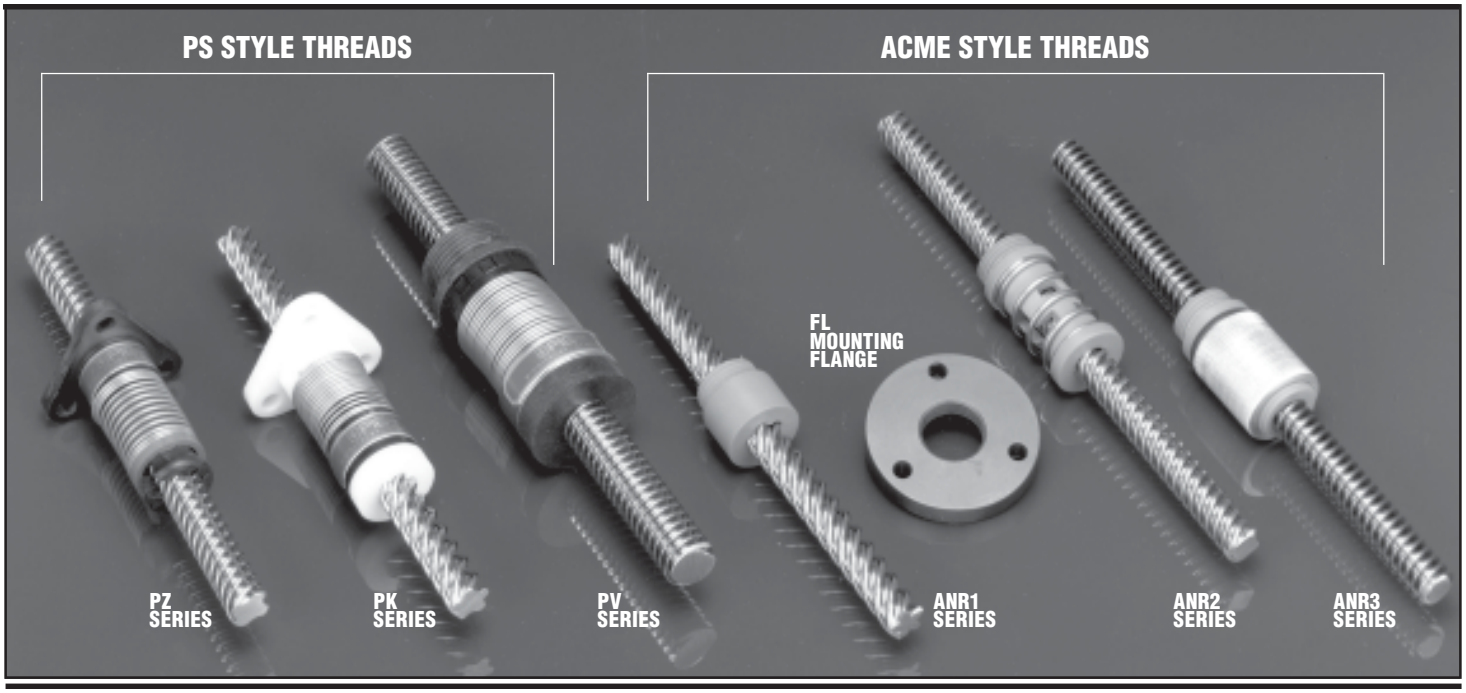
PIC DESIGN®

PRECISION INDUSTRIAL COMPONENTS

LEAD SCREWS & NUTS

A Range Of Styles / Inch And Metric Sizes



PIC Design has significantly increased its range of lead screws and nuts to provide users with the most complete line in the industry. Designers are no longer confined to the original Acme lead screws ... the new and innovative PS Series employs a modified thread form that is designed for maximum life and quiet operation when used in conjunction with the patented anti-backlash nuts.

PIC DESIGN LEAD SCREWS

Lead screws provide an economical solution for the transfer of rotary motion to linear motion. All PIC Design lead screws are precision rolled from 303 stainless steel with a lead accuracy of .0006 in/in (mm/mm). They are stocked in both inch and metric sizes with diameters that range from $^{3}/_{16}$" to $^{3}/_{4}$". Lengths are available up to six feet.

The now familiar precision rolled Acme lead screws are available with the above noted accuracy when used with Turcite X (Acetal-Teflon and Silicone filled) nuts.

The new PS style lead screws have accuracies similar to that of the Acme line, but feature a positional repeatability to within 50 micro-inches. These lead screws feature a burnished finish of 16 micro-inches, and a straightness of .003 in/ft.

PS style lead screws are available uncoated or coated with a custom composition of baked-on Teflon. This coating greatly improves lubricity and extends the normal life of the assembly by as much as 300%.

PS STYLE THREADS

Anti-Backlash Nuts

The standard method for taking up backlash is to bias two nut halves axially using a type of compliant spring. Using this method, the spring force must be at least as great as the load to be moved.

The new PS style lead screws use a patented axial take-up mechanism, which effectively puts a stiff spacer between the nut halves. By using this design, the nut functions independently of the load, resulting in a low drag torque. Nuts are a self-lubricating polyacetal material.

PZ Series anti-backlash nuts are ideal for vertical applications requiring noise and vibration control. This series accommodates lead screws with moderate loads, and diameters from $^{1}/_{4}$" to $^{1}/_{2}$".

PK Series anti-backlash nuts are very low in frictional drag and are specifically designed for $^{3}/_{8}$" diameter lead screws.

PV Series anti-backlash nuts provide the maximum load carrying capability and the lightest axial and radial stiffness. This results in smooth, quiet operation, and long life. The PV series is best suited for higher loads, and is thus used on PIC's largest lead screws with $^{1}/_{2}$" and $^{3}/_{4}$" diameters.

ACME STYLE THREADS

Power And Anti-Backlash Nuts

PIC Design offers three Turcite X nuts that are compatible with Acme style lead screws. Each nut offers distinct advantages.

ANR1 Series power nuts are used where a range of .003" to .007" axial backlash can satisfy user requirements. The ANR1 is the most economical.

ANR2 Series anti-backlash nuts are designed for applications requiring positional accuracy and repeatability. The ANR2 anti-backlash nut assembly consists of two halves with an axially compliant spring that provides some ability to fine tune preload. The spring preload on the nut must be approximately 5% greater than the axial load on the system.

ANR3 Series anti-backlash nuts are designed to be adjusted. An "O" ring spacer is placed between the two halves of the nut. The back half of the nut is adjusted by simply turning the outside body until desired preload is obtained. The "O" ring provides for minor screw thread deviations. ANR3 series nuts can be used for higher loads than the ANR2 series.

BALL SCREWS & NUTS

See the complete line of B style precision rolled ball screws & nuts starting on page 3-15.

TECHNICAL SECTION

TERMINOLOGY

The glossary of terms and basic formulas presented below will aid designers in evaluating system requirements. Critical system parameters such as torque, efficiency, maximum load and critical speed are easily evaluated.

- **Lead Screw Assembly:** A screw and nut device used for the purpose of transmitting motion or power as opposed to fastening.
- **Backlash:** Free axial movement between screw and nut.
- **Column Strength:** Maximum compressive load that can be applied to a shaft without taking a permanent set.
- **Critical Speed:** Operating speed of spinning shaft that develops severe vibrations during rotation. This is a function of length, diameter and end supports.
- **Drag Torque:** The torque necessary to drive the lead screw assembly alone.
- **Efficiency:** Ratio of work output to work input; varies with lead, thread angle and coefficient of friction (see screw data).
- **Lead:** Distance traveled by the nut in one revolution (equal to the screw pitch x the number of starts).
- **Lead Angle:** The angle made by the helix of the thread at the screw pitch line with plane perpendicular to the screw axis.
- **Major Diameter:** The diameter of a cylinder formed by the crests of the thread.
- **Minor Diameter:** The root diameter.
- **Pitch:** The distance as measured parallel to the thread axis between corresponding points on adjacent thread forms, generally equal to the lead divided by the number of starts.
- **Self Locking:** When it is impossible for a thrust load on a nut to create a torque on its screw, the screw and nut are said to be self-locking. A self-locking screw will not convert thrust to torque. Generally, Acme screws are self-locking while most high lead and ball screw are non self-locking. A non self-locking screw will require a mechanical brake or some other locking means to a sustain a load.
- **Stroke:** The axial distance traveled by the nut in either direction.
- **Thread per inch:** The reciprocal of the pitch is the number of threads per inch.

The application engineering information in this section should enable the designer to fully evaluate the lead screws offered in this catalog.

CRITICAL SPEED / ANGULAR VELOCITY

When a shaft is spinning, as in the case of an operating Lead screw, it will experience excessive vibration at a speed approximating its natural frequency of vibration. This speed is called the "Critical Speed" and good design practice dictates that speed should be limited to 85% of a shaft's first order critical speed. Critical speed is a function of shaft diameter, end support configuration and unsupported length. These speeds are shown in graphic form for various shaft diameters, lengths and supports.

COLUMN STRENGTH / COMPRESSION LOAD

Under compressive loading a sufficiently slender shaft will fail by elastic instability at a load well below the shaft's elastic limit or rated load. A graph is provided to show the maximum safe column load for various diameters, lengths and supports. Shaft slenderness ratios exceeding 200 are not recommended and the curves are dotted for these ratios. Column strength limitations do not apply to shafts under tension loads.

TORQUE, ROTARY TO LINEAR (Torque needed to move load)

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

TORQUE, LINEAR TO ROTARY (Backdriving Torque)

$$\text{Torque to hold load} = \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

If greater than 1 may backdrive*

FORWARD DRIVING EFFICIENCY (See screw data)

$$E_F = (\tan \lambda)\ [(\cos \Phi_n - f \tan \lambda) / (\cos \Phi_n \tan \lambda + f)]$$

BACKWARD DRIVING EFFICIENCY

$$E_B = (1/\tan \lambda)\ [(\cos \Phi_n \tan \lambda - f) / (\cos \Phi_n + f \tan \lambda)]$$

$$= \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

f = Coefficient of friction
E_B = Back drive efficiency
E_F = Forward drive efficiency
λ = Thread lead angle
Φ_n = Thread angle in normal plane. (29° for ACME Thread, 30° for Metric Trapezoidal, 40° for Precision PS Series.)

SCREW RPM

$$\text{RPM} = \frac{\text{Velocity (in/min)}}{\text{Lead (in/rev)}}$$

COLUMN LOAD STRENGTH (Based on Eulers Formula)

$$Pcr = \frac{14.03 \times 10^6 Fcd^4}{L^2}$$

Pcr = maximum load (lbs.)
Fc = end support factor (see page 3-3)
= .25 one end fixed, other free
= 1.00 both ends supported
= 2.00 one end fixed, other supported
= 4.00 both ends fixed
d = root diameter of screw (inches)
L = maximum distance between nut & load carrying bearing (inches)

When possible, design for tension loads to eliminate the buckling factor and reduce the required screw size.

CRITICAL SCREW SHAFT SPEED

(Maximum rotational speed of a screw)

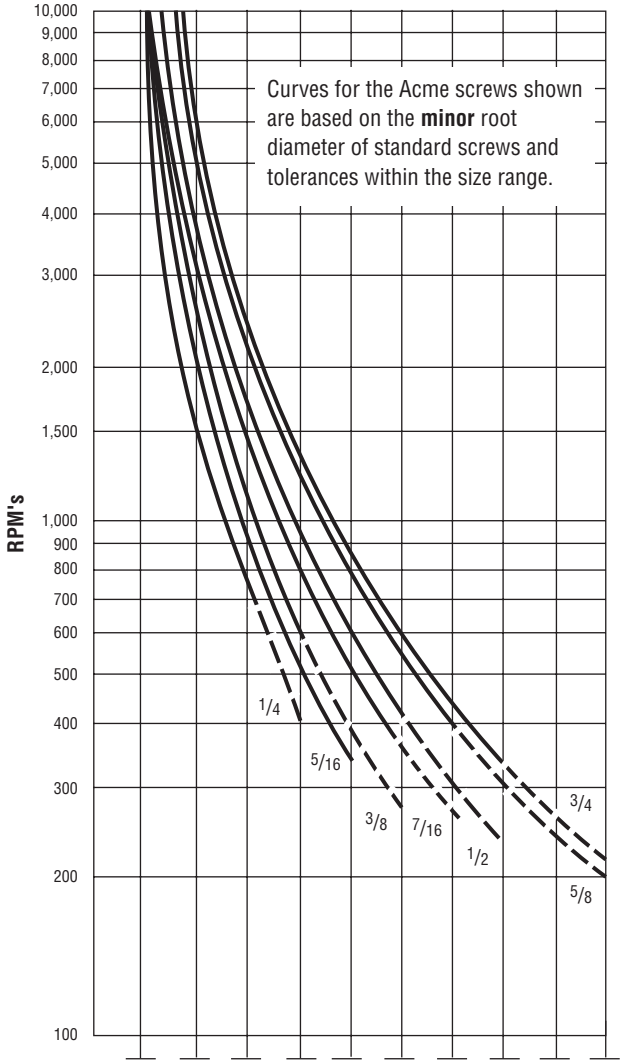
$$Cs = F \times 4.76 \times 10^6 \times \frac{d}{L^2}$$

Cs = Critical speed (RPM)
d = root diameter of screw (inches)
L = Length between supports (inches)
F = end support factor (see page 3-3)
.36 one end fixed, other free
1.00 simple supports both ends
1.47 one end fixed, one simple
2.23 both ends fixed

Critical shaft speed should be reduced to 85% to allow for other factors such as alignment and straightness.

