Haydon kerk Motion Solutions

LINEAR MOTION CATALOG AND DESIGN GUIDE

AMETEK®
ADVANCED MOTION SOLUTIONS

HAYDONKERKPITTMAN.COM

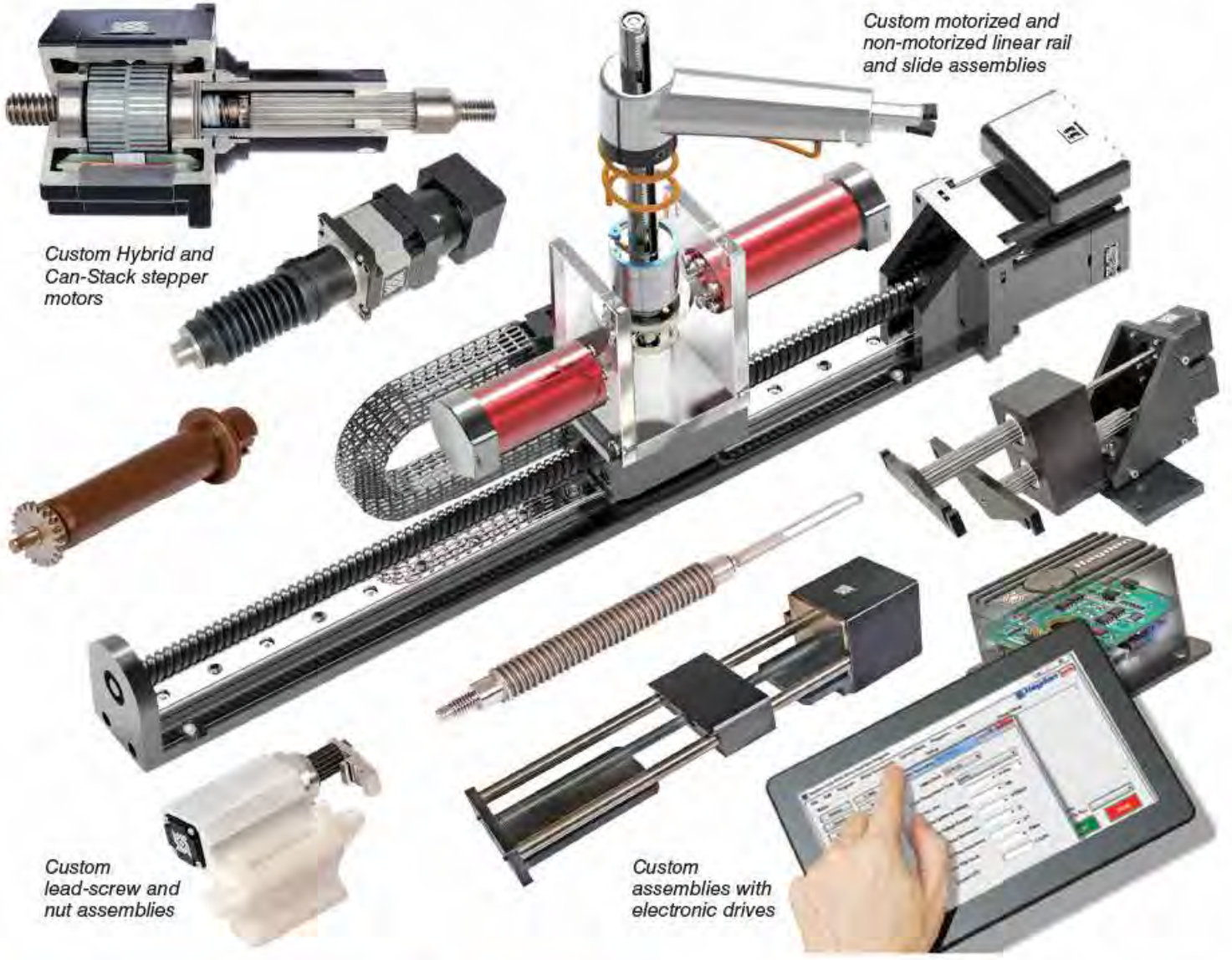
Haydon kerk Motion Solutions

Custom Motion Solutions

We can custom-design and manufacture practical motion control solutions to make your operations more productive and efficient.

Haydon Kerk Motion Solutions is an innovative technology company that offers a global network of people, facilities and services dedicated to engineering and manufacturing the world's most advanced motion control solutions.

- Systems design
- Engineering
- Manufacturing
- On-site mold making
- Precision machining
- Finishing
- Assembly
- Wiring
- Testing
- World-wide technical assistance



Custom motorized and non-motorized linear rail and slide assemblies

Custom Hybrid and Can-Stack stepper motors

Custom lead-screw and nut assemblies

Custom assemblies with electronic drives

Haydon kerk Motion Solutions Express℠

A standard selection of products is now available 24 hours a day at **www.HaydonKerkExpress.com**

2D/3D Model Downloads

A virtual 2D/3D simulation of your customized options available at **www.haydonkerkpittman.com**

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How to Use This Guide

Haydon Kerk Motion Solutions, Inc. *specializes in customized designs to solve complex engineering problems requiring precision linear motion.*

Before using this guide, take a few minutes to review the table of contents and scan through the entire catalog.

Lead-screws and Nut Assemblies (Page 11)

The lead-screw product line offers an extensive array of non-ball lead-screws, anti-backlash nuts, and free-wheeling nuts for use as components in a motion system. Our precision lead-screws and nuts that easily interface to many types of rotary power sources including stepper motors, servos, brushless DC, brush-type DC, and AC synchronous motors. Lead-screws and nuts are also versatile components in systems requiring combination mechanics such as "belt, pulley, lead-screw" systems, and "folded-over" linear actuator designs.

Lead-Screws (charts on pages 20 to 24)
Nominal screw diameter: 2 mm to 24 mm (5/64-in to 15/16-in)
Leads (travel/revolution): 0.3 mm to 76 mm (0.012-in to 3-in)/revolution

Nut Styles (product summary and charts on pages 25 to 27)
8 designs of anti-backlash and freewheeling nuts as a function of load and maximum allowable drag torque.

PAGE 11

Linear Actuator Stepper Motors (Page 50)

The stepper linear actuator product line offers an effective solution that simplifies the conventional way of translating rotary into linear motion. The rotary-to-linear conversion is unique; it takes place within the motor itself therefore eliminating the use of belts and pulleys, rack and pinion and other mechanical components.

Hybrid Linear Actuators (Overview on page 69)
Footprint: 21 mm to 87 mm (0.8-in to 3.4-in) square
Force Output: 2 N to 2200 N (0.5 lb to 500 lb)
Linear Travel/step: 1.5 to 127 microns/step (0.00006-in to 0.005-in)/step

Can-Stack Linear Actuators (Overview on page 127)
Footprint: 15 mm to 46 mm (0.59-in to 1.8-in) diameter
Force Output: 7 N to 260 N (1.6 lb to 58 lb)
Linear Travel/step: 20 to 400 microns/step (0.0008-in to 0.016-in)/step

PAGE 50

Rotary Stepper Motors (Page 171)

Haydon Kerk rotary motors are built to provide exceptionally high torque to size ratios. Utilizing a patented enlarged rotor with low inductance coils, the motors provide superior torque and continuous, reliable high performance. Optional rare earth magnets may be specified for even higher torque. Bronze sleeve bearings are standard, ball bearings are also available.
Footprint: 20 mm to 46 mm (0.79-in to 1.8-in) diameter
Holding Torque: 0.46 N-cm to 11.3 N-cm (0.65 oz-in to 16 oz-in)

PAGE 171

Electronic Controller Drives (Page 194)

The IDEA™ family of programmable Stepper Motor Controllers uses an intuitive patent-pending Graphic User Interface (GUI) which greatly simplifies set up and use. Units are available in either USB or RS-485 communication. Haydon Kerk also offers a range of Stepper Motor Non-Programmable Drives controlled with Step, Direction & Enable Commands. These microstepping chopper drives provide a simple solution for production volumes.

PAGE 194

Motorized and Non-Motorized Linear Rails and Slides (Page 202)

The linear rails and slides product line should be considered when a more extensive linear motion solution is desired to minimize overall system material cost, engineering time, and assembly cost. The linear rails and slides are complete mechanical systems that can be powered and motorized to include a linear bearing, rotary bearings, mechanical frame, precision screw and nut, and an electronic drive unit. We can also design, engineer and manufacture a multiple-axis configuration specific to your application requirements.
Travel distances (stroke lengths): Up to 90-in (229 cm)

PAGE 202

ScrewRails®, Spline Shafts and Guide Rails (Page 247)

Kerk® ScrewRail® combines both functions in a single, coaxial component. The design saves as much as 80% of the space used by a two-rail system. Kerk Spline Shafts provide anti-rotation for one axis motion or a drive mechanism with rotation for two axes of motion.

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Contact Information

Haydon Kerk Motion Solutions, Inc.

www.haydonkerkpittman.com

North American HQ/Operations

Haydon Kerk Motion Solutions, Inc.
Haydon Products Division
1500 Meriden Road
Waterbury, CT 06705 USA
Telephone: + 1 203 756 7441
info.haydonkerk@ametek.com

Haydon Kerk Motion Solutions, Inc.
Kerk Products Division
59 Meadowbrook Drive
Milford, NH 03055 USA
Telephone: + 1 603 213 6290
info.haydonkerk@ametek.com

Asia Operations

Haydon Linear Motors Co., Ltd.
Xianlong Industrial Park
No. 110, Lane 4, Xinyuan Road
New District, Changzhou, China 213031
Telephone: + 86 519 85113316 / 85113312
Sales: + 86 519 85123096 / 85139199
info.haydonkerk@ametek.com.cn

India Operations

AMETEK Instruments India Pvt. Ltd.
Haydon Kerk and Pittman Motor Sales
148 Prestige Featherlite Tech Park
EPIP Phase II, Whitefield
Bangalore - 560 066, India
+ 91 080 67823237 (Telephone)
+ 91 9686679509 (Mobile)
www.haydonkerkpittman.com
dinesh.dhananjayan@ametek.com

Europe Operations

Haydon Kerk Motion Solutions / France
57 rue des Vignerons
44220 Coueron - France
Telephone: + 33 2 40 92 87 51
info-europe.haydonkerk@ametek.com

Haydon Kerk Motion Solutions / Germany
Schmiedstr. 2
91207 Lauf a.d. Pegnitz - Germany
Telephone: + 49 9123 96 282 12
www.HaydonKerk.de
info-europe.haydonkerk@ametek.com

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Haydon kerk Motion Solutions

AMETEK®

ADVANCED MOTION SOLUTIONS

Whether an application requires a standard item, custom design, new product, or a more sophisticated complete assembly, Haydon Kerk Motion Solutions experienced engineering team will assist you.

Recognized as a leader in motor miniaturization, Haydon® Products Division has been building electric motors and stepper motor based linear actuators for almost half a century. The company's manufacturing facility, located on ten acres in the heart of Connecticut, supports today's most efficient technology and manufacturing methods and is ISO 9001 certified. **Kerk® Products Division was established in 1976 and has grown to be one of the world's largest exclusive manufacturers of non-ball lead-screws, linear rails, and actuator systems.** Our internationally acclaimed anti-backlash designs and materials provide high accuracy, unsurpassed repeatability, and long life in a full range of motion control applications.

Haydon Kerk Motion Solutions is headquartered in Waterbury, CT, with additional manufacturing operations in Milford, NH, and Changzhou, China.
Haydon Kerk also has facilities in Germany and a technical center in Coueron, France.

Haydon Kerk Motion Solutions linear motion products are used in much of today's sophisticated medical equipment, laboratory instrumentation, machinery automation, aerospace, analytical equipment, computer peripherals, semiconductor industries, and other applications that require precision motion.

AMETEK® is a global leader in electronic instruments and electromechanical devices with colleagues at numerous manufacturing, sales and service locations in the US and in many other countries around the world.

AMETEK consists of 2 operating groups: ***Electronic Instruments*** and ***Electromechanical***.

Electronic Instruments is a leader in advanced instruments for the process, aerospace, power, and industrial markets.

Electromechanical is a differentiated supplier of electrical interconnects, specialty metals, and technical motors and associated systems, as well as a leader in floor care and specialty motors.

We take pride in our expertise in customizing products for specific application needs.

We offer high precision motion systems at any level of sophistication and integration, providing all necessary mechanical, electrical and software supply and support. Single-axis and multiple-axis systems are our expertise, either using our own components or custom designed to our clients' specifications.

We are able to configure motion systems utilizing our own component level supply. Clients realize single-source supplier efficiency and fully tested solutions through our extensive in-house resources...

- Mechanical, electrical and software engineering teams
- Full inspection and testing capabilities (includes interferometry, vision inspection, environmental, vibration and noise testing). All operations are ISO Certified and RoHS Compliant.
- Proprietary and patented products and processes that include low friction coatings, in-house developed polymers.
- Extensive manufacturing capabilities
  - including ***in-house tool design and fabrication, injection molding, EDM, 3D printing, coating and cabling.***
  - ***Custom motor designs*** such as axial flux motors.
  - ***Linear Mechanics*** with virtually unlimited assembly options. We have single and multi-axis solutions as well as Z-theta.
  - ***Drives & Electronics***, integrated or stand-alone stepper drives, as well as software and servo drives.

Development And Design Engineers

Our experience starts with the design of the basic components and expands into the integration of these components for the right solution to your motion needs.

- Experts in medical device and surgical tool applications
- Meeting requirements of FDA, Qualification, Documentation
- Complete range of lab test OEM options
- Specialized industrial application capability

Manufacturing Professionals

Because we manufacture at the component level it allows us to responsibly fully evaluate all aspects of a tested system.

- Designed for manufacturablility, repeatability and reproducibility
- Custom testing to mimic application
- Ongoing technical support after development cycle

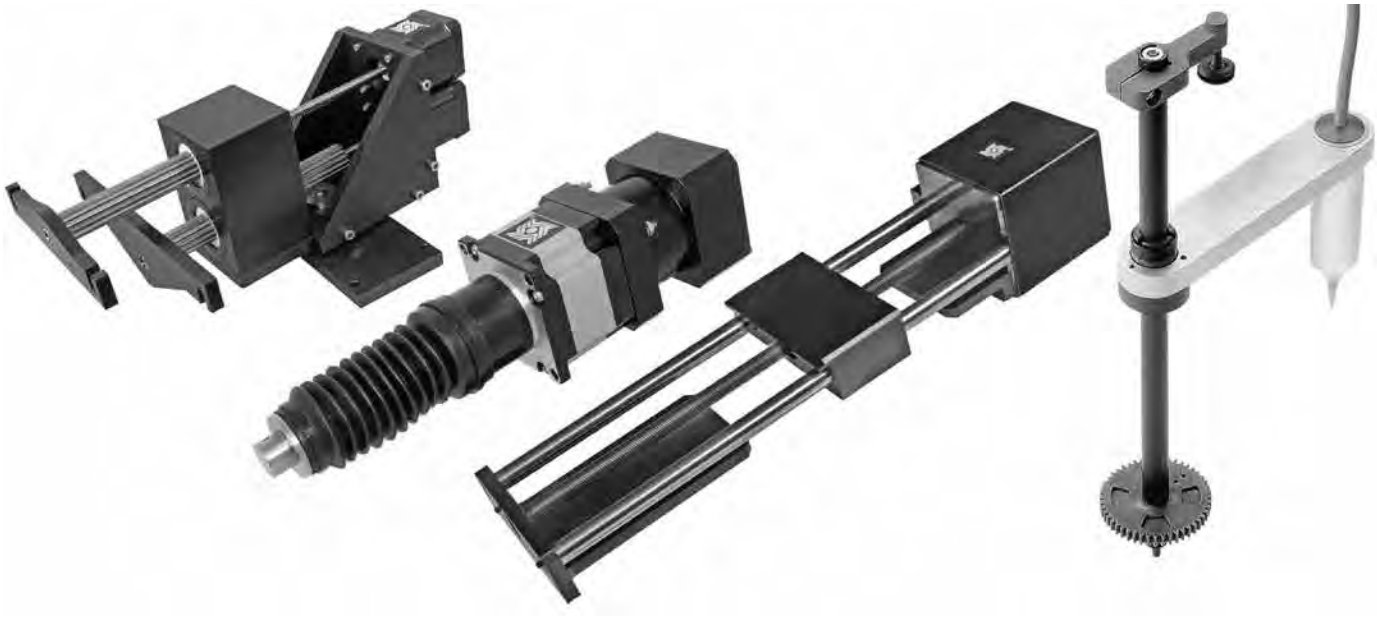
OEM Purchasing and Business Managers

A single source for a complete system to simplify your vendor base and reduce inventory costs. We can help decrease unnecessary labor and materials that can bring production cost savings.

Engineering / Development Managers

Ever increasing efficiency demands can make new projects difficult to finish on budget and on time. If your team is lacking expertise in a certain area of motion control, we have the experienced engineers to help fill the voids.

Receive individual attention from the single point contact of a small, focused and strategically aligned group, backed by the resources and support of a global corporation.




Lead-screw
Assemblies

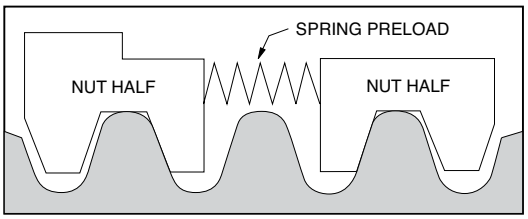
***Haydon Kerk Motion Solutions** products have been designed specifically for motion control applications. They are not compromised adaptations of general purpose screws or nuts. The screw thread form is designed for maximum life, quiet operation, and compatibility with Haydon Kerk Motion Solutions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

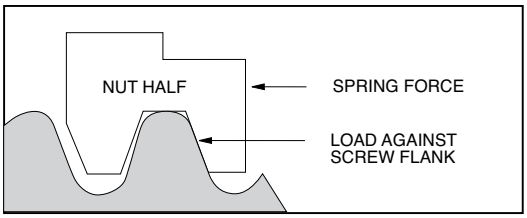
KERK® NUTS are available in 8 standard anti-backlash designs (CMP, ZBX, WDG, NTB, KHD, VHD, NTG, ZBA); general purpose BFW Series plus the Mini Series. (See Product Comparison Chart for size availability). Custom nut configurations and mountings are also readily available. The Kerk brand anti-backlash 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.

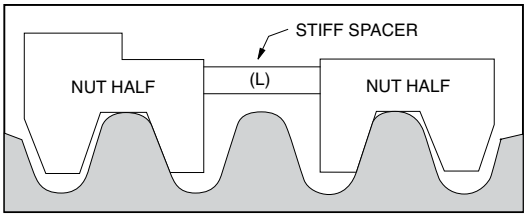


For example, if the maximum axial load to which the system is subjected is 50 lbs., the amount of spring preload must be equal to, or greater than, 50 lbs. in order to maintain intimate screw/nut contact. The problems arising from preloading in this manner are increased drag torque and nut wear.

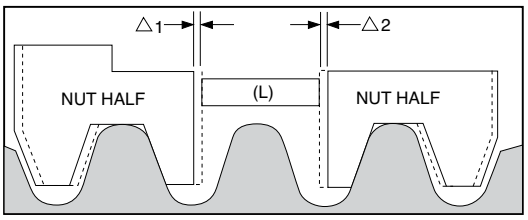
Obviously, the higher the load at the screw/nut interface, the higher the required torque to drive the nut on the screw and the more susceptible the unit is to nut wear.

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 (Δ1 + Δ2) 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 + Δ1 +Δ2). This process, although effective, would be extremely costly and difficult to implement on a continuous basis.

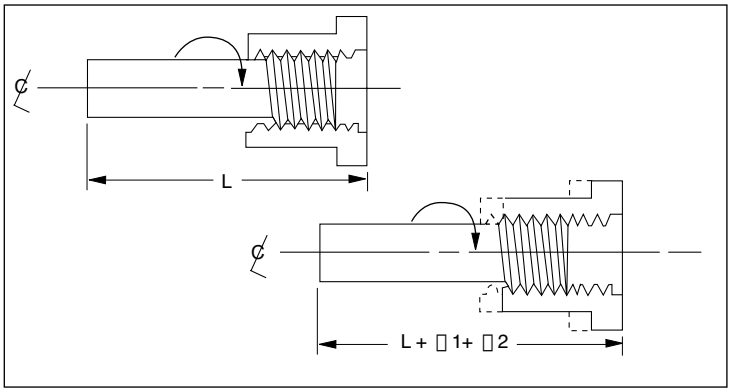
The Solution

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.

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

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®, Vespel®, PVDF, UHMW, Ertalyte® and customer-supplied specialty materials. We have also provided metal nuts made from bronze, brass, and stainless steel.

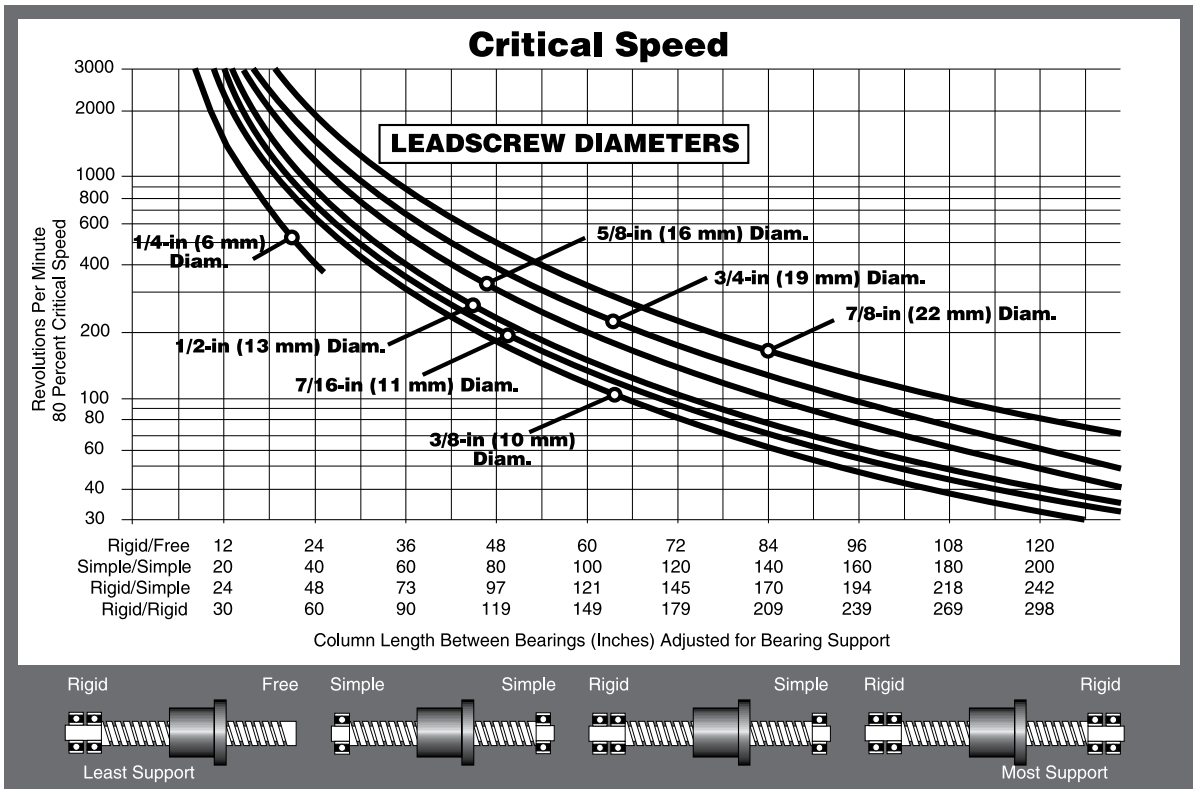
With so much flexibility in our manufacturing process, if the material can be molded, machined, ground, or rolled, Haydon Kerk Motion Solutions can likely process it using state of the art machine tools, injection molding and mold making, grinding and thread rolling equipment. Haydon Kerk Motion Solutions 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.

Design and Engineering Data

Screw Accuracy
Haydon Kerk Motion Solutions, Inc uses a unique precision rolling process for screw manufacturing. Standard lead accuracy for Kerk screws is .0006 in./in. (mm/mm). Lead accuracies are available up to .0001 in./in. (mm/mm). Please consult the factory for higher lead accuracies. Assemblies have an extremely high bi-directional repeatability of 50 micro-inches (1.25 micron).

End Machining
Haydon Kerk Motion Solutions can custom machine screws to your specifications or provide cut-to-length screws for your own machining.

Critical Speed
This is the rotational speed at which a screw may experience vibration or other dynamic problems. See CRITICAL SPEED CHART to determine if application parameters result in speed approaching critical. To minimize critical speed problems: use a longer lead, choose a larger diameter or increase bearing mount support.



Lengths
Lengths can be specified up to 12 ft. (4M) from stock, (depending on diameter and lead). Cut to length screws are offered in 6-in increments (6-in, 12, 18,....) +1.0-in/-0-in.

Lead
Advancement per revolution. All screws are listed by lead, not pitch.
Lead = Pitch x Number of Starts

Pitch
Crest-to-crest distance or one divided by threads per inch. (On a multiple start thread, the pitch equals the lead divided by the number of starts.)

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:

$$T_j = I\,\alpha$$

Where I = screw inertia
α = 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:

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

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:

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

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 sec²/inch)	(g-cm²/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

Anti-Backlash Life

Series	Without Kerkote® TFE Coating inch (cm)	With Kerkote® TFE Coating 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.

Dimensional Tolerances

Inch	
.X	± .02
.XX	± .010
.XXX	± .005

Metric (mm)	
L < 4	± 0.1
4 < L ≤ 16	± 0.15
16 < L ≤ 63	± 0.2
63 < L ≤ 250	± 0.3

Grease Compatibility Chart

Nut Type	Grease	Lubrication Coatings 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

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

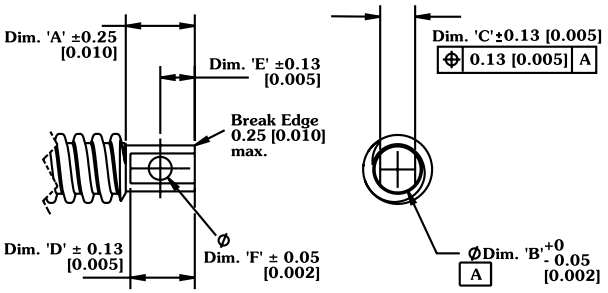
Standard Operating Temp. Range	Coefficent of Friction Polyacetal Nut to Screw
32 - 200° F* (0 - 93° C)*	Static = .08 .08 ** Dynamic = .15 .09 **

* 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

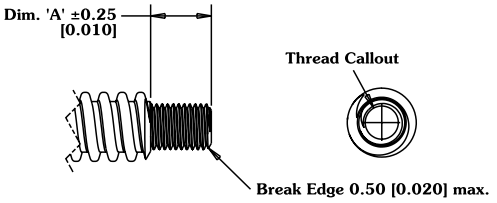
Standard End Machining

Dimensions = mm [inches]

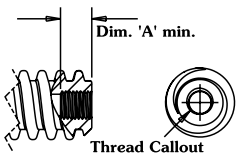
Cross Drilled Hole



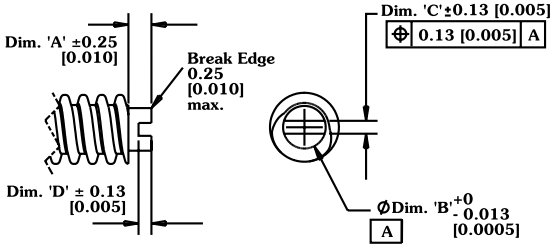
Male Thread



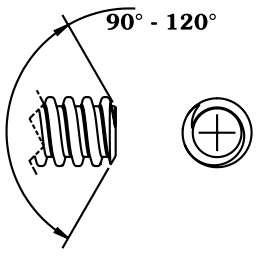
Female Thread



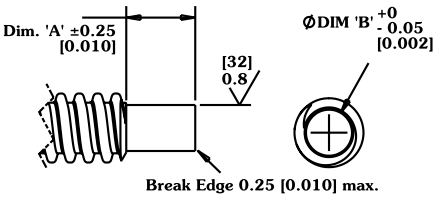
Screwdriver Slot



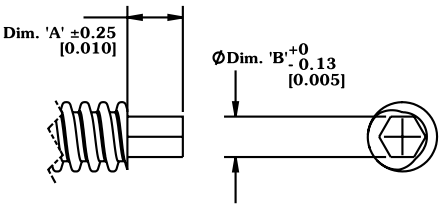
Standard Break Edge



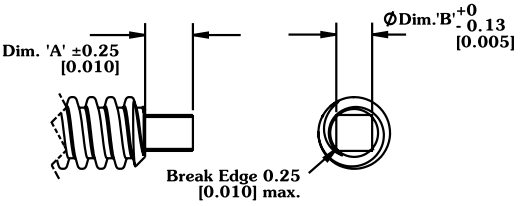
Turned Journal



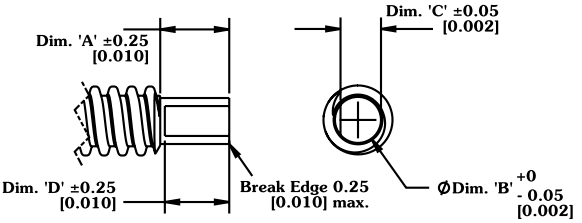
Hex Drive End



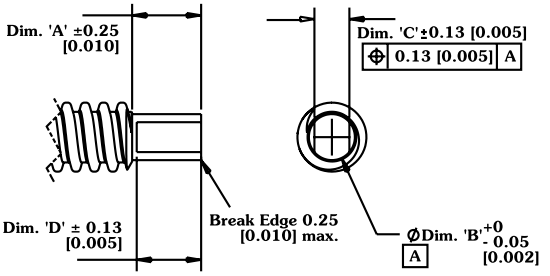
Square End



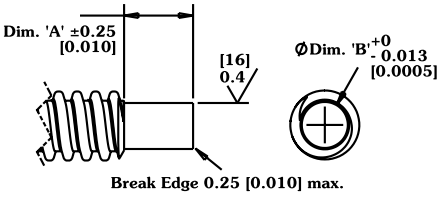
Single Flat



Double Flat



Ground Journal



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

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	T	K	R	–	043	–	0250	–	XXXX

Prefix:

LSS
(Screw Only)

Nut Series

CMP
ZBX
WDG
NTB
KHD
VHD
NTG
ZBA
BFW
ZBM

Nut Mounting Style

A = Flanged (Triangular)
F = Flanged (Round)
P = Flange (Triangular with pilot)
T = Threaded
S = Screw only

For Micro and Mini Nuts Only:

B = Barrel
R = Rectangular

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
G = Grease HSS-17 Standard
N = Nut only

Thread Direction

R = Right hand
L = Left hand
B = Right and Left hand

(Refer to lead-screw charts for availability)

Diameter Code

(Refer to lead-screw charts, pages 20 to 24)

Nominal Thread Lead Code

(Refer to lead-screw charts, pages 20 to 24)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

For immediate availability cut-to-length screws, check our ecommerce site at **haydonkerkexpress.com**

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, contaminents, 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)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Left Hand Available	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (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	3DP 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	3DP 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	3DP 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	3DP 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	
			0.500	12.70	0500		0.156	3.96	0.130	3.30	86	
3/16	5	018	0.020	0.50	0020		0.188	4.78	0.163	4.14	30	3DP 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	
			0.500	12.70	0500	●	0.188	4.78	0.142	3.61	86	
7/32	5.6	021	0.024	0.61	0024		0.218	5.54	0.181	4.60	31	3DP 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-screw Size List

Diameter (inches)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Left Hand Available	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (mm)	Efficiency %*	Compatible Nut Styles
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28	3DP 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)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Left Hand Available	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (mm)	Efficiency %*	Compatible Nut Styles
3/8	10	037	0.025	0.64	0025		0.375	9.53	0.337	8.56	21	3DP 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	

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)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Left Hand Available	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (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	
			0.410	10.41	**0410**	●	0.625	15.88	0.481	12.22	72	
			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	
			1.575	40.00	**1575**	●	0.625	15.88	0.499	12.67	86	
			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)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Left Hand Available	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (mm)	Efficiency %*	Compatible Nut Styles
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	
			0.394	10.00	0394		0.745	18.92	0.619	15.72	67	
			0.500	12.70	0500		0.744	18.90	0.624	15.85	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	
			0.630	16.00	0630		0.875	22.23	0.741	18.82	73	
			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).

Haydon kerk Express℠
www.HaydonKerkExpress.com

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.

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.

Nuts: General Purpose

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

All standard nuts are some form of unfilled acetal

Mini Series Nuts:

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 Series Nuts:

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

3DP Series

- Designed for rapid prototyping with additive manufacturing
- Simple integration of a premium performance thread system into a 3D printed prototype

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-directlional 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 ★★★

Comparison of Kerk® Nut Characteristics

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 N-m)						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 N-m)	.1-.5 oz.-in. (.001-.004 N-m)		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 N-m)					4 oz.-in. max. (.03 N-m max.)	.1-.5 oz.-in. (.001-.004 N-m)	.1-.5 oz.-in. (.001-.004 N-m)		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. (4.5 kg)	10 lbs. (4.5 kg)		50 lbs. (20 kg)
	Static Frictional Drag Torque	4 oz.-in. (.03 N-m)	.5-3 oz.-in. (.004-.02 N-m)	.5-2 oz.-in. (.004-.014 N-m)			4 oz.-in. max. (.03 N-m max)	.5-2 oz.-in. (.004-.014 N-m)	.5-2 oz.-in. (.004-.014 N-m)		Free Wheeling
5/16-in (8mm)	Dynamic Load	8 lbs. (3.6 kg)	10 lbs. (4.5 kg)	10 lbs. (4.5 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 N-m)	1-5 oz.-in. (.01-.03 N-mM)	1-3 oz.-in. (.01-.02 N-m)		1-3 oz.-in. (.01-.02 N-m)	5 oz.-in. max. (.04 N-m max)	1-3 oz.-in. (.01-.02 N-m)	1-3 oz.-in. (.007-.02 N-m)		Free Wheeling
3/8-in (10mm)	Dynamic Load	8 lbs. (3.6 kg)	10 lbs. (4.5 kg)	10 lbs. (4.5 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 N-m)	1-5 oz.-in. (.01-.03 N-m)	1-3 oz.-in. (.01-.02 N-m)		1-3 oz.-in. (.01-.02 N-m)	5 oz.-in. max. (.04 N-m max)	1-3 oz.-in. (.01-.02 N-m)	1-3 oz.-in. (.007-.02 N-m)		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 N-m)	2-5 oz.-in. (.014-.03 N-m)			9 oz.-in. max. (.06 N-m max)	1-3 oz.-in. (.007-.02 N-m)			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 N-m)	2-5 oz.-in. (.014-.03 N-m)			9 oz.-in. max. (.06 N-m max)	2-6 oz.-in. (.014-.04 N-m)		2-6 oz.-in. (.014-.04 N-m)	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 N-m)	3-7 oz.-in. (.02-.05 N-m)				2-6 oz.-in. (.014-.04 N-m)		2-6 oz.-in. (.014-.04 N-m)	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 N-m)				3-7 oz.-in. (.02-.05 N-m)		3-7 oz.-in. (.02-.05 N-m)	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 N-m)				4-8 oz.-in. (.03-.06 N-m)		3-7 oz.-in. (.02-.05 N-m)	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 N-m)				4-8 oz.-in. (.03-.06 N-m)			Free Wheeling

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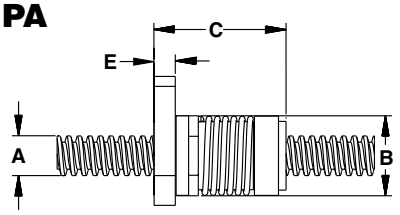
CMP Series – *for light loads, compact design*

The Kerk® CMP Series anti-backlash assembly utilizes a general purpose self-compensating nut in an exceptionally compact package. This allows equipment designers to utilize smaller assemblies without sacrificing stroke length. The CMP anti-backlash nut design is also ideally suited for applications using grease or oil.

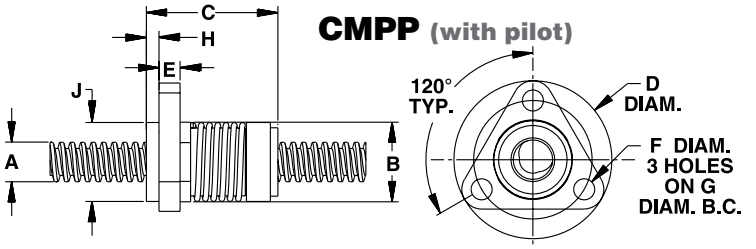
The standard CMP Series assembly utilizes a self-lubricating acetal nut, axially preloaded, on a 303 stainless steel screw. End machining of screw to customer specifications and Kerkote® or Black Ice® TFE screw coating are optional. Various axial compression springs are also available, depending on application requirements. Please consult factory for details.

CMPA and CMPP Series	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Hub Length H inch (mm)	Hub Diam. J inch (mm)	Dynamic Load lbs (Kg)	Drag Torque (max.) oz-in (N-m)
CMPA Flange Mount	3/16 (4)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	5 (2.3)	4 (.03)
	7/32 (5)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	5 (2.3)	4 (.03)
CMPP (with pilot)	1/4 (6)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	5 (2.3)	4 (.03)
	5/16 (8)	0.750 (19)	1.32 (33.5)	1.5 (38.1)	0.200 (5.08)	0.200(5.08)	1.125 (28.6)	0.120 (3.05)	0.750 (19.1)	8 (3.6)	5 (.04)
	3/8 (10)	0.750 (19)	1.32 (33.5)	1.5 (38.1)	0.200 (5.08)	0.200(5.08)	1.125 (28.6)	0.120 (3.05)	0.750 (19.1)	8 (3.6)	5 (.04)

CMPA



CMPP (with pilot)



CMPT Series	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M*	Thread Length N inch (mm)	Dynamic Load** lbs (Kg)	Drag Torque (max.)** oz-in (N-m)
CMPT Thread Mount	3/16 (4)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	5 (2.3)	4 (.03)
	7/32 (5)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	5 (2.3)	4 (.03)
	1/4 (6)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	5 (2.3)	4 (.03)
	5/16 (8)	0.750 (19)	1.32 (33.5)	5/8 - 18	0.320 (8.1)	8 (3.6)	5 (.04)
	3/8 (10)	0.750 (19)	1.32 (33.5)	5/8 - 18	0.320 (8.1)	8 (3.6)	5 (.04)

Metric numbers are for reference only

* metric available as required

** other spring pre-loads available

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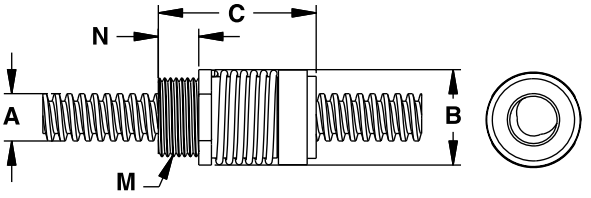
Standard products available 24-hrs.



Identifying the Kerk® CMP nut part number codes when ordering

NOTE: Dashes must be included in Part Number (–) as shown below.
For assistance or order entry, call our engineering team at 603 213 6290.

CMP	A	K	R	–	018	0020	–	XXXX

Prefix
CMP

Nut Mounting Style
A = Flanged (Triangular)
P = Flange (Triangular with pilot)
T = Threaded
X = Custom

Lubrication
S = Uncoated
K = Kerkote® TFE Coating
G = Grease
N = Nut only
B = Black Ice® TFE Coating

Thread Direction
R = Right hand
L = Left hand
(See page 20 lead-screw charts for availability)

Diameter Code
018 = .188-in (5)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)

Nominal Thread Lead Code
(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

ZBX Series *– for lighter loads*

The patented Kerk® ZBX Series anti-backlash assembly offers an effective linear actuator for design operations requiring precise positional accuracy and repeatability, with minimum cost.

The standard ZBX unit utilizes a patented self-lubricating polyacetal nut radially preloaded on a 303 stainless steel screw.

The ZBX assembly, through its unique transfer of loads, offers exceptional torque consistency and repeatability when traversing in either direction. The inherent damping qualities of the ZBX design make it ideally suited for vertical applications requiring noise or vibration control.

End machining to customer specifications and Kerkote® TFE screw coating are optional, as are designs for special operating configurations or environments.

ZBM Micro Series

ZBM Micro Series nuts are made from self-lubricating acetal and Kerkite® High Performance Composite Polymers. This remarkable product line is an enabling technology, opening up a whole new range of designs. Developed in response to growing demands in many markets, Haydon Kerk Motion Solutions has offered micro screws on a custom basis for more than 10 years. Now, available as a standard product, customers can get quicker, cost effective deliveries. The Micro Series ZBM anti-backlash and Micro Series lead-screws are available as stand-alone components or integrated into the high performance Haydon linear actuators. The Micro Series allows the miniaturization of products, reduced power consumption, and weight reduction without sacrificing performance or reliability.

Identifying the Kerk® ZBX and ZBM Micro Series nut part number codes when ordering

Haydon kerk Express℠
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Standard products available 24-hrs.

ZBX	T	K	R	–	025	0050	–	XXXX

Prefix

ZBX
ZBM = Micro Series

Nut Mounting Style

A = Flanged (Triangular)
T = Threaded
R = Micro Series Rectangular
X = Custom

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
G = Grease
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to Lead-screw charts for availability, page 20; Micro Series is Right hand only)

Diameter Code

008* = .078-in (2)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)
043 = .438-in (11)
050 = .500-in (13)
062 = .625-in (16)

** 008 for Micro Series screw/nut assemblies only*

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

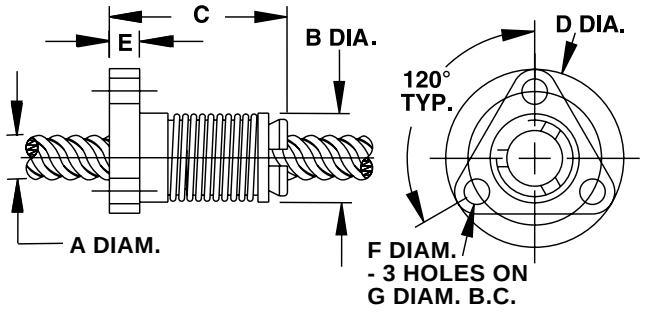
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

ZBXA Series: Flange Mount

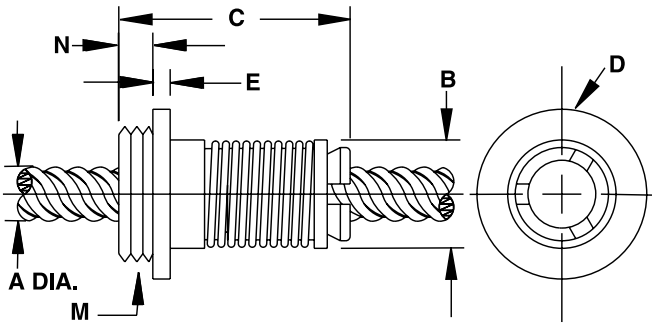
Metric numbers are for reference only

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
ZBXA Series Flange Mount	1/4 (6)	.50 (12.7)	1.0 (26)	1.0 (25.4)	.18 (4.6)	.140 (3.6)	.750 (19.1)	5 (2.3)	.25 - 3 (.002 - .021)
	5/16 (8)	.70 (17.8)	1.9 (48)	1.5 (38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.6)	10 (5)	1 - 5 (.007 - .03)
	3/8 (10)	.70 (17.8)	1.9 (48)	1.5 (38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.6)	10 (5)	1-5 (.007 - .03)
	7/16 (11)	.80 (20.3)	1.9 (48)	1.5 (38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.6)	15 (7)	2 - 6 (.014 - .04)
	1/2 (13)	.89 (22.6)	2.0 (51)	1.62 (41.2)	.26 (6.6)	.200 (5.08)	1.250 (31.8)	25 (11)	3 - 7 (.02 - .05)
	5/8 (16)	1.06 (26.9)	2.0 (51)	1.75 (44.5)	.26 (6.6)	.200 (5.08)	1.375 (34.9)	35 (16)	4 - 8 (.028 - .055)

Flange Mount



Thread Mount



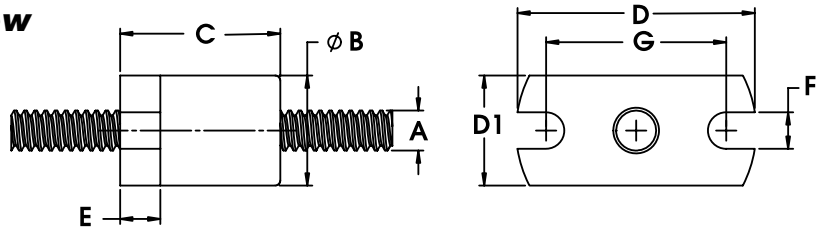
ZBXT Series: Thread Mount

Metric numbers are for reference only

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load** lbs (Kg)	Drag Torque** oz-in (N-m)
ZBXT Series Thread Mount	1/4 (6)	.50 (12.7)	1.3 (33)	.80 (20.3)	.22 (5.6)	5/8 - 18	.16 (4.1)	5 (2.3)	.25 - 3 (.002 - .021)
	5/16 (8)	.70 (17.8)	2.2 (56)	1.00 (25.4)	.17 (4.3)	5/8 - 18	3.8 (9.7)	10 (5)	1 - 5 (.007 - .03)
	3/8 (10)	.70 (17.8)	2.2 (56)	1.00 (25.4)	.17 (4.3)	5/8 - 18	.38 (9.7)	10 (5)	1-5 (.007 - .03)
	7/16 (11)	.80 (20.3)	2.3 (59)	1.00 (25.4)	.12 (3.1)	15/16 - 16	.38 (9.7)	15 (7)	2 - 6 (.014 - .04)
	1/2 (13)	.89 (22.6)	2.3 (59)	1.02 (25.9)	.12 (3.1)	15/16 - 16	.38 (9.7)	25 (11)	3 - 7 (.02 - .05)
	5/8 (16)	1.06 (26.9)	2.4 (61)	1.06 (26.9)	.15 (3.8)	15/16 - 16	.50 (12.7)	35 (16)	4 - 8 (.028 - .055)

* metric available as required
** other spring pre-loads available

MICRO Lead-screw Rectangular Anti-Backlash Nut Style



ZBMW Nut Style	Screw Diameter A inch (mm)	Nut Diameter B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diameter G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in. (N-m)
ZBMR* Rectangular Flange	5/64 (2)	0.22 (5.5)	0.32 (8)	0.22 (5.5)	0.47 (11.9)	0.08 (2.0)	0.07 (1.8)	0.35 (9.0)	1 (.45)	0.5 (.0035) Max.

MICRO Lead-screw Size List

Diameter (inches)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (mm)	Efficiency %**
5/64	2	008	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 **

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

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

KHD Series – *for moderate loads, low drag torque*

The Kerk® KHD Series anti-backlash assembly makes use of the Kerk patented AXIAL TAKE-UP MECHANISM (see *Lead-screw Assemblies: Anti-Backlash Technologies* section) to provide backlash compensation. The unique split nut with torsional take-up provides increased load capacity and axial stiffness over comparably sized ZBX units.

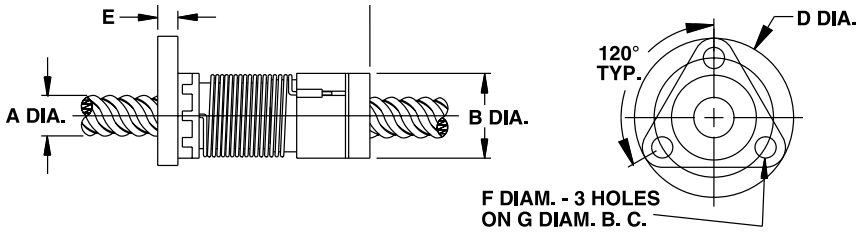
Although the KHD offers high axial stiffness, frictional drag torque (1-3 oz.-in.) is very low. The anti-backlash mechanism in the KHD unit eliminates the need for load compensating preload forces.

The assembly consists of a 303 stainless steel screw mated with a self-lubricating polyacetal nut. End machining to customer specifications and Kerkote® TFE screw coating are optional.

KHDA Series: Flange Mount

Metric numbers are for reference only

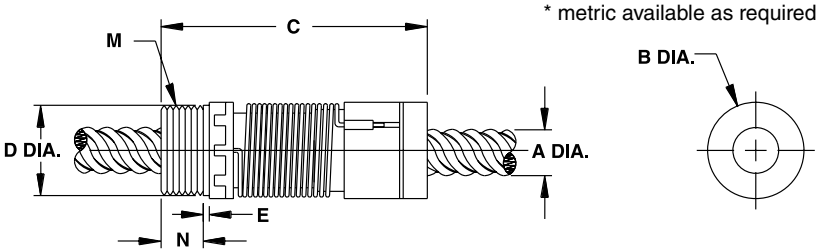
	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
KHDA Series Flange Mount	5/16 (8)	.80 (20.3)	2.0 (50.8)	1.50 (38.1)	.19 (4.8)	.200 (5.08)	1.125 (28.58)	20 (10)	1-3 (.007-.020)
	3/8 (10)	.80 (20.3)	2.0 (50.8)	1.50 (38.1)	.19 (4.8)	.200 (5.08)	1.125 (28.58)	20 (10)	1-3 (.007-.020)



KHDT Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
KHDT Series Thread Mount	5/16 (8)	.80 (20.3)	2.2 (55.9)	.75 (19.1)	.05 (1.27)	3/4-20	.35 (8.9)	20 (10)	1-3 (.007-.020)
	3/8 (10)	.80 (20.3)	2.2 (55.9)	.75 (19.1)	.05 (1.27)	3/4-20	.35 (8.9)	20 (10)	1-3 (.007-.020)

* metric available as required



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Standard products available 24-hrs.

Identifying the Kerk® nut part number codes when ordering

KHD	A	K	R	–	031	0039	–	XXXX

Prefix

KHD

Nut Mounting Style

A = Flanged (Triangular)
T = Threaded
X = Custom

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to Lead-screw charts for availability, pages 21 to 22)

Diameter Code

031 = .313-in (8)
037 = .375-in (10)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, pages 21 to 22)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown below. For assistance or order entry, call our engineering team at 603 213 6290.

WDG Series – *for moderate loads, compact designs*

The Kerk® WDG Series anti-backlash assembly utilizes an exceptionally compact design to provide stiffness and balanced accuracy for precise positioning. The unique wedge design locks the nut at the correct preload without excessive drag.

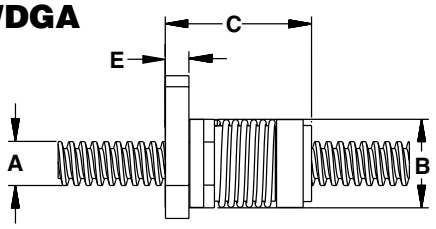
Shorter than other self-compensating nuts with similar performance, the W nut permits the design of smaller assemblies without sacrificing stroke length. Nut wear or momentary overload is accommodated through the WDG Series' compensation mechanism, which maintains positional accuracy in demanding applications.

The standard W Series assembly utilizes a self-lubricating acetal nut, axially preloaded, on a 303 stainless steel screw. End machining to customer specifications and Kerkote® or Black Ice® TFE screw coating are optional, as are designs for special operating configurations or environments.

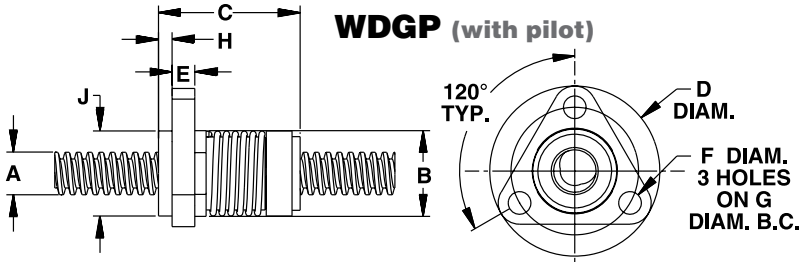
WDGA and WDGP Series	**Screw Diam.** **A** inch (mm)	**Nut Diam.** **B** inch (mm)	**Nut Length** **C** inch (mm)	**Flange Diam.** **D** inch (mm)	**Flange Thickness** **E** inch (mm)	**Mounting Hole Diam.** **F** inch (mm)	**Bolt Circle Diam.** **G** inch (mm)	**Hub Length** **H** inch (mm)	**Hub Diam.** **J** inch (mm)	**Dynamic Load** lbs (Kg)	**Drag Torque (max.)** oz-in (N-m)
WDGA Flange Mount & WDGP (with pilot)	3/16 (4)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	10 (4.5)	4 (.03)
	7/32 (5)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	10 (4.5)	4 (.03)
	1/4 (6)	0.625 (16)	1.05 (26.6)	1.125 (28.6)	0.160 (4.1)	0.143 (3.7)	0.875 (22.2)	0.08 (2.04)	0.625 (15.9)	10 (4.5)	4 (.03)
	5/16 (8)	0.750 (19)	1.32 (33.5)	1.5 (38.1)	0.200 (5.08)	0.200(5.08)	1.125 (28.6)	0.120 (3.05)	0.750 (19.1)	25 (11.3)	5 (.04)
	3/8 (10)	0.750 (19)	1.32 (33.5)	1.5 (38.1)	0.200 (5.08)	0.200(5.08)	1.125 (28.6)	0.120 (3.05)	0.750 (19.1)	25 (11.3)	5 (.04)
	7/16 (11)	1.00 (25.4)	2.078 (52.8)	1.750 (44.5)	0.250 (6.35)	0.220 (5.6)	1.406 (35.7)	0.255 (6.48)	1.000 (25.4)	75 (34)	9 (.06)
	1/2 (13)	1.00 (25.4)	2.078 (52.8)	1.750 (44.5)	0.250 (6.35)	0.220 (5.6)	1.406 (35.7)	0.255 (6.48)	1.000 (25.4)	75 (34)	9 (.06)

Metric numbers are for reference only

WDGA



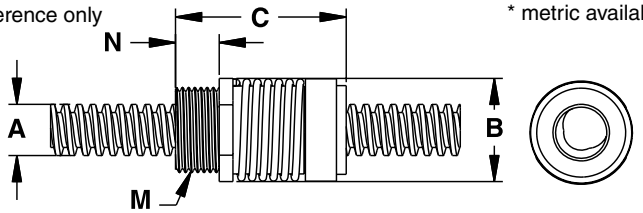
WDGP (with pilot)



WDGT Series	**Screw Diam.** **A** inch (mm)	**Nut Diam.** **B** inch (mm)	**Nut Length** **C** inch (mm)	**Thread** **M***	**Thread Length** **N** inch (mm)	**Dynamic Load** lbs (Kg)	**Drag Torque (max.)** oz-in (N-m)
WDGT Thread Mount	3/16 (4)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	10 (4.5)	4 (.03)
	7/32 (5)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	10 (4.5)	4 (.03)
	1/4 (6)	0.625 (16)	1.05 (26.6)	9/16 - 18	0.240 (6.1)	10 (4.5)	4 (.03)
	5/16 (8)	0.750 (19)	1.32 (33.5)	5/8 - 18	0.320 (8.1)	25 (11.3)	5 (.04)
	3/8 (10)	0.750 (19)	1.32 (33.5)	5/8 - 18	0.320 (8.1)	25 (11.3)	5 (.04)
	7/16 (11)	1.00 (25.4)	2.078 (52.8)	15/16 - 16	0.500 (12.7)	75 (34)	9 (.06)
	1/2 (13)	1.00 (25.4)	2.078 (52.8)	15/16 - 16	0.500 (12.7)	75 (34)	9 (.06)

Metric numbers are for reference only

* metric available as required



Identifying the Kerk® WDG nut part number codes when ordering

Haydon kerk Motion Solutions Express℠
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Standard products available 24-hrs.

