33.00	66.00	0.02	19.80	33.00	SFZ 15x1	15	EZRF-3015
	NRS 20x4	4	42	5	-	65	-	20x4x1.5	29.54	68.63	0.02	17.72	34.31	SFZ 15x1	15	EZRF-3015
	NRS 20x5	5	42	5	-	65	-	20x4x1.5	27.80	56.29	0.02	16.68	28.15	SFZ 15x1	15	EZRF-3015
	NRS 20x6	6	42	5	-	65	-	20x4x1.5	26.42	65.17	0.02	15.91	39.13	SFZ 15x1	15	EZRF-3015
21	NRS 21x5	5	45	5	26	64	72	20x5x2	40.70	68.70	0.02	24.40	34.20	SFZ 17x1	17	EZRF-3017
	NRS 21x8	8	45	5	26	64	72	20x5x2	44.20	69.00	0.02	26.50	34.50	SFZ 17x1	17	EZRF-3017
	NRS 21x10	10	45	5	26	64	72	20x5x2	47.90	69.50	0.02	28.70	35.00	SFZ 17x1	17	EZRF-3017
23	NRS 23x2	2	45	4	30	55	65	20x5x2	40.89	66.80	0.02	24.63	33.40	SFZ 17x1	17	EZRF-3017
	NRS 23x4	4	45	5	30	55	65	20x5x2	40.12	64.38	0.02	24.17	32.19	SFZ 17x1	17	EZRF-3017
	NRS 23x8	8	45	5	30	55	65	20x5x2	38.41	69.02	0.04	23.14	34.51	SFZ 17x1	17	EZRF-3017
25	NRS 25x5	5	53	5	32	78	90	25x6x2.5	52.70	92.00	0.02	31.60	46.00	SFZ 20x1	20	EZRF-3020
	NRS 25x10	10	53	5	32	78	90	25x6x2.5	60.50	88.51	0.04	36.30	44.20	SFZ 20x1	20	EZRF-3020
27	NRS 27x2	2	53	4	35	55	69	20x5x2	44.32	77.66	0.02	26.70	38.83	SFZ 25x1.5	20	EZRF-3025
	NRS 27x4	4	53	5	35	55	69	20x5x2	40.34	80.76	0.02	24.30	40.38	SFZ 25x1.5	20	EZRF-3025
	NRS 27x8	8	53	5	35	55	69	20x5x2	42.10	99.26	0.04	25.36	49.63	SFZ 25x1.5	20	EZRF-3025

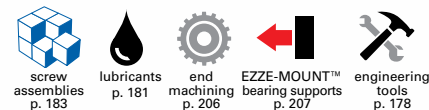


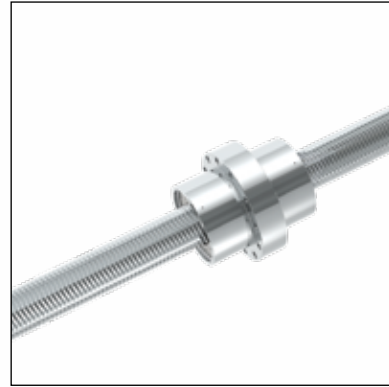


Nominal Screw Dia. d <sub>0</sub>	Dia. x Lead	Lead (mm)	D <sub>1</sub> (g6) (mm)	Q (mm)	D <sub>8</sub> (mm)	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)	Keyway L x b x h (mm)	ONE-PIECE NUT Load Rating		backlash (mm)	SPLIT NUT Load Rating		Locknut	End Code Type 5	EZZE-Mount
									Dynamic C <sub>a</sub> (kN)	Static C <sub>0a</sub> (kN)		Dynamic C <sub>a</sub> (kN)	Static C <sub>0a</sub> (kN)			
<b>30</b>	<b>NRS 30x2</b>	2	64	5	45	85	99	32x6x2.5	58.70	133.00	0.02	35.20	66.50	-	25	<b>EZRF-3025</b>
	<b>NRS 30x5</b>	5	64	5	45	85	99	32x6x2.5	76.70	122.30	0.02	46.00	61.15	-	25	<b>EZRF-3025</b>
	<b>NRS 30x10</b>	10	64	5	45	85	99	32x6x2.5	88.60	122.30	0.04	53.20	61.15	-	25	<b>EZRF-3025</b>
	<b>NRS 30x15</b>	15	64	5	45	85	99	32x6x2.5	96.40	119.40	0.07	57.80	59.70	-	25	<b>EZRF-3025</b>
	<b>NRS 30x20</b>	20	64	5	45	85	99	32x6x2.5	99.80	128.80	0.07	59.80	64.40	-	25	<b>EZRF-3025</b>
	<b>NRS 30x25</b>	25	64	5	45	85	99	32x6x2.5	102.40	143.20	0.07	61.40	71.60	-	25	<b>EZRF-3025</b>
<b>39</b>	<b>NRS 39x5</b>	5	80	7	50	110	126	40x8x3	107.70	228.50	0.02	64.60	114.30	-	35	<b>EZRF-3035</b>
	<b>NRS 39x10</b>	10	80	7	50	110	126	40x8x3	127.30	230.30	0.04	76.30	115.10	-	35	<b>EZRF-3035</b>
	<b>NRS 39x15</b>	15	80	7	50	110	126	40x8x3	138.30	228.10	0.04	82.80	114.00	-	35	<b>EZRF-3035</b>
	<b>NRS 39x20</b>	20	80	7	50	110	126	40x8x3	144.70	214.60	0.04	86.70	107.30	-	35	<b>EZRF-3035</b>
<b>44</b>	<b>NRS 44x12</b>	12	80	7	56	90	106	32x6x2.5	115.90	217.20	0.04	69.50	108.60	-	40	<b>EZRF-3040</b>
	<b>NRS 44x18</b>	18	80	7	56	90	106	32x6x2.5	127.40	215.00	0.07	76.40	107.50	-	40	<b>EZRF-3040</b>
	<b>NRS 44x24</b>	24	80	7	56	90	106	32x6x2.5	136.50	221.40	0.07	81.90	110.70	-	40	<b>EZRF-3040</b>
	<b>NRS 44x30</b>	30	80	7	56	90	106	32x6x2.5	133.80	206.30	0.07	80.20	103.10	-	40	<b>EZRF-3040</b>
<b>48</b>	<b>NRS 48x5</b>	5	100	7	63	127	142	45x8x3	165.10	334.30	0.02	99.00	167.15	-	45	<b>EZRF-3045</b>
	<b>NRS 48x10</b>	10	100	7	63	127	142	45x8x3	193.00	403.80	0.04	115.80	201.90	-	45	<b>EZRF-3045</b>
	<b>NRS 48x20</b>	20	100	7	63	127	142	45x8x3	215.10	369.00	0.07	129.00	184.50	-	45	<b>EZRF-3045</b>
<b>60</b>	<b>NRS 60x10</b>	10	130	10.5	77	162	180	45x10x3	282.30	662.60	0.04	169.40	331.30	SFZ 55x2	55	<b>EZRF-3055</b>
	<b>NRS 60x15</b>	15	130	10.5	77	162	180	45x10x3	307.00	656.30	0.07	184.20	328.20	SFZ 55x2	55	<b>EZRF-3055</b>
	<b>NRS 60x20</b>	20	130	10.5	77	162	180	45x10x3	325.00	558.90	0.07	195.00	279.45	SFZ 55x2	55	<b>EZRF-3055</b>
<b>64</b>	<b>NRS 64x30</b>	30	115	7	75	129	151	45x8x3	260.90	515.00	0.07	156.50	257.50	SFZ 60x2	60	<b>EZRF-3060</b>
	<b>NRS 64x36</b>	36	115	7	75	129	151	45x8x3	260.00	493.10	0.07	156.00	246.50	SFZ 60x2	60	<b>EZRF-3060</b>
	<b>NRS 64x42</b>	42	115	7	75	129	151	45x8x3	258.20	471.40	0.07	154.90	235.70	SFZ 60x2	60	<b>EZRF-3060</b>
<b>75</b>	<b>NRS 75x10</b>	10	150	10.5	98	191	211	63x10x3	411.10	969.40	0.04	246.00	484.70	SFZ 70x2	70	<b>EZRF-3070</b>
	<b>NRS 75x20</b>	20	150	10.5	98	191	211	63x10x3	483.40	816.20	0.07	290.00	408.10	SFZ 70x2	70	<b>EZRF-3070</b>
	<b>NRS 75x30</b>	30	150	10.5	98	206	224	63x10x3	461.40	866.90	0.07	276.80	433.45	SFZ 70x2	70	<b>EZRF-3070</b>
	<b>NRS 75x40</b>	40	160	10.5	98	200	218	63x10x3	595.80	906.10	0.07	-	-	SFZ 70x2	70	<b>EZRF-3070</b>
	<b>NRS 80x24</b>	24	150	10.5	98	200	224	63x10x3	650.90	1,078.00	0.07	-	-	SFZ 75x2	70	<b>EZRF-3075</b>
<b>100</b>	<b>NRS 100x25</b>	25	200	13	122.5	270	288	100x16x4	960.5	1412	0.07	-	-	-	-	-
	<b>NRS 100x50</b>	50	200	13	122.5	270	288	100x16x4	822.1	1292	0.07	-	-	-	-	-
<b>120</b>	<b>NRS 120x25</b>	25	240	15	176	280	304	100x16x4	1510	2376	0.07	-	-	-	-	-