* If the lead is greater than 1/3 of the diameter, it may backdrive

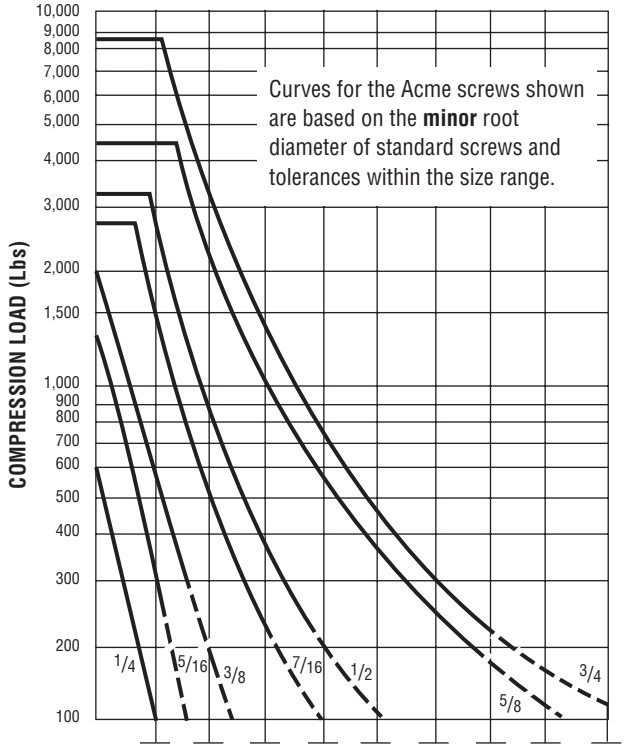
CRITICAL LEAD SCREW SPEED vs. LEAD SCREW LENGTH



A Fixed-Free	6	12	18	24	30	36	42	48	54	60
B Simple-Simple	10	20	30	40	50	60	70	80	90	100
C Fixed-Simple	12	24	36	48	61	73	85	97	109	121
D Fixed-Fixed	15	30	45	60	75	90	105	119	134	149

Maximum Length Between Bearings (Inches)

MAXIMUM COMPRESSION LOAD vs. LEAD SCREW LENGTH



A Fixed-Free	5	10	15	20	25	30	35	40	45
B Simple-Simple	10	20	30	40	50	60	70	80	90
C Fixed-Simple	14	28	42	57	71	85	99	113	127
D Fixed-Fixed	20	40	60	80	100	120	140	160	180

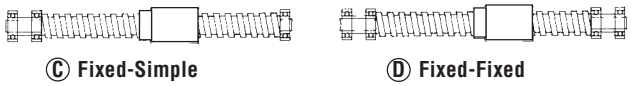
Maximum Length Between Bearings (Inches)

ASCERTAINING COMPRESSION LOADS

Use procedure similar to that for finding critical shaft speed

END SUPPORT CONFIGURATIONS

Ⓐ Fixed-Free Ⓑ Simple-Simple



Ⓒ Fixed-Simple Ⓓ Fixed-Fixed

ASCERTAINING CRITICAL SHAFT SPEED

1. Examine the drawings to the right and determine the type of lead screw end support bearing employed — A, B, C or D.
2. Determine the maximum length between end supports. Locate that number, in the table above, opposite the appropriate end support.
3. Locate the vertical line on the graph that matches the number in step 2. Where this line intersects the appropriate diameter lead screw curve, determine critical shaft speed. PIC Design recommends operating at a speed less than 85% of this number in order to allow for any misalignments.

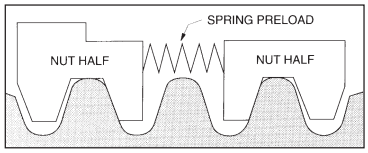
TECHNICAL SECTION

Axial Take-Up Mechanisms

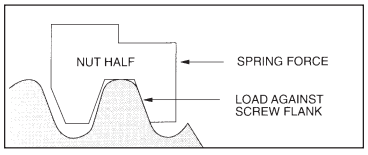
TYPICAL SOLUTIONS —

Backlash Compensation Without High Drag Torque

The standard method for taking up backlash is to bias two nut halves axially using some type of compliant spring. (Wavy washer, compression spring, rubber washer, etc.)



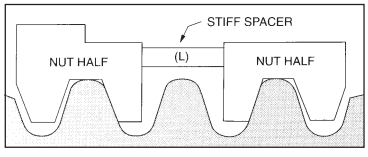
The unit is very stiff in the direction in which the nut half is loaded against the flank of the screw thread. However, in the direction away from the screw thread, the nut is only as axially stiff as the amount of preload which the spring exerts.

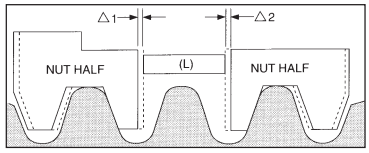


For example, if the maximum axial load which the system is subjected to is 50 lbs., the amount of spring preload must be equal to or greater than 50 lbs. in order to maintain intimate screw/nut contact. The problems arising from preloading in this manner are increased torque and nut wear.

An alternate method would thus be to replace the spring with a stiff spacer sized to fit exactly between the two nut halves.

There would then be no excessive preload force at the interface and the unit would be capable of carrying high axial loads in either direction with no backlash.





This is fine initially. However, as use time increases, wear begins on the nut threads causing a gap to develop between the spacer (L) and the nut halves.

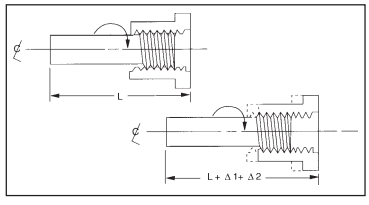
This gap ($\Delta 1 + \Delta 2$) is now the amount of backlash which has developed in the unit. This backlash can be removed by replacing the stiff spacer with a new spacer equal to ($L + \Delta 1 + \Delta 2$). This process, although effective, would be extremely costly and difficult to implement on a continuous basis.

A PATENTED SOLUTION

What is needed, then, is a stiff spacer which will continually expand to accommodate the wear which occurs during use.

This is done by creating a spacer threaded at one end with a complimentary nut torsionally biased to advance when a gap develops.

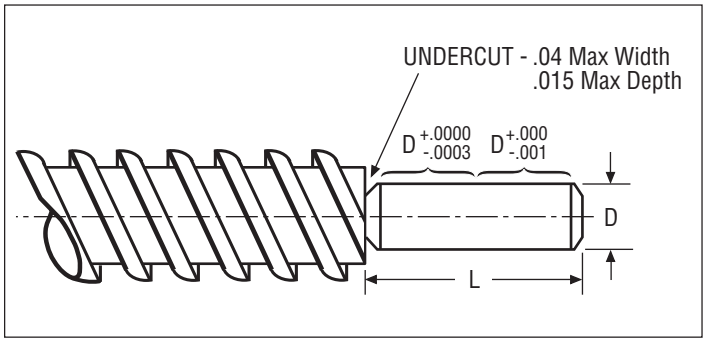
The thread at the end of the spacer is a fine helix such that an axial load will not backdrive the nut once spacer growth has occurred.



The amount of preload on the unit is only that necessary to turn the spacer nut on the spacer rod and is independent of the external system loadings. THIS PATENTED DESIGN HAS A SELF-WEAR COMPENSATING UNIT WHICH HAS EXTREMELY LOW FRICTIONAL DRAG TORQUE YET HIGH AXIAL STIFFNESS.

JOURNAL/END MACHINING & MOUNTING ACCESORIES

For Use With Series S10 and S12 Blocks



End Machining

Available at an additional cost. PIC offers a typical journal for use with a bearing/mount support. Custom end machining available. Send drawing with your RFQ.

Please Note:

- **Bearing Shaft Spacers are listed in Catalog Section 6**
- **Couplings are listed in Catalog Section 7**
- **Linear Bearings and Shafting are listed in Catalog Section 4**

The data presented below will be useful when designing lead screw systems using Series S10 Universal Bearing Blocks and Series S12 Bearing Blocks.

When Using Series S10 Universal Bearing Blocks

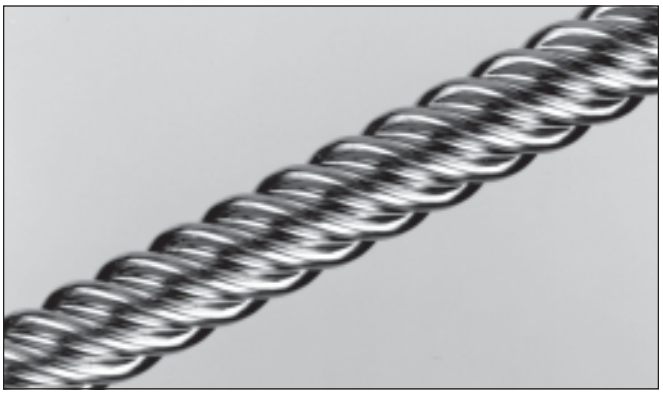
Screw Dia.	D Journal Dia.	L Journal Length	Ball Bearing	Retaining Ring	Shim Pack	Shaft Collar
3/16	0.1247	1.00	E1-3	Z1-1	SP-06	C1-1
1/4	0.1247	1.00	E1-3	Z1-1	SP-06	C1-1
5/16	0.1872	1.12	E1-8	Z1-2	SP-08	C1-2
3/8	0.2497	1.12	E1-9	Z1-3	SP-10	C1-3
7/16	0.2497	1.12	E1-9	Z1-3	SP-10	C1-3
1/2	0.3747	1.38	E1-15	Z1-5	SP-14	C1-10
5/8	0.3747	1.38	E1-15	Z1-5	SP-14	C1-10

When Using Series S12 Bearing Blocks

Screw Dia.	D Journal Dia.	L Journal Length	Flange Adaptor	Flange Spacer	Flanged Ball Bearing	Bearing Housing
3/16	0.1247	0.6	LMB-4		E2-3	S12-4
1/4	0.1247	0.6	LMB-4		E2-3	S12-4
5/16	0.1872	0.75	LMB-6		E2-6	S12-5
3/8	0.2497	0.813	LMB-6		E2-9	S12-8
7/16	0.2497	0.813	LMB-8		E2-9	S12-8
1/2	0.2497	0.813	LMB-8	SMB-8	E2-9	S12-8
5/8	0.3747	1.083	LMB-10	SMB-10	E2-15	S12-10

PRECISION PS STYLE LEAD SCREWS

For use with PZ, PK and PV Style Nuts **.0006 Inch/Inch (mm/mm) Lead Accuracy**



Material: 303 Stainless Steel

Repeatability: .000050 inches

System (lead screw and nut) Specification

Operating Temperature Range: 32°F - 200°F (0°C - 93°C)

Coefficient Of Friction (Nut To Screw): .08 Static
.15 Dynamic
(.09 when TFE coated)

Features:

- Precision rolled
- Lead screw accuracy of .0006 in./in. (mm/mm)
- Straightness tolerance of .003 in/ft.
- Screws have burnished finish of better than 16 micro-inch due to the rolling process
- 303 Stainless steel used for uniform grain structure to improve lead accuracy
- Available with custom TFE coating to extend normal life in as much as 300%

Part Number

PS ☐ ☐ – ☐ ☐

- ☐ Part Number from Table
- ☐ **Coating:** T = Teflon, Blank = no coating
- ☐ ☐ Length in inches (Consult factory for special lengths)

Screw Dia.	Lead (in. or mm)	Root Dia. in. (mm)	Efficiency EF (%)	Standard Length (in.)	** Part No.
1/4	0.062	0.170	52	12, 36, 72	**PS4006** ☐ - ☐☐
	0.250	0.168	79		**PS4025** ☐ - ☐☐
	1.000	0.170	84		**PS4100** ☐ - ☐☐
	1.5 mm	0.172 (4.37)	51		**PS4M01.5** ☐ - ☐☐
3/8	0.100	0.266	53	12, 36, 72	**PS6010** ☐ - ☐☐ *
	0.200	0.266	69		**PS6020** ☐ - ☐☐
	0.300	0.255	76		**PS6030** ☐ - ☐☐
	0.500	0.265	81		**PS6050** ☐ - ☐☐ *
	1.000	0.254	84		**PS6100** ☐ - ☐☐
	1.200	0.254	84		**PS6120** ☐ - ☐☐
	2 mm	0.254 (6.45)	47		**PS6M02** ☐ - ☐☐
	5 mm	0.266 (6.76)	69		**PS6M05** ☐ - ☐☐
7/16	0.250	0.325	70	24, 48, 72	**PS7025** ☐ - ☐☐
	0.500	0.328	80		**PS7050** ☐ - ☐☐
	3 mm	0.363 (9.22)	52		**PS7M03** ☐ - ☐☐
	5 mm	0.313 (7.95)	65		**PS7M05** ☐ - ☐☐
1/2	0.050	0.433	28	24, 48, 72	**PS8005** ☐ - ☐☐
	0.100	0.364	46		**PS8010** ☐ - ☐☐ *
	0.200	0.366	63		**PS8020** ☐ - ☐☐ *
	0.500	0.352	79		**PS8050** ☐ - ☐☐
	1.000	0.372	84		**PS8100** ☐ - ☐☐ *
3/4	1.000	0.619	81	24, 48, 72	**PS12100** ☐ - ☐☐ *
	2.000	0.611	84		**PS12200** ☐ - ☐☐

