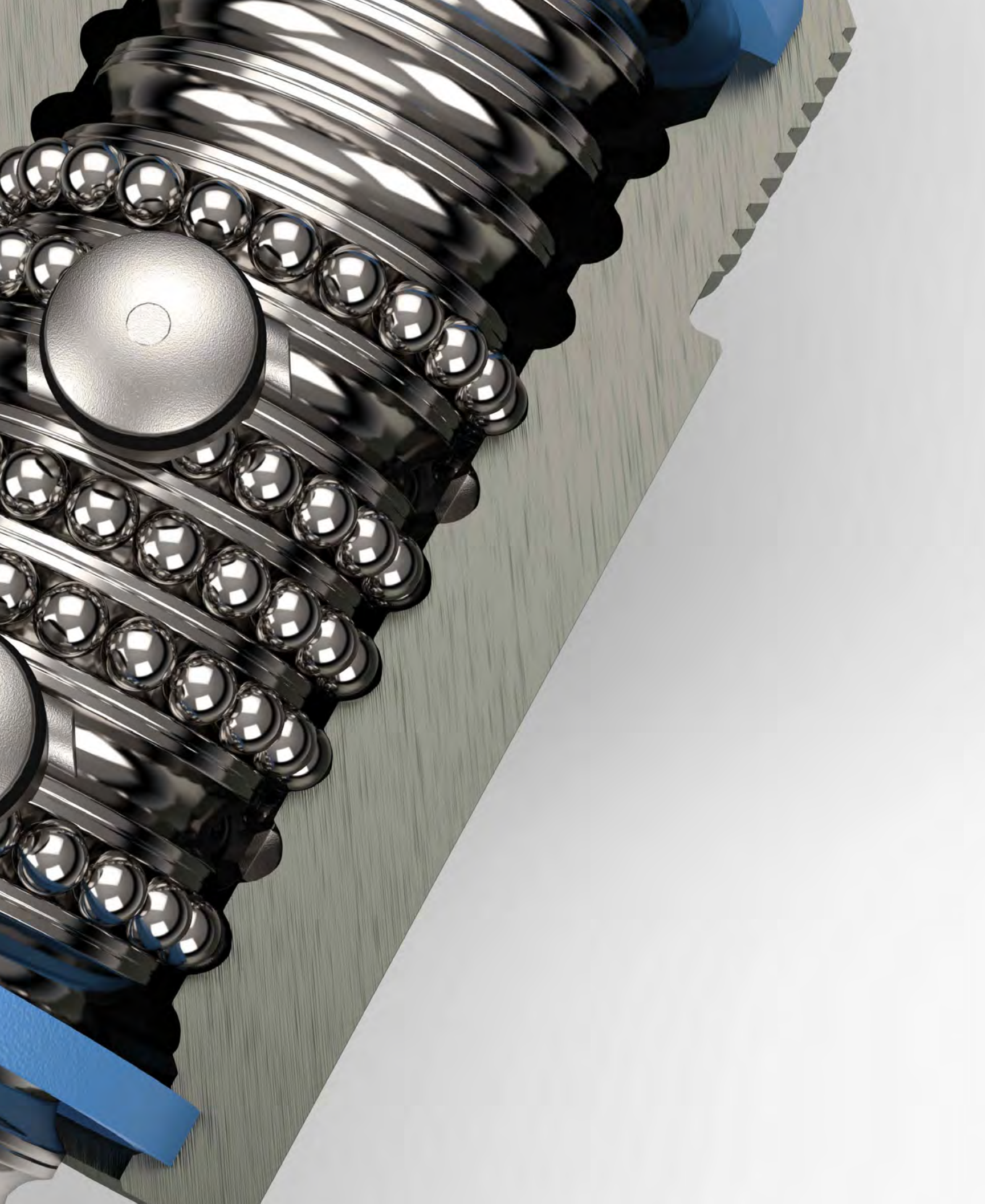


ROCKFORD BALL SCREW

METRIC PRODUCT CATALOG



It's Your Move.™



ROCKFORD BALL SCREW
METRIC PRODUCT CATALOG

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It's Your Move.™

OUR CUSTOMERS COME **FIRST**



Ian McBain founded the Rockford Ball Screw Company in 1973 with three goals in mind:

- 1 Provide the customer with a quality product**
- 2 Provide the customer with a competitive price**
- 3 Provide the product on time**



Today, the Rockford Ball Screw Company continues as a family owned and operated business, and Ian's three goals endure as the backbone of our growth and commitment to our customers needs.

Rockford Ball Screw products are built to the highest performance design standards. Extensive engineering expertise and a state-of-the-art manufacturing facility ensure top performance and reliability in our products. Our ball screw and ACME screw product lines feature over 100 standard models and one of the largest inventories in the industry.

Rockford Ball Screw is an ISO 9001 Certified company committed to to continuous improvement and dedication to total customer satisfaction. Call us today and see for yourself what "service" really means!

High-Quality Products

Rockford Ball Screw offers mature product line, built to the highest performance design standards. Our extensive engineering expertise and state-of-the-art manufacturing facility ensure top performance and reliability in our products.

We offer one of the largest inventories of ball screw and ACME screw product lines in the industry and our offerings are continually growing and evolving. Our extensive product lines include catalogued, non-catalogued, standard, and non-standard offerings. If you don't see what you're looking for, all you have to do is ask.

Value-Add Customization Services

Have you been told, "It can't be done"?
Call Rockford Ball Screw.

When customers bring us their ideas, we don't say, "No," or push them toward our standard offerings. Rather, we act as a trusted partner and seek to cooperatively find solutions through implementation of services such as:

- Feasibility assessments
- Formal engineering analyses

We take variable concepts all the way through implementation, including custom design, development, production, assembly work, and installation.

Additional Resources

- Visit Rockford Ball Screw's website for more information www.rockfordballscrew.com
- A full product catalogue is available as a downloadable PDF on the site
- Or call **(800) 475-9532** to request a hard copy of the product catalogue
- Our website offers an **interactive design module**
- Contact our technical staff at **(800) 475-9532** to discuss your specific application

Customers Come First

Rockford Ball Screw customers receive the highest level of quality, service, and engineering expertise. Our specially trained staff and state-of-the-art manufacturing facility and equipment work in concert to effectively fulfill customer needs - whether they require standard or custom offerings.

We offer one of the highest services-to-client ratio in the industry. Our customers have direct access to RBS personnel - including sales, development, engineering, etc. - as needed to support their requirements.

We believe in and are committed to partnering with our customers at the front end of projects to put a program in place for success across the entire lifecycle - from prototyping through production.

Rockford Ball Screw supports every major CAD software program - incompatibility is never an issue!

ABOUT BALL SCREWS

With a re-engineered bearing return system, metric ball screws help to minimize footprints and offer quiet and smooth performance. In addition, RBS metric ball screws feature new and improved wiper technology for optimum cleaning performance - making them an ideal solution for numerous commercial and industrial motion applications.



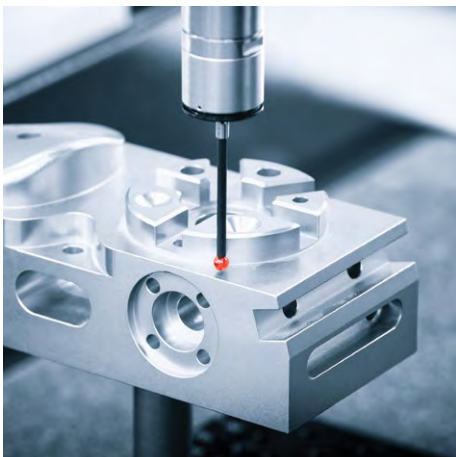
Factory Automation



Woodworking



Industrial Machines



Testing Equipment



Agricultural Equipment



Medical Equipment

A ball bearing screw is just that: a screw which runs on ball bearings. The screw and nut have matching helical grooves or races, and the ball bearings recirculate in these races. There is no physical contact between the screw and the nut. As the screw or nut rotates, and the rolling balls reach the trailing end of the nut, they are deflected or guided from this “pitch” contact by means of a return tube, inserts or end deflectors and returned to the leading end of the circuit. There, the cycle resumes and the balls recirculate continuously.



Major Diameter (Land Diameter) The outside diameter of the screw thread.

Minor Diameter (Root Diameter) The diameter of the screw shaft as measured at the bottom of the ball thread track. This diameter is used in column load and critical speed calculations. Minor diameter also is a consideration in support bearing selection.

Ball Pitch Diameter (Ball Circle Diameter) The theoretical cylinder passing through the center of the balls when they are in contact with the ball screw and ball nut races.

Lead The axial distance the screw or nut travels in one revolution.

Lead Error (Accuracy) The difference between the actual distance traveled compared to the theoretical travel based on the lead of the screw. The lead error for a standard screw will not exceed 52µm per 300mm. Lead error is cumulative based on the actual length of the ball screw thread. Ref. Grade 7 ISO3408-3. Lead charts describing incremental lead deviation offsets can be supplied (upon request). These incremental offsets can be input into motion controllers for lead error compensation.

Matched Leads (Synchronous Screws) Used when multiple screws are being driven by a single drive in order to keep the screws in sync. Basically the lead errors are matched at the factory in order to minimize misalignments during the stroke. Consult factory for additional information on matched leads.

Pitch The distance from one thread on the screw to a corresponding point on the next thread parallel to the screw axis. Pitch is equal to the lead on single start screws.

Screw Starts Screw Starts The number of independent threads on the screw shaft. The lead of the screw is calculated by multiplying the distance between threads (in mm) by the number of starts.

Backlash The axial free motion between the nut and the screw. It determines the amount of lost motion between the nut and screw on a horizontal application. Backlash on standard nuts range from .07mm to .13mm, depending on the size of the screw.

Selective Fit The process of selecting a unique ball size for reducing backlash to as little as .03mm.

ABOUT BALL SCREWS

Efficiency Expressed as a percentage and is the ability of a ball screw assembly to convert torque to thrust with minimal mechanical loss. Rockford Ball Screws operate in excess of 90% efficiency.

Dynamic Load The maximum thrust load under which a ball screw assembly will achieve a minimum of 1,000,000 revolutions before first signs of fatigue are present.

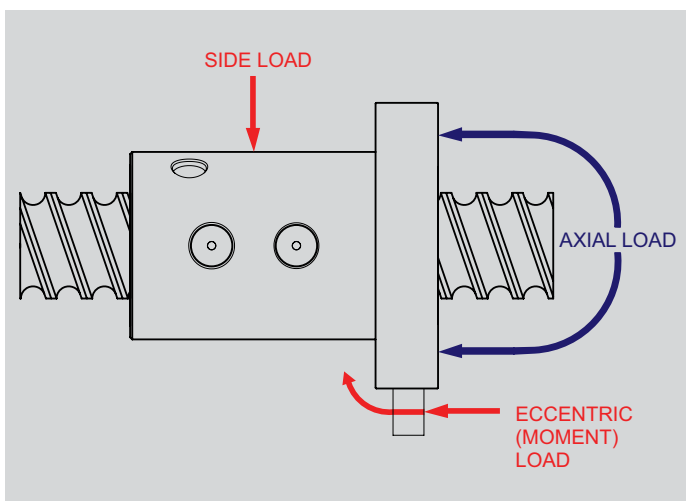
Static Load The maximum non-operating load capacity above which permanent damage of the ball track occurs.

Tension Load A load that tends to stretch the ball screw. This is the preferred mode of attaching the load since column loading limitations would not effect the screw.

Compression Load A load which would tend to compress or buckle the screw shaft. Use column load calculations to determine safe compression loads.

Axial Loading The recommended method of attaching the load to the ballnut. This load should be parallel to the centerline of the screw shaft and equally distributed around the mounting surface.

Eccentric (Moment Loading) A load tending to cock the ballnut on the screw and therefore reducing the rated life.



Side Loading (Radial Loading) A load that is applied perpendicular to the screw shaft. This type of loading will also reduce the rated life of the ball screw assembly.

Ball Screw Life (Life Expectancy) Expressed as total accumulated revolutions under a constant rated thrust load (with proper lubrication and clean environment) before first evidence of fatigue develops (1,000,000 revolutions under stated rated loads). Ball screw life is rated similar to ball bearings (L10). The L10 life rating states that 90% of a similar group of screws will achieve this life. Although 10% will not achieve the life, 50% could exceed life by 5 times.

Applied Dynamic Loading Each unique application needs to be evaluated such that ALL force components are realized and accounted for. The force components might include: weight of the sliding mechanism (if vertical), weight of the sliding mechanism multiplied by the coefficient of sliding friction (if horizontal), any direct forces resisting the linear motion (such as tool cutting loads), and any other applicable force components.

$$P = Wf * \mu + Fp$$

- P = Applied Dynamic Load (N)**
- Wf = Weight of Sliding Load (N)**
- μ = Coefficient of sliding friction
(=1 if load orientation is vertical)**
- Fp = Force component pushing directly
against the sliding mechanism (N)**

Coefficient of sliding friction for non-vertical loading applications

Steel on Steel	~.58
Steel on Steel (greased)	~.15
Aluminum on Steel	~.45
Gibb Ways	~.50
Dove Tail Slides	~.20
Linear Bearing (Ball Bushings)	<.001

Frictional coefficients are included for reference purposes only and may vary in accordance with actual operating conditions.