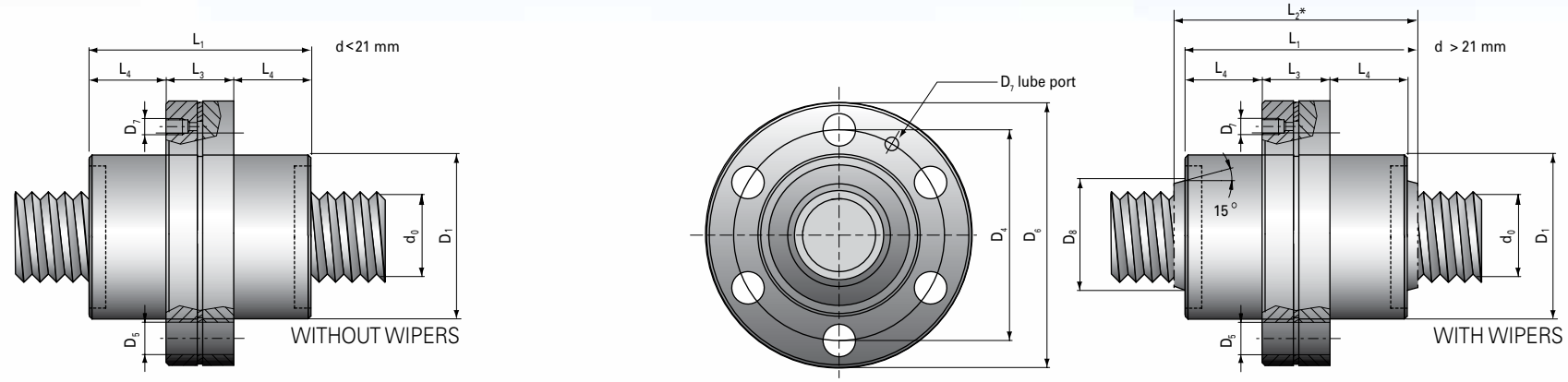
WITH WIPERS



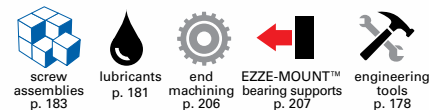


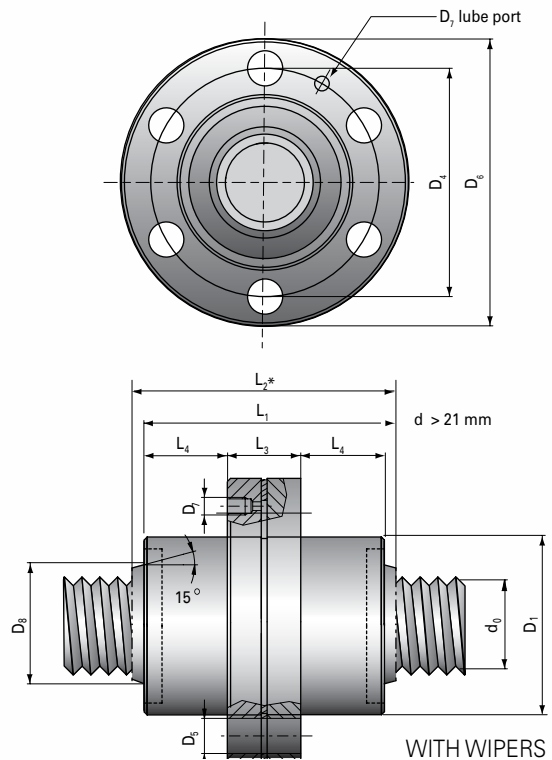
100 x 50 roller screw with flanged nut

Nook 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 <sub>0</sub>	Dia. x Lead	Lead (mm)	D <sub>1</sub> (g6) (mm)	D <sub>4</sub> (mm)	nxD <sub>5</sub> (mm)	D <sub>6</sub> (mm)	lube port						ONE-PIECE NUT Load Rating			SPLIT NUT Load Rating			Locknut	End Code Type 5	EZZE-Mount
							D <sub>7</sub> (mm)	D <sub>8</sub> (mm)	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)	L <sub>3</sub> (mm)	L <sub>4</sub> (mm)	D <sub>a</sub> (kN)	C <sub>0a</sub> (kN)	backlash (mm)	C <sub>a</sub> (kN)	C <sub>0a</sub> (kN)				
8	NRS 8x2	2	21	31	6x4.5	41	M4	-	31	41	13	14	6.98	17.91	0.02	4.19	8.90	-	-	-	
	NRS 8x4	4	21	31	6x4.5	41	M4	-	31	41	13	14	5.43	18.63	0.02	3.26	9.31	-	-	-	
12	NRS 12x2	2	26	36	6x4.5	46	M4	-	31	41	13	14	10.24	26.72	0.02	6.14	13.36	-	-	-	
	NRS 12x4	4	26	36	6x4.5	46	M4	-	31	41	13	14	8.92	27.74	0.02	5.35	13.87	-	-	-	
	NRS 12x5	5	26	36	6x4.5	46	M4	-	31	41	13	14	8.31	31.00	0.02	4.88	15.50	-	-	-	
15	NRS 15x2	2	34	45	6x5	56	M5	-	35	51	18	16.5	13.47	31.74	0.02	8.80	15.87	SFZ 12x1	12	EZRF-3012	
	NRS 15x4	4	34	45	6x5	56	M5	-	35	51	18	16.5	11.94	33.00	0.02	7.16	16.50	SFZ 12x1	12	EZRF-3012	
	NRS 15x5	5	34	45	6x5	56	M5	-	35	51	18	16.5	11.20	36.90	0.02	6.72	18.45	SFZ 12x1	12	EZRF-3012	
20	NRS 20x2	2	42	53	6x6	64	M6	-	55	65	20	22.5	33.00	66.00	0.02	19.80	33.00	SFZ 15x1	15	EZRF-3015	
	NRS 20x4	4	42	53	6x6	64	M6	-	55	65	20	22.5	29.54	68.63	0.02	17.72	34.31	SFZ 15x1	15	EZRF-3015	
	NRS 20x5	5	42	53	6x6	64	M6	-	55	65	20	22.5	27.80	56.29	0.02	16.68	28.15	SFZ 15x1	15	EZRF-3015	
	NRS 20x6	6	42	53	6x6	64	M6	-	55	65	20	22.5	26.42	65.17	0.02	15.91	39.13	SFZ 15x1	15	EZRF-3015	
21	NRS 21x5	5	45	56	6x6	68	M6	26	64	72	18	23	40.70	68.70	0.02	24.40	34.20	SFZ 17x1	17	EZRF-3017	
	NRS 21x8	8	45	56	6x6	68	M6	26	64	72	18	23	44.20	69.00	0.02	26.50	34.50	SFZ 17x1	17	EZRF-3017	
	NRS 21x10	10	45	56	6x6	68	M6	26	64	72	18	23	47.90	69.50	0.02	28.70	35.00	SFZ 17x1	17	EZRF-3017	
23	NRS 23x2	2	45	56	6x7	67	M6	30	55	65	20	22.5	24.63	33.40	0.02	24.63	33.40	SFZ 17x1	17	EZRF-3017	
	NRS 23x4	4	45	56	6x7	67	M6	30	55	65	20	22.5	24.17	32.19	0.02	24.17	32.19	SFZ 17x1	17	EZRF-3017	
	NRS 23x8	8	45	56	6x7	67	M6	30	55	65	20	22.5	23.14	34.51	0.04	23.14	34.51	SFZ 17x1	17	EZRF-3017	
25	NRS 25x5	5	53	70	6x7	84	M6	32	78	90	20	29	52.70	92.00	0.02	31.60	46.00	SFZ 20x1	20	EZRF-3020	
	NRS 25x10	10	53	70	6x7	84	M6	32	78	90	20	29	60.50	88.51	0.04	36.30	44.20	SFZ 20x1	20	EZRF-3020	
27	NRS 27x2	2	53	68	6x7	83	M6	35	55	69	22	23.5	44.32	77.66	0.02	26.70	38.83	SFZ 25x1.5	25	EZRF-3025	
	NRS 27x4	4	53	68	6x7	83	M6	35	55	69	22	23.5	40.34	80.76	0.02	24.30	40.38	SFZ 25x1.5	25	EZRF-3025	
	NRS 27x8	8	53	68	6x7	83	M6	35	55	69	22	23.5	42.10	99.26	0.04	25.36	49.63	SFZ 25x1.5	25	EZRF-3025	