NOTES: When Teflon coating is used, do not use lubrication. Random voids in the teflon coating have no effect on system performance. The lubricant, although solid, has some "spreading" ability as in fluid lubricants

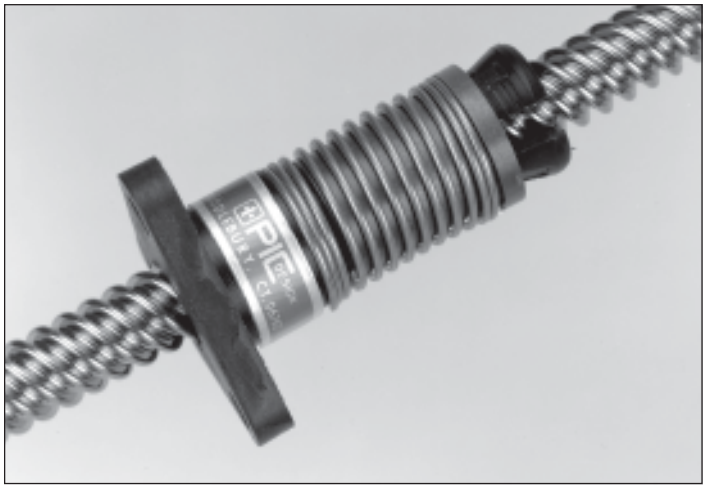
Uncoated screws should not require lubrication. For those instances where lubrication may be desired, a silicone or lithium-based lubricant is suggested.

* Left hand thread available.

** For Teflon coating insert a **T** before dash.
For Example: **PS4006T - 72**

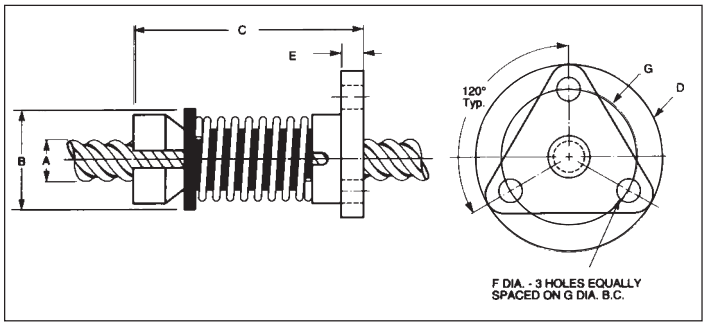
PZ STYLE LEAD SCREW NUTS

For Use With PS Series Lead Screws



PZ style nuts provide anti-backlash for light loads operating at moderate speeds. These nuts utilize a patented self-lubricating polyacetal radially pre-loaded nut. They are ideally suited for vertical applications requiring noise and vibration control. PZ style nuts are used in conjunction with $^1/_4$" to $^1/_2$" diameter lead screws.

This anti-backlash assembly offers an effective linear actuator for design operations requiring precise positional accuracy and repeatability, with minimum cost.



NUT SPECIFICATIONS

Material: Polyacetal with lubricating additive
Tensile Strength: 9,700 PSI at 73°F
Shear Strength: 9,500 PSI at 73°F

SYSTEM (NUT AND LEAD SCREW) SPECIFICATIONS

Temperature Range: 32°F to 200°F
Coefficient of Friction: .08 Static to .15 Dynamic
Coefficient of Thermal Expansion: 6 x 10^{-5} in./in./°F

Screw Dia.	Lead (in. or mm)	Drag Torque	Design Load	Part No.
$^1/_4$	0.062 0.250 1.000	1-4 oz.-in.	5 lbs.	**PZ4006N** **PZ4025N** **PZ4100N**
	1.5 mm	(.007 - .03NM)	(2kg)	**PZ4M01.5N**
$^3/_8$	0.100 0.200 0.300 0.500 1.000 1.200	2-5 oz.-in.	10 lbs.	**PZ6010N** **PZ6020N** **PZ6030N** **PZ6050N** **PZ6100N** **PZ6120N**
	2 mm 5 mm	(.014 - .035NM)	(5kg)	**PZ6M02N** **PZ6M05N**
$^7/_{16}$	0.250 0.500	3-6 oz.-in.	15 lbs.	**PZ7025N** **PZ7050N**
	3 mm 5 mm	(.021 - .04NM)	(7kg)	**PZ7M03N** **PZ7M05N**
$^1/_2$	0.050 0.100 0.200 0.500 1.000	3-6 oz.-in. (.021 - .04NM)	25 lbs. (.021 - .04NM)	**PZ8005N** **PZ8010N** **PZ8020N** **PZ8050N** **PZ8100N**

INTEGRALLY MOLDED FLANGE MOUNT

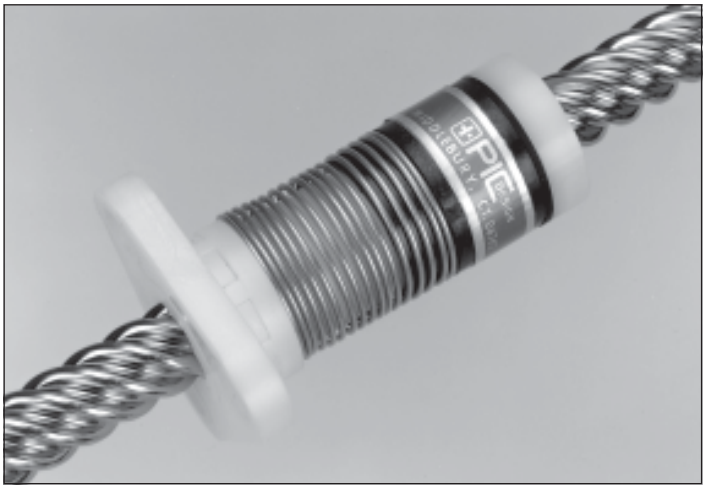
PZ Standard Mounting Dimensions

Series	Screw Dia. A		Nut Dia. B		Nut Length C		Flange Dia. D		Flange Width E		Mounting Holes F		Bolt Circle Dia. G	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
PZ4000	$^1/_4$	(6.35)	.50	(12.70)	1.0	(25.40)	1.00	(25.40)	.18	(4.57)	.143	(3.63)	.750	(19.05)
PZ6000	$^3/_8$	(9.53)	.70	(17.78)	1.9	(48.28)	1.50	(38.10)	.18	(4.57)	.200	(5.08)	1.125	(28.58)
PZ7000	$^7/_{16}$	(11.11)	.800	(20.32)	1.9	(48.26)	1.50	(38.10)	.18	(4.57)	.200	(5.08)	1.125	(28.58)
PZ8000	$^1/_2$	(12.70)	.890	(22.61)	2.0	(50.80)	1.62	(41.15)	.26	(6.60)	.200	(5.08)	1.250	(31.75)

Other Mountings Available — Please Contact PIC For Information

PK STYLE LEAD SCREW NUTS

For Use With PS Series Lead Screws



PK style anti-backlash nuts feature a patented split nut with torsional take up to provide increased load capacity and axial stiffness. This design while high in axial stiffness is very low in frictional drag torque (1-3 oz-in). The type of anti-backlash mechanism used in the PK type nut eliminates the need for load compensating preload forces. This series is specifically made for screws of 3/8" diameter, moderate loads and speeds.

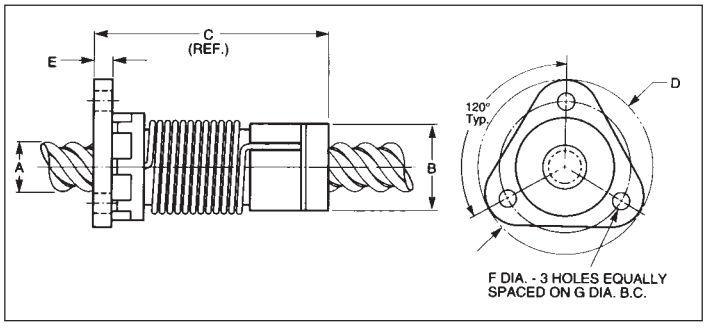
NUT SPECIFICATIONS

Material: Polyacetal with lubricating additive
Tensile Strength: 9,700 PSI at 73°F
Shear Strength: 9,500 PSI at 73°F

SYSTEM (NUT AND LEAD SCREW) SPECIFICATIONS

Temperature Range: 32°F to 200°F
Coefficient of Friction: .08 Static to .15 Dynamic
Coefficient of Thermal Expansion: 6 x 10^{-5} in./in./°F

Screw Dia.	Lead (in. or mm)	Drag Torque	Design Load	Part No.
3/8	0.100	1-3 oz.-in.	20 lbs.	PK6010N
	0.200			PK6020N
	0.300			PK6030N
	0.500			PK6050N
	1.000			PK6100N
	1.200			PK6120N
	2 mm	(.007 - .02NM)	(10kg)	PK6M02N
	5 mm			PK6M05N



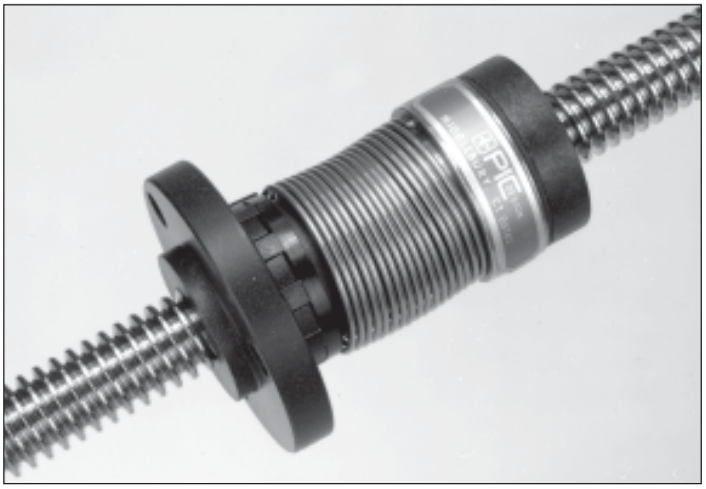
INTEGRALLY MOLDED FLANGE MOUNT

PK Standard Mounting Dimensions

Series	Screw Dia. A	Nut Dia. B	Nut Length C	Flange Dia. D	Flange Width E	Mounting Holes F	Bolt Circle Dia. G
PK6000 (in.)	3/8	.80	2.0	1.5	.19	.20	1.125
PK6000 (mm.)	9.53	20.32	50.80	38.10	4.83	5.08	28.58

PV STYLE LEAD SCREW NUTS

For Use With PS Series Lead Screws



PV style anti-backlash nuts provide a maximum load carrying capability and the lightest axial and radial stiffness of all PIC anti-backlash nuts. They are designed for smooth, quiet operation and long life, made possible by a patented axial take-up mechanism. Because this series is designed to operate with higher loads, operation is only possible with 1/2" and 3/4" diameter lead screws.