WDG	A	K	R	–	018	0039	–	XXXX

Prefix

WDG

Nut Mounting Style

A = Flanged (Triangular)
P = Flange (Triangular with pilot)
T = Threaded
X = Custom

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to Lead-screw charts for availability, page 20)

Diameter Code

018 = .188-in (5)
021 = .219-in (5.6)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)
043 = .438-in (11)
050 = .500-in (13)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above.
For assistance or order entry, call our engineering team at 603 213 6290.

NTB Series – *full range, flexible designs*

The Kerk® NTB Series anti-backlash assembly is designed for higher load applications than the ZBX or KHD series units. Using the specially designed take up mechanism, it maintains axial stiffness throughout its life while system torque is held to a minimum. The need to highly pre-load the nut to compensate for load has been eliminated with the Kerk NTB Series assembly.

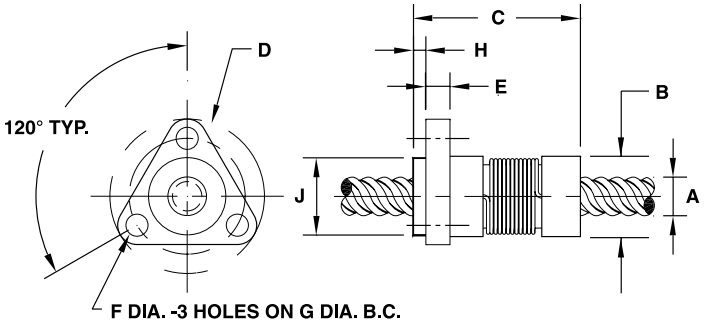
The nut is manufactured with a self-lubricating polyacetal designed to run efficiently on the precision rolled shafting. Screws are 303 stainless and are available with the proprietary long - life Kerkote® TFE coating. The NTB's simple, compact design can be easily modified for custom applications.

The NTB assembly provides low drag torque, high system stiffness, smooth operation, and long life throughout its load and speed range.

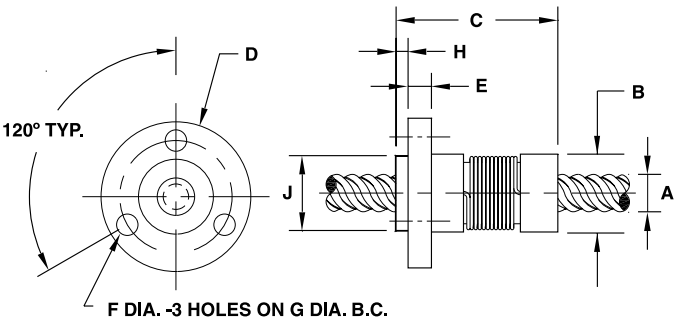
NTB Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Hub Width H inch (mm)	Hub Diam. J inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTBA Triangular Flange	1/4 (6)	.52 (13.2)	1.1 (28)	1.00 (25.4)	.16 (4.0)	.143 (3.63)	.750 (19.1)	.08 (2.0)	.500 (12.7)	10 (4.5)	.5-2 (.004-.014)
	5/16 (8)	.80 (20.3)	1.8 (46)	1.50 (38.1)	.20 (5.1)	.200 (5.08)	1.125 (28.6)	.10 (2.54)	.750 (19.1)	20 (9.1)	1-3 (.007-.02)
	3/8 (10)	.80 (20.3)	1.8 (46)	1.50 (38.1)	.20 (5.1)	.200 (5.08)	1.125 (28.6)	.10 (2.54)	.750 (19.1)	20 (9.1)	1-3 (.007-.02)
	7/16 (11)	.90 (22.9)	1.8 (46)	1.62 (41.2)	.23 (5.7)	.200 (5.08)	1.250 (31.8)	.10 (2.54)	.875 (22.2)	30 (13.6)	1-3 (.007-.02)
Metric numbers are for reference only											
NTBF Round Flange	1/2 (13)	1.06 (26.9)	2.1 (54)	1.75 (44.5)	.25 (6.4)	.220 (5.59)	1.406 (35.71)	.12 (3.0)	1.00 (25.4)	100 (45.5)	2-6 (.014-.04)
	5/8 (16)	1.38 (34.9)	2.3 (59)	2.13 (54.1)	.28 (7.0)	.220 (5.59)	1.750 (44.45)	.10 (2.54)	1.25 (31.8)	125 (56.8)	2-6 (.014-.04)
	3/4 (19)	1.56 (39.6)	2.7 (67)	2.38 (60.5)	.31 (7.9)	.220 (5.59)	2.000 (50.80)	.10 (2.54)	1.50 (38.1)	150 (68.2)	3-7 (.02-.05)
	7/8 (22)	1.75 (44.5)	2.8 (70)	2.63 (66.8)	.38 (9.5)	.220 (5.59)	2.250 (57.15)	.12 (3.0)	1.75 (44.5)	200 (90.9)	4-8 (.03-.06)
	15/16 (24)	1.75 (44.5)	2.8 (70)	2.63 (66.8)	.38 (9.5)	.220 (5.59)	2.250 (57.15)	.12 (3.0)	1.75 (44.5)	200 (90.9)	4-8 (.03-.06)

Triangular Flange



Round Flange

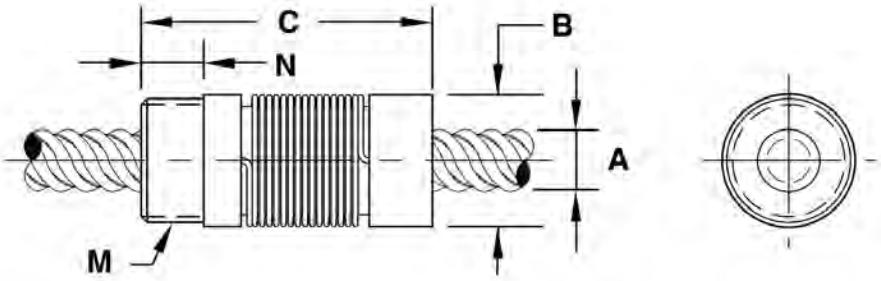


NTBT Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch (mm)	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTBT Thread Mount	1/4 (6)	.52 (13.2)	1.1 (28)	7/16-20	.25 (6.4)	10 (4.5)	.5-2 (.004-.014)
	5/16 (8)	.80 (20.3)	1.8 (45)	3/4-20	.38 (9.5)	20 (9.1)	1-3 (.007 -.02)
	3/8 (10)	.80 (20.3)	1.8 (45)	3/4-20	.38 (9.5)	20 (9.1)	1-3 (.007 -.02)
	7/16 (11)	.90 (22.9)	1.8 (46)	13/16-16	.38 (9.5)	30 (13.6)	1-3 (.007 -.02)
	1/2 (13)	1.06 (26.9)	2.1 (54)	15/16-16	.38 (9.5)	100 (45.5)	2-6 (.014-.04)
	5/8 (16)	1.38 (34.9)	2.3 (59)	1 1/8-16	.38 (9.5)	125 (56.8)	2-6 (.014-.04)
	3/4 (19)	1.56 (39.6)	2.7 (67)	1 3/8-16	.50 (12.7)	150 (68.2)	3-7 (.02-.05)
	7/8 (22)	1.75 (44.5)	2.8 (70)	1 9/16-16	.50 (12.7)	200 (90.9)	4-8 (.03-.06)
	15/16 (24)	1.75 (44.5)	2.8 (70)	1 9/16-16	.50 (12.7)	200 (90.9)	4-8 (.03-.06)

Metric numbers are for reference only

* metric available as required



Identifying the Kerk® NTB nut part number codes when ordering

NTB	T	K	R	–	025	0050	–	XXXX

Prefix

NTB

Nut Mounting Style

A = Flanged (Triangular)
F = Flanged (Round)
T = Threaded
X = Custom

For Mini Series:

B = Barrel [m]
R = Rectangular [m]

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand

(Refer to Lead-screw charts for availability, page 20)

Diameter Code

012[m] = .125-in (3.2)
013[m] = .133-in (3.3)
014[m] = .141-in (3.6)
016[m] = .156-in (4)
018[m] = .188-in (5)
021[m] = .219-in (5.6)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)
043 = .438-in (11)
050 = .500-in (13)
062 = .625-in (16)
075 = .750-in (19)
087 = .875-in (22)
093 = .938-in (24)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

[m] **NTB Mini Series**

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

NTB Rectangular Flange Mount for Small Diameter Lead-screws

The Kerk® NTB Series offers a rectangular anti-backlash nut option for small diameter lead-screw applications that requre quality and precision in motion control.

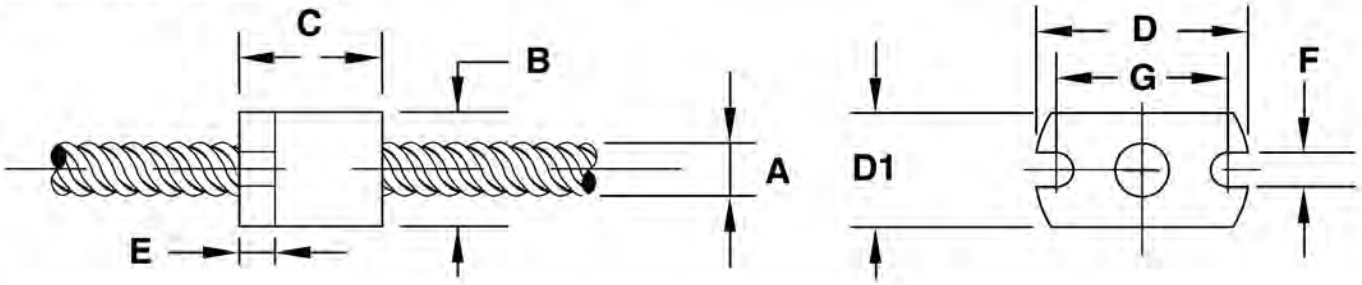
NTB Series Flange Mount

NTB Series Thread Mount with 1/8 inch diameter lead-screw with Kekote® TFE coating

NTB: Rectangular Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTBR Flange Mount	1/8 inch through 7/32 inch (3 mm through 5.6 mm)	0.40 (10.2)	0.50 (13)	0.40 (10.2)	0.75 (19.1)	0.13 (3.2)	0.120 (3.05)	0.600 (15.24)	5 (2.3)	0.5 (.004)

Metric numbers are for reference only

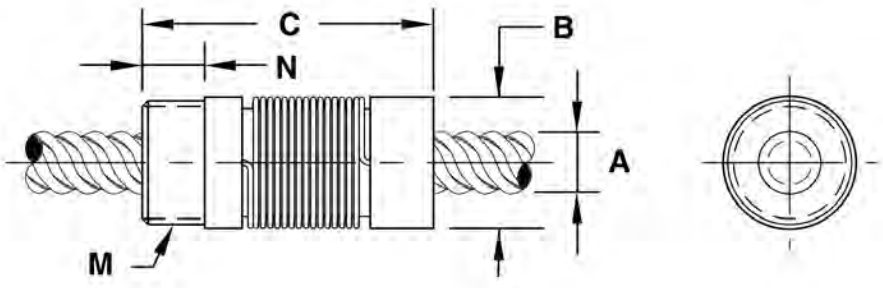


NTBT Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch (mm)	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTBT Thread Mount	1/8 (3)	.40 (10.2)	.50 (28)	3/8-24	.125 (3.18)	5 (2.3)	.5 (.004)

Metric numbers are for reference only

* metric available as required



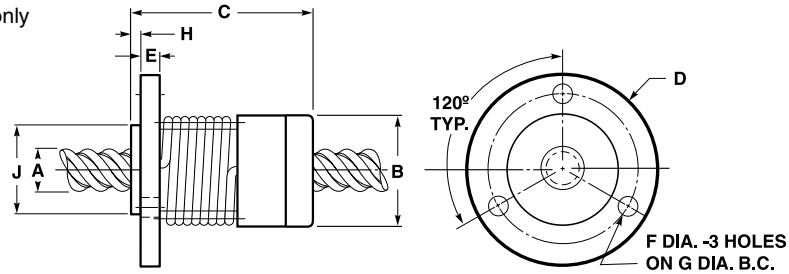
The Kerk® VHD Series anti-backlash assembly provides the maximum load carrying capability and the highest axial and radial stiffness of any Kerk nut assembly. Designed for smooth, quiet operation and long life, the VHD assembly provides low drag torque by making use of the patented Kerk AXIAL TAKE-UP MECHANISM (see *Lead-screw Assemblies: Anti-Backlash Technologies* section). Drag and wear associated with high pre-load forces are eliminated with the VHD Series. Screws are 303 stainless steel with Kerk's custom Kerkote® TFE extended life coating optional.

Assemblies are available cut-to-length or with screws machined to your requirements.

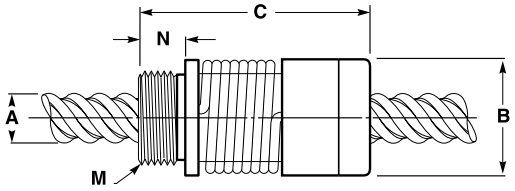
VHD Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Hub Width H inch (mm)	Hub Diam. J inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
VHDF Flange Mount	1/2 (13)	1.12 (28.5)	2.3 (59)	1.75 (44.5)	.23 (5.9)	.22 (5.60)	1.406 (35.71)	.12 (3.1)	.93 (23.62)	150 (68)	2-6 (.014-.042)
	5/8 (16)	1.38 (35.1)	2.6 (66)	2.08 (53)	.28 (7.1)	.22 (5.60)	1.750 (44.45)	N/A	N/A	250 (113)	2-6 (.014-.042)
	3/4 (19)	1.62 (41.2)	2.8 (71)	2.38 (60.5)	.31 (7.9)	.22 (5.60)	2.000 (50.80)	N/A	N/A	350 (159)	3-7 (.02-.05)
	7/8 (22)	1.62 (41.2)	2.8 (71)	2.38 (60.5)	.31 (7.9)	.22 (5.60)	2.000 (50.80)	N/A	N/A	350 (159)	3-7 (.02-.05)

Metric numbers are for reference only



VHD Series: Thread Mount



	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch (mm)	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
VHDT Thread Mount	1/2 (13)	1.12 (28.5)	2.5 (64)	15/16-16	.50 (12.7)	150 (68)	2-6 (.014-.04)
	5/8 (16)	1.38 (35.1)	2.8 (72)	1 1/4-16	.50 (12.7)	250 (113)	2-6 (.014-.04)
	3/4 (19)	1.62 (41.2)	3.12 (79)	1 3/8-16	.50 (12.7)	350 (159)	3-7 (.02-.05)
	7/8 (22)	1.62 (41.2)	3.12 (79)	1 3/8-16	.50 (12.7)	350 (159)	3-7 (.02-.05)

Metric numbers are for reference only

* metric available as required

Identifying the Kerk® VHD nut part number codes when ordering

Haydon kerk Express℠ www.HaydonKerkExpress.com

VHD	F	K	R	–	062	0125	–	XXXX

Prefix

VHD

Nut Mounting Style

F = Flanged (Round)
T = Threaded
X = Custom

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand

(Refer to Lead-screw charts for availability, page 23)

Diameter Code

050 = .500-in (13)
062 = .625-in (16)
075 = .750-in (19)
087 = .875-in (22)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 23)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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

ZBA Series *– adjustable drag torque/ultra smooth travel*

The patented Kerk® ZBA Series offers a cost effective anti-backlash assembly for applications requiring precise positional accuracy and repeatability. The ZBA has been developed specifically for those applications that require very smooth and consistent motion such as printing, scanning, and coordinate measurement systems.

An added benefit of the ZBA design is the ability to manually adjust the drag torque setting to match the specific requirements of the application. This drag torque can also be set at the factory to meet individual customer specifications. The inherent damping qualities of the ZBA design make it ideally suited for applications requiring noise or vibration control.

The standard ZBA unit utilizes a self-lubricating polyacetal nut radially preloaded on a 303 stainless steel screw. End machining to customer specifications and Kerkote® TFE screw coating are optional.

Identifying the Kerk® ZBA nut part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

ZBA	A	K	R	–	062	0100	–	XXXX

Prefix

ZBA

Nut Mounting Style

A = Flanged (Triangular)
T = Threaded
X = Custom

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
G = Grease
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to Lead-screw charts for availability, page 21)

Diameter Code

025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)
043 = .438-in (11)
050 = .500-in (13)
062 = .625-in (16)
075 = .750-in (19)
087 = .875-in (22)
093 = .938-in (24)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 21)

Unique Identifier

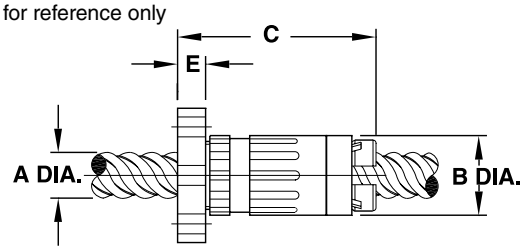
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

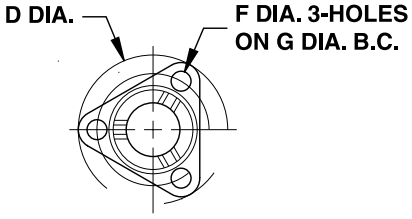
NOTE: Dashes must be included in Part Number (–) as shown above.
For assistance or order entry, call our engineering team at 603 213 6290.

ZBAA Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
ZBAA Flange Mount	1/4 (6)	.53 (13.5)	1.00 (25.4)	1.00 (25.4)	.18 (4.6)	.143 (3.6)	.750 (19.05)	5 (2.3)	.5-2 (.004-.014)
	5/16 (8)	.74 (18.8)	1.9 (48)	1.50 (38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.58)	10 (5)	1-3 (.007-.02)
	3/8 (9)	.74 (18.8)	1.9 (48)	1.50 (38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.58)	10 (5)	1-3 (.007-.02)
	7/16 (11)	.80 (20.3)	1.9 (48)	1.50 38.1)	.18 (4.6)	.200 (5.08)	1.125 (28.58)	15 (7)	2-5 (.014-.03)
	1/2 (13)	.875 (22.2)	1.97 (50.0)	1.62 (41.2)	.28 (7.1)	.200 (5.08)	1.250 (31.75)	25 (11)	2-5 (.014-.03)
	5/8 (16)	1.06 (26.9)	2.00 (50.8)	1.75 (44.5)	.28 (7.1)	.200 (5.08)	1.375 (34.93)	35 (16)	3-7 (.02-.05)
	3/4 (19)	1.70 (43.2)	2.88 (73.2)	2.63 (66.8)	.38 (9.6)	.218 (5.5)	2.25 (57.2)	55 (25)	5-9 (.03-.064)
	7/8 (22)	1.70 (43.2)	2.88 (73.2)	2.63 (66.8)	.38 (9.6)	.218 (5.5)	2.25 (57.2)	55 (25)	5-9 (.03-.064)
	15/16 (24)	1.70 (43.2)	2.88 (73.2)	2.63 (66.8)	.38 (9.6)	.218 (5.5)	2.25 (57.2)	55 (25)	5-9 (.03-.064)

Metric numbers are for reference only



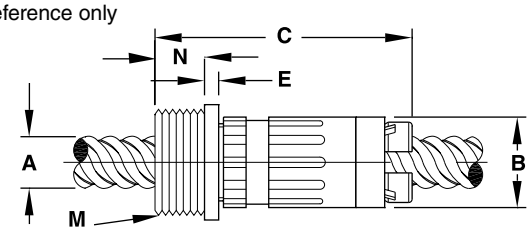


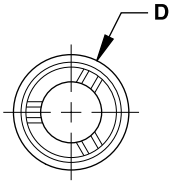
ZBAT Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
ZBAT Thread Mount	1/4 (6)	.53 (13.5)	1.3 (33)	.80 (20.3)	.12 (3.1)	5/8-18	.16 (4.1)	5 (2.3)	.5-2 (.004-.014)
	5/16 (8)	.74 (18.8)	2.2 (56)	1.00 (25.4)	.15 (3.8)	5/8-18	.38 (9.7)	10 (5)	1-3 (.007-.02)
	3/8 (10)	.74 (18.8)	2.2 (56)	1.00 (25.4)	.15 (3.8)	5/8-18	.38 (9.7)	10 (5)	1-3 (.007-.02)
	7/16 (11)	.80 (20.3)	2.3 (59)	1.00 (25.4)	.10 (2.5)	15/16-16	.38 (9.7)	15 (7)	2-5 (.014-.03)
	1/2 (13)	.89 (22.6)	2.3 (59)	1.04 (26.4)	.10 (2.5)	15/16-16	.50 (12.7)	25 (11)	2-5 (.014-.03)
	5/8 (16)	1.06 (26.9)	2.3 (58.9)	1.06 (26.9)	.14 (3.6)	15/16-16	.50 (12.7)	35 (16)	3-7 (.02-.05)

Metric numbers are for reference only

* metric available as required





NTG Series – adjustable drag torque/compact size

The adjustable Kerk® NTG Series offers a cost effective anti-backlash assembly for applications requiring precise positional accuracy, repeatability, and smoothness. The NTG has been developed specifically for demanding applications that require zero backlash with minimal drag torque. With its compact size and no moving components, the NTG can also be easily incorporated into customer specified, custom molded parts.

An integral part of the NTG design is the ability to manually adjust the drag torque setting to match specific requirements of the application. This drag torque can also be set at the factory to meet individual customer specifications. This is especially effective with fine leads.

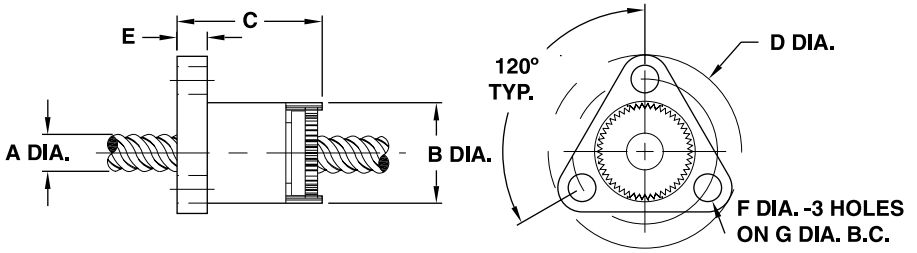
The standard NTG unit utilizes a self-lubricating polyacetal nut on a precision rolled 303 stainless steel screw. End machining to customer specifications and Kerkote® TFE screw coating are optional.

NTGA Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTGA Flange Mount	1/4 (6)	.52 (13.2)	.8 (20.3)	1.00 (25.4)	.16 (4.0)	.143 (3.63)	.750 (19.1)	10 (4.5)	.5-2 (.004-.014)
	5/16 (8)	.80 (20.3)	1.0 (25.4)	1.50 (38.1)	.20 (5.1)	.197 (5.00)	1.125 (28.6)	20 (9.1)	1-3 (.007-.02)
	3/8 (10)	.80 (20.3)	1.0 (25.4)	1.50 (38.1)	.20 (5.1)	.197 (5.00)	1.125 (28.6)	20 (9.1)	1-3 (.007-.02)

Metric numbers are for reference only

NTG MINI Series – *see MINI Series Products*



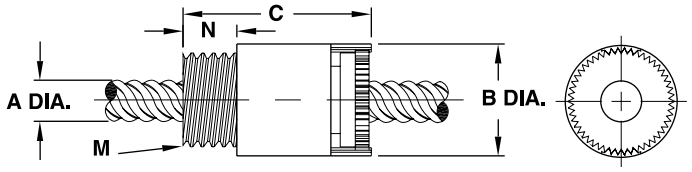
NTGT Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTGT Thread Mount	1/4 (6)	.520 (13.2)	.9 (22)	7/16 - 20	.250 (6.35)	10 (4.5)	.5-2 (.004-.014)
	5/16 (8)	.800 (20.3)	1.2 (30)	3/4 - 20	.375 (9.53)	20 (9.1)	1-3 (.007-.02)
	3/8 (10)	.800 (20.3)	1.2 (30)	3/4 - 20	.375 (9.53)	20 (9.1)	1-3 (.007-.02)

Metric numbers are for reference only

NTG MINI Series – *see MINI Series Products*

* metric available as required



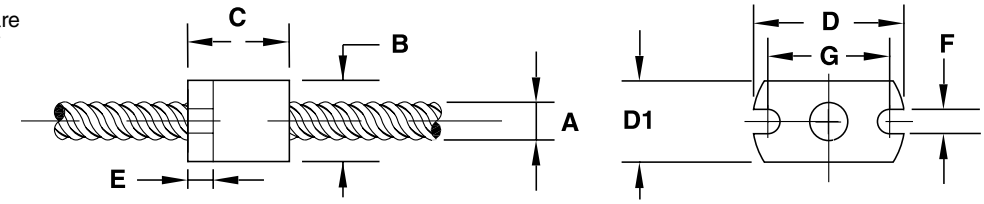
NTG Mini Series – miniature style assemblies with adjustable drag torque

The Kerk® NTG MINI Series brings quality, precision and value to miniature lead-screw assemblies that require a small-scale anti-backlash function and control of drag torque.

NTG Mini Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTGR Flange Mount	1/8 inch through 7/32 inch (3 mm through 5.6 mm)	0.40 (10.2)	0.50 (13)	0.40 (10.2)	0.75 (19.1)	0.13 (3.2)	0.120 (3.05)	0.600 (15.24)	5 (2.3)	0.5 (.004)

Metric numbers are for reference only

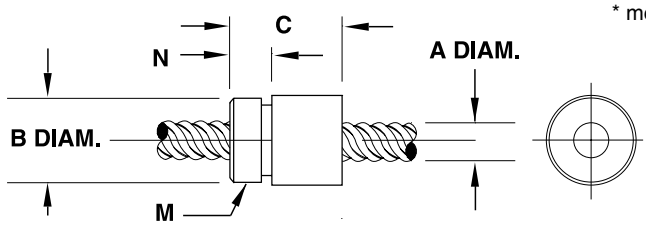


NTG Mini Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTGT Thread Mount	1/8 inch through 7/32 inch (3 mm through 5.6 mm)	0.40 (10.2)	0.50 (13)	3/8 - 24	0.160 (4.06)	5 (2.3)	0.5 (.004)

* metric available as required

Metric numbers are for reference only



Haydon kerk Motion Solutions Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Kerk® NTG nut part number codes when ordering

NTG	A	K	R	–	025	0050	–	XXXX

Prefix

NTG

Nut Mounting Style

A = Flanged (Triangular)
T = Threaded
X = Custom

For NTG Mini Series:

B = Barrel [m]
R = Rectangular [m]

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand

(Refer to Lead-screw charts for availability, page 20)

Diameter Code

012[m] = .125-in (3.2)
013[m] = .133-in (3.3)
014[m] = .141-in (3.6)
016[m] = .156-in (4)
018[m] = .188-in (5)
021[m] = .219-in (5.6)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

[m] **NTG Mini Series**

NOTE: Dashes must be included in Part Number (–) as shown above.
For assistance or order entry, call our engineering team at 603 213 6290.

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BFW Series – *conventional style, without "anti-backlash" function*

The Kerk® BFW Series general purpose "free-wheeling" nut is for applications not requiring anti-backlash and wear compensation. It provides effective power transmission at minimum cost, and features long life, self-lubricating polyacetal nuts.

The secure mounting and convenience of a circular flange is standard on the BFW nuts with triangular flange and thread mounting as an option. Many custom configurations are available.

The BFW is also available in a Micro Series that enables a whole new range of micro-sized designs. It allows the miniaturization without sacrificing performance or reliability.

Screws are 303 stainless steel with extended life, custom Kerkote® TFE coating optional. Assemblies can be supplied cut-to-length or with ends machined to customer requirements.

Identifying the Kerk® BFW nut part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

BFW	A	K	R	–	018	0020	–	XXXX

Prefix

BFW

Nut Mounting Style

A = Flanged (Triangular)
F = Flanged (Round)
T = Threaded
X = Custom

For Mini and Micro Series Only:

B = Barrel [m] [μ]
R = Rectangular [m] [μ]

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
G = Grease
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to Lead-screw charts for availability, page 20, Micro Series right hand only)

Diameter Code

008 [μ] = .078-in (2)
012 [m] = .125-in (3.2)
013 [m] = .133-in (3.3)
014 [m] = .141-in (3.6)
016 [m] = .156-in (4)
018 [m] = .188-in (5)
021 [m] = .219-in (5.6)
025 = .250-in (6)
031 = .313-in (8)
037 = .375-in (10)
043 = .438-in (11)
050 = .500-in (13)
062 = .625-in (16)
075 = .750-in (19)
087 = .875-in (22)
093 = .938-in (24)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

[m] **BFW Mini Series**
[μ] **BFW Micro Series**

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

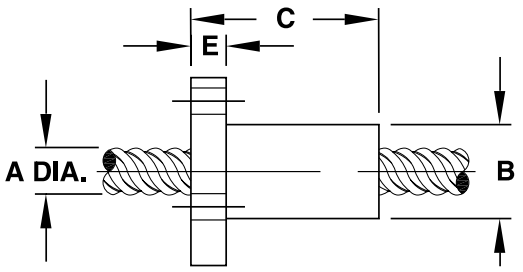
BFW Nut: Backlash

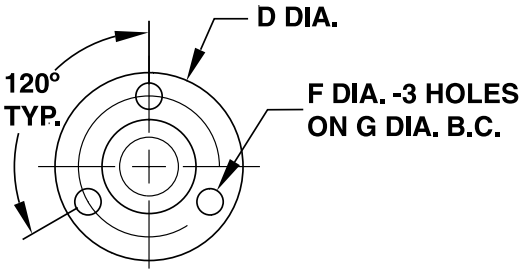
N/A, Typical Backlash .003 to .010 (.076 to .25)

BFWF Series: Flange Mount (Round)

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)
BFWF Round Flange	1/4 (6)	.50 (12.7)	1.0 (25.4)	1.00 (25.4)	.19 (4.8)	.140 (3.56)	.750 (19.05)	50 (20)
	5/16 (8)	.63 (15.9)	1.0 (25.4)	1.13 (28.7)	.19 (4.8)	.140 (3.56)	.875 (22.23)	75 (35)
	3/8 (10)	.63 (15.9)	1.0 (25.4)	1.13 (28.7)	.19 (4.8)	.140 (3.56)	.875 (22.23)	75 (35)
	7/16 (11)	.75 (19.1)	1.5 (38)	1.50 38.1)	.19 (4.8)	.203 (5.16)	1.125 (28.58)	90 (40)
	1/2 (13)	.75 (19.1)	1.5 (38)	1.50 (38.1)	.19 (4.8)	.203 (5.16)	1.125 (28.58)	150 (68)
	5/8 (16)	.88 (22.2)	1.5 (38)	1.50 (38.1)	.19 (4.8)	.203 (5.16)	1.188 (30.18)	225 (100)
	3/4 (19)	1.12 (28.4)	2.0 (51)	1.75 (44.4)	.25 (6.4)	.203 (5.16)	1.438 (36.53)	350 (160)
	7/8 (22)	1.50 (38.1)	2.0 (51)	2.25 (57.1)	.25 (6.4)	.203 (5.16)	1.875 (47.63)	500 (227)
	15/16 (24)	1.50 (38.1)	2.0 (51)	2.25 (57.1)	.25 (6.4)	.203 (5.16)	1.875 (47.63)	500 (227)

Metric numbers are for reference only

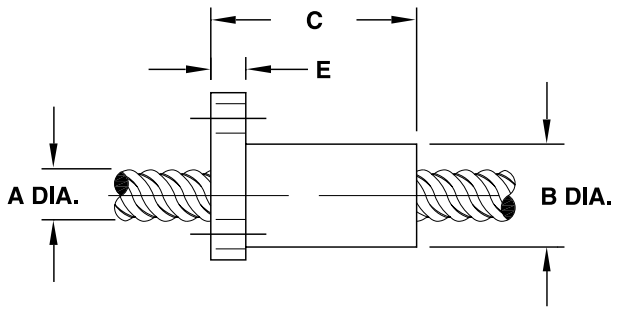


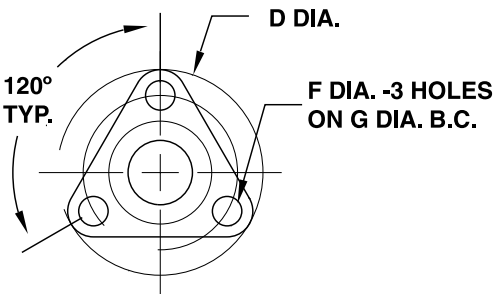


BFWA Series: Flange Mount (Triangular)

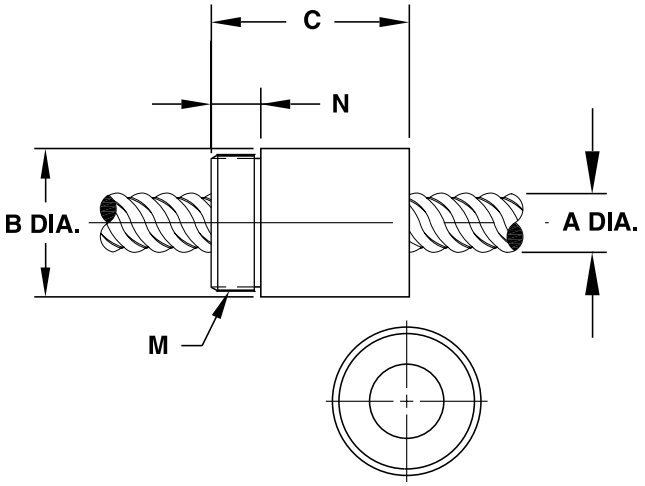
	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)
BFWA Triangular Flange	1/4 (6)	.50 (12.7)	1.0 (25.4)	1.00 (25.4)	.17 (4.3)	.143 (3.63)	.750 (19.05)	50 (20)
	5/16 (8)	.50 (12.7)	1.9 (48.3)	1.50 (38.1)	.17 (4.3)	.197 (5.00)	1.125 (28.58)	75 (35)
	3/8 (10)	.66 (16.6)	1.9 (48.3)	1.50 (38.1)	.17 (4.3)	.197 (5.00)	1.125 (28.58)	75 (35)
	7/16 (11)	.75 (19.1)	1.9 (48.3)	1.50 (38.1)	.17 (4.3)	.197 (5.00)	1.125 (28.58)	90 (40)
	1/2 (13)	.75 (19.1)	1.9 (48.3)	1.50 (38.1)	.17 (4.3)	.197 (5.00)	1.125 (28.58)	150 (68)

Metric numbers are for reference only





BFWT Series: Thread Mount



	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)
BFWT Thread Mount	1/4 (6)	.63 (15.9)	1.0 (25.4)	9/16 - 18	.187 (4.75)	50 (20)
	5/16 (8)	.75 (19.1)	1.0 (25.4)	5/8 - 18	.250 (6.35)	75 (35)
	3/8 (10)	.75 (19.1)	1.0 (25.4)	5/8 - 18	.250 (6.35)	75 (35)
	7/16 (11)	1.00 (25.4)	1.5 (38.1)	15/16 - 16	.375 (9.53)	90 (40)
	1/2 (13)	1.00 (25.4)	1.5 (38.1)	15/16 - 16	.375 (9.53)	150 (68)
	5/8 (16)	1.00 (25.4)	1.5 (38.1)	15/16 - 16	.375 (9.53)	225 (100)
	3/4 (19)	1.50 (38.1)	2.0 (51)	1 3/8 - 16	.500 (12.70)	350 (160)
	7/8 (22)	1.50 (38.1)	2.0 (51)	1 3/8 - 16	.500 (12.70)	500 (227)
	15/16 (24)	1.50 (38.1)	2.0 (51)	1 3/8 - 16	.500 (12.70)	500 (227)

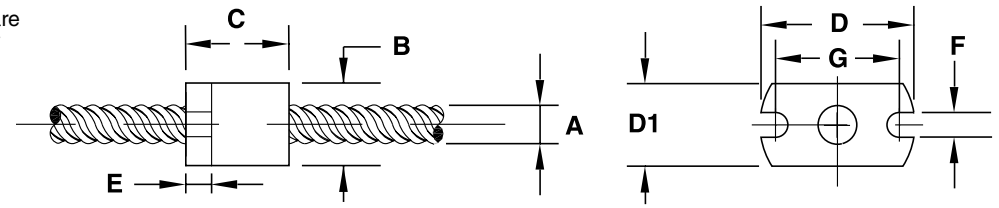
Metric numbers are for reference only

* metric available as required

BFWR Mini Series: Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diam. G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
BFWR Flange Mount	1/8 inch through 7/32 inch (3 mm through 5.6 mm)	0.40 (10.2)	0.50 (13)	0.40 (10.2)	0.75 (19.1)	0.13 (3.2)	0.120 (3.05)	0.600 (15.24)	25 (11)	Free Wheeling

Metric numbers are for reference only

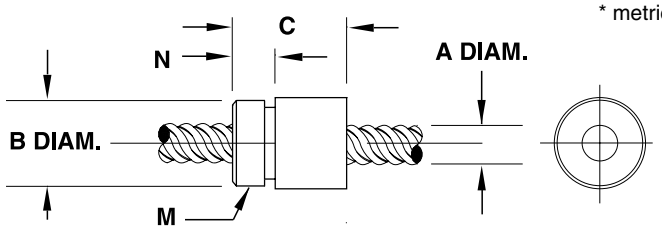


BFWT Mini Series: Thread Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
BFWT Thread Mount	1/8 inch through 7/32 inch (3 mm through 5.6 mm)	0.40 (10.2)	0.50 (13)	3/8 - 24	0.187 (4.75)	25 (11)	Free Wheeling

Metric numbers are for reference only

* metric available as required



MICRO Lead-screw Size List

Diameter (inches)	Diameter (mm)	Diameter Code	Lead (inches)	Lead (mm)	LEAD CODE	Outside Diameter (for Reference) (inches)	Outside Diameter (for Reference) (mm)	Root Diameter (for Reference) (inches)	Root Diameter (for Reference) (mm)	Efficiency %**
5/64	2	008	0.012	0.30	**0012**	0.079	2.01	0.068	1.73	24 **
			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 **

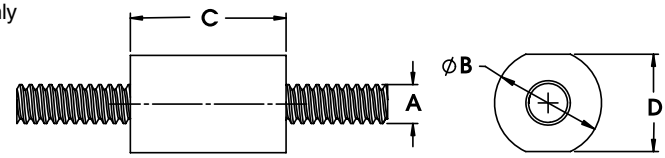
Shaded areas have been translated from their designed inch or mm dimension to an equivalent mm or inch dimension.

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

BFW Micro Series: Barrel Mount

	Nut Style	Screw Diameter A inch (mm)	Nut Diameter B inch (mm)	Nut Length C inch (mm)	Nut Flats D inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in. (N-m)
BFWB	Barrel Mount	5/64 (2)	0.22 (5.5)	0.32 (8)	0.20 (5.08)	10 (4.5)	Free Wheeling

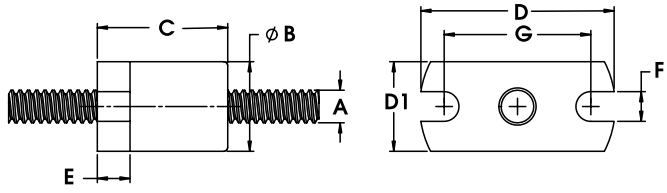
Metric numbers are for reference only



BFW Micro Series: Rectangular Mount

	Nut Style	Screw Diameter A inch (mm)	Nut Diameter B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diameter G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in. (N-m)
BFWR	Rectangular Flange	5/64 (2)	0.22 (5.5)	0.32 (8)	0.22 (5.5)	0.47 (11.9)	0.08 (2.0)	0.07 (1.8)	0.35 (9.0)	10 (4.5)	Free Wheeling

Metric numbers are for reference only



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Kerk® 3DP Nut Series – advanced technology for custom motion control prototype development

The Kerk® 3DP nut offering is designed for rapid prototyping with additive manufacturing. One of the challenges with the current material offerings in 3D printing is the lack of low wear, low friction materials. For prototyping a lead-screw driven assembly, it's critical to simulate the correct tribological performance of the lead nut solution to understand how the axis of motion will perform. By integrating basic anti-rotation, and axial locking features with our high efficiency thread form the 3DP nut allows for simple integration of a premium performance thread system into a 3D printed prototype. This gives engineers and developers a leg up on the competition by being able to quickly test several configurations while leveraging additive manufacturing and top performing lead nut materials. The result is shortened design cycle and rapid product launch to market allowing you to capture more market share with your latest and greatest solution."

021, 025 and 037 3DP Hex Nuts

Examples of 3DP printed nut applications

Identifying the Kerk® 3DP nut part number codes when ordering

3DP	H	K	R	–	012	0012	–	BZ00

Prefix

3DP

Nut Mounting Style

H = Hex

Lubrication

S = Uncoated
K = Kerkote® TFE Coating
G = Grease
N = Nut only
B = Black Ice® TFE Coating

Thread Direction

R = Right hand
L = Left hand
(Refer to lead-screw charts on page 20 for availability)

Diameter Code

012 = .125-in (3.2)
013 = .133-in (3.3)
014 = .141-in (3.6)
016 = .156-in (4)
018 = .188-in (5)
021 = .219-in (5.6)
025 = .250-in (6)
037 = .375-in (10)

Nominal Thread Lead Code

(Refer to LEAD CODE Specifications charts, page 20)

Unique Identifier

BZ00 = Acetal base with lubrication matrix

KZ00 = Kerkite® KN30 high performance polymer

BYXX = Standard acetal base hex nut and cut to length lead-screw (XX = length in inches)

KYXX = Kerkite® KN30 base hex nut and cut to length lead-screw (XX = length in inches)

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

3DP Nut: Technical Data

Material	**Polyacetal** with Lubricant Additive	**Kerkite® KN30** High Performance Engineered Polymer
Tensile Strength	9,700 psi	25,000 psi
Coefficient of Expansion	6.0 x 10 –5 in/in/°F	1.1 x 10 –5 in/in/°F
Coefficent of Friction Polyacetal Nut to Screw	Static = .08 .08 ** Dynamic = .15 .09 **	
Standard Operating Temperature Range	32 - 200° F* (0 - 93° C)*	

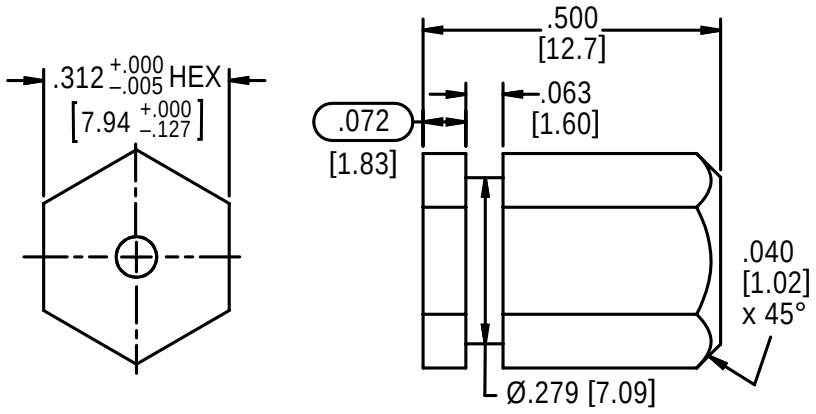
* Very high or low temperatures may cause significant changes in the nut fit or drag torque. Please call the Kerk Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating

3DP Nut: Grease Compatibility

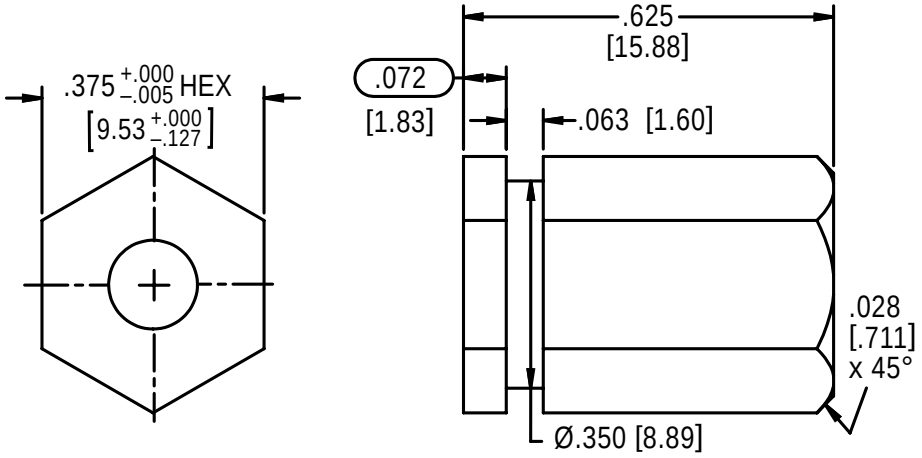
COATINGS	COMPATIBLE
Grease	YES
Kerkote TFE Coating	YES
Black Ice TFE Coating	YES

Kerk® 3DP Hex nut: Dimensional Drawings

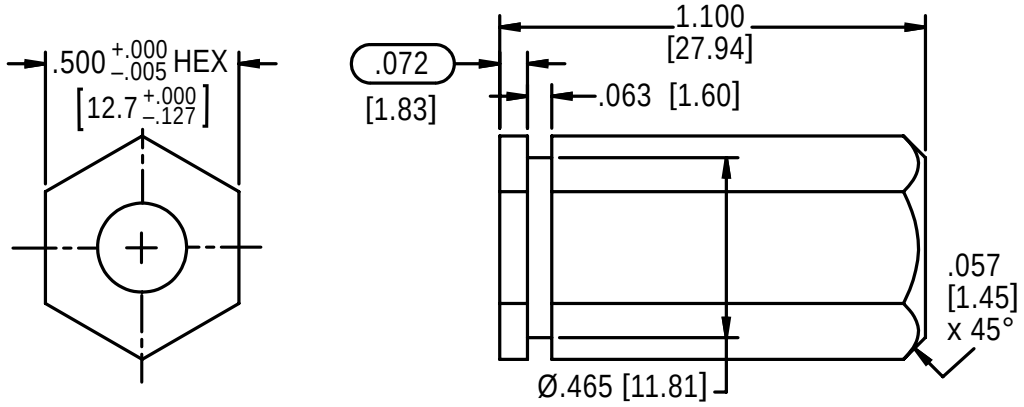
3DP Hex Nut: 012 to 021 Series



3DP Hex Nut: 025 Series



3DP Hex Nut: 037 Series



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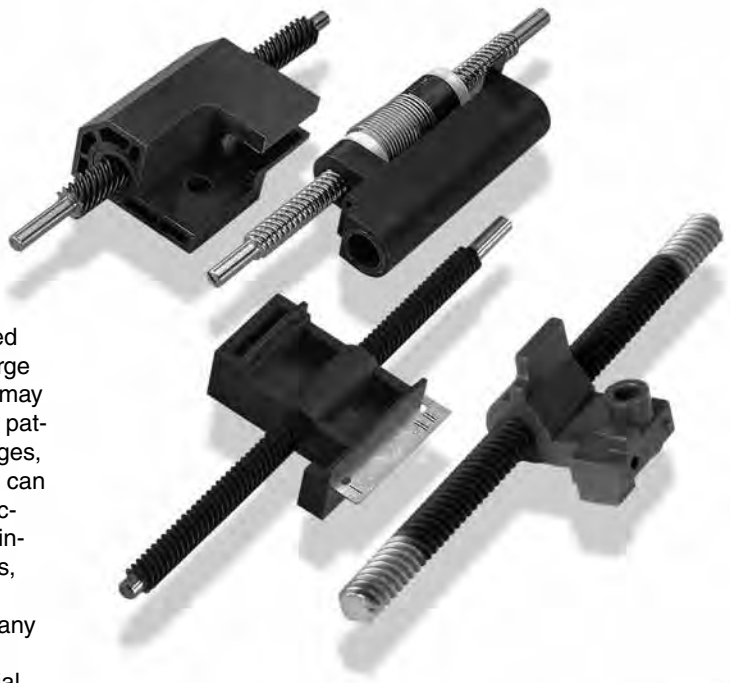
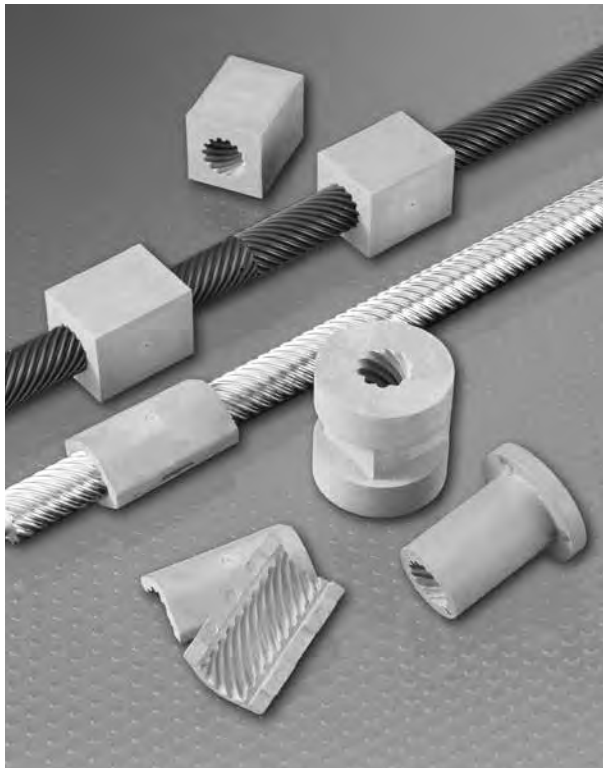
Custom Nut Configurations

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

In addition to The Kerk® standard nut types, modified and complete custom configurations represent a large portion of the company's production. Modifications may be simple changes such as different mounting hole patterns or mounting threads, small dimensional changes, or special materials. Haydon Kerk Motion Solutions can provide tremendous value by producing a multi-functional nut. Using custom molds and specialty machining, nuts can also include guide bushings, carriages, timing pulleys, gears, syringe components, sensor mounts and flags, encoder features, clamps and many other complimentary elements. In addition, custom designed nuts can offer quick release mounts, partial thread engagement, half nut construction or special shapes and geometries. Special materials are offered to extend the performance of our assemblies. Materials can be chosen for extreme temperature, chemical compatibility, autoclaving, agency approvals, special loadings and many other specific requirements.



Custom nut designs can include multi-functionality, eliminating additional components to simplify product manufacturing. This can deliver both cost and space-saving benefits.



Custom geometries and custom materials can be combined for a wide variety of product application requirements.


Stepper Motor
Linear
Actuators

Stepper Motor Linear Actuators: Product Summary

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Hybrid Linear Actuators

Series	Size (square)	Configuration#	Stroke (mm)		Max Force (N)	Travel/step (micron)
			C#	NC / EL#		
21000	21 mm (0.8-in)	C / NC / EL	9 - 38.1	Up to ≈ 200	2 - 44	1.5 - 40
28000	28 mm (1.1-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 250	15 - 90	3 - 50
35000	35 mm (1.4-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 300	50 - 220	1.5 - 50
43000	43 mm (1.7-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 400	100 - 220	1.5 - 50
57000	57 mm (2.3-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 500	300 - 890	4 - 50
87000	87 mm (3.4-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 500	400 - 2224	12.7 - 127

Double Stack Hybrid Linear Actuators

Series	Size (square)	Configuration#	Stroke (mm)		Max Force (N)	Travel/step (micron)
			C#	NC / EL#		
21000	21 mm (0.8-in)	C / NC / EL	9 - 38.1	Up to ≈ 200	10 - 75	2.5 - 40
28000	28 mm (1.1-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 250	30 - 133 [A]	3 - 50
35000	35 mm (1.4-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 300	50 - 220 [A]	15.8 - 127
43000	43 mm (1.7-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 400	50 - 337	15.8 - 127
57000	57 mm (2.3-in)	C / NC / EL	12.7 - 63.5	Up to ≈ 500	150 - 890 [A]	12.7 - 127

[A] Maximum force limited by bearing capabilities.

Dual Action Actuators

Size (square)	Torque (N-cm)	Linear Stroke (mm)	Max Force	Travel/step (micron)	Load Limits
35 mm (1.4-in)	12.7	Up to 101.6†	50 - 220 N (25 lbs)	3 - 50	133 N (30 lbs)
43 mm (1.7-in)	13	Up to 101.6†	100 - 220 N (50 lbs)	1.5 - 50	222 N (50 lbs)

† Standard strokes: 25.4 mm (1-in.), 50.8 mm (2-in.) and 101.6 mm (4-in.).

Can-Stack Linear Actuators

Series	Ø Size	Configuration#	Stroke (mm)		Max Force (N)	Travel/step (micron)
			C#	NC / EL#		
G4 19000	20 mm (.79-in)	C / NC / EL	14 - 31	Up to ≈ 150	12 - 50	25 - 100
G4 25000	26 mm (1-in)	C / NC / EL	13 - 31	Up to ≈ 150	20 - 90	12.7 - 100
G4 37000	36 mm (1.4-in)	C / NC / EL	17 - 38	Up to ≈ 150	30 - 260	12.7 - 100
LC15	15 mm (.59-in)	C / EL	12.7	Up to ≈ 60	7	20
(Z)20000	20 mm (.79-in)	C / NC / EL	12.7	Up to ≈ 150	3 - 35	25 - 100
(Z)26000	26 mm (1-in)	C / NC / EL	12.7 - 31	Up to ≈ 150	10 - 80	6 - 100
36000	36 mm (1.4-in)	C / NC / EL	15.5	Up to ≈ 150	15 - 160	3 - 100
46000	46 mm (1.8-in)	C / NC / EL	23.1	Up to ≈ 200	20 - 260	12.7 - 400

Configurations = Captive / Non-captive / External Linear Lead-screws

Drives

	Type	Motor Leads	Input Voltage (VDC)	Current (RMS)/phase (I)	Microstepping Resolution
40105	Chopper	4	20 - 40	2	2
44103	Chopper	4*	24 - 28	1	8
DCS4020	Chopper	4	24 - 40	2	2
DCM4826X	Chopper	4	12 - 48	2.6	64
DCM8028	Chopper	4 / 6 / 8	20 - 80 *E*	2.8	256
DCM8055	Chopper	4 / 6 / 8	20 - 80 *E*	5.5	256

* 5V motors only. E = For Europe – the max. input voltage must be limited to 70 VDC (CE regulations).