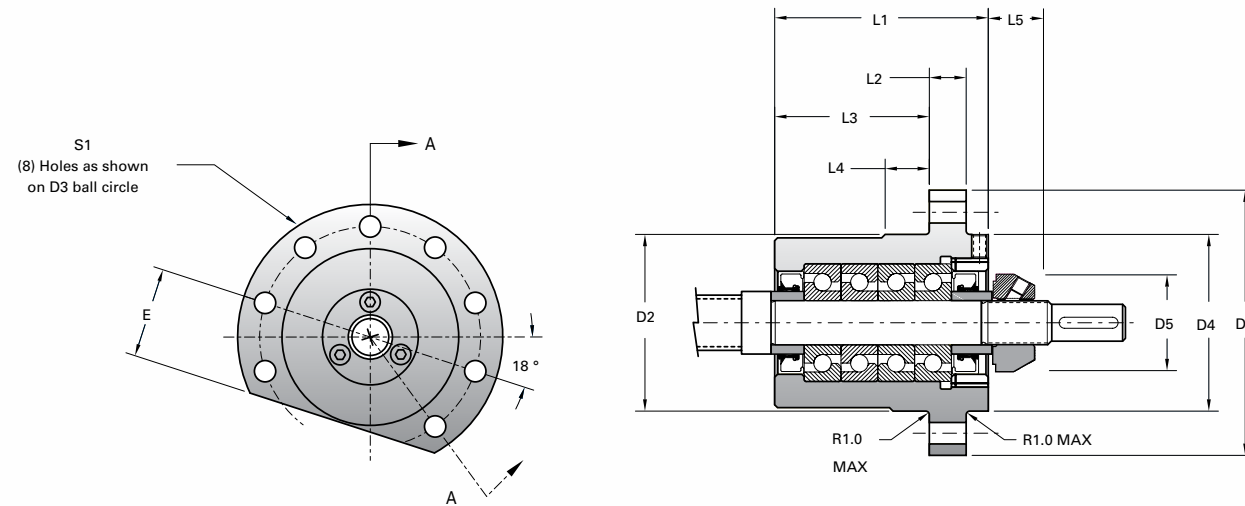


Nominal Screw Dia. $d_0$	Dia. x Lead	Lead (mm)	$D_1$ (g6) (mm)	$D_4$ (mm)	$n \times D_5$ (mm)	$D_6$ (mm)	lube port						ONE-PIECE NUT Load Rating Dynamic Static		backlash mm	SPLIT NUT Load Rating Dynamic Static		Locknut	End Code Type 5	EZZE-Mount
							$D_7$ (mm)	$D_8$ (mm)	$L_1$ (mm)	$L_2$ (mm)	$L_3$ (mm)	$L_4$ (mm)	$C_a$ (kN)	$C_{0a}$ (kN)		$C_a$ (kN)	$C_{0a}$ (kN)			
30	NRS 30x2	2	64	81	6x9	98	M6	45	85	99	27	29	58.70	133.00	0.02	35.20	66.50	SFZ 25x1.5	25	EZRF-3025
	NRS 30x5	5	64	81	6x9	98	M6	45	85	99	27	29	76.70	122.30	0.02	46.00	61.15	SFZ 25x1.5	25	EZRF-3025
	NRS 30x10	10	64	81	6x9	98	M6	45	85	99	27	29	88.60	122.30	0.04	53.20	61.15	SFZ 25x1.5	25	EZRF-3025
	NRS 30x15	15	64	81	6x9	98	M6	45	85	99	27	29	96.40	119.40	0.07	57.80	59.70	SFZ 25x1.5	25	EZRF-3025
	NRS 30x20	20	64	81	6x9	98	M6	45	85	99	27	29	99.80	128.80	0.07	59.80	64.40	SFZ 25x1.5	25	EZRF-3025
	NRS 30x25	25	64	81	6x9	98	M6	45	85	99	27	29	102.40	143.20	0.07	61.40	71.60	SFZ 25x1.5	25	EZRF-3025
39	NRS 39x5	5	80	102	6x11	124	M6	54	110	126	33	38.5	107.70	228.50	0.02	64.60	114.30	SFZ 35x1.5	35	EZRF-3035
	NRS 39x10	10	80	102	6x11	124	M6	54	110	126	33	38.5	127.30	230.30	0.04	76.30	115.10	SFZ 35x1.5	35	EZRF-3035
	NRS 39x15	15	80	102	6x11	124	M6	54	110	126	33	38.5	138.30	228.10	0.04	82.80	114.00	SFZ 35x1.5	35	EZRF-3035
	NRS 39x20	20	80	102	6x11	124	M6	54	110	126	33	38.5	144.70	214.60	0.04	86.70	107.30	SFZ 35x1.5	35	EZRF-3035
44	NRS 44x12	12	80	102	6x11	124	M8x1	56	90	106	33	28.5	115.90	217.20	0.04	69.50	108.60	SFZ 40x1.5	40	EZRF-3040
	NRS 44x18	18	80	102	6x11	124	M8x1	56	90	106	33	28.5	127.40	215.00	0.07	76.40	107.50	SFZ 40x1.5	40	EZRF-3040
	NRS 44x24	24	80	102	6x11	124	M8x1	56	90	106	33	33.5	136.50	221.40	0.07	81.90	110.70	SFZ 40x1.5	40	EZRF-3040
	NRS 44x30	30	80	102	6x11	124	M8x1	56	90	106	33	33.5	133.80	206.30	0.07	80.20	103.10	SFZ 40x1.5	40	EZRF-3040
48	NRS 48x5	5	100	127	6x13.5	150	M8x1	63	127	142	37	45	165.10	334.30	0.02	99.00	167.15	SFZ 45x1.5	40	EZRF-3045
	NRS 48x10	10	100	127	6x13.5	150	M8x1	63	127	142	37	45	193.00	403.80	0.04	115.80	201.90	SFZ 45x1.5	40	EZRF-3045
	NRS 48x20	20	100	127	6x13.5	150	M8x1	63	127	142	37	45	215.10	369.00	0.07	129.00	184.50	SFZ 45x1.5	40	EZRF-3045
60	NRS 60x10	10	130	160	8x16.75	190	M8x1	79	162	180	45	58.5	282.30	662.60	0.04	169.40	331.30	SFZ 55x2	55	EZRF-3055
	NRS 60x15	15	130	160	8x16.75	190	M8x1	79	162	180	45	58.5	307.00	656.30	0.07	184.20	328.20	SFZ 55x2	55	EZRF-3055
	NRS 60x20	20	130	160	8x16.75	190	M8x1	79	162	180	45	58.5	325.00	558.90	0.07	195.00	279.45	SFZ 55x2	55	EZRF-3055
64	NRS 64x30	30	115	150	8x16.75	180	M8x1	75	129	151	45	42	260.90	515.00	0.07	156.50	257.50	SFZ 60x2	60	EZRF-3060
	NRS 64x36	36	115	150	8x16.75	180	M8x1	75	129	151	45	42	260.00	493.10	0.07	156.00	246.50	SFZ 60x2	60	EZRF-3060
	NRS 64x42	42	115	150	8x16.75	180	M8x1	75	129	151	45	42	258.20	471.40	0.07	154.90	235.70	SFZ 60x2	60	EZRF-3060
	NRS 64x50	50	115	150	8x16.75	180	M8x1	75	129	151	45	42	258.20	471.40	0.07	154.90	235.70	SFZ 60x2	60	EZRF-3060
75	NRS 75x10	10	150	180	8x16.75	210	M8x1	98	191	211	45	73	411.10	969.40	0.04	246.00	484.70	SFZ 70x2	70	EZRF-3070
	NRS 75x20	20	150	180	8x16.75	210	M8x1	98	191	211	45	73	483.40	816.20	0.07	290.00	408.10	SFZ 70x2	70	EZRF-3070
	NRS 75x30	30	150	180	8x16.75	210	M8x1	98	206	224	45	80.5	461.40	866.90	0.07	276.80	433.45	SFZ 70x2	70	EZRF-3070
	NRS 75x40	40	160	180	8x16.75	210	M8x1	98	200	218	45	77.5	820.00	980.00	0.07	-	-	SFZ 70x2	70	EZRF-3070
80	NRS 80x24	24	150	180	8x16.75	210	M8x1	98	200	224	45	77.5	840.00	1,260.00	0.07	-	-	SFZ 75x2	75	EZRF-3075
100	NRS 100x25	25	200	245	12x17.5	275	M8x1	122.5	270	288	65	102.5	960.5	1412	0.07	-	-	-	-	-
	NRS 100x50	50	200	245	12x17.5	275	M8x1	122.5	270	288	65	102.5	822.1	1292	0.07	-	-	-	-	-

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

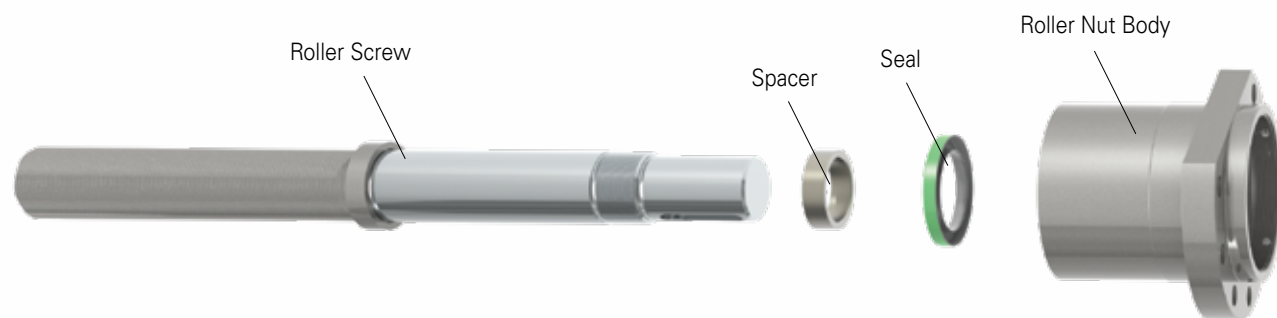
Roller screw high load ratings and extreme performance characteristics place large demands on end support units. Nook Industries has developed support units capable of handling these demands. Nook series EZRF end support units are

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
<b>EZRF-3012</b>	NRS 15	67	10	51	14	15	72	48	60	48	30	25	5.8
<b>EZRF-3015</b>	NRS 20	72	10	55.5	15	17	82	54	68	54	33	28	6.8
<b>EZRF-3017</b>	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
<b>EZRF-3020</b>	NRS 25	82	12	62	17	19	100	64	82	64	40	33	8.8
<b>EZRF-3025</b>	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
<b>EZRF-3035</b>	NRS 39	115	20	83.5	23	23	140	100	120	100	54	51	10.8
<b>EZRF-3040</b>	NRS 44	125	20	90.5	25	23	160	112	136	112	65	57	12.8
<b>EZRF-3045</b>	NRS 48	135	20	99.5	27	23	174	125	150	125	70	63.5	12.8
<b>EZRF-3055</b>	NRS 60	152	25	111.5	31	26	214	150	182	150	85	76	16.8
<b>EZRF-3060</b>	NRS 64	169	25	127.5	33	27	226	162	194	162	90	82	16.8
<b>EZRF-3070</b>	NRS 75	186	30	137.5	37	29	268	188	228	188	100	95	20.8
<b>EZRF-3075</b>	NRS 80	196	30	146.5	39	29	290	211	251	211	105	109	20.8

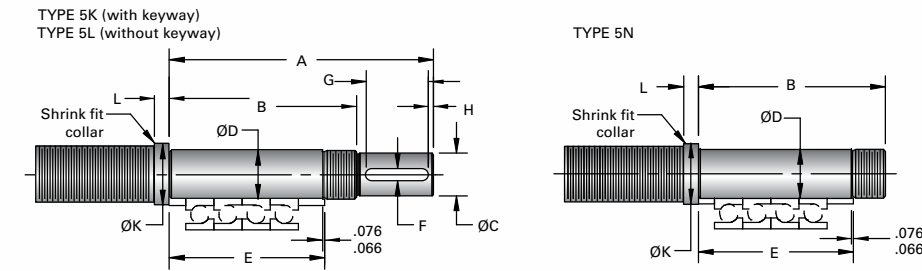
all dimensions in millimeters



## TYPE 5 END MACHINING USED WITH EZRF BEARING MOUNTS

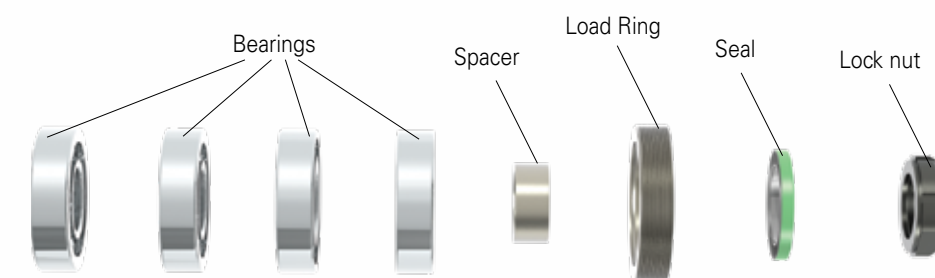
Specifying standard machined ends results in quicker deliveries. The machined ends shown below represent designs that are compatible with common application requirements for fixed bearing support.

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.



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



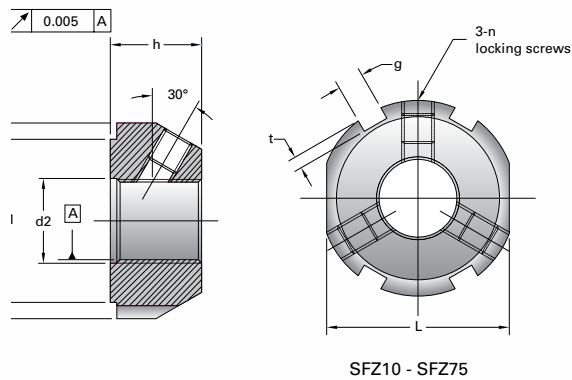


Precision ground locknuts



SFZ Locknut on an EZRF bearing mount

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



Conventional locknuts may not be suitable in a typical roller screw application due to the high axial load generated. Nook 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.