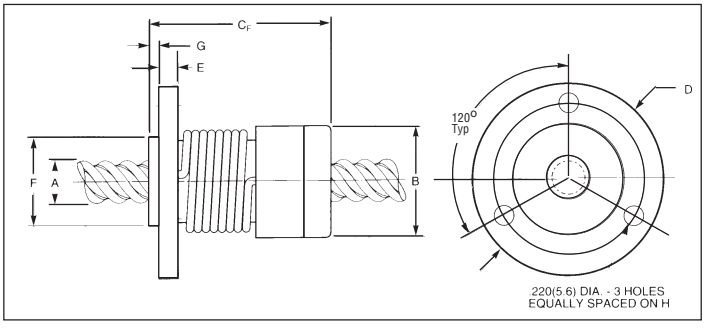
NUT SPECIFICATIONS

Material: Polyacetal with lubricating additive
Tensile Strength: 9,700 PSI at 73°F
Shear Strength: 9,500 PSI at 73°F

SYSTEM (NUT AND LEAD SCREW) SPECIFICATIONS

Temperature Range: 32°F to 200°F
Coefficient of Friction: .08 Static to .15 Dynamic
Coefficient of Thermal Expansion: 6 x 10^{-5} in./in./°F

Screw Dia.	Lead (in. or mm)	Drag Torque	Design Load	Part No.
1/2	0.050 0.100 0.200 0.500 1.000	2-6 oz.-in. (.01 - .04NM)	150 lbs. (68kg)	**PV8005N** **PV8010N** **PV8020N** **PV8050N** **PV8100N**
3/4	1.000 2.000	3-7 oz.-in. (.02 - .05NM)	350 lbs. (159kg)	**PV12100N** **PV12200N**



INTEGRALLY MOLDED FLANGE MOUNT

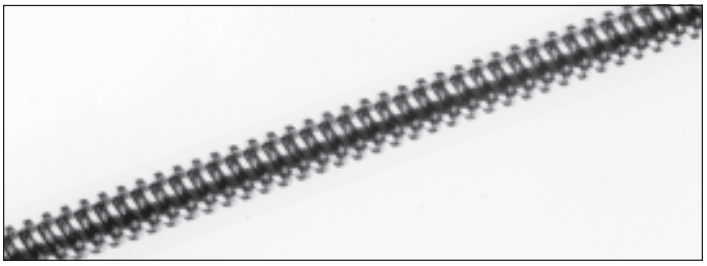
PV Standard Mounting Dimensions

Series	Screw Dia. A		Nut Dia. B		Nut Length CF		Flange Dia. D		Flange Width E		Pilot Dia. F		Pilot Depth G		Bolt Circle Dia. H	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
PV8000	1/2	(12.70)	1.12	(28.45)	2.3	(58.42)	1.75	(44.45)	.23	(5.84)	.93	(23.63)	.12	(3.05)	1.406	(35.71)
PV12000	3/4	(19.05)	1.62	(41.15)	2.8	(71.12)	2.38	(60.45)	.31	(7.87)	—	—	—	—	2.00	(50.80)

Please Contact PIC For Optional Mounting Threads Or Special Configuration Requirements.

PRECISION ACME LEAD SCREWS

Inch and Metric **.003 Inch/Foot Lead Accuracy**



Part Number

ARS ☐ **X** ☐ ☐ ☐ ☐ — ☐ ☐

From Table

Specify Length code (inches) on metric threads (meters)

Sold & Serviced By:

ELECTROMATE

Toll Free Phone (877) SERV098
Toll Free Fax (877) SERV099
www.electromate.com
sales@electromate.com

Material: 303 Stainless Steel

Features:

- Screws are precision rolled.
- Lead accuracy of ±.003" per foot.
- Straightness tolerance of .010" per foot.
- Class 2G Thread
- Burnished finish of 24 RMS or better due to the rolling process.
- 303 stainless steel used for uniform grain structure to improve lead accuracy and finish.

Available on request & special quotation:

- Teflon "S" coated lead screw assemblies with film thickness of .0005 to .001. Coating improves distribution of lubricant whereby it improves the coefficient of friction between the nut and screw, with reduced torque needed to drive the lead screw assembly. The Teflon coated lead screw assembly increases useful life of the system by more than twofold.

Teflon "S" Coating Properties:

- Coefficient of friction:
  static = .12
  dynamic = .10
- Hardness, coating Knoop scale 9-12
- Abrasion resistance (TABER) (weight loss in grams, 100 cycles) .04
- Thickness .0005 to.001 in.

Screw Dia. (in.)	Screw Size	Lead (in.)	Minor Root Dia. (in.)	Efficiency (%)	Weight per ft. (lbs.)	Standard Length (in.)	Part No. Add length to end of Part No.
3/16	3/16 - 20	0.050	0.119	46	.06	12, 36, 72	ARS1X1820 - ☐☐
1/4	1/4 - 20	0.050	0.190	38	.13		ARS1X2520 - ☐☐ *
	1/4 - 16	0.0625	0.170	44	.13		ARS1X2516 - ☐☐ *
5/16	5/16 - 8, 4 start (stub)	0.500	0.218	71	.19		ARS4X3108 - ☐☐
3/8	3/8 - 20	0.050	0.315	29	.31		ARS1X3720 - ☐☐
	3/8 - 16	0.0625	0.303	34	.31		ARS1X3716 - ☐☐ *
	3/8 - 10	0.100	0.255	46	.27		ARS1X3710 - ☐☐ *
	3/8 - 8 (stub)	0.125	0.280	52	.30		ARS1X3708 - ☐☐
	3/8 - 10, 2 start	0.200	0.255	66	.27		ARS2X3710 - ☐☐
	3/8 - 8, 2 start (stub)	0.250	0.280	67	.26		ARS2X3708 - ☐☐
	3/8 - 8, 4 start (stub)	0.500	0.270	77	.28		ARS4X3708 - ☐☐
	3/8 - 5, 5 start	1.000	0.255	79	.27	12, 36	ARS5X3705 - ☐☐ **
	3/8 - 4, 5 start (stub)	1.250	0.243	75	.28		ARS5X3704 - ☐☐ **
7/16	7/16 - 8, 2 start (stub)	0.250	0.327	64	.40	24, 48, 72	ARS2X4308 - ☐☐
	7/16 - 8, 4 start (stub)	0.500	0.327	75	.42		ARS4X4308 - ☐☐
1/2	1/2 - 10	0.100	0.380	38	.53		ARS1X5010 - ☐☐ *
	1/2 - 10, 2 start	0.200	0.380	55	.80		ARS2X5010 - ☐☐
5/8	5/8 - 10	0.100	0.505	32	.85		ARS1X6210 - ☐☐ *
	5/8 - 8 (stub)	0.125	0.530	38	.48		ARS1X6208 - ☐☐
	5/8 - 10, 2 start	0.200	0.505	49	.85		ARS2X6210 - ☐☐

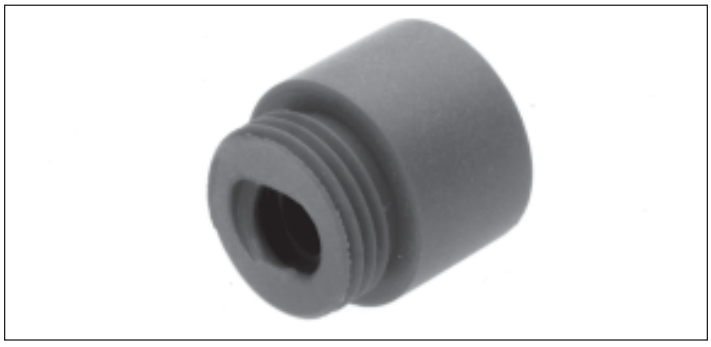
Screw Dia. (mm)	Trapezoidal Metric Thread (ISO)	Lead (mm)	Minor Root Dia. (mm)	Efficiency (%)	Weight per meter (kg)	Standard Length (meter)	Part No. Add length to end of Part No.
4	4 x 1 mm	1	2.5	44	.3	.5, 1.0, 1.8	ARS1X041M - ☐☐
8	8 x 2 mm	2	5.5	44	.6		ARS1X082M - ☐☐
10	10 x 2 mm	2	7.5	38	.7		ARS1X102M - ☐☐
10	10 x 1.5 mm, 4 start	6	7.9	63	.7		ARS4X101M - ☐☐ ***
14	14 x 4 mm	4	9.5	47	.9		ARS1X144M - ☐☐ ***

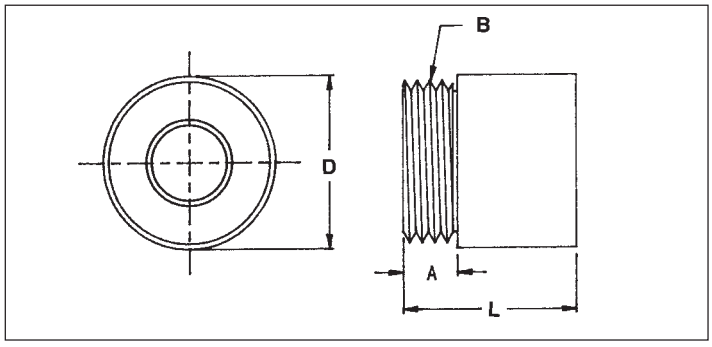
NOTE: Screws should not require lubrication. For those instances where lubrication may be desired, a silicone or lithium-based lubricant is suggested.

* Left hand thread available.
** 36" max length.
*** 416 Stainless Steel only.

ACME LEAD SCREW POWER NUTS

Inch and Metric **For use with ACME Lead Screws**





Features:

- Tensile strength (at break) 5900 PSI
- Elongation (at break) 19%
- Flexural yield strength 8000 PSI
- Compressive strength 9500 PSI
- Coefficient of friction:
  — static (40 psi) = .08
  — dynamic (40 psi / 50 fmp) = .12
- Coefficient of linear thermal expansion 5.2 x 10^{-5} in./in./^{O}F
- Limiting PV (1" dia shaft, 100 FPM) 16000 PSI-FPM

For Mounting Flange, See Page 3-13

Specifications:

Hardness: Durometer Shore D 75

Temperature Range: Min. 32^{O}F, Max. 180^{O}F

Max. Speed (Unlubricated): 200 SF/M (surface feet per minute)

Material: Turcite X (Acetal - Teflon and Silicon filled)

Note:

It is recommended that dynamic loads not exceed 25% of the static load rating. Factors such as speed, duty cycle, eccentric cantilever loading and temperature can adversely effect load ratings.

1) Torque values to raise 1 lb. also apply to anti-backlash nuts for load torque calculations.

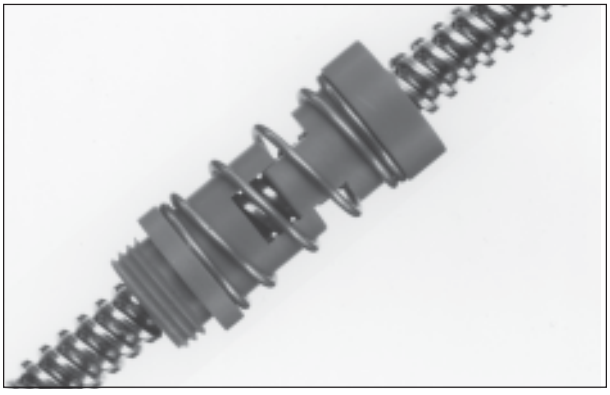
2) Torque values are for nut & screw only, drag, bearing mounting & drive component inefficiencies need to be considered when determining total necessary torque

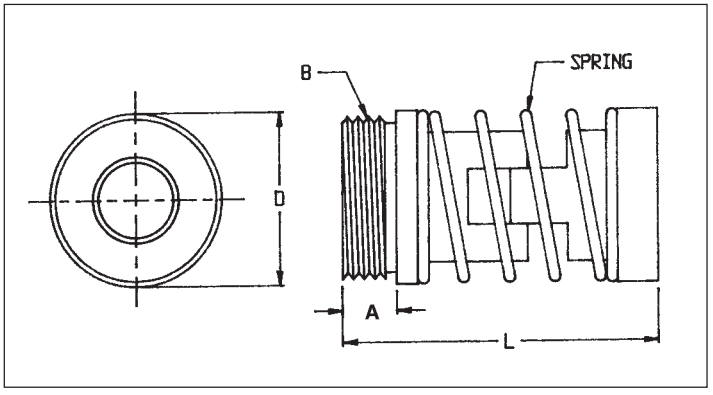
Major Dia. (in.)	Lead (in.)	Powernut Dimensions (in.) D	L	A	B	Flange No.	Max. Static Load	Torque To Raise 1 lb. Load (Oz. - In.)	Part No.
3/16	0.050	0.62	0.62	3/16	9/16 - 18	FL-3	150 lbs.	0.40	**ANR11-1820**
1/4	0.050	0.62	0.62	3/16	9/16 - 18	FL-3	200 lbs.	0.40	**ANR11-2520**
	0.0625							0.42	**ANR11-2516**
5/16	0.500	0.75	0.75	1/4	5/8 - 18	FL-1	250 lbs.	1.8	**ANR14-3108**
3/8	0.050	0.75	0.75	1/4	5/8 - 18	FL-1	350 lbs.	0.60	**ANR11-3720**
	0.0625							0.58	**ANR11-3716**
	0.100							0.64	**ANR11-3710**
	0.125							0.70	**ANR11-3708**
	0.200							0.92	**ANR12-3710**
	0.250							1.1	**ANR12-3708**
	0.500							1.8	**ANR14-3708**
	1.000							3.5	**ANR15-3705**
	1.250							4.2	**ANR15-3704**
7/16	0.250	1.00	1.00	5/16	15/16 - 16	FL-2	800 lbs.	1.1	**ANR12-4308**
	0.500							1.9	**ANR14-4308**
1/2	0.100	1.00	1.00	5/16	15/16 - 16	FL-2	800 lbs.	0.80	**ANR11-5010**
	0.200							1.1	**ANR12-5010**
5/8	0.100	1.00	1.00	5/16	15/16 - 16	FL-2	800 lbs.	0.80	**ANR11-6210**
	0.125							1.0	**ANR11-6208**
	0.200							1.1	**ANR12-6210**

Major Dia. (mm.)	Lead (mm.)	Powernut Dimensions (mm) D	L	A	B	Flange No.	Max. Static Load	Torque To Raise 1 kg. Load (NM)	Part No.
4.0	1.0	15	20	5.0	M12 x 1.5	FLM-1	60 kg	.004	**ANR11-041m**
8.0	2.0	15	20	5.0	M12 x 1.5	FLM-1	100 kg	.009	**ANR11-082m**
10.0	2.0	25	25	6.4	M20 x 1.5	FLM-2	160 kg	.013	**ANR11-102m**
10.0	6.0	25	25	6.4	M20 x 1.5	FLM-2	160 kg	.012	**ANR14-101m**
14.0	4.0	25	25	6.4	M20 x 1.5	FLM-2	350 kg	.015	**ANR11-144m**

ACME LEAD SCREW ANTI-BACKLASH STYLE NUTS

For use with ACME Lead Screws **Inch and Metric**





Preload may be increased slightly by adding a SHIM behind the spring, or decreased by respositioning one-half of the nut assembly away from the opposite half. Lubrication is recommended for continuous duty and high speed applications. It is recommended that drive motors be selected with at least 50% additional torque to handle other system inefficiencies.

