

Overview of Lead-screw Assemblies

Haydon Kerk Motion Solutions, Inc. • www.haydonkerk.com • Phone: 800 243 2715 • International: 203 756 7441

Haydon Kerk Motion Solutions products have been designed specifically for motion control applications. They are not compromised adaptations of general purpose screws or nuts. The screw thread form is designed for maximum life, quiet operation, and compatibility with Haydon Kerk Motion Solutions anti-backlash nut designs.

KERK® LEAD-SCREWS are available in standard diameters from 5/64-in (2 mm) to 15/16-in (23 mm), with standard leads from .012-in to almost 4-in (0.30 mm to 92 mm) including hard metric and left hand threads. Custom sizes and leads can be special ordered. Most stock screws are manufactured from 303 stainless steel and are produced with Haydon Kerk Motion Solutions exclusive precision rolling process. Other materials are available on special order. Positional bi-directional repeatability (with Kerk anti-backlash nut) is within 50 micro-inches (1.25 micron) and standard lead accuracy is better than 0.0006-in./in. (mm/mm). Lead accuracies are available to .0001-in./in. (mm/mm). Haydon Kerk Motion Solutions total in-house manufacturing and quality control assure uniform and consistent products.



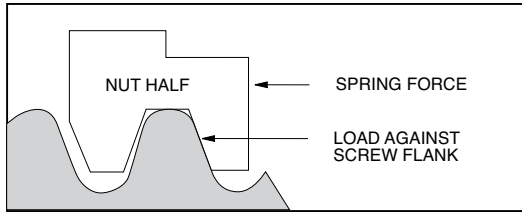
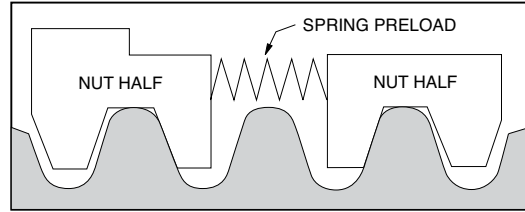
KERK® NUTS are available in 8 standard anti-backlash designs (CMP, ZBX, WDG, NTB, KHD, VHD, NTG, ZBA); general purpose BFW Series plus the Mini Series. (See Product Comparison Chart for size availability). Custom nut configurations and mountings are also readily available. The Kerk brand anti-backlash designs provide assemblies which are wear compensating with low frictional drag and exceptional positional repeatability. Operation to more than 300 million inches of travel can be achieved. Haydon Kerk Motion Solutions provides nuts in a wide range of wear resistant, self-lubricating thermoplastic materials.



Axial Take-up Mechanism

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.

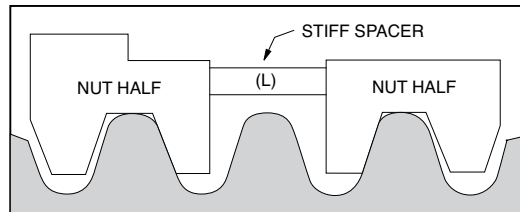


For example, if the maximum axial load to which the system is subjected is 50 lbs., the amount of spring preload must be equal to, or greater than, 50 lbs. in order to maintain intimate screw/nut contact. The problems arising from preloading in this manner are increased drag torque and nut wear.

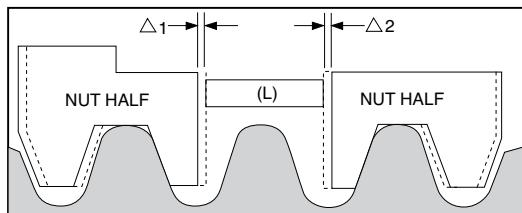
Obviously, the higher the load at the screw/nut interface, the higher the required torque to drive the nut on the screw and the more susceptible the unit is to nut wear.

An alternate method replaces the spring with a stiff spacer sized to fit exactly between the two nut halves.

There is no excessive preload force at the interface and the unit is 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.

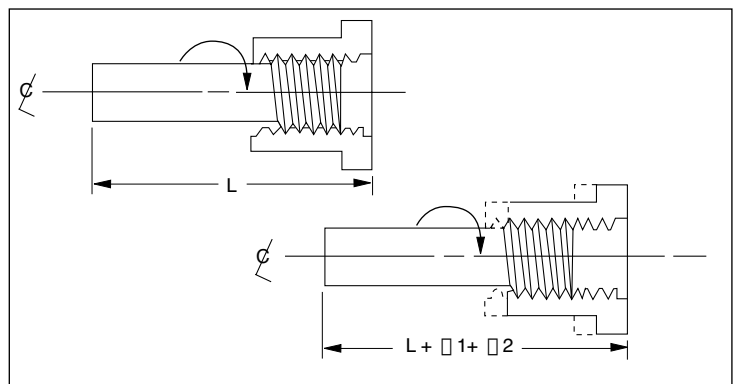
The Solution

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 preload on the unit is only the amount necessary to turn the spacer nut on the spacer rod and is independent of the external system loadings. We thus have a self-wear compensating unit which has extremely low frictional drag torque yet high axial stiffness.





Kerkote® and Black Ice® TFE Coatings

Haydon Kerk Motion Solutions, Inc. offers multiple options for lubrication. All Kerk® lead-screw nuts feature self-lubricating polymers. When maximum performance is required, Kerkote® and Black Ice® TFE coatings provide unmatched results in the most demanding applications.

The purpose of TFE coating is to supply a more even distribution of lubricant than is normally found when using standard self-lubricating plastics on steel. The wear life, coefficient of friction and resulting torque to drive a lead screw assembly are highly governed by the ability of the engineered plastic to supply sufficient lubrication to the nut/screw interface. The inability of the internal lubricating agents in some plastics to consistently migrate to the surface may result in erratic drag torques and unpredictable wear.

Kerkote® TFE Coating

Kerkote TFE coating covering the entire screw surface results in an extremely even lubrication distribution. Test results indicate system torque requirements are consistently low with little or no change in required frictional driving torque, even with changes in motor R.P.M. Haydon Kerk Motion Solutions has developed a custom composition Kerkote TFE specifically for our lead screw and nut materials. It is applied using an automated process and provides extended nut life and smooth operation with little additional cost.

Kerkote TFE is a soft coating, a long-term dry lubricant that is optimized for softer plastics like acetals and nylons, with or without mechanical reinforcement. Lubrication to the nut/screw interface occurs by the nut picking up Kerkote TFE particles from the coating as well as from the migration of the internal lubricant within the plastic nut. Although care is taken to ensure that chips and voids do not occur in the coating, small voids have been shown to have no effect on system performance. The transfer of TFE to the nut continues throughout the operating life of the assembly as long as the nut periodically travels over areas with Kerkote TFE coating. The lubricant, although solid, also has some “spreading” ability as in fluid lubricants. Kerkote TFE coated screws provide the maximum level of self-lubrication and should not be additionally lubricated or used in environments where oils or other lubricant contamination is possible.

Black Ice® TFE Coating

Black Ice TFE coating shares many of the benefits of Kerkote TFE but, in contrast, is a hard coating that offers exceptional durability in all types of environments, with virtually any type of polymer nut. Black Ice TFE coating remains on the screw, offering a low friction surface upon which the nut travels. Rather than acting as a dry lubricant, Black Ice TFE is an anti-friction coating whose surface properties displace the metal to which it is applied. Though it is not intended for use with metal or glass fiber reinforced nuts, Black Ice TFE is bonded securely to the screw’s surface and can withstand abrasion from contamination, rigid polymer systems, fluid impingement and wash down applications. Black Ice TFE can be used in the presence of more aggressive environment conditions, or anywhere reduced friction and a permanent coating is desired.

Both Kerkote and Black Ice TFE coatings offer the advantages of dry lubrication. These are maintenance-free coatings that are designed to last the life of the product. They are intended to be used without additional lubricants, thereby further increasing the value of Kerk lead-screw assemblies through elimination of the most common failure of screw driven drives, lubrication failure.

There are certain applications where external lubrication may be desired. These include the use of nut materials such as glass reinforced plastic or metal. Greases, when used properly can provide unique capabilities and Haydon Kerk Motion Solutions does offer a selection of greases developed specifically for these applications. Please contact a sales engineer for assistance selecting the best lubricant for your requirements.



303 Stainless Steel

Kerk® brand lead-screws and linear rails start with premium grade 303 stainless steel. Haydon Kerk Motion Solutions, Inc. has identified the material properties most critical for producing the very high quality rolled steel screws in the world and controls these to levels unmatched in the industry. Because of our leadership position, we are able to utilize this exceptional quality steel without having to charge premium prices.