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

**EZZE-MOUNT™**  
PRECISION SCREW SUPPORTS



Nook EZZE-MOUNT™ bearing blocks

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Flange-Mount Single and Double Bearing  
Support ..... 198-199

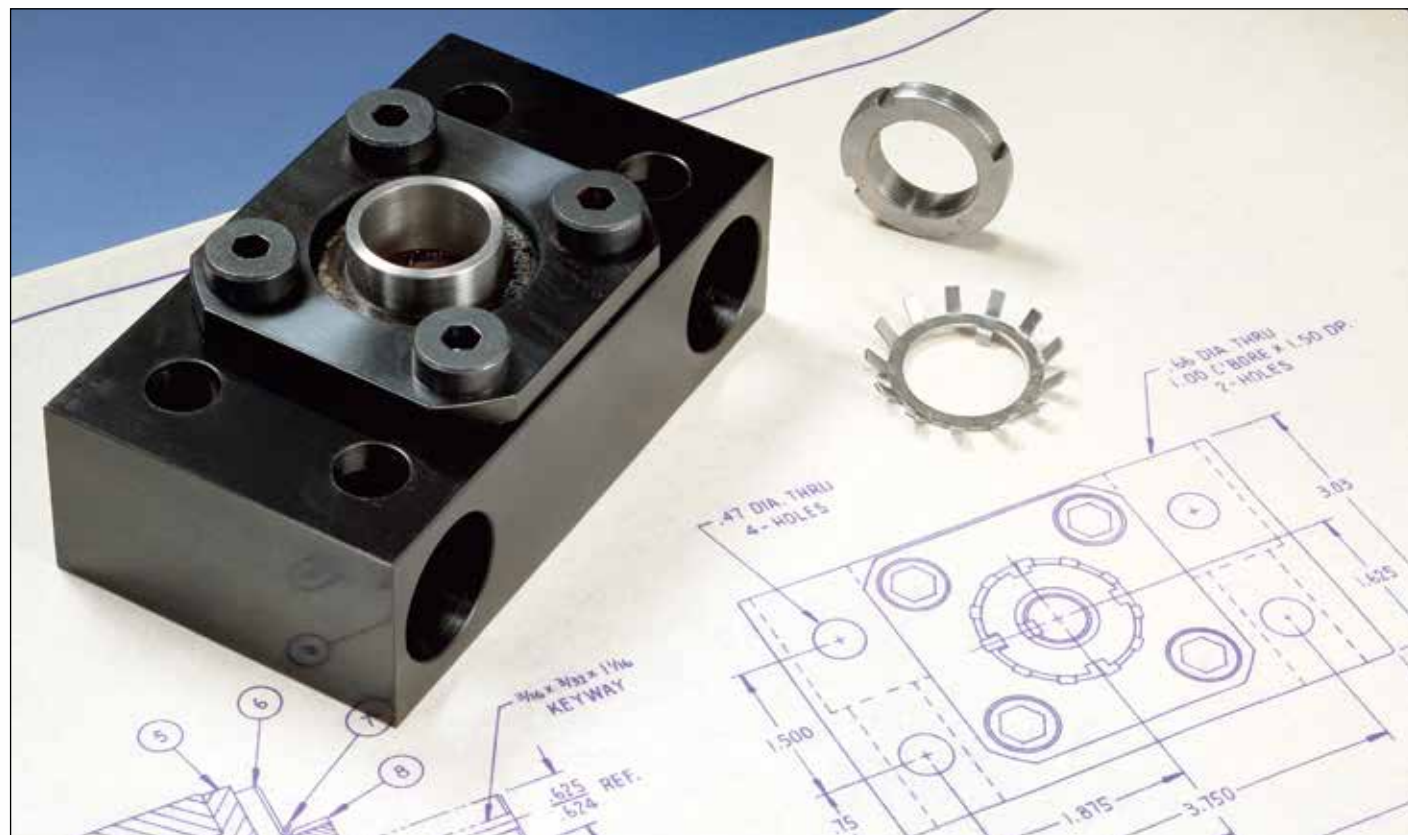
Universal Mount Bearing Support with Motor  
Mount ..... 200

Flange Mount Bearing Support with Motor  
Mount ..... 201

BEARING MOUNTS  
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 Industries, Inc. offers both the bearing mounts and end machining as a complete assembly.



Nook Industries 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 Industries 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 industries 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 192-194 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 Industries 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

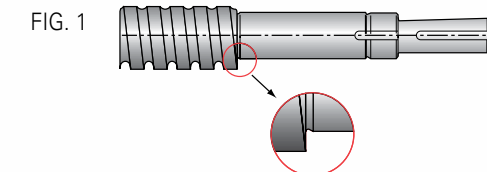
See pages 12-13 and 66-67 for a more detailed definition of end fixity.

**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 Industries 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)



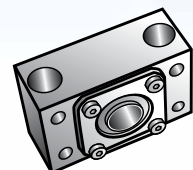
**CONCENTRICITY**

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.

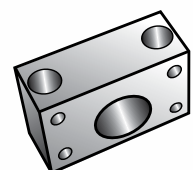
**APPROVAL DRAWINGS**

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.

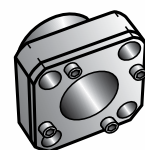
**QUICK REFERENCE:**  
**MACHINED ENDS BEARING SUPPORTS**  
**ACME SCREWS**



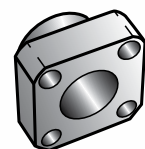
Universal Mount  
Double Bearing



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
3/4 - 2	12	8	EZM-3102	EZM-4012	EZF-3012	EZF-4012
3/4 - 6	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
3/4 - 10	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
7/8 - 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
1 1/8 - 5	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1 1/4 - 4	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
1 1/4 - 5	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1 1/2 - 2	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1 1/2 - 2 3/8	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
1 1/2 - 4	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1 1/2 - 5	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1 1/2 - 10	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
1 3/4 - 4	35	19	—	—	—	—
2 - 2	35	19	—	—	—	—
2 - 4	40	22	—	—	—	—
2 - 5	40	28	—	—	—	—
2 1/4 - 2	40	24	—	—	—	—
2 1/4 - 4	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2 1/2 - 2	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
2 1/2 - 3	50	32	—	—	—	—
2 1/2 - 4	50	32	—	—	—	—
3 - 2	60	39	EZM-3060	EZM-4060	—	—
3 3/8 - 1 1/2	65	39*	—	—	—	—
3 3/4 - 1 1/2	75	48	—	—	—	—
4 1/2 - 1 1/2	95	55	—	—	—	—
5 - 1 1/2	105	67	—	—	—	—
6 - 1 1/2	—	—	—	—	—	—

\* Some journals may show tracings of the thread

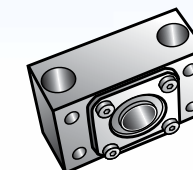
See PowerAc™ pages 34-49 for screw dimensions. Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 195.

**QUICK REFERENCE:**  
**MACHINED ENDS BEARING SUPPORTS**  
**TRAPEZOIDAL SCREWS**

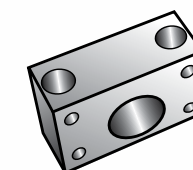
NOMINAL DIA-LEAD	END CODE TYPE		EZZE-MOUNT™			
			UNIVERSAL MOUNTS		FLANGE MOUNTS	
			1,2,3	4	Double	Single
Tr 20x4	12	8	EZM-3017	EZM-3017	EZF-3017	EZF-3017
Tr 12x3	7	4	EZM-1007	EZM-4007	EZF-1007	EZF-4007
Tr 16x4	10	6	EZM-3010	EZM-4010	EZF-3010	EZF-4010
Tr 20x4	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
Tr 26x6	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
Tr 40x7	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
Tr 55x12	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
Tr 65x12	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045

\* Some journals may show tracings of the thread

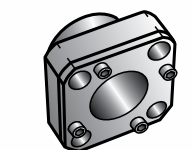
See PowerAc™ pages 52-57 for screw dimensions. Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 195



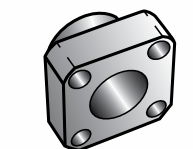
Universal Mount  
Double Bearing



Universal Mount  
Single Bearing



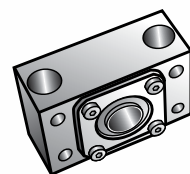
Flange Mount  
Double Bearing



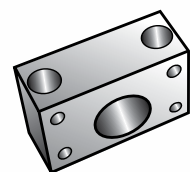
Flange Mount  
Single Bearing



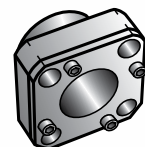
**QUICK REFERENCE:**  
**MACHINED ENDS BEARING SUPPORTS** ←  
**INCH SRT, XPR AND SGT PRECISION BALL SCREWS**



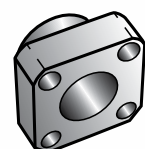
Universal Mount  
Double Bearing



Universal Mount  
Single Bearing



Flange Mount  
Double Bearing



Flange Mount  
Single Bearing

NOMINAL DIA-LEAD	END CODE TYPE		EZZE-MOUNT™			
	1,2,3	4	UNIVERSAL MOUNTS		FLANGE MOUNTS	
			Double	Single	Double	Single
<b>0375-0125</b>	7	4	EZM-1007	EZM-4007	EZF-1007	EZF-4007
<b>0500-0200</b>	10	6	EZM-3010	EZM-4010	EZF-3010	EZF-4010
<b>0500-0500</b>	8	6	EZM-1008	EZM-4008	EZF-1008	EZF-4008
<b>0631-0200</b>	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
<b>0631-0500</b>	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
<b>0631-1000</b>	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
<b>0750-0200</b>	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
<b>0750-0500</b>	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
<b>0875-0200</b>	17	10	EZM-3017	EZM-4017	EZF-3017	EZF-4017
<b>1000-0200</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>1000-0250</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>1000-0500</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>1000-1000</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>1150-0200</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1171-0413</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>1250-0200</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1250-0500</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1500-0200</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>1500-0250</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>1500-0473</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1500-0500 SRT</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1500-0500 XPR</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1500-0500 SGT</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>1500-1000</b>	25	16	EZM-3025	EZM-4025	EZF-3025	EZF-4025
<b>1500-1875</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>2000-0200</b>	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
<b>2000-0400</b>	45*	28*	EZM-3045	EZM-4045	EZF-3045	EZF-4045
<b>2250-0500</b>	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
<b>2250-1000</b>	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
<b>2500-0250</b>	50	32	—	—	—	—
<b>2500-0500</b>	50	32	—	—	—	—
<b>3000-0660</b>	60	39	EZM-3060	EZM-4060	—	—
<b>3000-1500</b>	60	39	EZM-3060	EZM-4060	—	—
<b>4000-1000</b>	80	48	EZM-3080	—	—	—
<b>6000-1000</b>	—	—	—	—	—	—

\* Some journals may show tracings of the thread

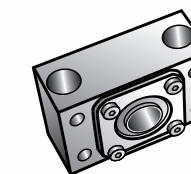
See PowerTrac™ pages 86-139 for screw dimensions. Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 183.