Specifications:

Temperature Range: Min. 32°F, Max. 180°F

Material: Nut-Turcite X (Acetal - Teflon and Silicone filled)
Spring-300 Series Stainless Steel

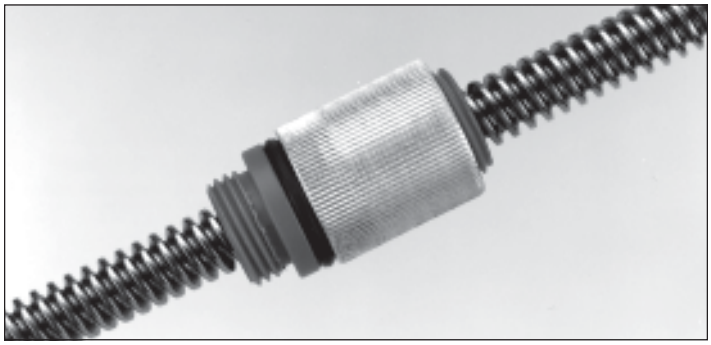
For Mounting Flange, See Page 3-13

Major Dia. (in.)	Lead (in.)	AB Nut Dimensions (in.)					Flange No.	Max. Preload (lbs.)	Max Load For Zero Backlash (lbs.)	Torque* (Oz. - in.)	Part No.
		D	L Max.	L Min.	A	B					
3/16	0.050	0.62	1.34	1.12	3/16	9/16 - 18	FL-3	5.25	5	6.7	**ANR21-1820**
1/4	0.050 0.0625	0.62	1.34	1.12	3/16	9/16 - 18	FL-3	5.25	5	6.7 6.1	**ANR21-2520** **ANR21-2516**
5/16	0.500	0.75	1.7	1.4	1/4	5/8 - 18	FL-1	5.25	5	10.9	**ANR24-3108**
3/8	0.050 0.0625 0.100 0.125 0.200 0.250 0.500 1.000 1.250	0.75	1.7	1.4	1/4	5/8 - 18	FL-1	5.25	5	11.0 8.5 7.0 7.0 7.3 8.0 11.2 19.4 23.1	**ANR21-3720** **ANR21-3716** **ANR21-3710** **ANR21-3708** **ANR22-3710** **ANR22-3708** **ANR24-3708** **ANR25-3705** **ANR25-3704**
7/16	0.250 0.500	1.00	2.00	1.7	5/16	15/16 - 16	FL-2	11.55	11	18.6 25.3	**ANR22-4308** **ANR24-4308**
1/2	0.100 0.200	1.00	2.00	1.7	5/16	15/16 - 16	FL-2	11.55	11	19.3 19.1	**ANR21-5010** **ANR22-5010**
5/8	0.100 0.125 0.200	1.00	2.00	1.7	5/16	5/16 - 16	FL-2	11.55	11	22.8 21.9 21.8	**ANR21-6210** **ANR21-6208** **ANR22-6210**
Major Dia. (mm)	**Lead (mm)**	**AB Nut Dimensions (mm)**					**Flange No.**	**Max. Preload (Kg)**	**Max Load For Zero Backlash (Kg)**	**Torque* (NM)**	**Part No.**
		D	**L Max.**	**L Min.**	**A**	**B**					
4.0	1.0	15	30	25	5.0	M12 x 1.5	FLM-1	2.4	2.3	.093	**ANR21-041m**
8.0	2.0	15	30	25	5.0	M12 x 1.5	FLM-1	2.4	2.3	.124	**ANR21-082m**
10.0	2.0	25	50	43	6.4	M20 x 1.5	FLM-2	5.2	5.0	.280	**ANR21-102m**
10.0	6.0	25	50	43	6.4	M20 x 1.5	FLM-2	5.2	5.0	.275	**ANR24-101m**
14.0	4.0	25	50	43	6.4	M20 x 1.5	FLM-2	5.2	5.0	.295	**ANR21-144m**

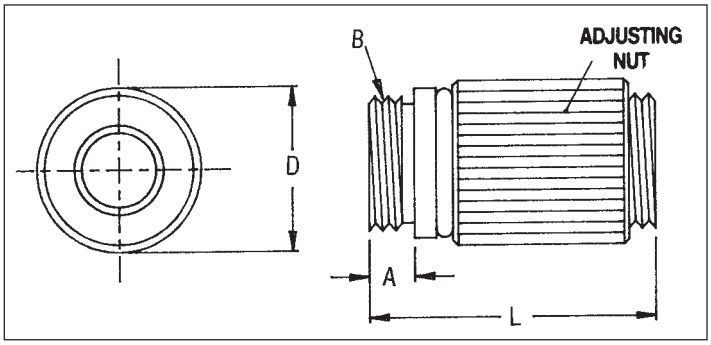
*Torque figures are based on three factors: load, preload, and efficiency.

ANR STYLE ADJUSTABLE COMPLIANT NUTS

Inch and Metric **For Use With ACME Lead Screws**



Easily adjusted by turning adjusting nut for desired preload.



Material:
Nut: Turcite X
Sleeve: Anodized Aluminum
"O" Ring: Buna N

Specifications:
Temperature Range: Min. 32°F, Max. 180°F
Max. Speed (Unlubricated): 200 ft/min
Material: Turcite X (Acetal - Teflon and Silicon filled)

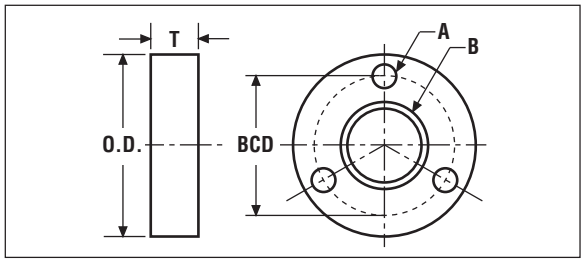
For Mounting Flange, See Page 3-13

Screw Dia. (in.)	Lead (in.)	Adjustable Nut Dimensions (in.) D	L Max.	L Min.	A	B	Flange No.	Max. Dynamic Load (lbs.)	Torque To Raise 1 lb. Load (oz.- in.)	Part No.
3/16	0.050	0.62	1.34	1.12	3/16	9/16 - 18	FL-3	35	.40	ANR31-1820
1/4	0.050 0.0625	0.62	1.34	1.17	3/16	9/16 - 18	FL-3	45	.40 .42	ANR31-2520 ANR31-2516
5/16	0.500	0.75	1.70	1.40	1/4	5/8 - 18	FL-1	60	1.8	ANR34-3108
3/8	0.050 0.0625 0.100 0.125 0.200 0.250 0.500 1.000 1.250	0.75	1.70	1.40	1/4	5/8 - 18	FL-1	85	.60 .58 .64 .70 .92 1.1 1.8 3.5 4.2	ANR31-3720 ANR31-3716 ANR31-3710 ANR31-3708 ANR32-3710 ANR32-3708 ANR34-3708 ANR35-3705 ANR35-3704
7/16	0.250 0.500	1.00	2.00	1.70	5/16	15/16 - 16	FL-2	130	1.1 1.9	ANR32-4308 ANR34-4308
1/2	0.100 0.200	1.00	2.00	1.70	5/16	15/16 - 16	FL-2	130	.80 1.1	ANR31-5010 ANR32-5010
5/8	0.100 0.125 0.200	1.00	2.00	1.70	5/16	15/16 - 16	FL-2	130	.80 1.0 1.1	ANR31-6210 ANR31-6208 ANR32-6210

Screw Dia. (mm)	Lead (mm)	Adjustable Nut Dimensions (mm) D	L Max.	L Min.	A	B	Flange No.	Max. Dynamic Load (Kg)	Torque To Raise 1 kg (NM)	Part No.
4.0	1.0	15	30	25	5.0	M12 x 1.5	FLM-1	15	.004	ANR31-041m
8.0	2.0	15	30	25	5.0	M12 x 1.5	FLM-1	25	.009	ANR31-082m
10.0	2.0	25	50	43	6.4	M20 x 1.5	FLM-2	40	.013	ANR31-102m
10.0	6.0	25	50	43	6.4	M20 x 1.5	FLM-2	40	.012	ANR34-101m
14.0	4.0	25	50	43	6.4	M20 x 1.5	FLM-2	80	.015	ANR31-144m

STANDARD MOUNTING FLANGES

Inch and Metric

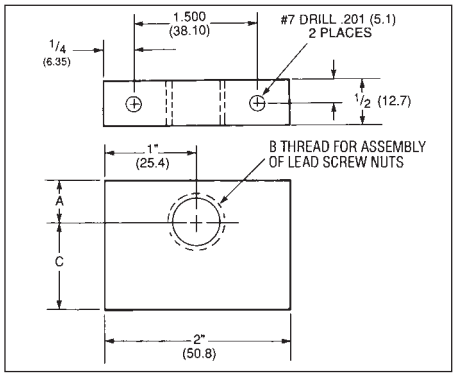


Flange Dimensions					Part Number
O.D.	T	A	BCD	B (thread)	
1.62	1/4	.177	1.25	5/8 - 18	**FL-1**
2.00	5/16	.266	1.50	15/16 - 16	**FL-2**
1.25	3/16	.140	1.00	9/16 - 18	**FL-3**
30	5.0	3.5	22	M12 x 1.5	**FLM-1***
40	6.5	3.5	32	M20 x 1.5	**FLM-2***

*Sizes in mm.

Material: Aluminum
Finish: Black Anodized

Flanges should be pinned or bonded to the nut to prevent disassembly during operation. Flanges do not have a Set Screw which could deform a nut and possibly cause binding.



Material: Aluminum Alloy (6061)
Finish: Black Anodized

Inch Sizes			
A ±.002	B Thread	C ±.002	Part No.
.375	5/8 - 18	.625	**LMB-1**
.562	15/16 - 16	.812	**LMB-2**
.375	9/16 - 18	.625	**LMB-3**
Metric Sizes			
9.53	M12 x 1.5	15.88	**LMB-1M**
14.27	M20 x 1.5	20.62	**LMB-2M**

FLANGE ADAPTOR

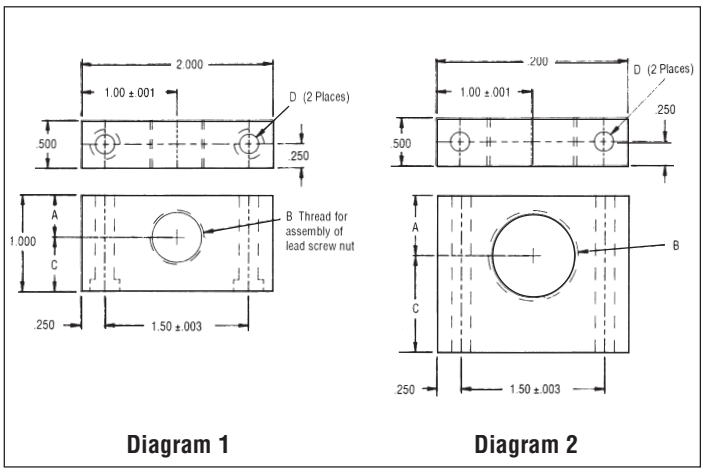


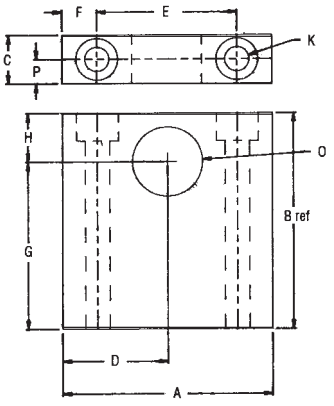
Diagram 1 **Diagram 2**

Part No.	Diagram	A	B	C ±.001	D		
					Thru Dia.	C'Bore Dia.	Depth Dia.
LMB-4	1	0.437	9/16 -18	0.563	0.201	0.312	0.125
LMB-6	2	0.625	5/8 -18	0.762	0.201	—	—
LMB-8	2	0.625	15/16 -16	1	0.201	—	—
LMB-10	2	1.062	15/16 -16	1.625	0.201	—	—