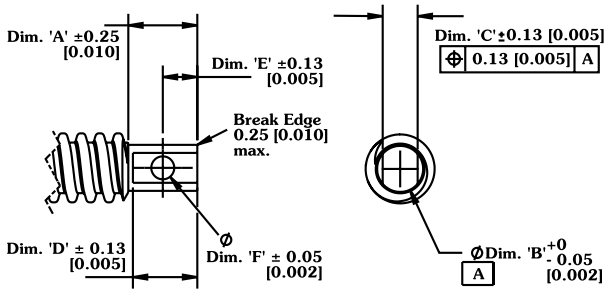
Integrated Electronic Drive

Series	Type	Input Voltage (VDC)	Programming	Connector	I/O inputs - I/O outputs
IDEA DRIVE	Chopper	12 - 75 VDC	Graphic User Interface	USB/RS-485	8 opto-isolated

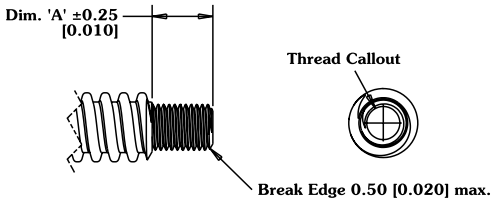
Standard End Machining: Non-Captive and External Linear Actuators

Dimensions = mm [inches]

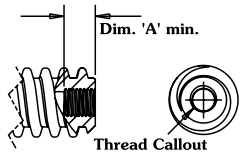
Cross Drilled Hole



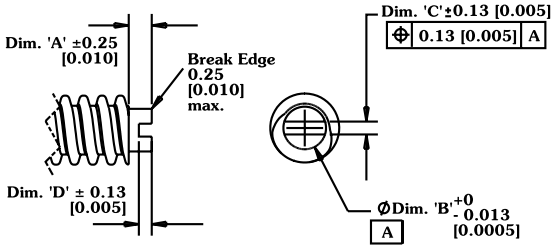
Male Thread



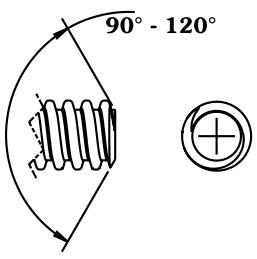
Female Thread



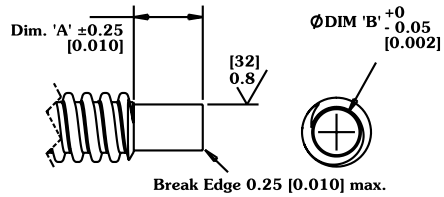
Screwdriver Slot



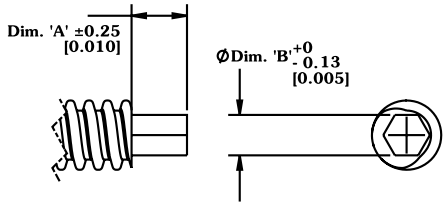
Standard Break Edge



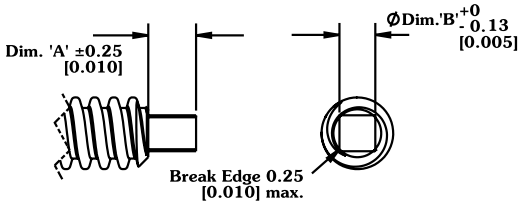
Turned Journal



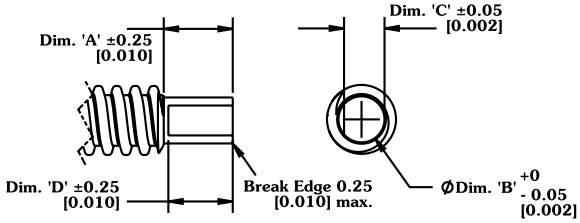
Hex Drive End



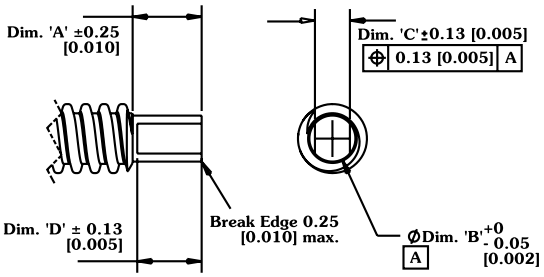
Square End



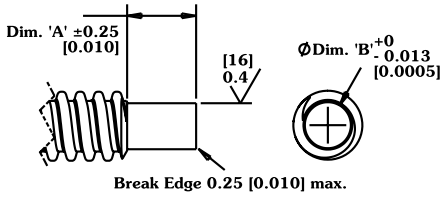
Single Flat



Double Flat



Ground Journal



Black Ice® Coating

Black Ice TFE coating is a hard coating that offers exceptional durability in all types of environments, with virtually any type of polymer lead-screw nut. Rather than acting as a dry lubricant, Black Ice TFE is an anti-friction coating whose surface properties displace the metal to which its is applied. Though it is not intended for use with metal or glass fiber reinforced nuts, Black Ice TFE is bonded securely to the surface of the lead-screw and can withstand abrasion from contamination, rigid polymer systems, fluid impingement and wash down applications.

Haydon® Super Slick Greases

Haydon offers a wide selection of greases designed to meet any application requirements. Please contact Haydon Kerk Motion Solutions for assistance in selecting the most effective lubrication option.

	Grease Type	Chemical Compat-ibility	Tempera-ture	Load Carrying Capacity	Comments	Cost Comparison
HSS-17	Synthetic Hydrocarbon	Good	-20°C to +125°C	High	Standard	$
HSS-03	Polyolester	Good	-54°C to +150°C	Moderate	Can-Stack Standard	$
HSS-06	Perfluoropolyether	Best	-65°C to +250°C	Moderate	Tough Environments	$$
HSS-16	Perfluoropolyether	Better	-80°C to +204°C	Moderate	Vacuum compatible	$$$
HSS-20	Perfluoropolyether	Best	-65°C to +250°C	Moderate	High Repeatability	$$$

HSS-17

is a medium viscosity synthetic hydrocarbon grease thickened with lithium soap. It is fortified with EP (extreme pressure) modifiers to increase load carrying capabilities and TFE to increase lubricity and reduce friction. Rated temperature capacity is -20°C to +125°C.

HSS-03

is a light viscosity, polyolester based grease thickened with PTFE. It is an economical alternative to premium PFPE (perfluoropolyether) types where low temperature performance is a primary requirement as it provides low starting torque.

HSS-06

is a TFE thickened heavy viscosity perfluoropolyether grease. It is designed to operate in chemically harsh environments and provides excellent operating properties for light to medium loads. Rated temperature capacity is -65°C to +250°C. Standard on Hybrid Actuators.

HSS-16

is a perfluoropolyether grease developed for use in vacuum environments good to $4x10^{-13}$ torr at 20°C. Rated temperature capacity is -80°C to +204°C.

HSS-20

is an ultrafiltered version of HSS-06, meaning that the grease it put through a 'cleaning' process to remove any particles greater than 35 microns in size. It is designed for use when accuracy and repeatability are of utmost concern.

Suppose you, as an engineer, are tasked to design a machine or part of a machine that requires precise linear positioning. How would you go about accomplishing this? What is the most straightforward and effective method?

When students are trained in classic mechanical engineering, they are taught to construct a system using conventional mechanical components to convert rotary into linear motion. Converting rotary to linear motion can be accomplished by several mechanical means using a motor, rack and pinion, belt and pulley, and other mechanical linkages. The most effective way to accomplish this rotary to linear motion, however, is within the motor itself.

First, What Exactly Is a Stepper Motor-Based Linear Actuator?

A linear actuator is a device that develops a force and a motion through a straight line. A stepper motor-based linear actuator uses a stepping motor as the source of rotary power. Inside the rotor, there's a threaded precision nut instead of a shaft. The shaft is replaced by a lead-screw. As the rotor turns (as in a conventional stepper motor), linear motion is achieved directly through the nut and threaded screw. It makes sense to accomplish the rotary to linear conversion directly inside the motor, as this approach greatly simplifies the design of rotary to linear applications. This allows high resolution and accuracy ideal for use in applications where precision motion is required.

Basic Components

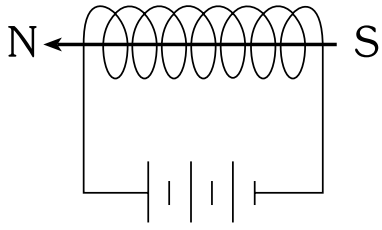
Stepper Motor

Why use a stepper motor instead of a conventional rotary motor? Unlike other rotary motors, steppers are unique in that they move a given amount of rotary motion for every electrical input pulse. This makes steppers a perfect solution for use in positioning applications. Depending on the type of stepper motor, our motors can achieve resolutions from 18 rotational degrees per step to 0.9 rotational degrees per step. This unique "stepping" feature coupled with the characteristics of the lead-screw provides a variety of very fine positioning resolutions

How Does the Stepper Motor Work?

Permanent magnet stepper motors incorporate a permanent magnet rotor, coil windings, and a steel stator capable of carrying magnetic flux. Energizing a coil winding creates an electromagnetic field with a NORTH and SOUTH pole as shown in figure 1.

Figure 1. Magnetic field created by energizing a coil winding



The stator conducts the magnetic field and causes the permanent magnet rotor to align itself to the field. The stator magnetic field can be altered by sequentially energizing and de-energizing the stator coils. This causes a "stepping" action and incrementally moves the rotor resulting in angular motion.

"One-Phase On" Stepping Sequence

Figure 2 illustrates a typical step sequence for a simplified 2 phase motor. In step 1, phase A of the 2 phase stator is energized. This magnetically locks the rotor in the position shown, since unlike poles attract. When phase A is turned off and phase B is turned on, the rotor moves 90° clockwise. In step 3, phase B is turned off and phase A is turned on but with the polarity reversed from step 1. This causes another 90° rotation. In step 4, phase A is turned off and phase B is turned on, with polarity reversed from step 2. Repeating this sequence causes the rotor to move clockwise in 90° steps.

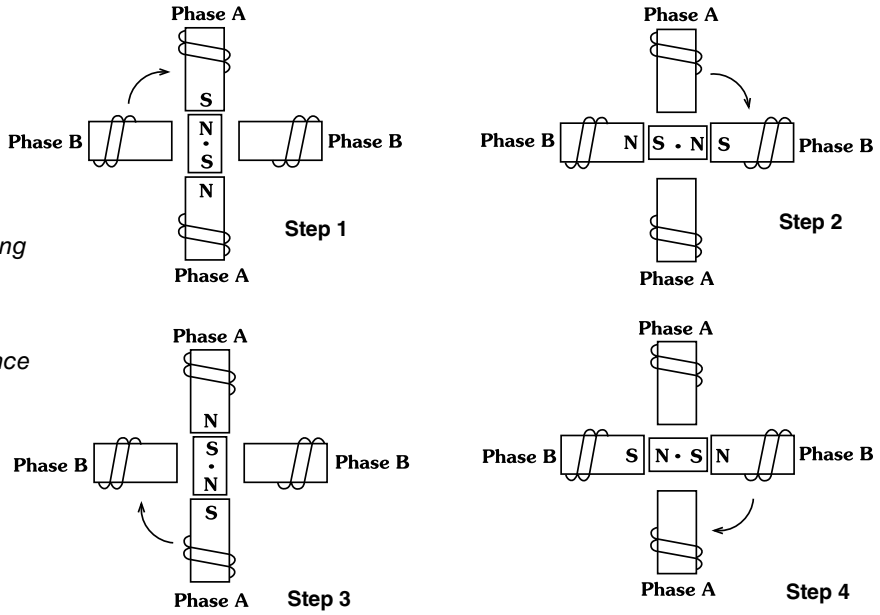


Figure 2."One Phase On"stepping sequence for two phase motor "Two-Phase On" Stepping Sequence

"Two-Phase On" Stepping Sequence

A more common method of stepping is "two phase on" where both phases of the motor are always energized. However, only the polarity of one phase is switched at a time, as shown in Figure 3. With two phase on stepping, the rotor aligns itself between the "average" north and "average" south magnetic poles. Since both phases are always on, this method provides 41.4% more torque than "one phase on" stepping.

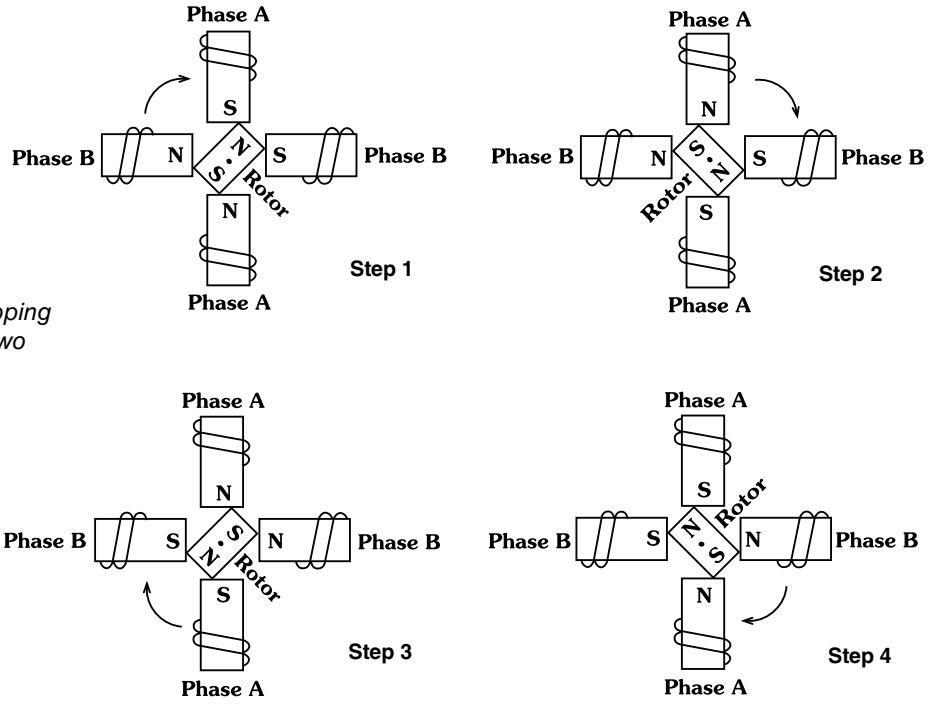


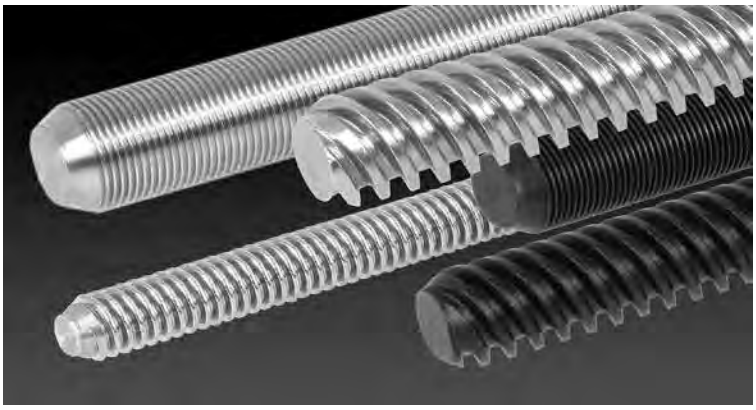
Figure 3."Two Phase On"stepping sequence for two phase motor

Lead-screw

The acme lead-screw is a special type of screw that provides a linear force using the simple mechanical principle of the inclined plane. Imagine a steel shaft with a ramp (inclined plane) wrapped around it. The mechanical advantage (force amplification) is determined by the angle of the ramp which is a function of the lead, pitch, and diameter of the screw.

Lead – The axial distance a screw thread advances in a single revolution
Pitch – The axial distance measured between adjacent thread forms

The threads of the lead-screw allow a small rotational force to translate into a large load capability depending on the steepness of the ramp (the thread lead). A small lead (more threads per inch) will provide a high force and resolution output. A large lead (fewer threads) will provide a lower force, but a correspondingly higher linear speed from the same source of rotary power.



Examples of different thread configurations: Finer lead threads will provide higher force but lower speeds; Coarse lead threads will provide higher speeds but lower force.

Integrated Nut

Of equal, if not greater importance to the lead-screw is the nut that drives the screw. This nut is often imbedded in the rotor of the stepping motor, which makes this actuator configuration unique from other rotary to linear techniques. The traditional nut material is a bearing grade bronze which lends itself to the required machining of the internal threads. Bronze is a traditional compromise between physical stability and lubricity. Compromise, however, is the key word since it excels at neither.

Friction Considerations

A much better material for a power nut in the linear actuator is a lubricated thermoplastic material. With the evolution of new engineered plastics, the screw threads may now travel with a lower overall coefficient of friction. This is illustrated below in Figure 4.

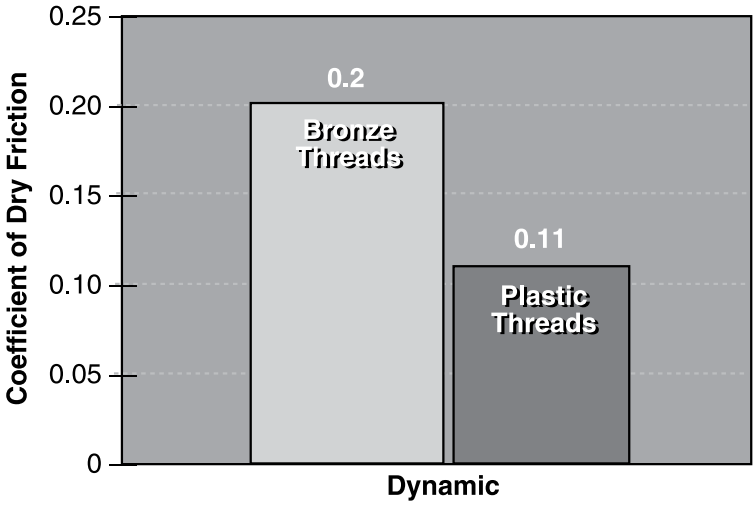


Figure 4.

FRICTION EFFECTS

Comparative friction effects of stainless steel on select rotor materials

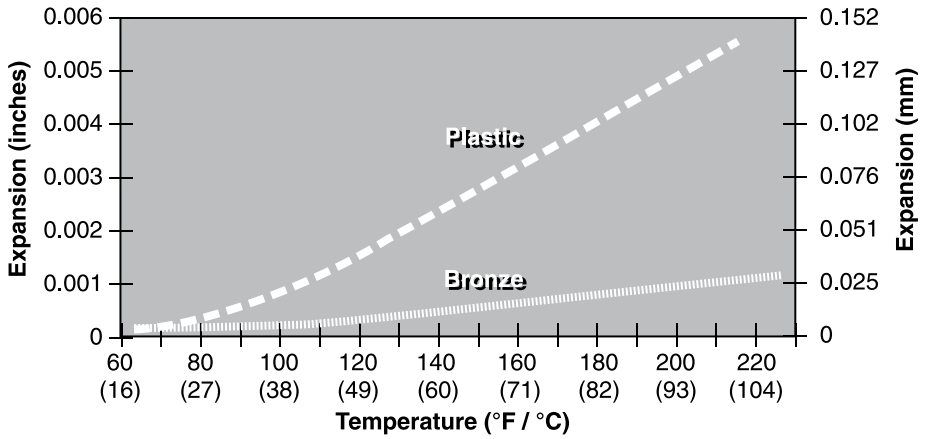
Thermal Considerations

Given the data, it was clear that a plastic drive nut provides the lower coefficient of friction when compared with bronze. Unfortunately, as good as the plastic is for threads, it is not stable enough for the bearing journals of a hybrid motor, which are critical in the hybrid motor design. Under a continuous full load condition, plastic bearing journals can expand as much as 0.004", where brass will expand only 0.001". This is illustrated in Figure 5. In order to achieve the high performance characteristics of the stepper motor, the design must maintain a stator-to-rotor airgap of only a few thousandths of an inch. This tight design requirement demands thermally stable bearing journals.

Figure 5.

THERMAL EFFECT

Linear thermal expansion for 1-inch (25.4 mm) samples

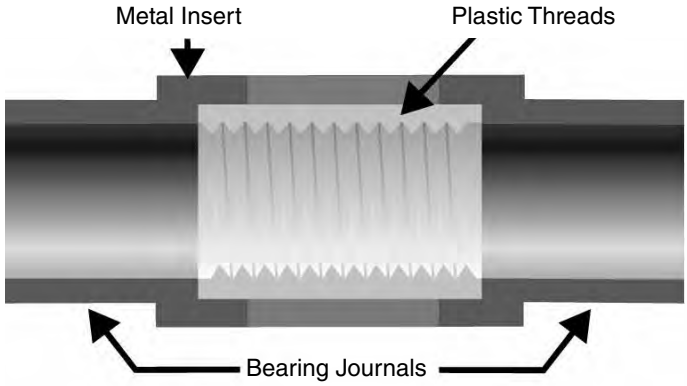


By injection molding plastic threads within a brass rotor assembly, both characteristics of low friction and high bearing journal stability is achieved (see figure 6).

Figure 6.

POWER NUT CONFIGURATION

Embedded in Permanent Magnet Rotor



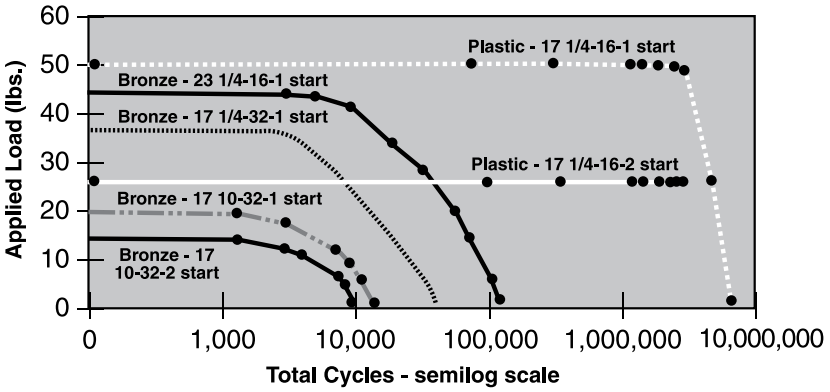
Effects on Actuator Life

The result is a product with quiet operation, higher efficiencies, and higher life expectancies. Motor life is improved by 10 to 100 times over the traditional bronze nut configuration, as illustrated in the life test chart in figure 7.

Figure 7.

LIFE TEST: BRONZE vs PLASTIC

Nuts used in Size 17 and 23 Hybrid Linear Actuators



Extending Actuator Life

With proper application consideration, Haydon linear actuators deliver up to 20 million cycles. Ultimately, motor fatigue and resultant life are determined by each customer's unique application.

There are some general guidelines that should be understood in order to insure maximum life. Ultimately, to determine an actuator's performance in a given system it's best to perform testing in the final assembly in "field conditions" or in a setting that closely approximates those conditions.

Since a stepper has no brushes to wear out, its life usually far exceeds that of other mechanical components of the system. If a stepper does fail there are certain components which are likely to be involved. Bearings and lead-screw/nut interface (in linear actuators) are typically the first components to experience fatigue. Required torque or thrust and operating environment are the factors which affect these motor components.

Extensive testing has shown that motor life increases exponentially with reduced operating loads. Environmental factors such as high humidity, exposure to harsh chemicals or gases, excessive dirt/debris, and heat will affect motor life. Mechanical factors in the assembly such as side loading of the shaft (linear actuators) or an unbalanced load (rotary motors) will also affect life.

Properly designing a system which minimizes these factors and also insuring the motor is operating within its electrical specifications will ensure maximum motor life. The first step in maximizing life is choosing a motor which has a safety factor of 2 or more. The second step is insuring the system is mechanically sound by minimizing side loading, unbalanced loads, and impact loads. Also insure techniques to allow effective heat dissipation. Air flow around the motor or mounting which provides some heat sinking are effective means to insure the motor operates at a safe temperature.

If these simple, yet effective guidelines are followed, the linear actuators will provide reliable operation over millions of cycles.

Putting It All Together

Figure 8 below is a cross section drawing of a "captive" type linear actuator. Captive indicates that there is already an anti-rotation mechanism built into the actuator through the use of a splined "anti-rotation" shaft and a "captive sleeve." The "captive" configuration is ideal for use in precision liquid drawing/dispensing and proportional valve control. Other forms of linear actuators are "non-captive" and "external linear" as pictured in Figures 9 and 10.

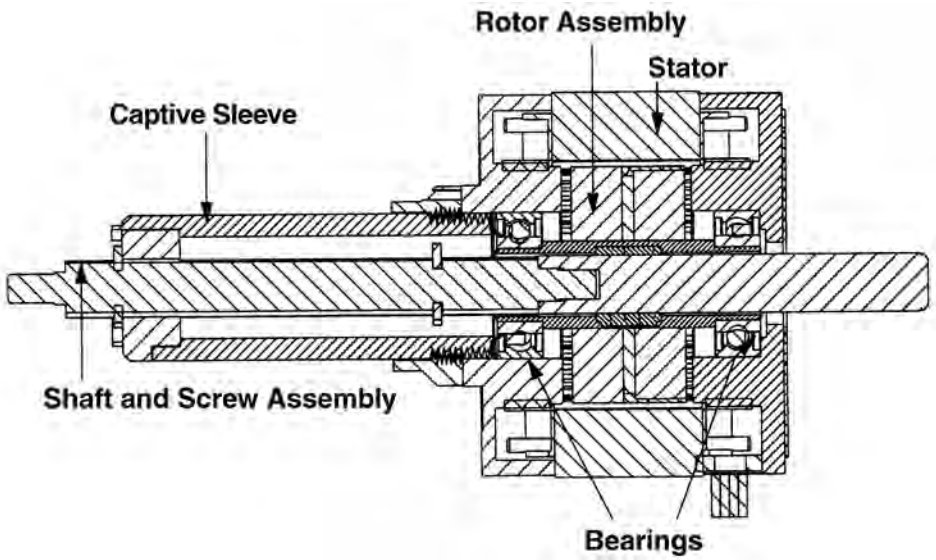


Figure 8.

TYPICAL HYBRID LINEAR ACTUATOR

Captive linear stepping actuator

Figure 9.

HYBRID LINEAR ACTUATORS

Size 17 Series (1.7-in / 43 mm square) captive, non-captive and external linear, available in 1.8 and 0.9 rotational degrees per step.

Figure 10.

CAN-STACK LINEAR ACTUATORS

36000 Series (Ø 1.4-in / 36 mm) Captive, external linear, non-captive available in 15 and 7.5 rotational degrees per step.

All This Theory Is Good, But How Are They Sized?

Sizing a linear actuator is quite easy once you understand the basic needs of the application. The following is the minimum information needed to begin sizing the proper device.

1) Linear force needed to move the load, expressed in Newtons (N)
2) Linear distance the load needs to be moved, expressed in meters (M)
3) Time required to move the load, expressed in seconds (s)
4) Table 1 (next page)
5) Performance curves illustrated in Haydon linear actuator catalogs

Power Requirements

The power required to meet the application is now calculated using the parameters above. This will allow the user to easily choose the correct motor framesize needed.

$$\text{P linear} = \frac{\text{(distance traveled in Meters) (force in Newtons)}}{\text{(Time to travel the distance in Seconds)}} = \text{watts}$$

Once the power is known in watts, choose the proper framesize of the actuator as listed in Table 1 (next page).

All stepper motor linear actuators require a drive to send the pulses to the motor. As seen in the table, the power for both an L/R drive and a chopper drive is listed. Most applications today use an electronic chopper drive. Unless the application is battery powered (as in a hand-held portable device), a chopper drive is highly recommended to get the maximum performance from the linear actuator.

Table 1. Frame Sizes and Performance Based On Required Output Power

Hybrid Single Stack					
				Max. Linear Power (watts)	
Series	Size	Max Force (N)	Linear Travel Per Step (micron)	L/R Drive	Chopper Drive
21000	8	44	1.5 – 40	0.3	0.37
28000	11	90	3 – 50	0.27	0.51
35000	14	220	1.5 – 50	0 .59	1.5
43000	17	220	1.5 – 50	1.02	2.31
57000	23	890	4 – 50	1.47	6
87000	34	2224	12.7 – 127	N/A	21.19

Hybrid Double Stack					
				Max. Linear Power (watts)	
Series	Size	Max Force (N)	Linear Travel Per Step (micron)	L/R Drive	Chopper Drive
21000	8	75	2.5 – 40	N/A	0.76
28000	11	133	3 – 50	N/A	1.14
35000	14	220	15.8 – 127	N/A	2.7
43000	17	337	15.8 – 127	N/A	4.62
57000	23	890	12.7 – 127	N/A	10.08

Can-Stack					
				Max. Linear Power (watts)	
Series	Size Ø (mm)	Max Force (N)	Linear Travel Per Step (micron)	L/R Drive	Chopper Drive
G4 19000	20	50	25 – 100	0.17	0.35
G4 25000	26	90	12.7 – 100	0.26	0.53
G4 37000	36	260	12.7 – 100	0.44	0.66
15000	15	7	20	0.025	0.03
Z20000	20	35	25 – 100	0 .09	0.23
Z26000	26	80	6 – 100	0.18	0.48
36000	36	160	3 – 100	0.23	0.51
46000	46	260	12.7 – 400	0.55	1.13

Velocity

After calculating the mechanical power needed to meet the application requirements, the linear velocity in inches per second is calculated using the following equation.

$$\text{Velocity linear} = \frac{\text{Required travel distance (in)}}{\text{Time to achieve travel (s)}} = \text{in / s}$$

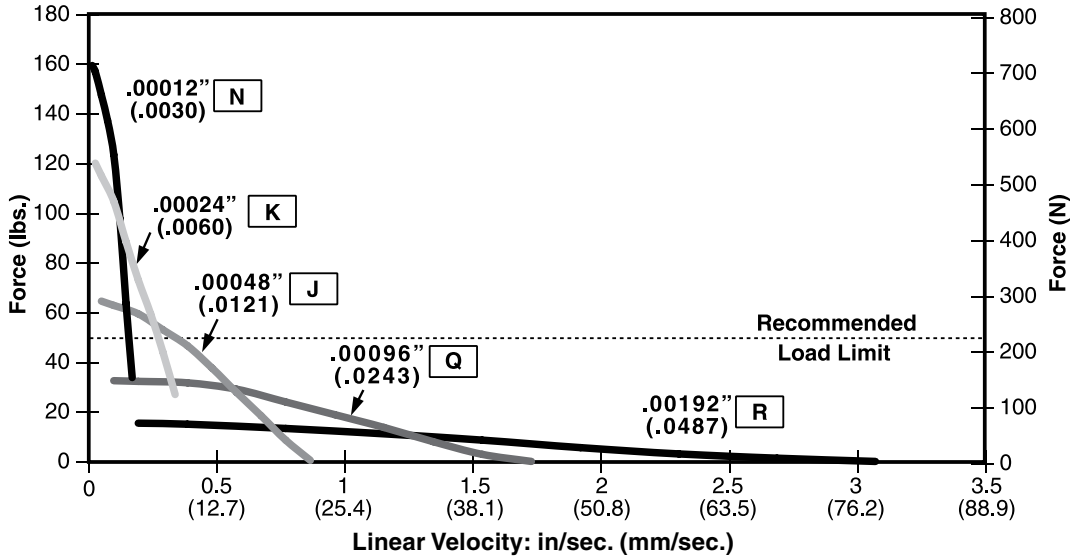
Force vs Linear Velocity Curves

Once the required actuator framesize is determined and the linear velocity is calculated, the "force vs linear velocity curve" is used to determine the proper resolution of the actuator lead-screw.

Figure 11.

FORCE vs LINEAR VELOCITY SIZE 17 SERIES 43000

Ø .218 (5.54 mm) lead-screw, Bipolar, Chopper Drive, 100% Duty Cycle



Actuator Life

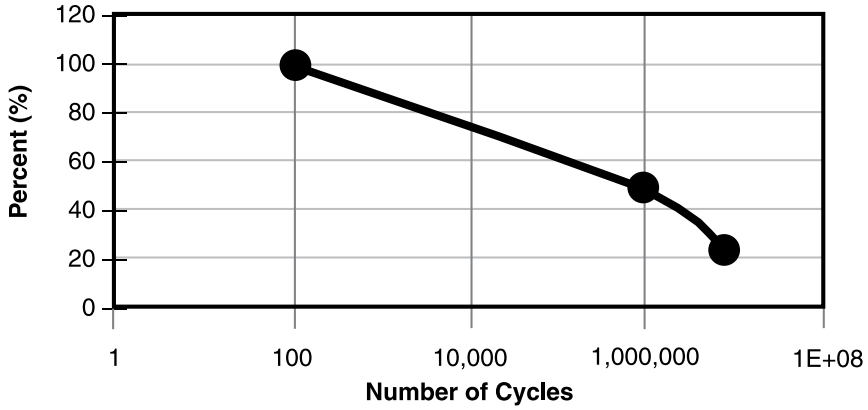
There are many variables that ultimately determine life of the actuator. The best way to predict life is through application testing, which is highly recommended.

There is, however, a first approximation technique that can help estimate this value. The stepper motor prime mover contains no brushes to wear out and also utilize precision long-life ball bearings. The main wear component is the power nut. The number of cycles can be summarized as a function of load, as illustrated in Figure 12 below.

Figure 12.

% RATED LOAD vs NUMBER OF CYCLES

Cycles on a standard stroke actuator



With proper application, Haydon linear actuators deliver up to 20 million cycles and Haydon rotary motors provide up to 25,000 hours of service. Ultimately motor fatigue and resultant life are determined by each customer's unique application. The following definitions are important for understanding motor life and fatigue.

Continuous Duty: Running a motor at its rated voltage.

25% Duty Cycle: Running a motor at double its rated power. The motor is "on" approximately 25% of the time. The motor generates about 60% more output than at rated voltage. Note, duty cycle is not related to the load placed on the motor. Also, there is a 50% reduction when using LC/LE15000 Series motors.

Life: A linear actuator's life is the number of cycles that the motor is able to move at a prescribed load and maintain step accuracy. Rotary motor life is the number of hours of operation. Life axis values should be halved for the LC/LE 15000 Series actuators.

One Cycle: A linear actuator's cycle consists of extending and retracting back to the original position.

EXAMPLE #1

Application Requirements:

Required Force (lbs) =	15 lbs
Required Travel (inches) =	3 in
Time To Achieve Travel (sec) =	6 sec
Desired Cycles =	1,000,000
Linear Velocity (in / sec) =	3 in / 6 sec = 0.5 in / sec

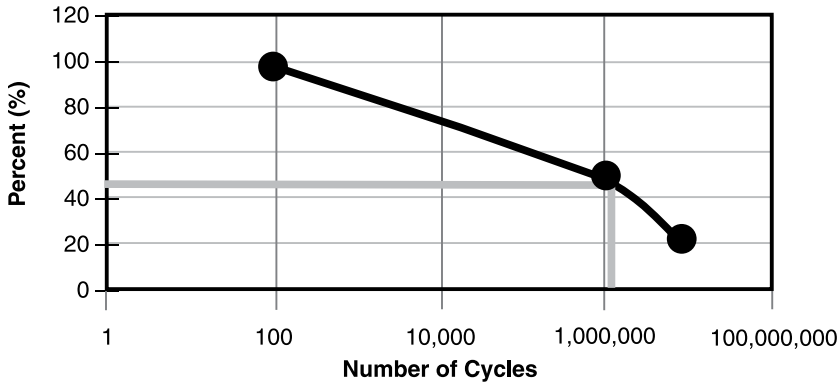
Calculate the initial rated force based on required # of cycles:

Step 1:
Refer to Figure 12 and determine the % wear after 1,000,000 cycles.
This is indicated with the blue line in Figure 13 below.

Figure 13.

LIFE EXPECTANCY

Cycles on a standard stroke actuator



Step 2:
As indicated in the chart, in order to get 1,000,000 cycles, a factor of 0.5 must be used when sizing the actuator. The initial rated force required in order to meet the load after 1,000,000 cycles is therefore…

15 lbs / 0.5 = 30 lbs

Step 3:
Convert lbs to Newtons (N)

30 lbs / (0.225 lbs / N) = 133 N

Determine required travel in meters

3 in x (0.0254 M / in) = 0.0762 M

Choose the proper framesize actuator using the selector chart

Step 1:
Determine the required linear mechanical power in watts

P_{linear} = (133 N x 0.0762 M) / 6 sec = 1.7 N-M / sec = 1.7 watts

Step 2:
Use **Table 1** to determine the correct framesize actuator. As discussed earlier in the paper, most applications will use a chopper drive to supply the required input pulses to the stepper motor. The 43000 (Size 17 Hybrid) was chosen for this application, as highlighted in the **"Hybrid Single Stack"** section of Table 1.

Hybrid Single Stack					
				Max. Linear Power (watts)	
Series	Size	Max Force (N)	Linear Travel Per Step (micron)	L/R Drive	Chopper Drive
21000	8	45	1.5 – 40	0.3	0.37
28000	11	90	3 – 50	0.27	0.51
35000	14	220	1.5 – 50	0 .59	1.5
43000	**17**	220	1.5 – 50	1.02	**2.31**
57000	23	880	4 – 50	1.47	6
87000	34	2200	12.7 – 127	N/A	21.19

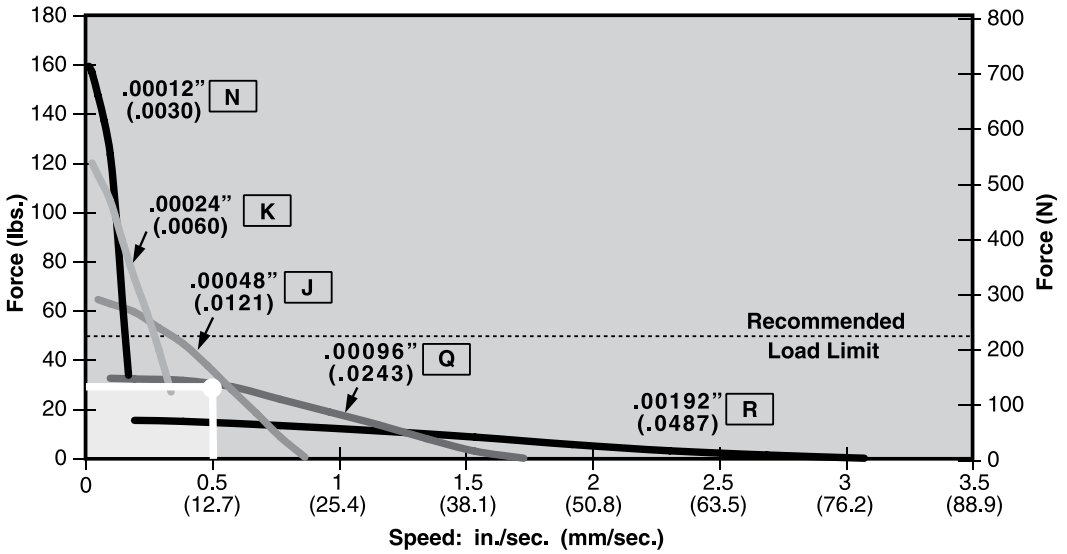
Determine the proper resolution using the "Force vs Linear Velocity" chart

As determined by the life calculation performed above, an initial load of 30 lbs is to be moved at a velocity of 0.5 in / sec. The resulting lead-screw resolution required in the Size 17 hybrid motor is 0.00048" (J resolution), as indicated in figure 14 below.

Figure 14.

FORCE vs LINEAR VELOCITY SIZE 17 SERIES 43000

Ø .218 (5.54 mm) lead-screw, Bipolar, Chopper Drive, 100% Duty Cycle



Verify selection by checking force at the required step rate

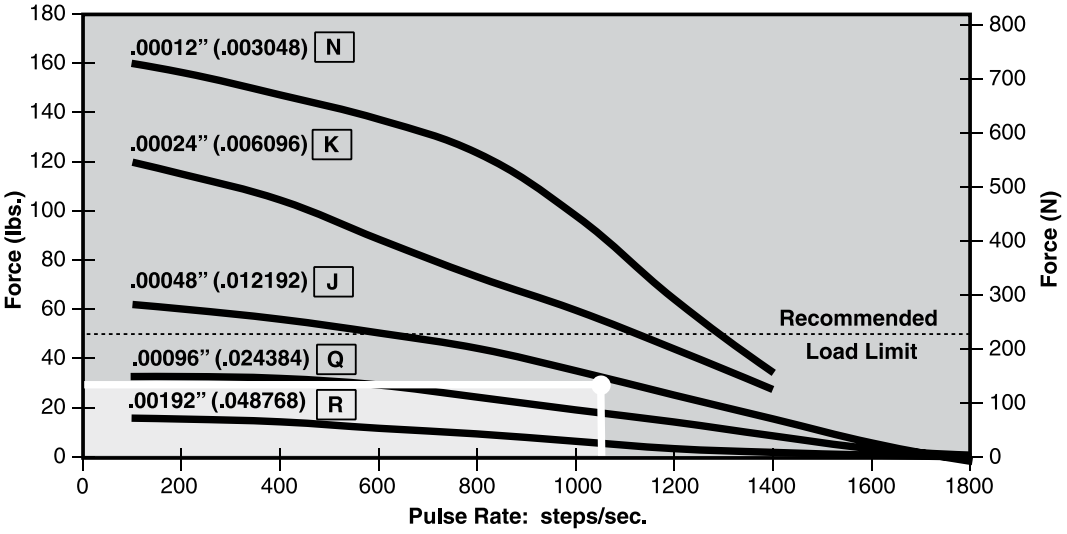
Earlier in the paper, it was discussed that the lead-screw advances based on the number of input steps to the motor. Haydon performance curves are expressed in both "in/sec" (as illustrated in Figure 14) and also in "steps / sec" (Figure 15 below). As an effective check, verify the selection by checking the force at the required step rate.

Resolution chosen	0.00048 in / step ("J" screw)
Req'd linear velocity	0.5 in / sec
Req'd step rate	(0.5 in / sec) / (0.00048 in / step) = 1041 steps / sec

Figure 15.

FORCE vs PULSE RATE SIZE 17 SERIES 43000

Ø .218 (5.54 mm) lead-screw, Bipolar, Chopper Drive, 100% Duty Cycle



Figures 14 and 15 are good illustrations of how the pulses to the stepper motor translate into linear motion through the lead-screw.

EXAMPLE #2

Haydon Kerk Motion Solutions, Inc. offers a line of Double Stack Hybrid Actuators that are designed to meet the needs of higher speed applications. This next example illustrates a typical situation where higher speed is required to perform the motion.

All other application requirements with the exception of the move velocity is unchanged from Example #1.

Application Requirements:

Required Force (lbs) =	15 lbs
Required Travel (inches) =	3 in
Time To Achieve Travel (sec) =	3 sec (modified application requirement)
Desired Cycles =	1,000,000
Linear Velocity (in / sec) =	3 in / 3 sec = 1.0 in / sec (modified linear velocity)

Calculate the initial rated force based on required # of cycles:

Step 1:
Refer to Figure 10 and determine the % wear after 1,000,000 cycles. This is indicated with the blue line in Figure 11. This will be identical to that shown in Sizing Example #1 because the number of desired cycles didn't change.

Step 2:
As indicated in Figure 11, in order to get 1,000,000 cycles, a factor of 0.5 must be used when sizing the actuator. The initial force required in order to meet the load after 1,000,000 cycles is therefore…

15 lbs / 0.5 = 30 lbs *(Unchanged from Example #1)*

Step 3:
Convert lbs to Newtons (N)

30 lbs / (0.225 lbs / N) = 133 N *(Unchanged from Example #1)*

Determine required travel in meters

3 in x (0.0254 M / in) = 0.0762 M (*(Unchanged from Example #1)*

Choose the proper framesize actuator using the selector chart

Step 1:
Determine the required linear mechanical power in watts

P_{linear} = (133N x 0.0762M) / 3s = 3.4 N-M / s = 3.4 watts *(This changed from 1.7 watts needed in Example #1)*

As shown from the result above, the required output power increased by 100% due to the application requirement change from a 6s Time to Achieve Travel (Example #1) to a 3s Time to Achieve Travel.

Step 2:
Assuming the mounting footprint is to remain unchanged (in this case, the Size 17 motor frame), using the Double Stack version of the actuator would easily meet the application requirements. This is highlighted in the **"Hybrid Double Stack"** section of **Table 1**.

Hybrid Double Stack					
				Max. Linear Power (watts)	
Series	**Size**	**Max Force (N)**	**Linear Travel Per Step (micron)**	**L/R Drive**	**Chopper Drive**
21000	8	75	2.5 – 40	N/A	0.76
28000	11	133	3 – 50	N/A	1.14
35000	14	220	15.8 – 127	N/A	2.7
43000	**17**	337	15.8 – 127	N/A	**4.62**
57000	23	890	12.7 – 127	N/A	10.08

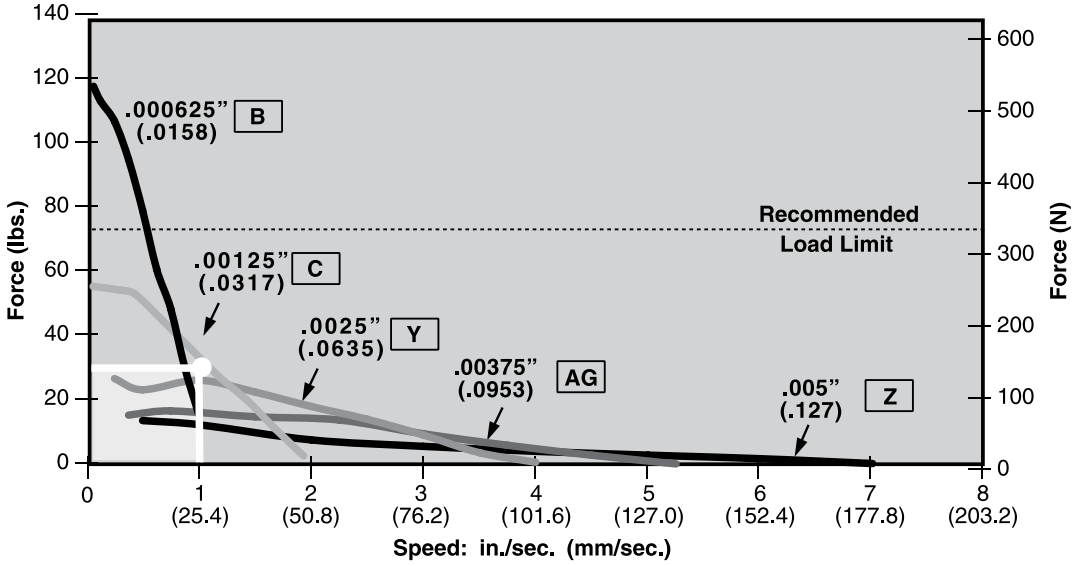
Determine the proper resolution using the "Force vs Linear Velocity" chart

As determined by the life calculation performed above, an initial load of 30 lbs is to be moved at a new velocity of 1.0 in/s. The intercept falls under curve "C". The resulting lead-screw resolution required in the Size 17 double stack hybrid motor is 0.00125" (C resolution), as indicated in Figure 16 below.

Figure 16.

FORCE vs LINEAR VELOCITY SIZE 17 DOUBLE STACK SERIES 43000

Ø .250 (6.35 mm) lead-screw, Bipolar, Chopper Drive, 100% Duty Cycle



Verify selection by checking force at the required step rate

As discussed earlier, Haydon motor performance curves are expressed in both "in/sec" and also in "steps/sec". As an effective check, verify the selection by checking the force at the required step rate.

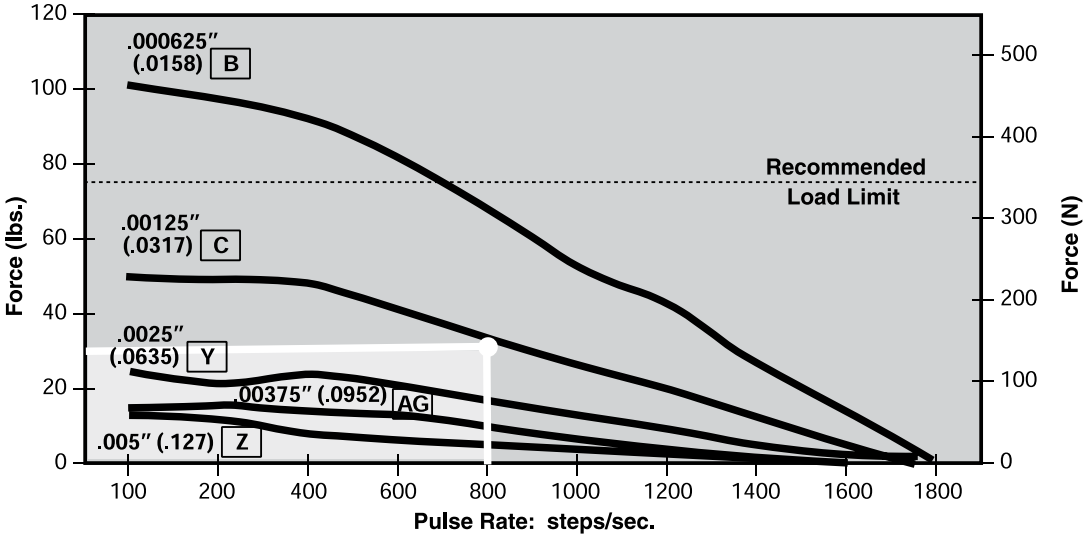
Resolution chosen	0.00125 in / step ("C" screw)
Required linear velocity	1.0 in / sec
Required step rate	(1.0 in / sec) / (0.00125 in / step) = 800 steps / sec

The intercept of the required force and pulse rate (load point) is confirmed to fall under curve "C" as calculated.

Figure 17.

FORCE vs PULSE RATE SIZE 17 DOUBLE STACK SERIES 43000

Ø .250 (6.35 mm) lead-screw, Bipolar, Chopper Drive, 100% Duty Cycle



Resolution, Accuracy, and Repeatability – What's The Difference??

In any linear motion application, the subject of resolution, accuracy, and repeatability inevitability comes up. These terms have very different meanings, but are in many cases, used interchangeably.

Resolution

This is defined as the incremental distance the actuator's output shaft will extend per input pulse.

Resolution is expressed as inches/step. As seen in the curves above, resolutions are available in fractions or subfractions of an inch per step allowing very controlled linear motion.

Resolution = (screw lead) / (360 deg / step angle)

Example: Screw lead = 0.096-in / rev (inch / revolution)
Step angle = 1.8 deg / step

Actuator Resolution = (0.096 in / rev) / (360 deg / (1.8 deg / step) = 0.00048 in / step (use **"J" screw**)

Accuracy

The difference between the theoretical distance and the actual distance traveled. Due to manufacturing tolerances in the individual components of the actuator, the actual travel will be slightly different. The tight design tolerances of the Haydon actuators allow this error to be very small, but nevertheless, it exists. See Figure 18.

For a Haydon® hybrid linear actuator utilizing a screw with a 1-in lead, 360° of rotary motion will result in a theoretical 1-in stoke. In general, the tolerance of a Haydon Hybrid linear actuator with a 1-in move will be +/– 0.0005-in.

Repeatability

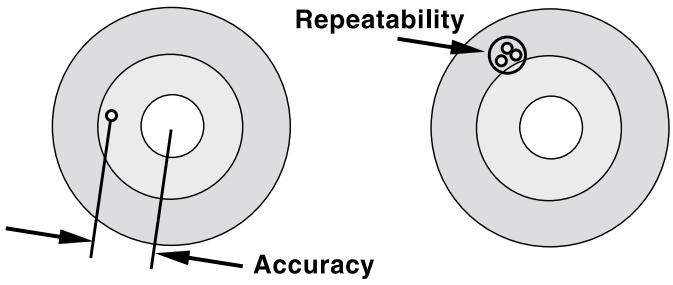
The range of positions attained when the actuator is commanded to approach the same target multiple times under identical conditions.

Example:

Allow the actuator to extend a commanded distance from its home position (starting point). Measure and record this distance and call it "x". Retract the actuator back to its home position. Command the actuator to repeatedly return to the commanded distance "x". The differences between the actual distances traveled and "x" is the repeatability.

Figure 18.

ACCURACY and REPEATABILITY



Resonance

Stepper motors have a natural resonant frequency as a result of the motor being a spring-mass system. When the step rate equals the motor's natural frequency, there may be an audible change in noise made by the motor, as well as an increase in vibration. The resonant point will vary with the application and load, but typically occurs somewhere between 100 and 250 steps per second. In severe cases the motor may lose steps at the resonant frequency. Changing the step rate is the simplest means of avoiding many problems related to resonance in a system. Also, half stepping or micro stepping usually reduces resonance problems. When accelerating/decelerating to speed, the resonance zone should be passed through as quickly as possible.

Selecting The Proper Motor Checklist

In order to select the proper motor several factors must be considered. Is linear or rotary motion required? Following is a list of some of the basic requirements to consider when choosing a motor. This will help determine the best choice of an actuator or a rotary motor.

Rotary Motor	Linear Actuator
How much torque is required?	How much force is required?
What is the duty cycle?	What is the duty cycle?
What is desired step angle?	What is desired step increment?
What is the step rate or RPM?	What is the step rate or speed of travel?
Bipolar or unipolar coils?	Bipolar or unipolar coils?
Coil Voltage?	Coil Voltage?
Detent or holding torque requirements?	Must the screw hold position with power off or must it be "backdrivable"with power off?
Are there size restrictions?	Are there size restrictions?
What is anticipated life requirement?	What is anticipated life requirement?
Temperature of operating environment?	Temperature of operating environment?
Sleeve or ball bearings?	Captive or non-captive shaft?
Radial and axial load?	Type of driver?
Type of driver?	

Drives

Stepper motors require some external electrical components in order to run. These components typically include a power supply, logic sequencer, switching components and a clock pulse source to determine the step rate. Many commercially available drives have integrated these components into a complete package. Some basic drive units have only the final power stage without the controller electronics to generate the proper step sequencing.

Bipolar Drive

This is a very popular drive for a two phase bipolar motor having four leads. In a complete driver/controller the electronics alternately reverse the current in each phase. The stepping sequence is shown on page 70.

Unipolar Drive

This drive requires a motor with a center-tap at each phase (6 leads). Instead of reversing the current in each phase, the drive only has to switch current from one coil to the other in each phase (see page 70). The windings are such that this switching reverses the magnetic fields within the motor. This option makes for a simpler drive but only half of the copper winding is used at any one time. This results in approximately 30% less available torque in a rotary motor or force in a linear actuator as compared to an equivalent bipolar motor.

L/R Drives

This type of drive is also referred to as a constant voltage drive. Many of these drives can be configured to run bipolar or unipolar stepper motors. L/R stands for the electrical relationship of inductance (L) to resistance (R). Motor coil impedance vs. step rate is determined by these parameters. The L/R drive should "match" the power supply output voltage to the motor coil voltage rating for continuous duty operation. Most published motor performance curves are based on full rated voltage applied at the motor leads. Power supply output voltage level must be set high enough to account for electrical drops within the drive circuitry for optimum continuous operation.

Performance levels of most steppers can be improved by increasing the applied voltage for shortened duty cycles. This is typically referred to as "over-driving" the motor. When over-driving a motor, the operating cycle must have sufficient periodic off time (no power applied) to prevent the motor temperature rise from exceeding the published specification.

Chopper Drives

A chopper drive allows a stepper motor to maintain greater torque or force at higher speeds than with an L/R drive. The chopper drive is a constant current drive and is almost always the bipolar type. The chopper gets its name from the technique of rapidly turning the output power on and off (chopping) to control motor current. For this setup, low impedance motor coils and the maximum voltage power supply that can be used with the drive will deliver the best performance. As a general rule, to achieve optimum performance, the recommended ratio between power supply and rated motor voltage is eight to one. An eight to one ratio was used for the performance curves in this catalog.

Microstepping Drives

Many bipolar drives offer a feature called microstepping. Microstepping electronically divides a full step into smaller steps. For instance, if one step of a linear actuator is 0.001 inch, this can be driven to have 10 microsteps per step. In this case, one microstep would normally be 0.0001 inch. Microstepping effectively reduces the step increment of a motor. However, the accuracy of each microstep has a larger percentage of error as compared to the accuracy of a full step. As with full steps, the incremental errors of microsteps are non-cumulative.

Summary

Stepper motors have been used in a wide array of applications for many years. With trends towards miniaturization, computer control and cost reduction, “hybrid” style stepper motor actuators are being used in an ever increasing range of applications. In particular the use of linear actuators has rapidly expanded in recent years. These precise, reliable motors can be found in many applications including blood analyzers and other medical instrumentation, automated stage lighting, imaging equipment, HVAC equipment, valve control, printing equipment, X-Y tables, integrated chip manufacturing, inspection and test equipment. This attractive technical solution eliminates the use of numerous components and the associated costs related to assembly, purchasing, inventory, etc. The applications for these motors are only limited by the designer’s imagination.