**QUICK REFERENCE:**  
**MACHINED ENDS BEARING SUPPORTS** ←  
**METRIC MRT AND PMT BALL SCREWS**

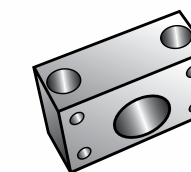
NOMINAL DIA-LEAD	END CODE TYPE		EZZE-MOUNT™			
	1,2,3	4	UNIVERSAL MOUNTS		FLANGE MOUNTS	
			Double	Single	Double	Single
<b>16 × 5 MRT/PMT</b>	12	8	EZM-3012	EZM-4012	EZF-3012	EZF-4012
<b>20 × 5 MRT/PMT</b>	15	8	EZM-3015	EZM-4015	EZF-3015	EZF-4015
<b>25 × 5 MRT/PMT</b>	20	12	EZM-2020	EZM-4020	EZF-2020	EZF-4020
<b>40 × 10 MRT/PMT</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>40 × 40 MRT</b>	30	19	EZM-2030	EZM-4030	EZF-2030	EZF-4030
<b>50 × 10 MRT/PMT</b>	45	28	EZM-3045	EZM-4045	EZF-3045	EZF-4045
<b>50 × 50 MRT</b>	40	24	—	—	—	—
<b>63 × 12 MRT/PMT</b>	50	32	—	—	—	—

See PowerTrac™ pages 150-161 for screw dimensions.

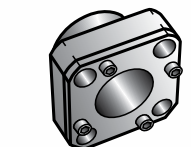
Note: When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 195.



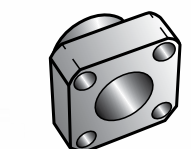
Universal Mount  
Double Bearing



Universal Mount  
Single Bearing



Flange Mount  
Double Bearing



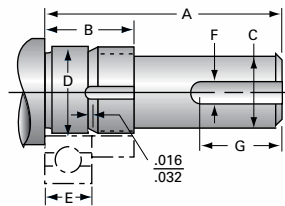
Flange Mount  
Single Bearing



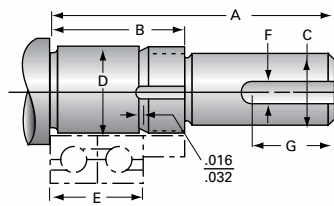
Specifying standard machined ends results in quicker deliveries. The machined ends shown below represent designs that are compatible with common application requirements for either simple or fixed bearing support. Included in the chart are the locknut and lockwasher

identification. 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™

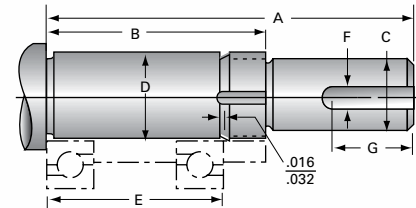
**Type 1K** (with keyway)  
**Type 1L** (without keyway)



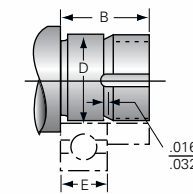
**Type 2K** (with keyway)  
**Type 2L** (without keyway)



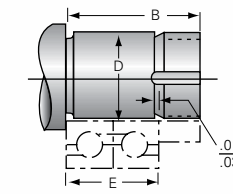
**Type 3K** (with keyway)  
**Type 3L** (without keyway)



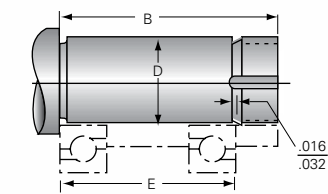
**Type 1N**



**Type 2N**



**Type 3N**



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)						Locknut	Lock-washer
	A	B	E	A	B	E	A	B	E	C	D	F	G				
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	1/4-20	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		
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 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 Industries 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

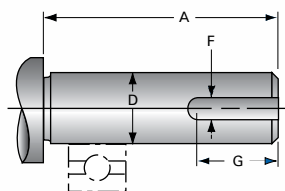
EZZE-MOUNTS™

**MACHINED ENDS**  
**DRAWINGS AND CODES** *continued*

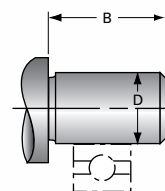
TYPE 4 (K, L, N)  
Typical Journal for Pillow Block

Machine End Code	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

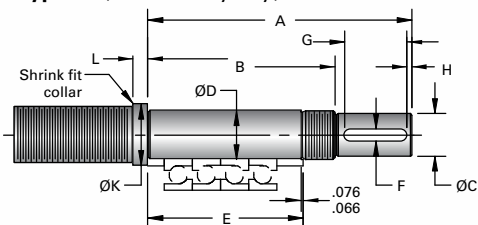
**Type 4K** (with keyway)  
**Type 4L** (without keyway)



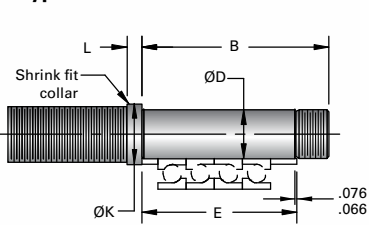
**Type 4N**



**Type 5K** (with keyway)  
**Type 5L** (without keyway)



**Type 5N**



Machine End Code	TYPE 5 (K, L) Typical Journal for EZRF Bearing Block (in)					COMMON DIMENSIONS FOR TYPE 5 (K L N) (in)					
	A	C	F	G	H	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 x 1
15	5.24	.472/.471	0.157	1.30	0.12	3.66	.5909/.5904	2.913	0.87	0.35	SFZ 15 x 1
17	5.55	.591/.590	0.197	1.30	0.12	3.98	.6696/.6692	3.150	0.94	0.35	SFZ 17 x 1
20	5.94	.669/.668	0.197	1.46	0.16	4.13	.7878/.7872	3.307	1.10	0.35	SFZ 20 x 1
25	6.69	.787/.786	0.236	1.61	0.20	4.69	.9846/.9841	3.740	1.26	0.39	SFZ 25 x 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 x 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 x 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 x 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 x 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 x 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 x 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 x 2

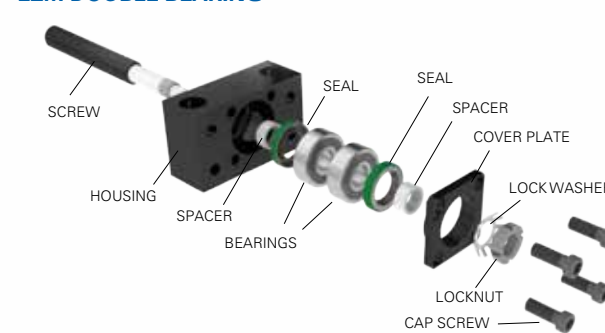
**CAUTION:** When using fixed bearing mounts on both ends, contact Nook Engineering to determine the mount-to-mount length tolerance of the final assembly.

**EZZE-MOUNT™**  
**END BEARING IDENTIFICATION**

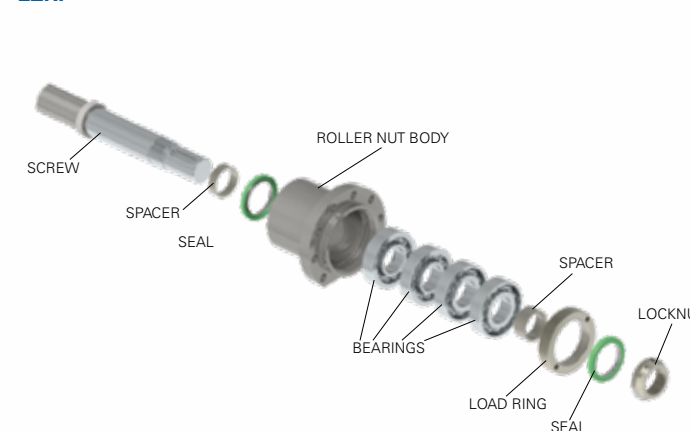
**EZM SINGLE BEARING**



**EZM DOUBLE BEARING**



**EZRF**



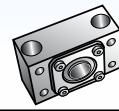
EZM Part#	Bearing	Locknut No.	Locknuts Max Axial Load Lb
EZM-1007* EZF-1007*	627-2RS1	¼"-20	1800
EZM-1008* EZF-1008*	608-2RS1	⅝"-24	2300
EZM-1009* EZF-1009*	629-2RS1	⅝"-24	2300
EZM-3010* EZF-3010*	6000-2RS1	N-00	4100
EZM-3012 EZF-3012	7301	N-01	6900
EZM-3015 EZF-3015	7302	N-02	8100
EZM-3017 EZF-3017	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.

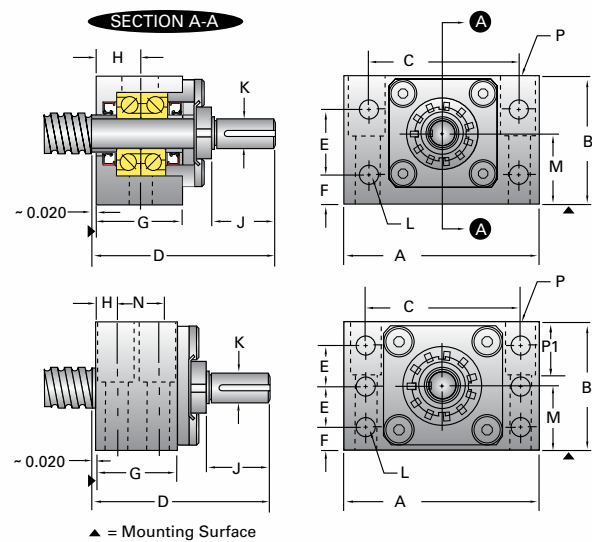
EZRF Part#	Bearing	Locknut No.	Locknuts Max Axial Load kN
EZRF-3012	7301	SFZ 12x1	40
EZRF-3015	7302	SFZ 15x1	60
EZRF-3017	7303	SFZ 17x1	80
EZRF-3020	7304	SFZ 20x1	90
EZRF-3025	7305	SFZ 25x1.5	130
EZRF-3035	7307	SFZ 35x1.5	190
EZRF-3040	7308	SFZ 40x1.5	210
EZRF-3045	7309	SFZ 45x1.5	240
EZRF-3055	7311	SFZ 55x2	340
EZRF-3060	7312	SFZ 60x2	380
EZRF-3070	7314	SFZ 70x2	490
EZRF-3075	7315	SFZ 75x2	520