Kerk stainless steel lead-screws and guide rails are corrosion resistant, non-magnetic, and compatible with many demanding processes. The ideal starting point for a maintenance-free product, this premium quality stainless steel is being used in numerous applications including medical applications, clean rooms, food and human contact, salt spray, cryogenics and vacuum.

Kerkite® Composite Polymers

In addition to the Kerk® self-lubricating acetal nut material, Haydon Kerk Motion Solutions offers a variety of custom compounded Kerkite composite polymers. Kerkite polymers are a family of high performance materials that offer exceptional wear properties with the cost and design advantages afforded through injection molding. Kerkite polymers offer a variety of mechanical, thermal and electrical properties and are compatible with many chemicals and environmental conditions.

Kerkite Composite Polymers are available options for most Kerk Lead-screw Nuts and are standard materials for Linear Rail and Spline Shaft bushings, RGS® Carriages and Screwrail® Bushings and End Supports. Each member of the Kerkite family is compounded with lubricants, reinforcements and thermoplastic polymers formulated to provide optimum performance in its target conditions and applications, resulting in superior performance and extended life.

A cornerstone of the Haydon Kerk Motion Solutions advantage is design flexibility. Kerkite Composite Polymers, along with our injection molding and mold making capabilities, offer huge design advantages and cost savings compared with non-moldable materials. Kerkite high performance polymers outperform other plastics and outlast metal bushings and bearings. When combined with Kerkote® or Black Ice® TFE coatings, Kerkite Composite Polymers have been shown to provide hundreds of millions of inches of travel in customer applications while continuing to maintain precise, accurate motion and positioning.



Special Materials

In addition to the Kerk standard material – 303 stainless steel, self lubricating acetal and Kerkite high performance composite polymers – we also work with a vast array of custom materials. Kerk has rolled screws in many other materials, including 316 stainless, 400 series stainless, precipitate hardening materials, carbon steel, aluminum, and titanium. Kerk nuts had been produced in many alternative plastics including PEEK, polyester, Torlon®, VespeI®, PVDF, UHMW, Ertalyte® and customer-supplied specialty materials. We have also provided metal nuts made from bronze, brass, and stainless steel.

With so much flexibility in our manufacturing process, if the material can be molded, machined, ground, or rolled, Haydon Kerk Motion Solutions can likely process it using state of the art machine tools, injection molding and mold making, grinding and thread rolling equipment. Haydon Kerk Motion Solutions excels at supplying the best overall solution to meet our customers' requirements. Contact Haydon Kerk Motion Solutions to find out how you can benefit from these choices.

Traverse Speed

The nut materials we use provide long wear-life over a wide variety of conditions. However, very high loads and/or speeds will accelerate nut wear. Special materials may be required for these situations. We offer the following guidelines for continuous duty linear traversing speeds for optimum life:

| Lead | Traverse Speed | Lead | Traverse Speed |
|---------------|----------------|------------|----------------|
| 1/10 - 1/2-in | 4-in/sec. | 1 - 12 mm | 100 mm/sec. |
| 1/2 - 1-in | 10-in/sec. | 12 - 25 mm | 250 mm/sec. |
| 1 - 2 1/2-in | 30-in/sec. | 25 - 60 mm | 760 mm/sec. |

Maximum Load

Although the Kerk® Anti-Backlash Assemblies are capable of withstanding relatively high loads without catastrophic failure, these units have been designed to operate under the loading shown in the size charts.

Efficiency

Efficiency is the relationship of work input to work output. It should not be confused with mechanical advantage. Listed efficiencies are theoretical values based on Kerkote® TFE coated screws.

Torque

The required motor torque to drive a lead screw assembly is the sum of three components: the **inertial torque**, **drag torque**, and **torque-to-move load**. It must be noted that this is the torque necessary to drive the lead screw assembly alone. Additional torque associated with driving frictional bearings and motor shafts, moving components, and drag due to general assembly misalignment must also be considered.

Inertial Torque:

$$T_j = I \alpha \quad \text{Where } I = \text{screw inertia} \\ \alpha = \text{angular acceleration}$$

Drag Torque:

The Kerk Anti-Backlash Assemblies are typically supplied with drag torque of 1 to 7 oz.-in. The magnitude of the drag torque is dependent on the standard factory settings or settings specified by the customer. Generally, the higher the preset force, the better the Anti-Backlash characteristics.

Torque-to-Move:

$$T_L = \frac{\text{LOAD} \times \text{LEAD}}{2\pi \times \text{EFFICIENCY}}$$

Back Driving

Sometimes referred to as reversibility, back driving is the ability of a screw to be turned by a thrust load applied to the nut. Generally, back driving will not occur when the screw lead is less than 1/3 the diameter for uncoated screws or 1/4 the diameter for Kerkote® TFE coated screws. For higher leads where back driving is likely, the torque required for holding a load is:

$$T_b = \frac{\text{LOAD} \times \text{LEAD} \times \text{BACKDRIVE EFFICIENCY}}{2\pi}$$

Screw Straightness

Screw straightness is measured as Total Indicator Runout(TIR). The standard straightness for lead screws is .003-in/ft. Haydon Kerk Motion Solutions can provide tighter specifications on customer request.

All screws are hand straightened before shipping.

Mechanical Properties

Screw Inertia

| Screw Size inch (mm) | Screw Inertia | |
|----------------------------|----------------------------------|-------------------------|
| | (oz-inch sec ² /inch) | (g-cm ² /cm) |
| 5/64 (2) | 3.4 x 10 ⁻⁸ | 9.5 x 10 ⁻⁴ |
| 1/8 (3.2) | 1.8 x 10 ⁻⁷ | 5.0 x 10 ⁻³ |
| 9/64 (3.5) | 3.4 x 10 ⁻⁷ | 9.5 x 10 ⁻³ |
| 5/32 (3.97) | 4.9 x 10 ⁻⁷ | 1.4 x 10 ⁻² |
| 3/16 (4.76) | 1.1 x 10 ⁻⁶ | 3.1 x 10 ⁻² |
| 7/32 (5.55) | 1.8 x 10 ⁻⁶ | 5.0 x 10 ⁻² |
| 1/4 (6) | 3 x 10 ⁻⁵ | 8.3 x 10 ⁻² |
| 5/16 (8) | 5 x 10 ⁻⁵ | 1.4 |
| 3/8 (10) | 1.5 x 10 ⁻⁵ | 0.4 |
| 7/16 (11) | 3.5 x 10 ⁻⁵ | 1.0 |
| 1/2 (13) | 5.2 x 10 ⁻⁵ | 1.4 |
| 5/8 (16) | 14.2 x 10 ⁻⁵ | 3.9 |
| 3/4 (19) | 30.5 x 10 ⁻⁵ | 8.5 |
| 7/8 (22) | 58.0 x 10 ⁻⁵ | 16.1 |
| 15/16 (24) | 73.0 x 10 ⁻⁵ | 20.3 |

Dimensional Tolerances

| Inch | | Metric | |
|------|--------|--------------|--------|
| .X | ± .02 | < L 4 | ± 0.1 |
| .XX | ± .010 | 4 < L ≤ 16 | ± 0.15 |
| .XXX | ± .005 | 16 < L ≤ 63 | ± 0.2 |
| | | 63 < L ≤ 250 | ± 0.3 |

Grease Compatibility Chart

| Nut Type | Lubrication Coatings | | |
|------------|----------------------|----------|------------|
| | Grease | Kerkote® | Black Ice® |
| CMP | Yes | Yes | Yes |
| ZBX | Yes | Yes | Yes |
| ZBA | Yes | Yes | Yes |
| KHD | No | Yes | Yes |
| VHD | No | Yes | Yes |
| WDG | No | Yes | Yes |
| BFW | Yes | Yes | Yes |
| NTB | No | Yes | Yes |
| NTG | Yes | Yes | Yes |