Equivalent Load This calculation is used in applications where the load is not constant throughout the entire stroke. This equivalent load can be used in life calculations. In cases where there is only minor variation in loading, use greatest load for conservative life calculation. Please note that the drive torques and horsepower requirements should always be based on the greatest thrust load encountered.

$$P_e = \sqrt[3]{\frac{\%_{01}(P_1)^3 + \%_{02}(P_2)^3 + \%_{03}(P_3)^3 + \%_{0n}(P_n)^3}{100}}$$

Pe = Equivalent Load (N)
Pn = Each Increment at Different Load (N)
%n = Percentage of stroke at load increment

Example: 2000 N load for 25% of stroke
 3300 N load for 50% of stroke
 900 N load for 25% of stroke

$$P_e = \sqrt[3]{\frac{25(2000)^3 + 50(3300)^3 + 25(900)^3}{100}}$$

Equivalent Load (Pe) = 2720 N

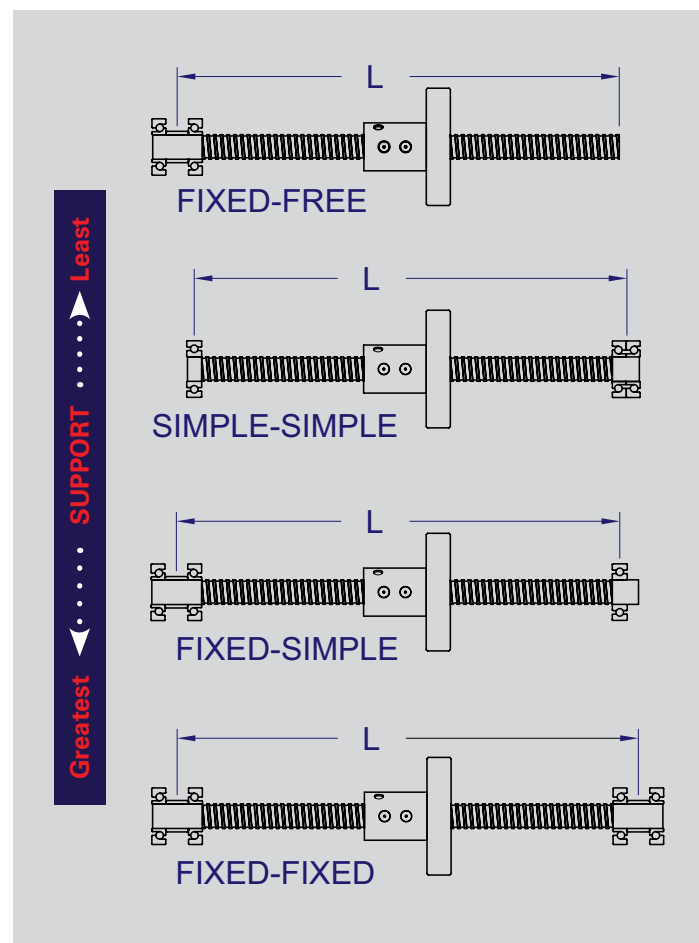
Life At Loads (Other than Rated) Based on the inverse cube ratio in that by operating at 1/2 the rated load you will get 8 times the life or operating at twice the rated load you will get 1/8 the life.

$$(Rated\ Load / Actual\ Load)^3 * 10^6 = LIFE\ ASSEMBLY\ UNDER\ ACTUAL\ LOAD$$

Design Life Objective Design Life Objective is the distance that a ball screw will travel during the desired life of the machine. Generally it is ultimately stated in terms of years of life but we need to compare total revolutions to calculated life.

Length of stroke	= 150 mm
Screw Lead	= 10mm/rev
Cycle rate of machine	= 20 Strokes/hr.
Hours of operation/day	= 16 hours
Number of working days per year	= 250 days
Number of years machine is designed for	= 5 years
$(150 / 10) * 20 * 16 * 250 * 5$	= 6,000,000 revolutions of life

End Fixity End Fixity (Bearing Mount Support Configuration) refers to the method by which the ends of the screws are supported. The end fixity basically describes the bearing configuration being used to support the rotational axis of the screw. The end fixity combinations are determined as a result of critical speed, column loading and system stiffness calculations. There are three basic end fixity styles that can be used in four combinations. The ends styles are "free" (no support), "Simple" (single point support) and "Fixed" (spaced support points).



ABOUT BALL SCREWS

Critical Speed Critical Speed is the theoretical linear velocity (rpm) which excites the natural frequency of the screw. As the speed of the screw approaches the natural frequency (critical speed), the screw shaft begins to resonate which leads to excessive vibration. The resulting resonance can occur regardless of whether the screw or nut rotates or regardless of screw orientation. R/B/S recommends limiting the maximum RPM to 80% of the calculated critical speed value.

$$C_s = \frac{F_e * 1.2 * 10^8 * D_{min} * F_s}{L^2}$$

Cs = Critical Speed (rpm)
Dmin = Minor Diameter (root) of Screw (mm)
L = Distance between bearing supports (mm)
Fe = End Fixity Variable
= .36 for Fixed-Free Support Configuration
= 1.00 for Simple-Simple Configuration
= 1.47 for Fixed-Simple Configuration
= 2.23 for Fixed-Fixed Configuration
Fs = Factor of Safety (80% recommended)

Speed Limit of Nut is rotational speed limit due to the critical ball velocity within the ball nut for very short periods of time. Exceeding this value can have a detrimental effect on the life of the ball screw assembly.

$n < 50000 / D_{nom}$
n = rotational speed (rpm)
Dnom = screw shaft nominal diameter (mm)

Column Load Strength Column Load Strength is the ability of the screw shaft to withstand compressive forces. The fundamental limit occurs when a compressive load exceeds the elastic stability of the screw shaft. Exceeding the column load will result in bending and buckling of the screw. This mode of failure can only occur when the screw shaft is in compression and never in tension. R/B/S recommends limiting the maximum compressive load to 80% of the calculated column load strength.

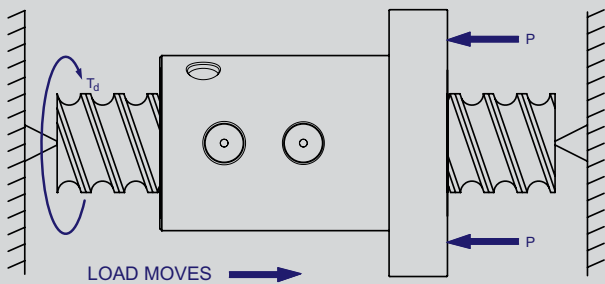
$$P_c = \frac{F_e * 9.69 * 10^4 * D_{min}^4 * F_s}{L^2}$$

Pc = Maximum Column Load (N)
Dmin = Minor Diameter (root) of Screw (mm)
L = Distance (max.) between load and bearing in compression (mm)
Fe = End Fixity Variable
= .25 for Fixed-Free Support Configuration
= 1.00 for Simple-Simple Configuration
= 2.00 for Fixed-Simple Configuration
= 4.00 for Fixed-Fixed Configuration
Fs = Factor of Safety (80% recommended)

Drive Torque Drive Torque is the amount of torque (Nm) required by the ball screw to move the load. This torque does not take into account any inertial loading required for acceleration.

$$T_d = \frac{S_L * P}{2000 * \pi * E_f}$$

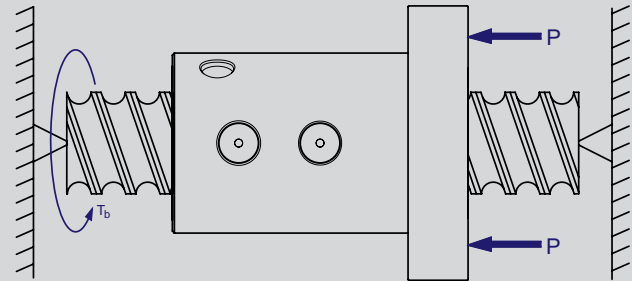
T_d = Drive Torque (Nm)
P = Applied Dynamic Load (N) *(see formula page 8)*
SL = Lead of Screw (mm)
Eff = Ball Screw Efficiency (90%)



Back Drive Torque The torque produced through the screw shaft by a thrust load on the ball nut. Ball screws can coast or backdrive due to the high efficiency of the mechanism (90%). If back driving is not acceptable, a method to resist the overturning backdriving systemic torque, such as a brake, will be required to hold the load. If backdriving is desired, the lead of the screw should be at least 1/3 of the screw diameter. Ideally the lead should be equal to the screw diameter. This calculated torque is the minimum amount of braking torque to hold the load in position.

$$T_b = \frac{S_L * P * E_f}{2000 * \pi}$$

T_b = Backdrive Torque (Nm)
P = Applied Dynamic Load (N) *(see formula on page 8)*
SL = Lead of Screw (mm)
Eff = Ball Screw Efficiency (90%)



ABOUT BALL SCREWS

Power Requirements The power (HP) to drive a ball screw assembly is a function of required drive torque and motor R.P.M. Horsepower should be calculated based on the maximum torque required during the stroke or cycle. The highest torques generally are during acceleration due to inertial loading.

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

$$Horsepower = \frac{RPM * Drive Torque (Nm) * 8.85}{63,000}$$

Materials and Hardness Most screws and nuts are made from alloy steel and case hardened to Rc 56 minimum.

Screw Straightness Screw straightness is extremely important in minimizing screw vibration. Our ball screw stock is Straight to .25mm/300mm not to exceed .64mm over the entire length. We can hold straightness on machined screws to as little as .05mm/300mm (screw diameter and length dependent).

Temperature Range Temperature range for our ball screws is between -20°C (-4°F) and 110°C (230°F) with suitable lubricants.

Lubrication Lubrication is required to achieve optimum life for a ball screw assembly. Ball screws that are not lubricated can experience up to a 90% reduction in calculated life. In general, standard lubrication practices for anti-friction rolling element bearings apply. Grease, oil or dry film lubrication can be used. Many ball nuts are equipped with metric lube port machined into the nut body (see model pages for size information). For models that do not have a factory lube port, contact factory for recommendations regarding application of lubrication.

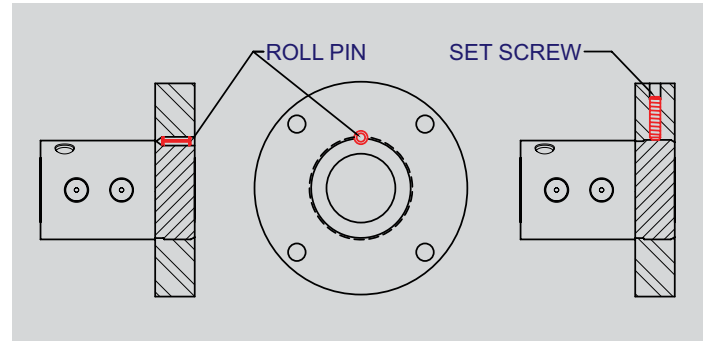
See page 16 for Rockford Ball Screw Grease. This lubricant is specially formulated for use with ball screws as well as ACME screws and bearing mount assemblies. Rockford Ball Screw Grease is packaged in convenient 14 oz. grease cartridges.

Ball Screw Finish Ball Screw Finish is surface hardened carbon steel. Long term corrosion resistance is accomplished by the rust inhibiting properties of the screw lubricant. Optional black oxide coating can be applied to help prevent corrosion during shipping and brief storage. In applications subject to extreme environments, additional coatings such as nickel, hard chrome, zinc, or others can be applied. Contact Rockford Ball Screw for detailed specifications.



Wiper Kits Wiper kits are standard for all metric ball screw models and come pre-installed. The molded wiper is designed to keep large particulates from entering the ball nut. However for harsh environments, the use of boots or bellows to enclose the screw is recommended. Contact Rockford Ball Screw for further information on enclosures.

Mounting Flanges If a mounting flange is used instead of the standard v-thread on the ball nut body, it must be permanently attached to prevent disengagement during operation. The two standard methods of retaining the flange is pinning and retaining with a set screw. Commercial thread locking adhesives may also be used (light loads only). It is always recommended that the flange pinning be performed at the factory to assure no metal chips are present after drilling.



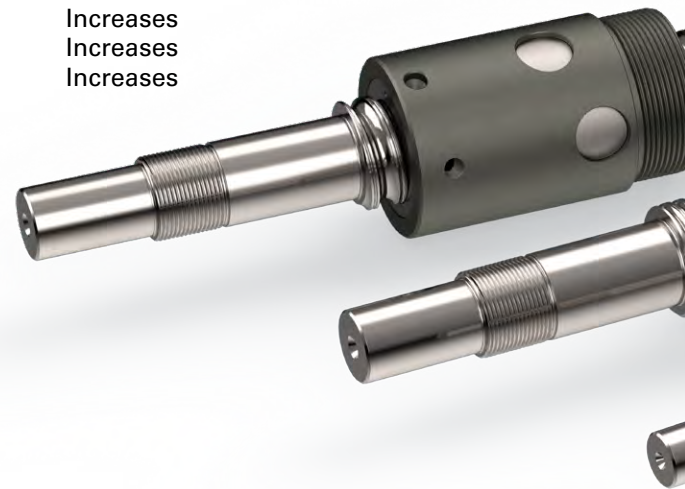
Custom precision end machining is available for any specification.

Machined Ends Rockford Ball Screw offers full service machining capabilities to supply screw assemblies that are ready for installation. We offer standard end machining that can accommodate our line of bearing mounts or we can machine ends to your specifications. See pages 36-45 for our standard end machining designs. Screws can also be supplied cut to length. However, it is recommended to have the screw ends factory annealed to assist subsequent machining.

CHARACTERISTICS | INVENTORY

EFFECT OF CHANGE IN PARAMETER

INCREASE IN	EFFECTS	HOW
Screw Length	Critical Speed Column Load	Decreases Decreases
Screw Diameter	Critical Speed Inertia Stiffness Spring Rate Load Capacity Column Load	Increases Increases Increases Increases Increases Increases
Lead	Torque Input Load Capacity Positioning Accuracy Angular Velocity Ball Diameter	Increases Increases Decreases Decreases Increases
Angular Velocity	Critical Speed	Decreases
Mounting Rigidity	Critical Speed System Stiffness	Increases Increases
Load	Life	Decreases
Nut Length (7 1/2 Turn Max)	Load Capacity Stiffness	Increases Increases
Number of Balls	System Stiffness Load Capacity	Increases Increases
Preload	Positioning Accuracy System Stiffness Drag-Torque	Increases Increases Increases
Ball Diameter	Life Stiffness Load Capacity	Increases Increases Increases



INVENTORY



Rockford Ball Screw has been manufacturing ball screws, ACME screws and linear motion components since 1973. We pride ourselves in being able to respond to our customers' needs by maintaining one of the largest inventories of products.

We stock in excess of 60 ball screw models, over 25 ACME screws sizes, many types of bearing mounts and other linear motion products. Many products are stocked in a variety of materials such as high and low carbon alloy steels and various grades of stainless steel.