EZZE-MOUNTS™

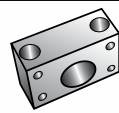
# EZZE-MOUNT™ UNIVERSAL MOUNT SINGLE AND DOUBLE BEARING SUPPORT



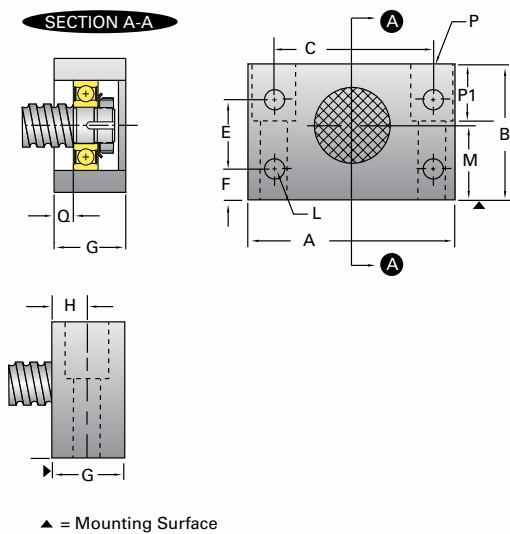
**Universal-Mount Double**  
Double Angular Contact Bearing, which should be used with Type 3 Standard Ends



Double Part No.	A	B	C	D	E	F	G	H	J	K Shaft Dia.	L Thru (4 or 6)	M	N	P				Q	End Code
														Bolt Size (2 or 4)	Thru	C'Bore	P1		
EZM-1007	2.00	1.38	1.50	1.94	0.88	0.25	1.06	0.50	0.46	0.187 0.186	0.22(4)	0.687	—	¼ × 1¾(2)	0.28	0.41	0.41	—	7
EZM-1008	2.00	1.38	1.50	2.00	0.88	0.25	1.06	0.50	0.56	0.250 0.249	0.22(4)	0.687	—	¼ × 1¾(2)	0.28	0.41	0.41	—	8
EZM-1009	2.75	2.00	2.00	2.38	1.38	0.31	1.19	0.56	0.56	0.250 0.249	0.28(4)	1.000	—	⅝ × 2(2)	0.34	0.50	0.56	—	9
EZM-3010	2.75	2.00	2.00	2.50	1.38	0.31	1.19	0.56	0.69	0.312 0.311	0.28(4)	1.000	—	⅝ × 2(2)	0.34	0.50	0.56	—	10
EZM-3012	3.50	2.22	2.75	3.29	1.25	0.50	1.38	0.69	1.30	0.406 0.405	0.28(4)	1.187	—	⅝ × 1¾(2)	0.41	0.62	1.00	—	12
EZM-3015	3.50	2.52	2.75	3.50	1.25	0.80	1.38	0.69	1.30	0.500 0.499	0.28(4)	1.438	—	⅝ × 2½(2)	0.41	0.62	1.00	—	15
EZM-3017	4.50	2.69	3.38	3.65	1.38	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
EZM-2020	5.00	3.03	3.75	4.03	1.50	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
EZM-3025	6.50	3.69	4.75	4.45	2.00	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
EZM-2030	6.50	3.69	4.75	4.86	2.00	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
EZM-3045	8.50	5.62	6.62	6.68	1.81	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
EZM-3060	10.00	7.50	8.00	9.22	2.50	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
EZM-3080	12.50	8.50	10.00	11.56	2.75	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



**Universal-Mount Single**  
Single Radial Bearing, which should be used with Type 1 Standard Ends



Single Part No.	A	B	C	D	E	F	G	H	J	K Shaft Dia.	L Thru (4 or 6)	M	N	P				Q	End Code
														Bolt Size (2 or 4)	Thru	C'Bore	P1		
EZM-4007	2.00	1.38	1.50	—	0.88	0.25	1.06	0.50	—	—	0.22(4)	0.687	—	¼ × 1¾(2)	0.28	0.41	0.41	0.19	7
EZM-4008	2.00	1.38	1.50	—	0.88	0.25	1.06	0.50	—	—	0.22(4)	0.687	—	¼ × 1¾(2)	0.28	0.41	0.41	0.19	8
EZM-4009	2.75	2.00	2.00	—	1.38	0.31	1.19	0.56	—	—	0.28(4)	1.000	—	⅝ × 2(2)	0.34	0.50	0.56	0.38	9
EZM-4010	2.75	2.00	2.00	—	1.38	0.31	1.19	0.56	—	—	0.28(4)	1.000	—	⅝ × 2(2)	0.34	0.50	0.56	0.38	10
EZM-4012	3.50	2.22	2.75	—	1.25	0.50	1.38	0.69	—	—	0.28(4)	1.187	—	⅝ × 1¾(2)	0.41	0.62	1.00	0.33	12
EZM-4015	3.50	2.52	2.75	—	1.25	0.80	1.38	0.69	—	—	0.28(4)	1.438	—	⅝ × 2½(2)	0.41	0.62	1.00	0.33	15
EZM-4017	4.50	2.69	3.38	—	1.38	0.62	1.69	0.84	—	—	0.41(4)	1.500	—	½ × 2¼(2)	0.53	0.88	1.25	0.38	17
EZM-4020	5.00	3.03	3.75	—	1.50	0.75	1.72	0.86	—	—	0.47(4)	1.625	—	⅝ × 2½(2)	0.66	1.00	1.50	0.5	20
EZM-4025	6.50	3.69	4.75	—	2.00	0.88	1.94	0.97	—	—	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	0.52	25
EZM-4030	6.50	3.69	4.75	—	2.00	0.88	1.94	0.97	—	—	0.66(4)	1.875	—	⅞ × 3¼(2)	0.91	1.38	1.75	0.52	30
EZM-4045	8.50	5.62	6.62	—	1.81	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
EZM-4060	10.00	7.50	8.00	—	2.50	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

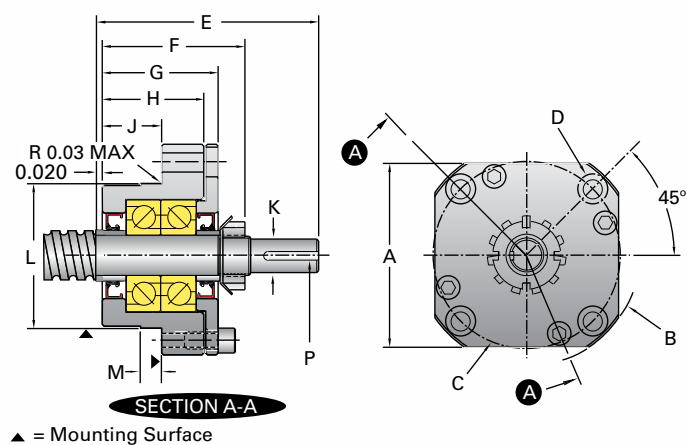
**Note:** When selecting the bearing support for an application with high axial loads, the capacities of the bearings and locknuts must be considered. See page 195

**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

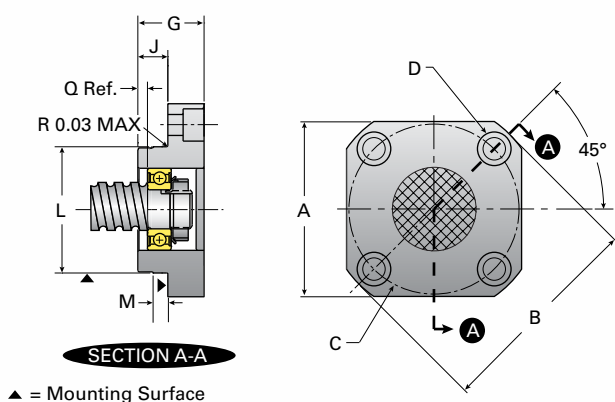


Double Part No.	A	B	C	D Thru	C'bore	E	F	G	H	J	K Shaft Dia.	L	M	P	Q	END CODE
EZF-1007	1.88	2.44	1.875	0.266	0.44	1.94	1.44	1.06	0.82	0.50	0.187-0.186	1.3775-1.3770	0.188	0.063	—	7
EZF-1008	1.88	2.44	1.875	0.266	0.44	2.00	1.44	1.06	0.82	0.50	0.250-0.249	1.3775-1.3770	0.188	0.094	—	8
EZF-1009	2.00	2.60	2.000	0.266	0.44	2.38	1.81	1.33	1.09	0.71	0.250-0.249	1.4957-1.4951	0.188	0.094	—	9
EZF-3010	2.00	2.60	2.000	0.266	0.44	2.50	1.81	1.33	1.09	0.71	0.312-0.311	1.4957-1.4951	0.190	0.125	—	10
EZF-3012	2.50	3.17	2.500	0.266	0.44	3.29	1.99	1.57	1.38	0.75	0.406-0.405	1.8894-1.8888	0.312	0.125	—	12
EZF-3015	2.70	3.27	2.750	0.281	0.44	3.50	2.10	1.71	1.50	0.88	0.500-0.499	2.1256-2.1250	0.312	0.125	—	15
EZF-3017	3.38	4.03	3.250	0.344	0.53	3.65	2.33	1.93	1.63	0.94	0.500-0.499	2.5193-2.5185	0.312	0.125	—	17
EZF-2020	3.38	4.03	3.250	0.344	0.53	4.03	2.71	1.98	1.72	1.03	0.625-0.624	2.5193-2.5185	0.312	0.188	—	20
EZF-3025	4.38	5.31	4.250	0.531	0.81	4.45	2.89	2.36	1.94	1.19	0.750-0.749	3.1492-3.1482	0.375	0.188	—	25
EZF-2030	4.38	5.31	4.250	0.531	0.81	4.86	3.05	2.36	1.94	1.19	0.999-1.000	3.1492-3.1482	0.375	0.250	—	30
EZF-3045	6.50	7.88	6.313	0.781	1.25	6.68	4.47	4.01	3.22	1.97	1.375-1.374	4.8025-4.8015	0.500	0.313	—	45