Anti-Backlash Life

| Series | Without Kerkote® TFE Coating | With Kerkote® TFE Coating |
|------------|---|---|
| | inch (cm) | inch (cm) |
| CMP | 40 to 60 million (100 to 150 million) | 150 to 200 million (380 to 500 million) |
| ZBA | 5 to 10 million (12 to 25 million) | 15 to 40 million (38 to 100 million) |
| ZBX | 40 to 60 million (100 to 150 million) | 150 to 200 million (380 to 500 million) |
| KHD | 80 to 100 million (200 to 250 million) | 180 to 230 million (450 to 580 million) |
| WDG | 100 to 125 million (250 to 315 million) | 200 to 250 million (500 to 635 million) |
| NTB | 100 to 125 million (250 to 315 million) | 200 to 250 million (500 to 635 million) |
| VHD | 200 to 225 million (500 to 570 million) | 300 to 350 million (760 to 880 million) |
| BFW | N/A, Typical Backlash .003 to .010 (.076 to .25) | N/A, Typical Backlash .003 to .010 (.076 to .25) |
| NTG | 5 to 10 million (12 to 25 million) | 15 to 40 million (38 to 100 million) |

Anti-backlash life is defined as the nut's ability to compensate for wear while maintaining its zero backlash properties. Above life data is based on 25% of the dynamic load rating. NTB style does not include mini series sizes. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Mechanical Properties

Lead-screw

| Material | Surface Finish |
|--|---|
| 303 Stainless Steel (options available) | Better than 16 micro-inches (0.4 μm) |

Nuts

| Material | Tensile Strength | Coefficient of Expansion |
|---|------------------|------------------------------------|
| Polyacetal with Lubricating Additive | 9,700 psi | 6.0 x 10 ⁻⁵ in/in/°F |

Other Kerkite materials available

Assembly

| Standard Operating Temp. Range | Coefficient of Friction Polyacetal Nut to Screw |
|--------------------------------|--|
| 32 - 200° F* (0 - 93° C)* | Static = .08 .08 ** Dynamic = .15 .09 ** |

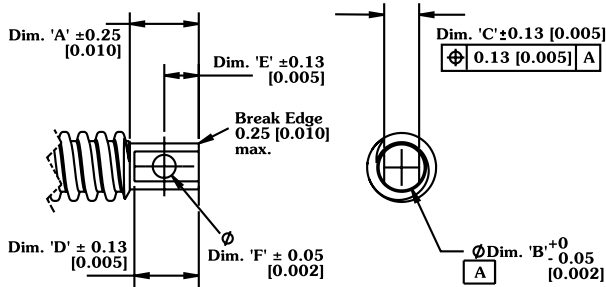
* Very high or low temperatures may cause significant changes in the nut fit or drag torque. Please call Haydon Kerk Motion Solutions™ for optional temperature range materials.

** with Kerkote® TFE Coating

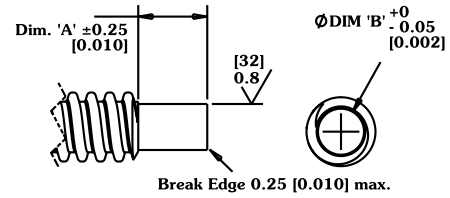
Standard End Machining

Dimensions = mm [inches]

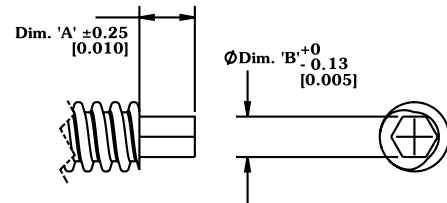
Cross Drilled Hole



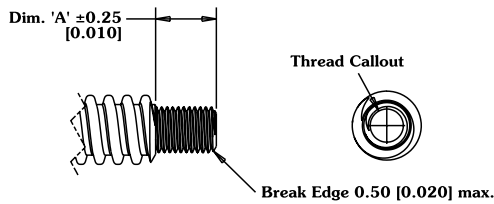
Turned Journal



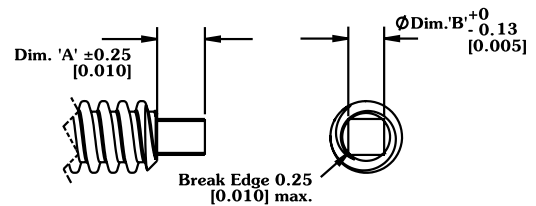
Hex Drive End



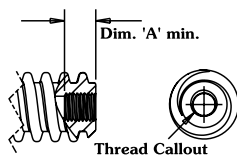
Male Thread



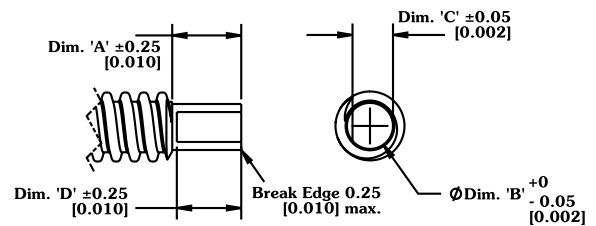
Square End



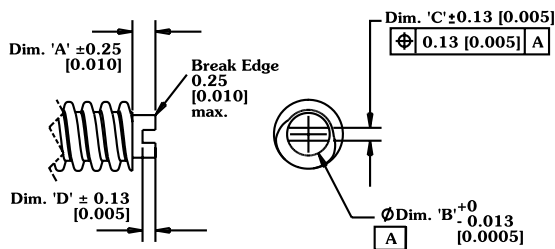
Female Thread



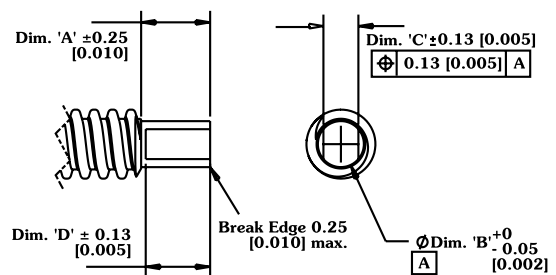
Single Flat



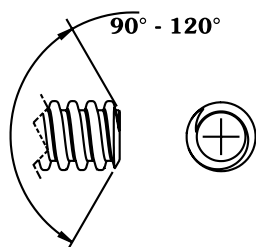
Screwdriver Slot



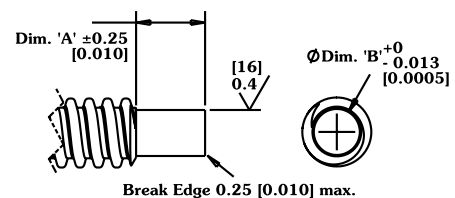
Double Flat



Standard Break Edge



Ground Journal





Kerk® Lead-screws

KERK® LEAD-SCREWS are available in standard diameters from 1/8-in (3.2mm) to 15/16-in (23mm), with standard leads from .012-in to almost 4-in (0.30mm to 92mm) including metric and left hand threads. Custom sizes and leads can be special ordered. Most stock screws are manufactured from 303 stainless steel and are produced with Haydon Kerk Motion Solutions exclusive precision rolling process. Other materials are available on special order. Positional bi-directional repeatability (with Kerk anti-backlash nut) is within 50 micro-inches (1.25 micron) and standard lead accuracy is better than 0.0006-in./in. (mm/mm). Lead accuracies are available to .0001-in./in. (mm/mm). Please consult factory for more details. Haydon Kerk Motion Solutions total in-house manufacturing and quality control assure uniform and consistent products.

Identifying the part number codes when ordering

| | | | | | | | | | |
|--|---|---|---|---|-------------------------------------|---|-------------------------------------|---|---|
| ZBX | F | K | R | - | 012 | - | 0012 | - | XXXX |
| Prefix: | Nut Mounting Style | Lubrication | Thread Direction | | Diameter Code | | Nominal Thread Lead Code | | Unique Identifier |
| LSS (Screw Only) | A = Flanged (Triangular) F = Flanged (Round) P = Flange (Triangular with pilot) T = Threaded S = Screw only X = Custom | S = Uncoated K = Kerkote® TFE Coating G = Grease N = Nut only B = Black Ice® | R = Right hand L = Left hand <i>(Refer to lead-screw charts for availability)</i> | | <i>(Refer to lead-screw charts)</i> | | <i>(Refer to lead-screw charts)</i> | | Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part. |
| Nut Series | For Micro and Mini Nuts Only: B = Barrel R = Rectangular | | | | | | | | |
| CMP ZBX WDG NTB KHD VHD NTG ZBA BFW ZBM | | | | | | | | | |

EXAMPLES:

LSSSSR-025-0250 = Lead-screw only, uncoated, right hand thread, 1/4-in nominal screw diameter, 0.250 thread lead, without an assigned unique identifier

WDGABR-037-0125-XXXX = Assembly: WDG Series Nut, triangular flanged mount, Black Ice® TFE coating, right hand thread, 3/8-in nominal screw diameter, 0.125 thread lead, without an assigned unique identifier

ZBXTKR-043-0250-XXXX = Assembly: ZBX Series Nut, thread mounting, Kerkote® TFE coating, right hand thread, 7/16-in nominal screw diameter, 0.250 thread lead, without an assigned unique identifier

Special environments (temperature, clean room, contaminants, etc.)