We are equipped to supply your ball and ACME screw requirements with second to none service and delivery times. In addition to our "Standard" inventory lines, we take pride in our specialty and custom designs.

Call us today and see for yourself what "service" really means.



BALL NUT LUBRICATION



**R/B/S MULTI-PURPOSE
SYNTHETIC GREASE**

AVAILABLE IN 14 OZ. CARTRIDGES

NOTE: To achieve optimal grease performance, it is recommended that the machine components should be kept in careful alignment, the operating environment should be kept clean, and the assembly should be periodically inspected for proper lubrication quantity and integrity.

Advantages Proper lubrication along with reducing/eliminating foreign contamination are essential for preventing premature catastrophic failure. The R/B/S multi-purpose PTFE fortified synthetic grease has been specifically formulated with extreme pressure and anti-wear additives to reduce rolling element friction, wear, and provide noise damping characteristics. The excellent mechanical stability allows for compatibility with ferrous metals, non-ferrous metals, and most engineering plastics.

Consult the factory for specific material interactions. R/B/S recommends this grease be used for ballscrew, ACME screws, bearing mount, and other applications requiring excellent hydrodynamic lubrication.

Data Multi-Purpose Grease Specifications:

NLGI Grade:	2
Temperature Range:	-40°C (-40°F) and 135°C (275°F)
Base Fluid	
Viscosity (cSt):	75 @ 40°C 12 @ 100°C
Worked Penetration:	291 (ASTM D1403)

HOW TO SIZE A BALL SCREW

Ball Screw Selection Example:

Specification:

Equipment: Transfer Table
 Screw Orientation: **Horizontal**
 Load Supported on Dove Tail Ways: **.20** Coefficient of friction
 Load is **16000** N Max (combined weight of product and table)
 Stroke Length: **1000** mm
 Over Travel (per side): **10** mm
 Travel rate: **7500** mm per minute (Max.)
 Input RPM: **1600**
 Duty Cycle: **20** cycles per hour, **16** hours per day, **250** days per year
 Required Life: **5** years

Given Specification in GOLD
Resultant Calculation in RED
Catalog Product Data in PURPLE

Specifications to be used to select proper ball screw assembly

Steps:

1 Determine Required Life (mm):

$$1000 \text{ mm/stroke} * 2 \text{ strokes/cycle} * 20 \text{ cycles/hr} * 16 \text{ hrs/day} * 250 \text{ days/year} * 5 \text{ years} = 800,000,000 \text{ mm}$$

2 Determine Thrust Load on Ball Screw – Multiply the thrust load by the coefficient of sliding friction (for horizontal application):

$$16000 \text{ N} * .20 \text{ Coefficient of Friction} = 3200 \text{ N}$$

Use this load for life calculations. (If load varies during the stroke or cycle, an equivalent load calculation can be utilized page 9)

3 Determine Lead of the Screw:

Using RPM formula (page 12):

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

$$\rightarrow \frac{7,500 \text{ (mm/min)}}{1,600 \text{ rpm}} = 4.7 \text{ mm/rev (lead)}$$

Select 5mm which is the next closest lead.

$$\rightarrow \frac{800,000,000 \text{ mm}}{5 \text{ mm/rev}} = 160,000,000 \text{ rev}$$

4 Determine Required Ball Screw Dynamic Axial Loading to Achieve Required Life:

Using formula on page 9, input the **3200** N thrust load (Or equivalent load) and the required life.

$$\left(\frac{\text{Rated Load } (P_r)}{\text{Actual Load } (P_t)} \right)^3 * 1,000,000 \text{ rev} = \text{Life of assembly under actual load}$$

$$\rightarrow \left(\frac{P_r}{3,200 \text{ N}} \right)^3 * 1,000,000 \text{ rev} = 160,000,000 \text{ rev}$$

The result is the minimum rated load for a ball screw to achieve the required life.

$$\rightarrow \left(\frac{P_r^3}{3,200^3} \right) = \frac{160,000,000 \text{ rev}}{1,000,000 \text{ rev}} \rightarrow P_r = \sqrt[3]{160 * 3,200^3} = 17,372 \text{ N}$$

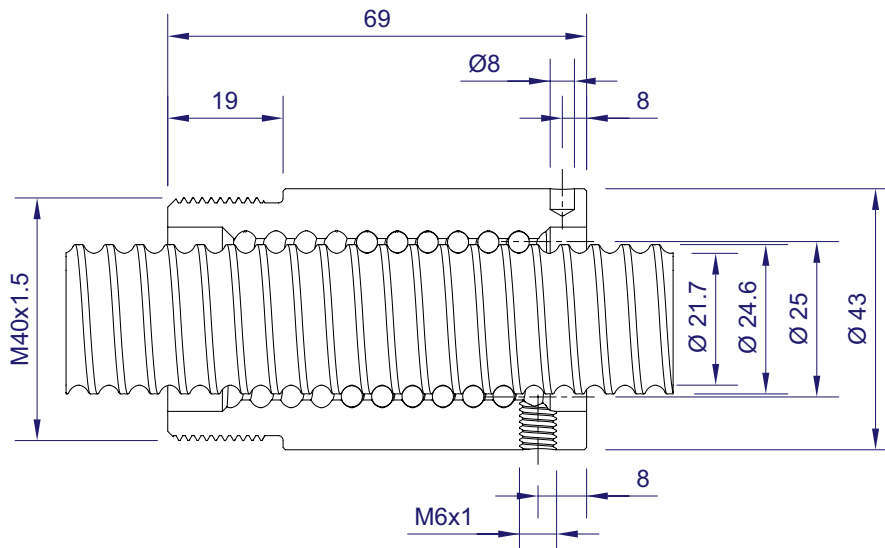
USE THIS QUICK REFERENCE CHART TO SELECT APPROPRIATE BALL SCREW MODEL

SCREW DIA. X LEAD	SCREW RATED LOAD (kN)	SCREW MINOR DIA.	CATALOG PAGE NUMBER
M16x5	7.6	12.7	26
M20x5	14	16.7	28
M25x5	19	21.7	27
M25x10	23.5	20.5	26
M32x5	22	28.7	28
M32x10	27.1	27.8	29
M40x5	24.3	36.7	30
M40x10	61.5	37	31



Ball Screw Selection:

Load Rating: Load Rating: Smallest diameter screw with **17,372 N** (min.) operating load and a **5 mm** lead is the M25x5 (page 27)



5 Calculate Length Between Bearing Supports:

Length between bearings = Stroke length + Ball Nut length + Desired over-travel

1000 mm stroke + **69 mm** nut length (page 27) + **20 mm** over-travel = **1089 mm** between bearings
(use this length for column load and critical speed calculations)

HOW TO SIZE A BALL SCREW

6 Calculate End Fixity Based on Critical Speed Limits (page 9-10):

Using formula for Critical Speed, rearrange to solve for Fe (End Fixity Variable)

$$C_s = \frac{F_e * 1.2 * 10^8 * D_{min} * F_s}{L^2}$$

Cs = Critical Speed = **1600** rpm

Dmin = Minor Diameter (root) of Screw = **21.7** mm

L = Distance between bearing supports = **1089** mm

Fe = End Fixity Variable

= .36 for Fixed-Free Support Configuration

= 1.00 for Simple-Simple Configuration

= 1.47 for Fixed-Simple Configuration

= 2.23 for Fixed-Fixed Configuration

Fs = Factor of Safety (80% recommended)

Equations below will solve for the minimum end fixity factor based on a speed of **1600** rpm.

$$1,600 \text{ rpm} = \frac{F_e * 1.2 * 10^8 * 21.7 * .8}{1,089^2}$$

$$F_{e(\min)} = \frac{1,600 * 1,089^2}{1.2 * 10^8 * 21.7 * .8} = 0.91 \quad \text{Select End Fixity Factor larger than } 0.91$$



Thus a Simple-Simple (Fe = **1.00**) is the proper selection

7 Actual Calculated Critical Speed:

This calculated critical speed is based on the Simple-Simple end fixity arrangement. It is the maximum safe linear speed with this mounting arrangement, screw model and between bearing supports distance. If greater speed is required, a Fixed-Simple or Fixed-Fixed arrangement can be used and recalculate maximum speed accordingly.

$$C_s = \frac{1.00 * 1.2 * 10^8 * 21.7 * .8}{1,089^2} = 1,756 \text{ rpm} \quad (\text{maximum attainable safe linear speed})$$

8 Calculate Critical Ball Speed (DN) (page 10):

$$n < 50000 / D_{nom}$$

$$n < 50000 / 25 \rightarrow n < 2000 \text{ rpm}$$

$$n_{max} = \frac{50,000}{D_{nom}}$$

$$n_{max} = \frac{50,000}{25} = 2,000 \text{ rpm}$$

9 Calculate Column Load Limit (page 10):

This calculated column load is the maximum safe compression load allowable based on mounting arrangement, screw model and distance between bearings. In this example the calculated column loading should be greater than **3200 N**. (Step #2).

$$P_c = \frac{F_e * 9.69 * 10^4 * D_{min}^4 * F_s}{L^2}$$

P_c = Maximum Column Load (N)

D_{min} = Minor Diameter (root) of Screw = **21.7 mm**

L = Distance (max.) between load and bearing in compression = **1089 mm**

F_e = End Fixity Variable

= .25 for Fixed-Free Support Configuration

= **1.00 for Simple-Simple Configuration**

= 2.00 for Fixed-Simple Configuration

= 4.00 for Fixed-Fixed Configuration

F_s = Factor of Safety (80% recommended)

$$P_c = \frac{1.00 * 9.69 * 10^4 * 21.7^4 * .8}{1,089^2} = 14,500 \text{ N max}$$

10 Calculate Drive Torque (page 11):

$$T_d = \frac{S_L * P}{2000 * \pi * E_f}$$

T_d = Drive Torque (Nm)

P = Applied Dynamic Thrust Load = **3200 N**

S_L = Lead of Screw = **5 mm/rev**

E_f = Ball Screw Efficiency (**90%**)

$$\rightarrow \frac{5 * 3,200}{2000 * \pi * .9} = 2.8 \text{ Nm torque at constant velocity}$$

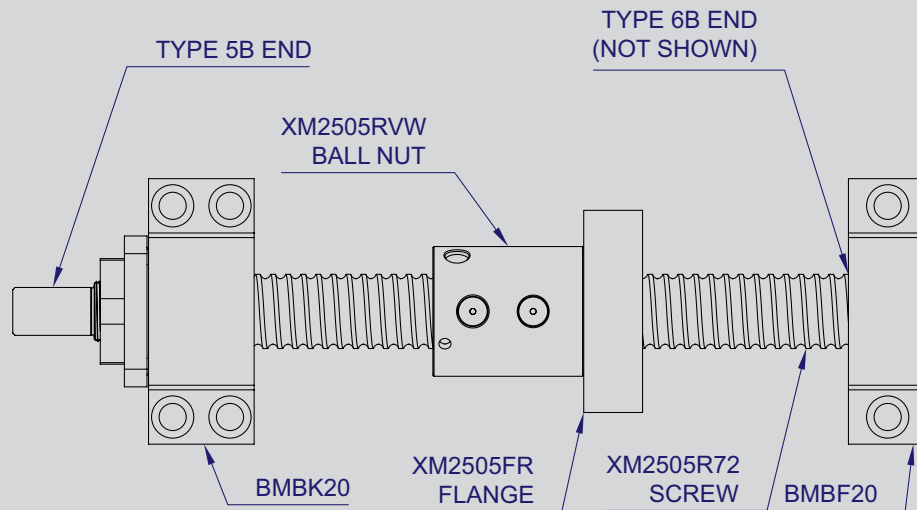
HOW TO SIZE A BALL SCREW

11 Calculate H.P. Required at Constant Velocity (page 12):

$$\text{Horsepower} = \frac{\text{RPM} * \text{Drive Torque (in. lbs)} * 8.85}{63,000} \rightarrow \frac{1600 * 2.8 * 8.85}{63,000} = 0.63 \text{ HP min}$$

12 Specifying Proper Ball Screw Assembly (page 27):

Screw Overall Length = **1089** between bearings + **80 (Type 5B)** + **16 (Type 6B)** = **1185** mm OAL



Model Size: **XM2505** Ballnut #: **XM2505RVW** Mounting Flange #: **XM2505FR**

Bearing Mount Part #: **BMBF20** (compact simple radial support) non-drive end

BMBK20 (compact simple angular support) drive end

Ball Screw Machined Ends: **Type 5B** one end and **Type 6B** other end

13 Go to website to get 2D & 3D downloadable drawings: www.rockfordballscrew.com

METRIC BALL SCREWS



It's Your Move.™



BALL SCREWS

M16x5

METRIC BALL SCREWS

16 diameter x 5 lead

STANDARD BALL SCREW

Ball Screw Part # RH XM1605R72
Ball Nut Part # RH XM1605RVW

Dynamic Load (kN) per 10^6 revs 7.6
Max. Static Load (kN) 10.7
Ball Nut Weight (kg) 0.14
Ball Screw Weight (kg/m) 1.3

ACCESSORIES

Mounting Flange Part # XM1605FR

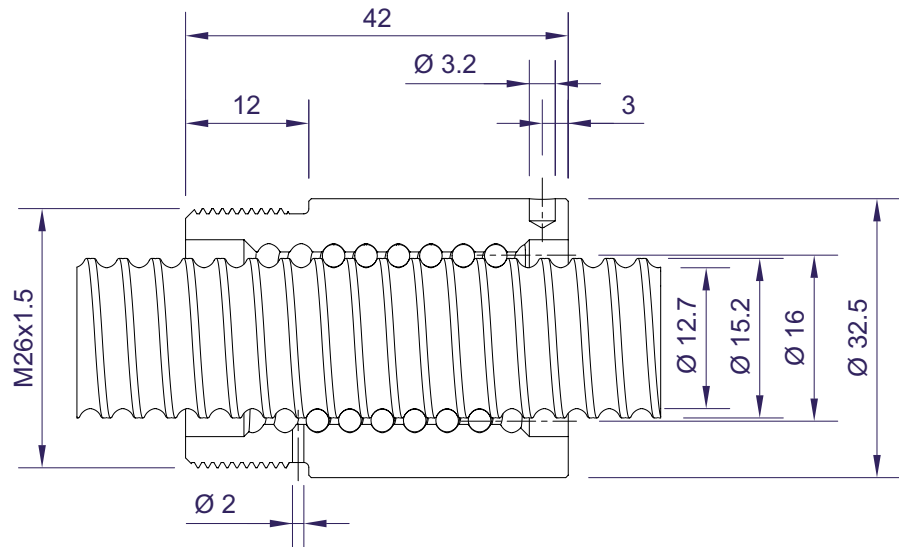
TECHNICAL INFO

Bearing Mounts and
Machined Ends page 32-45
Lubrication information page 16

The specifications and data in this publication are deemed to be accurate and reliable and are subject to change without notice.