Material: Aluminum Alloy (6061)
Finish: Black Anodized

BEARING HOUSING BLOCKS

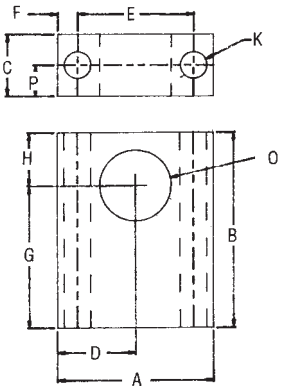
Diagram 1



Material: Aluminum
Finish: Black Anodized

Note:
See section 6 for alternate bearing housings

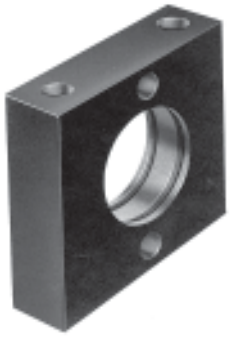
Diagram 2



Part No.	Diagram	A	B ref.	C	D ±.001	E ±.001	F	G ±.001	H	K			O +.0002 -.0000	P	Screws
										Thru Dia.	C'Bore Dia.	Depth Dia.			
S12-4	1	0.938	1.000	0.375	0.469	0.625	0.156	0.688	0.312	0.156	0.250	0.141	0.375	0.188	#6
S12-6	2	1.094	1.375	0.438	0.547	0.813	0.140	1.000	0.375	0.188	—	—	0.500	0.219	#8
S12-8	1	1.875	1.938	0.438	0.938	1.250	0.313	1.500	0.438	0.218	0.375	0.250	0.625	0.219	#10
S12-10	1	2.375	2.750	0.625	1.188	1.625	0.375	2.000	0.750	0.339	0.500	0.500	0.875	0.313	5/16

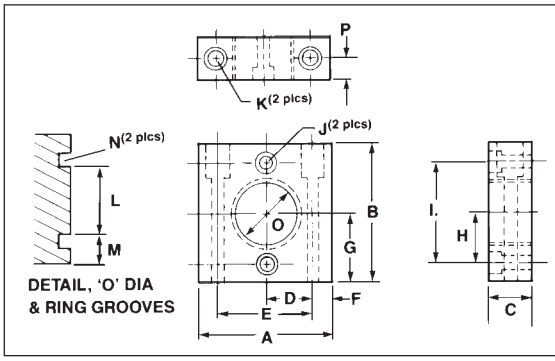
UNIVERSAL BEARING HOUSING BLOCKS

Inch and Metric



Material: Aluminum
Finish: Black Anodized

Note:
See section 6 for alternate bearing housings



Inch Sizes

Part Number	A	B	C	D ±.003	E ±.003	F	G ±.001	H ±.003	I ±.003	J			K			L*	M	N		O +.0003 -.000	P	Screws Socket Head	
										Thru Dia.	C'Bore Dia.	C'Bore Deep	Thru Dia.	C'Bore Dia.	C'Bore Deep			Dia. ±.002	Wide +.003 -.000			J	K
S10-06	2	2	.500	.625	1.250	.38	1.000	.625	1.250	.170	.281	.156	.187	.313	.75	.191	.15	.397	.029	.3749	.25	#6	#8
S10-08	2	2	.500	.625	1.250	.38	1.000	.625	1.250	.170	.281	.156	.187	.313	.75	.236	.13	.530	.039	.4999	.25	#6	#8
S10-10	2 1/4	2 1/4	.625	.781	1.562	.34	1.125	.781	1.562	.187	.313	.187	.210	.375	.75	.241	.19	.665	.039	.6249	.31	#8	#10
S10-14	2 1/4	2 1/4	.625	.781	1.562	.34	1.125	.781	1.562	.187	.313	.187	.210	.375	.75	.346	.14	.931	.046	.8749	.31	#8	#10

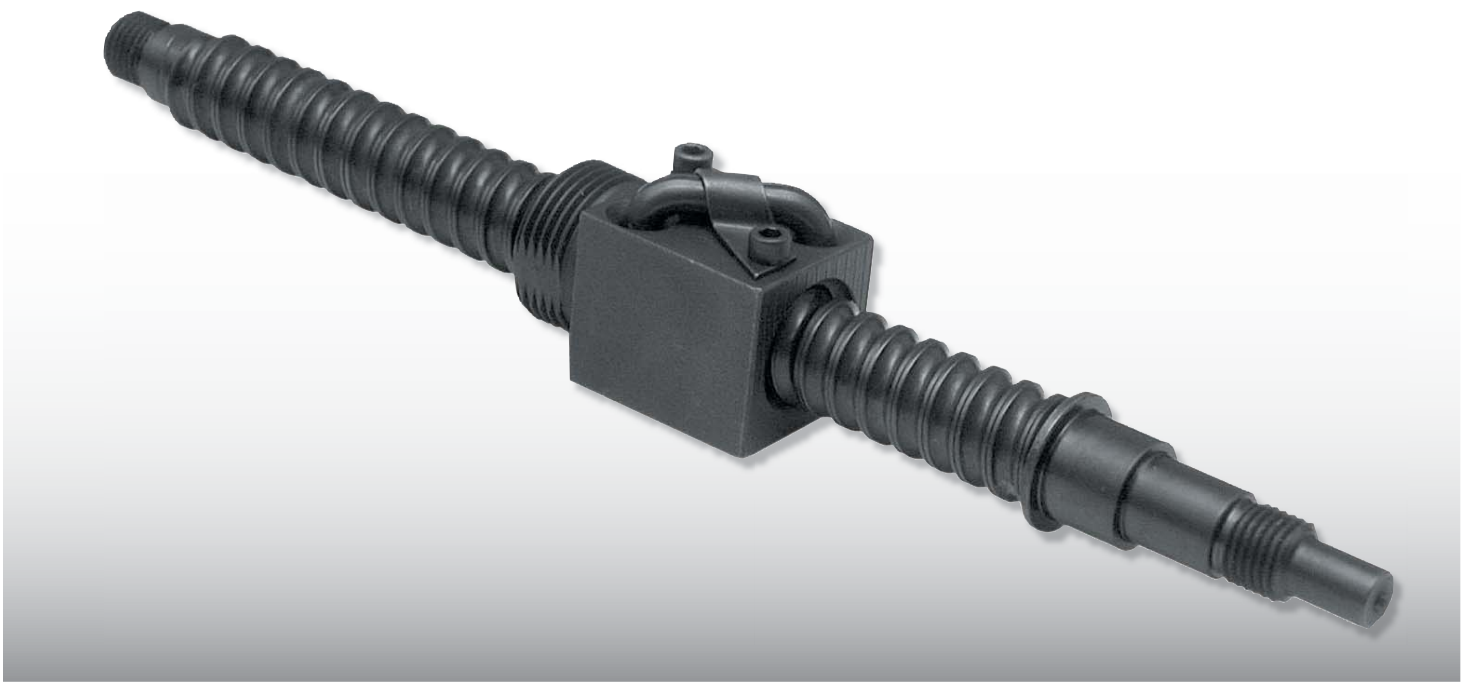
Metric Sizes

Part Number	A	B	C	D ±.08	E ±.08	F	G ±.03	H ±.08	I ±.08	J			K			L*	M	N		O +.005 -.003	P	Screws Socket Head	
										Thru Dia.	C'Bore Dia.	C'Bore Deep	Thru Dia.	C'Bore Dia.	C'Bore Deep			Dia. ±.11	Wide (min.)			J	K
MS10-10	50.8	50.8	12.7	15.88	31.75	9.6	25.40	15.88	31.75	3.8	6.5	4.0	4.75	8.25	19.0	5.0	3.85	10.4	1.1	10	6.4	M3	M4
MS10-13	50.8	50.8	12.7	15.88	31.75	9.6	25.40	15.88	31.75	3.8	6.5	4.0	4.75	8.25	19.0	6.0	3.35	13.6	1.1	13	6.4	M3	M4
MS10-19	57.2	57.2	15.88	19.84	39.67	8.6	28.53	19.84	39.67	4.75	8.25	4.7	5.80	9.75	19.0	7.5	4.20	20.0	1.1	19	7.9	M4	M5
MS10-22	57.2	57.2	15.88	19.84	39.67	8.6	28.58	19.84	39.67	4.75	8.25	4.7	5.80	9.75	19.0	9.0	3.44	23.0	1.1	22	7.9	M4	M5

* Includes space for outer race preload spacers.

B STYLE PRECISION ROLLED BALL SCREWS & NUTS

Range Of Sizes ■ Up To 0.003 Inch / Foot Lead Accuracy



B Style precision rolled lead screws are available in a choice of stainless steel or alloy steel for higher load capacities. Typically alloy steel systems can handle operating loads as much as six times greater than stainless steel. Lead screw diameters are available in 3/8, ½ or 0.631 inch diameters. Special lengths can be ordered, consult factory. PIC will cut Style B ball screws to your length requirement and supply them with or without machined ends. Annealed ends can also be provided.

HARDNESS SPECIFICATIONS

Stainless Steel: Precipitation hardened 17-4 PH to Rc40 minimum.

Alloy Steel: Induction hardened to Rc56 minimum.

BALL NUTS, FLANGES AND WIPERS

Both single and dual circuit nuts are available. When higher loads are being supported, users should select dual circuit nuts in standard or preloaded versions. Ball nut flanges are available from PIC and must be securely mounted to the nut to prevent the nut from turning off the flange. Wiper kits can be ordered to prevent most foreign material from entering the ball nut as it traverses along the screw.

EFFICIENCY

B Style lead screw systems are 90% efficient. Because of their high efficiency, they will back drive and will require a brake to hold the load.

STRAIGHTNESS

B Style straightness is rated at 0.010 inches per foot TIR and will not exceed 0.025 inches over the entire length of the screw.

TORQUE

The amount of torque required to move the load is measured in inch-pounds. The formulas are as follows:

Rotary to Linear (Drive Torque):
Torque = 0.177 x Load x Lead of Screw

Linear to Rotary (Backdriving Torque):
Torque = 0.143 x Load x Lead of Screw

Preload Torque (Additional Torque Due to Preload Only):
Preload Torque = 0.034 x Preload Setting (lbs.) x Lead of Screw

Torque – H. P.

$$\text{Torque} = \frac{63{,}000 \times \text{HP}}{\text{RPM (speed)}}$$

Angular Velocity Formula

$$\text{RPM} = \frac{\text{Velocity (inches/min.)}}{\text{Lead (inches/rev.)}}$$

B STYLE PRECISION ROLLED BALL SCREWS & NUTS

3/8" Diameter Screws & Nuts

LEAD — 0.125 Inches

Lead Accuracy (In/ft cumulative)	Standard Length (inches)	Part Number	
		Alloy	Stainless Steel
0.003	12,36,48	**BSPRC3708-XX**	**BSPRS3708-XX**
0.007	12,36,48	**BSRC3708-XX**	**BSRS3708-XX**

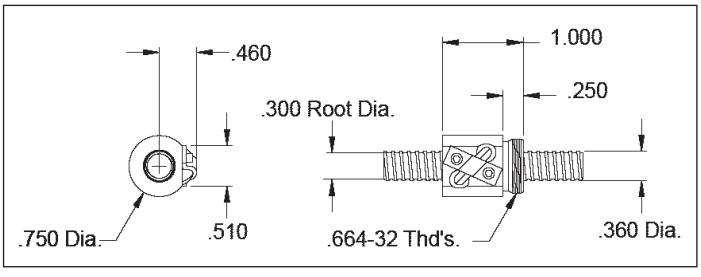
Special lengths to 12 feet. Specify length XX in inches ± 1/32 inch.

BALL NUTS — Use Alloy Ball Nuts with Alloy Lead Screws

SINGLE CIRCUIT BALL NUTS

Contains an average of 62 1/16 inch balls

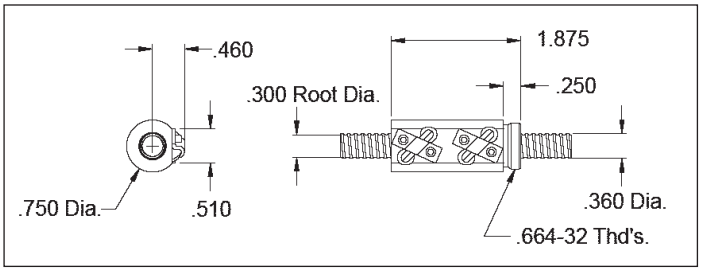
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	150	1300	**BNC1-3708**
Stainless	25	230	**BNS1-3708**



DUAL CIRCUIT BALL NUTS

Contains an average of 124 1/16 inch balls

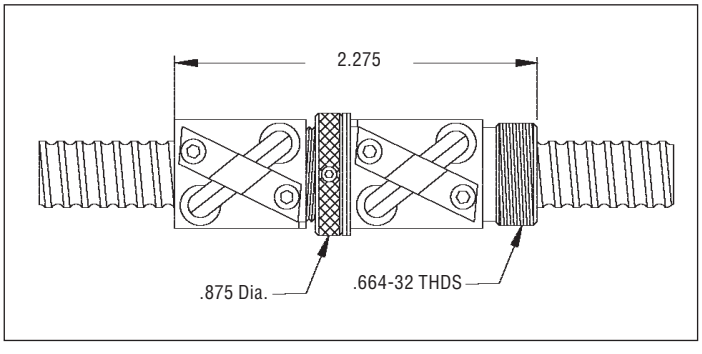
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	300	2600	**BNC2-3708**
Stainless	50	460	**BNS2-3708**



PRELOADED BALL NUTS

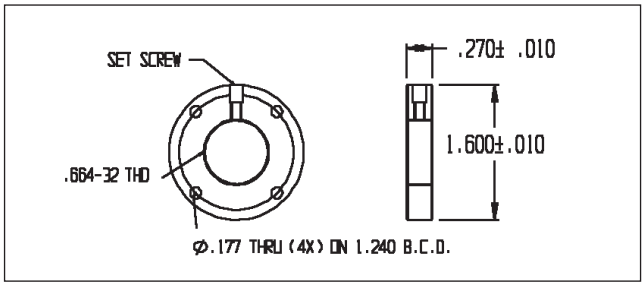
Contains an average of 124 1/16 inch balls per unit.
Includes wiper kit and flange.