For applications assistance or order entry, call your the Haydon Kerk Motion Solutions Engineering at 603 213 6290.

NOTE:

- Not all thread leads are available in all screw diameters
- New nuts and leads are continually being added. Contact Haydon Kerk Motion Solutions for latest availability.

Lead-screw Size List

| Diameter (inches) (mm) | | Diameter Code | Lead (inches) (mm) | | LEAD CODE | Left Hand Available | Outside Diameter (for Reference) (inches) (mm) | | Root Diameter (for Reference) (inches) (mm) | | Efficiency %* | Compatible Nut Styles |
|---------------------------|------|------------------|-----------------------|-------|--------------|---------------------------|--|------|---|------|------------------|--|
| 5/64 | 2 | 008 | 0.012 | 0.30 | 0012 | | 0.079 | 2.01 | 0.068 | 1.73 | 24** | BFW ZBM |
| | | | 0.016 | 0.40 | 0016 | | 0.075 | 1.91 | 0.058 | 1.47 | 30** | |
| | | | 0.020 | 0.50 | 0020 | | 0.077 | 1.96 | 0.057 | 1.45 | 36** | |
| | | | 0.039 | 1.00 | 0039 | | 0.079 | 2.01 | 0.059 | 1.50 | 52** | |
| | | | 0.079 | 2.00 | 0079 | | 0.077 | 1.96 | 0.057 | 1.45 | 66** | |
| 1/8 | 3.2 | 012 | 0.024 | 0.61 | 0024 | | 0.129 | 3.28 | 0.093 | 2.36 | 44 | NTB NTG BFW |
| | | | 0.039 | 1.00 | 0039 | | 0.129 | 3.28 | 0.094 | 2.39 | 57 | |
| | | | 0.048 | 1.22 | 0048 | | 0.129 | 3.28 | 0.093 | 2.36 | 61 | |
| | | | 0.075 | 1.91 | 0075 | | 0.129 | 3.28 | 0.093 | 2.36 | 70 | |
| | | | 0.096 | 2.44 | 0096 | ● | 0.129 | 3.28 | 0.093 | 2.36 | 75 | |
| | | | 0.125 | 3.18 | 0125 | LH Only | 0.125 | 3.18 | 0.078 | 1.98 | 80 | |
| 0.132 | 3.3 | 013 | 0.020 | 0.50 | 0020 | | 0.132 | 3.35 | 0.104 | 2.64 | 42 | NTB NTG BFW |
| | | | 0.039 | 1.00 | 0039 | | 0.132 | 3.35 | 0.080 | 2.03 | 61 | |
| | | | 0.079 | 2.00 | 0079 | | 0.132 | 3.35 | 0.080 | 2.03 | 75 | |
| | | | 0.157 | 4.00 | 0157 | | 0.132 | 3.35 | 0.080 | 2.03 | 84 | |
| | | | 0.315 | 8.00 | 0315 | | 0.132 | 3.35 | 0.080 | 2.03 | 87 | |
| 9/64 | 3.6 | 014 | 0.012 | 0.30 | 0012 | | 0.140 | 3.56 | 0.123 | 3.12 | 26 | NTB NTG BFW |
| | | | 0.024 | 0.61 | 0024 | | 0.140 | 3.56 | 0.105 | 2.67 | 43 | |
| | | | 0.048 | 1.22 | 0048 | | 0.140 | 3.56 | 0.081 | 2.06 | 62 | |
| | | | 0.096 | 2.44 | 0096 | | 0.140 | 3.56 | 0.081 | 2.06 | 75 | |
| | | | 0.394 | 10.00 | 0394 | | 0.140 | 3.56 | 0.102 | 2.59 | 86 | |
| 5/32 | 4 | 016 | 0.033 | 0.84 | 0033 | ● | 0.156 | 3.96 | 0.116 | 2.95 | 45 | NTB NTG BFW |
| | | | 0.050 | 1.27 | 0050 | LH Only | 0.156 | 3.96 | 0.096 | 2.44 | 59 | |
| | | | 0.094 | 2.39 | 0094 | | 0.164 | 4.17 | 0.128 | 3.25 | 67 | |
| | | | 0.125 | 3.18 | 0125 | | 0.168 | 4.27 | 0.130 | 3.30 | 74 | |
| | | | 0.250 | 6.35 | 0250 | | 0.156 | 3.96 | 0.130 | 3.30 | 83 | |
| | | | 0.375 | 9.53 | 0375 | | 0.156 | 3.96 | 0.130 | 3.30 | 85 | |
| 3/16 | 5 | 018 | 0.020 | 0.50 | 0020 | | 0.188 | 4.78 | 0.163 | 4.14 | 30 | CMP WDG NTB NTG BFW |
| | | | 0.025 | 0.64 | 0025 | | 0.188 | 4.78 | 0.150 | 3.81 | 39 | |
| | | | 0.039 | 1.00 | 0039 | | 0.188 | 4.78 | 0.144 | 3.66 | 47 | |
| | | | 0.050 | 1.27 | 0050 | | 0.188 | 4.78 | 0.124 | 3.15 | 58 | |
| | | | 0.100 | 2.54 | 0100 | | 0.188 | 4.78 | 0.136 | 3.45 | 69 | |
| | | | 0.1875 | 4.76 | 0188 | | 0.188 | 4.78 | 0.167 | 4.24 | 78 | |
| | | | 0.200 | 5.08 | 0200 | | 0.188 | 4.78 | 0.124 | 3.15 | 82 | |
| | | | 0.375 | 9.53 | 0375 | | 0.188 | 4.78 | 0.161 | 4.09 | 84 | |
| | | | 0.400 | 10.16 | 0400 | | 0.188 | 4.78 | 0.124 | 3.15 | 84 | |
| | | | 0.427 | 10.85 | 0427 | | 0.188 | 4.78 | 0.162 | 4.11 | 85 | |
| 7/32 | 5.6 | 021 | 0.024 | 0.61 | 0024 | | 0.218 | 5.54 | 0.181 | 4.60 | 31 | WDG NTB NTG BFW |
| | | | 0.03125 | 0.79 | 0031 | | 0.204 | 5.18 | 0.160 | 4.06 | 39 | |
| | | | 0.048 | 1.22 | 0048 | | 0.216 | 5.49 | 0.156 | 3.96 | 50 | |
| | | | 0.050 | 1.27 | 0050 | | 0.200 | 5.08 | 0.135 | 3.43 | 52 | |
| | | | 0.0625 | 1.59 | 0063 | | 0.218 | 5.54 | 0.142 | 3.61 | 60 | |
| | | | 0.096 | 2.44 | 0096 | | 0.218 | 5.54 | 0.156 | 3.96 | 66 | |
| | | | 0.192 | 4.88 | 0192 | | 0.218 | 5.54 | 0.156 | 3.96 | 78 | |
| | | | 0.250 | 6.35 | 0250 | ● | 0.204 | 5.18 | 0.140 | 3.56 | 81 | |
| 0.384 | 9.75 | 0384 | | 0.218 | 5.54 | 0.159 | 4.04 | 86 | | | | |

Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

* Listed efficiencies are theoretical values based on Kerkote® TFE coated lead-screws

** Listed efficiencies for Micro screws are theoretical values based on non-coated lead-screws

Lead-screws: Lead-screw Size List

Haydon Kerk Motion Solutions, Inc. • www.HaydonKerk.com • Phone: 800 243 2715 • International: 203 756 7441