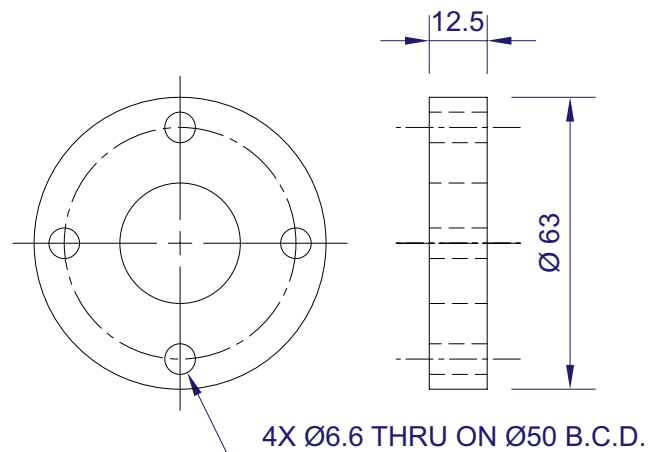
Dimensions in mm

Ball Screw



Ball bearing nominal diameter 3.175. Average ball quantity per nut is 51.

Mounting Flange

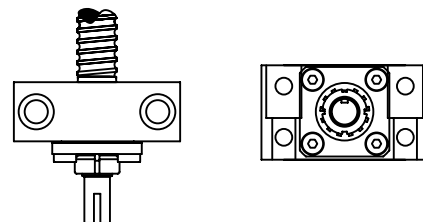


Bearing Mount

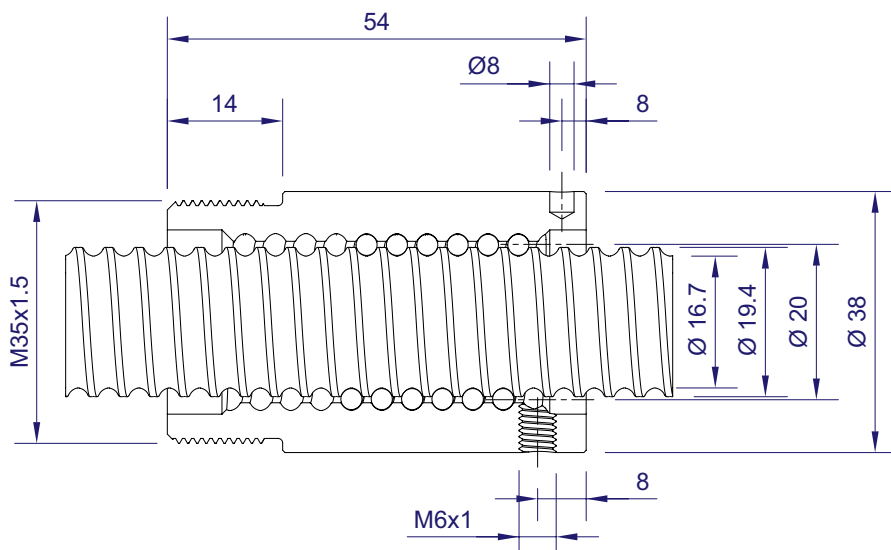
Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.

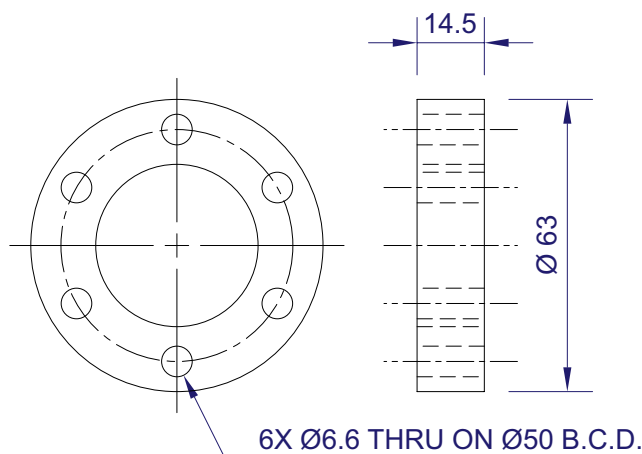


Ball Screw



Ball bearing nominal diameter 3.5. Average ball quantity per nut is 72.

Mounting Flange

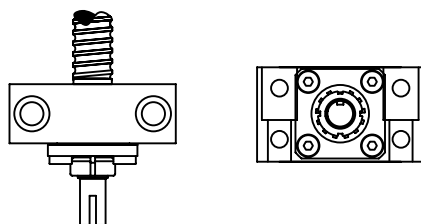


Bearing Mount

Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.



M20x5

20 diameter x 5 lead

STANDARD BALL SCREW

Ball Screw Part # RH	XM2005R72
Ball Nut Part # RH	XM2005RVW

Dynamic Load (kN) per 10 ⁶ revs	14
Max. Static Load (kN)	23.8
Ball Nut Weight (kg)	0.24
Ball Screw Weight (kg/m)	2

ACCESSORIES

Mounting Flange Part #	XM2005FR
------------------------	----------

TECHNICAL INFO

Bearing Mounts and Machined Ends	page 32-45
Lubrication information	page 16

The specifications and data in this publication are deemed to be accurate and reliable and are subject to change without notice.

Dimensions in mm

M25x5

METRIC BALL SCREWS

25 diameter x 5 lead

STANDARD BALL SCREW

Ball Screw Part # RH XM2505R72
Ball Nut Part # RH XM2505RVW

Dynamic Load (kN) per 10^6 revs 19
Max. Static Load (kN) 37.8
Ball Nut Weight (kg) 0.39
Ball Screw Weight (kg/m) 3.3

ACCESSORIES

Mounting Flange Part # XM2505FR

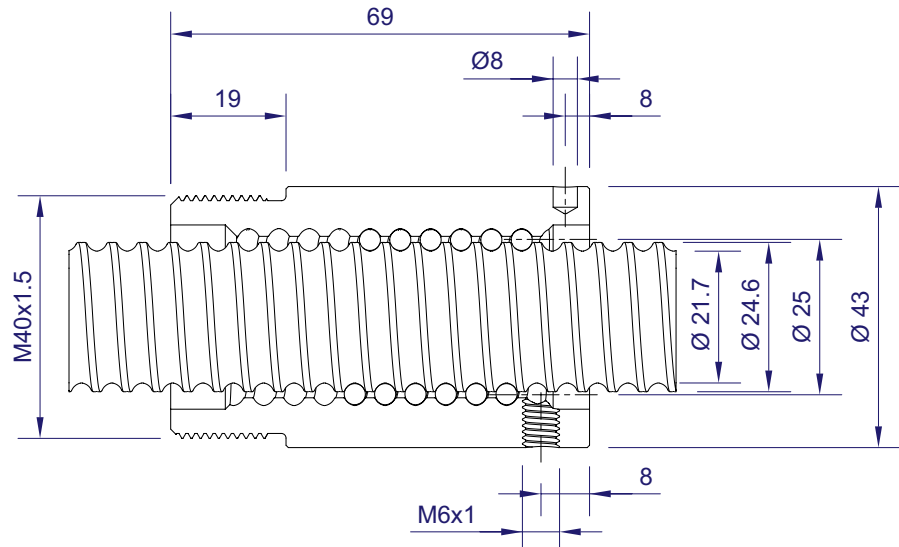
TECHNICAL INFO

Bearing Mounts and
Machined Ends page 32-45
Lubrication information page 16

The specifications and data in this publication are deemed to be accurate and reliable and are subject to change without notice.

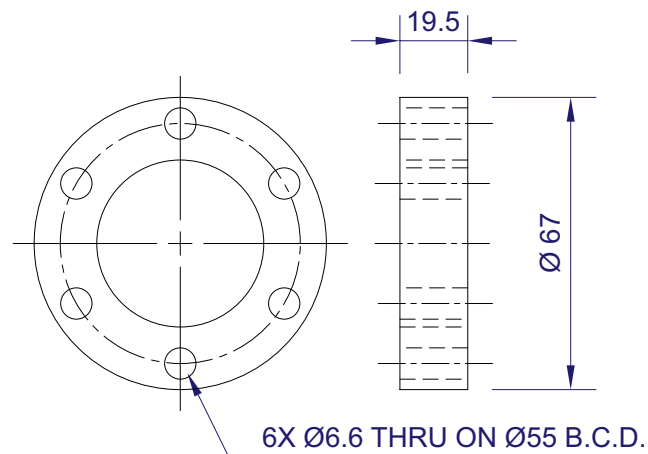
Dimensions in mm

Ball Screw



Ball bearing nominal diameter 3.5. Average ball quantity per nut is 110.

Mounting Flange

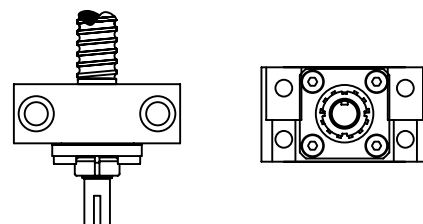


Bearing Mount

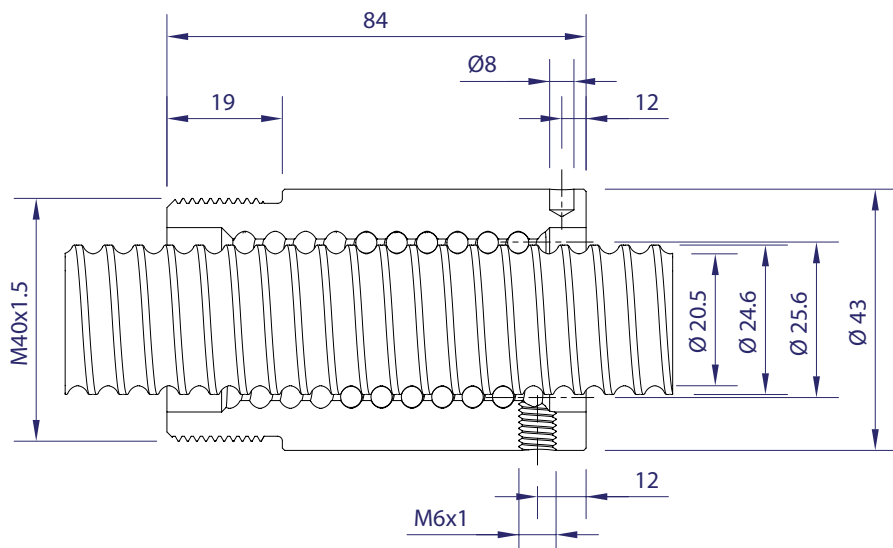
Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.

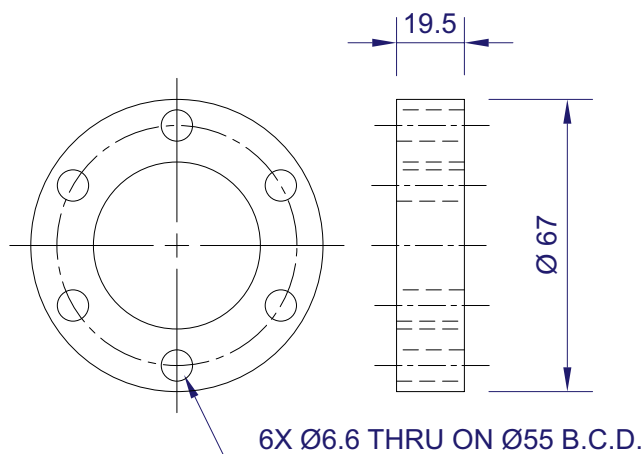


Ball Screw



Ball bearing nominal diameter 5.0. Average ball quantity per nut is 68.

Mounting Flange

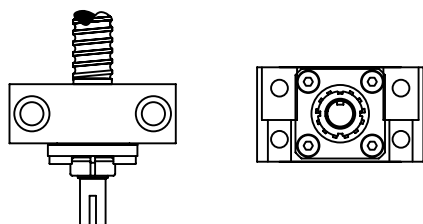


Bearing Mount

Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.



M25x10

25 diameter x 10 lead

STANDARD BALL SCREW

Ball Screw Part # RH	XM2510R72
Ball Nut Part # RH	XM2510RVW

Dynamic Load (kN) per 10 ⁶ revs	23.5
Max. Static Load (kN)	39
Ball Nut Weight (kg)	0.4
Ball Screw Weight (kg/m)	3.2

ACCESSORIES

Mounting Flange Part #	XM2510FR
------------------------	----------

TECHNICAL INFO

Bearing Mounts and Machined Ends	page 32-45
Lubrication information	page 16

The specifications and data in this publication are deemed to be accurate and reliable and are subject to change without notice.