Terminology

Detent or residual torque: The torque required to rotate the motor’s output shaft with no current applied to the windings.

Drives: A term depicting the external electrical components to run a Stepper Motor System. This will include power supplies, logic sequencers, switching components and usually a variable frequency pulse source to determine the step rate.

Dynamic torque: The torque generated by the motor at a given step rate. Dynamic torque can be represented by PULL IN torque or PULL OUT torque.

Holding torque: The torque required to rotate the motor’s output shaft while the windings are energized with a steady state D.C. current.

Inertia: The measure of a body’s resistance to acceleration or deceleration. Typically used in reference to the inertia of the load to be moved by a motor or the inertia of a motor’s rotor.

Linear step increment: The linear travel movement generated by the lead-screw with each single step of the rotor.

Maximum temperature rise: Allowable increase in motor temperature by design. Motor temperature rise is caused by the internal power dissipation of the motor as a function of load. This power dissipation is the sum total from I^2R (copper loss), iron (core) loss, and friction. The final motor temperature is the sum of the temperature rise and ambient temperature.

Pulse rate: The number of pulses per second (pps) applied to the windings of the motor. The pulse rate is equivalent to the motor step rate.

Pulses per second (PPS): The number of steps that the motor takes in one second (sometimes called “steps per second”). This is determined by the frequency of pulses produced by the motor drive.

Ramping: A drive technique to accelerate a given load from a low step rate, to a given maximum step rate and then to decelerate to the initial step rate without the loss of steps.

Single step response: The time required for the motor to make one complete step.

Step: The angular rotation produced by the rotor each time the motor receives a pulse. For linear actuators a step translates to a specific linear distance.

Step angle: The rotation of the rotor caused by each step, measured in degrees.

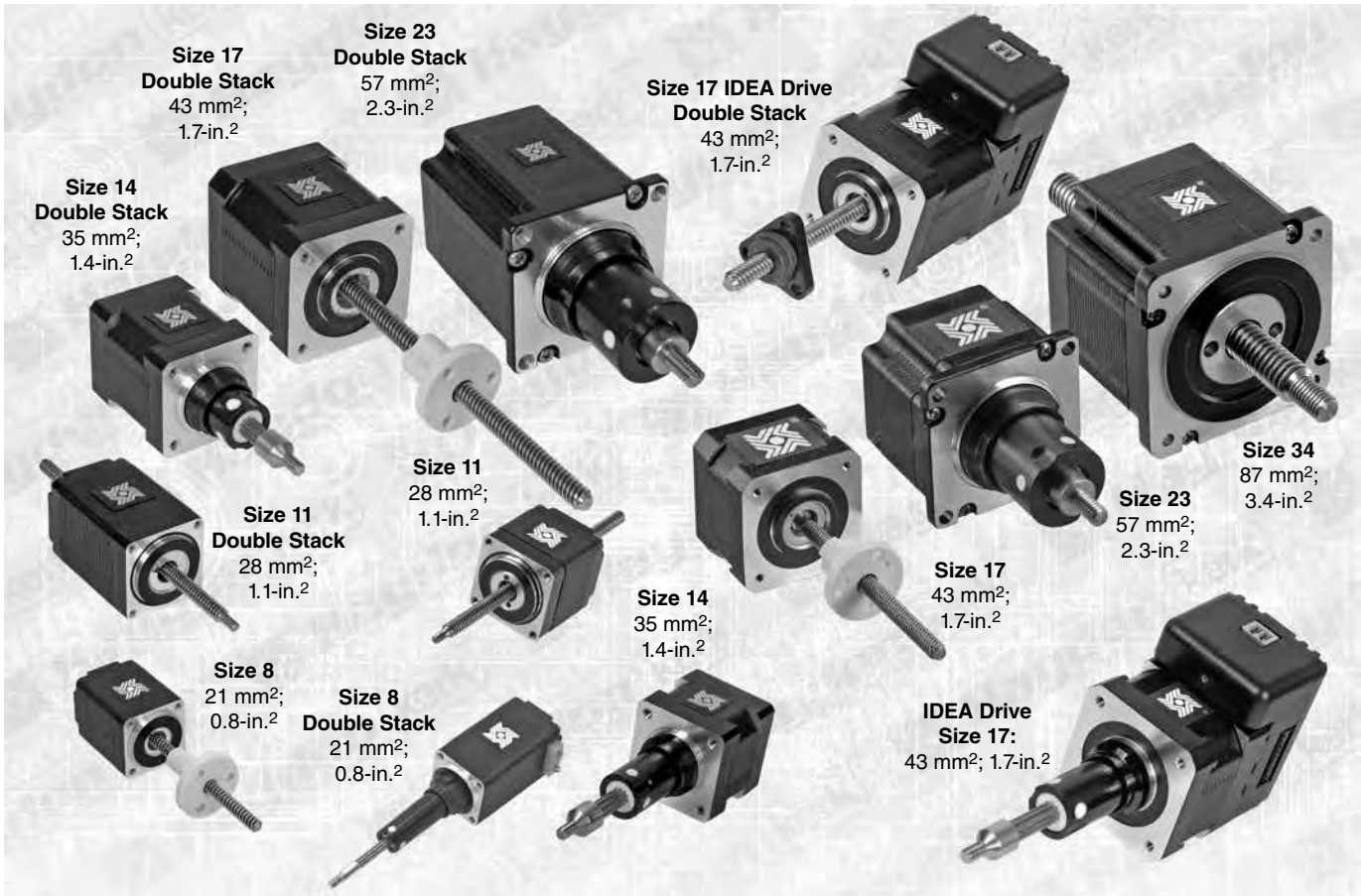
Steps per revolution: The total number of steps required for the rotor to rotate 360°.

Torque: The sum of the frictional load torque and inertial torque.

- **Pull out torque:** The maximum torque the motor can deliver once the motor isrunning at constant speed. Since there is no change in speed there is no inertial torque. Also, the kinetic energy stored in the rotor and load inertia help to increase the pull out torque.
- **Pull in torque:** The torque required to accelerate the rotor inertia and any rigidly attached external load up to speed plus whatever friction torque must be overcome. Pull in torque, therefore, is always less than pull out torque.

Torque to inertia ratio: Holding torque divided by rotor inertia.

Hybrid Linear Actuators



Haydon Kerk Motion Solutions hybrid linear actuators open new avenues for equipment designers who require high performance and exceptional endurance in a very small package. The various designs use a proprietary manufacturing process, which incorporates engineering thermoplastics in the rotor drive nut and a stainless steel lead-screw. This allows the motor to be much quieter, more efficient and more durable than the v-thread and bronze nut configuration commonly used in other actuators. Motor life is improved more than 10 times over the traditional bronze nut style – and it requires no maintenance and does not affect the cost. An additional feature is the bearing preload adjustment which, unlike other designs, does not protrude from the motor configuration commonly used in other actuators.

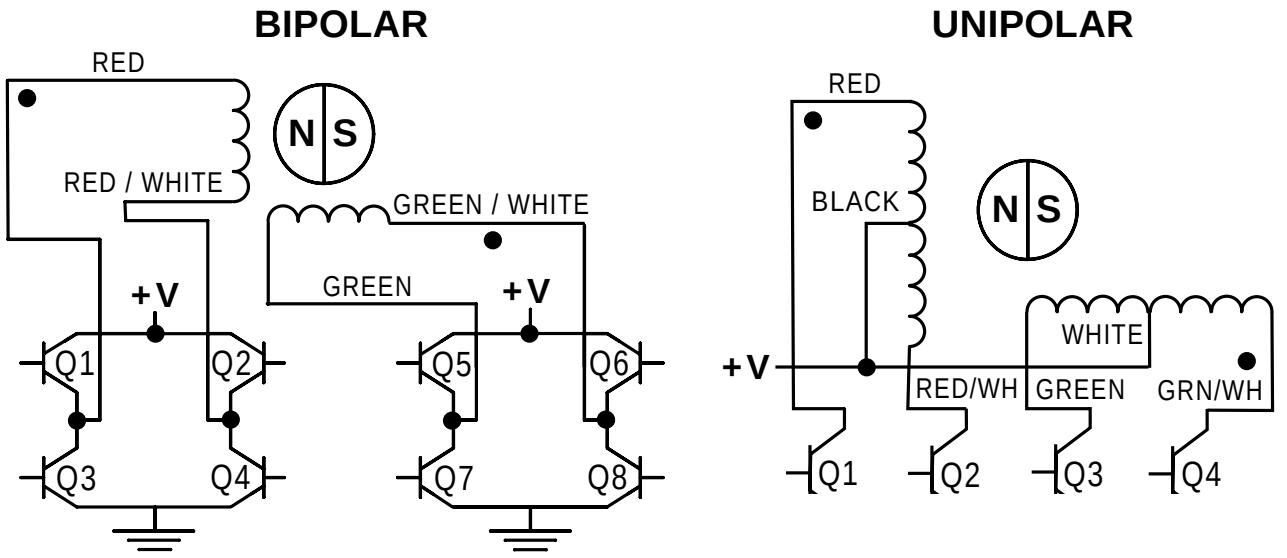
The hybrid actuators come in six sizes, from 21 mm square to 87 mm square. Each size has three designs available – captive, non-captive and an external linear version. Haydon also offers a series of Double Stack enhanced performance hybrid linear actuators available in sizes from 21 mm to 57 mm square. An integrated, programmable IDEA™ Drive is available for the Size 17 (43 mm) hybrid and Double Stack hybrid motors.

There are 28 different travels per step available, from .00006 inch (.001524 mm) to .005 inch (.127 mm). Micro stepping can be used for even finer resolution. Our 87 mm actuator delivers up to 500 pounds (2224 N) of force.

These linear actuators are ideal for applications requiring a combination of precise positioning, rapid motion and long life.

Typical applications include X-Y tables, medical equipment, semiconductor handling, telecommunications equipment, valve control, and numerous other uses. Sold at competitive prices, this product is an excellent value for incorporation into your next project. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design these motors to meet your specific application needs. Lead time for standard prototype designs is usually 2 to 3 days, and 4 to 6 weeks for production orders.

Hybrid Linear Actuator: Bipolar and Unipolar Wiring



Hybrid Linear Actuator: Bipolar and Unipolar Stepping Sequence

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Unipolar	Q1	Q2	Q3	Q4
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

EXTEND CW ↓

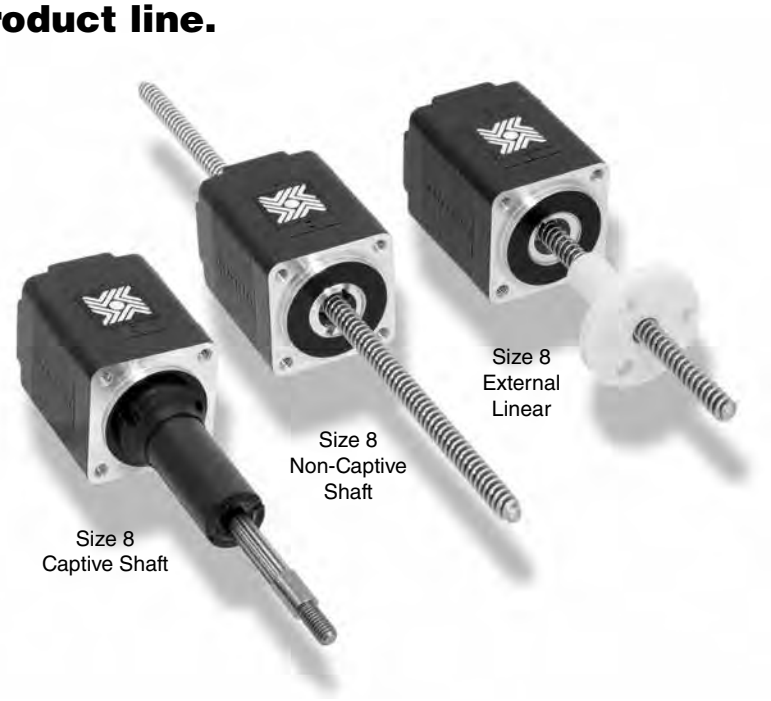
RETRACT CCW ↑

Note: Half stepping is accomplished by inserting an off state between transitioning phases.

One of the world's smallest linear actuators, the Size 8 precision motor is a recent addition to our extensive, award winning miniature stepper motor product line.

Equipment designers and engineers now have an even more compact option for their motion applications. The Haydon® 21000 Series Size 8 linear actuator occupies a minimal 0.8" (21 mm) space and includes numerous patented innovations that provide customers high performance and endurance in a very small package.

Three designs are available, captive, non-captive and external linear versions. The 21000 Series is available in a wide variety of resolutions - from 0.00006" (.0015 mm) per step to 0.00157" (0.04 mm) per step. The Size 8 actuator delivers thrust of up to 10 lbs. (44 N).



Specifications

Size 8: 21 mm (0.8-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	21H4 ■–■■–■■■†		
	Non-captive	21F4 ■–■■–■■■†		
	External Lin.	E21H4 ■–■■–■■■†		
Wiring		Bipolar		
Winding Voltage		2.5 VDC	5 VDC	7.5 VDC
Current (RMS)/phase		.49 A	.24 A	.16 A
Resistance/phase		5.1 Ω	20.4 Ω	45.9 Ω
Inductance/phase		1.5 mH	5.0 mH	11.7 mH
Power Consumption		2.45 W Total		
Rotor Inertia		1.4 gcm^2		
Insulation Class		Class B (Class F available)		
Weight		1.5 oz (43 g)		
Insulation Resistance		20 MΩ		

† Part numbering information on page 72.

Linear Travel / Step Screw Ø.14-in(3.56 mm) inches	mm	Order Code I.D.
.00006	.0015*	U**
.000098*	.0025	AA**
.00012	.0030*	N
.00019*	.005	AB
.00024	.006*	K
.00039*	.01	AC
.00048	.0121*	J
.00078*	.02	AD
.00157*	.04	AE

*Values truncated
**TFE coating not available

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Identifying the Hybrid part number codes when ordering

Haydon Kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

E	21	H	4	AB	–	7.5	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor

Series number designation

21 = 21000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)

Code ID Resolution Travel/Step

U* = .00006-in (.0015)
AA* = .000098-in (.0025)
N = .00012-in (.0030)
AB = .00019-in (.005)
K = .00024-in (.006)
AC = .00039-in (.01)
J = .00048-in (.0121)
AD = .00078-in (.02)
AE = .00157-in (.04)

**TFE not available*

Voltage

2.5 = 2.5 VDC
05 = 5 VDC
7.5 = 7.5 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 73.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

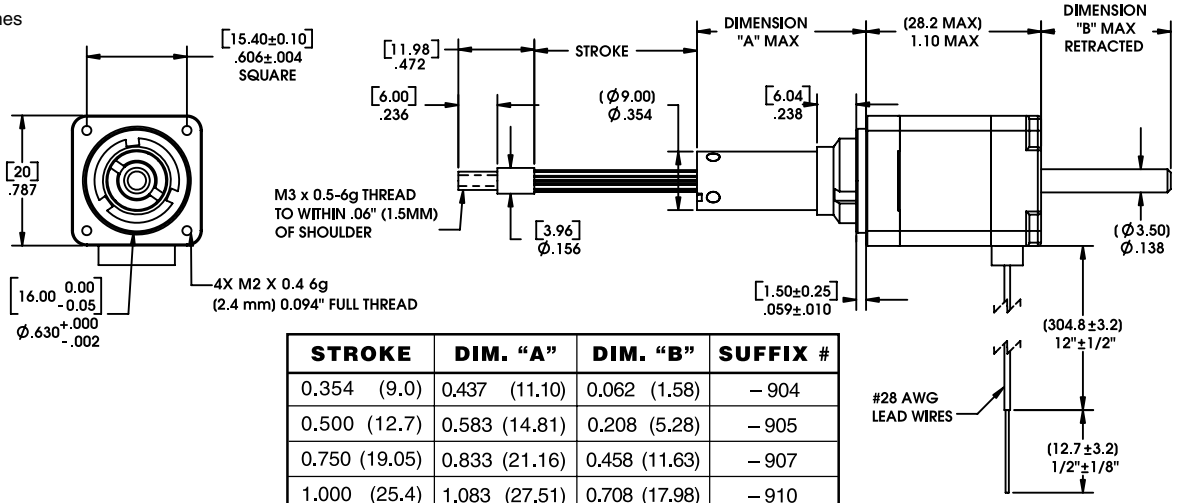
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other
OPTIONAL ASSEMBLIES
also available

Captive Lead-screw

Dimensions = (mm) inches

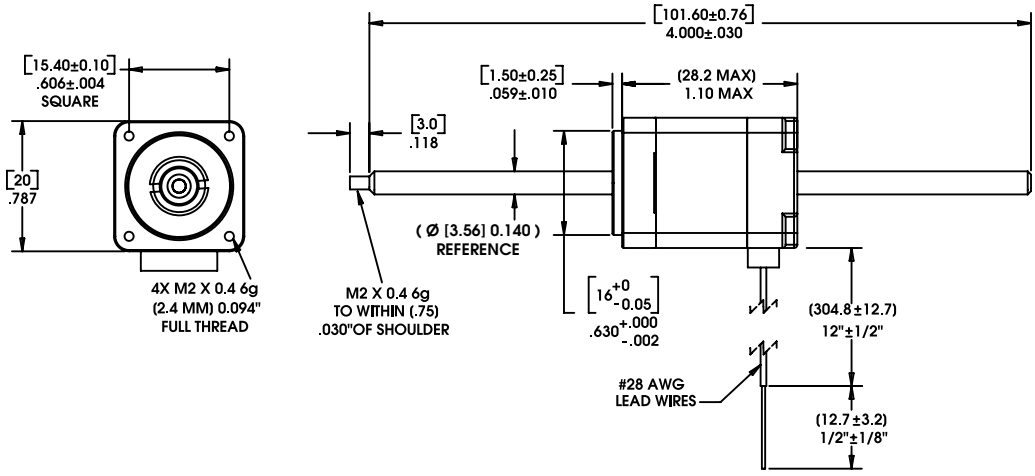


STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.354 (9.0)	0.437 (11.10)	0.062 (1.58)	– 904
0.500 (12.7)	0.583 (14.81)	0.208 (5.28)	– 905
0.750 (19.05)	0.833 (21.16)	0.458 (11.63)	– 907
1.000 (25.4)	1.083 (27.51)	0.708 (17.98)	– 910
1.250 (31.8)	1.333 (33.86)	0.958 (24.33)	– 912
1.500 (38.1)	1.583 (40.21)	1.208 (30.68)	– 915

Non-Captive Lead-screw

Dimensions = (mm) inches

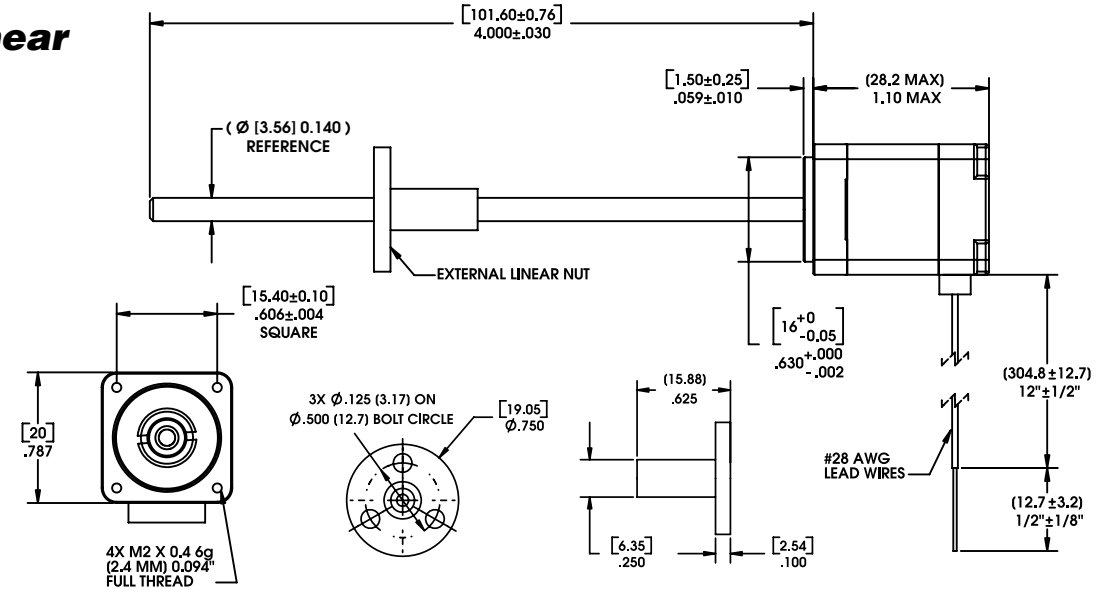
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.



External Linear

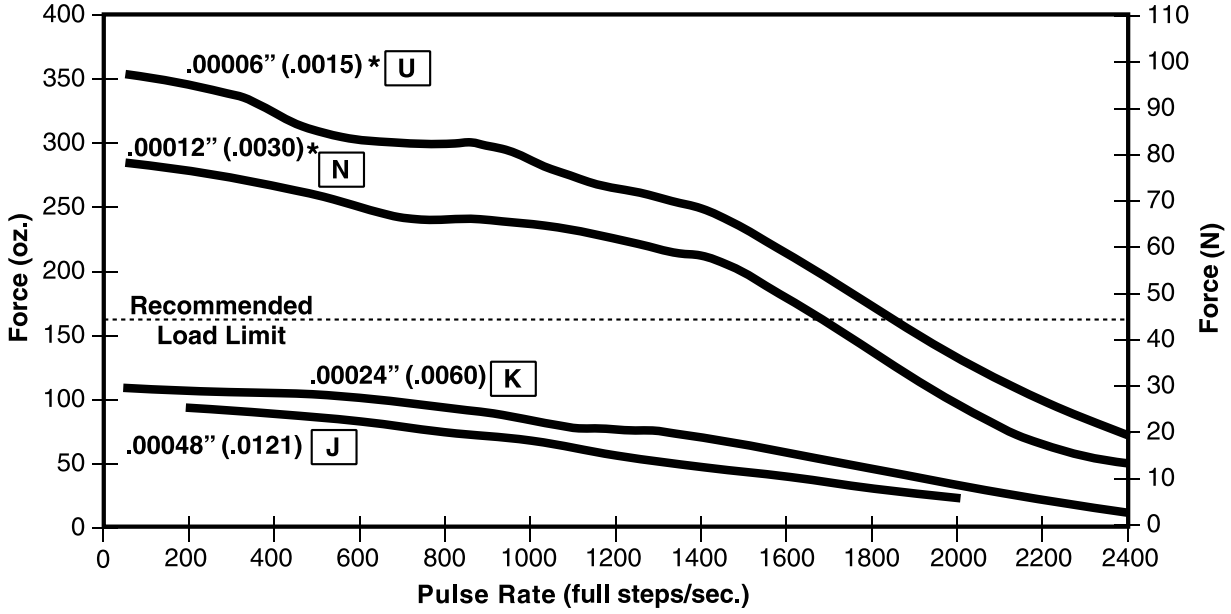
Dimensions = (mm) inches

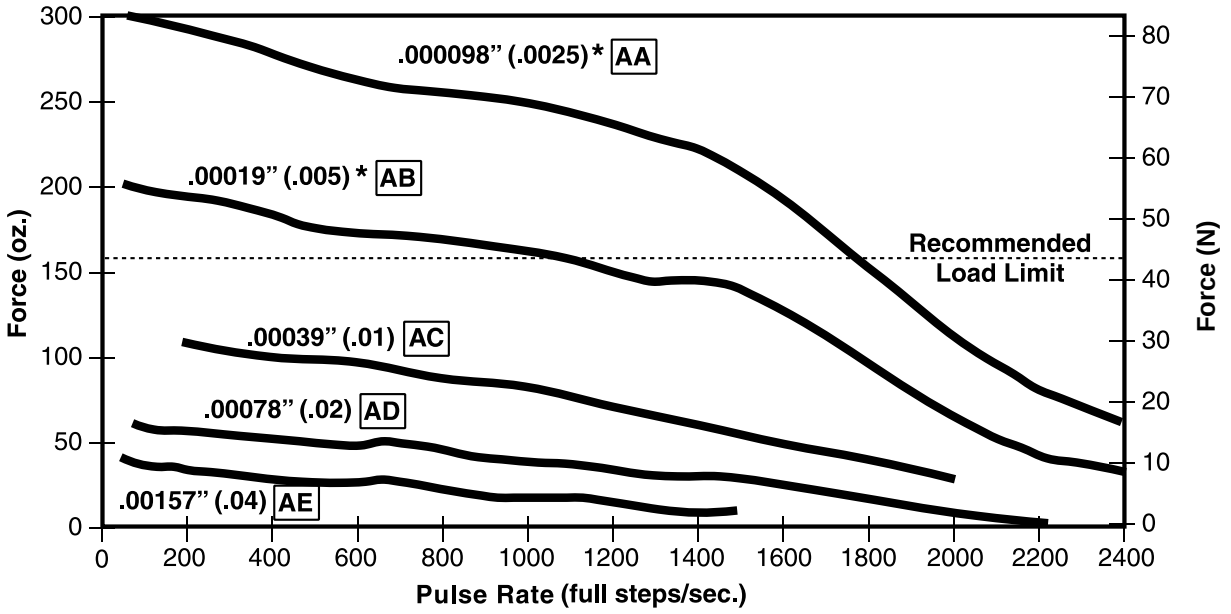
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.



FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .14 (3.56) Lead-screw





*Care should be taken when utilizing these screw pitches to ensure that the physical load limits of the motor are not exceeded. Please consult the factory for advice in selecting the proper pitch for your application.

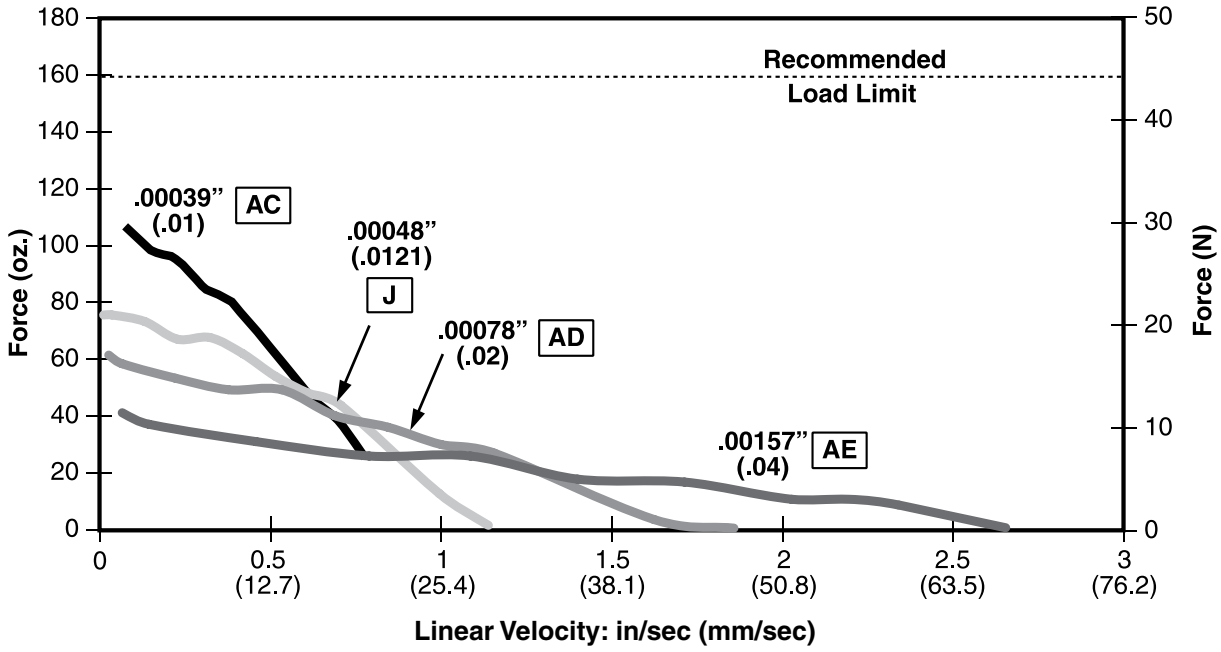
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

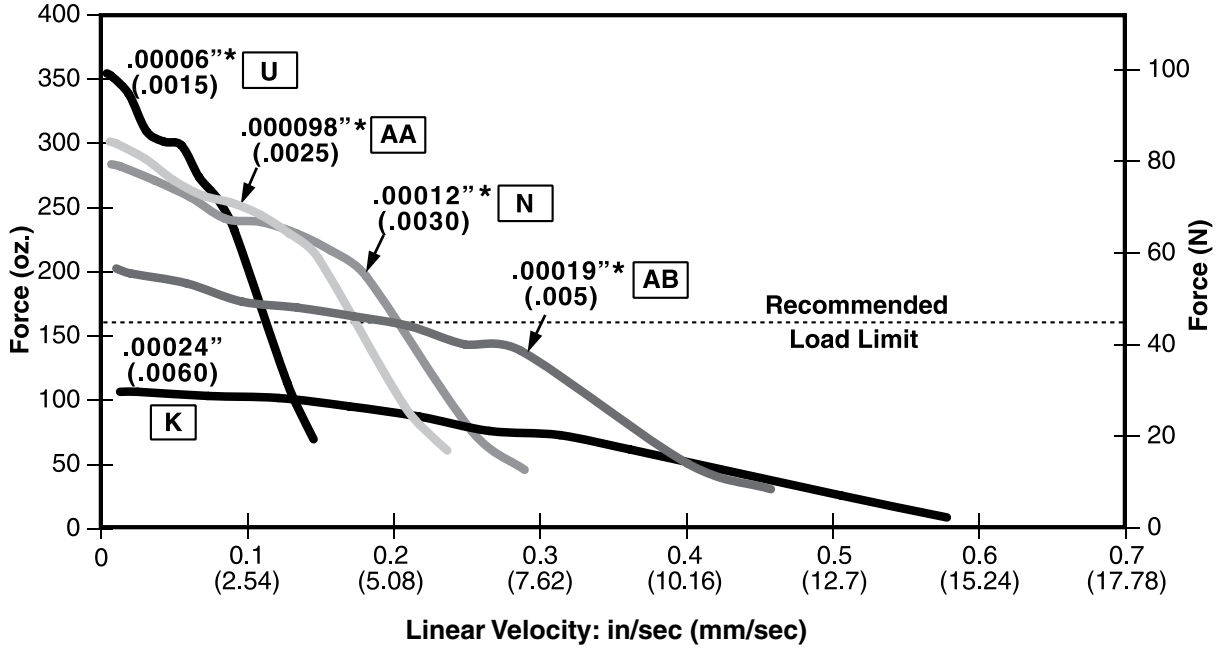
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .14 (3.56) Lead-screw





*Care should be taken when utilizing these screw pitches to ensure that the physical load limits of the motor are not exceeded. Please consult the factory for advice in selecting the proper pitch for your application.

NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® 21000 Series Size 8 Double Stack hybrid linear actuators provide enhanced performance over a single stack.

Size 8 Double Stack models deliver improved performance and new linear motion design opportunities in a 20 mm frame size.

Three designs are available, captive, non-captive and external linear versions. The 21000 Series is available in a wide variety of resolutions - from 0.000098 in (.0025 mm) per step to 0.00157 in (0.04 mm) per step. The Size 8 actuator delivers thrust of up to 17 lbs. (75 N).

Assembly options include:
Incremental encoders, proximity sensors (captive types only), anti-backlash and custom nuts, and TFE coated lead-screws.

Specifications

Size 8 Double Stack: 21 mm (0.8-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	21M4 ■–■■–■■■ †		
	Non-captive	21L4 ■–■■–■■■ †		
	External Lin.	E21M4 ■–■■–■■■ †		
Wiring		Bipolar		
Winding voltage		2.5 VDC	5 VDC	7.5 VDC
Current (RMS)/phase		1.32 A	.65 A	.43 A
Resistance/phase		1.9 Ω	7.7 Ω	17.3 Ω
Inductance/phase		0.8 mH	3.2 mH	6.1 mH
Power consumption		6.5 W Total		
Rotor inertia		2.6 gcm²		
Insulation Class		Class B (Class F available)		
Weight		2.4 oz (68 g)		
Insulation resistance		20 MΩ		

† Part numbering information on page 77.

Linear Travel / Step Screw Ø.14-in(3.56 mm) inches	mm	Order Code I.D.
.000098*	.0025	AA
.00012	.0030*	N
.00019*	.005	AB
.00024	.006*	K
.00039*	0.01	AC
.00048	.0121*	J
.00078*	.02	AD
.00157*	.04	AE

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Identifying the Hybrid part number codes when ordering

E	21	M	4	N	–	2.5	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor

Series number designation

21 = 21000

(Series numbers represent approximate width of motor body)

Style

L = 1.8° Non-captive
M = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)

Code ID Resolution Travel/Step

AA* = .000098-in (.0025)
N = .00012-in (.0030)
AB = .00019-in (.005)
K = .00024-in (.006)
AC = .00039-in (.01)
J = .00048-in (.0121)
AD = .00078-in (.02)
AE = .00157-in (.04)

**TFE not available*

Voltage

2.5 = 2.5 VDC
05 = 5 VDC
7.5 = 7.5 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 78.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

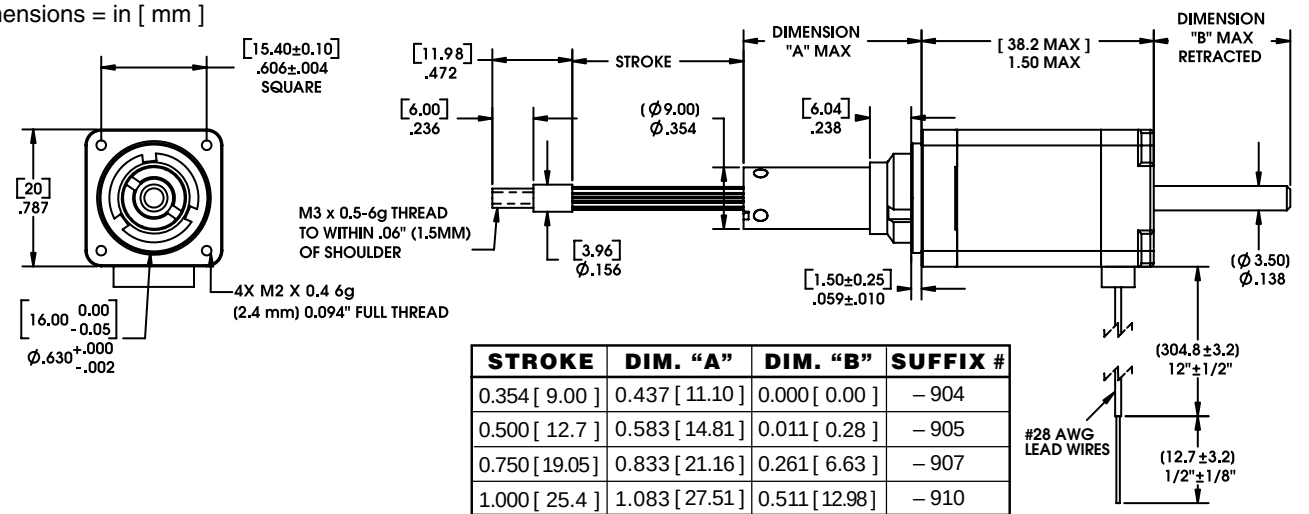
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = in [mm]

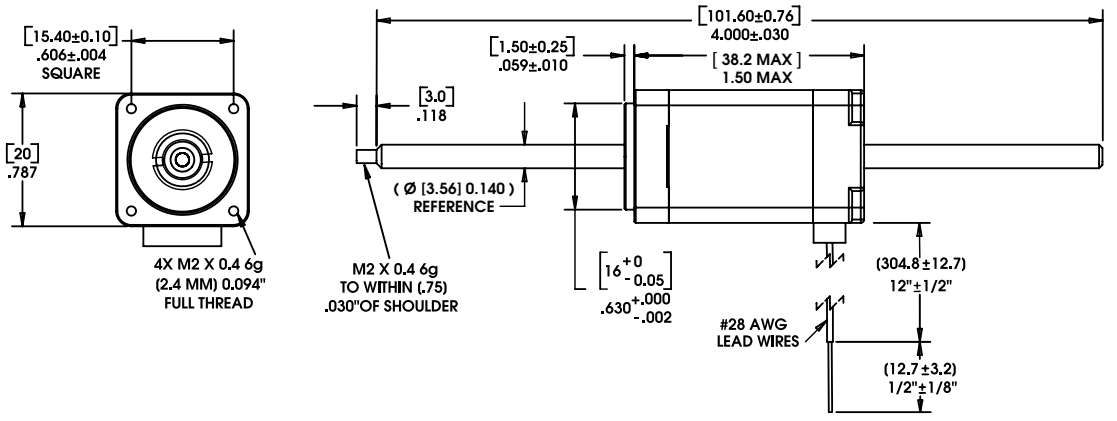


STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.354 [9.00]	0.437 [11.10]	0.000 [0.00]	– 904
0.500 [12.7]	0.583 [14.81]	0.011 [0.28]	– 905
0.750 [19.05]	0.833 [21.16]	0.261 [6.63]	– 907
1.000 [25.4]	1.083 [27.51]	0.511 [12.98]	– 910
1.250 [31.8]	1.333 [33.86]	0.761 [19.33]	– 912
1.500 [38.1]	1.583 [40.21]	1.011 [25.68]	– 915

Non-Captive Lead-screw

Dimensions = in [mm]

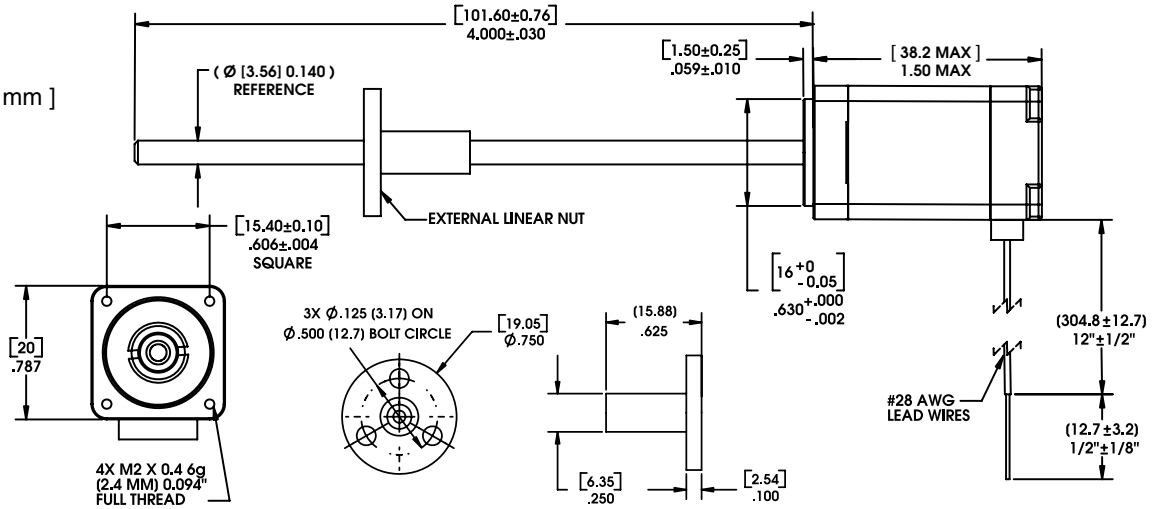
Up to 6 in (152 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = in [mm]

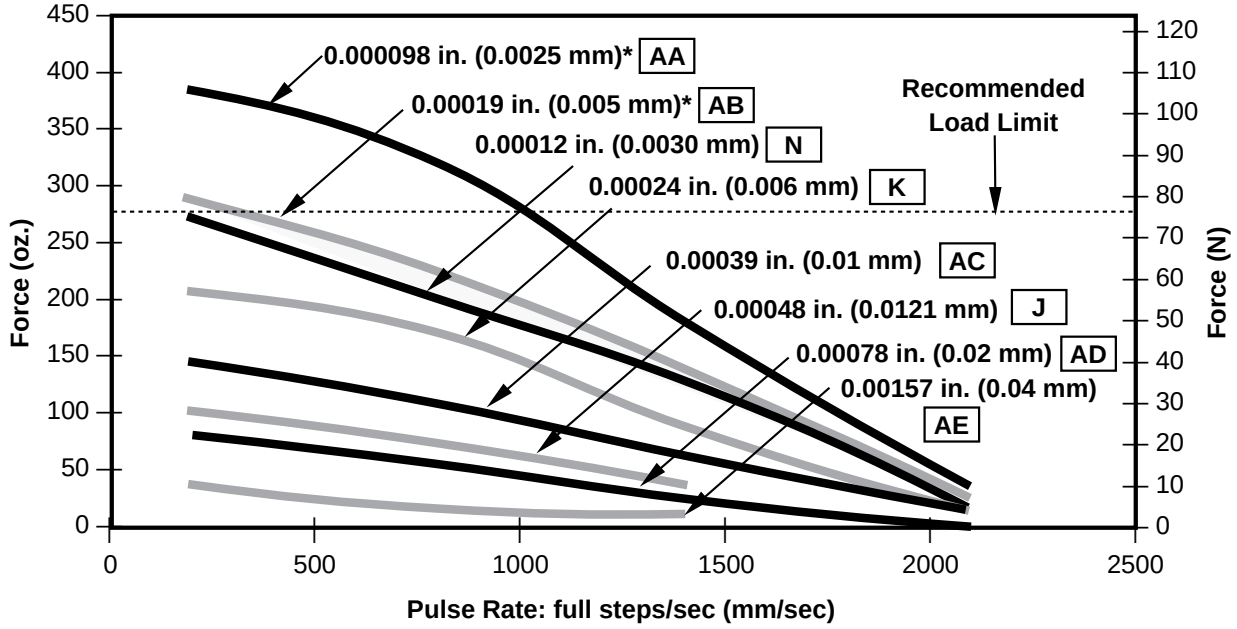
Up to 6 in (152 mm) standard screw lengths. Longer screw lengths are available.



FORCE vs PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage

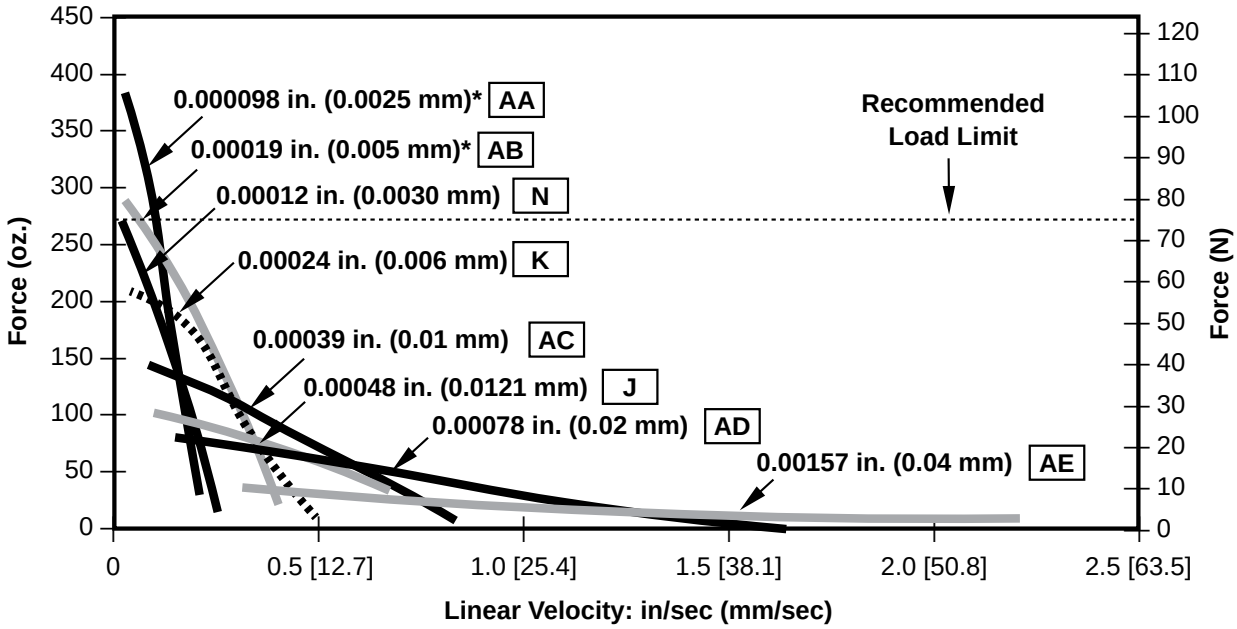
Ø .14 (3.56) Lead-screw



FORCE vs LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage

Ø .14 (3.56) Lead-screw



*Care should be taken when utilizing these screw pitches to ensure that the physical load limits of the motor are not exceeded. Please consult the factory for advice in selecting the proper pitch for your application.

NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

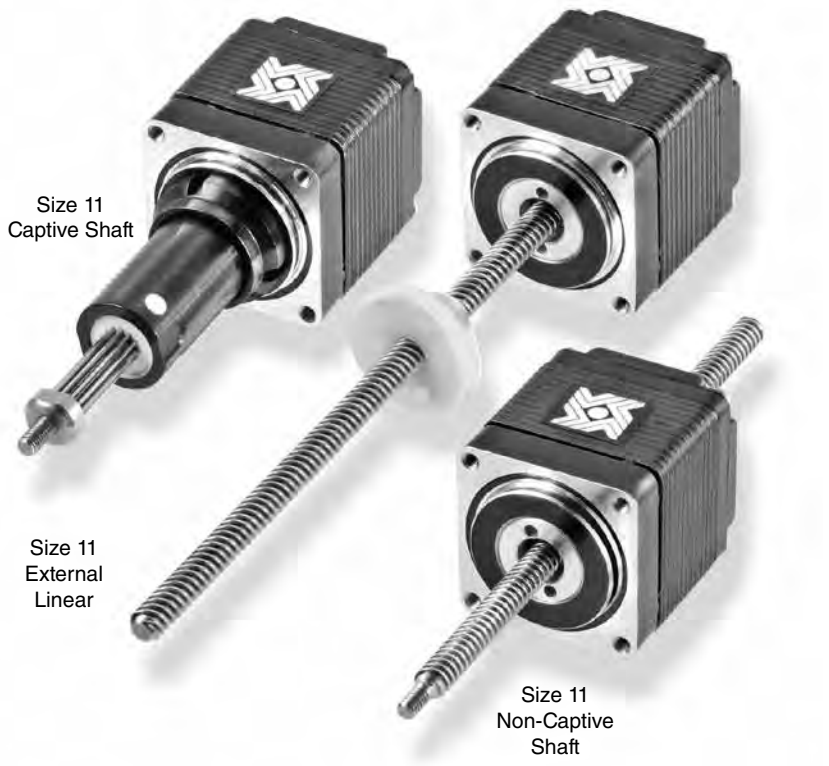
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® brand Size 11 hybrid linear actuators offer compact, production-proven precision in motion.

The various patented designs deliver high performance, opening avenues for equipment designers who require performance and endurance in a very small package.

Three designs are available, captive, non-captive and external linear versions. The 28000 Series is available in a wide variety of resolutions - from 0.000125-in (.003175 mm) per step to 0.002-in (.0508 mm) per step. The Size 11 actuator delivers thrust of up to 20 lbs. (90 N).



Specifications

Size 11: 28 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	28H4 ■–■■–■■■†			28H6 ■–■■–■■■†	
	Non-captive	28F4 ■–■■–■■■†			28F6 ■–■■–■■■†	
	External Lin.	E28H4 ■–■■–■■■†			E28H6 ■–■■–■■■†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.1 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.0 A	0.42 A	0.18 A	0.42 A	0.18 A
Resistance/phase		2.1 Ω	11.9 Ω	68.6 Ω	11.9 Ω	68.6 Ω
Inductance/phase		1.5 mH	6.7 mH	39.0 mH	3.3 mH	19.5 mH
Power Consumption		4.2 W				
Rotor Inertia		9.0 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		4.2 oz (119 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø.1875"(4.76mm) inches	mm	Order Code I.D.
.000125	.0031*	7
.00025	.0063*	9
.0005	.0127	3
.001	.0254	1
.002	.0508	2

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

† Part numbering information on page 81

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Identifying the Hybrid part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

E	28	H	4	7	–	05	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

28 = 28000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.0508)
3 = .0005-in (.0127)
7 = .000125-in (.0031)
9 = .00025-in (.0063)

Voltage

2.1 = 2.1 VDC (Bipolar only)
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 82.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

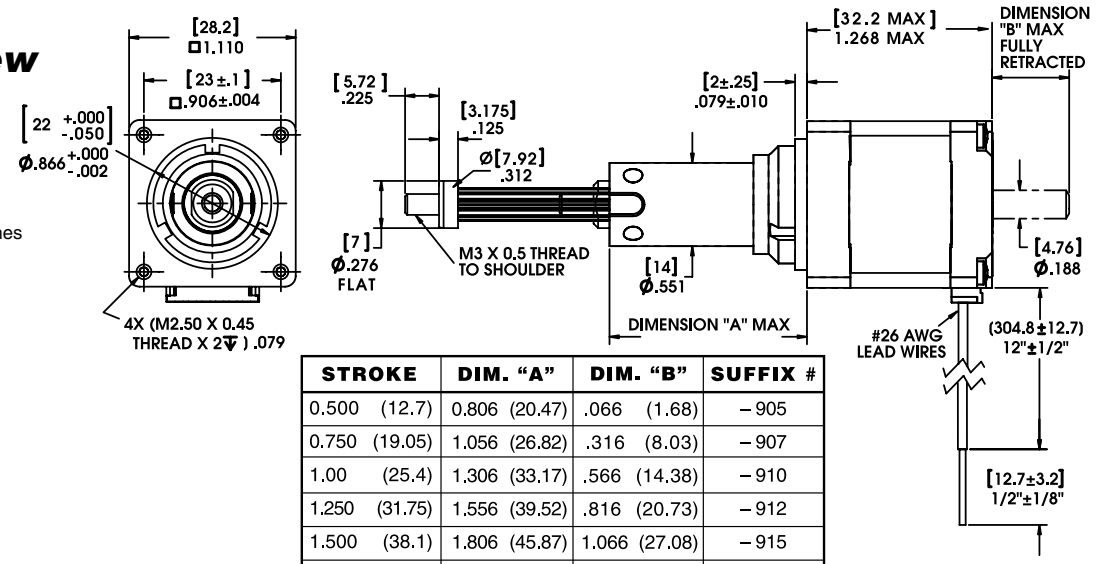
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches



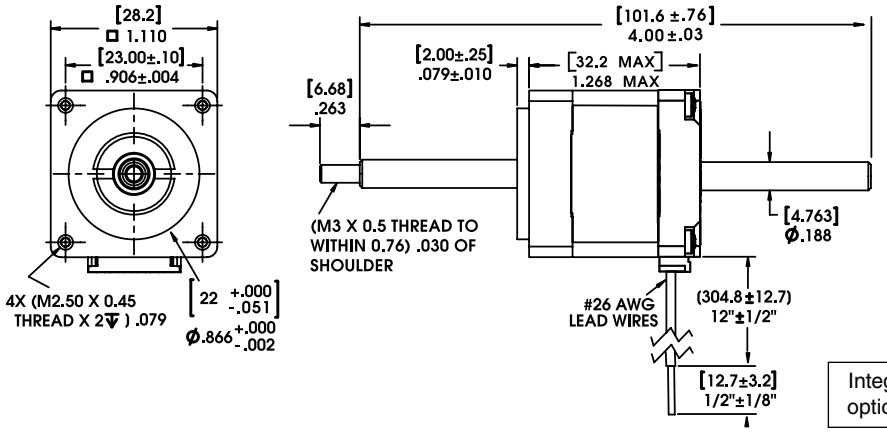
STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.500 (12.7)	0.806 (20.47)	.066 (1.68)	–905
0.750 (19.05)	1.056 (26.82)	.316 (8.03)	–907
1.00 (25.4)	1.306 (33.17)	.566 (14.38)	–910
1.250 (31.75)	1.556 (39.52)	.816 (20.73)	–912
1.500 (38.1)	1.806 (45.87)	1.066 (27.08)	–915
2.00 (50.8)	2.306 (58.57)	1.566 (39.78)	–920
2.500 (63.5)	2.806 (71.27)	2.066 (52.48)	–925

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 8-in (203 mm) standard screw lengths. Longer screw lengths are available.

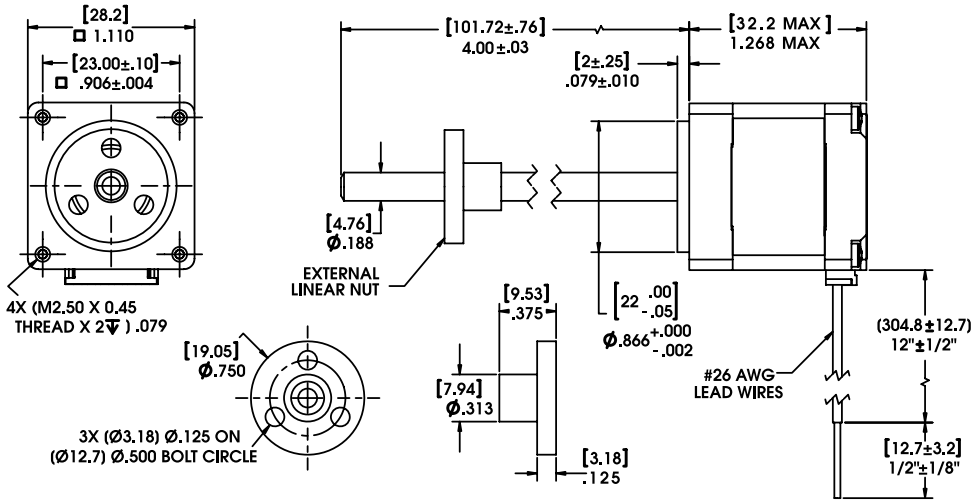


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

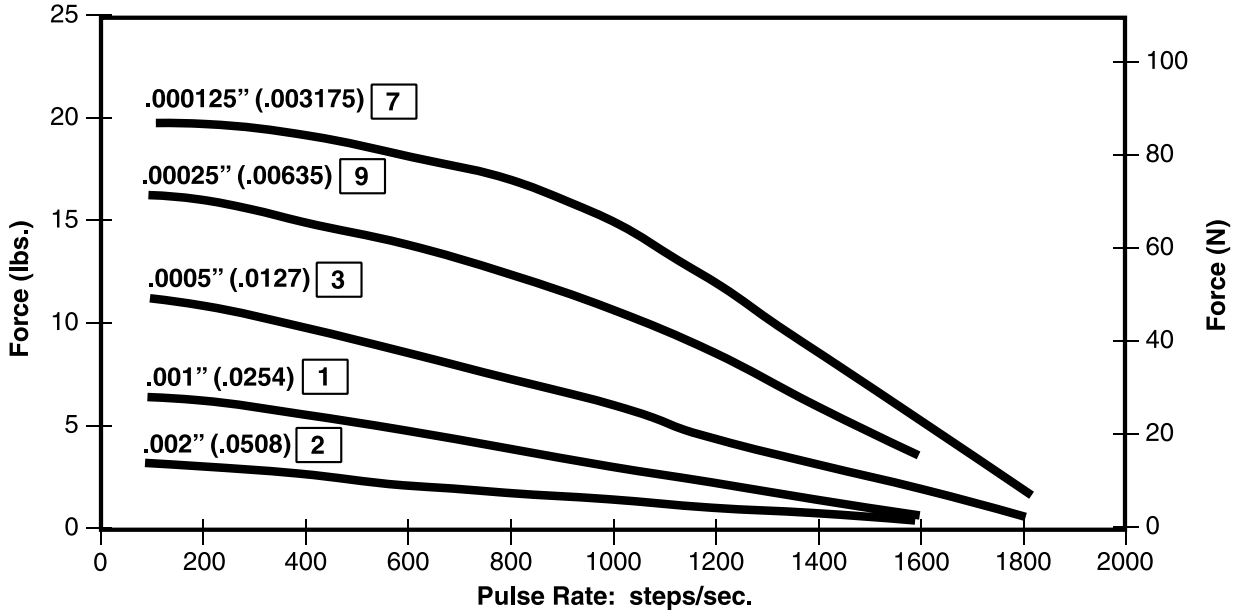
Up to 8-in (203 mm) standard screw lengths. Longer screw lengths are available.