Lead-screw Size List

| Diameter (inches) (mm) | Diameter Code | Lead (inches) (mm) | LEAD CODE | Left Hand Available | Outside Diameter (for Reference) (inches) (mm) | Root Diameter (for Reference) (inches) (mm) | Efficiency %* | Compatible Nut Styles | | | | |
|---------------------------|------------------|-----------------------|--------------|---------------------------|--|---|------------------|-----------------------------|-------|------|----|--|
| 1/4 | 6 | 025 | 0.024 | 0.61 | 0024 | | 0.250 | 6.35 | 0.218 | 5.54 | 28 | CMP ZBX ZBA WDG NTB NTG BFW |
| | | | 0.025 | 0.64 | 0025 | | 0.250 | 6.35 | 0.214 | 5.44 | 30 | |
| | | | 0.03125 | 0.79 | 0031 | | 0.250 | 6.35 | 0.208 | 5.28 | 34 | |
| | | | 0.039 | 1.00 | 0039 | | 0.250 | 6.35 | 0.190 | 4.83 | 40 | |
| | | | 0.048 | 1.22 | 0048 | | 0.250 | 6.35 | 0.190 | 4.83 | 45 | |
| | | | 0.050 | 1.27 | 0050 | ● | 0.250 | 6.35 | 0.191 | 4.85 | 46 | |
| | | | 0.059 | 1.50 | 0059 | | 0.250 | 6.35 | 0.172 | 4.37 | 52 | |
| | | | 0.0625 | 1.59 | 0063 | | 0.250 | 6.35 | 0.170 | 4.32 | 52 | |
| | | | 0.079 | 2.00 | 0079 | | 0.250 | 6.35 | 0.170 | 4.32 | 59 | |
| | | | 0.096 | 2.44 | 0096 | | 0.250 | 6.35 | 0.190 | 4.83 | 61 | |
| | | | 0.100 | 2.54 | 0100 | | 0.250 | 6.35 | 0.190 | 4.83 | 62 | |
| | | | 0.118 | 3.00 | 0118 | | 0.250 | 6.35 | 0.175 | 4.45 | 68 | |
| | | | 0.125 | 3.18 | 0125 | | 0.250 | 6.35 | 0.190 | 4.83 | 67 | |
| | | | 0.197 | 5.00 | 0197 | | 0.250 | 6.35 | 0.172 | 4.37 | 72 | |
| | | | 0.200 | 5.08 | 0200 | | 0.250 | 6.35 | 0.170 | 4.32 | 65 | |
| | | | 0.250 | 6.35 | 0250 | ● | 0.250 | 6.35 | 0.168 | 4.27 | 79 | |
| | | | 0.3125 | 7.94 | 0313 | | 0.250 | 6.35 | 0.184 | 4.67 | 81 | |
| | | | 0.333 | 8.46 | 0333 | | 0.250 | 6.35 | 0.170 | 4.32 | 82 | |
| 0.394 | 10.00 | 0394 | | 0.250 | 6.35 | 0.170 | 4.32 | 78 | | | | |
| 0.400 | 10.16 | 0400 | | 0.250 | 6.35 | 0.170 | 4.32 | 84 | | | | |
| 0.500 | 12.70 | 0500 | ● | 0.250 | 6.35 | 0.169 | 4.29 | 85 | | | | |
| 0.750 | 19.05 | 0750 | | 0.250 | 6.35 | 0.170 | 4.32 | 86 | | | | |
| 1.000 | 25.40 | 1000 | ● | 0.250 | 6.35 | 0.170 | 4.32 | 84 | | | | |
| 5/16 | 8 | 031 | 0.039 | 1.00 | 0039 | | 0.315 | 8.00 | 0.261 | 6.63 | 34 | CMP ZBX ZBA KHD WDG NTB NTG BFW |
| | | | 0.057 | 1.44 | 0057 | | 0.315 | 8.00 | 0.243 | 6.17 | 43 | |
| | | | 0.0741 | 1.88 | 0074 | | 0.312 | 7.92 | 0.211 | 5.36 | 51 | |
| | | | 0.111 | 2.82 | 0111 | | 0.312 | 7.92 | 0.232 | 5.89 | 60 | |
| | | | 0.167 | 4.24 | 0167 | | 0.312 | 7.92 | 0.211 | 5.36 | 69 | |
| | | | 0.250 | 6.35 | 0250 | | 0.312 | 7.92 | 0.234 | 5.94 | 76 | |
| | | | 0.500 | 12.70 | 0500 | | 0.312 | 7.92 | 0.232 | 5.89 | 83 | |
| | | | 0.800 | 20.32 | 0800 | | 0.306 | 7.77 | 0.243 | 6.17 | 86 | |

Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

*Listed efficiencies are theoretical values based on Kerkote® TFE coated lead-screws



Lead-screw Size List

| Diameter (inches) (mm) | Diameter Code | Lead (inches) (mm) | | LEAD CODE | Left Hand Available | Outside Diameter (for Reference) (inches) (mm) | | Root Diameter (for Reference) (inches) (mm) | | Efficiency %* | Compatible Nut Styles | |
|---------------------------|------------------|-----------------------|---------|--------------|---------------------------|--|-------|---|-------|------------------|-----------------------------|--|
| | | | | | | | | | | | | |
| 3/8 | 10 | 037 | 0.025 | 0.64 | 0025 | | 0.375 | 9.53 | 0.337 | 8.56 | 21 | CMP ZBX ZBA KHD WDG NTB NTG BFW |
| | | | 0.039 | 1.00 | 0039 | | 0.394 | 10.01 | 0.350 | 8.89 | 28 | |
| | | | 0.04167 | 1.06 | 0042 | | 0.375 | 9.53 | 0.320 | 8.13 | 34 | |
| | | | 0.050 | 1.27 | 0050 | ● | 0.375 | 9.53 | 0.301 | 7.65 | 36 | |
| | | | 0.055 | 1.40 | 0055 | | 0.375 | 9.53 | 0.303 | 7.70 | 38 | |
| | | | 0.059 | 1.50 | 0059 | ● | 0.389 | 9.88 | 0.313 | 7.95 | 38 | |
| | | | 0.0625 | 1.59 | 0063 | ● | 0.388 | 9.86 | 0.295 | 7.49 | 41 | |
| | | | 0.068 | 1.73 | 0068 | | 0.388 | 9.86 | 0.295 | 7.49 | 42 | |
| | | | 0.079 | 2.00 | 0079 | | 0.375 | 9.53 | 0.264 | 6.71 | 47 | |
| | | | 0.0833 | 2.12 | 0083 | | 0.375 | 9.53 | 0.293 | 7.44 | 48 | |
| | | | 0.100 | 2.54 | 0100 | ● | 0.375 | 9.53 | 0.266 | 6.76 | 53 | |
| | | | 0.125 | 3.18 | 0125 | | 0.375 | 9.53 | 0.295 | 7.49 | 59 | |
| | | | 0.157 | 4.00 | 0157 | | 0.375 | 9.53 | 0.274 | 6.96 | 65 | |
| | | | 0.1667 | 4.23 | 0167 | | 0.371 | 9.42 | 0.261 | 6.63 | 61 | |
| | | | 0.197 | 5.00 | 0197 | | 0.375 | 9.53 | 0.266 | 6.76 | 69 | |
| | | | 0.200 | 5.08 | 0200 | ● | 0.375 | 9.53 | 0.266 | 6.76 | 69 | |
| | | | 0.250 | 6.35 | 0250 | | 0.375 | 9.53 | 0.268 | 6.81 | 70 | |
| | | | 0.300 | 7.62 | 0300 | | 0.375 | 9.53 | 0.255 | 6.48 | 76 | |
| | | | 0.333 | 8.46 | 0333 | | 0.375 | 9.53 | 0.245 | 6.22 | 78 | |
| | | | 0.363 | 9.22 | 0363 | ● | 0.375 | 9.53 | 0.260 | 6.60 | 79 | |
| | | | 0.375 | 9.53 | 0375 | | 0.375 | 9.53 | 0.265 | 6.73 | 79 | |
| | | | 0.394 | 10.00 | 0394 | | 0.375 | 9.53 | 0.260 | 6.60 | 79 | |
| | | | 0.400 | 10.16 | 0400 | | 0.375 | 9.53 | 0.293 | 7.44 | 79 | |
| | | | 0.472 | 12.00 | 0472 | | 0.388 | 9.86 | 0.287 | 7.29 | 82 | |
| | | | 0.500 | 12.70 | 0500 | ● | 0.388 | 9.86 | 0.265 | 6.73 | 81 | |
| | | | 0.667 | 16.94 | 0667 | | 0.375 | 9.53 | 0.273 | 6.93 | 83 | |
| 0.750 | 19.05 | 0750 | | 0.388 | 9.86 | 0.273 | 6.93 | 84 | | | | |
| 0.984 | 25.00 | 0984 | | 0.375 | 9.53 | 0.262 | 6.65 | 84 | | | | |
| 1.000 | 25.40 | 1000 | | 0.383 | 9.73 | 0.254 | 6.45 | 84 | | | | |
| 1.200 | 30.48 | 1200 | ● | 0.383 | 9.73 | 0.254 | 6.45 | 84 | | | | |
| 1.250 | 31.75 | 1250 | | 0.375 | 9.53 | 0.278 | 7.06 | 84 | | | | |
| 1.500 | 38.10 | 1500 | | 0.375 | 9.53 | 0.264 | 6.71 | 83 | | | | |
| 7/16 | 11 | 043 | 0.050 | 1.27 | 0050 | | 0.437 | 11.10 | 0.362 | 9.19 | 30 | ZBX ZBA WDG NTB BFW |
| | | | 0.0625 | 1.59 | 0063 | ● | 0.436 | 11.07 | 0.358 | 9.09 | 38 | |
| | | | 0.079 | 2.00 | 0079 | | 0.472 | 11.99 | 0.374 | 9.50 | 42 | |
| | | | 0.111 | 2.82 | 0111 | | 0.437 | 11.10 | 0.327 | 8.31 | 52 | |
| | | | 0.118 | 3.00 | 0118 | | 0.438 | 11.13 | 0.363 | 9.22 | 52 | |
| | | | 0.125 | 3.18 | 0125 | | 0.438 | 11.13 | 0.357 | 9.07 | 54 | |
| | | | 0.197 | 5.00 | 0197 | | 0.438 | 11.13 | 0.315 | 8.00 | 65 | |
| | | | 0.236 | 6.00 | 0236 | | 0.433 | 11.00 | 0.313 | 7.95 | 70 | |
| | | | 0.250 | 6.35 | 0250 | | 0.442 | 11.23 | 0.325 | 8.26 | 70 | |
| | | | 0.307 | 7.80 | 0307 | | 0.445 | 11.30 | 0.343 | 8.71 | 73 | |
| | | | 0.325 | 8.26 | 0325 | | 0.444 | 11.28 | 0.342 | 8.69 | 74 | |
| | | | 0.394 | 10.00 | 0394 | | 0.446 | 11.33 | 0.331 | 8.41 | 78 | |
| | | | 0.472 | 12.00 | 0472 | | 0.438 | 11.13 | 0.318 | 8.08 | 80 | |
| | | | 0.500 | 12.70 | 0500 | | 0.452 | 11.48 | 0.327 | 8.31 | 80 | |
| | | | 0.615 | 15.62 | 0615 | | 0.475 | 12.07 | 0.376 | 9.55 | 82 | |