Dimensions in mm

M32x5

METRIC BALL SCREWS

32 diameter x 5 lead

STANDARD BALL SCREW

Ball Screw Part # RH XM3205R72
Ball Nut Part # RH XM3205RVW

Dynamic Load (kN) per 10^6 revs 22
Max. Static Load (kN) 51.6
Ball Nut Weight (kg) 0.48
Ball Screw Weight (kg/m) 5.6

ACCESSORIES

Mounting Flange Part # XM3205FR

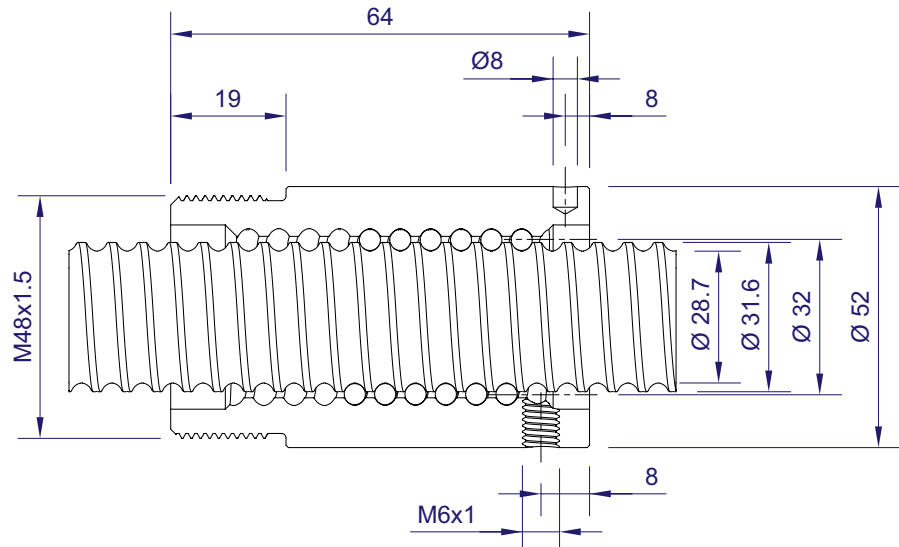
TECHNICAL INFO

Bearing Mounts and
Machined Ends page 32-45
Lubrication information page 16

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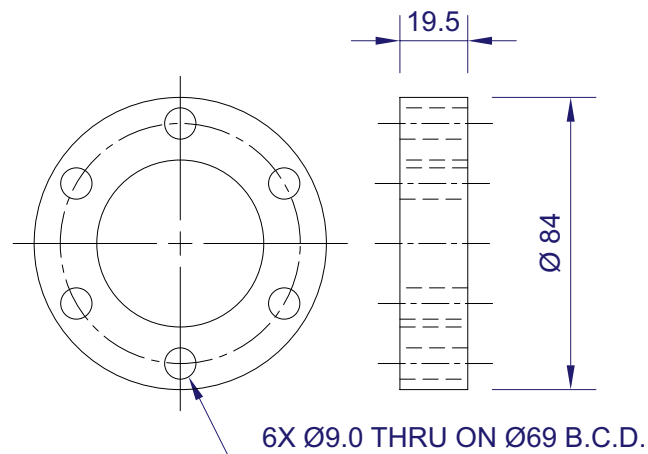
Dimensions in mm

Ball Screw



Ball bearing nominal diameter 3.5. Average ball quantity per nut is 140.

Mounting Flange

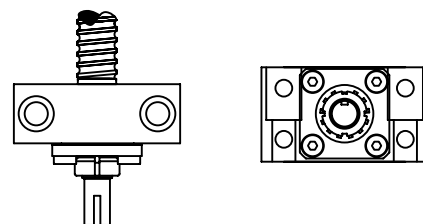


Bearing Mount

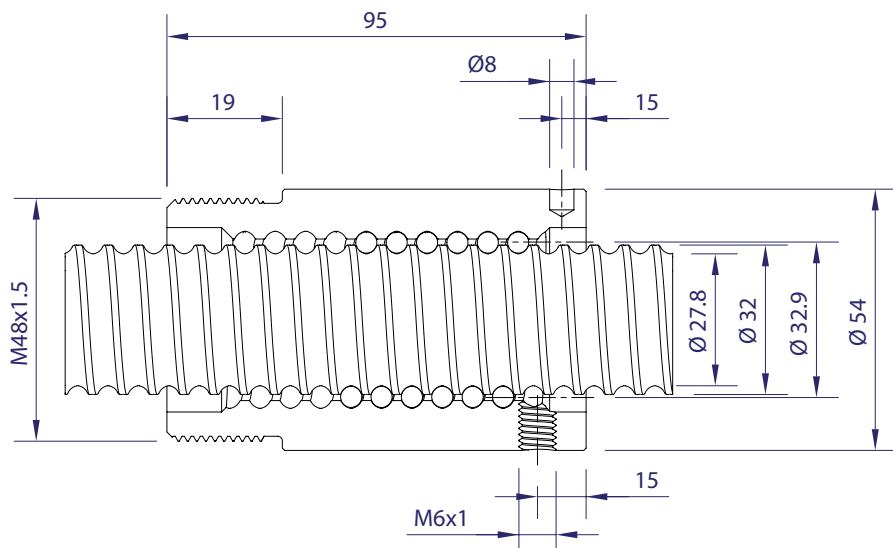
Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.

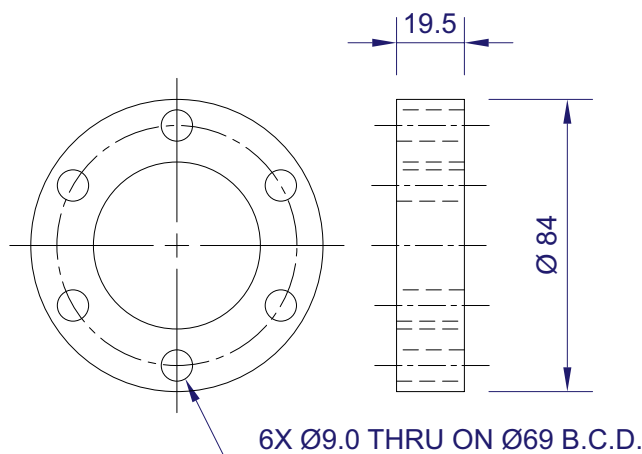


Ball Screw



Ball bearing nominal diameter 5.0. Average ball quantity per nut is 80

Mounting Flange

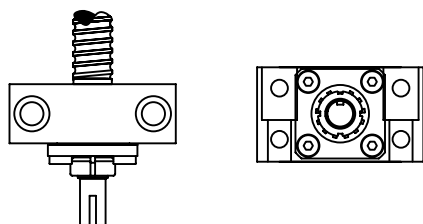


Bearing Mount

Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.



M32x10

32 diameter x 10 lead

STANDARD BALL SCREW

Ball Screw Part # RH	XM3210R72
Ball Nut Part # RH	XM3210RVW

Dynamic Load (kN) per 10 ⁶ revs	27.1
Max. Static Load (kN)	52
Ball Nut Weight (kg)	0.77
Ball Screw Weight (kg/m)	5.6

ACCESSORIES

Mounting Flange Part #	XM3210FR
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TECHNICAL INFO

Bearing Mounts and Machined Ends	page 32-45
Lubrication information	page 16

The specifications and data in this publication are deemed to be accurate and reliable and are subject to change without notice.

Dimensions in mm

M40x5

METRIC BALL SCREWS

40 diameter x 5 lead

STANDARD BALL SCREW

Ball Screw Part # RH XM4005R72
Ball Nut Part # RH XM4005RVW

Dynamic Load (kN) per 10⁶ revs 24.3
Max. Static Load (kN) 65.6
Ball Nut Weight (kg) 0.58
Ball Screw Weight (kg/m) 9

ACCESSORIES

Mounting Flange Part # XM4005FR

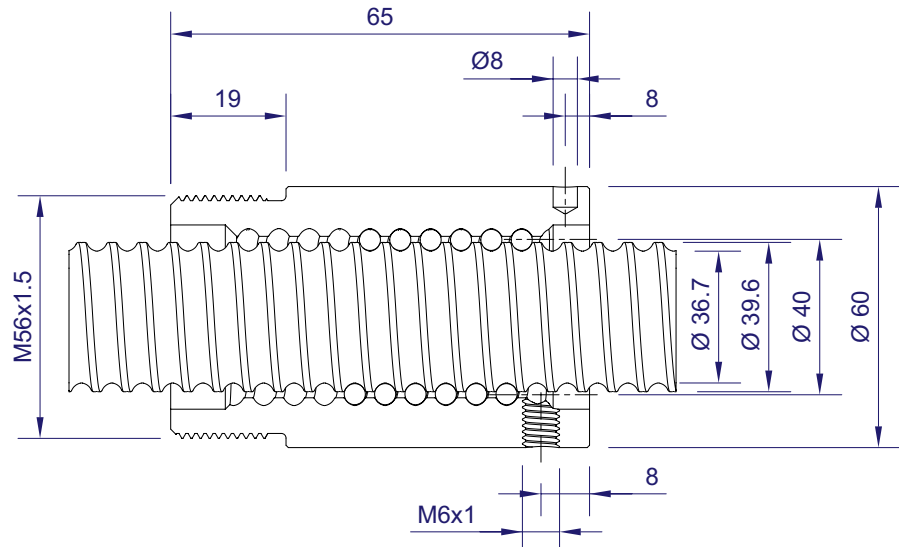
TECHNICAL INFO

Bearing Mounts and
Machined Ends page 32-45
Lubrication information page 16

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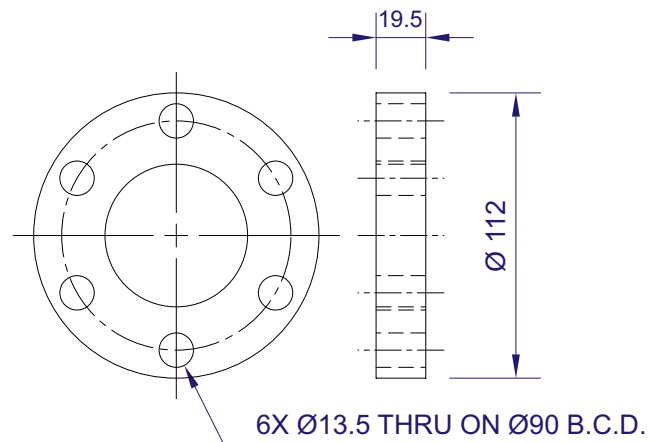
Dimensions in mm

Ball Screw



Ball bearing nominal diameter 3.5. Average ball quantity per nut is 175.

Mounting Flange

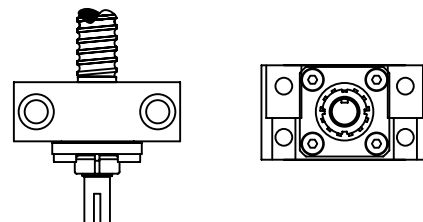


Bearing Mount

Please Note

Technical drawings, information, and availability can vary depending on which Bearing Mount is desired.

See pages 36-45 for details.



BEARING MOUNTS



It's Your Move.™



BEARING MOUNTS

END MACHINING

BMR SERIES

- Simple Radial Bearing Mounts
- End Machining

BMBF COMPACT SERIES

- Simple Radial Bearing Mounts
- End Machining

BM SERIES

- Simple Angular Bearing Mounts
- End Machining

BMBK COMPACT SERIES

- Simple Angular Bearing Mounts
- End Machining

BMF SERIES

- Fixed Angular Bearing Mounts
- End Machining

BEARING SUPPORTS

Every screw assembly functionally requires a means of supporting the rotational axis of the screw and absorbing the radial and axial force components, e.g.

- Bearing support utilizing rolling element bearings
- Sleeve and rolling element bearing combination
- Static screw mounted into a structure with a rotating nut

It is recommended that only axial force vectors be transmitted directly into the axis of the ball screw to obtain optimal and in some instances functional performance & longevity.

All of our bearing mounts are furnished sealed and greased from the factory.

- Bearing mounts can be shipped loose for customer installation or preassembled to the screw at our factory.
- If shipped loose for customer installation, please note that the bearings have an interference fit to the shaft and that installation procedures in accordance with those recommended by rolling element bearing manufacturers need to be implemented. Please consult our factory for additional detail.

Types of Standard Bearing Mounts

Rockford Ball Screw offers standard bearing mounts in five (5) available configurations:

- Simple radial – R/B/S model BMR
- Simple angular – R/B/S model BM
- Fixed angular – R/B/S model BMF
- Compact Simple angular – R/B/S model BMBK
- Compact Simple radial – R/B/S model BMBF

For those applications where standard bearing mounts cannot be applied, please contact Rockford Ball Screw for a custom solution.



BMR/BMBF uses a deep groove radial ball bearing

BMR/BMBF mounts are well suited for high duty cycle conditions where frictional forces may cause a thermal transfer of energy into the screw assembly. The resulting thermal migration will cause the screw to expand axially and occasionally can lead to catastrophic failure.

Overview of BMR/BMBF:

- Considered “simple” support
- Float of the bearing in the housing allows for shaft expansion
- Standard end machining available
- Predrilled for face or foot mounting

BMF uses a set of spaced angular contact bearings

- Able to achieve greater compressive column strength by decreasing the effective length in the column buckling equations
- Increases the angular dynamic systemic stiffness, thereby increasing the first order harmonic frequency and increasing the critical speed capability
- Standard end machining available
- Standard bearing support includes a two (2) bearing configuration
- Available with up to four (4) bearings for more demanding applications; contact us for alternative bearing configurations
- Predrilled for foot mount only
- Predrilled for taper pin reaming to suit final assembly location

BM/BMBK uses a set of angular contact bearings

- Can support a combination of radial and axial loads
- Considered “simple” support
- Standard end machining available
- Predrilled for face or foot mounting
- Industry standard interchangeability
- Contact us for bearing support capacities

Custom Bearing Supports

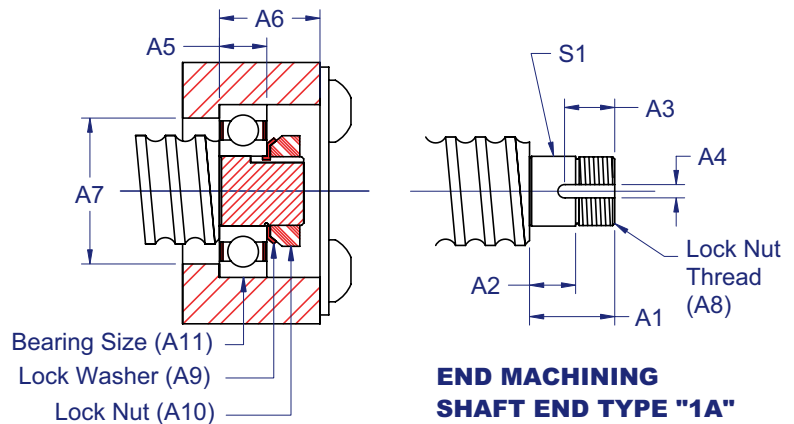
Rockford Ball Screw works closely with our customers to design, engineer, and manufacture customer bearing supports for unique applications. Custom bearing support examples:

- Tapered roller bearing
- Thrust bearing arrangements
- Spherical roller bearings
- Multiple angular contact bearing stacks
- Contact Rockford Ball Screw to request a thorough review of your application

BMR BEARING MOUNTS

The BMR series bearing mounts are **SIMPLE RADIAL** supports utilizing shielded Radial ball bearings for supporting radial load components. These bearing mounts are **NOT** intended to support axial load components of force. Consult engineering for application assistance if required.