Material	Recommended Load			Maximum Load			Part Number
	Preload (lbs)	Static (lbs)	Preload (lbs)	Preload (lbs)	Static (lbs)	Preload (lbs)	
Alloy	15	135	1285	45	105	1255	**BNC3-3708**
Stainless	3	23	228	8	18	223	**BNS3-3708**



MOUNTING FLANGE

Material	Outside Diameter (inches)	Width (inches)	Bolt Hole Pattern			Part Number
			No. of Holes	Diameter (inches)	Bolt Circle (inches)	
Alloy	1.600	0.270	4	0.177	1.240	**BFC-37**
Stainless						**BFS-37**



WIPER KIT

Contains 2 brush wipers, user to epoxy on

Diameter (inches)	Thickness (inches)	Part Number	
		Alloy	Stainless Steel
0.750	0.100	**BNW-37**	**BNW-37S**

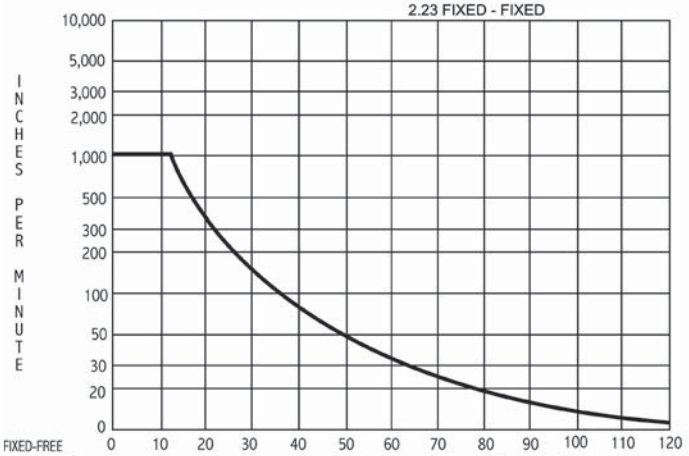
B STYLE PRECISION ROLLED BALL SCREWS & NUTS

3/8" Diameter Screws & Nuts

CRITICAL SPEED

$$N = \left[C \cdot 4.76 \cdot 10^{6} \cdot \left[\frac{D * H}{L^{2}} \right] \cdot 8 \right]$$

N = CRITICAL SPEED (INCHES PER MINUTE)
H = LEAD OF SCREW
D = ROOT IDAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.36 FIXED FREE
1.00 SIMPLE - SIMPLE
1.47 FIXED - SIMPLE
2.23 FIXED - FIXED



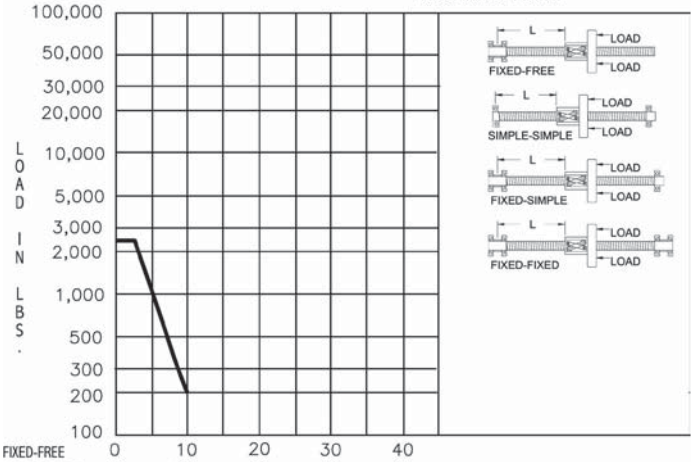
FIXED-FREE	0	10	20	30	40	50	60	70	80	90	100	110	120
SIMPLE-SIMPLE	0	14	28	42	56	70	84	98	112	126	140	154	168
FIXED-SIMPLE	0	15	30	45	60	75	90	105	120	135	150	165	180
FIXED-FIXED	0	16	32	48	64	80	96	112	128	144	160	176	192

DISTANCE IN INCHES BETWEEN SUPPORTS

COLUMN LOAD

$$P = \left[C \cdot 14.03 \cdot 10^{6} \cdot \left[\frac{D^{4}}{L^{2}} \right] \cdot 8 \right]$$

P = CRITICAL COLUMN LOAD(POUNDS)
D = ROOT DIAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.25 FIXED FREE
1.00 SIMPLE - SIMPLE
2.00 FIXED - SIMPLE
4.00 FIXED - FIXED



FIXED-FREE	0	10	20	30	40
SIMPLE-SIMPLE	0	20	40	60	80
FIXED-SIMPLE	0	28	57	85	
FIXED-FIXED	0	40	80		

INCHES BETWEEN SUPPORTS

Note: Screws may be ordered with annealed ends for subsequent finishing by the user. Dimensions are always specified by customer. In each case a detailed drawing is necessary.

B STYLE PRECISION ROLLED BALL SCREWS & NUTS

1/2" Diameter Screws & Nuts

LEAD — 0.500 Inches

Lead Accuracy (In/ft cumulative)	Standard Length (inches)	Part Number	
		Alloy Steel	Stainless Steel
0.003	12,36,48	BSPRC5002-XX	BSPRS5002-XX
0.007	12,36,48	BSRC5002-XX	BSRS5002-XX

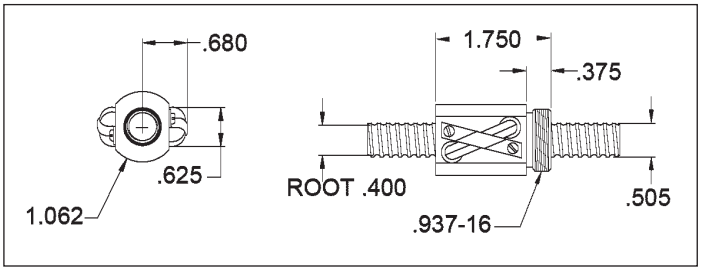
Special lengths to 12 feet. Specify length xx in inches +/- 1/32 inches.

BALL NUTS

SINGLE CIRCUIT BALL NUTS

Contains an average of 70 1/8 inch balls

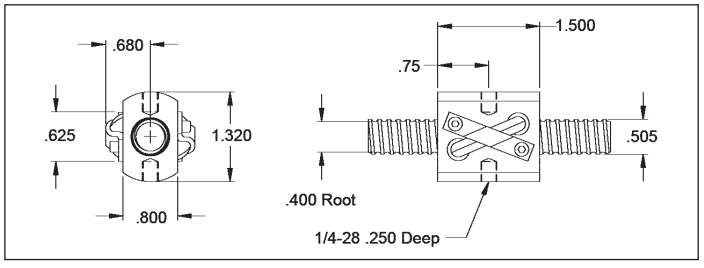
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	850	4150	BNC2-5002
Stainless	140	750	BNS2-5002



TRUNION STYLE BALL NUTS

Contains an average of 70 1/8 inch balls per dual circuit unit.

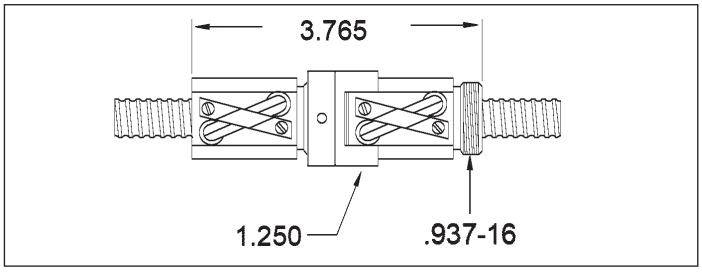
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	850	4150	BNCT-5002
Stainless	140	750	BNST-5002



PRELOADED BALL NUTS

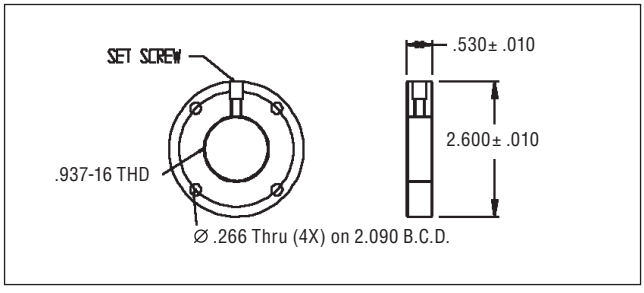
Includes wiper kit and flange

Material	Recommended Load			Maximum Load			Part Number
	Preload (lbs)	Rated (lbs)	Static (lbs)	Preload (lbs)	Rated (lbs)	Static (lbs)	
Alloy	85	756	4065	255	595	3895	BNC3-5002
Stainless	14	126	736	42	98	708	BNS3-5002



MOUNTING FLANGE

Material	Outside Diameter (inches)	Width (inches)	Bolt Hole Pattern			Part Number
			No. of Holes	Diameter (inches)	Bolt Circle (inches)	
Alloy	2.600	0.530	4	0.266	2.090	BFC-50
Stainless						BFS-50



WIPER KIT

Contains 2 brush wipers, user to epoxy on

Diameter (inches)	Thickness (inches)	Part Number	
		Alloy	Stainless Steel
1.062	0.100	BNW-50	BNW-50S

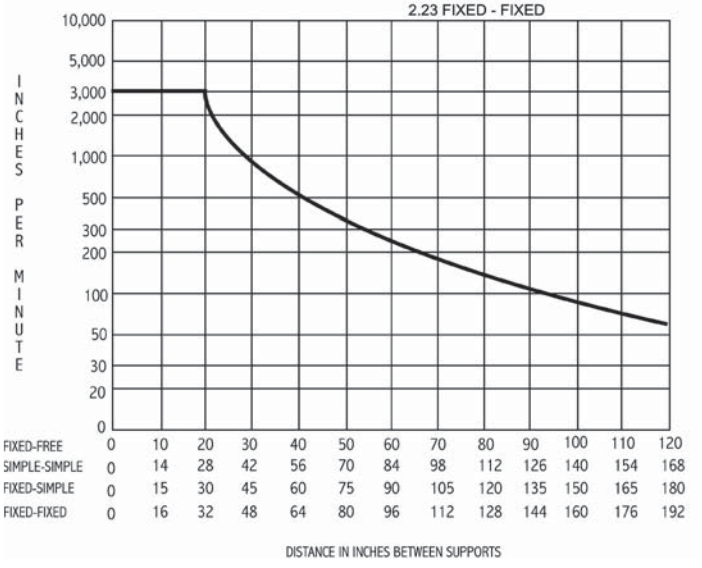
B STYLE PRECISION ROLLED BALL SCREWS & NUTS

1/2" Diameter Screws & Nuts

CRITICAL SPEED

$$N = \left[C \cdot 4.76 \cdot 10^{6} \cdot \left[\frac{D * H}{L^{2}} \right] \cdot 8 \right]$$

N = CRITICAL SPEED (INCHES PER MINUTE)
H = LEAD OF SCREW
D = ROOT IDAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.36 FIXED FREE
1.00 SIMPLE - SIMPLE
1.47 FIXED - SIMPLE
2.23 FIXED - FIXED

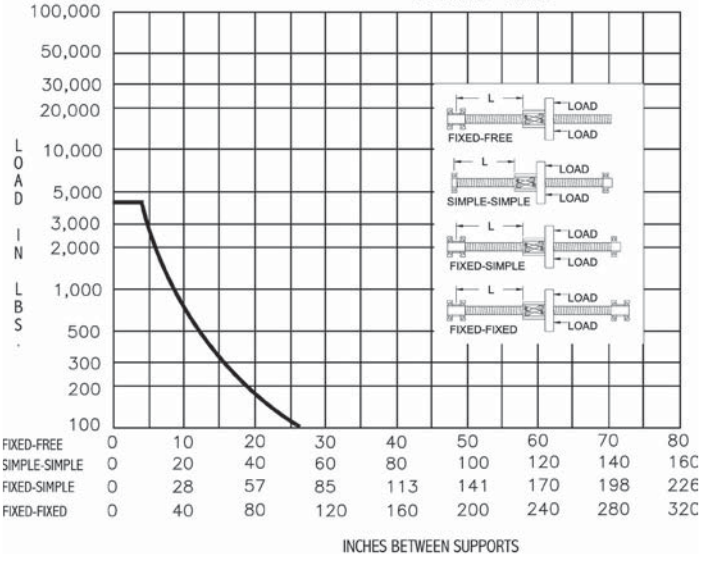


FIXED-FREE	0	10	20	30	40	50	60	70	80	90	100	110	120
SIMPLE-SIMPLE	0	14	28	42	56	70	84	98	112	126	140	154	168
FIXED-SIMPLE	0	15	30	45	60	75	90	105	120	135	150	165	180
FIXED-FIXED	0	16	32	48	64	80	96	112	128	144	160	176	192

COLUMN LOAD

$$P = \left[C \cdot 14.03 \cdot 10^{6} \cdot \left[\frac{D^{4}}{L^{2}} \right] \cdot 8 \right]$$

P = CRITICAL COLUMN LOAD(POUNDS)
D = ROOT DIAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.25 FIXED FREE
1.00 SIMPLE - SIMPLE
2.00 FIXED - SIMPLE
4.00 FIXED - FIXED



FIXED-FREE	0	10	20	30	40	50	60	70	80	90	100	110	120
SIMPLE-SIMPLE	0	20	40	60	80	100	120	140	160	180	200	220	240
FIXED-SIMPLE	0	28	57	85	113	141	170	198	226	255	283	311	340
FIXED-FIXED	0	40	80	120	160	200	240	280	320	360	400	440	480

Note: Screws may be ordered with annealed ends for subsequent finishing by the user. Dimensions are always specified by customer. In each case a detailed drawing is necessary.