LEAD-SCREW
ASSEMBLIES

Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

*Listed efficiencies are theoretical values based on Kerkote® TFE coated lead-screws

Lead-screws: Lead-screw Size List

Haydon Kerk Motion Solutions, Inc. • www.HaydonKerk.com • Phone: 800 243 2715 • International: 203 756 7441

Lead-screw Size List

LEAD-SCREW
ASSEMBLIES

| Diameter (inches) (mm) | | Diameter Code | Lead (inches) (mm) | | LEAD CODE | Left Hand Available | Outside Diameter (for Reference) (inches) (mm) | | Root Diameter (for Reference) (inches) (mm) | | Efficiency %* | Compatible Nut Styles |
|---------------------------|-----------|------------------|-----------------------|-------|--------------|---------------------------|--|-------|---|-------|------------------|--|
| 1/2 | 13 | 050 | 0.050 | 1.27 | 0050 | | 0.495 | 12.57 | 0.433 | 11.00 | 29 | ZBX ZBA WDG NTB VHD BFW |
| | | | 0.079 | 2.00 | 0079 | | 0.473 | 12.01 | 0.355 | 9.02 | 41 | |
| | | | 0.098 | 2.50 | 0098 | | 0.500 | 12.70 | 0.383 | 9.73 | 46 | |
| | | | 0.100 | 2.54 | 0100 | ● | 0.490 | 12.45 | 0.364 | 9.25 | 46 | |
| | | | 0.125 | 3.18 | 0125 | | 0.500 | 12.70 | 0.374 | 9.50 | 51 | |
| | | | 0.157 | 4.00 | 0157 | | 0.500 | 12.70 | 0.384 | 9.75 | 58 | |
| | | | 0.160 | 4.06 | 0160 | | 0.500 | 12.70 | 0.388 | 9.86 | 67 | |
| | | | 0.1667 | 4.23 | 0167 | | 0.500 | 12.70 | 0.384 | 9.75 | 58 | |
| | | | 0.197 | 5.00 | 0197 | | 0.500 | 12.70 | 0.365 | 9.27 | 62 | |
| | | | 0.200 | 5.08 | 0200 | ● | 0.492 | 12.50 | 0.366 | 9.30 | 63 | |
| | | | 0.250 | 6.35 | 0250 | | 0.500 | 12.70 | 0.382 | 9.70 | 67 | |
| | | | 0.333 | 8.46 | 0333 | ● | 0.497 | 12.62 | 0.362 | 9.19 | 73 | |
| | | | 0.394 | 10.00 | 0394 | | 0.497 | 12.62 | 0.362 | 9.19 | 76 | |
| | | | 0.400 | 10.16 | 0400 | | 0.497 | 12.62 | 0.364 | 9.25 | 76 | |
| | | | 0.500 | 12.70 | 0500 | | 0.488 | 12.40 | 0.352 | 8.94 | 79 | |
| | | | 0.630 | 16.00 | 0630 | | 0.500 | 12.70 | 0.374 | 9.50 | 80 | |
| | | | 0.750 | 19.05 | 0750 | | 0.525 | 13.34 | 0.399 | 10.13 | 83 | |
| | | | 0.800 | 20.32 | 0800 | | 0.500 | 12.70 | 0.370 | 9.40 | 83 | |
| 0.984 | 25.00 | 0984 | | 0.500 | 12.70 | 0.369 | 9.37 | 84 | | | | |
| 1.000 | 25.40 | 1000 | ● | 0.490 | 12.45 | 0.372 | 9.45 | 84 | | | | |
| 1.500 | 38.10 | 1500 | | 0.490 | 12.45 | 0.374 | 9.50 | 85 | | | | |
| 2.000 | 50.80 | 2000 | | 0.488 | 12.40 | 0.378 | 9.60 | 87 | | | | |
| 5/8 | 16 | 062 | 0.100 | 2.54 | 0100 | | 0.615 | 15.62 | 0.498 | 12.65 | 40 | ZBX ZBA NTB VHD BFW |
| | | | 0.125 | 3.18 | 0125 | ● | 0.625 | 15.88 | 0.470 | 11.94 | 45 | |
| | | | 0.200 | 5.08 | 0200 | | 0.625 | 15.88 | 0.495 | 12.57 | 53 | |
| | | | 0.250 | 6.35 | 0250 | | 0.625 | 15.88 | 0.469 | 11.91 | 63 | |
| | | | 0.315 | 8.00 | 0315 | | 0.627 | 15.93 | 0.493 | 12.52 | 68 | |
| | | | 0.500 | 12.70 | 0500 | ● | 0.625 | 15.88 | 0.478 | 12.14 | 76 | |
| | | | 0.630 | 16.00 | 0630 | | 0.625 | 15.88 | 0.491 | 12.47 | 78 | |
| | | | 1.000 | 25.40 | 1000 | | 0.625 | 15.88 | 0.481 | 12.22 | 83 | |
| | | | 1.500 | 38.10 | 1500 | | 0.625 | 15.88 | 0.499 | 12.67 | 85 | |
| 2.000 | 50.80 | 2000 | ● | 0.625 | 15.88 | 0.499 | 12.67 | 86 | | | | |

Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

*Listed efficiencies are theoretical values based on Kerkote® TFE coated lead-screws