Integrated connector option, see page 117

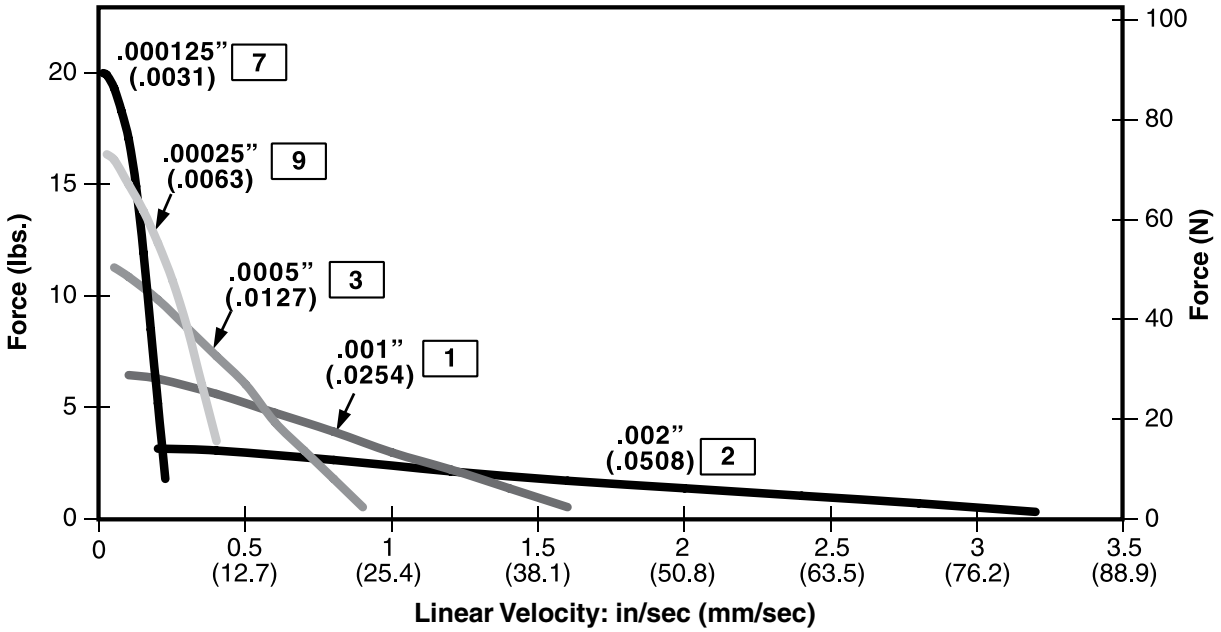
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .187 (4.75) Lead-screw



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .187 (4.75) Lead-screw



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

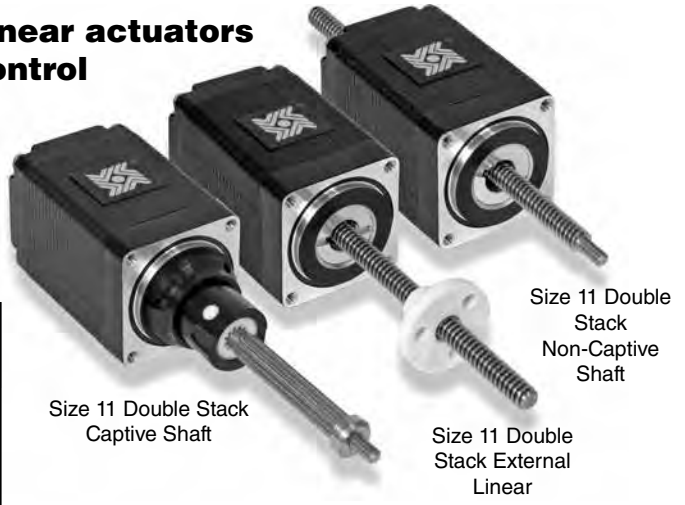
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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

Haydon® Size 11 Double Stack hybrid linear actuators for enhanced performance in motion control

Three designs are available, captive, non-captive and external linear versions. The 28000 Series is available in a wide variety of resolutions - from 0.000125-in (.003175 mm) per step to 0.002-in (.0508 mm) per step. The Size 11 actuator delivers thrust of up to 30 lbs. (133 N).



Specifications

Size 11: 28 mm (1.1-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	28M4 ■ – ■■ – ■■■ †		
	Non-captive	28L4 ■ – ■■ – ■■■ †		
	External Lin.	E28M4 ■ – ■■ – ■■■ †		
Wiring		Bipolar		
Winding Voltage		2.1 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.9 A	750 mA	313 mA
Resistance/phase		1.1 Ω	6.7 Ω	34.8 Ω
Inductance/phase		1.1 mH	5.8 mH	35.6 mH
Power Consumption		7.5 W Total		
Rotor Inertia		13.5 gcm²		
Insulation Class		Class B (Class F available)		
Weight		5.8 oz (180 g)		
Insulation Resistance		20 MΩ		

† Part numbering information below.

Linear Travel / Step Screw Ø.1875"(4.76mm) inches	mm	Order Code I.D.
.000125	.0031*	7
.00025	.0063*	9
.0005	.0127	3
.001	.0254	1
.002	.0508	2

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Hybrid part number codes when ordering

E	28	M	4	7	–	05	–	910

Prefix (include only when using the following)
- **A** = A Coil (See AC Synchronous page 189)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Switch

Series number designation

28 = 28000

(Series numbers represent approximate width of motor body)

Style
- **L** = 1.8° Non-captive
- **M** = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils
- **4** = Bipolar (4 wire)

Code ID Resolution Travel/Step
- **1** = .001-in (.0254)
- **2** = .002-in (.0508)
- **3** = .0005-in (.0127)
- **7** = .000125-in (.0031)
- **9** = .00025-in (.0063)

Voltage
- **2.1** = 2.1 VDC
- **05** = 5 VDC
- **12** = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 85.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

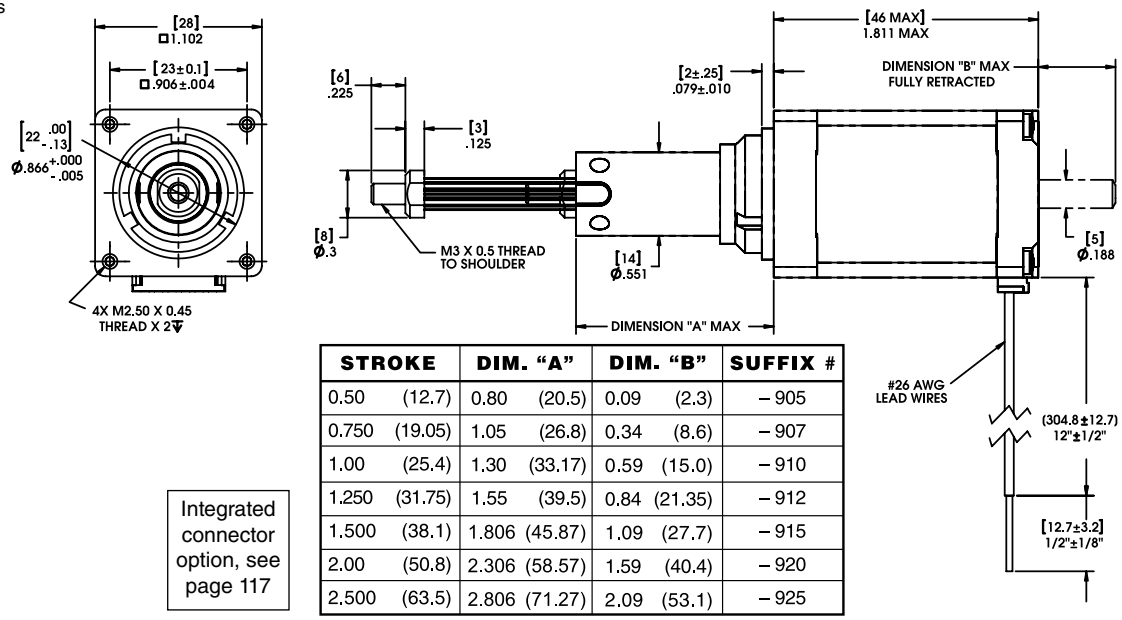
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches



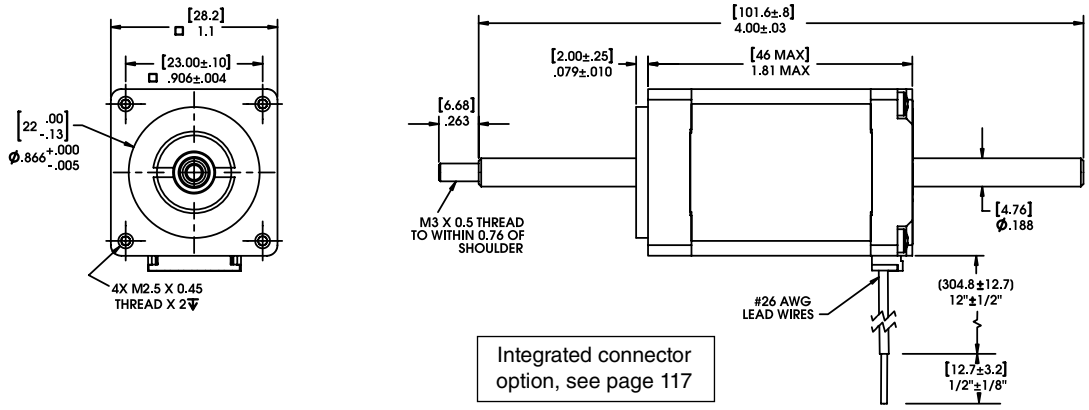
STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.50 (12.7)	0.80 (20.5)	0.09 (2.3)	– 905
0.750 (19.05)	1.05 (26.8)	0.34 (8.6)	– 907
1.00 (25.4)	1.30 (33.17)	0.59 (15.0)	– 910
1.250 (31.75)	1.55 (39.5)	0.84 (21.35)	– 912
1.500 (38.1)	1.806 (45.87)	1.09 (27.7)	– 915
2.00 (50.8)	2.306 (58.57)	1.59 (40.4)	– 920
2.500 (63.5)	2.806 (71.27)	2.09 (53.1)	– 925

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

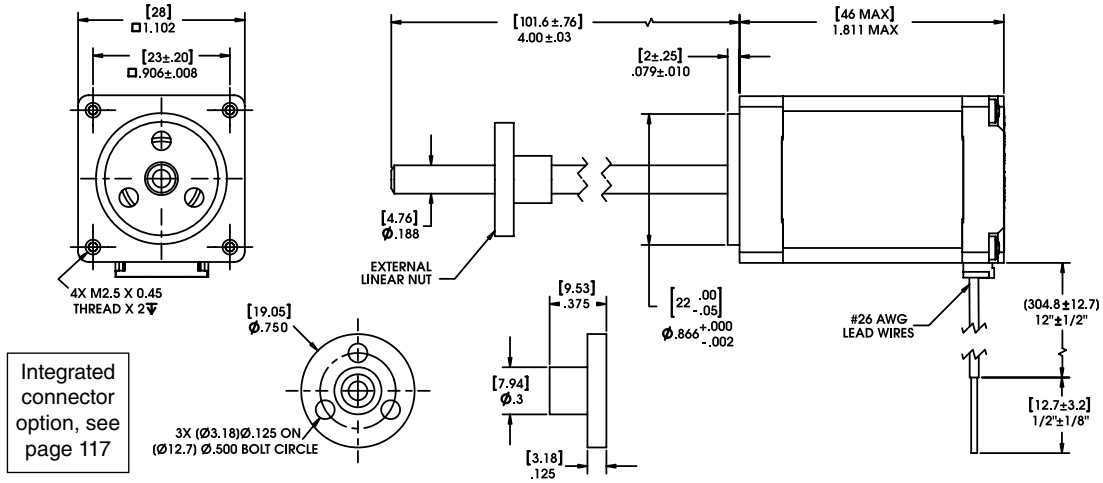


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

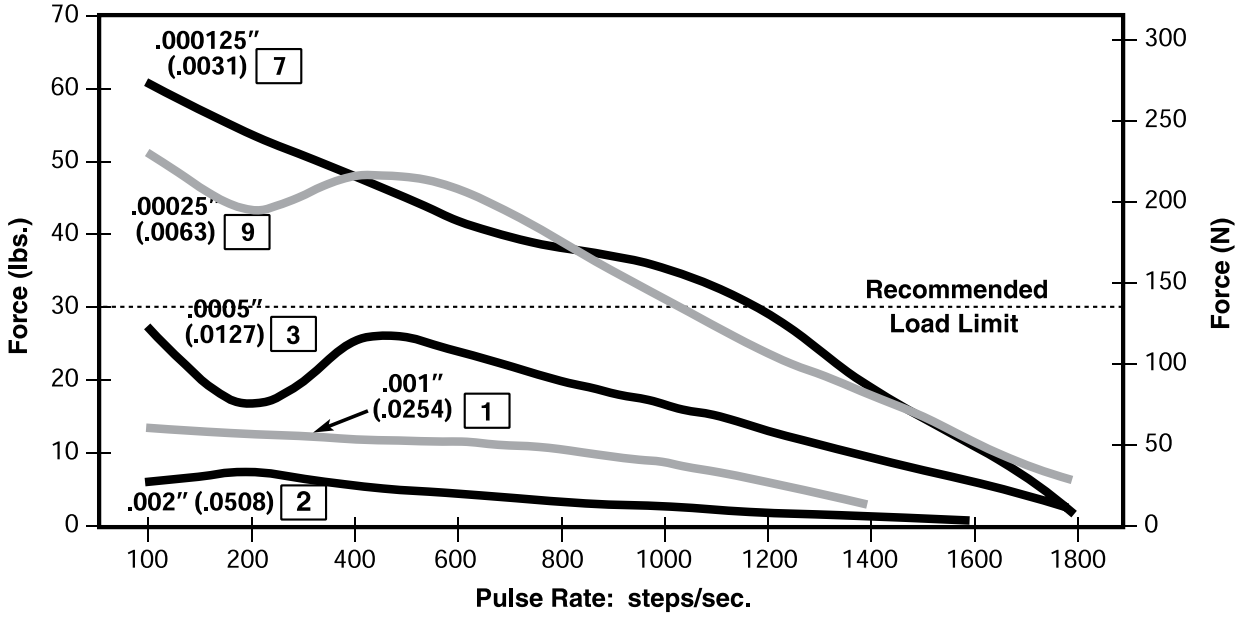
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.



Integrated connector option, see page 117

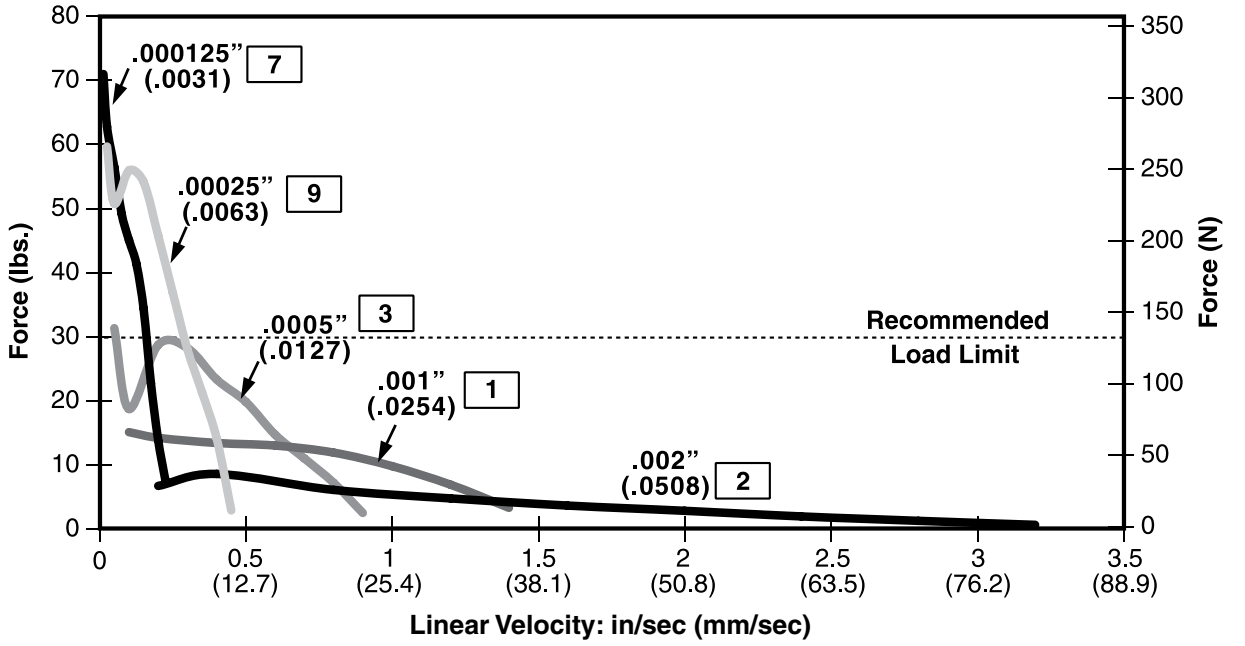
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .187 (4.75) Lead-screw



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .187 (4.75) Lead-screw



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® 35000 Series Size 14 hybrid linear actuators have been improved to provide higher force, longer life and improved performance.

The various designs deliver exceptional performance and new linear motion design opportunities. Three designs are available, captive, non-captive and external linear versions. The 35000 Series is available in a wide variety of resolutions - from 0.00012-in (.003048 mm) per step to 0.00192-in (.048768 mm) per step. The motors can also be microstepped for even finer resolutions. The Size 14 actuator delivers thrust of up to 50 lbs. (222 N).

Size 14
External Linear

Size 14
Non-Captive Shaft

Size 14
Captive Shaft

Specifications

Size 14: 35 mm (1.4-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	35H4 ■–■■–■■■†			35H6 ■–■■–■■■†	
	Non-captive	35F4 ■–■■–■■■†			35F6 ■–■■–■■■†	
	External Lin.	E35H4 ■–■■–■■■†			E35H6 ■–■■–■■■†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.33 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.25 A	0.57 A	0.24 A	0.57 A	0.24 A
Resistance/phase		1.86 Ω	8.8 Ω	50.5 Ω	8.8 Ω	50.5 Ω
Inductance/phase		2.8 mH	13 mH	60 mH	6.5 mH	30 mH
Power Consumption		5.7 W				
Rotor Inertia		16.0 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		5.7 oz (162 g)				
Insulation Resistance		20 MΩ				

† Part numbering information on page 88.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step					
Screw Ø .218" (5.54 mm) inches	mm	Order Code I.D.	Screw Ø .250" (6.35 mm) inches	mm	Order Code I.D.
.00012	.0030*	N	.00015625	.0039*	P
.00024	.0060*	K	.0003125	.0079*	A
.00048	.0121*	J	.000625	.0158*	B
.00096	.0243*	Q	.00125	.0317*	C
.00192	.0487*	R			

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

35000 Series: Hybrid Size 14 Single Stack Part Number Identification

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

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Hybrid part number codes when ordering

E	35	H	4	N	–	2.33	–	910

Prefix (include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

35 = 35000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)
J = 0.9° Non-captive
K = 0.9° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

N = .00012-in (.0030)
K = .00024-in (.0060)
J = .00048-in (.0121)
Q = .00096-in (.0243)
P = .00015625-in (.0039)
A = .0003125-in (.0079)
B = .000625-in (.0158)
C = .00125-in (.0317)
R = .00192-in (.0478)

High Resolution

U = .00006-in (.0015)
V = .000078-in (.00198)

Voltage

2.33 = 2.33 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 89.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

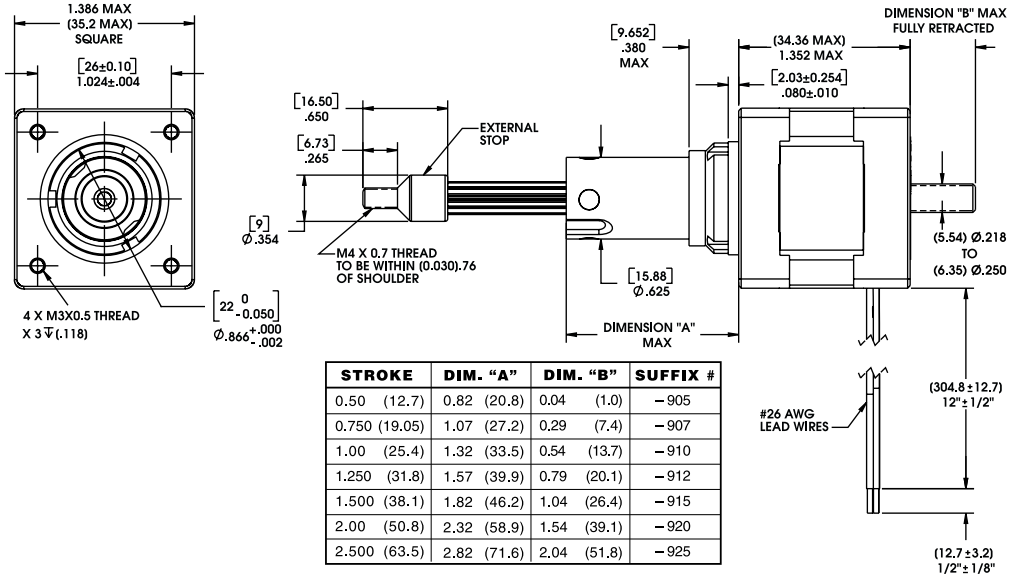
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Captive Lead-screw

Dimensions = (mm) inches



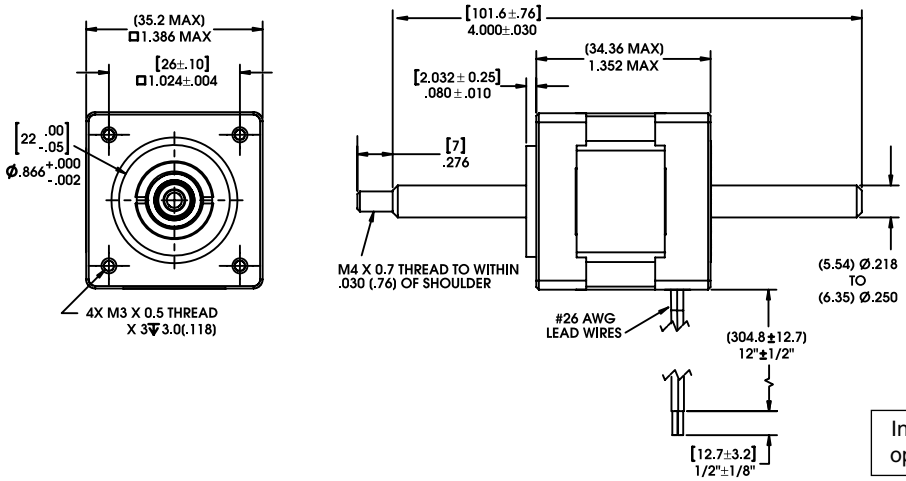
STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.50 (12.7)	0.82 (20.8)	0.04 (1.0)	–905
0.750 (19.05)	1.07 (27.2)	0.29 (7.4)	–907
1.00 (25.4)	1.32 (33.5)	0.54 (13.7)	–910
1.250 (31.8)	1.57 (39.9)	0.79 (20.1)	–912
1.500 (38.1)	1.82 (46.2)	1.04 (26.4)	–915
2.00 (50.8)	2.32 (58.9)	1.54 (39.1)	–920
2.500 (63.5)	2.82 (71.6)	2.04 (51.8)	–925

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

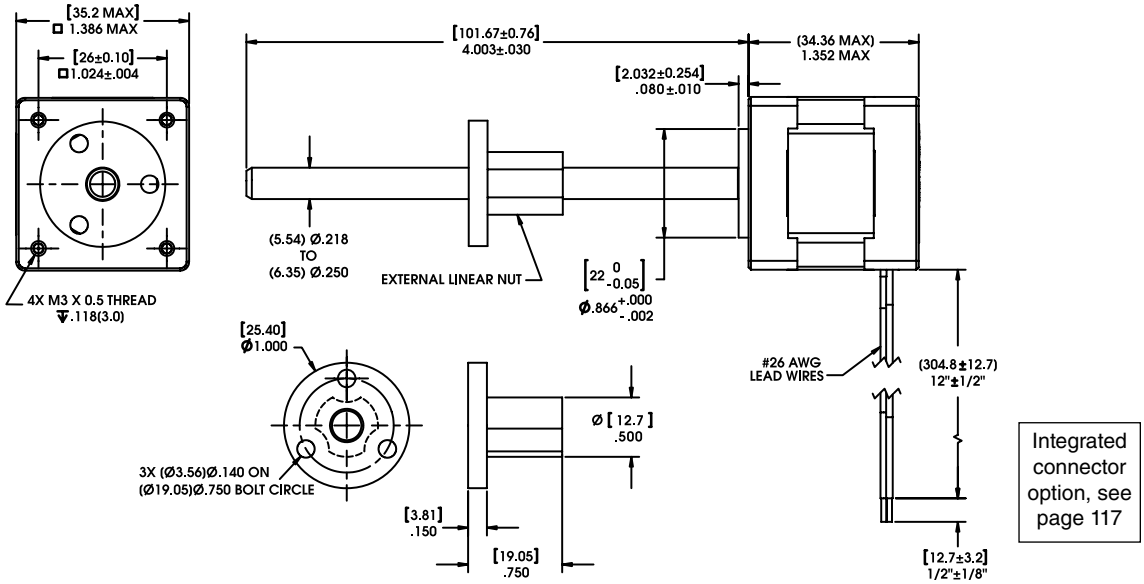


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

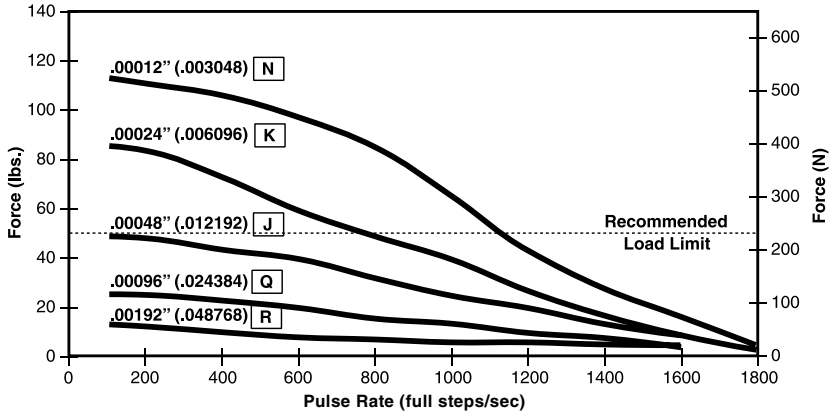


Integrated connector option, see page 117

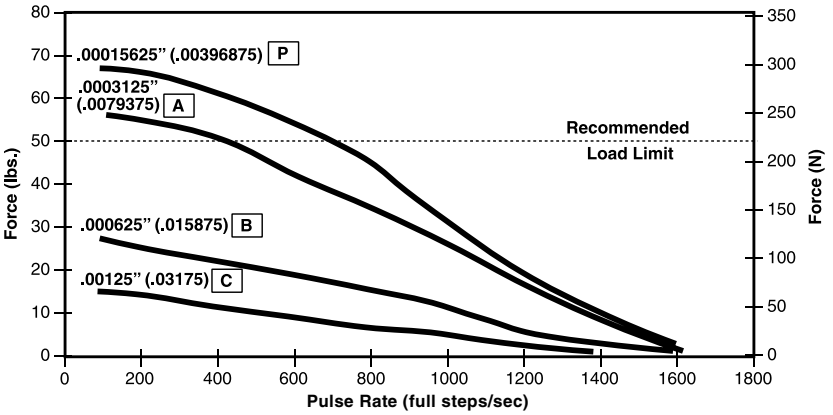
FORCE vs. PULSE RATE

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Ø .218 (5.54) Lead-screw >



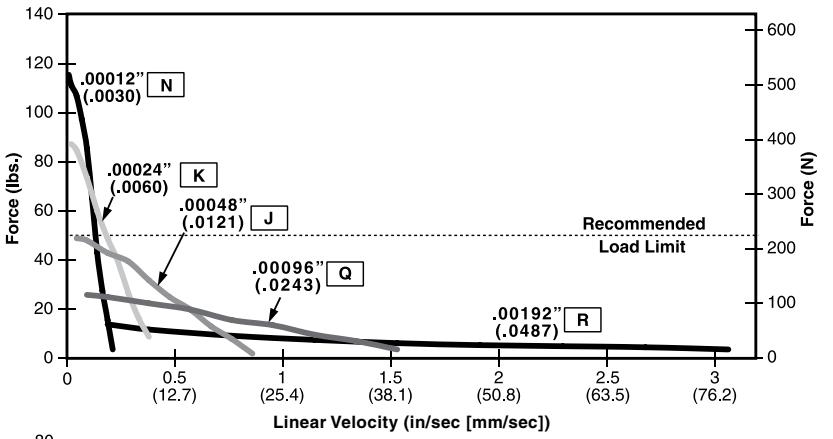
Ø .250 (6.35) Lead-screw >



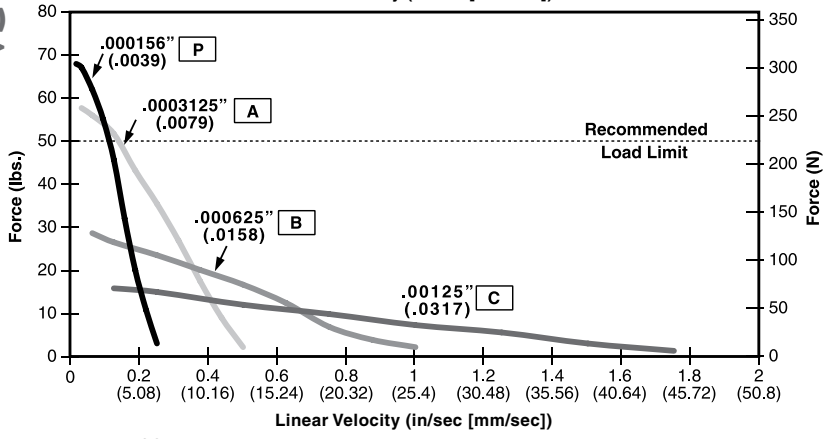
FORCE vs. LINEAR VELOCITY

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Ø .218 (5.54) Lead-screw >



Ø .250 (6.35) Lead-screw >



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

The Haydon® 35000 Series Size 14, 0.9° high resolution motor

Compared to the standard resolution (1.8°) this motor has been engineered to precisely deliver reliable high speed, force, up to 50 lbs (222 N), as well as a full step movement as low as 1.5 microns.

Specifications

Size 14: 35 mm (1.4-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	35K4 □-□□-□□□†			35K6 □-□□-□□□†	
	Non-captive	35J4 □-□□-□□□†			35J6 □-□□-□□□†	
	External Lin.	E35K4 □-□□-□□□†			E35K6 □-□□-□□□†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.33 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.25 A	0.57 A	0.24 A	0.57 A	0.24 A
Resistance/phase		1.86 Ω	8.8 Ω	50.5 Ω	8.8	50.5 Ω
Inductance/phase		2.8 mH	13 mH	60 mH	6.5 mH	30 mH
Power Consumption		5.7 W				
Rotor Inertia		16 gcm²				
Insulation Class		Class B (Class F available)				
Weight		5.7 oz (162 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step					
Screw Ø .218" (5.54 mm) inches	mm	Order Code I.D.	Screw Ø .250" (6.35 mm) inches	mm	Order Code I.D.
.00006	.0015*	U	.000078*	.00198*	V
.00012	.0030*	N	.00015625	.0039*	P
.00024	.0060*	K	.0003125	.0079*	A
.00048	.0121*	J	.000625	.0158*	B
.00096	.0243*	Q			

*Values truncated

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

NOTE: Refer to performance curves on page 100 for codes N, K, J, Q, P, A, B

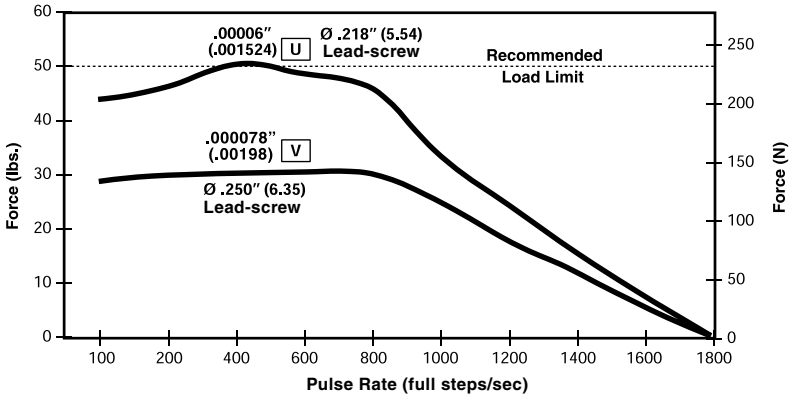
† Part numbering information on page 88.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

FORCE vs. PULSE RATE

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

– with two available lead-screw diameters

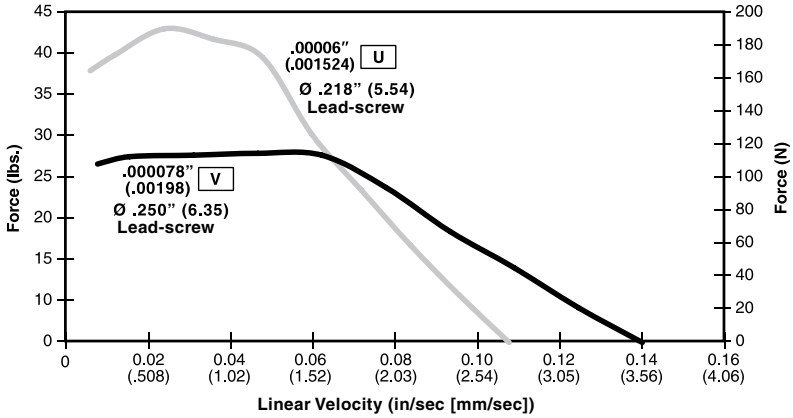


NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

FORCE vs. LINEAR VELOCITY

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

– with two available lead-screw diameters



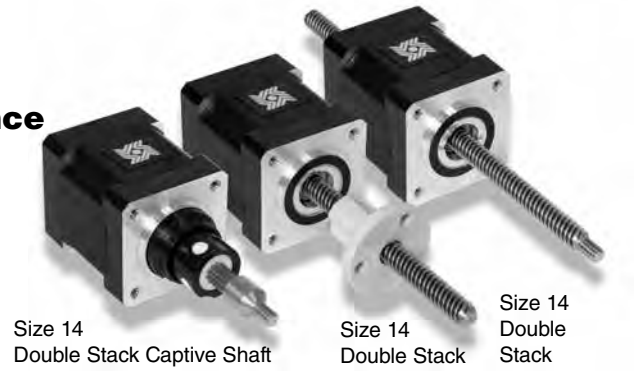
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

35000 Series Size 14 Double Stack linear actuators for improved force and performance

The Size 14 Double Stack designs deliver exceptional performance and new linear motion design opportunities.

Three designs are available, captive, non-captive and external linear versions. The 35000 Series is available in a wide variety of resolutions - from 0.000625-in (.0158 mm) per step to 0.005-in (.127 mm) per step. The motors can also be microstepped for even finer resolutions. The Size 14 actuator delivers thrust of up to 50 lbs. (222 N).



Size 14 Double Stack Captive Shaft

Size 14 Double Stack External Linear

Size 14 Double Stack Non-Captive Shaft

Specifications

Size 14: 35 mm (1.4-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	35M4 ■ – ■■ – ■■■		
	Non-captive	35L4 ■ – ■■ – ■■■		
	External Lin.	E35M4 ■ – ■■ – ■■■		
Wiring		Bipolar		
Winding Voltage		2.33 VDC	5 VDC	12 VDC
Current (RMS)/phase		2 A	910 mA	380 mA
Resistance/phase		1.2 Ω	5.5 Ω	31.6 Ω
Inductance/phase		1.95 mH	7.63 mH	65.1 mH
Power Consumption		9.1 W Total		
Rotor Inertia		30 gcm^2		
Insulation Class		Class B (Class F available)		
Weight		8.5 oz (240 g)		
Insulation Resistance		20 MΩ		

Linear Travel / Step Screw Ø.250" (6.35 mm) inches	mm	Order Code I.D.
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.00375	.0953	AG
.005	.127	Z

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Hybrid part number codes when ordering

E	35	L	4	B	–	12	–	910

Prefix (include only when using the following)
- **A** = A Coil (See AC Synchronous page 189)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Switch

Series number designation
35 = 35000
(Series numbers represent approximate width of motor body)

Style
- **L** = 1.8° Non-captive
- **M** = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils
- **4** = Bipolar (4 wire)

Code ID Resolution Travel/Step
- **B** = .000625-in (.0158)
- **C** = .00125-in (.0317)
- **Y** = .0025-in (.0635)
- **AG** = .00375-in (.0953)
- **Z** = .005-in (.127)

Voltage
- **2.33** = 2.33 VDC
- **05** = 5 VDC
- **12** = 12 VDC

Custom V available

Suffix
Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 93.)

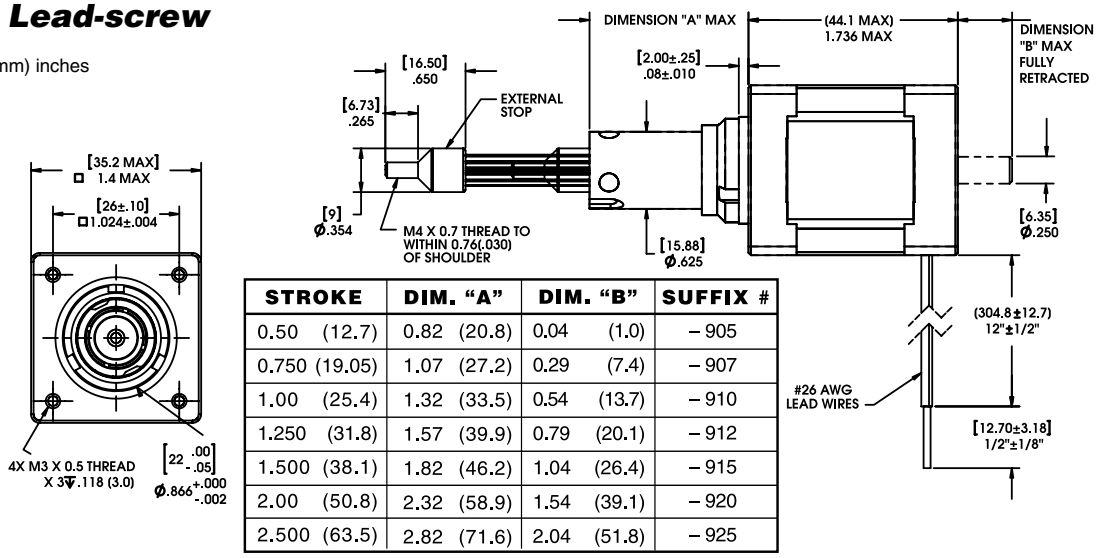
Suffix also represents:
– 800 = Metric
– 900 = External Linear with grease and flanged nut
– XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches



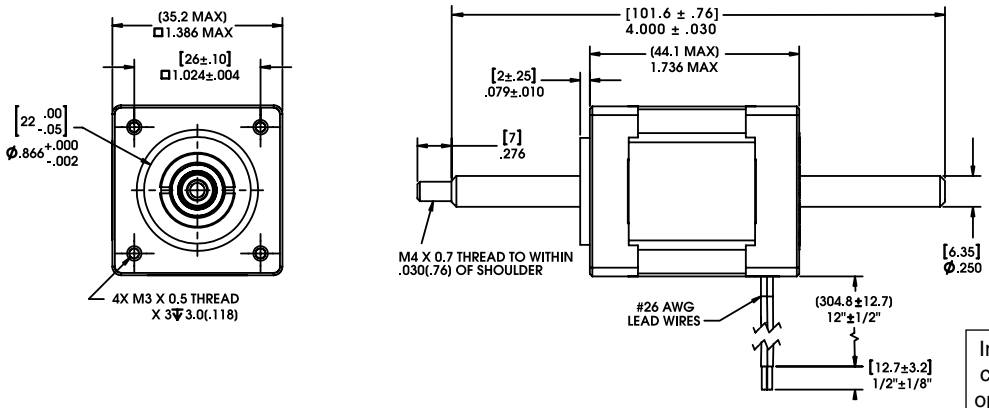
STROKE	DIM. "A"	DIM. "B"	SUFFIX #
0.50 (12.7)	0.82 (20.8)	0.04 (1.0)	– 905
0.750 (19.05)	1.07 (27.2)	0.29 (7.4)	– 907
1.00 (25.4)	1.32 (33.5)	0.54 (13.7)	– 910
1.250 (31.8)	1.57 (39.9)	0.79 (20.1)	– 912
1.500 (38.1)	1.82 (46.2)	1.04 (26.4)	– 915
2.00 (50.8)	2.32 (58.9)	1.54 (39.1)	– 920
2.500 (63.5)	2.82 (71.6)	2.04 (51.8)	– 925

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

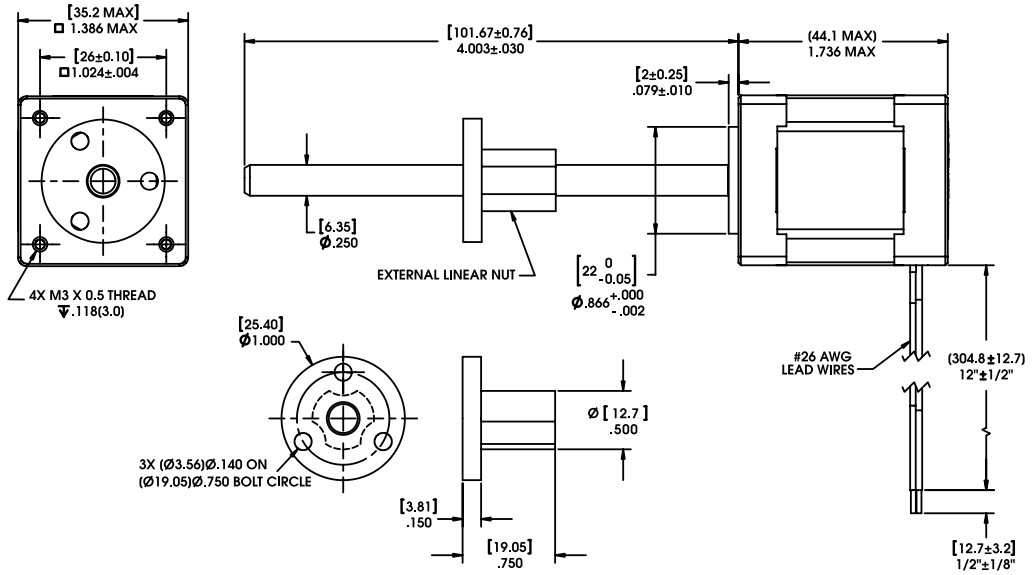


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

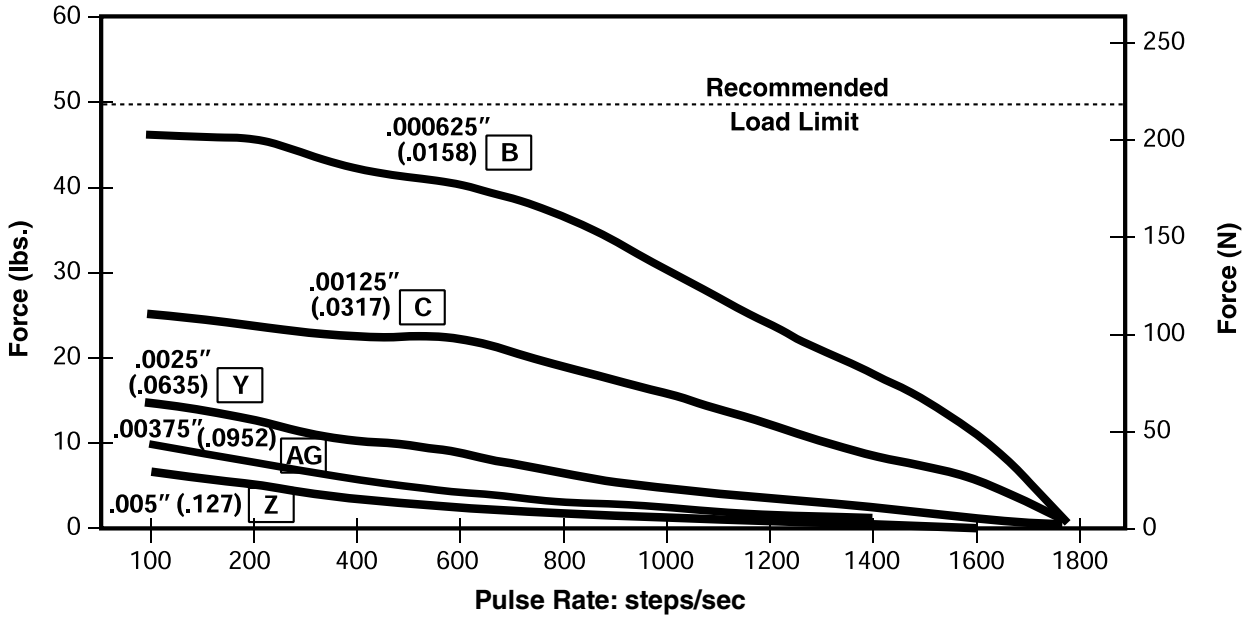
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.



Integrated connector option, see page 117

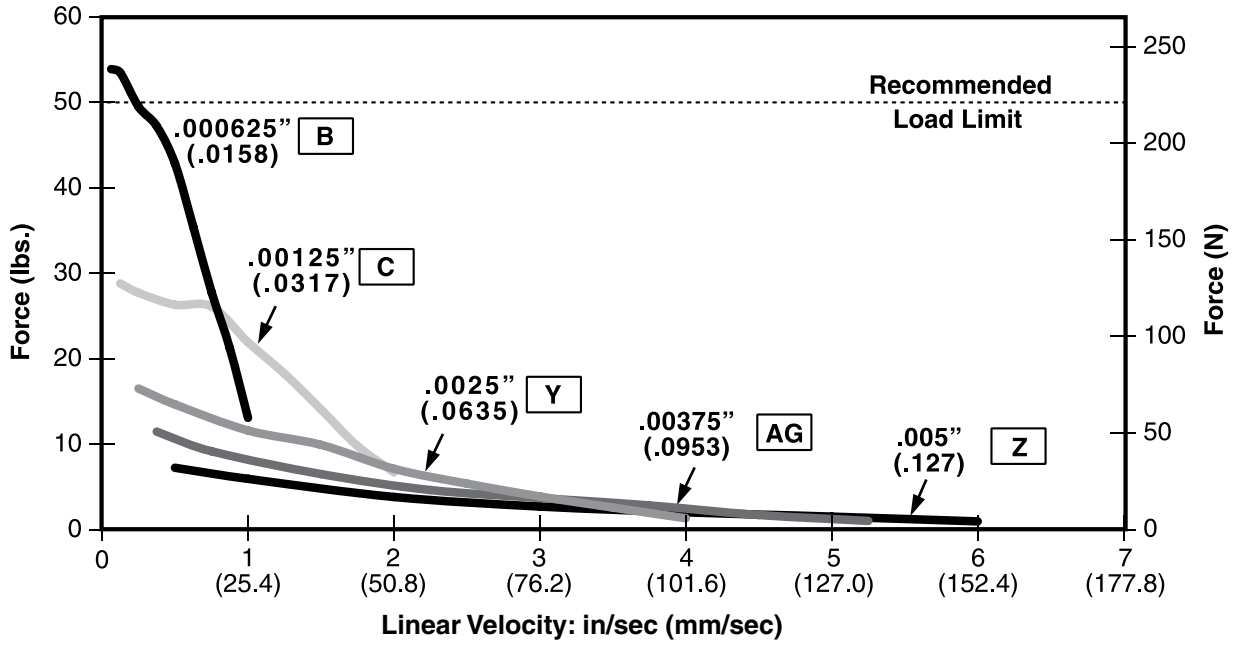
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .250 (6.35) Lead-screw



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .250 (6.35) Lead-screw



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® 43000 Series Size 17 hybrid linear actuators are our best selling compact hybrid motors.

These top selling designs deliver high performance, opening avenues for equipment designers who previously settled for products with inferior performance and endurance.

Three designs are available, captive, non-captive and external linear versions. The 43000 Series is available in a wide variety of resolutions - from 0.00006-in. (.001524 mm) per step to 0.00192-in. (.048768 mm) per step - and delivers thrust of up to 50 lbs. (222 N), or speeds exceeding 3 inches (7.62 cm) per second.