B STYLE PRECISION ROLLED BALL SCREWS & NUTS

0.631" Diameter Economy Screws & Nuts

LEAD — 0.200 Inches

Lead Accuracy (In/ft cumulative)	Standard Length (inches)	Part Number	
		Alloy Steel	Stainless Steel
0.003	36, 48, 72	**BSPRC6305-XX**	**BSPRS6305-XX**
0.007	36, 48, 72	**BSRC6305-XX**	**BSRS6305-XX**

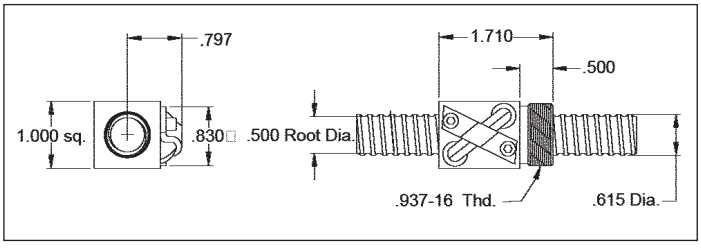
Special lengths to 12 feet. Specify length xx in inches +/- 1/32 inches.

BALL NUTS

SINGLE CIRCUIT NUTS

Contains an average of 67 1/8 inch diameter balls per unit.

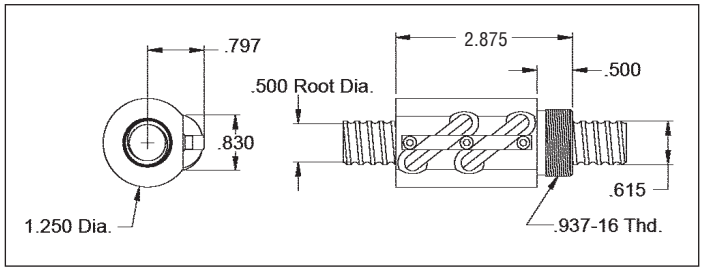
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	825	6250	**BNC1-6305**
Stainless	170	1250	**BNS1-6305**



DUAL CIRCUIT BALL NUTS

Contains an average of 134 1/8 inch diameter balls per unit.

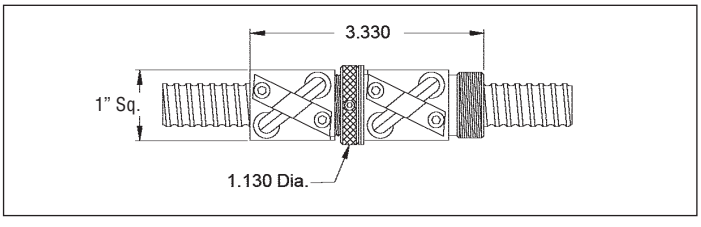
Material	Operating Load (lbs)	Max. Static Load (lbs)	Part Number
Alloy	1650	9000	**BNC2-6305**



PRELOADED BALL NUTS

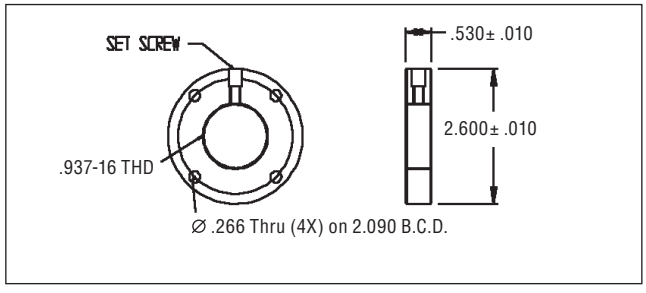
Includes wiper kit and flange.

Material	Recommended Load			Maximum Load			Part Number
	Preload (lbs)	Rated (lbs)	Static (lbs)	Preload (lbs)	Rated (lbs)	Static (lbs)	
Alloy	83	742	6067	249	576	5901	**BNC3-6305**
Stainless	17	153	1233	51	119	1199	**BNS3-6305**



MOUNTING FLANGE

Material	Outside Diameter (inches)	Width (inches)	Bolt Hole Pattern			Part Number
			No. of Holes	Diameter (inches)	Bolt Circle (inches)	
Alloy	2.600	0.530	4	0266	2.090	**BFC-63**
Stainless						**BFS-63**



WIPER KIT

Contains 2 brush wipers and 1 end cap.

Diameter (inches)	Thickness (inches)	Part Number	
		Alloy	Stainless Steel
0.975	0.100	**BNW-63**	**BNW-63S**

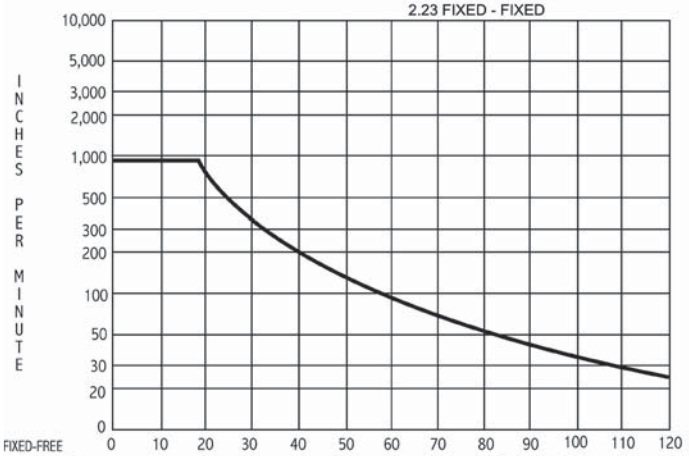
B STYLE PRECISION ROLLED BALL SCREWS & NUTS

0.631" Diameter Screws & Nuts

CRITICAL SPEED

$$N = \left[C \cdot 4.76 \cdot 10^{6} \cdot \left[\frac{D * H}{L^{2}} \right] \cdot 8 \right]$$

N = CRITICAL SPEED (INCHES PER MINUTE)
H = LEAD OF SCREW
D = ROOT IDAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.36 FIXED FREE
1.00 SIMPLE - SIMPLE
1.47 FIXED - SIMPLE
2.23 FIXED - FIXED



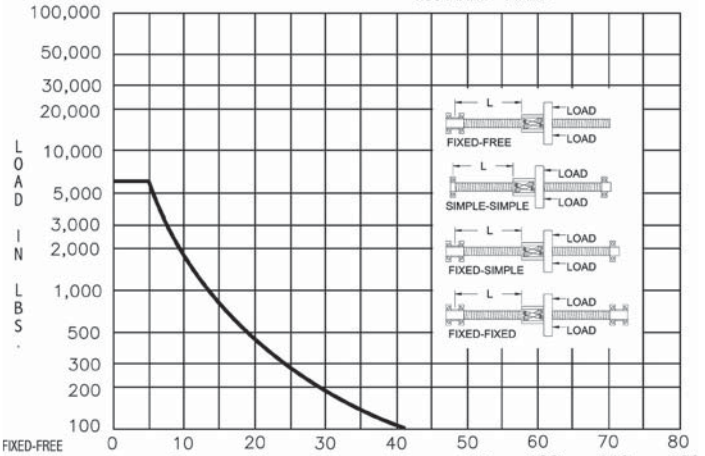
FIXED-FREE	0	10	20	30	40	50	60	70	80	90	100	110	120
SIMPLE-SIMPLE	0	14	28	42	56	70	84	98	112	126	140	154	168
FIXED-SIMPLE	0	15	30	45	60	75	90	105	120	135	150	165	180
FIXED-FIXED	0	16	32	48	64	80	96	112	128	144	160	176	192

DISTANCE IN INCHES BETWEEN SUPPORTS

COLUMN LOAD

$$P = \left[C \cdot 14.03 \cdot 10^{6} \cdot \left[\frac{D^{4}}{L^{2}} \right] \cdot 8 \right]$$

P = CRITICAL COLUMN LOAD(POUNDS)
D = ROOT DIAMETER OF SCREW
L = LENGTH BETWEEN SUPPORTS
C = END FIXITY FACTOR
P_S = 0.25 FIXED FREE
1.00 SIMPLE - SIMPLE
2.00 FIXED - SIMPLE
4.00 FIXED - FIXED



FIXED-FREE	0	10	20	30	40	50	60	70	80	90	100	110	120
SIMPLE-SIMPLE	0	20	40	60	80	100	120	140	160	180	200	220	240
FIXED-SIMPLE	0	28	57	85	113	141	170	198	226	255	283	311	340
FIXED-FIXED	0	40	80	120	160	200	240	280	320	360	400	440	480

INCHES BETWEEN SUPPORTS

Note: Screws may be ordered with annealed ends for subsequent finishing by the user. Dimensions are always specified by customer. In each case a detailed drawing is necessary.

B STYLE PRECISION ROLLED BALL SCREWS & NUTS

Technical Information

LEAD: The linear distance the ball nut or screw will travel in one revolution.

LEAD ACCURACY: The maximum variation of lead measured in inches per foot. The standard grade of accuracy is .007" per foot cumulative. The premium grade is .003" per foot cumulative.

BACKLASH (AXIAL LASH): The axial-free movement between the ball nut and ball screw. It determines the amount of lost motion between the ball nut and screw on a horizontal application. Backlash on standard nuts range from .004 to .018 inches, depending on size of screw.

PRELOAD: The use of two groups of ball bearings, loaded in opposite directions, to eliminate backlash in a ball screw assembly. Preloading increases screw stiffness and provides for accurate positioning with very little increase in applied torque.

EFFICIENCY: The ratio of work output divided by work input. Generally this is greater than 90 percent.

THRUST LOAD: A load parallel to and concentric with the center line of the ball screw, which acts continuously in the same direction. Thrust loading is the recommended method of attaching the load to the ball screw.

COMPRESSION (COLUMN) LOAD: A load that tends to buckle or compress the screw shaft.

TENSION LOAD: A load that tends to stretch the screw shaft. A greater selection of screw sizes are available when tension loading is present because there are no column load limitations.

OFF-CENTER LOAD: A load that tends to "cock" the ball nut on the screw. This type of loading will reduce ball screw life.

SIDE LOAD: A load that is applied perpendicular to the screw shaft. This type will also reduce the life of a ball screw assembly.

Dynamic Load (Operating) Rating: The maximum thrust load under which a ball screw assembly will achieve a minimum of 1,000,000 inches of travel life.

STATIC LOAD: The maximum load (including shock loads) that can be applied to a stationary ball screw assembly before there is permanent deformation of the ball track in the ball nut or screw.

BALL SCREW LIFE (Life Expectancy): Is expressed as total revolutions or inches of travel an assembly will operate under a rated load in a clean environment with proper lubrication. About 90 percent of all ball screws operated at rated loads will meet or exceed a million inches of life before evidence of fatigue appears. Although 10 percent may not reach a million inches, 50 percent could exceed 5 million inches.

TEMPERATURE: Ball screws operate with normal efficiency between temperatures of –65° F to 300° F, with suitable lubricants.

LUBRICATION: Ball screws should not be operated without proper lubrication. A spindle or 10-weight oil is recommended. For applications with infrequent cycles, a light lithium grease is recommended.

FINISH ON BALL SCREW ASSEMBLY: Ball screw assemblies are supplied with Black Oxide-type finish.

BRUSH WIPERS: Brush wipers help to prohibit contaminants from entering the ball screw assembly. Brush wipers are recommended for any application where contaminants might be deposited on the ball screw.