NOTE: Dimensions shown for screws without corresponding bearing mounts are for reference only.



**END MACHINING
SHAFT END TYPE "1A"**

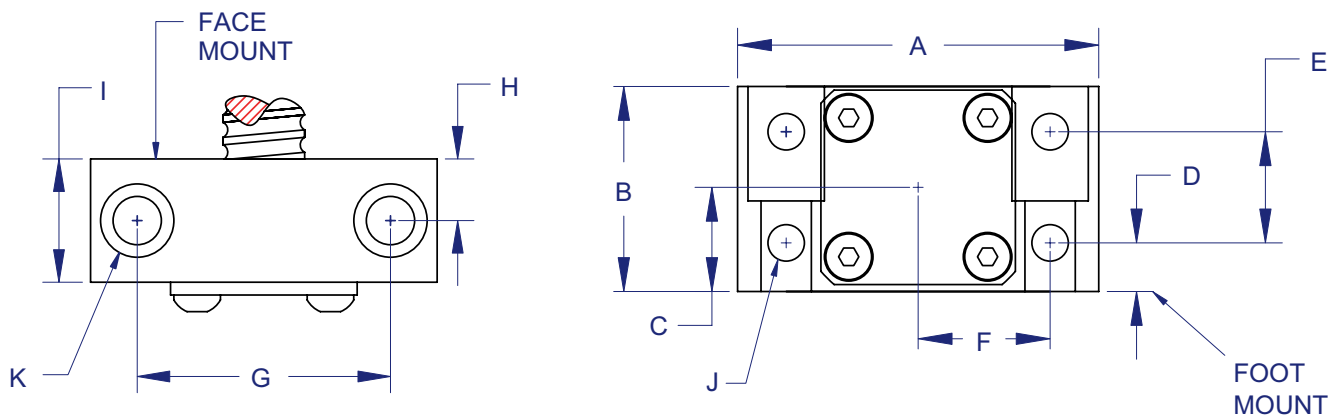
- ▶ Ball Screw (inch)
- ▶ Ball Screw (metric)
- ▶ ACME Screw (inch)

SCREW NUMBER	PART NUMBER	S1	A1	A2	A3	A4	A5	A6	A7	A8 (in-tpi)	A9	A10
▶ R-10, 11, 12, 15, 16		7.003 6.995	17.0	6.4	N/A	N/A	7.0	20.3	19.1	1/4-28	N/A	N/A
▶ 1/2-10		9.002 8.994	19.1	7.4	N/A	N/A	8.0	22.2	22.4	5/16-24	N/A	N/A
▶ R-02, 20, 21, 22, 23 ▶ 5/8-8, 5/8-6	BMR-10	10.008 9.997	16.5	8.4	10.4	3.2	9.0	20.3	25.4	.391-32	W-00	N-00
▶ R-1, 03, 30, 31, 32, 30A, 30RFW, 31LFW ▶ XM16 ▶ 5/8-10, 3/4-5, 3/4-6, 3/4-8	BMR-12	12.004 11.996	22.6	11.4	13.5	3.2	12.0	26.1	31.8	.469-32	W-01	N-01
▶ R-04, 34, 35, 36, 37, 38 ▶ XM20 ▶ 3/4-10, 7/8-5, 7/8-6, 1-4, 1-5, 1-6	BMR-15	15.006 14.999	23.6	12.4	13.5	3.2	13.0	27.8	35.1	.586-32	W-02	N-02
▶ R-06, 40, 40A, 40B, 40RF, 40C, 41C, R-41, ▶ 41LF, 42, 43, 44, 48 ▶ XM25 ▶ 1-8, 1-10, 1 1/8-5, 1 1/4-4	BMR-20	20.008 19.997	27.2	14.5	15.0	4.8	15.0	33.1	44.5	.781-32	W-04	N-04
▶ R-45, 46, 47, R-55, 56, 57, 58 ▶ XM32 ▶ 1 1/4-5, 1 1/2-4"	BMR-25	25.009 24.999	30.2	16.5	17.0	4.8	17.0	36.1	52.3	.969-32	W-05	N-05
▶ R-50, 50A, 51A, 53A, R-53, 54, 54A ▶ XM40 ▶ 1 1/2-5, 1 3/4-4	BMR-30	30.008 29.997	32.4	18.3	17.3	4.8	19.0	40.3	61.7	1.173-18	W-06	N-06
▶ R-61, 62		40.010 39.997	37.3	22.4	18.3	7.9	23.0	47.6	78.7	1.563-18	W-08	N-08
▶ R-60, 60A, 63 ▶ 2 1/2-2, 2 1/2-4	BMR-45	45.011 44.999	39.4	24.4	19.1	7.9	25.0	63.2	88.9	1.767-18	W-09	N-09
▶ R-75		50.010 49.997	42.9	26.4	20.6	7.9	27.0	54.0	98.6	1.967-18	W-10	N-10
▶ R-70, 71, 74		55.014 54.999	45.0	28.4	20.6	7.9	29.0	57.2	104.9	2.157-18	W-11	N-11
▶ R-80, 81		60.013 60.000	47.8	30.4	21.3	7.9	31.0	60.3	114.3	2.360-18	W-12	N-12
▶ R-90, 91		80.013 79.997	57.7	38.4	25.7	9.5	39.0	69.9	152.4	3.137-12	W-16	N-16

Note: Bearing mounts are supplied factory lubricated

BEARING MOUNTS

1. The BMR series bearing mounts are universally precision machined to allow either foot or face mounting.
2. The BMR series bearing mounts are to be considered as "SIMPLE" support for column loading and critical speed calculations.

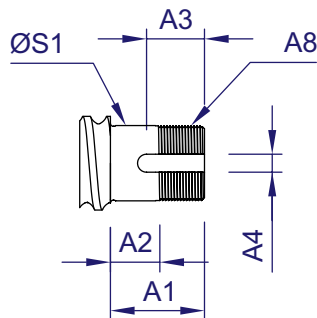


PART NUMBER	A	B	C	D	E	F	G	H	I	J	K
BMR-10	76.2	47.6	25.4	9.5	28.6	28.6	57.2	17.1	34.1	7.1 (4x)	10.3 Thru 15.9 C'bore 22.2 Deep
BMR-12	76.2	47.6	25.4	9.5	28.6	28.6	57.2	17.1	34.1	7.1 (4x)	10.3 Thru 15.9 C'bore 22.2 Deep
BMR-15	88.9	54.0	28.6	9.5	34.9	31.8	63.5	20.7	41.3	7.1 (4x)	10.3 Thru 15.9 C'bore 25.4 Deep
BMR-20	114.3	69.9	36.5	12.7	44.5	41.3	82.6	23.8	47.6	12.7 (4x)	16.7 Thru 25.4 C'bore 33.3 Deep
BMR-25	165.1	93.7	47.6	22.2	50.8	60.3	120.7	24.6	49.3	17.5 (4x)	23.0 Thru 44.4 Deep 34.9 C'bore
BMR-30	165.1	93.7	47.6	22.2	50.8	60.3	120.7	29.4	58.7	17.5 (4x)	23.0 Thru 34.9 C'bore 52.4 Deep
BMR-45	215.9	142.9	71.5	25.4	92.1	84.2	168.3	22.2	88.1	20.6 (6x)	25.7 Thru 39.7 C'bore 88.9 Deep

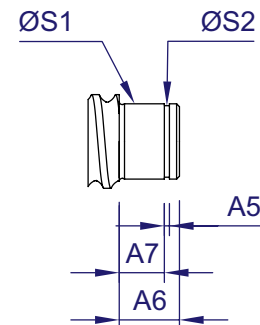
BMBF COMPACT BEARING MOUNTS

The BMBF compact series bearing mounts are **SIMPLE RADIAL** supports that utilize shielded Radial ball bearings for supporting radial load components. These bearing mounts are **NOT** intended to support axial load components of force. Consult engineering for application assistance if required.

NOTE: Dimensions shown for screws without corresponding bearing mounts are for reference only.



**END MACHINING
SHAFT END TYPE "6A"**



**END MACHINING
SHAFT END TYPE "6B"**

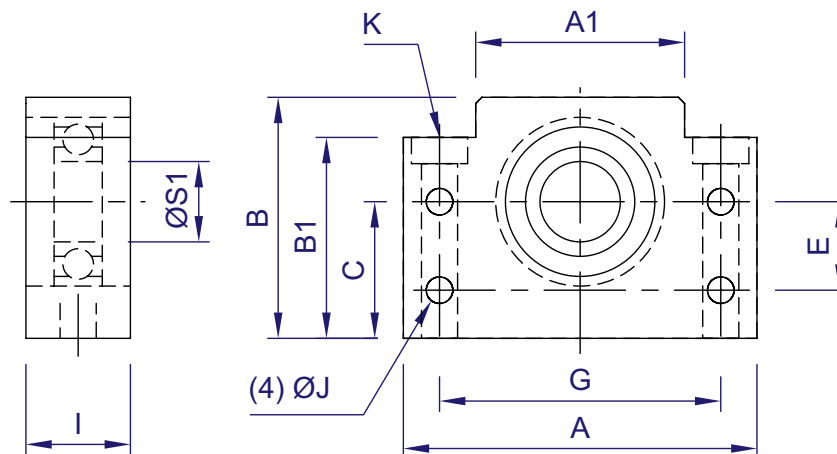
- ▶ Ball Screw (inch)
- ▶ Ball Screw (metric)
- ▶ ACME Screw (inch)

SCREW NUMBER	PART NUMBER	S1	S2	A1	A2	A3	A4	A5	A6	A7	A8 (in-tpi)
▶ R-02, 20, 21, 22, 23 ▶ 5/8-8, 5/8-6	BMBF10	8.000 7.985	7.6	N/A	N/A	N/A	N/A	0.90	10	7	N/A
▶ R-01, 03, 30, 31, 32, 30A, 30RFW, 31LFW ▶ XM16 ▶ 5/8-10, 3/4-5, 3/4-6, 3/4-8	BMBF12	10.000 9.985	9.6	15.5	7.4	13.4	3.2	1.15	11	8	.391-32
▶ R-04, 34, 35, 36, 37, 38 ▶ XM20 ▶ 3/4-10, 7/8-5, 7/8-6, 1-4, 1-5, 1-6	BMBF15	15.000 14.982	14.3	19.6	8.4	13.4	3.2	1.15	13	9	.586-32
▶ R-06, 40, 40A, 40B, 40RF, 40C, 41C, 41, ▶ 41LF, 42, 43, 44, 48 ▶ XM25 ▶ 1-8, 1-10, 1 1/8-5, 1 1/4-4	BMBF20	20.000 19.979	19.0	24.2	11.5	15.0	4.8	1.35	16	12	.781-32
▶ R-45, 46, 47, 55, 56, 57, 58 ▶ XM32 ▶ 1 1/4-5, 1 1/2-4	BMBF25	25.000 24.979	23.9	28.2	14.5	17.0	4.8	1.35	20	15	.969-32
▶ R-50, 50A, 51A, 53A, 53, 54, 54A ▶ XM40 ▶ 1 1/2-5, 1 3/4-4	BMBF30	30.000 29.979	28.6	29.4	15.3	17.3	6.4	1.75	21	16	1.173-18

Note: Bearing mounts are supplied factory lubricated

BEARING MOUNTS

1. The BMBF series bearing mounts are universally precision machined to allow either foot or face mounting.
2. The BMBF series bearing mounts are to be considered as "SIMPLE" support for column loading and critical speed calculations.



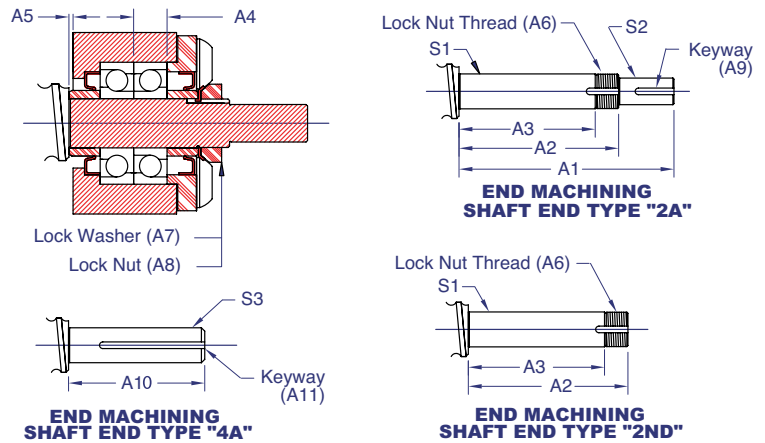
PART NUMBER	S1 nom	I	A	B	C	A1	B1	E	G	J	K
BMBF10	8	20	60	39	22	34	32.5	15	46	5.5	6.6 Thru 10.8 C'bore 5.0 Deep
BMBF12	10	20	60	43	25	34	32.5	18	46	5.5	6.6 Thru 10.8 C'bore 1.5 Deep
BMBF15	15	20	70	48	28	40	38.0	18	54	5.5	6.6 Thru 11.0 C'bore 6.5 Deep
BMBF20	20	26	88	60	34	52	50.0	22	70	6.6	9.0 Thru 14.0 C'bore 8.5 Deep
BMBF25	25	30	106	80	48	64	70.0	33	85	9.0	11.0 Thru 17.0 C'bore 11.0 Deep
BMBF30	30	32	128	89	51	76	78.0	33	102	11.0	14.0 Thru 20.0 C'bore 13.0 Deep

BM BEARING MOUNTS

The BM series bearing mounts are **SIMPLE** supports that utilize a set of Angular Contact ball bearings mounted back to back. These bearing mounts are designed to support radial and axial load components of force. Consult engineering for application assistance if required.