Specifications

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	43H4□-□□-□□□†			43H6□-□□-□□□†	
	Non-captive	43F4□-□□-□□□†			43F6□-□□-□□□†	
	External Lin.	E43H4□-□□-□□□†			E43H6□-□□-□□□†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.33 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.5 A	700 mA	290 mA	700 mA	290 mA
Resistance/phase		1.56 Ω	7.2 Ω	41.5 Ω	7.2 Ω	41.5 Ω
Inductance/phase		1.9 mH	8.7 mH	54.0 mH	4.4 mH	27.0 mH
Power Consumption		7 W				
Rotor Inertia		37 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		8.5 oz (241 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step					
Screw Ø .218" (5.54 mm) inches	mm	Order Code I.D.	Screw Ø .250" (6.35 mm) inches	mm	Order Code I.D.
.00012	.0030*	N	.00015625	.0039*	P
.00024	.0060*	K	.0003125	.0079*	A
.00048	.0121*	J	.000625	.0158*	B
.00096	.0243*	Q	.00125	.0317*	C
.00192	.0487*	R			

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C. Also available, motors with high temperature capability windings up to 155°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

†Part numbering information on page 96.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Identifying the Hybrid part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

E	43	H	6	N	–	2.33	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

43 = 43000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)
J = 0.9° Non-captive
K = 0.9° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

G = IDEA Drive (Size 17, 43000 Series, Bipolar only)

Code ID Resolution Travel/Step

N = .00012-in (.0030)
K = .00024-in (.0060)
J = .00048-in (.0121)
Q = .00096-in (.0243)
P = .00015625-in (.0039)
A = .0003125-in (.0079)
B = .000625-in (.0158)
C = .00125-in (.0317)
R = .00192-in (.0478)

High Resolution

U = .00006-in (.0015)
V = .000078-in (.00198)

Voltage

2.33 = 2.33 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 97.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

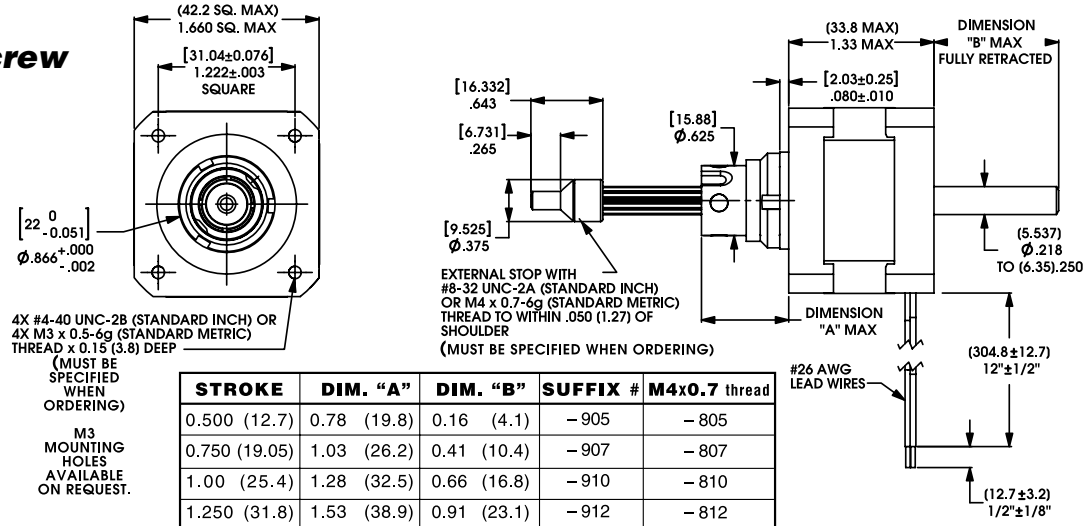
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches



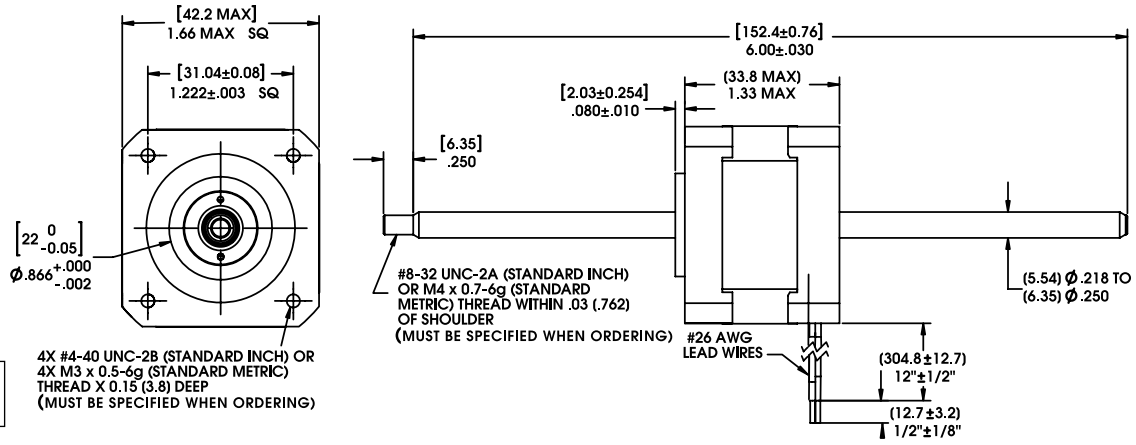
STROKE	DIM. "A"	DIM. "B"	SUFFIX #	M4x0.7 thread
0.500 (12.7)	0.78 (19.8)	0.16 (4.1)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.41 (10.4)	–907	–807
1.00 (25.4)	1.28 (32.5)	0.66 (16.8)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.91 (23.1)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.16 (29.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.66 (42.2)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.16 (54.9)	–925	–825

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

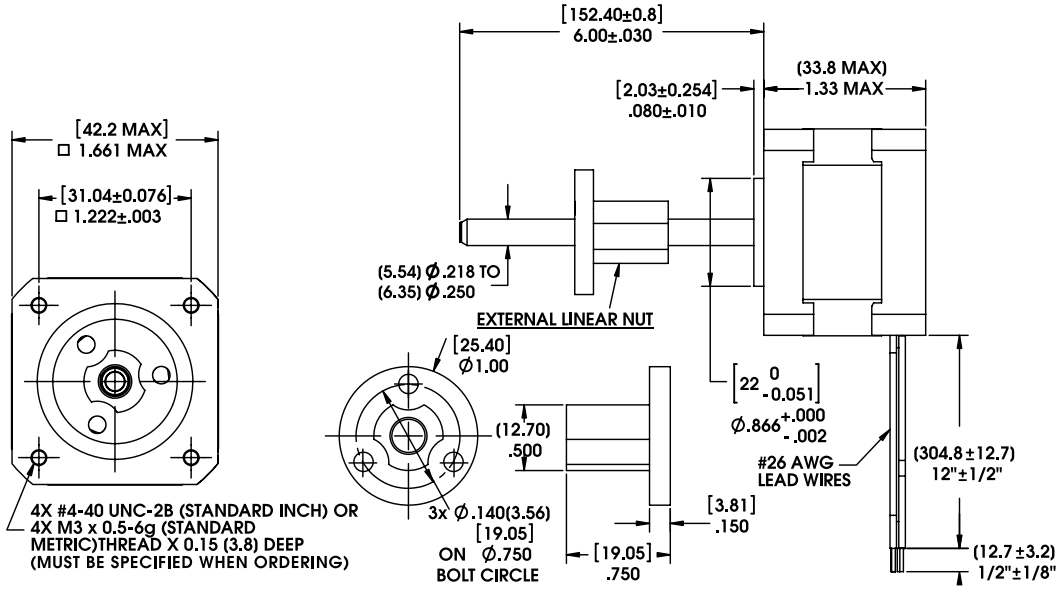


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

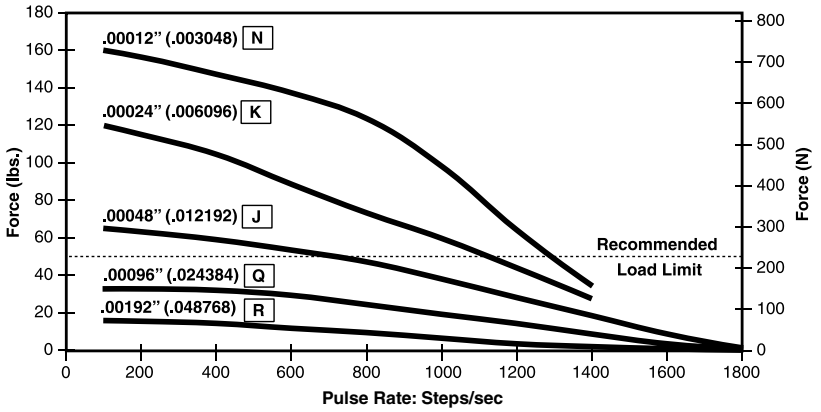


Integrated connector option, see page 117

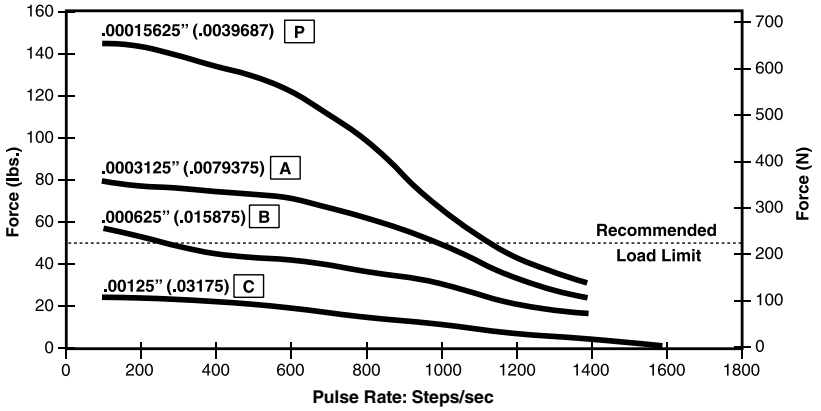
FORCE vs. PULSE RATE

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Ø .218 (5.54) Lead-screw >



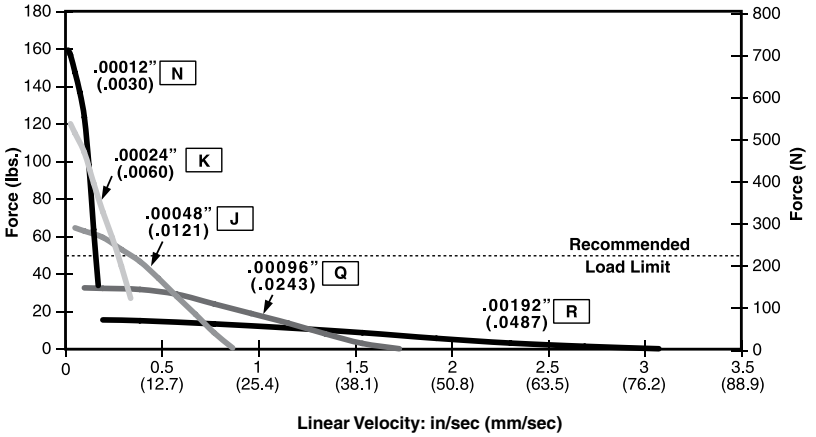
Ø .250 (6.35) Lead-screw >



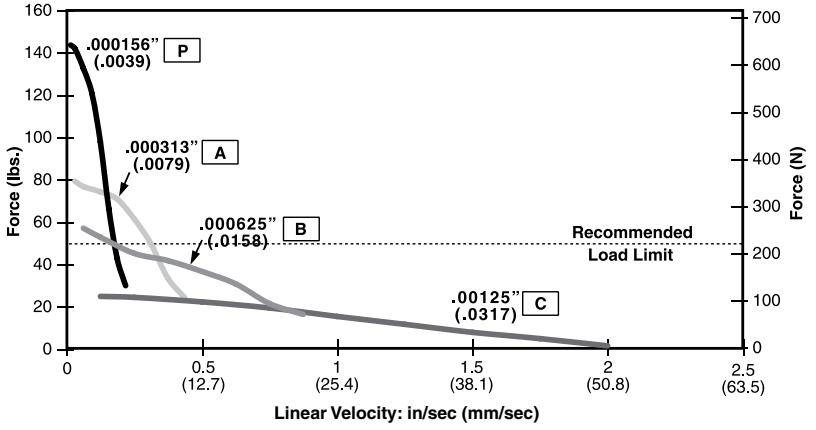
FORCE vs. LINEAR VELOCITY

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Ø .218 (5.54) Lead-screw >



Ø .250 (6.35) Lead-screw >



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

The Haydon® 43000 Series Size 17, 0.9° High Resolution Motor

The Size 17 High Resolution Actuator features a production-proven, patented rotor drive nut that delivers trouble-free, long-term performance.

Specifications

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (0.9° Step Angle)					
Captive	43K4 ■–■■–■■■†			43K6 ■–■■–■■■†	
Non-captive	43J4 ■–■■–■■■†			43J6 ■–■■–■■■†	
External Lin.	E43K4 ■–■■–■■■†			E43K6 ■–■■–■■■†	
Wiring	Bipolar			Unipolar**	
Winding Voltage	2.33 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	1.5 A	700 mA	290 mA	700 mA	290 mA
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω	7.2 Ω	41.5 Ω
Inductance/phase	2.6 mH	12.0 mH	70.0 mH	6.0 mH	35.0 mH
Power Consumption	7 W				
Rotor Inertia	37 gcm^2				
Insulation Class	Class B (Class F available)				
Weight	8.5 oz (241 g)				
Insulation Resistance	20 MΩ				

Linear Travel / Step					
Screw Ø .218" (5.54 mm) inches	mm	**Order Code I.D.**	Screw Ø .250" (6.35 mm) inches	mm	**Order Code I.D.**
.00006	.0015*	U	.000078*	.00198*	V
.00012	.0030*	N	.00015625	.0039*	P
.00024	.0060*	K	.0003125	.0079*	A
.00048	.0121*	J	.000625	.0158*	B
.00096	.0243*	Q			

*Values truncated

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

NOTE: Refer to performance curves on page 98 for codes N, K, J, Q, P, A, B

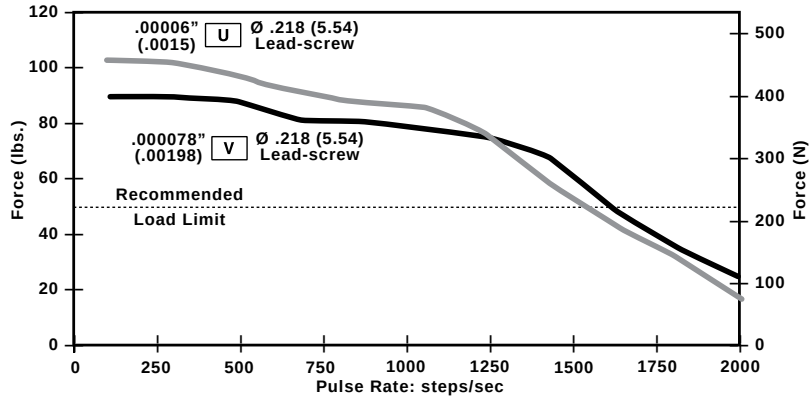
† Part numbering information on page 96.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

FORCE vs. PULSE RATE

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

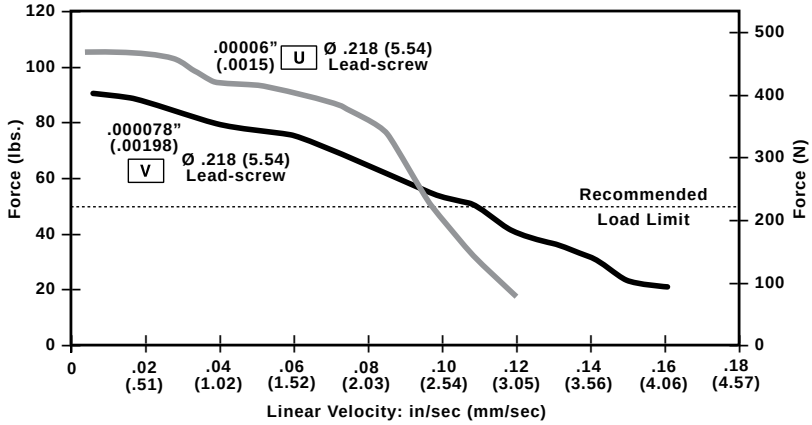
– with two available lead-screw diameters



FORCE vs. LINEAR VELOCITY

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

– with two available lead-screw diameters



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

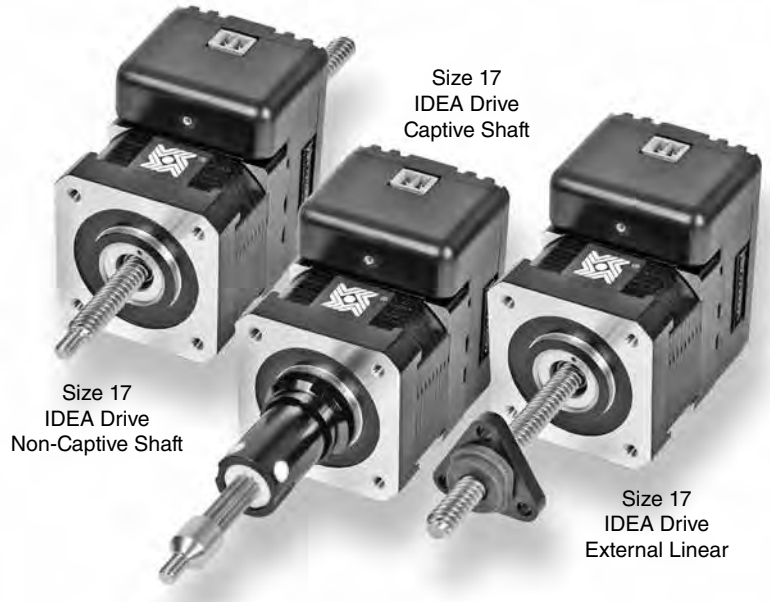
The Haydon® 43000 Series Size 17 Hybrid Linear Actuators with integrated IDEA™ Drive – high performance in a compact package

The **43000 Series Single Stack actuator** is available in a wide variety of resolutions – from 0.00006-in (.001524 mm) per step to 0.00192-in (.048768mm) per step. Delivers output force of up to 50 lbs (220N), or speeds exceeding 3 inches (7.62 cm) per second.

Programmable 43000 Series with IDEA™ Drive Features:

- Fully Programmable
- RoHS Compliant
- USB or RS-485 Communication
- Microstepping Capability
  – Full, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64
- Graphic User Interface
- Auto-population of Drive Parameters
- Programmable Acceleration/Deceleration and Current Control

Note: For more information about the **IDEA™ Drive** see page 194.



Single Stack Specifications

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)		
Part No.	Captive	43HG ■–■■–■■■†
	Non-captive	43FG ■–■■–■■■†
	External Lin.	E43HG ■–■■–■■■†
Wiring		Bipolar
Winding voltage		2.33 VDC**

Linear Travel / Step					
Screw Ø .218" (5.54 mm) inches	mm	**Order Code I.D.**	Screw Ø .250" (6.35 mm) inches	mm	**Order Code I.D.**
.00012	.0030*	N	.00015625	.0039*	P
.00024	.0060*	K	.0003125	.0079*	A
.00048	.0121*	J	.000625	.0158*	B
.00096	.0243*	Q	.00125	.0317*	C
.00192	.0487*	R			

*Values truncated

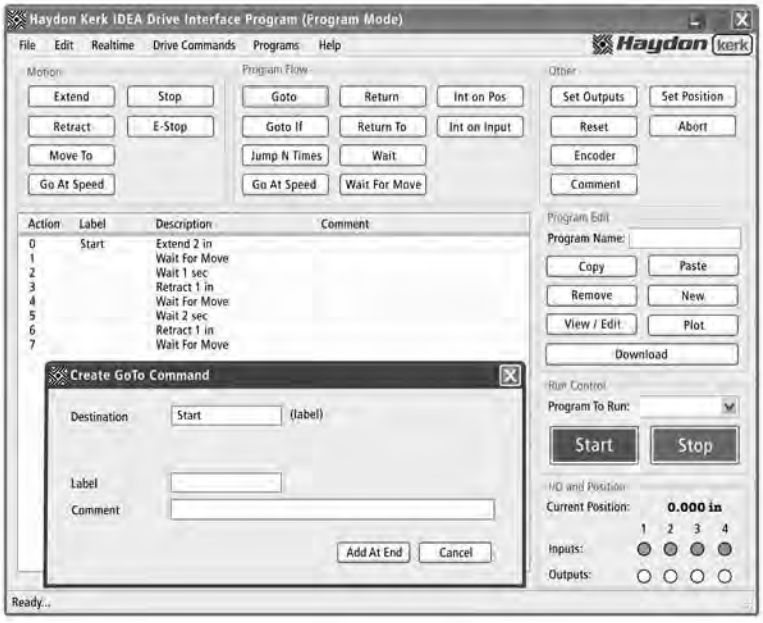
† Part numbering information on page 96.

**Contact Haydon Kerk if a higher voltage motor is desired.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

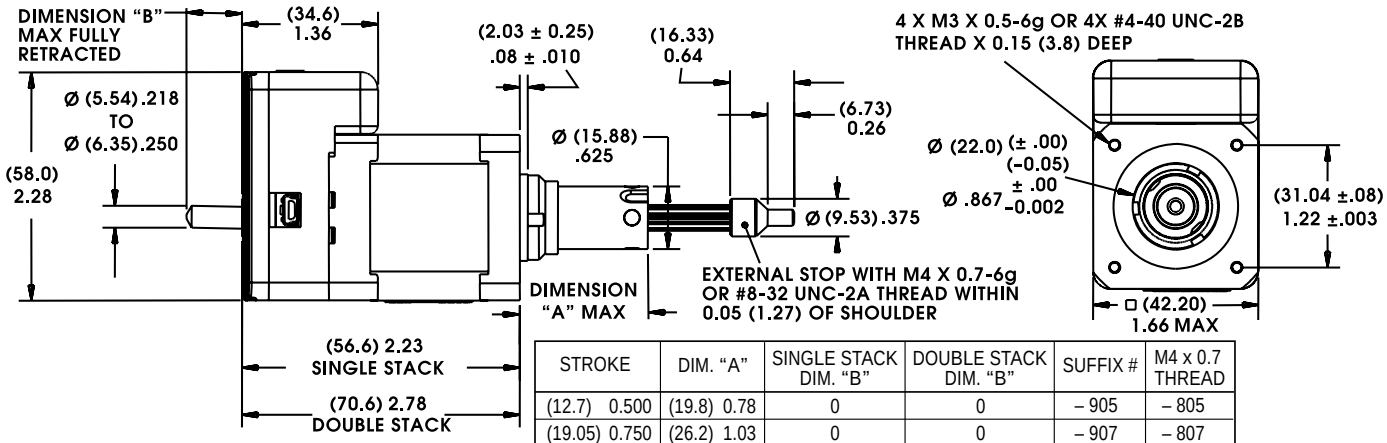
IDEA™ Drive software is simple to use with on-screen buttons and easy-to-understand programming guides.

The software program generates motion profiles directly into the system and also contains a "debug" utility allowing line-by-line execution of a motion program for easy troubleshooting.



Captive Lead-screw

Dimensions = (mm) inches

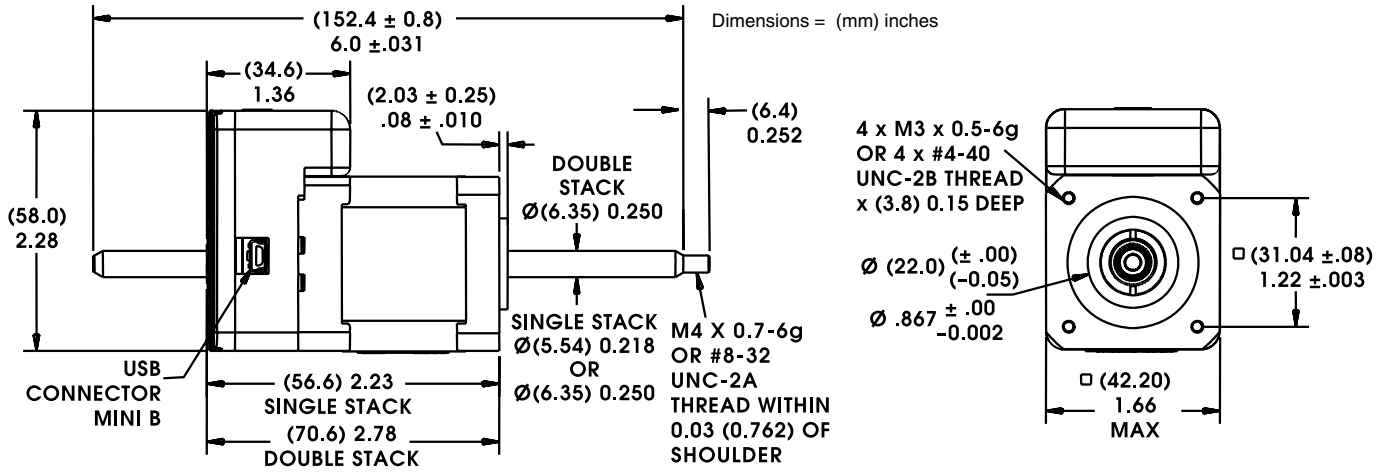


STROKE	DIM. "A"	SINGLE STACK DIM. "B"	DOUBLE STACK DIM. "B"	SUFFIX #	M4 x 0.7 THREAD
(12.7) 0.500	(19.8) 0.78	0	0	– 905	– 805
(19.05) 0.750	(26.2) 1.03	0	0	– 907	– 807
(25.4) 1.00	(32.5) 1.28	0	0	– 910	– 810
(31.8) 1.250	(38.9) 1.53	0	0	– 912	– 812
(38.1) 1.500	(45.2) 1.78	(5.9) 0.232	(2.5) 0.091	– 915	– 815
(50.8) 2.00	(57.9) 2.28	(18.6) 0.732	(15.0) 0.591	– 920	– 820
(63.5) 2.500	(70.6) 2.78	(31.3) 1.232	(27.7) 1.091	– 925	– 825

Non-Captive Lead-screw

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

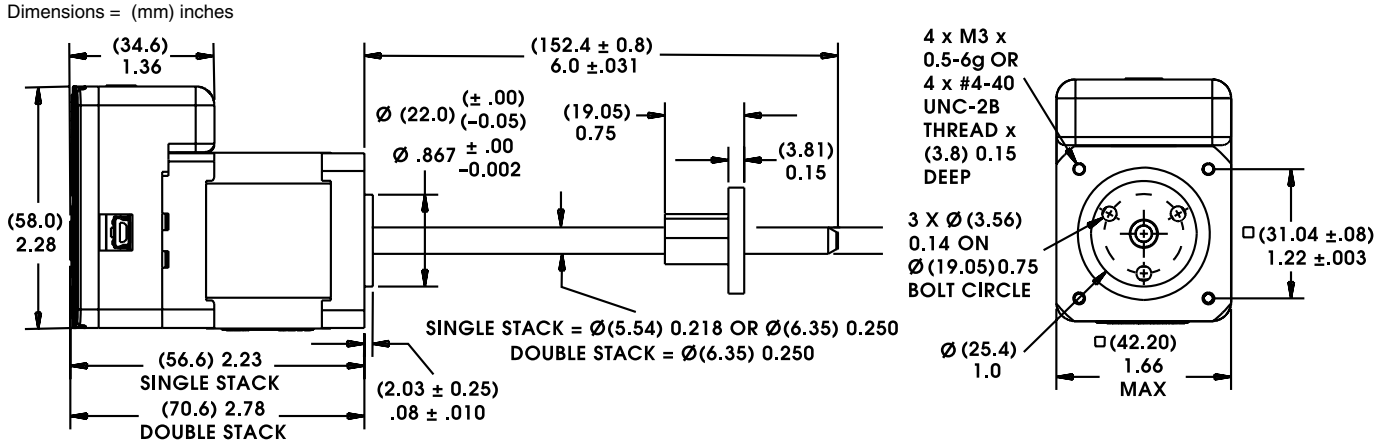
Dimensions = (mm) inches



External Linear

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

Dimensions = (mm) inches



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

Haydon® 43000 Series Size 17 Double Stack hybrid linear actuators offer greater performance.

The versatile designs deliver exceptional performance and new linear motion design opportunities.

Three designs are available, captive, non-captive and external linear versions. The 43000 Series is available in a wide variety of resolutions – from 0.000625-in (.0158 mm) per step to 0.005-in (.127 mm) per step. The motors can also be microstepped for even finer resolutions. The Size 17 Double Stack actuator delivers thrust of up to 75 lbs. (337 N).

Specifications

Size 17: 43 mm (1.7-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	43M4 ■–■■–■■■†		
	Non-captive	43L4 ■–■■–■■■†		
	External Lin.	E43M4 ■–■■–■■■†		
Wiring		Bipolar		
Winding Voltage		2.33 VDC	5 VDC	12 VDC
Current (RMS)/phase		2.6 A	1.3 A	550 mA
Resistance/phase		0.9 Ω	3.8 Ω	21.9 Ω
Inductance/phase		1.33 mH	8.21 mH	45.1 mH
Power Consumption		10.4 W Total		
Rotor Inertia		78 gcm^2		
Insulation Class		Class B (Class F available)		
Weight		12.5 oz (352 g)		
Insulation Resistance		20 MΩ		

† Part numbering information on page 103.

Linear Travel / Step Screw Ø.250" (6.35 mm) inches	mm	Order Code I.D.
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.00375	.0953	AG
.005	.127	Z

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Identifying the Hybrid part number codes when ordering

E	43	M	G	N	–	2.33	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

43 = 43000

(Series numbers represent approximate width of motor body)

Style

L = 1.8° Non-captive
M = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)

G = IDEA Drive (Size 17, 43000 Series, Bipolar only)

Code ID Resolution Travel/Step

B = .000625-in (.0158)
C = .00125-in (.0317)
Y = .0025-in (.0635)
AG = .00375-in (.0953)
Z = .005-in (.127)

Voltage

2.33 = 2.33 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 104.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

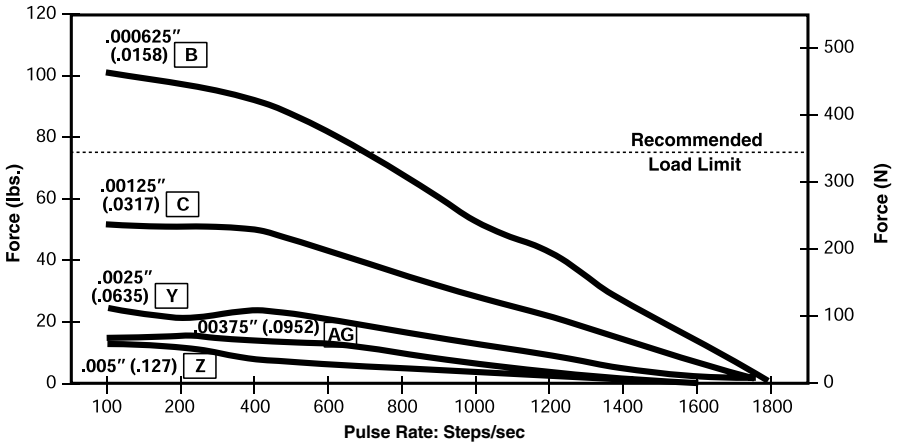
ENCODERS and other **OPTIONAL ASSEMBLIES** also available

43000 Series: Size 17 Double Stack Performance Curves

FORCE vs. PULSE RATE

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

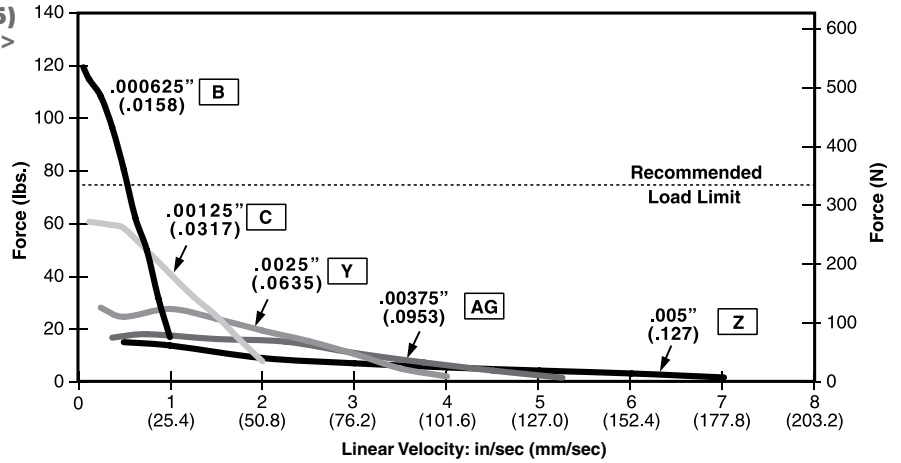
Ø .250 (6.35) Lead-screw >



FORCE vs. LINEAR VELOCITY

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

Ø .250 (6.35) Lead-screw >



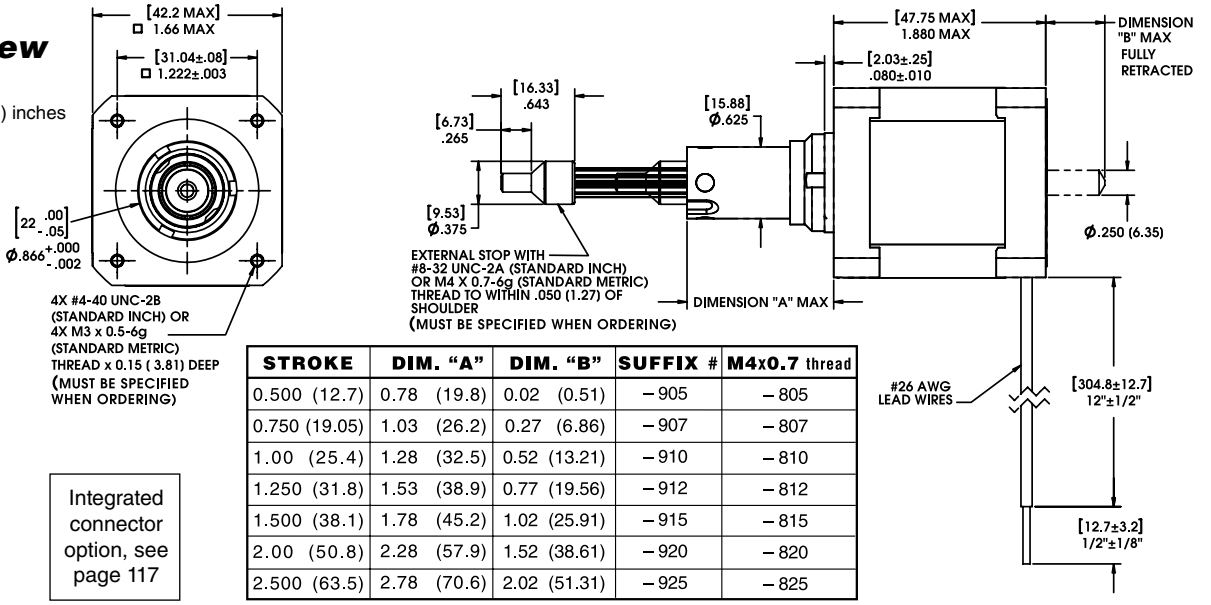
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Captive Lead-screw

Dimensions = (mm) inches



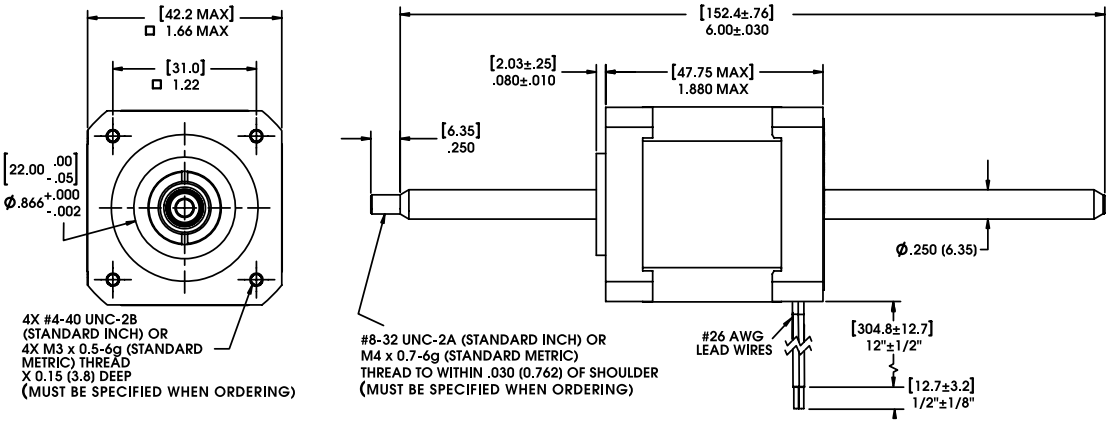
STROKE	DIM. "A"	DIM. "B"	SUFFIX #	M4x0.7 thread
0.500 (12.7)	0.78 (19.8)	0.02 (0.51)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.27 (6.86)	–907	–807
1.00 (25.4)	1.28 (32.5)	0.52 (13.21)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.77 (19.56)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.02 (25.91)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.52 (38.61)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.02 (51.31)	–925	–825

Integrated connector option, see page 117

Non-Captive Lead-screw

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.

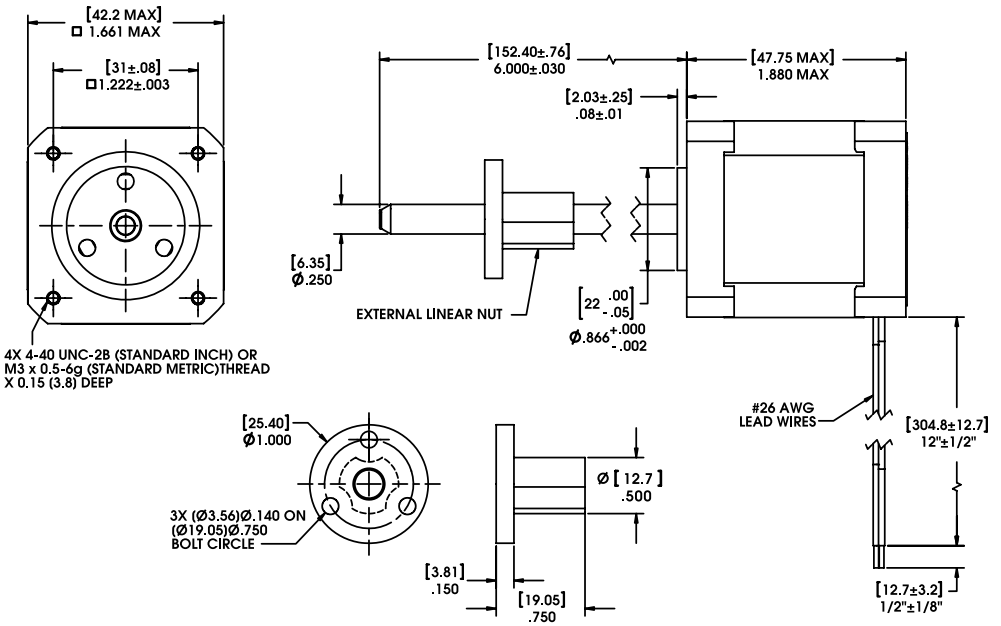


Integrated connector option, see page 117

External Linear

Dimensions = (mm) inches

Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



Integrated connector option, see page 117

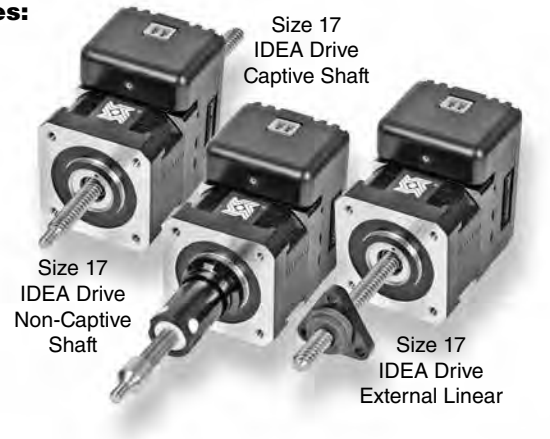
The Haydon® 43000 Series Size 17 Double Stack Hybrid Linear Actuators with integrated IDEA™ Drive – programmable, improved performance

The **43000 Series Double Stack actuator** is available in a wide variety of resolutions – from 0.000625-in (.0158 mm) per step to 0.005-in (.127 mm) per step. Delivers output force of up to 75 lbs (337N).

Programmable IDEA™ Drive Features:

- Fully Programmable
- RoHS Compliant
- USB or RS-485 Communication
- Microstepping Capability
  – Full, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64
- Graphic User Interface
- Auto-population of Drive Parameters
- Programmable Acceleration/Deceleration and Current Control

Note: See page 194 for more information on the IDEA™ Drive



Dimensional Drawings
See page 101.

Double Stack Specifications

Size 17 DS: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)		
Part No.	Captive	43MG ■–■■–■■■
	Non-captive	43LG ■–■■–■■■
	External Lin.	E43MG ■–■■–■■■
Wiring		Bipolar
Winding voltage		2.33 VDC**

Linear Travel / Step Screw Ø .250" (6.35 mm) inches	mm	**Order Code I.D.**
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635*	Y
.00375	.0953*	AG
.005	.127*	Z

*Values truncated

**Contact Haydon Kerk if a higher voltage motor is desired.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Identifying the Hybrid part number codes when ordering

E	43	M	G	N	–	2.33	–	910

Prefix (include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

43 = 43000

(Series numbers represent approximate width of motor body)

Style

L = 1.8° Non-captive
M = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
G = IDEA Drive (Size 17, 43000 Series, Bipolar only)

Code ID Resolution Travel/Step

B = .000625-in (.0158)
C = .00125-in (.0317)
Y = .0025-in (.0635)
AG = .00375-in (.0953)
Z = .005-in (.127)

Voltage

2.33 = 2.33 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 104.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

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Standard products available 24-hrs.

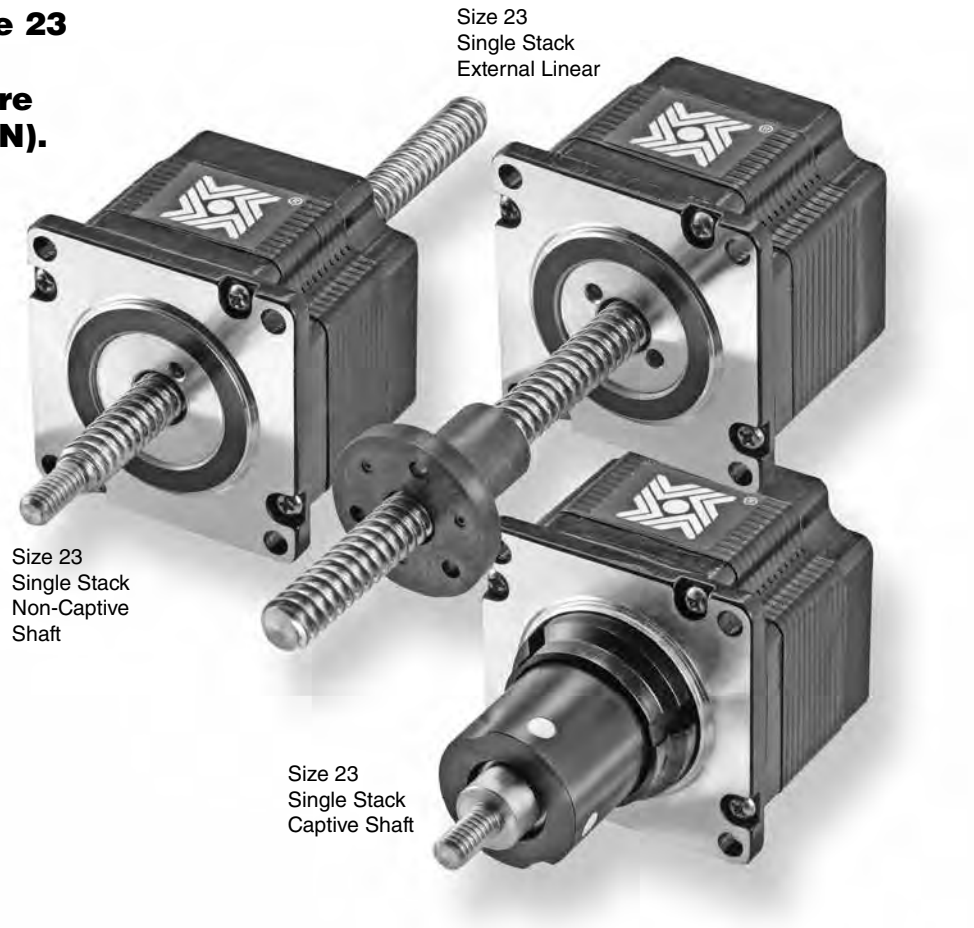
ENCODERS and other **OPTIONAL ASSEMBLIES** also available

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

Haydon® 57000 Series Size 23 hybrid linear actuators for applications that require forces up to 200 lbs. (890 N).

The Haydon® Size 23 incorporates the same high performance and durable design as the Size 17.

The 57000 Series Hybrid Linear Actuator is available in a wide variety of resolutions - from 0.0003125-in. (.0079375 mm) per step to 0.002-in. (.0508 mm) per step. They deliver a thrust of up to 200 lbs. (890 N) or speeds exceeding 2.0-in. (5.08 cm) per second.



Specifications

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	57H4 ■–■■–■■■†			57H6 ■–■■–■■■†	
	Non-captive	57F4 ■–■■–■■■†			57F6 ■–■■–■■■†	
	External Lin.	E57H4 ■–■■–■■■†			E57H6 ■–■■–■■■†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		3.25 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		2.0 A	1.3 A	.54 A	1.3 A	.54 A
Resistance/phase		1.63 Ω	3.85 Ω	22.2 Ω	3.85 Ω	22.2 Ω
Inductance/phase		3.5 mH	10.5 mH	58 mH	5.3 mH	23.6 mH
Power Consumption		13 W				
Rotor Inertia		166 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		18 oz (511 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø.375"(9.53 mm) inches	mm	Order Code I.D.
.0003125	.0079*	A
.0004167	.0105*	S
.0005	.0127	3
.0008333	.0211*	T
.001	.0254	1
.002	.0508	2

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

† Part numbering information on page 107.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Identifying the Hybrid part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

E	57	H	6	7	–	3.25	–	910

Prefix (include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

57 = 57000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)
J = 0.9° Non-captive
K = 0.9° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

7 = .000125-in (.0031)
S = .0004167-in (.01058418)
3 = .0005-in (.0127)
1 = .001-in (.0254)
A = .0003125-in (.0079)
T = .0008333-in (.0211)
2 = .002-in (.0508)

High Resolution

P = .00015625-in (.003969)
X = .00020833-in (.00529166)
9 = .00025-in (.0635)

Voltage

3.25 = 3.25 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 108.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

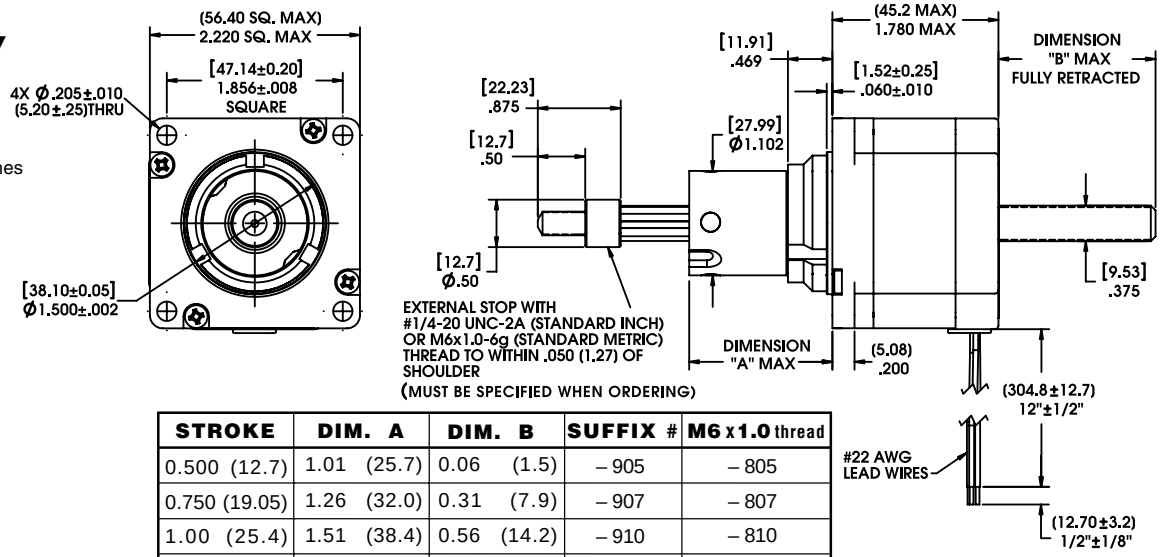
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

ENCODERS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches

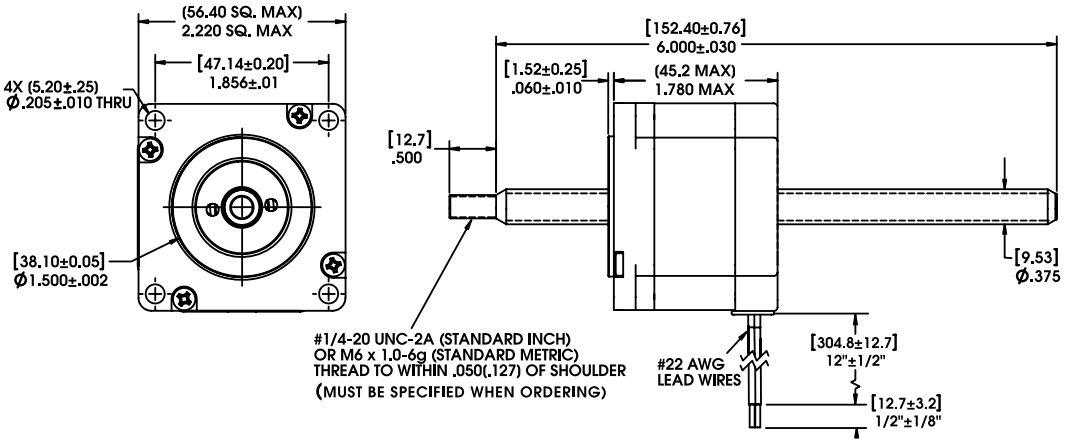


STROKE	DIM. A	DIM. B	SUFFIX #	M6 x 1.0 thread
0.500 (12.7)	1.01 (25.7)	0.06 (1.5)	– 905	– 805
0.750 (19.05)	1.26 (32.0)	0.31 (7.9)	– 907	– 807
1.00 (25.4)	1.51 (38.4)	0.56 (14.2)	– 910	– 810
1.250 (31.8)	1.76 (44.7)	0.81 (20.6)	– 912	– 812
1.500 (38.1)	2.01 (51.1)	1.06 (26.9)	– 915	– 815
2.00 (50.8)	2.51 (63.8)	1.56 (39.6)	– 920	– 820
2.500 (63.5)	3.01 (76.5)	2.06 (52.3)	– 925	– 825

Non-Captive Lead-screw

Dimensions = (mm) inches

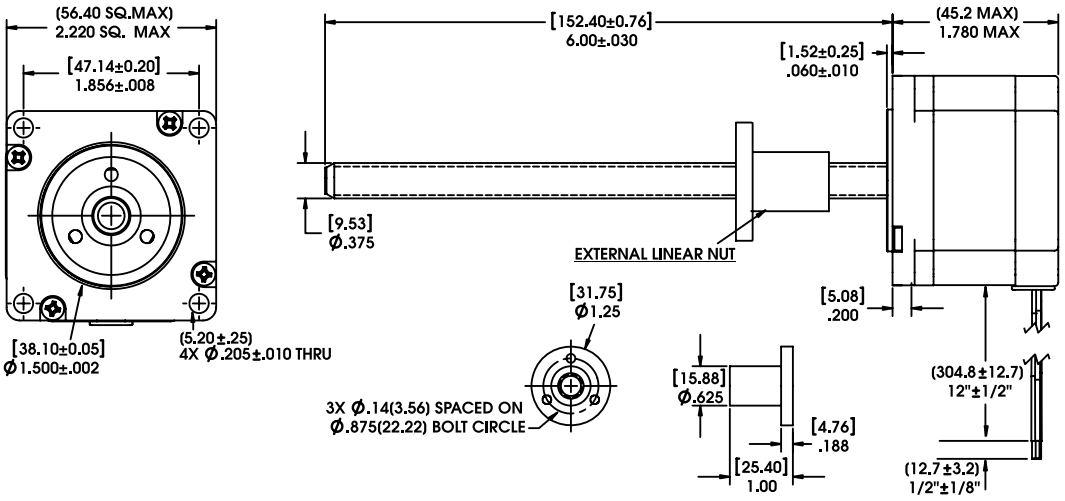
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

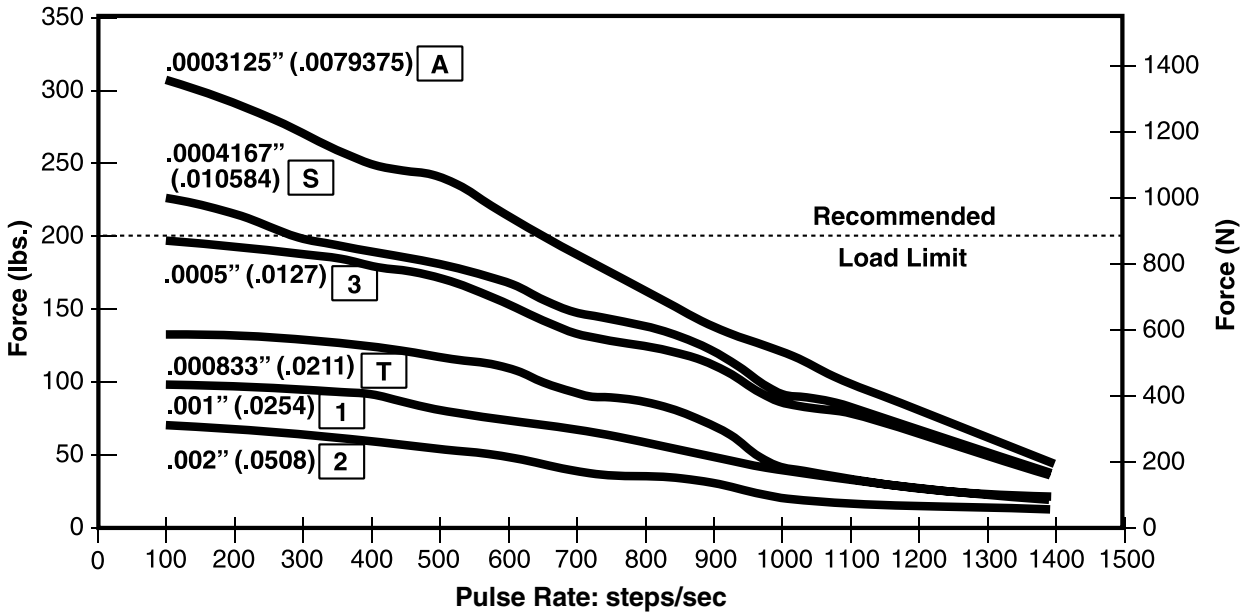
Dimensions = (mm) inches

Up to 12-in (305 mm) standard screw lengths. Longer screw lengths are available.



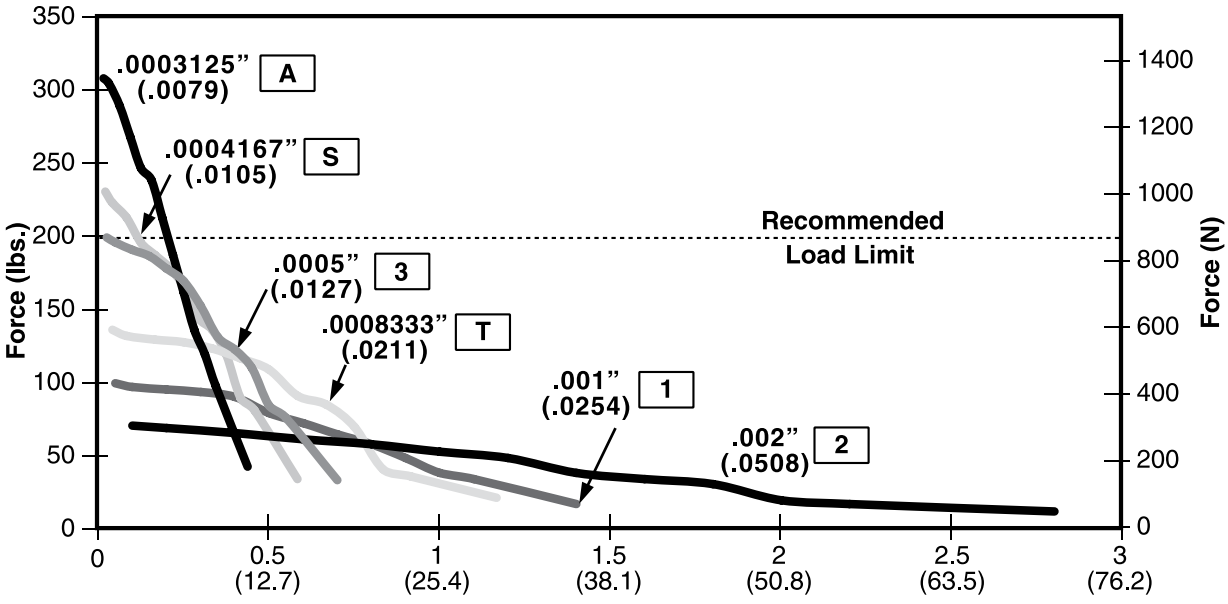
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .375 (9.53) Lead-screw



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .375 (9.53) Lead-screw



NOTE: All chopper drive curves were created with a 5 volt motor and a 75 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

The Haydon® 57000 Series Size 23, 0.9° High Resolution Motor

The Size 23, 0.9° high resolution hybrid offers precise, excellent motion control with a full linear step movement as low as 2 microns and a thrust capability up to 200 lbs (890 N).

Specifications

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	57K4 ■-■■-■■■†			57K6 ■-■■-■■■†	
	Non-captive	57J4 ■-■■-■■■†			57J6 ■-■■-■■■†	
	External Lin.	E57K4 ■-■■-■■■†			E57K6 ■-■■-■■■†	
Wiring		†Bipolar			Unipolar**	
Winding Voltage		3.25 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		2.0 A	1.3 A	0.54 A	1.3 A	0.54 A
Resistance/phase		1.63 Ω	3.85 Ω	22.2 Ω	3.85 Ω	22.2 Ω
Inductance/phase		4.2 mH	13 mH	68 mH	6 mH	27 mH
Power Consumption		13 W				
Rotor Inertia		166 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		18 oz (511 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø.375"(9.53 mm) inches	mm	Order Code I.D.
.000125	.0031*	7
.00015625	.003969	P
.00020833	.00529166	X
.00025	.00635	9
.0004167	.01058418	S
.0005	.0127	3
.001	.0254	1

*Values truncated

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

NOTE: Refer to performance curves on page 109 for codes S, 3, 1

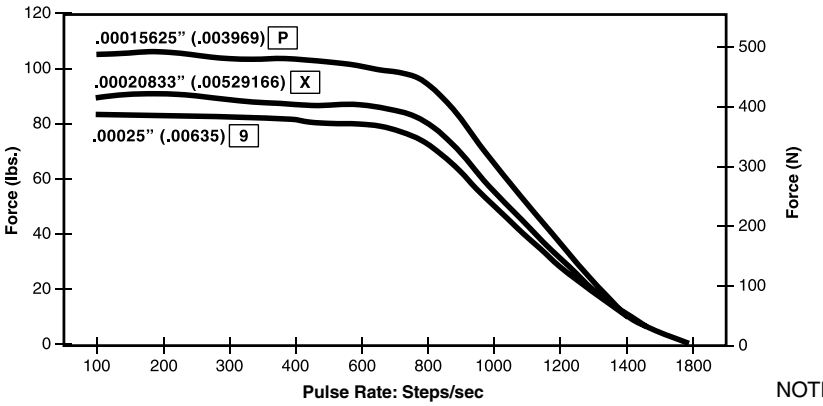
† Part numbering information on page 107.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

FORCE vs. PULSE RATE

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

– with two available lead-screw diameters

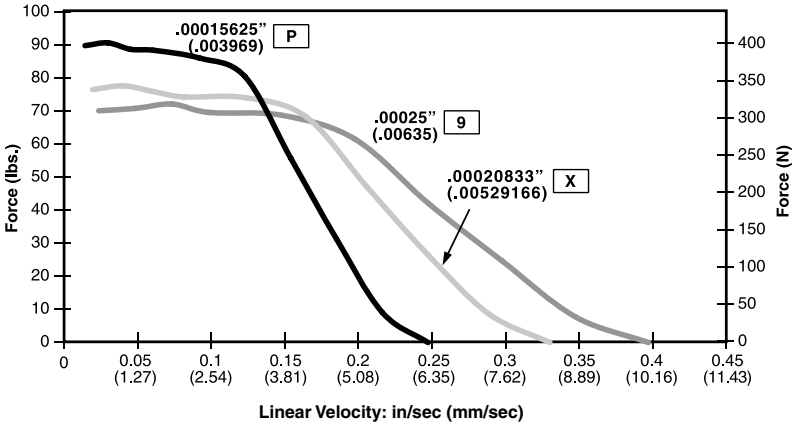


NOTE: All chopper drive curves were created with a 5 volt motor and a 75 volt power supply.