Lead-screw Size List

| Diameter (inches) (mm) | Diameter Code | Lead (inches) (mm) | LEAD CODE | Left Hand Available | Outside Diameter (for Reference) | | Root Diameter (for Reference) | | Efficiency %* | Compatible Nut Styles | | |
|---------------------------|------------------|-----------------------|--------------|---------------------------|-------------------------------------|---------|----------------------------------|-------|------------------|-----------------------------|----|--------------------------|
| | | | | | (inches) | (mm) | (inches) | (mm) | | | | |
| 3/4 | 19 | 075 | 0.0625 | 1.59 | 0063 | | 0.750 | 19.05 | 0.671 | 17.04 | 25 | ZBA NTB VHD BFW |
| | | | 0.098 | 2.50 | 0098 | | 0.742 | 18.85 | 0.626 | 15.90 | 35 | |
| | | | 0.100 | 2.54 | 0100 | ● | 0.746 | 18.95 | 0.624 | 15.85 | 35 | |
| | | | 0.1667 | 4.23 | 0167 | | 0.727 | 18.47 | 0.645 | 16.38 | 47 | |
| | | | 0.197 | 5.00 | 0197 | | 0.745 | 18.92 | 0.624 | 15.85 | 51 | |
| | | | 0.200 | 5.08 | 0200 | | 0.741 | 18.82 | 0.632 | 16.05 | 52 | |
| | | | 0.250 | 6.35 | 0250 | | 0.731 | 18.57 | 0.639 | 16.23 | 57 | |
| | | | 0.276 | 7.00 | 0276 | | 0.750 | 19.05 | 0.624 | 15.85 | 59 | |
| | | | 0.333 | 8.46 | 0333 | | 0.750 | 19.05 | 0.624 | 15.85 | 64 | |
| | | | 0.500 | 12.70 | 0500 | | 0.744 | 18.90 | 0.623 | 15.82 | 73 | |
| | | | 0.551 | 14.00 | 0551 | | 0.750 | 19.05 | 0.624 | 15.85 | 73 | |
| | | | 0.591 | 15.00 | 0591 | | 0.749 | 19.02 | 0.623 | 15.82 | 74 | |
| | | | 0.709 | 18.00 | 0709 | | 0.780 | 19.81 | 0.650 | 16.51 | 77 | |
| | | | 0.748 | 19.00 | 0748 | | 0.672 | 17.07 | 0.547 | 13.89 | 80 | |
| | | | 0.787 | 20.00 | 0787 | | 0.780 | 19.81 | 0.648 | 16.46 | 78 | |
| | | | 0.800 | 20.32 | 0800 | | 0.750 | 19.05 | 0.618 | 15.70 | 79 | |
| | | | 0.945 | 24.00 | 0945 | | 0.734 | 18.64 | 0.633 | 16.08 | 80 | |
| | | | 1.000 | 25.40 | 1000 | ● | 0.743 | 18.87 | 0.619 | 15.72 | 81 | |
| 1.500 | 38.10 | 1500 | ● | 0.712 | 18.08 | 0.590 | 14.99 | 84 | | | | |
| 1.969 | 50.00 | 1969 | | 0.751 | 19.08 | 0.620 | 15.75 | 84 | | | | |
| 2.000 | 50.80 | 2000 | ● | 0.742 | 18.85 | 0.611 | 15.52 | 84 | | | | |
| 2.400 | 60.96 | 2400 | ● | 0.750 | 19.05 | 0.620 | 15.75 | 84 | | | | |
| 3.622 | 92.00 | 3622 | ● | 0.750 | 19.05 | 0.634 | 16.10 | 87 | | | | |
| 7/8 | 22 | 087 | 0.200 | 5.08 | 0200 | ● | 0.870 | 22.10 | 0.742 | 18.85 | 48 | ZBA NTB VHD BFW |
| | | | 0.236 | 6.00 | 0236 | | 0.848 | 21.54 | 0.773 | 19.63 | 52 | |
| | | | 0.250 | 6.35 | 0250 | | 0.875 | 22.23 | 0.749 | 19.02 | 53 | |
| | | | 0.394 | 10.00 | 0394 | | 0.875 | 22.23 | 0.741 | 18.82 | 65 | |
| | | | 0.500 | 12.70 | 0500 | | 0.862 | 21.89 | 0.744 | 18.90 | 69 | |
| | | | 0.667 | 16.94 | 0667 | | 0.871 | 22.12 | 0.745 | 18.92 | 74 | |
| | | | 0.787 | 20.00 | 0787 | | 0.875 | 22.23 | 0.741 | 18.82 | 78 | |
| | | | 0.945 | 24.00 | 0945 | | 0.875 | 22.23 | 0.741 | 18.82 | 79 | |
| 1.000 | 25.40 | 1000 | | 0.871 | 22.12 | 0.742 | 18.85 | 80 | | | | |
| 15/16 | 24 | 093 | 0.050 | 1.27 | 0050 | LH Only | 0.938 | 23.83 | 0.874 | 22.20 | 17 | ZBA NTB BFW |
| | | | 2.000 | 50.80 | 2000 | | 0.927 | 23.55 | 0.815 | 20.70 | 85 | |
| | | | 3.000 | 76.20 | 3000 | ● | 0.939 | 23.85 | 0.803 | 20.40 | 86 | |

Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

*Listed efficiencies are theoretical values based on Kerkote® TFE coated lead-screws

Haydon® “external” style linear actuators can be made available with the various lead codes shown in this section (while maintaining the lead screw “diameter” as described in the linear actuator specifications).



Lead-screw Assemblies: Nut Styles

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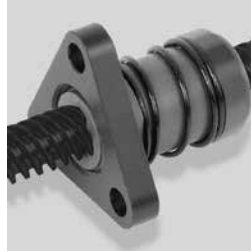
Anti-Backlash: Self-Compensating, Zero Backlash



CMP Series
– Light Loads, Compact Design
Exceptionally compact self-lubricating acetal nut; ideally suited for applications using oil or grease.



ZBX Series
– Light Loads
Patented self-lubricating polyacetal nut; precise positional accuracy and repeatability at a low cost.



WDG Series
– Moderate Loads
An exceptionally compact design to provide stiffness and balanced accuracy for precise positioning. A self-lubricating acetal nut, axially preloaded, the patented wedge design locks the nut at the correct preload without excessive drag.



KHD Series
– Moderate Loads, Low Drag Torque
For moderate load applications; delivers increased load capacity and greater axial stiffness with low drag torque.



NTB Series
– Full Range, Flexible Design
Self-compensating nut assembly maintains axial stiffness throughout its life with minimum system drag torque. Easily modified for custom applications.



VHD Series
– Heavy Loads, High Axial Stiffness
Delivers maximum load carrying capability, with highest axial and radial stiffness.

All standard nuts are some form of unfilled acetal

Anti-Backlash: Special Purpose



ZBA Series
– Adjustable Drag Torque/Ultra Smooth Travel
Unique patented self-lubricating polyacetal nut can be adjusted for torque ranges.



NTG Series
– Adjustable Drag Torque/Compact Size
Compact anti-backlash assembly allows drag torque to be pre-set according to system requirements.



BFW Series
– For applications that do not require anti-backlash or wear compensation
Long life at minimal cost.



MINI Series
– Miniature lead-screw assemblies
Advanced mini lead-screw motion control technology for small-scale lead-screw applications – 3 to 5 mm (1/8 to 3/16-in.). Available in NTB and NTG anti-backlash and BFW style general purpose configurations.



MICRO
– ZBM Series
– Revolutionary micro designs
A lead-screw / nut product design that enables a whole new range of motion control applications. Available in BFW and ZBM (anti-backlash) style configurations with 2 mm (5/64-inch) diameter lead-screws.

Nuts: Custom



- Custom shapes machined and molded
- In-house mold and toolmaking to help expedite the design process
- Custom materials such as PEEK, PPS and carbon reinforced polymers

Nut Feature Matrix

Haydon Kerk Motion Solutions has a wide variety of standard nut designs which offer many features to choose from. Once an application's most important requirements are understood, it becomes a matter of choosing the nut which best meets those requirements. Occasionally, more than one nut might do the job, but in the vast majority of situations, one nut design will stand above the rest. The matrix below may help to narrow down the choices.