NOTE: Dimensions shown for screws without corresponding bearing mounts are for reference only.

- ▶ Ball Screw (inch)
- ▶ Ball Screw (metric)
- ▶ ACME Screw (inch)

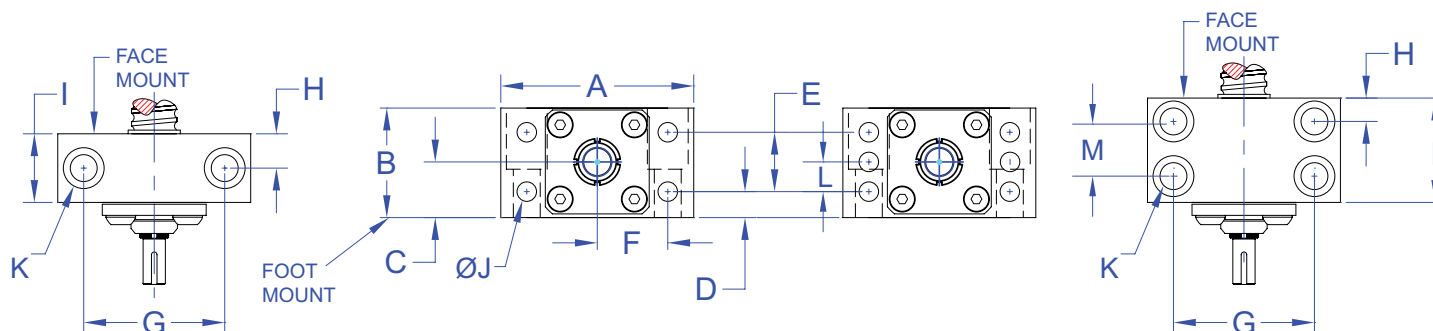


SCREW NUMBER	PART No.	OS1	OS2	OS3	A1	A2	A3	A4	A5	A6 (in-tpi)	A7	A8	A9	A10	A11
▶ R-10, 11, 12, 15, 16		7.003 6.995	4.750 4.724	6.350 6.337	54.6	43.2	31.5	7.0	0.9	1/4-28	N/A	N/A	1.6 x9.5	35.1	1.6 x19.1
▶ 1/2-10		9.002 8.994	6.350 6.325	6.350 6.337	62.2	46.2	33.5	8.0	0.9	5/16-24	N/A	N/A	2.4 x12.7	35.1	1.6 x19.1
▶ R-02, 20, 21, 22, 23 ▶ 5/8-8, 5/8-6	BM-10	10.008 9.997	7.925 7.899	9.525 9.512	72.1	53.1	43.2	9.0	0.0	.391-32	W-00	N-00	3.2 x12.7	44.5	3.2 x22.2
▶ R-1, 03, 30, 31, 32, 30A, 30RFW, 31LFW ▶ XM16 ▶ 5/8-10, 3/4-5, 3/4-6, 3/4-8	BM-12	12.004 11.996	10.312 10.287	12.700 12.687	83.6	50.8	39.8	12.0	0.0	.469-32	W-01	N-01	3.2 x15.9	57.2	3.2 x41.3
▶ R-04, 34, 35, 36, 37, 38 ▶ XM20 ▶ 3/4-10, 7/8-5, 7/8-6, 1-4, 1-5, 1-6	BM-15	15.006 14.999	12.700 12.675	12.700 12.687	91.2	65.8	54.5	13.0	1.0	.586-32	W-02	N-02	3.2 x15.9	57.2	3.2 x41.3
▶ R-06, 40, 40A, 40B, 40RF, 40C, 41C, ▶ R-41, 41LF, 42, 43, 44, 48 ▶ XM25 ▶ 1-8, 1-10, 1 1/8-5, 1 1/4-4	BM-20	20.008 19.997	15.875 15.850	19.050 19.037	101.6	73.2	60.4	15.0	1.0	.781-32	W-04	N-04	4.8 x15.9	72.9	4.8 x38.1
▶ R-45, 46, 47, R-55, 56, 57, 58 ▶ XM32 ▶ 1 1/4-5, 1 1/2-4	BM-25	25.009 24.999	19.050 19.025	25.400 25.387	113.0	73.4	59.1	17.0	0.0	.969-32	W-05	N-05	4.8 x25.4	72.9	6.4 x44.5
▶ R-50, 50A, 51A, 53A, R-53, 54, 54A ▶ XM40 ▶ 1 1/2-5, 1 3/4-4	BM-30	30.008 29.997	25.400 25.375	30.163 30.150	135.4	91.4	77.4	19.0	1.6	1.173-18	W-06	N-06	6.4 x25.4	104.6	6.4 x50.8
▶ R-61, 62		40.010 39.997	34.925 34.900	38.100 38.087	176.0	112.5	96.5	23.0	1.6	1.563-18	W-08	N-08	7.9 x38.1	125.5	9.5 x76.2
▶ R-60, 60A, 63 ▶ 2 1/2-2, 2 1/2-4	BM-45	45.011 44.999	34.925 34.900	44.450 44.437	169.7	114.0	98.4	25.0	1.3	1.767-18	W-09	N-09	7.9 x38.1	125.5	9.5 x76.2
▶ R-75		50.010 49.997	44.450 44.425	50.800 50.787	196.9	123.7	106.7	27.0	1.6	1.967-18	W-10	N-10	9.5 x38.1	131.8	12.7 x82.6
▶ R-70, 71, 74		55.014 54.999	47.625 47.600	50.800 50.787	213.4	137.2	119.4	29.0	1.6	2.157-18	W-11	N-11	12.7 x38.1	161.8	12.7 x82.6
▶ R-80, 81		60.013 60.000	57.150 57.125	61.913 61.887	234.2	140.7	122.7	31.0	1.6	2.360-18	W-12	N-12	12.7 x50.8	184.2	15.9 x123.8
▶ R-90, 91		80.013 79.997	76.200 76.149	76.200 76.175	293.4	174.5	154.2	39.0	1.6	3.137-12	W-16	N-16	19.1 x76.2	192.0	19.1 x127.0

Note: Bearing mounts are supplied factory lubricated

BEARING MOUNTS

1. The BM series bearing mounts are universally precision machined to allow either foot or face mounting.
2. The BM series bearing mounts are to be considered as "SIMPLE" support for column loading and critical speed calculations.

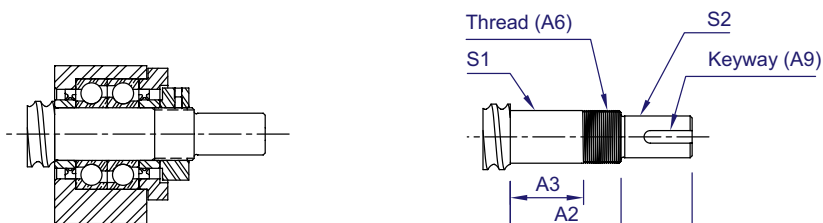


PART NUMBER	A	B	C	D	E	F	G	H	I	J	K	L	M
BM-10	76.2	47.6	25.4	9.5	28.6	28.6	57.2	17.1	34.1	7.1 (4x)	10.3 Thru 15.9 C'bore 22.2 Deep	N/A	N/A
BM-12	76.2	47.6	25.4	9.5	28.6	28.6	57.2	17.1	34.1	7.1 (4x)	10.3 Thru 15.9 C'bore 22.2 Deep	N/A	N/A
BM-15	88.9	54.0	28.6	9.5	34.9	31.8	63.5	20.7	41.3	7.1 (4x)	10.3 Thru 15.9 C'bore 25.4 Deep	N/A	N/A
BM-20	114.3	69.9	36.5	12.7	44.5	41.3	82.6	23.8	47.6	11.9 (4x)	16.7 Thru 25.4 C'bore 33.3 Deep	N/A	N/A
BM-25	165.1	93.7	47.6	22.2	50.8	60.3	120.7	24.6	49.3	16.7 (4x)	23. Thru 34.9 C'bore 44.5 Deep	N/A	N/A
BM-30	165.1	93.7	47.6	22.2	50.8	60.3	120.7	29.4	58.7	16.7 (4x)	23. Thru 34.9 C'bore 52.3 Deep	N/A	N/A
BM-45	215.9	142.9	71.5	25.4	92.1	84.2	168.3	22.2	88.1	20.7 (6x)	25.7 Thru 39.7 C'bore 88.9 Deep	46.1	43.7

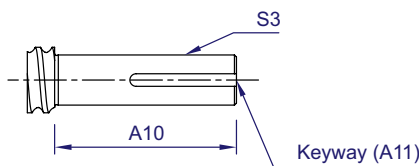
BMBK COMPACT BEARING MOUNTS

The BMBK compact series bearing mounts are **SIMPLE** supports that utilize a set of **Angular Contact ball bearings mounted face to face**. These bearing mounts are designed to support radial and axial load components of force. Consult engineering for application assistance if required.

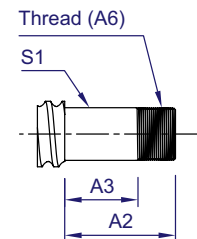
NOTE: Dimensions shown for screws without corresponding bearing mounts are for reference only.



END MACHINING
SHAFT END TYPE "5A" (with keyway)
"5B" (without keyway)



END MACHINING
SHAFT END TYPE "4A"



END MACHINING
SHAFT END TYPE "5ND"

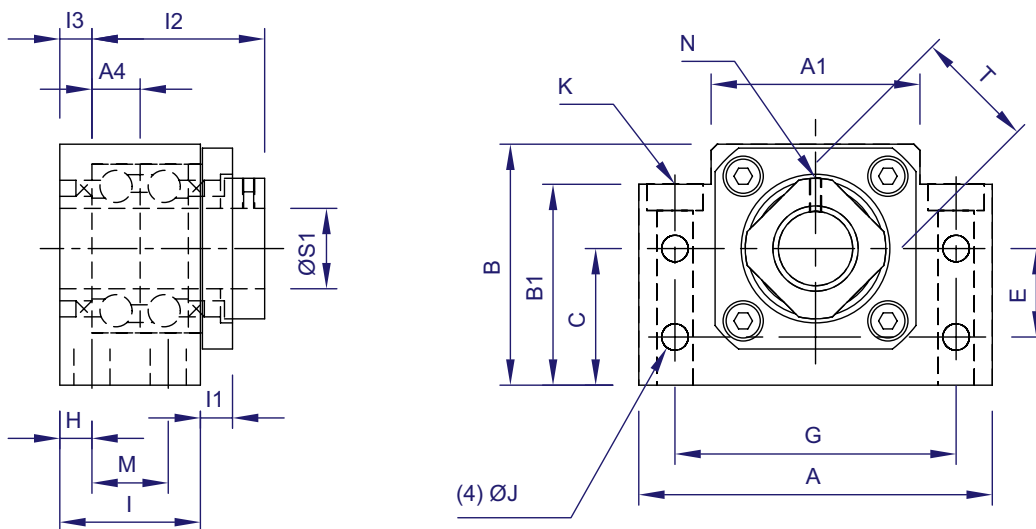
- ▶ Ball Screw (inch)
- ▶ Ball Screw (metric)
- ▶ ACME Screw (inch)

SCREW NUMBER	PART NUMBER	S1	S2	S3	A1	A2	A3	A6	A9	A10	A11
▶ R-02, 20, 21, 22, 23 ▶ 5/8-8, 5/8-6	BMBK10	10.000 9.985	7.925 7.899	9.525 9.512	55	36	24	M10x1	3.2x12.7	44.5	3.2x22.2
▶ R-01, 03, 30, 31, 32, 30A, 30RFW, 31LFW ▶ XM16 ▶ 5/8-10, 3/4-5, 3/4-6, 3/4-8	BMBK12	12.000 11.982	10.312 10.287	12.700 12.687	65	36	24	M12x1	3.2x15.9	57.2	3.2x41.3
▶ R-04, 34, 35, 36, 37, 38 ▶ XM20 ▶ 3/4-10, 7/8-5, 7/8-6, 1-4, 1-5, 1-6	BMBK15	15.000 14.982	12.700 12.675	12.700 12.687	65	40	28	M15x1	3.2x15.9	57.2	3.2x41.3
▶ R-06, 40, 40A, 40B, 40RF, 40C, 41C, 41, ▶ 41LF, 42, 43, 44, 48 ▶ XM25 ▶ 1-8, 1-10, 1 1/8-5, 1 1/4-4	BMBK20	20.000 19.979	15.875 15.850	19.050 19.037	80	53	38	M20x1	4.8x15.9	72.9	4.8x38.1
▶ R-45, 46, 47, 55, 56, 57, 58 ▶ XM32 ▶ 1 1/4-5, 1 1/2-4	BMBK25	25.000 24.979	19.050 19.025	25.400 25.387	105	66	46	M25x1.5	4.8x25.4	72.9	6.4x44.5
▶ R-50, 50A, 51A, 53A, 53, 54, 54A ▶ XM40 ▶ 1 1/2-5, 1 3/4-4	BMBK30	30.000 29.979	25.400 25.375	30.163 30.150	115	73	48	M30x1.5	6.35x25.4	104.6	6.4x50.8

Note: Bearing mounts are supplied factory lubricated

BEARING MOUNTS

1. The BMBK series bearing mounts are universally precision machined to allow either foot or face mounting.
2. The BMBK series bearing mounts are to be considered as "SIMPLE" support for column loading and critical speed calculations.