**Flange-Mount Single**

Single Radial Bearing, which should be used with Type 1 Standard Ends

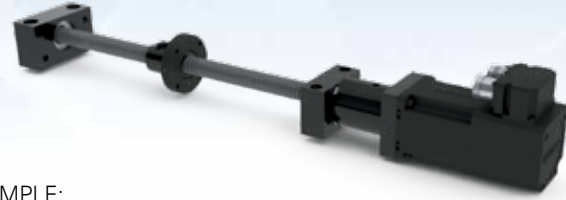


Single Part No.	A	B	C	D Thru	C'bore	E	F	G	H	J	K Shaft Dia.	L	M	P	Q	END CODE
EZF-4007	1.88	2.44	1.875	0.266	0.44	—	—	1.00	—	0.40	—	1.3775 1.3770	0.188	—	0.13	7
EZF-4008	1.88	2.44	1.875	0.266	0.44	—	—	1.00	—	0.40	—	1.3775 1.3770	0.188	—	0.13	8
EZF-4009	2.00	2.60	2.000	0.266	0.44	—	—	1.00	—	0.44	—	1.4957 1.4951	0.188	—	0.13	9
EZF-4010	2.00	2.60	2.000	0.266	0.44	—	—	1.00	—	0.44	—	1.4957 1.4951	0.190	—	0.13	10
EZF-4012	2.50	3.17	2.500	0.266	0.44	—	—	1.15	—	0.55	—	1.8894 1.8888	0.312	—	0.13	12
EZF-4015	2.70	3.27	2.750	0.281	0.44	—	—	1.25	—	0.63	—	2.1256 2.1250	0.312	—	0.20	15
EZF-4017	3.38	4.03	3.250	0.344	0.53	—	—	1.32	—	0.63	—	2.5193 2.5185	0.312	—	0.20	17
EZF-4020	3.38	4.03	3.250	0.344	0.53	—	—	1.47	—	0.72	—	2.5193 2.5185	0.312	—	0.20	20
EZF-4025	4.38	5.31	4.250	0.531	0.81	—	—	1.67	—	0.76	—	3.1492 3.1482	0.375	—	0.25	25
EZF-4030	4.38	5.31	4.250	0.531	0.81	—	—	1.67	—	0.76	—	3.1492 3.1482	0.375	—	0.25	30
EZF-4045	6.50	7.88	6.313	0.781	1.25	—	—	2.50	—	1.25	—	4.8025-4.8015	0.500	—	0.50	45

**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 195



# 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 195.

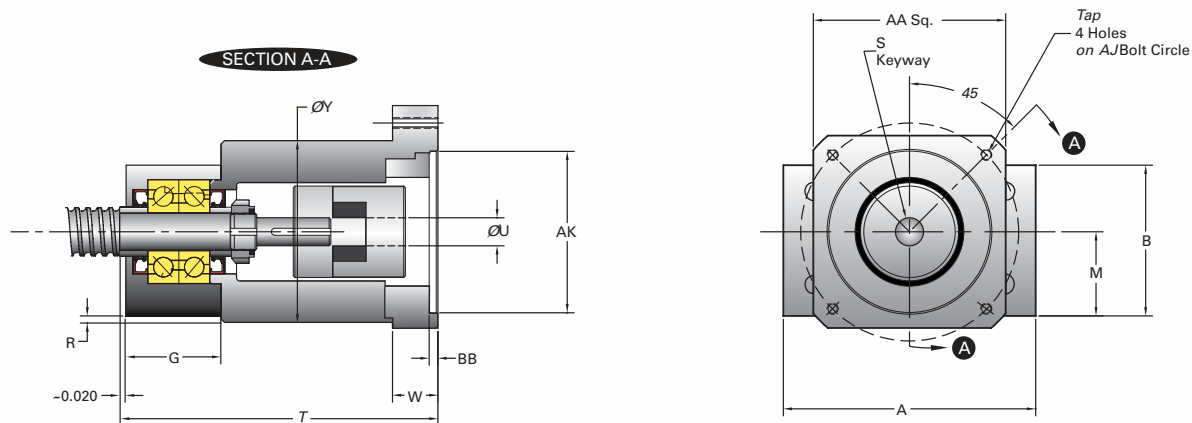
EXAMPLE:

1000-0250 SRT RH / U3 / 4N / 41.87 / SBN7508 / FS  
EZM-2020-34

EXAMPLES OF EZM DESIGNATIONS:

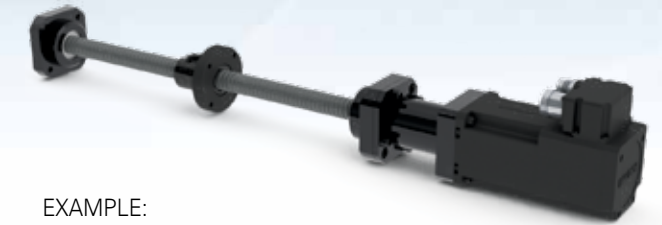
U1, U2, U3 or U4 = Standard Mount available above  
UX = modified, further explanation needed (i.e.: Special Frame)

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	3.25	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	1/4"-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	1/4"-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	1/4"-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	1/4"-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 208 - 210.

# EZZE-MOUNT™ FLANGE MOUNT BEARING SUPPORT WITH MOTOR MOUNT



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 195.

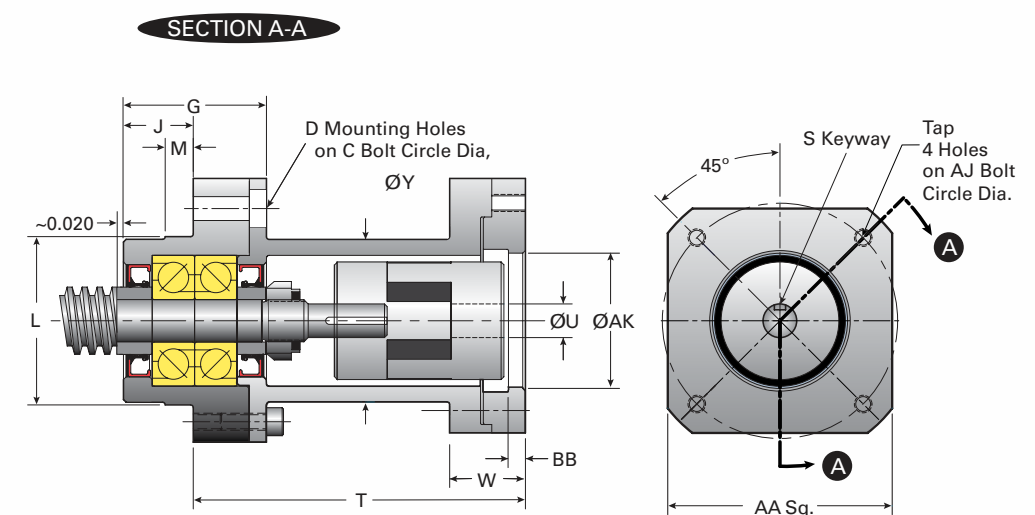
EXAMPLE:

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	1/4"-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	1/4"-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	1/4"-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	1/4"-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



# Power•Torq™

PRECISION BALL  
SPLINE ASSEMBLIES



Power•Torq™ splines are used in many paper manufacturing applications

**PRECISION BALL SPLINE ASSEMBLY  
TECHNICAL INTRODUCTION.....204-209**  
 Glossary and Technical Data ..... 204-207  
 Lubrication and Maintenance ..... 207  
 Life Expectancy and Critical Speed  
 Charts..... 208-209

**INCH BALL SPLINE  
TECHNICAL DATA ..... 210-213**  
 0375-3-0156 to 1000-6-0187 .....210-211  
 1500-6-0250 to 2500-6-0312 ..... 212-213

## BALL SPLINES

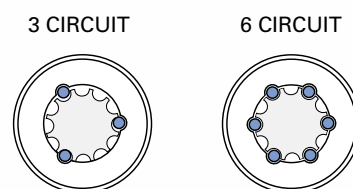
## GLOSSARY AND TECHNICAL DATA

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 Industries, 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 209 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.



### LOAD DEFINITIONS

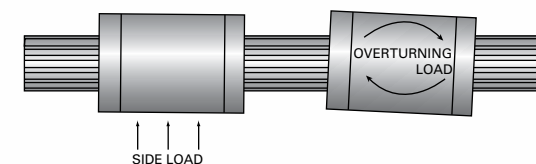
**DYNAMIC TORQUE LOAD** - The torque load which, when applied to the ball spline assembly, will allow a minimum life of 1,000,000 inches of travel.

**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 210-213 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.



## GLOSSARY AND TECHNICAL DATA



**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-900 Ball Screw Lubricant is oil that has been developed specifically for ball screws and ball splines and is available as a spray or liquid.

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 Industries 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 66-67.

**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 value. The formula used to calculate critical speed is found on page 208. The critical speed chart can also be used to quickly determine the minimum diameter.



## E-900 LUBRICANT

E-900 Ball Screw Lubricant protects against inter-ball friction, wear, corrosion, and oxidation. E-900 Ball Screw Lubricant may be used on PowerTorq™ Ball Splines. E-900 will provide a lasting film for wear protection and resistance to corrosion. With an operating range of -65° to +375°F, E-900 has low rolling friction characteristics and helps reduce inter-ball friction in ball spline assemblies.

For optimum results, the ball spline assembly should be in good repair and free of dirt and grease. Used regularly, E-900 will extend the life of ball spline assemblies. It should be applied generously on the entire length of the spline.