FORCE vs. LINEAR VELOCITY

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

– with two available lead-screw diameters

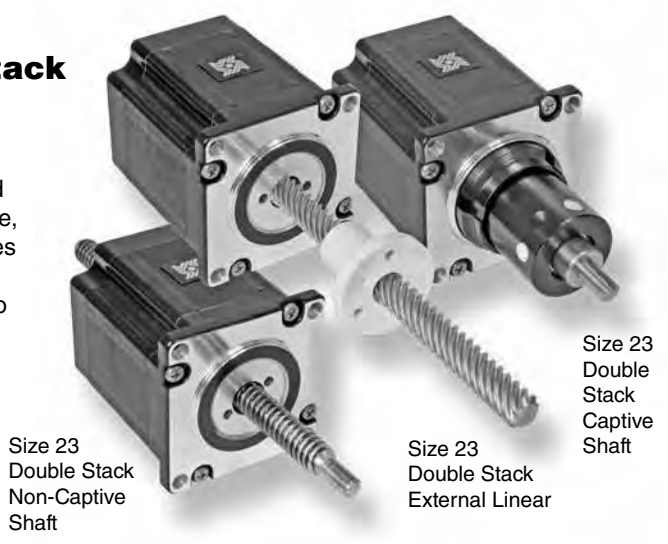


Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® 57000 Series Size 23 Double Stack hybrid linear actuators deliver greater performance in a compact size.

The various patented designs deliver exceptional performance and new linear motion design opportunities. Three designs are available, captive, non-captive and external linear versions. The 57000 Series is available in a wide variety of resolutions - from 0.0005-in (.0127 mm) per step to 0.005-in (.127 mm) per step. The motors can also be microstepped for even finer resolutions. The Size 23 actuator delivers thrust of up to 200 lbs. (890 N).



Size 23 Double Stack Non-Captive Shaft

Size 23 Double Stack External Linear

Size 23 Double Stack Captive Shaft

Specifications

Size 23: 57 mm (2.3-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	57M4 ■–■■–■■■		
	Non-captive	57L4 ■–■■–■■■		
	External Lin.	E57M4 ■–■■–■■■		
Wiring		Bipolar		
Winding Voltage		3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase		3.85 A	2.5 A	1 A
Resistance/phase		0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase		2.3 mH	7.6 mH	35.0 mH
Power Consumption		25 W Total		
Rotor Inertia		332 gcm²		
Insulation Class		Class B (Class F available)		
Weight		32 oz (958 g)		
Insulation Resistance		20 MΩ		

Linear Travel / Step Screw Ø.375" (9.53 mm) inches	mm	Order Code I.D.
.0005	.0127*	3
.001	.0254	1
.002	.0508	2
.0025	.0635	Y
.005	.127	Z

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Hybrid part number codes when ordering

E	57	M	4	3	–	3.25	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 189)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

57 = 57000

(Series numbers represent approximate width of motor body)

Style

L = 1.8° Non-captive
M = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)

Code ID Resolution Travel/Step

3 = .0005-in (.0127)
1 = .001-in (.0254)
2 = .002-in (.0508)
Y = .0025-in (.0635)
Z = .005-in (.127)

Voltage

3.25 = 3.25 VDC
05 = 5 VDC
12 = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 112.)

Suffix also represents:

–800 = Metric

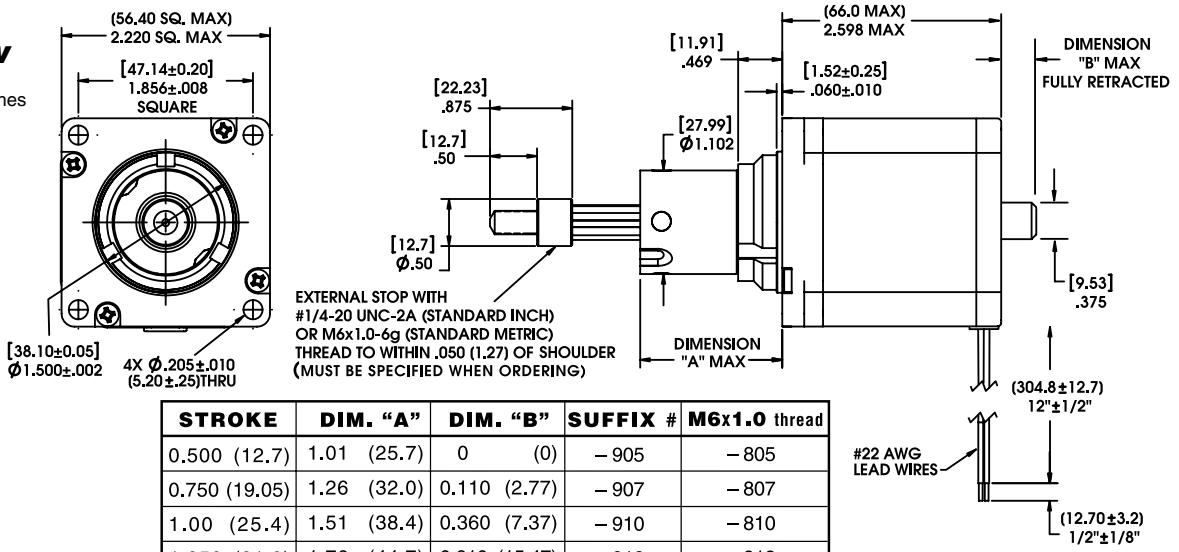
–900 = External Linear with grease and flanged nut

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Captive Lead-screw

Dimensions = (mm) inches

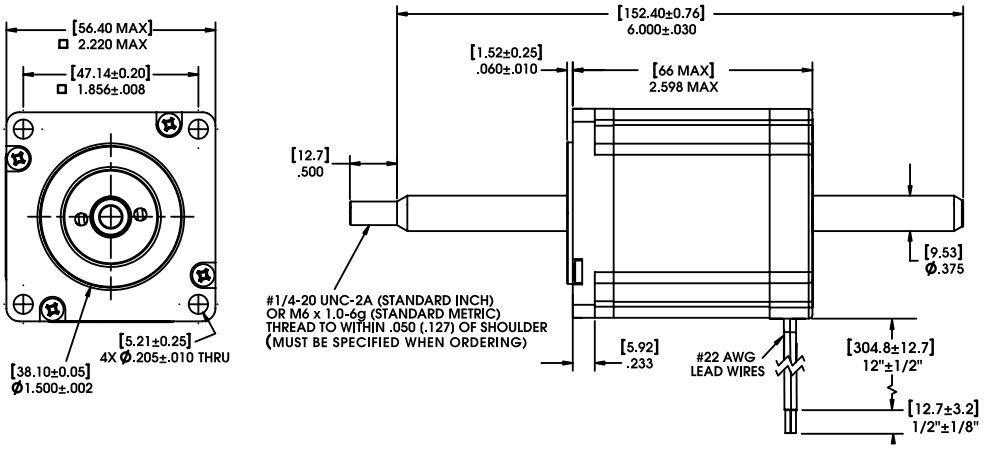


STROKE	DIM. "A"	DIM. "B"	SUFFIX #	M6x1.0 thread
0.500 (12.7)	1.01 (25.7)	0 (0)	–905	–805
0.750 (19.05)	1.26 (32.0)	0.110 (2.77)	–907	–807
1.00 (25.4)	1.51 (38.4)	0.360 (7.37)	–910	–810
1.250 (31.8)	1.76 (44.7)	0.610 (15.47)	–912	–812
1.500 (38.1)	2.01 (51.1)	0.860 (21.83)	–915	–815
2.00 (50.8)	2.51 (63.8)	1.360 (34.52)	–920	–820
2.500 (63.5)	3.01 (76.5)	1.860 (47.22)	–925	–825

Non-Captive Lead-screw

Dimensions = (mm) inches

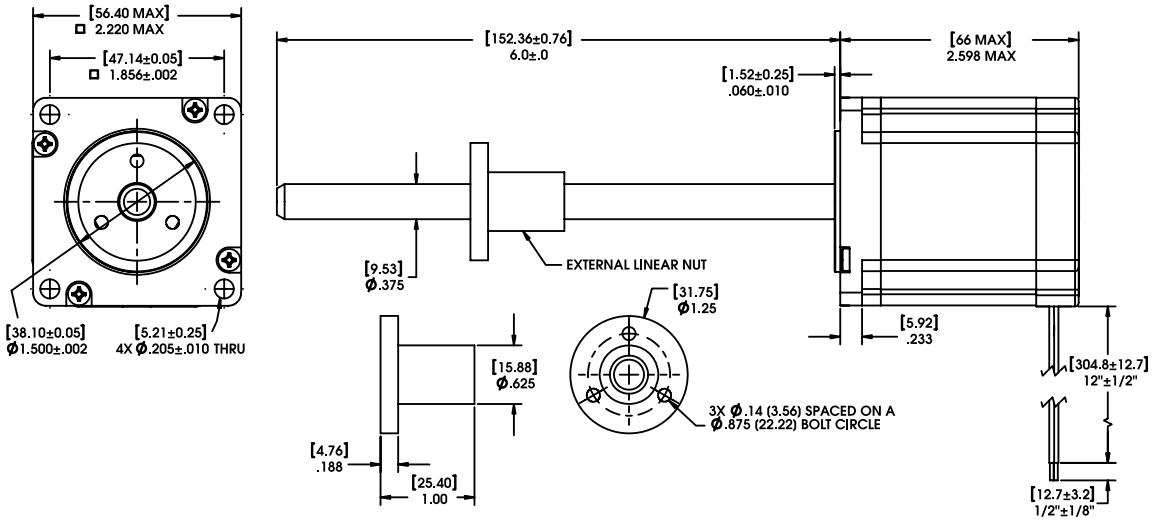
Up to 18-in (457 mm) standard screw lengths. Longer screw lengths are available.



External Linear

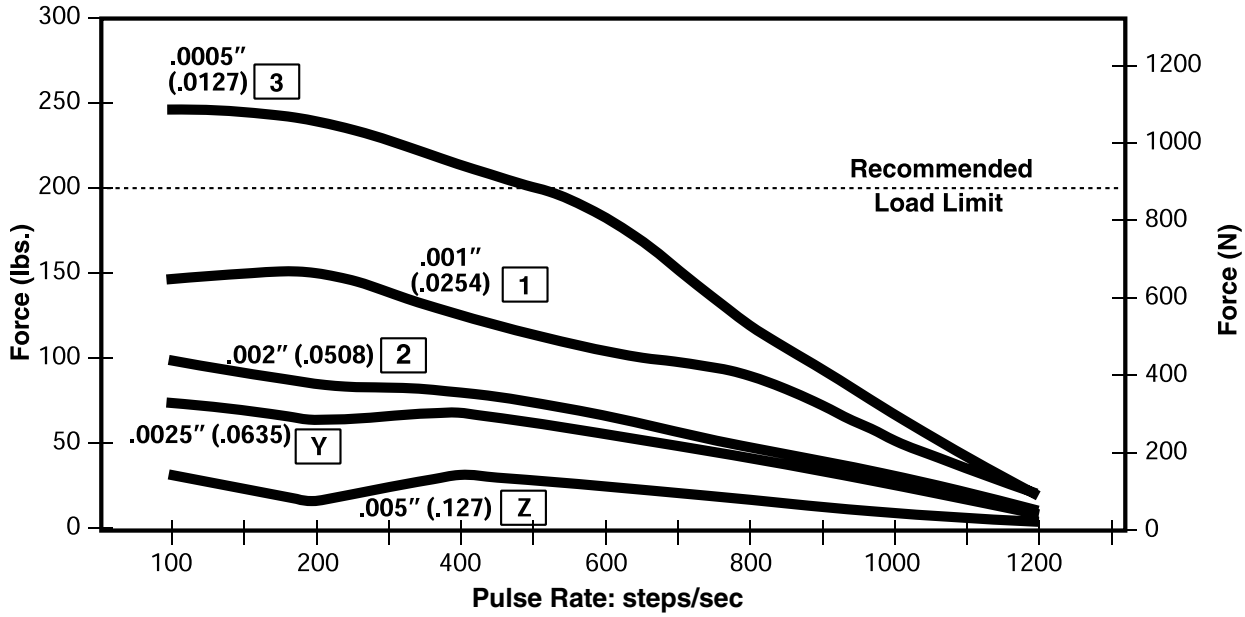
Dimensions = (mm) inches

Up to 12-in (305 mm) standard screw lengths. Longer screw lengths are available.



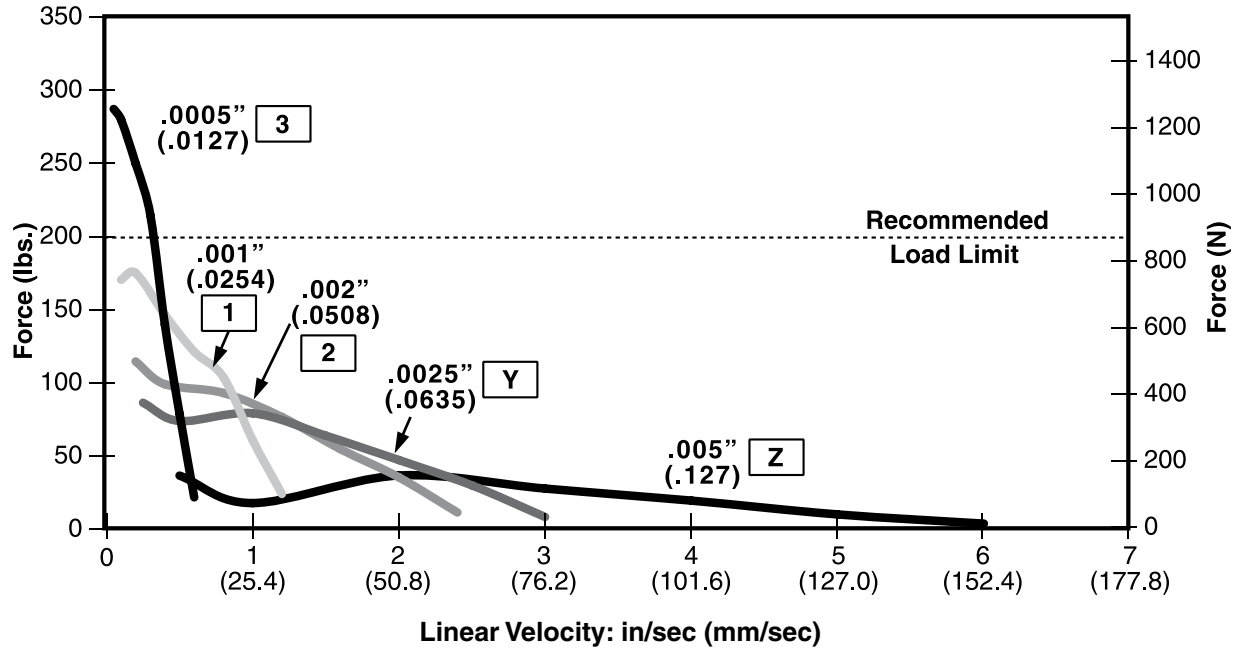
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .375 (9.53) Lead-screw



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% Duty Cycle • 8:1 Motor Coil to Drive Supply Voltage
Ø .375 (9.53) Lead-screw



NOTE: All chopper drive curves were created with a 5 volt motor and a 75 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

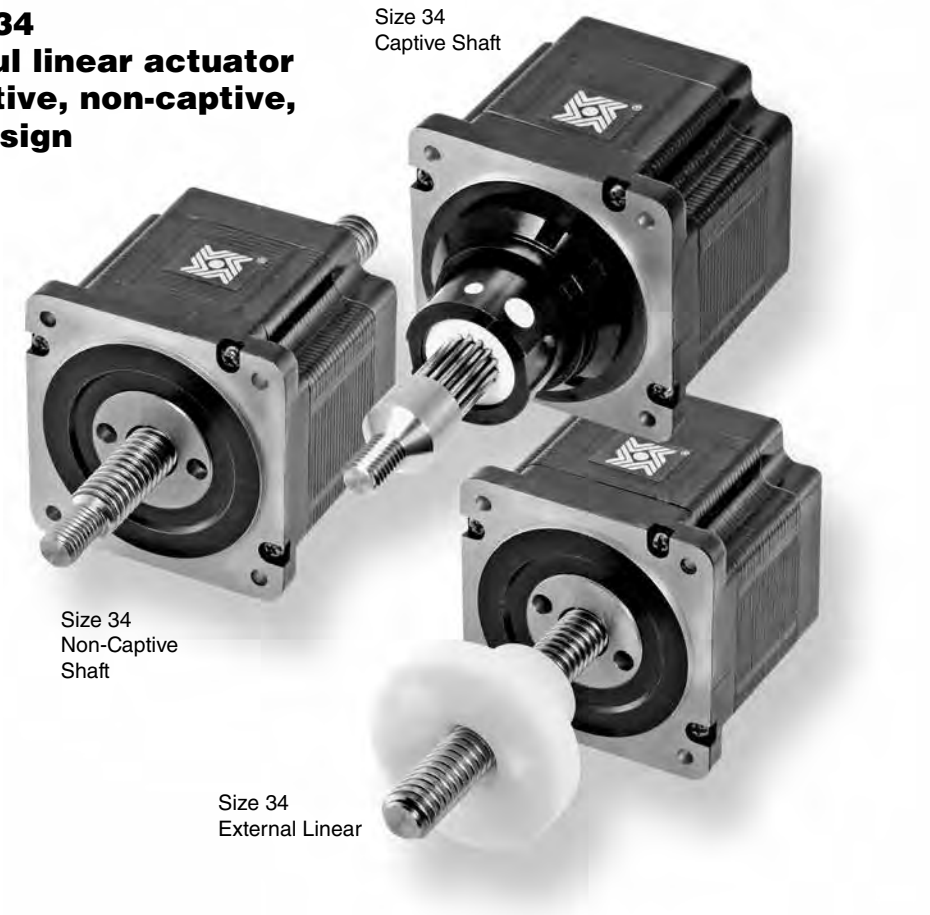
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Haydon® 87000 Series Size 34 ... our largest, most powerful linear actuator is also available with a captive, non-captive, and external linear shaft design

Despite its large size and strength, this motor incorporates the same precision, high performance and durable patented designs featured in our entire hybrid product line. The 87000 series delivers forces up to 500 lbs. (2224 N) in a compact, 3.4-in (87 mm) square package.

The 87000 Series is available in a wide variety of resolutions - from 0.0005-in (.0127 mm) per step to 0.005-in (.127 mm) per step. Speeds exceed 3.0-in (7.62 cm) per second.

In addition to our standard configurations, Haydon Kerk Motion Solutions, Inc. can custom build this powerful motor to meet your specific motion requirements.



Specifications

Size 34: 87 mm (3.4-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	87H4 ■–■■–■■■†			87H6 ■–■■–■■■†	
	Non-captive	87F4 ■–■■–■■■†			87F6 ■–■■–■■■†	
	External Lin.	E87H4 ■–■■–■■■†			E87H6 ■–■■–■■■†	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.85 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		5.47 A	3.12 A	1.3 A	3.12 A	1.3 A
Resistance/phase		0.52 Ω	1.6 Ω	9.23 Ω	1.6 Ω	9.23 Ω
Inductance/phase		2.86 mH	8.8 mH	51 mH	4.4 mH	25.5 mH
Power Consumption		31.2 W				
Rotor Inertia		1760 gcm^2				
Insulation Class		Class B (Class F available)				
Weight		5.1 lbs. (2.3 Kg)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø.625"(15.88 mm) inches	mm	Order Code I.D.
.0005	.0127	3
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.005	.127	Z

*Values truncated

Standard motors are Class B rated for maximum temperature of 130°C.

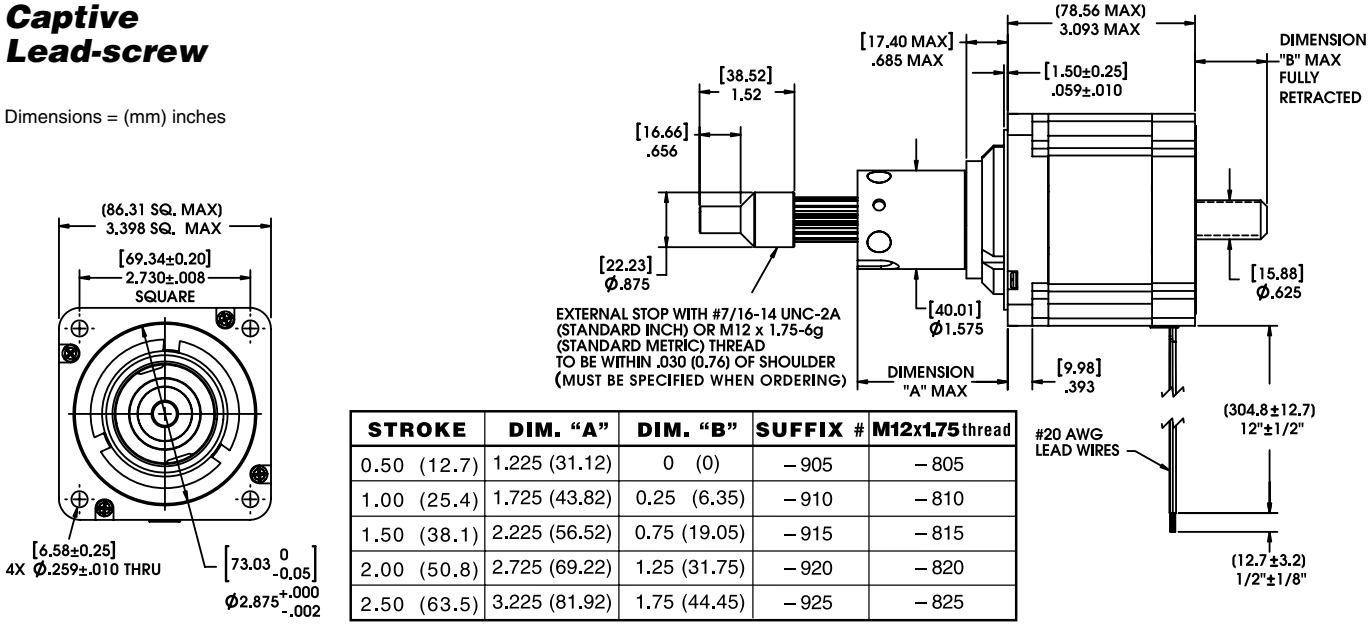
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

† Part numbering information on page 116.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Captive Lead-screw

Dimensions = (mm) inches

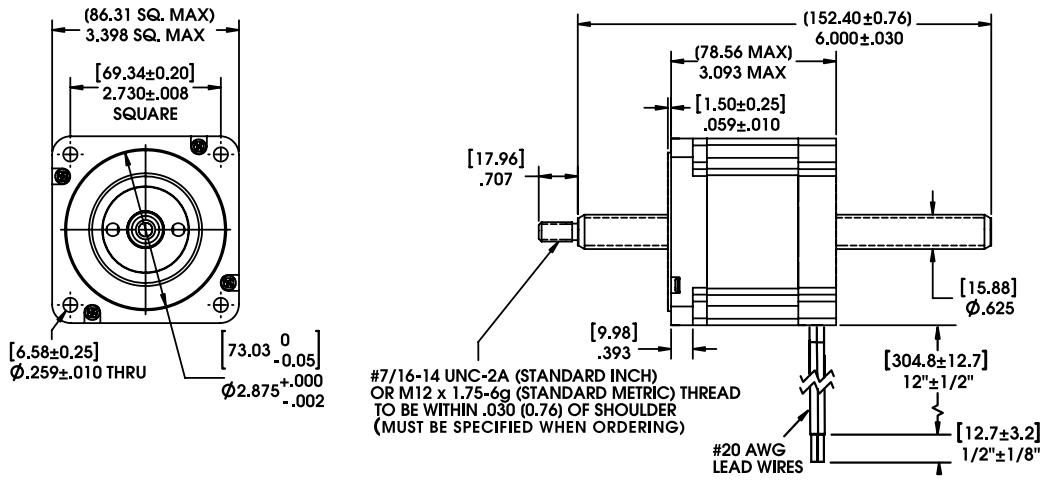


STROKE	DIM. "A"	DIM. "B"	SUFFIX #	M12x1.75 thread
0.50 (12.7)	1.225 (31.12)	0 (0)	–905	–805
1.00 (25.4)	1.725 (43.82)	0.25 (6.35)	–910	–810
1.50 (38.1)	2.225 (56.52)	0.75 (19.05)	–915	–815
2.00 (50.8)	2.725 (69.22)	1.25 (31.75)	–920	–820
2.50 (63.5)	3.225 (81.92)	1.75 (44.45)	–925	–825

Non-Captive Lead-screw

Dimensions = (mm) inches

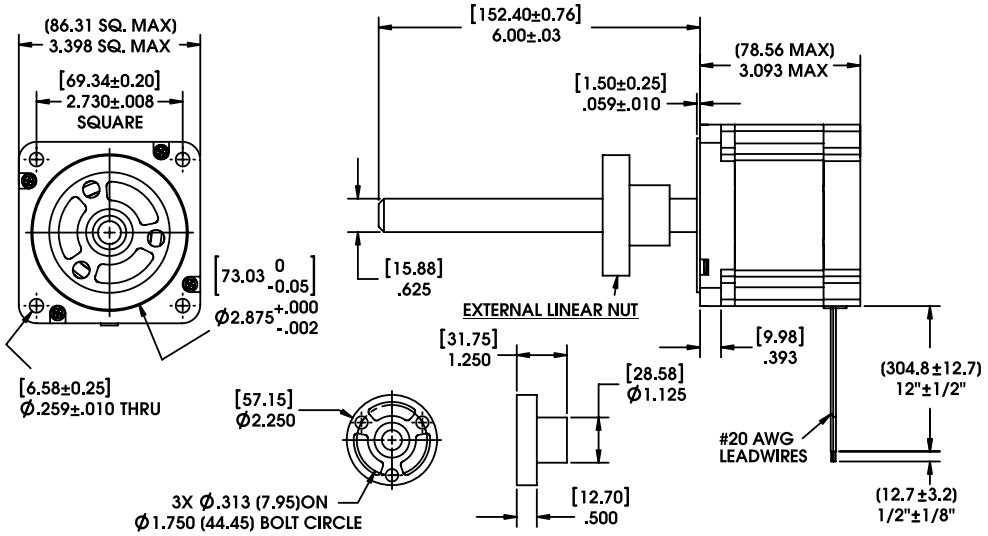
Up to 18-in (457 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = (mm) inches

Up to 12-in (305 mm) standard screw lengths. Longer screw lengths are available.



Identifying the Hybrid part number codes when ordering

E	87	H	4	C	–	2.85	–	910

Prefix (include only when using the following)
- **A** = A Coil (See AC Synchronous page 189)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Switch

Series number designation

87 = 87000

(Series numbers represent approximate width of motor body)

Style
- **F** = 1.8° Non-captive
- **H** = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils
- **4** = Bipolar (4 wire)
- **6** = Unipolar (6 wire)

Code ID Resolution Travel/Step
- **3** = .0005-in (.0127)
- **B** = .000625-in (.0158)
- **C** = .00125-in (.0317)
- **Y** = .0025-in (.0635)
- **Z** = .005-in (.127)

Voltage
- **2.85** = 2.85 VDC
- **05** = 5 VDC
- **12** = 12 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page 115.)

Suffix also represents:

–800 = Metric

–900 = External Linear with grease and flanged nut

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

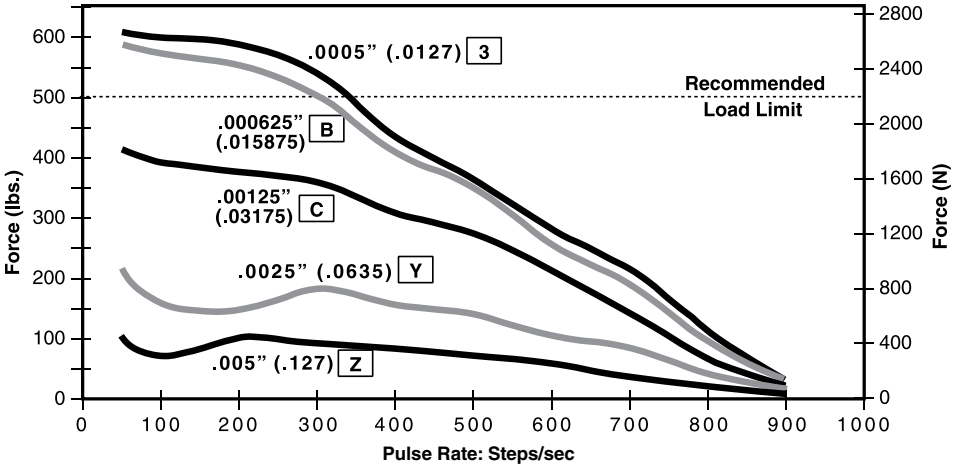
Haydon Kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

87000 Series: Size 34 Single Stack Stack Performance Curves

FORCE vs. PULSE RATE

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

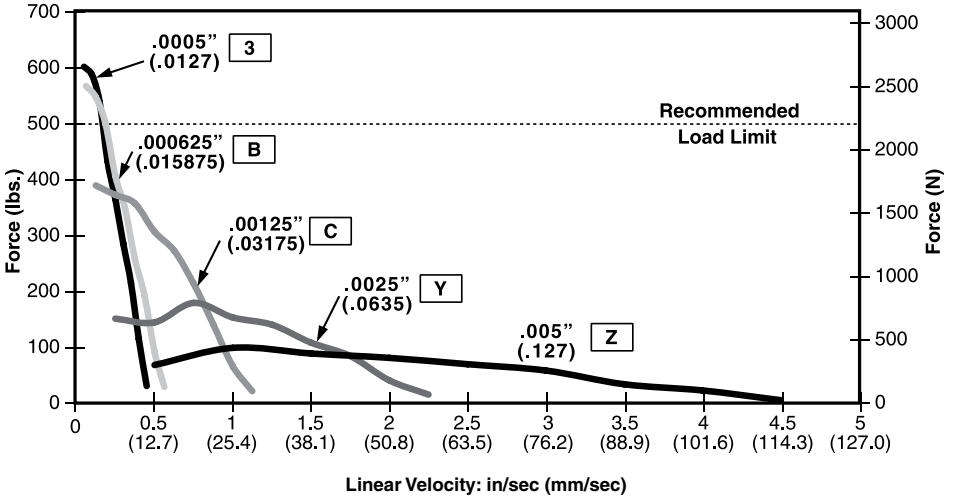
Ø .625 (15.88) Lead-screw >



FORCE vs. LINEAR VELOCITY

- **Chopper**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

Ø .625 (15.88) Lead-screw >



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Integrated Connectors for Series 28000, 35000 and 43000 Hybrid Stepper Motor Linear Actuators

Motor Connector:
JST part # S06B-PASK-2
Mating Connector:
JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)
Wire to Board Connector:
JST part number SPHD-001T-P0.5

Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	–
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	–
6	Phase 1 Start	Phase 1 Start	Red

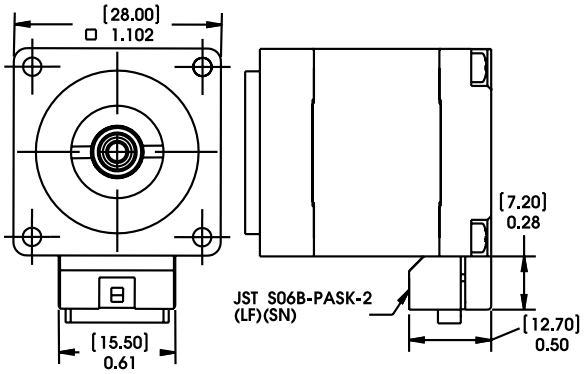
43000 Series, Size17 captive with integrated conector

Hybrid Sereies 28000, 35000 and 43000 (Size 11, 14, and 17) linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. This motor is ideal for those that want to plug in directly to pre-existing harnesses.

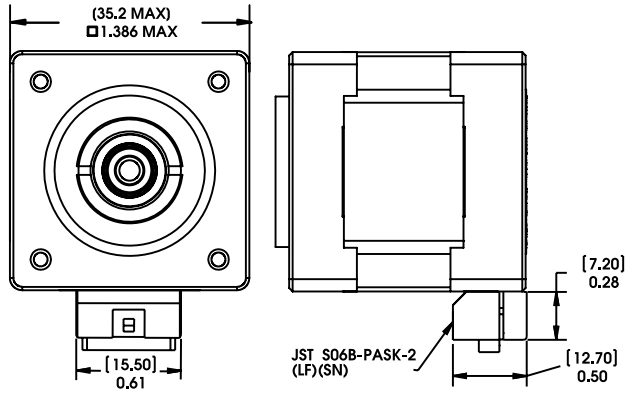
Integrated Connectors: Dimensional Drawings

Dimensions = (mm) inches

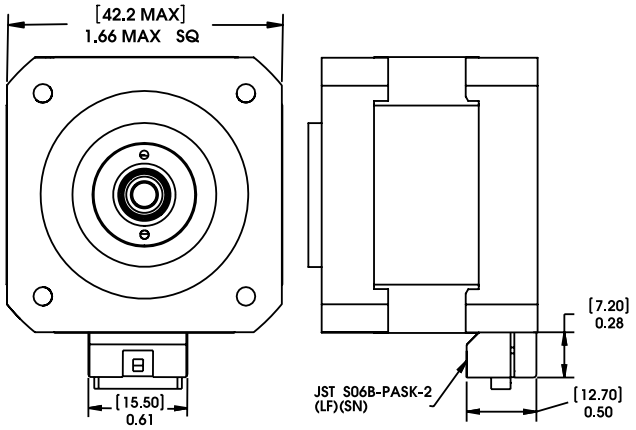
28000 Series: Size 11 Integrated Connector



35000 Series: Size 14 Integrated Connector



43000 Series: Size 17 Integrated Connector



Encoders designed for all sizes of hybrid linear actuators: Series 21000, 28000, 35000, 43000, 57000 and 87000

Size 8 with encoder

All Haydon® hybrid linear actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 8 encoder provides resolutions for applications that require 250 and 300 counts per revolution. The Size 11, 14 and 17 encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. The Size 23 and 34 encoder is offered in resolutions of 200, 400, 1,000 and 2,000 counts per revolution. Encoders are available for all motor configurations – captive, non-captive and external linear.

Size 17 with encoder

Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic photodetector array with signal shaping electronics to produce the two channel bounceless TTL outputs.

Size 23 with encoder

Electrical Specifications

	Minimum	Typical	Maximum	Units
Input voltage	4.5	5.0	5.5	VDC
Output signals	4.5	5.0	5.5	VDC

- 2 channel quadrature TTL squarewave outputs.
- Channel B leads A for a clockwise rotation of the rotor viewed from the encoder cover.
- Tracks at speeds of 0 to 100,000 cycles/sec.
- Optional index available as a 3rd channel (one pulse per revolution).

Operating Temperature

Size 8	
Minimum	- 10°C (14°F)
Maximum	85°C (185°F)

Size 11, 14, 17, 23, 34	
Minimum	- 40°C (- 40°F)
Maximum	100°C (212°F)

Single Ended Encoder Pinout Size 8

Connector Pin #	Description
1	+5 VDC Power
2	Channel A
3	Ground
4	Channel B

Single Ended Encoder Pinout Size 11, 14, 17 23, 34

Connector Pin #	Description
1	Ground
2	Index (optional)
3	Channel A
4	+5 VDC Power
5	Channel B

Mechanical Specifications

	Maximum
Acceleration	250,000 rad/sec^2
Vibration (5 Hz to 2 kHz)	20 g

Differential Ended Encoder Pinout Size 11, 14, 17 23, 34

Connector Pin #	Description
1	Ground
2	Ground
3	– Index
4	+ Index
5	Channel A –
6	Channel A +
7	+5 VDC Power
8	+5 VDC Power
9	Channel B –
10	Channel B +

Resolution 4 standard Cycles Per Revolution **(CPR)** or *Pulses Per Revolution* ***(PPR)***

Size 8 Encoder

CPR	250	300
PPR	*1000*	*1200*

Others are available.

Size 11, 14 & 17 Encoders

CPR	200	400	1000*
PPR	*800*	*1600*	*4000**

Size 23 and 34 Encoders

CPR	200	400*	1000	2000
PPR	*800*	*1600**	*4000*	*8000*

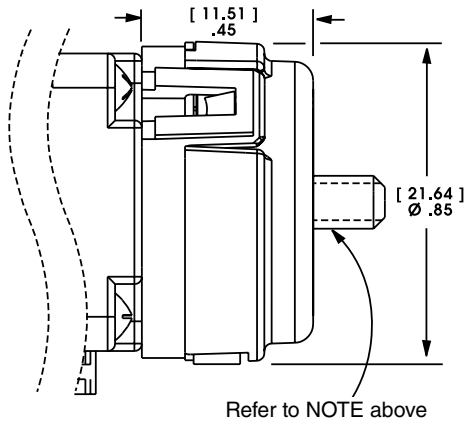
*Index Pulse Channel not available.

Hybrid Encoders: Dimensional Drawings

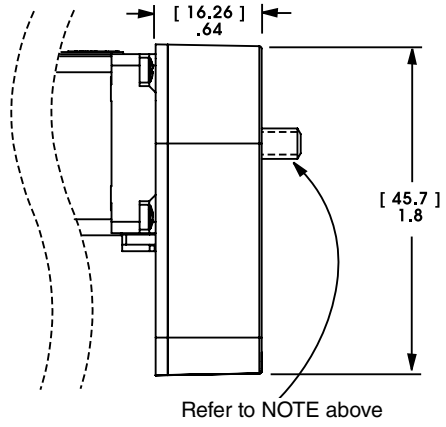
NOTE: Lead-screw extends beyond encoder on specific captive and non-captive motors.
External linear shaft extension is available upon request.

Dimensions = [mm] / inches

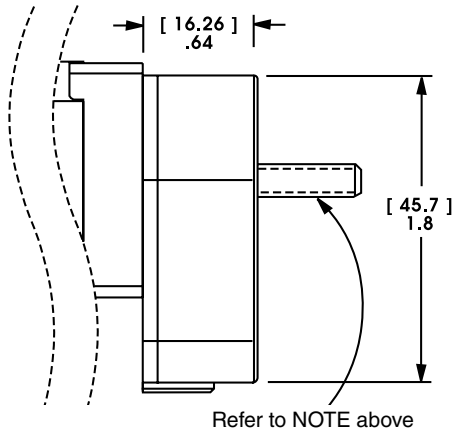
21 mm with 21000 Series Size 8



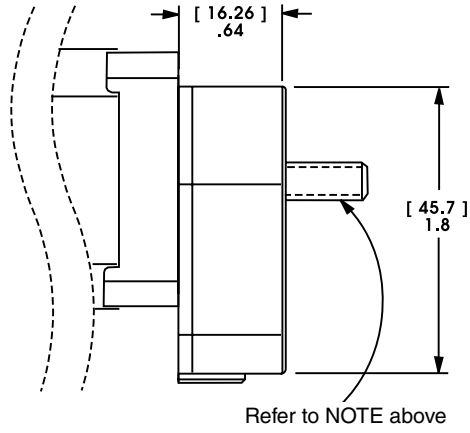
30 mm with 28000 Series Size 11



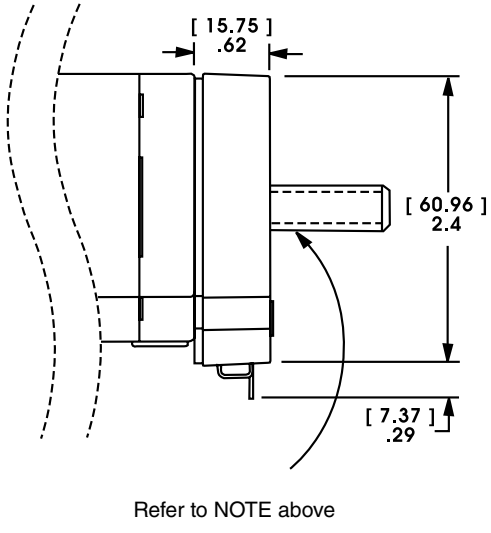
30 mm with 35000 Series Size 14



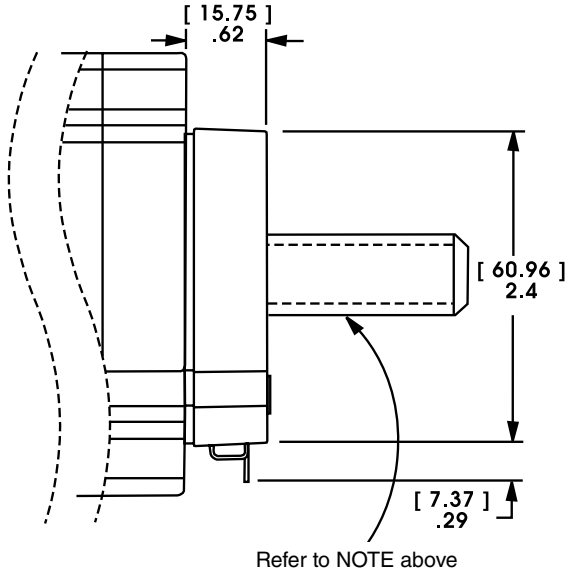
30 mm with 43000 Series Size 17



57 mm with 57000 Series Size 23



57 mm with 87000 Series Size 34



Encoder Ready Option for all sizes of Hybrids

Haydon Hybrid Linear Actuators can now be manufactured as an encoder ready actuator. These encoder ready actuators can be used to install several popular hollow shaft encoders. They are available with an extended rotor journal and a threaded rear housing. The motors use a proprietary manufacturing process which incorporates engineering thermoplastics in the rotor drive nut and a stainless steel Acme lead-screw that allows the motor to be much more efficient and durable than today's more commonly used V-thread/bronze nut configurations.

Extended Rotor Journal for all Hybrid sizes

Haydon Hybrid Linear Actuators are available with an extended rotor journal. This extended rotor journal can be used for encoder installation, manual adjustment, or flag installation for a positioning sensor.

Size 23 Mounting Face Plate for Size 17 Hybrids

Haydon Kerk Motion Solutions, Inc. offers a Size 23 mounting pattern for its hybrid 43000 Series, Size 17 linear actuators.

Home Position Switch for Hybrids

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. When ordering motors with the home position switch, the part number should be preceded by an "S" prefix.

End of Stroke Proximity Sensor for all sizes of Hybrids

The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided. When ordering motors with the proximity sensor, the part number should be preceded by a "P" prefix.

Black Ice® and Kerkote® TFE Coated Lead-screws (certain conditions apply)

Where applications require the use of a "greaseless" screw and nut interface Haydon Kerk Motion Solutions offers TFE coated lead-screws.

A "dry" (non-lubricated) TFE coated lead-screw provides improved performance in both life and thrust as compared to a conventional stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for Haydon® brand captive, non-captive and external linear linear actuators.

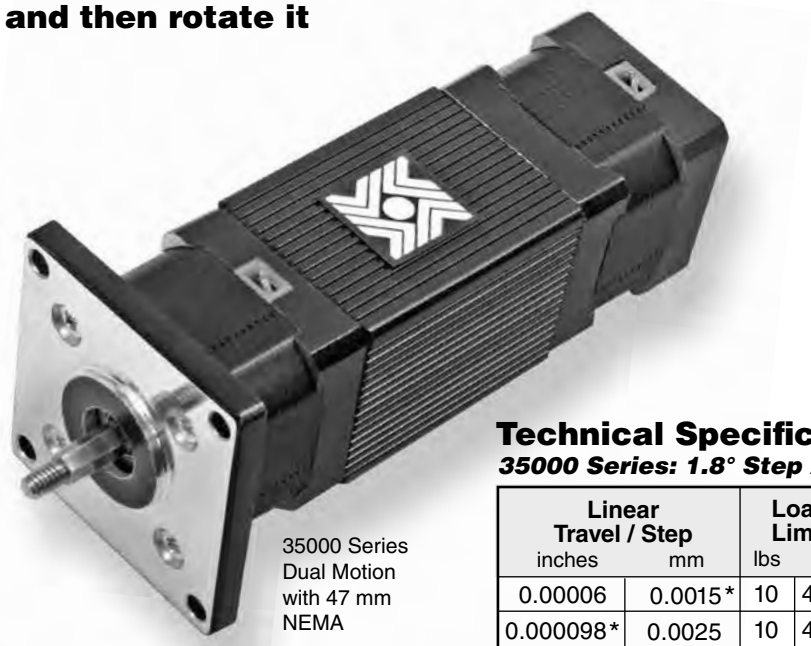
Integrated Anti-backlash Nut for Hybrids

All sizes (except 87000 Series, Size 34) of captive and non-captive hybrid stepper motors can be equipped with an integral anti-backlash feature.

There is a normal backlash between the lead-screw and integral rotor nut. Haydon® actuators are designed for millions of cycles. However, over time additional backlash could increase and eventually double. Haydon Kerk Motion Solutions Integrated Anti-backlash nut can eliminate all backlash. Designed specifically for the Haydon captive and non-captive hybrid motors, these nuts use an opposing spring force to eliminate backlash between the screw and the nut interface. The nuts will self-compensate and accommodate any wear.

Haydon Kerk Motion Solutions application engineers can help you select the appropriate preload for your application.

Haydon® Size 14 Dual Motion actuators axially move components to their insertion positions and then rotate it



35000 Series Dual Motion with 47 mm NEMA

The actuators are based on unique, patented designs and incorporate proven motor technology. These units simplify product development by replacing what would otherwise be far more bulky and complex mechanisms. Another feature of this design is to provide an electric motor in which linear and rotary motions are controllable independently of one another.

For a rotary/linear motor, it is desirable that the linear and rotary motions be controllable independently of one another. These devices can be run using a standard two axis stepper motor driver. Performance can be enhanced using chopper and/or microstepping drives.

Technical Specifications

35000 Series: 1.8° Step Angle

Linear Travel / Step inches	Linear Travel / Step mm	Load Limit lbs	Load Limit N	Order Code I.D.
0.00006	0.0015*	10	44.4	U
0.000098*	0.0025	10	44.4	AA
0.00012	0.0030*	15	67	N
0.00019*	0.005	15	67	AB
0.00024	0.0061*	15	67	K
0.00039*	0.01	15	67	AC
0.00048	0.0121*	15	67	J
0.00078*	0.02	15	67	AD
0.00157*	0.04	15	67	AE

*Values truncated

35000 Series: 0.9° Step Angle

Linear Travel / Step inches	Linear Travel / Step mm	Load Limit lbs	Load Limit N	Order Code I.D.
0.00003	0.00076*	10	44.4	BP
0.00005*	0.00125	10	44.4	AY
0.00006	0.0015*	15	67	U
0.000098*	0.0025	15	67	AA
0.00012	0.0030*	15	67	N
0.00019*	0.005	15	67	AB
0.00024	0.0061*	15	67	K
0.00039*	0.01	15	67	AC
0.00079*	0.02	15	67	AD

Standard motors are Class B rated for maximum temperature of 130°C.

Identifying the Series 35000 Series dual motion part number codes when ordering

LR	35	H	H	4	J	–	05	–	910

Prefix
LR = Linear/Rotary

Series number designation
35 = 35000

Rotary Step Angle
H = 1.8°
K = 0.9°
M = 1.8° Double Stack
P = 0.9° Double Stack

Linear Step Angle
H = 1.8°
K = 0.9°

Coils
4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

1.8° Step Angle	*0.9° Step Angle*
U = .00006-in (.0015)	**BP** = .00003-in (.00076)
AA = .000098-in (.0025)	**AY** = .00005-in (.00125)
N = .00012-in (.0030)	**U** = .00006-in (.0015)
AB = .00019-in (.005)	**AA** = .000098-in (.0025)
K = .00024-in (.0061)	**N** = .00012-in (.0030)
AC = .00039-in (.01)	**AB** = .00019-in (.005)
J = .00048-in (.0121)	**K** = .00024-in (.0061)
AD = .00078-in (.02)	**AC** = .00039-in (.01)
AE = .00157-in (.04)	**AD** = .00078-in (.02)

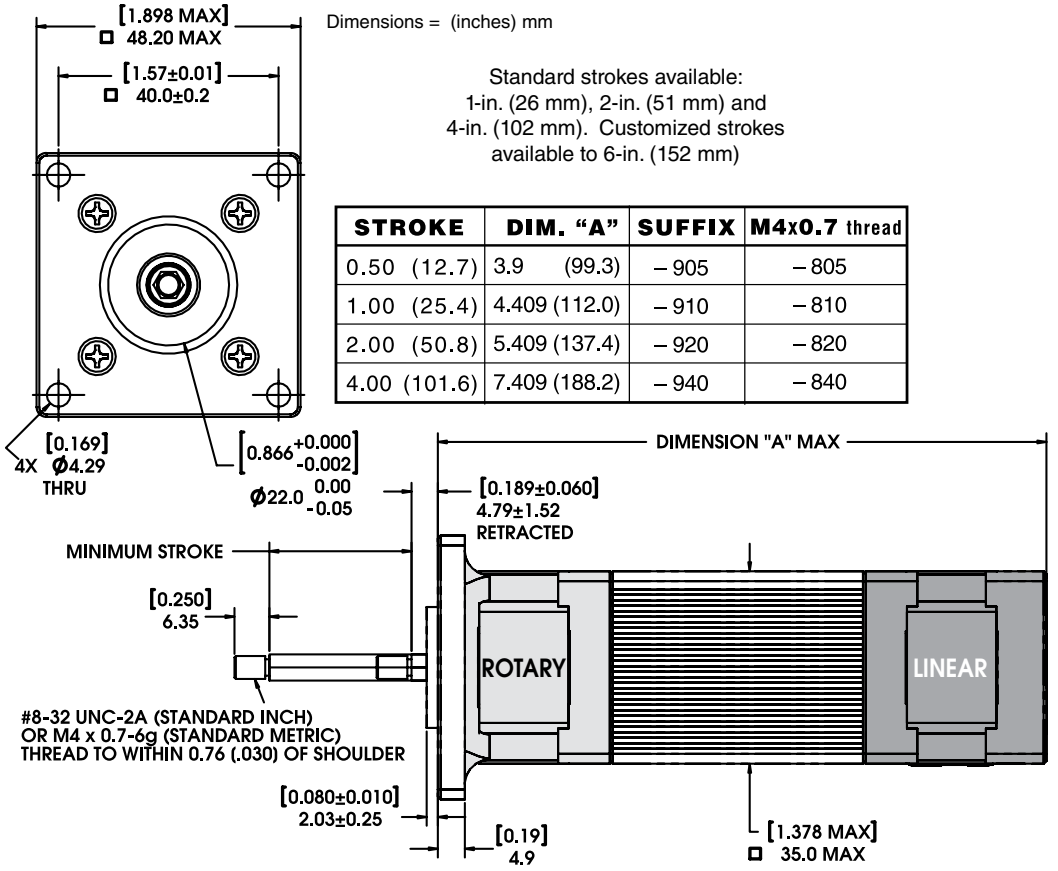
Voltage
05 = 5 VDC
12 = 7.5 VDC
SP = Mixed Voltages
Custom V available

Suffix:
Stroke
Example: –910 = 1-in (26 mm)
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

NOTE: SEE PAGE 87
35000 SERIES HYBRID FOR MORE DETAILED MOTOR INFORMATION

Dimensional Drawings

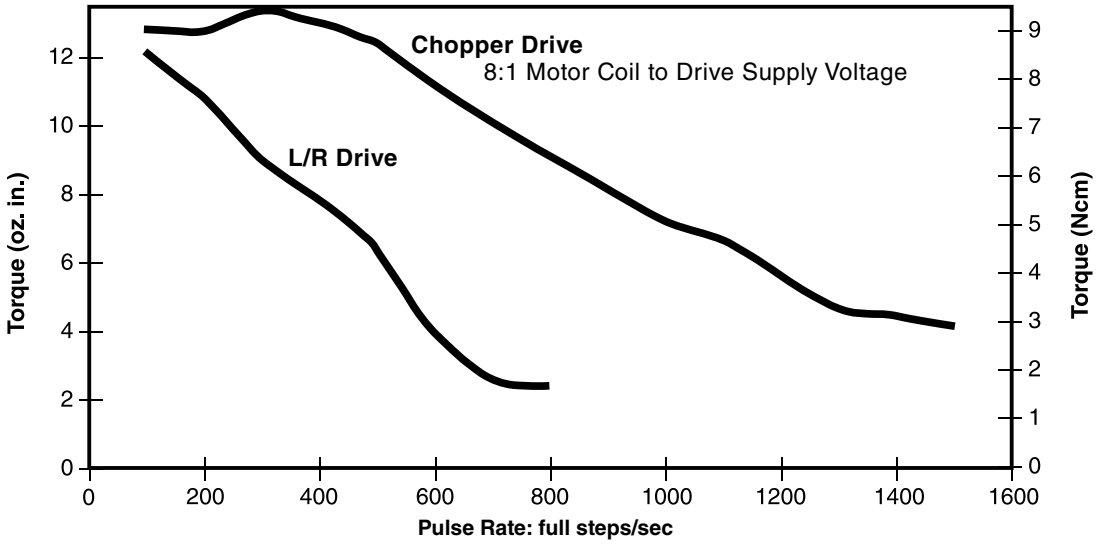


Standard strokes available:
1-in. (26 mm), 2-in. (51 mm) and
4-in. (102 mm). Customized strokes
available to 6-in. (152 mm)

STROKE	DIM. "A"	SUFFIX	M4x0.7 thread
0.50 (12.7)	3.9 (99.3)	– 905	– 805
1.00 (25.4)	4.409 (112.0)	– 910	– 810
2.00 (50.8)	5.409 (137.4)	– 920	– 820
4.00 (101.6)	7.409 (188.2)	– 940	– 840

TORQUE vs. PULSE RATE: ROTARY FUNCTION

Bipolar • 100% Duty Cycle



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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

Haydon® Size 17 dual motion actuators provide linear and rotary motions, controllable independently of one another

For a rotary/linear motor, it is desirable that the linear and rotary motions be controllable independently of one another. These devices can be run using a standard two axis stepper motor driver. Performance can be enhanced using chopper and/or microstepping drives.

The actuators are based on unique, patented designs and incorporate proven motor technology. These units simplify product development by replacing what would otherwise be far more bulky and complex mechanisms.