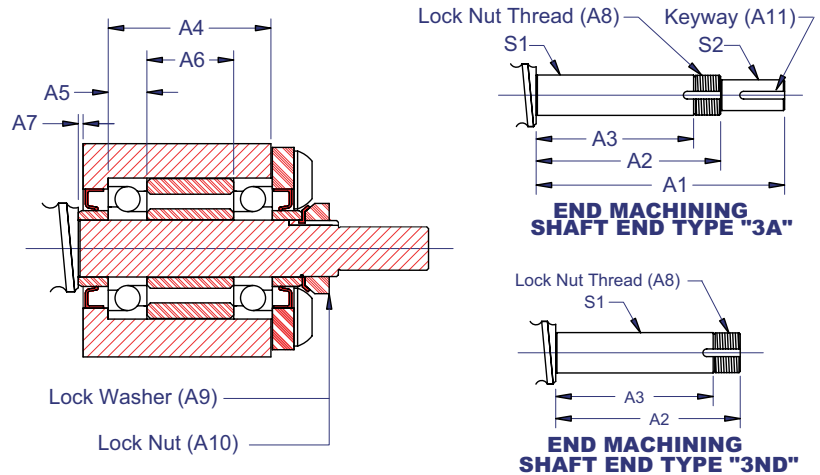
PART NUMBER	S1 nom	I	I1	I2	I3	M	H	A	B	C	A1	A4	B1	E	G	J	K	N	T
BMBK10	10	25	5	29.5	5	13	6	60	39	22	34	8	32.5	15	46	5.5	6.6 Thru 10.8 C'bore 5.0 Deep	M4	16
BMBK12	12	25	5	29.5	5	13	6	60	43	25	34	8	32.5	18	46	5.5	6.6 Thru 10.8 C'bore 1.5 Deep	M4	19
BMBK15	15	27	6	32.0	6	15	6	70	48	28	40	9	38.0	18	54	5.5	6.6 Thru 11.0 C'bore 6.5 Deep	M3	22
BMBK20	20	35	8	43.0	8	19	8	88	60	34	52	12	50.0	22	70	6.6	9.0 Thru 14.0 C'bore 8.5 Deep	M4	30
BMBK25	25	42	12	54.0	9	22	10	106	80	48	64	15	70.0	33	85	9	11.0 Thru 17.0 C'bore 11.0 Deep	M5	35
BMBK30	30	45	14	61.0	9	23	11	128	89	51	76	16	78.0	33	102	11	14.0 Thru 20.0 C'bore 13.0 Deep	M6	40

BMF BEARING MOUNTS

The BMF series bearing mounts are **FIXED RIGID** supports that utilize a set of spaced **Angular Contact ball bearings**. These bearing mounts are designed to support both radial and axial load components of force. Consult engineering for application assistance if required.

NOTE: Dimensions shown for screws without corresponding bearing mounts are for reference only.

- ▶ Ball Screw (inch)
- ▶ Ball Screw (metric)
- ▶ ACME Screw (inch)

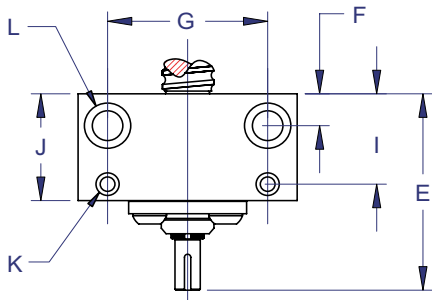


SCREW NUMBER	PART No.	S1	S2	A1	A2	A3	A4	A5	A6	A7	A8 (in-tpi)	A9	A10	A11
▶ R-10, 11, 12, 15, 16		7.003 6.995	4.750 4.724	72.4	59.7	46.2	27.5	7.0	14.0	0.9	1/4-28	N/A	N/A	1.6 x9.5
▶ 1/2-10		9.002 8.994	6.350 6.325	82.0	66.0	50.3	31.5	8.0	16.0	0.9	5/16-24	N/A	N/A	2.4 x12.7
▶ R-02, 20, 21, 22, 23 ▶ 5/8-8, 5/8-6	BMF-10	10.008 9.997	7.925 7.899	88.9	69.9	57.2	38.5	9.0	21.0	1.3	.391-32	W-00	N-00	3.2 x12.7
▶ R-1, 03, 30, 31, 32, 30A, 30RFW, 31LFW ▶ XM16 ▶ 5/8-10, 3/4-5, 3/4-6, 3/4-8	BMF-12	12.004 11.996	10.312 10.287	109.2	76.2	59.7	47.0	12.0	23.4	1.0	.469-32	W-01	N-01	3.2 x15.9
▶ R-04, 34, 35, 36, 37, 38 ▶ XM20 ▶ 3/4-10, 7/8-5, 7/8-6, 1-4, 1-5, 1-6	BMF-15	15.006 14.999	12.70 12.675	117.3	84.1	69.3	50.8	13.0	25.3	0.9	.586-32	W-02	N-02	3.2 x15.9
▶ R-06, 40, 40A, 40B, 40RF, 40C, 41C, ▶ R-41, 41LF, 42, 43, 44, 48 ▶ XM25 ▶ 1-8, 1-10, 1 1/8-5, 1 1/4-4	BMF-20	20.008 19.997	15.875 15.850	128.3	96.5	78.7	60.3	15.0	30.9	0.9	.781-32	W-04	N-04	4.8 x15.9
▶ R-45, 46, 47, R-55, 56, 57, 58 ▶ XM32 ▶ 1 1/4-5, 1 1/2-4	BMF-25	25.009 24.999	19.050 19.025	153.9	114.3	95.3	71.5	17.0	38.1	2.1	.969-32	W-05	N-05	4.8 x25.4
▶ R-50, 50A, 51A, 53A, R-53, 54, 54A ▶ XM40 ▶ 1 1/2-5, 1 3/4-4	BMF-30	30.008 29.997	25.400 25.375	169.4	125.0	106.7	83.8	19.0	46.4	1.9	1.173-18	W-06	N-06	6.4 x25.4
▶ R-61, 62		40.010 39.997	34.925 34.900	207.0	149.9	130.3	107.6	23.0	62.2	0.9	1.563-18	W-08	N-08	7.9 x38.1
▶ R-60, 60A, 63 ▶ 2 1/2-2, 2 1/2-4	BMF-45	45.011 44.999	34.925 34.900	218.9	161.8	142.2	117.4	25.0	68.2	0.9	1.767-18	W-09	N-09	7.9 x38.1
▶ R-75		50.010 49.997	44.450 44.425	245.9	172.7	151.1	128.3	27.0	74.9	0.9	1.967-18	W-10	N-10	9.5 x38.1
▶ R-70, 71, 74		55.014 54.999	47.625 47.600	256.5	186.7	165.1	142.4	29.0	85.1	0.9	2.157-18	W-11	N-11	12.7 x38.1
▶ R-80, 81		60.013 60.000	57.150 57.125	293.6	204.7	181.6	153.3	31.0	91.9	1.6	2.360-18	W-12	N-12	12.7 x50.8
▶ R-90, 91		80.013 79.997	76.200 76.149	368.3	252.7	227.3	199.3	39.0	121.9	1.6	3.137-12	W-16	N-16	19.1 x76.2

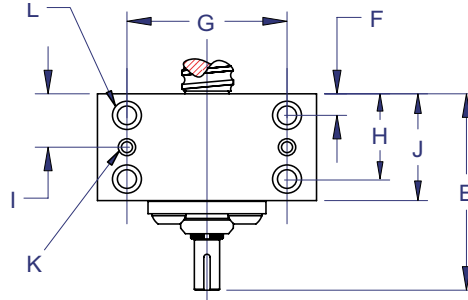
Note: Bearing mounts are supplied factory lubricated

BEARING MOUNTS

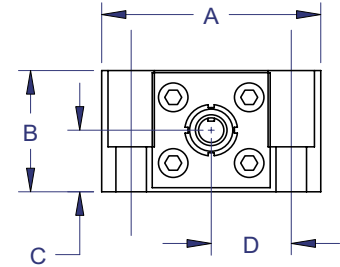
1. The BMF series bearing mounts are precision machined for foot mounting and pre-drilled for taper pins
2. The BMF series bearing mounts are to be considered as "FIXED" support for column loading and critical speed calculations.



PLAN VIEW FOR
BMF-20, 25, & 30



PLAN VIEW FOR
BMF-10, 12, & 15



PART NUMBER	A	B	C	D	E	F	G	H	I	J	K	L
BMF-10	76.2	47.6	25.4	28.6	87.6	9.5	57.2	38.1	23.8	47.6	6.4 Thru 9.5 C'bore #5 Taper Pin	10.3 Thru 15.9 C'bore 28.7 Deep
BMF-12	76.2	47.6	25.4	28.6	108.3	11.1	57.2	42.9	27.0	54.0	6.4 Thru 9.5 C'bore #5 Taper Pin	10.3 Thru 15.9 C'bore 28.7 Deep
BMF-15	88.9	54.0	28.6	31.8	116.5	12.7	63.5	47.6	30.2	60.3	6.4 Thru 9.5 C'bore #5 Taper Pin	10.3 Thru 15.9 C'bore 33.8 Deep
BMF-20	114.3	69.9	36.5	41.3	127.4	23.8	82.6	N/A	54.0	69.9	11.1 Thru 17.5 C'bore #8 Taper Pin	17.5 Thru 25.4 C'bore 41.3 Deep
BMF-25	165.1	93.7	47.6	60.3	151.8	24.6	120.7	N/A	69.9	82.6	11.1 Thru 17.5 C'bore #8 Taper Pin	23.8 Thru 34.9 C'bore 57.2 Deep
BMF-30	165.1	93.7	47.6	60.3	167.5	29.4	120.7	N/A	81.9	94.6	11.1 Thru 17.5 C'bore #8 Taper Pin	23.8 Thru 34.9 C'bore 57.2 Deep
BMF-45	215.9	142.9	71.5	84.1	218.1	22.2	168.3	107.9	65.0	130.1	16.3 Thru 25.4 C'bore #10 Taper Pin	26.2 Thru 39.7 C'bore 88.9 Deep

BALL SCREWS

Rockford Ball Screw offers a mature standard inch product line, built to the highest performance design standards. Our extensive engineering expertise and state-of-the-art manufacturing facility ensure top performance and reliability in our products.

We offer one of the largest inventories of ball screw and ACME screw product lines in the industry and our offerings are continually growing and evolving. Our extensive product lines include catalogued, non-catalogued, standard, and non-standard offerings.

If you don't see what you're looking for, all you have to do is ask.



PRELOADED ASSEMBLIES

RBS offers preloaded ball screw assembly options for many of its standard products. Preloaded assemblies offer the advantage of increased stiffness, reduced free play to provide for accurate positioning with very little increase to the running torque and very little decrease to load capacity.

If you do not see a product that meets your need, give us a call to see how we can develop an economical solution to give your design the advantage.



ACME SCREWS

The RBS line of ACME screw products has been designed and manufactured to provide an economical means to convert rotational to linear motion without internal moving components. Our standard line of ACME screws is produced to General Purpose-2G tolerances from excellent quality materials. The trapezoidal thread is a very effective at preventing back driving which will reduce the need for additional braking or motor holding. These perform well in many different applications including dirty harsh environments. Check out our offerings and contact our team and experience what we can do for you.



FREE WHEELING BALL SCREWS

Our free wheeling screw (also referred to as planetary or epicyclic ball screws) is different from a standard ball screw in that it utilizes a ball cage (retainer) inside the nut. As the cage contacts a stop in the screw at the end of the stroke, the ball nut will stop linear motion but the screw will continue to rotate (free-wheel). When the screw rotation reverses, linear motion will continue in the opposite direction until the cage contacts the pin at the other end of the stroke.

Limit switches or other types of expensive stops are not necessary. This eliminates the possibility of over travel and motor stall can cause many problems. These are used in many applications such as adjustable bed or lift chair actuations, marine trim tab actuators and electrical switching devices. Perfect for manual jog or timer applications that do not require complex logic and switches.

Check us out and give us a call to see how we can meet your design needs.



LINEAR GUIDE RAILS

Do you currently use linear motion guidance products or could your design application benefit from their use? Are you in the preliminary design phase of a project that requires linear guidance and in need of technical support? Then look no further than Rockford Linear Motion and their commitment to make Motion Simplified™.

At Rockford Linear Motion, we believe that your customer experience should be simple in all aspects - Simple to locate the technical data you require, specify the necessary product, purchase from our customer service team, and in those cases that require custom product or technical assistance, simple to work closely with our technical support staff. Therefore no matter what Linear Motion process phase you are in, contact us to realize just how Simple Linear Motion can be and let us become your go-to choice for linear guide rail products and services.





KEEPING INDUSTRY ON THE MOVE

We've provided the solutions to keep industry moving for nearly 50 years and we know how important it is to your productivity and bottom line to keep your ball screws operating efficiently. When you need ball screw repair, timing and service is of the essence. Our sales and service team stands by with free, comprehensive evaluations, supported by reverse engineering and failure mode analysis. Our repair team offers one of the fastest turnaround times in the industry, reducing machine down time and saving up to 70% of the cost to replace with new product.

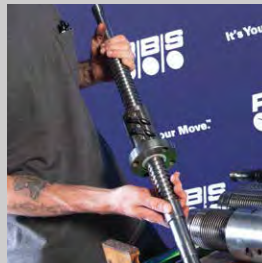
We service all brands/manufacturers (including American Ball Screw, Beaver Precision Products, Century, Cincinnati, Nook, NSK, Rockford Ball Screw, THK, Thomson/Saginaw, Tsubaki, Twentieth, Warner Electric)

- Foreign and domestic
- Diameters up to 6 inches
- Lengths up to 40 feet
- Rolled and precision ground screws
- Standard (inch) and metric sizes/dimensions
- Carbon steel & stainless steel
- Wide range of ball bearings (steel, ceramic & plastic)
- Customized backlash and preloads
- Internal and external return
- Repair External Tubes

50 YEARS OF MAINTAINING PRODUCTIVITY.

SERVICES PROVIDED

- Design Optimization
- Reverse Engineering
- Inspection for wear and damage
- Ball Screw Repair -
 - Machined end journals
 - Threaded ends
 - Key Ways in ends
- Failure Mode Analysis
- Technical Drawings
- Refurbish Bearing Mounts
- Replace Bearings in Ball Nuts



PUT OUR EXPERTISE TO WORK

- Experts in ball screws and linear rails
- Quick turnaround
- Expedited services on request
- Large inventory of raw materials & components
- Extensive range of screw diameters & lengths
- New replacement ball screws if more cost-effective



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It's Your Move.™ The logo for Rockford Ballscrew (RBS) features the letters 'R', 'B', and 'S' in a bold, italicized font, each separated by a vertical line. Below each letter is a solid dark blue circle.