### E-900 SPRAY CAN

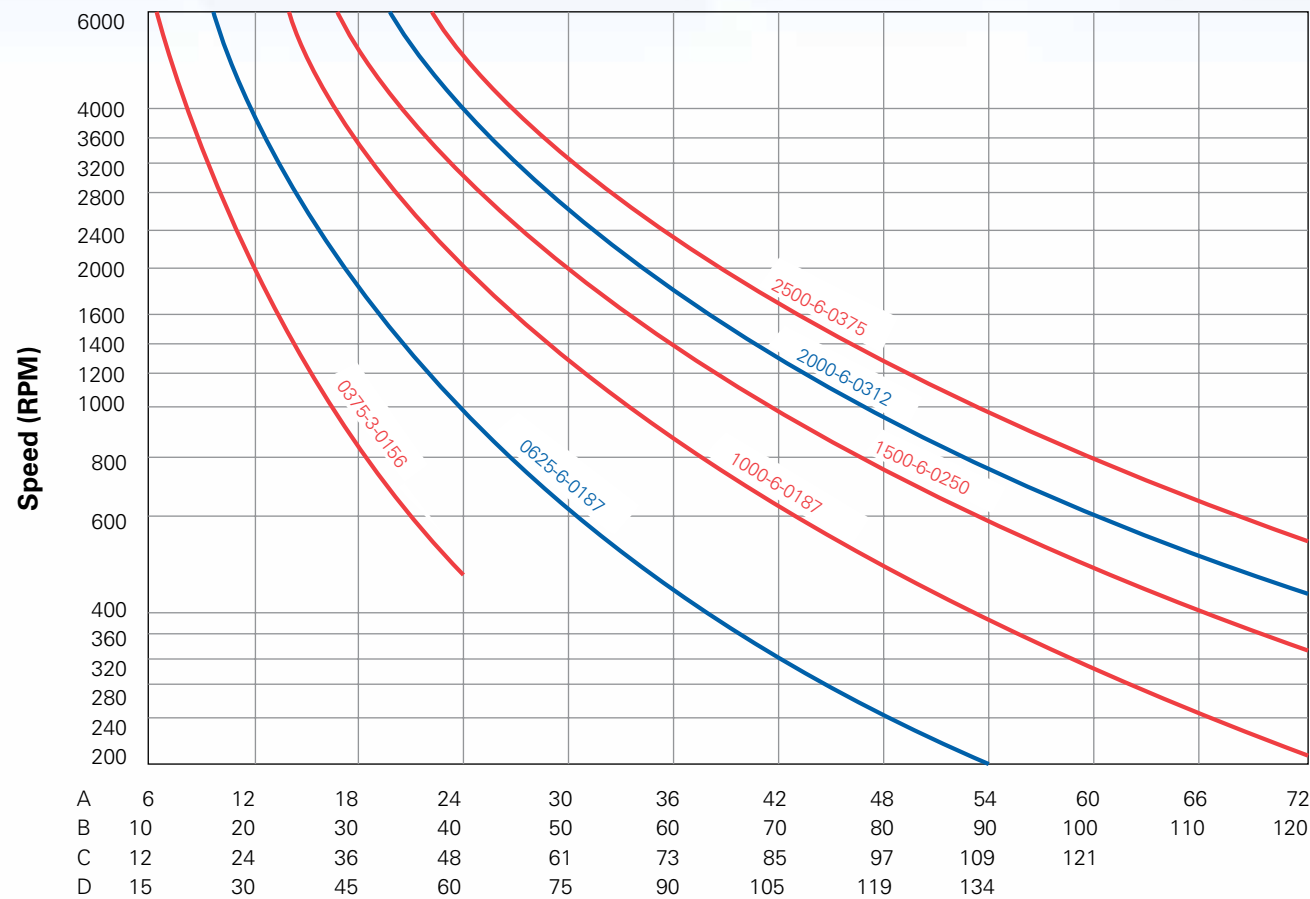
PART NAME	E-900
NET CONTENTS PER UNIT	12 oz.
PART # NLU-1003	1 CAN weight of 1 lb
PART # NLU-2003	1 CASE with 12 cans - total weight of 13 lb

### E-900 LIQUID

PART NAME	E-900L
PART # NLU-1004	1 BOTTLE weight of 32 oz.
PART # NLU-2004	1 CASE with 12 quarts - total weight of 25 lb 5 oz.



### CRITICAL SPEED: PRECISION BALL SPLINES



Maximum Length (Inches) Between Bearings and Load

See page 66-67 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.

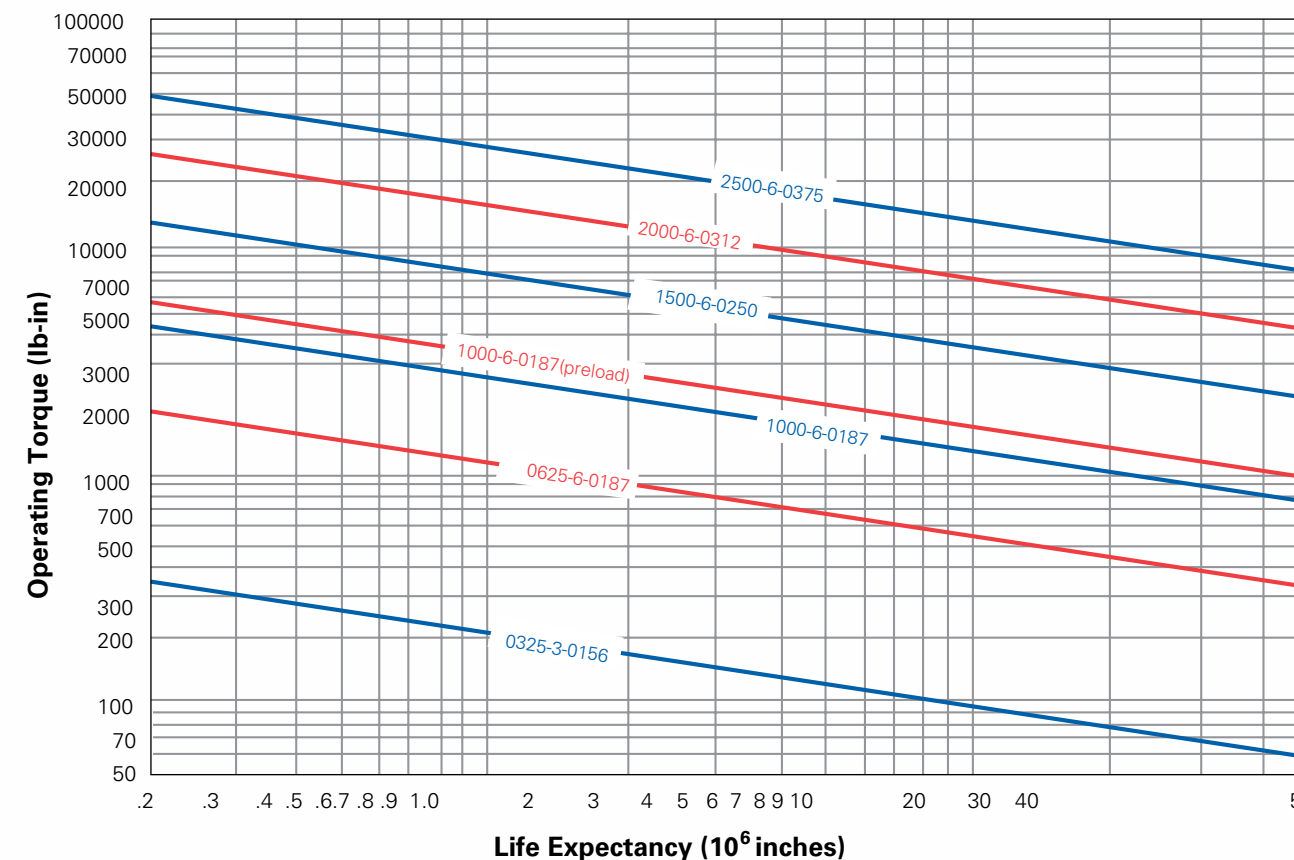
**To use this chart:**

- [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

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.

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.

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:

**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.

$$T_m = \sqrt[3]{\frac{\%_1(T_1)^3 + \%_2(T_2)^3 + \%_3(T_3)^3 + \dots + \%_n(T_n)^3}{100}}$$

WHERE:

T<sub>m</sub> = equivalent load  
 T<sub>n</sub> = each increment of load  
 %<sub>n</sub> = percent of stroke at load T<sub>n</sub>

FOR EXAMPLE:

T<sub>1</sub> = 150 pound-inch  
 T<sub>2</sub> = 225 pound-inch  
 T<sub>3</sub> = 725 pound-inch

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

T = 466 pound-inch

The specifications and data in this publication are believed to be accurate and reliable. However, it is the responsibility of the product user to determine the suitability of Nook Industries products for a specific application. While defective products will be replaced without charge if promptly returned, no liability is assumed beyond such replacement.

	Outer Race Number	Active Circuits	Performance	Dynamic Torque (in-lb)	Static Torque (in-lb)	Optional Keyway	Outer Race Wt. (lb)	Balls per outer race	Ball Return	Max custom inner race length	Nominal size (in)	Root Dia. (in)	Nominal Ball Dia. (in)	Inner Race Wt. (lb/ft)		
<b>0375-3-0156</b> 0.375 Nominal Size (in) 0.156 Nominal Ball Dia (in)	<b>HPR6900</b>	<b>3</b>	high performance	200	656	$\frac{3}{16} \times \frac{3}{32} \times 1$	0.32	54	Cast	2'	0.375	0.200	0.156	0.310		
<b>0625-6-0187</b> 0.625 Nominal Size (in) 0.187 Nominal Ball Dia (in)	<b>HPR8943</b>	<b>6</b>	high performance	1770	3540	$\frac{1}{4} \times \frac{1}{8} \times 1.125$	0.98	120	Cast	4'	0.625	0.425	0.187	1.400		
<b>1000-6-0187</b> 1.000 Nominal Size (in) 0.187 Nominal Ball Dia (in)	<b>HPR8944</b>	<b>6</b>	high performance	2600	7880	$\frac{1}{4} \times \frac{1}{8} \times 1.625$	4.00	156	Cast	12'	1.000	0.800	0.187	2.200		

**STANDARD INNER RACE LENGTHS**

	<b>375-3-0156</b>	<b>0625-6-0187</b>	<b>1000-6-0187</b>
2 ft	SRR7547	—	—
4 ft	—	SRR7548	SRR6068
8 ft	—	—	SRR6076
12 ft	—	—	SRR6084

For longer lengths, contact Customer Service.



	Outer Race Number	Active Circuits	Performance	Dynamic Torque (in-lb)	Static Torque (in-lb)	Optional Keyway	Outer race wt (lb)	Balls per outer race		Ball Return	Max custom inner race length	Nominal size (in)	Root Dia (in)	Nominal Ball Dia. (in)	Inner Race Wt. (lb/ft)		
<b>1500-6-0250</b>																	
1.500 Nominal Size (in) 0.250 Nominal Ball Dia (in)																	
	<b>SOR8945</b>	<b>6</b>	standard	8,400	23,170	$\frac{3}{8} \times \frac{3}{16} \times 2.00$	3.42	168		Stamped	12'	1.500	1.250	0.250	5.25		
	<b>HPR8945</b>	<b>6</b>	high performance	8,400	23,170	$\frac{3}{8} \times \frac{3}{16} \times 2.00$	4.00	168		Cast	12'	1.500	1.250	0.250	5.25		
<b>2000-6-0312</b>																	
2.000 Nominal Size (in) 0.312 Nominal Ball Dia (in)																	
	<b>HPR8946</b>	<b>6</b>	high performance	16,000	40,270	$\frac{1}{2} \times \frac{7}{32} \times 2.50$	4.48	144		Cast	12'	2.000	1.670	0.312	9.90		
<b>2500-6-0375</b>																	
2.500 Nominal Size (in) 0.375 Nominal Ball Dia (in)																	
	<b>HPR8947</b>	<b>6</b>	high performance	27,000	62,250	$\frac{1}{2} \times \frac{1}{4} \times 3.00$	6.60	132		Cast	12'	2.500	2.100	0.375	15.80		

**STANDARD INNER RACE LENGTHS**

	<b>1500-3-0250</b> <b>1500-6-0250</b>	<b>2000-3-0312</b> <b>2000-6-0312</b>	<b>2500-3-0375</b> <b>2500-6-0375</b>
4 ft	SRR6372	SRR6420	SRR6468
8 ft	SRR6380	SRR6428	SRR6476
12 ft	SRR6388	SRR6436	SRR6484

For longer lengths, contact Customer Service.





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