All Kerk® nuts can be modified to some degree to help them better meet specific requirements. Haydon Kerk Motion Solutions is also very willing to discuss custom nut designs where requirements and volumes justify.

| Nut Feature | Nut Style: CMP | ZBX | ZBA | ZBM | KHD | WDG | NTB | NTG | VHD | BFW |
|---|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Compactness | ★★★★ | ★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★★ | ★★★★ | ★ | ★★★★ |
| Dynamic Load Capability | ★★ | ★ | ★★ | ★ | ★★ | ★★ | ★★ | ★★ | ★★★★ | ★★★★ |
| Minimal Drag Torque | ★ | ★★ | ★★ | ★★ | ★★★★ | ★★ | ★★ | ★★ | ★★★★ | N/A |
| Vibration Damping (horizontal) | ★ | ★★★★ | ★★★★ | ★★★★ | ★★ | ★ | ★ | ★★ | ★★ | N/A |
| Vibration Damping (vertical) | ★ | ★★★★ | ★★★★ | ★★★★ | ★ | ★ | ★ | ★ | ★ | N/A |
| Smoothness of Operation (printing, scanning) | ★ | ★★ | ★★★★ | ★★ | ★★ | ★★ | ★★ | ★★★★ | ★★ | ★ |
| Backlash/Wear Compensation Capability | ★★★★ | ★★ | ★ | ★★ | ★★★★ | ★★★★ | ★★★★ | ★ | ★★★★ | N/A |
| Ease of User Adjustment of Drag Torque/Backlash | N/A | N/A | ★★★★ | N/A | ★★ | N/A | ★ | ★★★★ | ★★ | N/A |
| Stiffness (less axial bi-directional compliance) | ★★ | ★★ | ★★ | ★★ | ★★★★ | ★★★★ | ★★★★ | ★★ | ★★★★ | N/A |
| Ability to Add Modifications | ★ | ★★ | ★ | ★ | ★ | ★ | ★★★★ | ★ | ★ | ★★★★ |
| Ability to manufacture with Custom Material | ★ | ★★ | ★★ | ★ | ★ | ★ | ★★★★ | ★★ | ★ | ★★★★ |
| Ability to Work with Finer Leads (<0.2-in [5.08 mm]) | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★ | ★★★★ | ★★★★ | ★★★★ |
| Ability to Work with Long Leads (>1-in [25.4 mm]) | ★★★★ | ★★★★ | ★★★★ | N/A | ★★★★ | ★★★★ | ★★★★ | ★ | ★★★★ | ★★★★ |

GOOD ★ BETTER ★★ BEST ★★★

Lead-screw Assemblies: Nut Comparison Chart



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Comparison of Kerk® Nut Characteristics

LEAD-SCREW ASSEMBLIES

| Nominal Screw Diameter | Property | Nut Style Series | | | | | | | | | |
|------------------------|-------------------------------|--------------------|----------------------------|-----------------------------|-----------------------|--------------------------|------------------------------|------------------------------|------------------------------|---------------------------|-------------------|
| | | CMP | ZBX | ZBA | ZBM | KHD | WDG | NTB | NTG | VHD | BFW |
| 5/64-in (2mm) | Dynamic Load | | | | 1.0 lbs. (.45 kg) | | | | | | 10 lbs. (4.5 kg) |
| | Static Frictional Drag Torque | | | | .5 oz.-in. (.0035 NM) | | | | | | Free Wheeling |
| 1/8-in (3mm) | Dynamic Load | | | | | | | 5 lbs. (2.3 kg) | 5 lbs. (2.3 kg) | | 25 lbs. (11 kg) |
| | Static Frictional Drag Torque | | | | | | | .1-.5 oz.-in. (.001-.004 NM) | .1-.5 oz.-in. (.001-.004 NM) | | Free Wheeling |
| 3/16-in (4mm) | Dynamic Load | 5 lbs. (2.3 kg) | | | | | 10 lbs. (4.5 kg) | 5 lbs. (2.3 kg) | 5 lbs. (2.3 kg) | | 25 lbs. (11 kg) |
| | Static Frictional Drag Torque | 4 oz.-in. (.03 NM) | | | | | 4 oz.-in. max. (.03 NM max.) | .1-.5 oz.-in. (.001-.004 NM) | .1-.5 oz.-in. (.001-.004 NM) | | Free Wheeling |
| 1/4-in (6mm) | Dynamic Load | 5 lbs. (2.3 kg) | 5 lbs. (2.3 kg) | 5 lbs. (2.3 kg) | | | 10 lbs. (4.5 kg) | 10 lbs. (4.6 kg) | 10 lbs. (4.6 kg) | | 50 lbs. (20 kg) |
| | Static Frictional Drag Torque | 4 oz.-in. (.03 NM) | .5-3 oz.-in. (.004-.02 NM) | .5-2 oz.-in. (.004-.014 NM) | | | 4 oz.-in. max. (.03 NM max.) | .5-2 oz.-in. (.004-.014 NM) | .5-2 oz.-in. (.004-.014 NM) | | Free Wheeling |
| 5/16-in (8mm) | Dynamic Load | 8 lbs. (3.6 kg) | 10 lbs. (5 kg) | 10 lbs. (5 kg) | | 20 lbs. (10 kg) | 25 lbs. (11.3 kg) | 20 lbs. (10 kg) | 20 lbs. (10 kg) | | 75 lbs. (35 kg) |
| | Static Frictional Drag Torque | 5 oz.-in. (.04 NM) | 1-5 oz.-in. (.01-.03 NM) | 1-3 oz.-in. (.01-.02 NM) | | 1-3 oz.-in. (.01-.02 NM) | 5 oz.-in. max. (.04 NM max.) | 1-3 oz.-in. (.01-.02 NM) | 1-3 oz.-in. (.007-.02 NM) | | Free Wheeling |
| 3/8-in (10mm) | Dynamic Load | 8 lbs. (3.6 kg) | 10 lbs. (5 kg) | 10 lbs. (5 kg) | | 20 lbs. (10 kg) | 25 lbs. (11.3 kg) | 20 lbs. (10 kg) | 20 lbs. (10 kg) | | 75 lbs. (35 kg) |
| | Static Frictional Drag Torque | 5 oz.-in. (.04 NM) | 1-5 oz.-in. (.01-.03 NM) | 1-3 oz.-in. (.01-.02 NM) | | 1-3 oz.-in. (.01-.02 NM) | 5 oz.-in. max. (.04 NM max.) | 1-3 oz.-in. (.01-.02 NM) | 1-3 oz.-in. (.007-.02 NM) | | Free Wheeling |
| 7/16-in (11mm) | Dynamic Load | | 15 lbs. (7 kg) | 15 lbs. (7 kg) | | | 75 lbs. (34 kg) | 30 lbs. (13 kg) | | | 90 lbs. (40 kg) |
| | Static Frictional Drag Torque | | 2-6 oz.-in. (.014-.04 NM) | 2-5 oz.-in. (.014-.03 NM) | | | 9 oz.-in. max. (.06 NM max.) | 1-3 oz.-in. (.007-.02 NM) | | | Free Wheeling |
| 1/2-in (13mm) | Dynamic Load | | 25 lbs. (11 kg) | 25 lbs. (11 kg) | | | 75 lbs. (34 kg) | 100 lbs. (45 kg) | | 150 lbs. (68 kg) | 150 lbs. (68 kg) |
| | Static Frictional Drag Torque | | 3-7 oz.-in. (.02-.05 NM) | 2-5 oz.-in. (.014-.03 NM) | | | 9 oz.-in. max. (.06 NM max.) | 2-6 oz.-in. (.014-.04 NM) | | 2-6 oz.-in. (.014-.04 NM) | Free Wheeling |
| 5/8-in (16mm) | Dynamic Load | | 35 lbs. (16 kg) | 35 lbs. (16 kg) | | | | 125 lbs. (56 kg) | | 250 lbs. (113 kg) | 225 lbs. (100 kg) |
| | Static Frictional Drag Torque | | 4-8 oz.-in. (.03-.055 NM) | 3-7 oz.-in. (.02-.05 NM) | | | | 2-6 oz.-in. (.014-.04 NM) | | 2-6 oz.-in. (.014-.04 NM) | Free Wheeling |
| 3/4-in (19mm) | Dynamic Load | | | 55 lbs. (25 kg) | | | | 150 lbs. (68 kg) | | 350 lbs. (159 kg) | 350 lbs. (160 kg) |
| | Static Frictional Drag Torque | | | 5-9 oz.-in. (.03-.063 NM) | | | | 3-7 oz.-in. (.02-.05 NM) | | 3-7 oz.-in. (.02-.05 NM) | Free Wheeling |
| 7/8-in (22mm) | Dynamic Load | | | 55 lbs. (25 kg) | | | | 200 lbs. (90 kg) | | 350 lbs. (159 kg) | 500 lbs. (227 kg) |
| | Static Frictional Drag Torque | | | 5-9 oz.-in. (.03-.063 NM) | | | | 4-8 oz.-in. (.03-.06 NM) | | 3-7 oz.-in. (.02-.05 NM) | Free Wheeling |
| 15/16-in (24mm) | Dynamic Load | | | 55 lbs. (25 kg) | | | | 200 lbs. (90 kg) | | | 500 lbs. (227 kg) |
| | Static Frictional Drag Torque | | | 5-9 oz.-in. (.03-.063 NM) | | | | 4-8 oz.-in. (.03-.06 NM) | | | Free Wheeling |