43000 Series
Dual Motion
with 57 mm NEMA

Identifying the 43000 Series Dual Motion part number codes when ordering

LR	43	H	H	4	J	–	05	–	910

Prefix

LR =Linear/ Rotary

Series number designation

43 = 43000

Rotary Step Angle

H = 1.8°
K = 0.9°
M = 1.8° Double Stack
P = 0.9° Double Stack

Linear Step Angle

H = 1.8°
K = 0.9°

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

1.8° Step Angle	*0.9° Step Angle*
N = .00012-in (.003)	**U** = .00006-in (.0015)
7 = .000125-in (.0031)	**BB** = .0000625-in (.0016)
P = .00015625-in (.0039)	**V** = .00007825-in (.00198)
AB = .00019-in (.005)	**AA** = .000098-in (.0025)
K = .00024-in (.006)	**N** = .00012-in (.003)
9 = .00025-in (.0063)	**7** = .000125-in (.0031)
A = .0003125-in (.0079)	**P** = .00015625-in (.0039)
AC = .00039-in (.01)	**AB** = .00019-in (.005)
J = .00048-in (.0121)	**K** = .00024-in (.006)
3 = .0005-in (.0127)	**9** = .00025-in (.0063)
B = .000625-in (.0158)	**A** = .0003125-in (.0079)
AQ = .00098-in (.025)	**BG** = .00049-in (.0125)
Q = .00096-in (.0243)	**J** = .00048-in (.0121)
C = 0.00125-in (.0317)	**B** = .000625-in (.0158)
BH = .00196-in (.05)	**AQ** = .00098-in (.025)
R = 0.00192-in (.0487)	**Q** = .00096-in (.0243)
Y = .0025-in (.0635)	**C** = 0.00125-in (.0317)
AG = .00375-in (.0953)	**AF** = .001875-in (.0476)
Z = .005-in (.127)	**Y** = .0025-in (.0635)

Voltage

05 = 5 VDC
12 = 7.5 VDC
SP = Mixed Voltages

Custom V available

Suffix:

Stroke
Example:
–910 = 1-in (26 mm)

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above.
For assistance or order entry, call our engineering team at 203 756 7441.

NOTE: SEE PAGE 95 43000 SERIES HYBRID FOR MORE DETAILED MOTOR INFORMATION

Technical Specifications

43000 Series: 1.8° Step Angle

Linear Travel / Step inches	Linear Travel / Step mm	Load Limit lbs	Load Limit N	Order Code I.D.
0.00012	0.003*	30	133	N
0.000125	0.0031*	30	133	7
0.00015625	0.0039*	30	133	P
0.00019*	0.005	30	133	AB
0.00024	0.0060*	30	133	K
0.00025	0.0063*	30	133	9
0.0003125	0.0079*	50	222	A
0.00039*	0.01	50	222	AC
0.00048	0.0121*	50	222	J
0.0005	0.0127*	50	222	3
0.000625	0.0158*	50	222	B
0.00098*	0.025	50	222	AQ
0.00096	0.0243*	50	222	Q
0.00125	0.0317*	50	222	C
0.00196*	0.05	50	222	BH
0.00192	0.0487*	50	222	R
0.0025	0.0635	50	222	Y
0.00375	0.0953*	50	222	AG
0.005	0.127	50	222	Z

*Values truncated

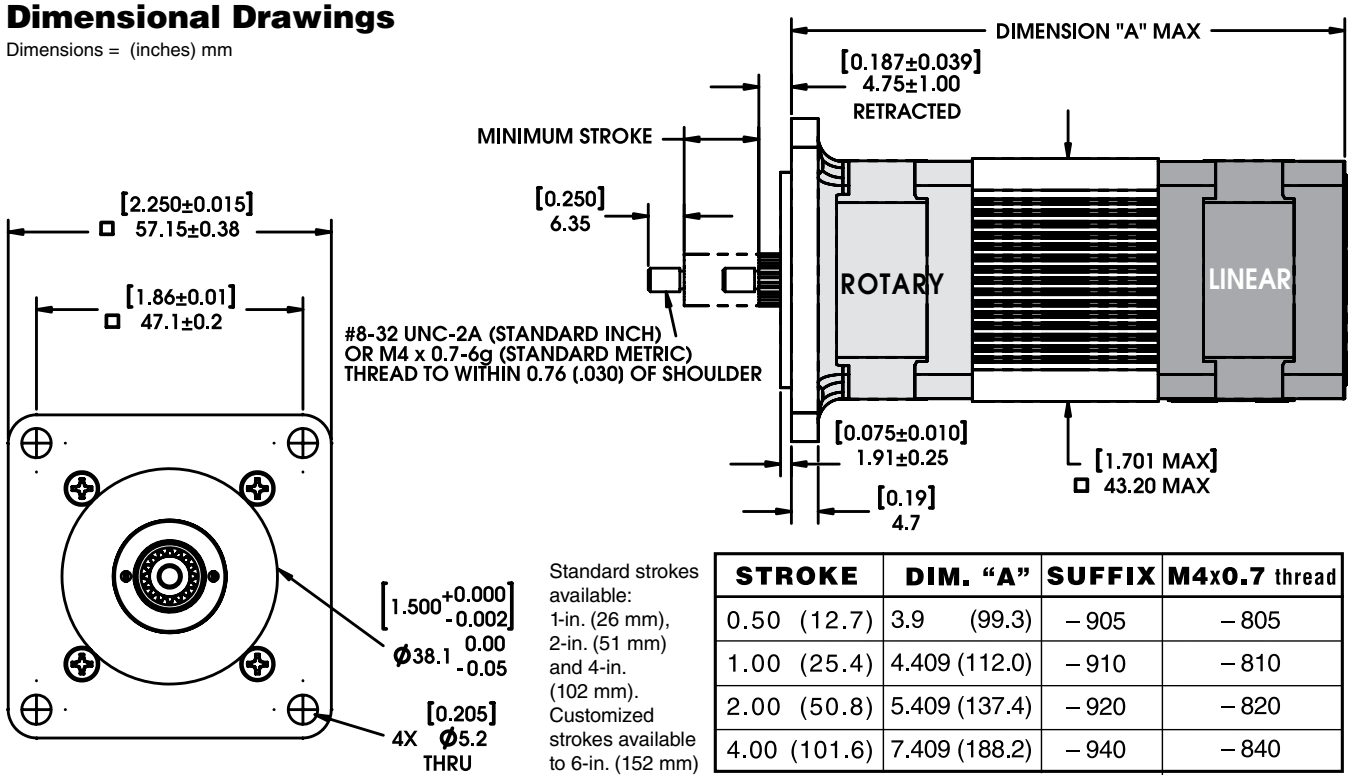
43000 Series: 0.9° Step Angle

Linear Travel / Step inches	Linear Travel / Step mm	Load Limit lbs	Load Limit N	Order Code I.D.
0.00006	0.0015*	30	133	U
0.0000625	0.0016*	30	133	BB
0.00007825	0.00198*	30	133	V
0.000098*	0.0025	30	133	AA
0.00012	0.003*	30	133	N
0.000125	0.0031*	30	133	7
0.00015625	0.0039*	50	222	P
0.00019*	0.005	50	222	AB
0.00024	0.0060*	50	222	K
0.00025	0.0063*	50	222	9
0.0003125	0.0079*	50	222	A
0.00049*	0.0125	50	222	BG
0.00048	0.0121*	50	222	J
0.000625	0.0158*	50	222	B
0.00098*	0.025	50	222	AQ
0.00096	0.0243*	50	222	Q
0.00125	0.0317*	50	222	C
0.001875	0.0476*	50	222	AF
0.0025	0.0635	50	222	Y

Standard motors are Class B rated for maximum temperature of 130°C.

Dimensional Drawings

Dimensions = (inches) mm

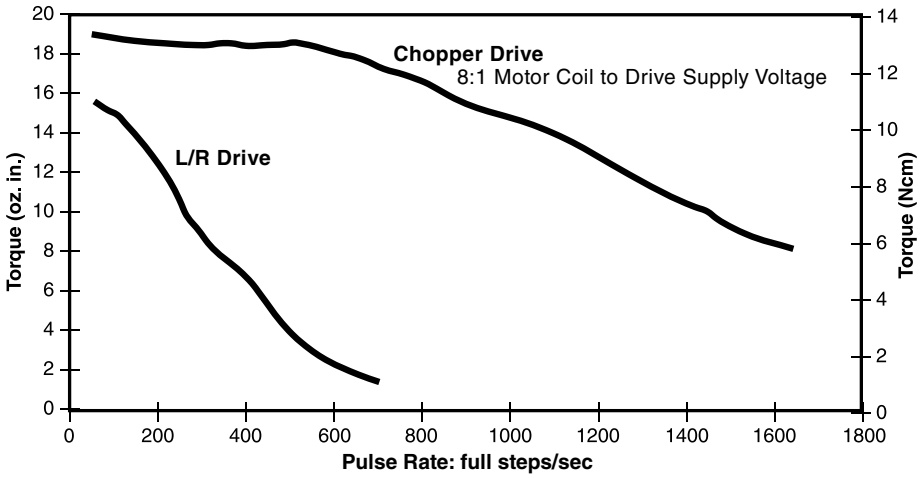


Standard strokes available: 1-in. (26 mm), 2-in. (51 mm) and 4-in. (102 mm). Customized strokes available to 6-in. (152 mm)

STROKE	DIM. "A"	SUFFIX	M4x0.7 thread
0.50 (12.7)	3.9 (99.3)	– 905	– 805
1.00 (25.4)	4.409 (112.0)	– 910	– 810
2.00 (50.8)	5.409 (137.4)	– 920	– 820
4.00 (101.6)	7.409 (188.2)	– 940	– 840

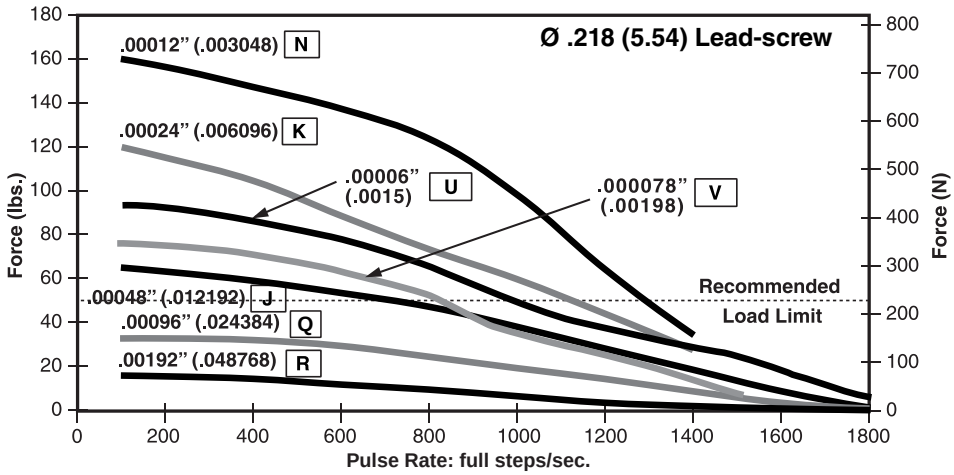
TORQUE vs. PULSE RATE: ROTARY FUNCTION

- Bipolar
- 100% Duty Cycle



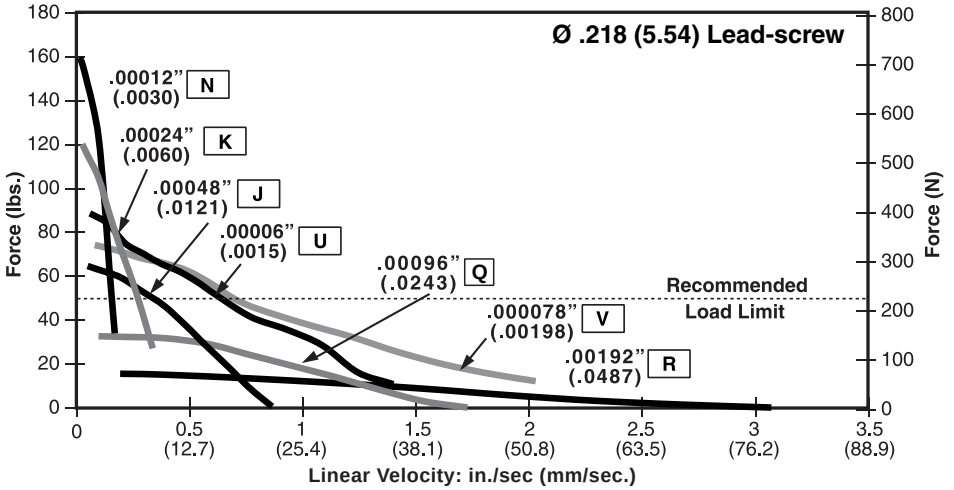
FORCE vs. PULSE RATE: LINEAR FUNCTION

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. LINEAR VELOCITY

- Chopper
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.


Can-Stack
Linear
Actuators

Haydon® linear actuators provide both a broader range and, for a given size, significantly higher thrust

The basic motors incorporate a threaded rotor in conjunction with a (lead-screw) shaft to provide rapid linear movement in two directions (inward and outward). Available step increments vary with the motor frame sizes and are dependent on the step angle of the motor and the lead-screw pitch. A captive or non-captive shaft (lead-screw) option can be supplied for every basic size. Most of the basic sizes also offer an external linear option. The captive shaft configuration features a built-in "anti-rotation" design whereas the non-captive shaft requires the customer to provide external anti-rotation. Both unipolar and bipolar coil configurations are available.

Unique features impart ruggedness and reliability that assure long life and consistent performance. Rare earth magnets are available for even higher thrust. All basic frame sizes are built with dual ball bearings for greater motion control, precise step accuracy and long life. Most of the Haydon® brand motors can also be electronically microstepped for tighter controls.

Applications include medical instrumentation, office equipment, machinery automation, robotics, sophisticated pumping systems and other automated devices which require precise remote controlled linear movement in a broad range of temperature environments.

G4 Series

The G4 Can-Stack Series represents advanced motion control with the industry's most robust and most powerful linear actuators.
The series features:

- Enhanced teeth geometry
- High energy neodymium magnets
- Optimized magnetic circuit design
- High-tech engineered polymers
- Oversized spline (captive)
- Larger ball bearings

Available body-width diameters include Ø 20 mm (.79-in), Ø 26 mm (1-in), Ø 36 mm (1.4-in).

Available with captive, non-captive and external linear lead-screws

G4 19000
Captive
Ø 20 mm (.79-in)

G4 25000
Non-Captive
Ø 25 mm (1-in)

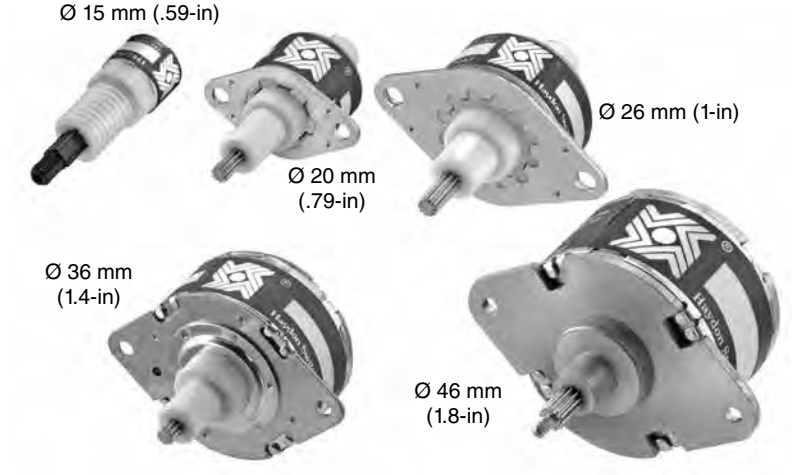
G4 37000
External Linear
Ø 36 mm (1.4-in)

Can-Stack Series

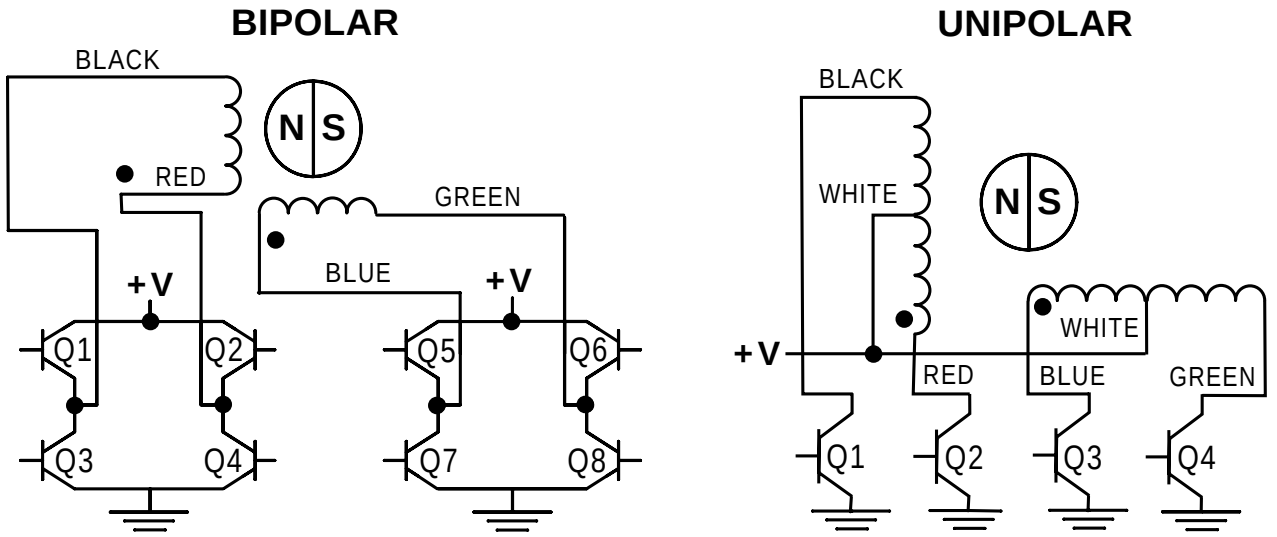
Four basic frame sizes are available – Ø 20 mm (.79-in), Ø 26 mm (1-in), Ø 36 mm (1.4-in) and Ø 46 mm (1.8-in) – as well as a series of extremely compact, Ø 15 mm (.59-in) motors.

All Can-Stacks are available with captive, non-captive and external linear lead-screws except Ø 15 mm (.59-in) which is available with a captive and external linear lead-screw only.

Captive stepper motor linear actuators shown.



Can-Stack Linear Actuator: Bipolar and Unipolar Wiring



Can-Stack Linear Actuator: Stepping Sequence

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Unipolar	Q1	Q2	Q3	Q4
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

EXTEND CW ↓

RETRACT CCW ↑

Note: Half stepping is accomplished by inserting an off state between transitioning phases.

Haydon® 19000 Series generates the highest force of any similar size linear actuator stepper motor.

Utilizing high energy rare earth (neodymium) magnets, the G4 Series linear actuators consistently deliver exceptional performance. All units are built with dual ball bearings.

Ø20mm (.79-in) Non-captive

Ø20mm (.79-in) External Linear

Ø20mm (.79-in) Captive

Specifications

Ø 20 mm (.79-in) motor					
Wiring		Bipolar			
Part No.	Captive	1944 ■–■■–■■■■		1954 ■–■■–■■■■	
	Non-captive	1934 ■–■■–■■■■		1984 ■–■■–■■■■	
	External	E1944 ■–■■–■■■■		E1954 ■–■■–■■■■	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		350 mA	160 mA	338 mA	140 mA
Resistance/phase		14.0 Ω	74.5 Ω	14.8 Ω	85.5 Ω
Inductance/phase		6.24 mH	31.2 mH	6.84 mH	37.8 mH
Rotor inertia		1.052 gcm²		.548 gcm²	
Power consumption		3.38 W			
Insulation Class		Class B			
Weight		1.24 oz (35 g)			
Insulation resistance		20 MΩ			

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
15° Angle	0.001	0.0254	1
	0.002	0.051	2
	0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Can-Stack part number codes when ordering

E – **19** – **4** – **4** – **2** – **05** – **1005**

Prefix (include only when using the following)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Position Switch

Series number designation
19 = 19000
(Series numbers represent approximate diameters of motor body)

Style
- **3** = 7.5° non-captive
- **4** = 7.5° Captive or External (use "E" or "K" Prefix for External version)
- **5** = 15° Captive or External (use "E" or "K" Prefix for External version)
- **8** = 15° non-captive

Coils
- **4** = Bipolar (4 wire)

Code ID Resolution Travel/Step
- **1** = .001-in (.0254)
- **2** = .002-in (.051)
- **3** = .0005-in (.013)
- **4** = .004-in (.102)

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

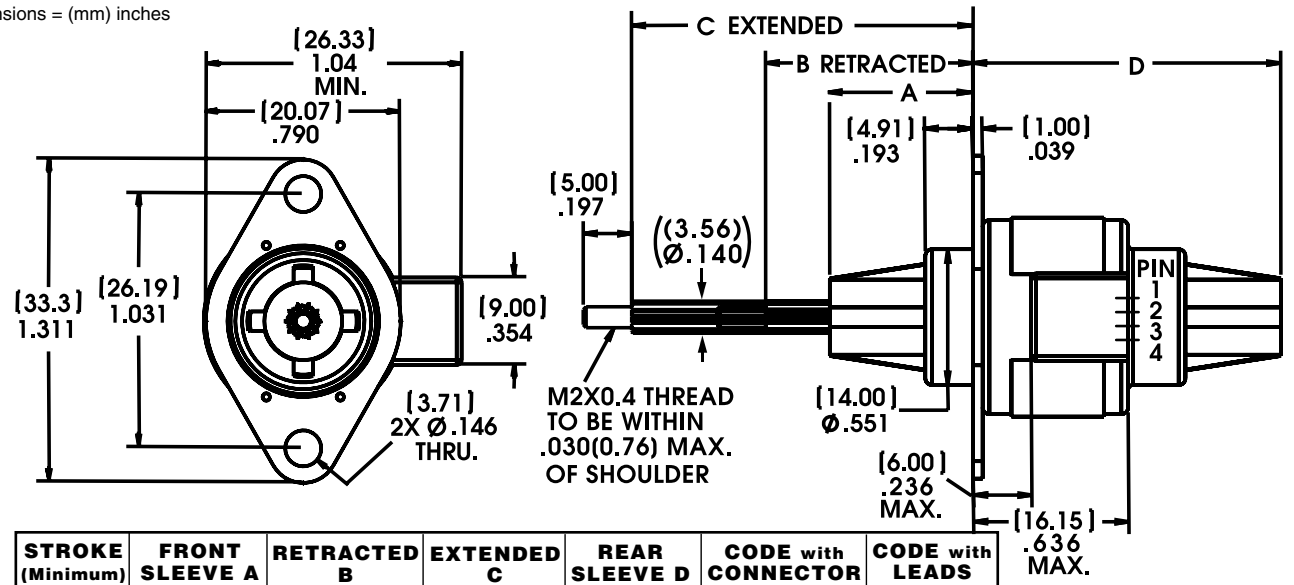
Suffix
Stroke
Example: –1005 = captive 13mm stroke with leads
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

SCREW LENGTH OPTIONS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

Dimensions = (mm) inches

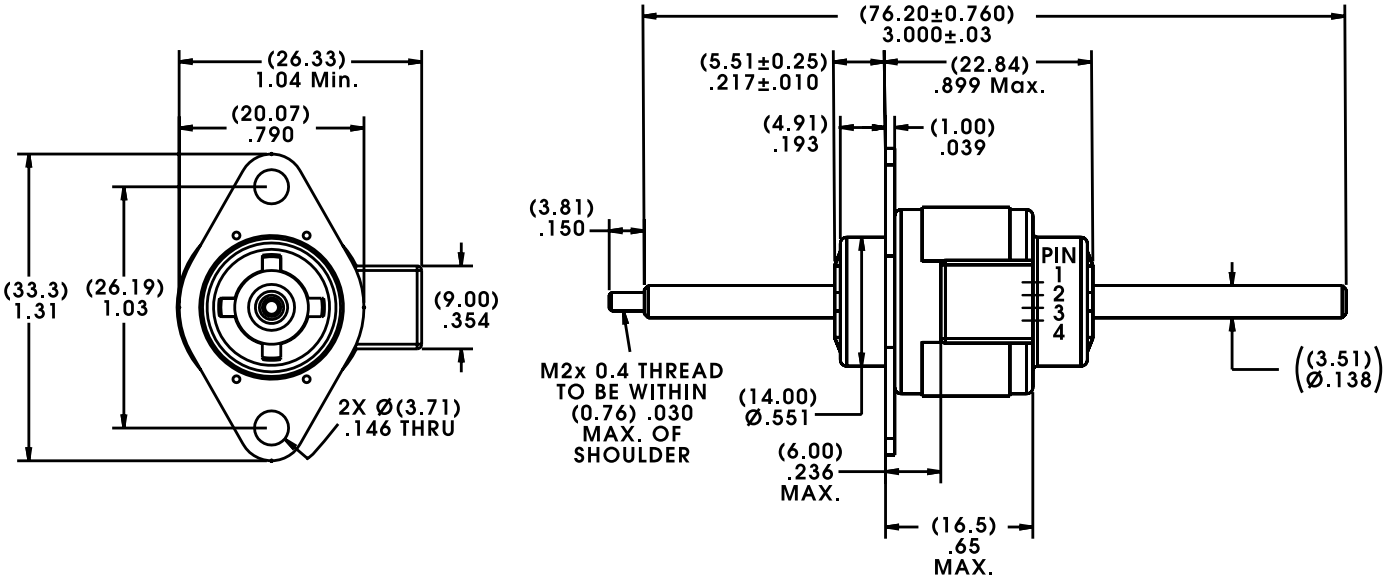


STROKE (Minimum)	FRONT SLEEVE A	RETRACTED B	EXTENDED C	REAR SLEEVE D	CODE with CONNECTOR	CODE with LEADS
(13 mm) .512	(14.75±0.25) .581±.010	(21.37±0.64) .841±.025	(35.17±0.38) 1.385±.015	(32.08 Max.) 1.263 Max.	– 905	– 1005
(18 mm) .708	(20.05±0.25) .789±.010	(26.67±0.64) 1.050±.025	(45.77±0.38) 1.802±.015	(37.38 Max.) 1.472 Max.	– 907	– 1007
(25 mm) .984	(27.05±0.25) 1.065±.010	(33.67±0.64) 1.325±.025	(59.77±0.38) 2.353±.015	(44.38 Max.) 1.747 Max.	– 910	– 1010
(31 mm) 1.22	(33.05±0.25) 1.301±.010	(39.67±0.64) 1.562±.025	(71.77±0.38) 2.826±.015	(63.08 Max.) 2.483 Max.	– 912	– 1012

Non-Captive Lead-screw

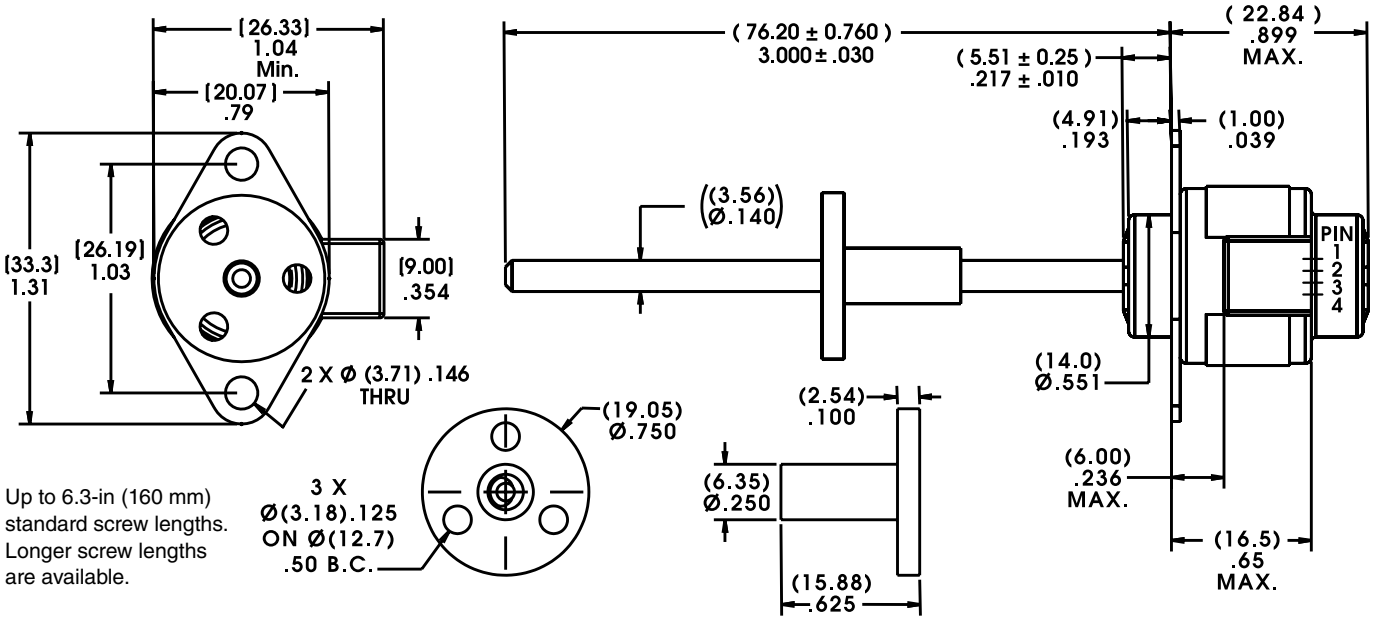
Dimensions = (mm) inches

Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



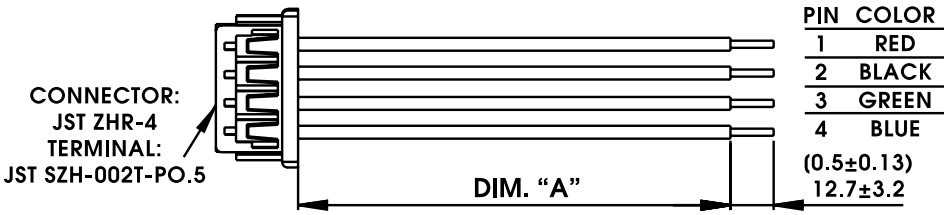
External Linear

Dimensions = (mm) inches



Up to 6.3-in (160 mm) standard screw lengths. Longer screw lengths are available.

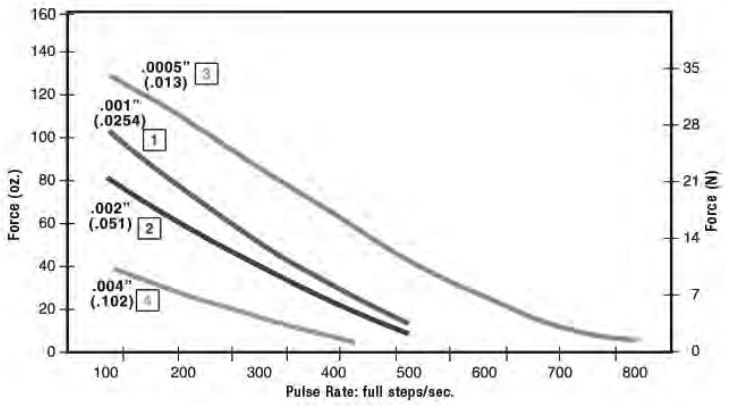
Connector



Part Number	Dimension "A"
56-1318-4	(24 ±0.39) 610 ±10 mm
56-1318-3	(18 ±0.39) 450 ±10 mm
56-1318-2	(12 ±0.39) 305 ±10 mm
56-1318-1	(6 ±0.39) 150 ±10 mm

FORCE vs. PULSE RATE

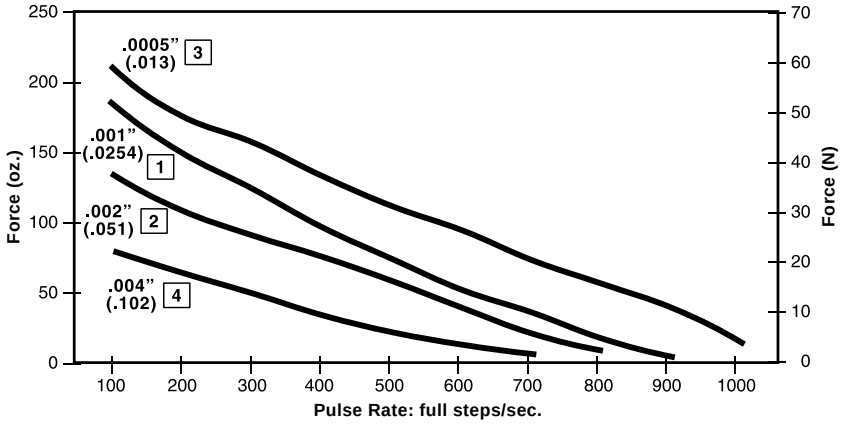
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

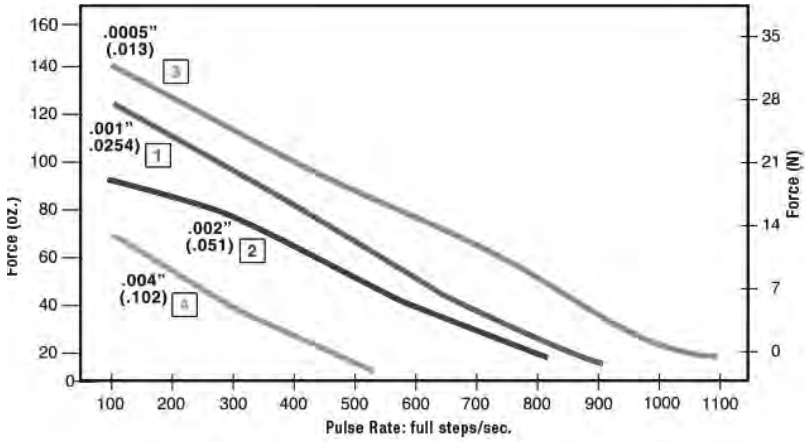
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

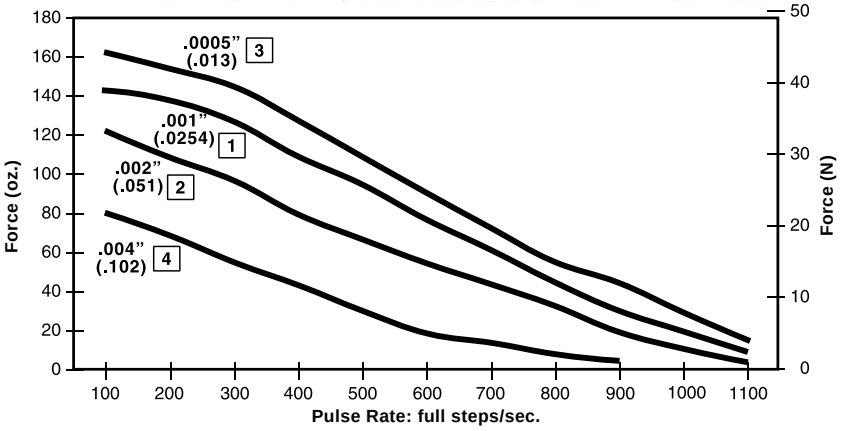
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

G4 19000 Series, Captive

TFE coated lead-screws for applications that require a permanent, dry lubricant

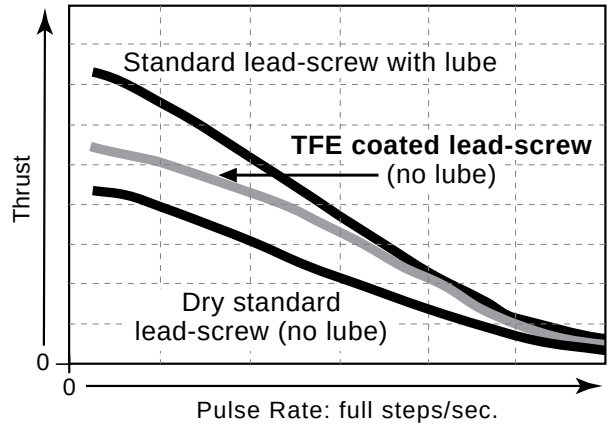
Haydon Kerk Motion Solutions, Inc. offers a TFE coated lead-screw option for its Can-Stack 19000 G4 Series linear actuators. This lead-screw option is ideal for applications where conventional oils and greases can not be used for lead-screw lubrication.

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the Haydon® captive, non-captive and external linear linear actuators.

The TFE coated lead-screw is typically used for applications where contamination from grease or lubricants must be avoided, such as silicon wafer handling, clean rooms, medical equipment, laboratory instrumentation or anywhere precise linear motion is required.

Lead-Screw Comparison

FORCE vs. PULSE RATE L/R Drive • 100% Duty Cycle

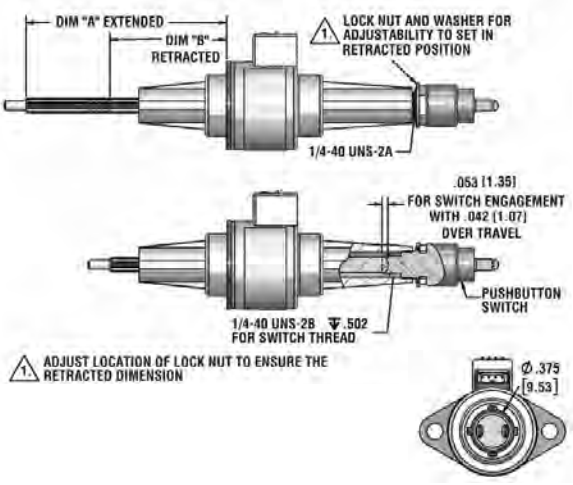


Home Position Switch

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

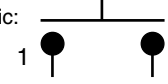
The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S".

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.



Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	



Multiple contact options available.

Dimensions = inches (mm)

S19000 Series Home Position Switch		
STROKE	**DIM "A" Extended**	**DIM "B" Retracted**
.512 (13)	1.385 (35.17)	.841 (21.37)
.708 (18)	1.802 (45.77)	1.050 (26.67)
.984 (25)	2.353 (59.77)	1.325 (33.67)
1.22 (31)	N/A-Contact Customer Service	

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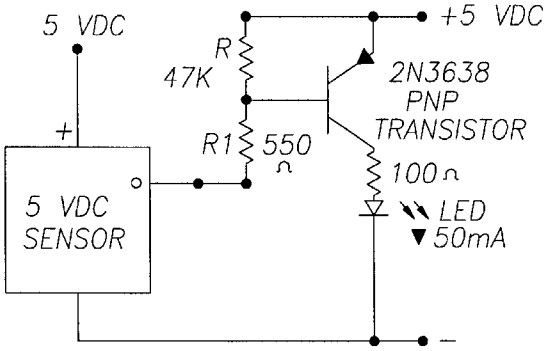
End of Stroke Proximity Sensor

The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

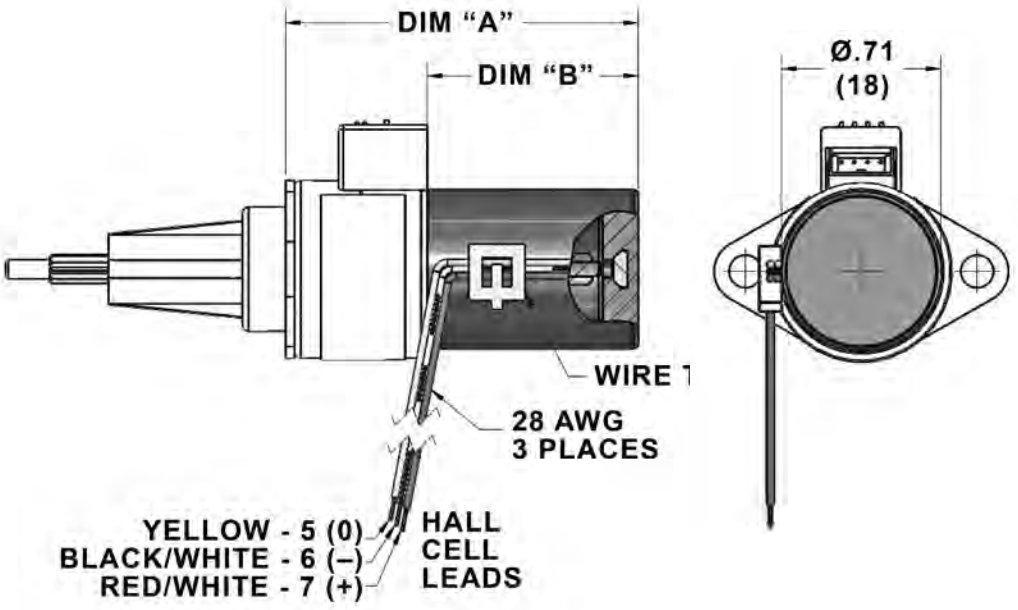
Specifications

Supply Voltage (VDC):	3.8 min. to 24 max.
Current consumption:	10 mA max.
Output voltage (operated):	0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current:	20 mA max.
Output leakage current (released):	10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time	
Rise, 10 to 90%:	.05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%:	.15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature:	– 40 to +150°C



Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.

Dimensional Drawings



Dimensions = inches (mm)

P19000 G4 SERIES		
STROKE	**DIM "A"**	**DIM "B"**
.512 (13)	1.360 (34.55)	.73 (18.55)
.708 (18)	1.569 (39.85)	.94 (23.85)
.984 (25)	1.844 (46.85)	1.21 (30.85)
1.22 (31)	2.081 (52.85)	1.45 (36.85)

The sensor has virtually unlimited cycle life.
Special cabling and connectors can also be provided.

Haydon® 25000 Series – generates higher force than all other competitors.

Offers high durability and exceptional performance.
All units are built with high energy neodymium magnets and dual ball bearings.

Ø25mm (1.0-in) External Linear

Ø25mm (1.0-in) Non-captive

Ø25mm (1.0-in) Captive

Specifications

Ø 25 mm (1.0-in) motor					
Wiring		Bipolar			
Part No.	Captive	2544 ■–■■–■■■■		2554 ■–■■–■■■■	
	Non-captive	2534 ■–■■–■■■■		2584 ■–■■–■■■■	
	External	E2544 ■–■■–■■■■		E2554 ■–■■–■■■■	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		385 mA	160 mA	385 mA	160 mA
Resistance/phase		13 Ω	72 Ω	13 Ω	72 Ω
Inductance/phase		10.8 mH	60 mH	8.08 mH	48 mH
Rotor inertia		1.07 gcm²			
Power consumption		3.85 W			
Insulation Class		Class B			
Weight		1.74 oz (49 g)			
Insulation resistance		20 MΩ			

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
15° Angle	0.001	0.0254	1
	0.002	0.051	2
	0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Haydon kerk Motion Solutions Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Can-Stack part number codes when ordering

E	25	5	4	4	–	12	–	1010

Prefix
(include only when using the following)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Position Switch

Series number designation
25 = 25000
(Series numbers represent approximate diameters of motor body)

Style
3 = 7.5° non-captive
4 = 7.5° Captive or External (use "E" or "K" Prefix for External version)
5 = 15° Captive or External (use "E" or "K" Prefix for External version)
8 = 15° non-captive

Coils
4 = Bipolar (4 wire)

Code ID Resolution Travel/Step
1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

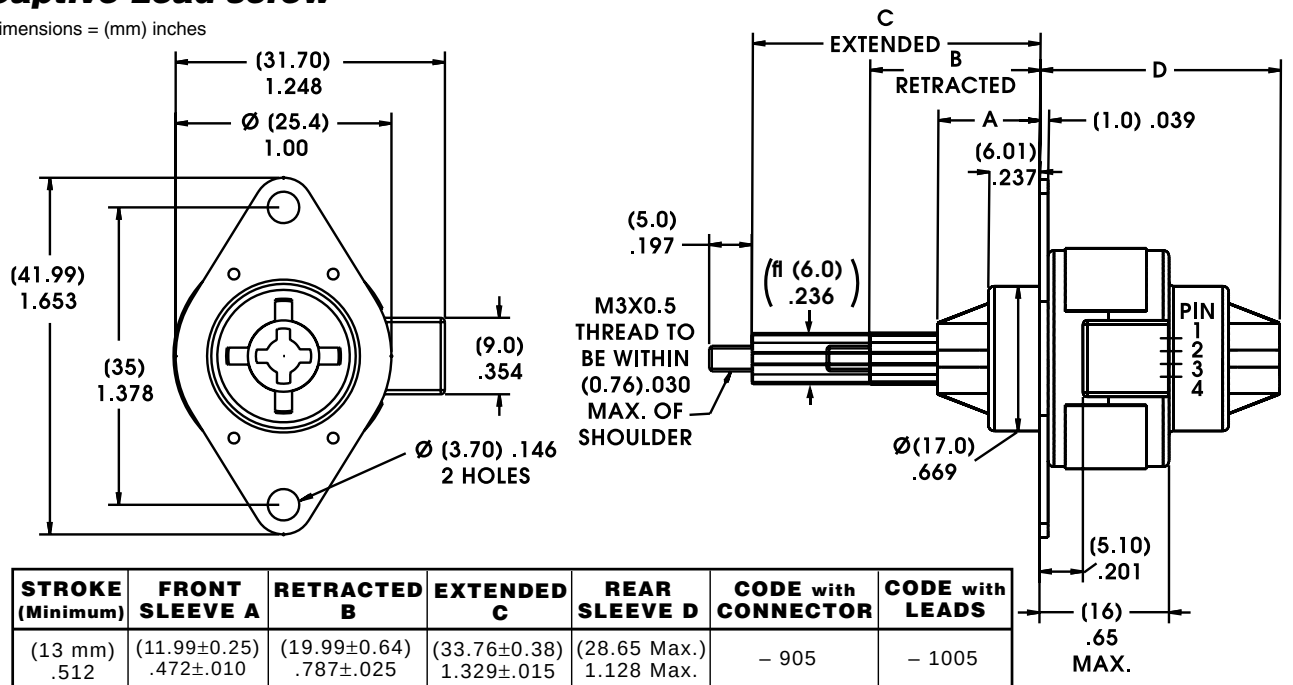
Suffix
Stroke
Example: –1010 = captive 25mm stroke with leads
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

SCREW LENGTH OPTIONS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

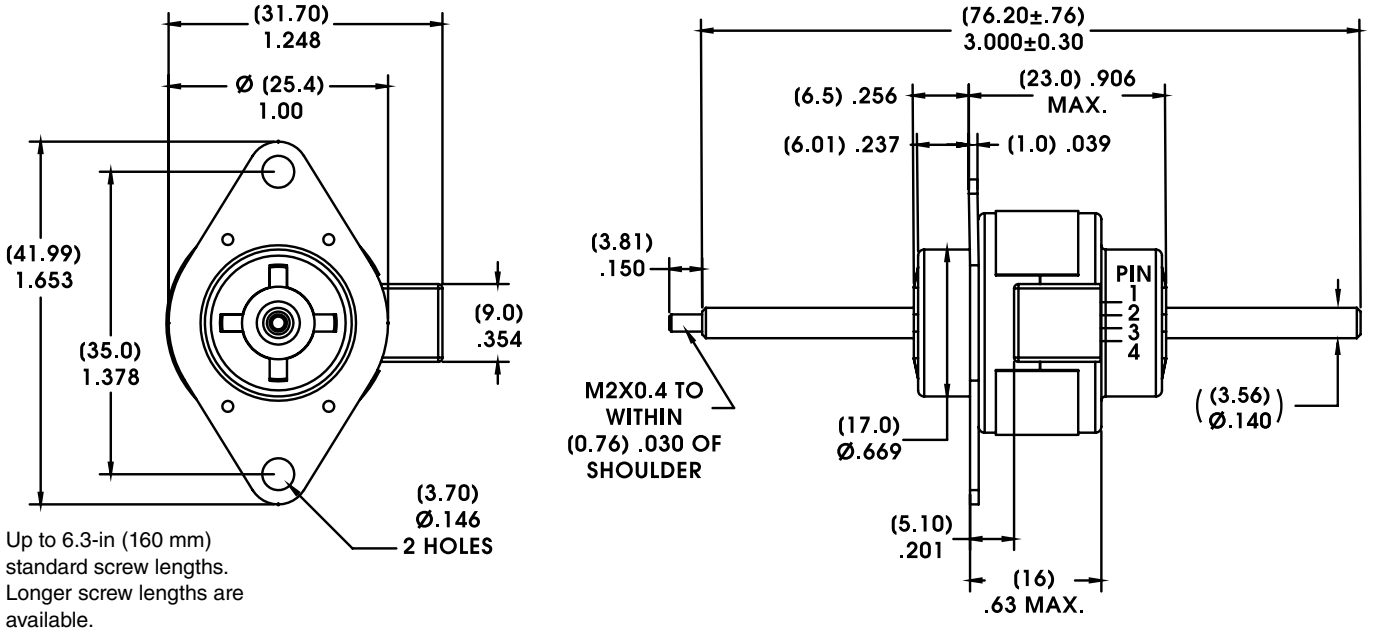
Dimensions = (mm) inches



STROKE (Minimum)	FRONT SLEEVE A	RETRACTED B	EXTENDED C	REAR SLEEVE D	CODE with CONNECTOR	CODE with LEADS
(13 mm) .512	(11.99±0.25) .472±.010	(19.99±0.64) .787±.025	(33.76±0.38) 1.329±.015	(28.65 Max.) 1.128 Max.	– 905	– 1005
(18 mm) .708	(17.28±0.25) .680±.010	(25.25±0.64) .994±.025	(44.27±0.38) 1.743±.015	(33.94 Max.) 1.336 Max.	– 907	– 1007
(25 mm) .984	(24.26±0.25) .955±.010	(32.23±0.64) 1.269±.025	(58.24±0.38) 2.293±.015	(40.92 Max.) 1.611 Max.	– 910	– 1010
(31 mm) 1.22	(30.25±0.25) 1.191±.010	(38.23±0.64) 1.505±.025	(70.23±0.38) 2.765±.015	(46.91 Max.) 1.847 Max.	– 912	– 1012

Non-Captive Lead-screw

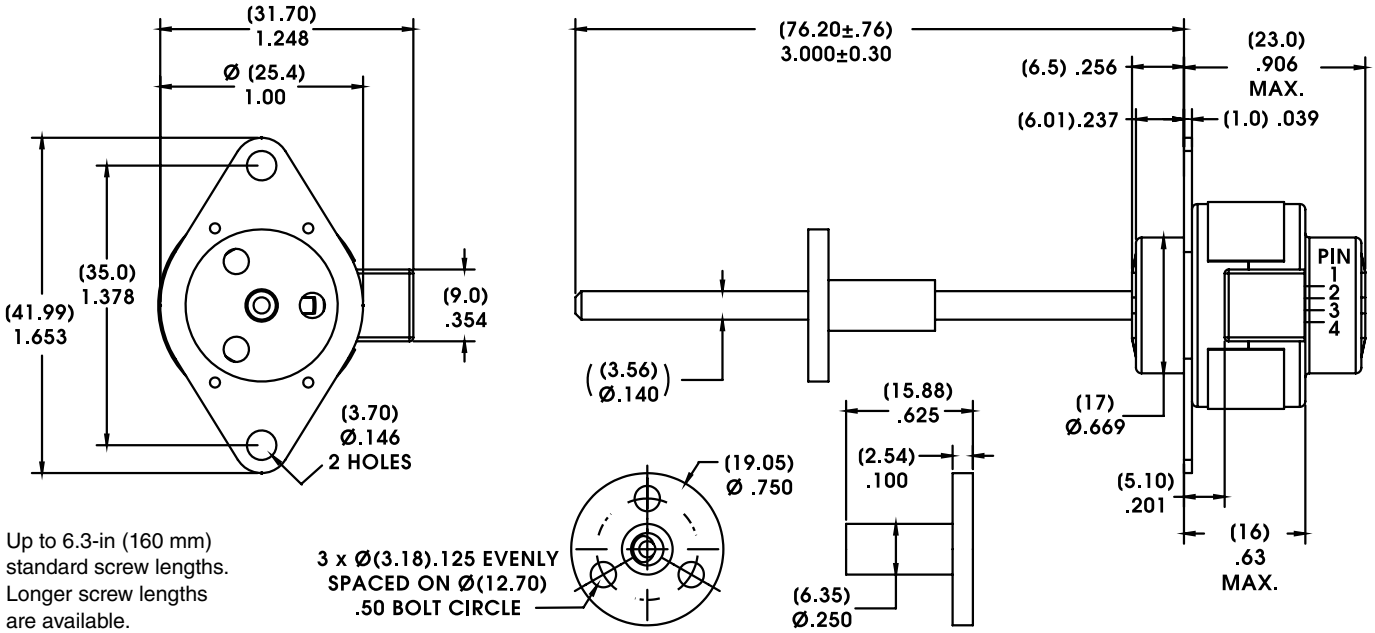
Dimensions = (mm) inches



Up to 6.3-in (160 mm) standard screw lengths. Longer screw lengths are available.

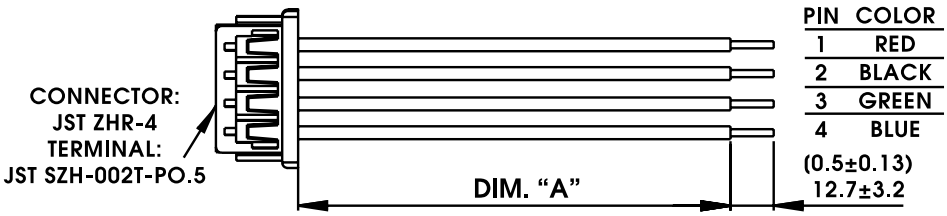
External Linear

Dimensions = (mm) inches



Up to 6.3-in (160 mm) standard screw lengths. Longer screw lengths are available.

Connector

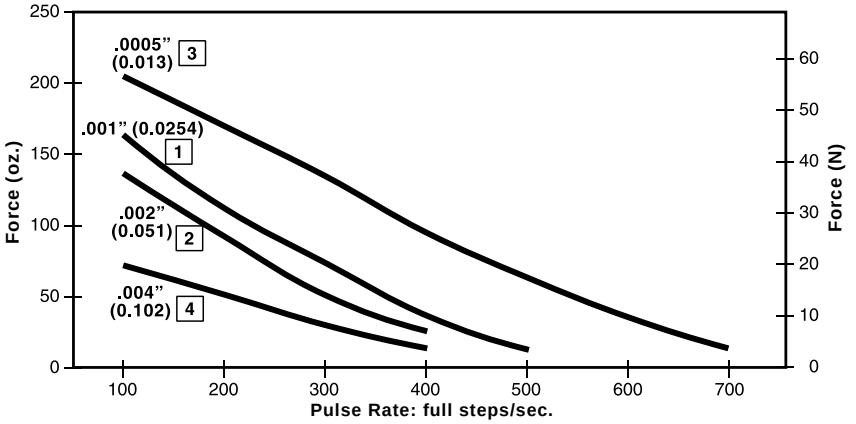


PIN	COLOR
1	RED
2	BLACK
3	GREEN
4	BLUE

Part Number	Dimension "A"
56-1318-4	(24 ±0.39) 610 ±10 mm
56-1318-3	(18 ±0.39) 450 ±10 mm
56-1318-2	(12 ±0.39) 305 ±10 mm
56-1318-1	(6 ±0.39) 150 ±10 mm

FORCE vs. PULSE RATE

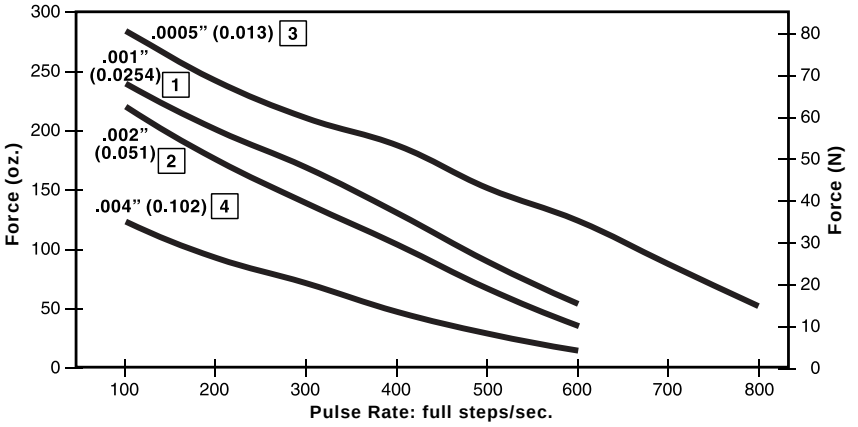
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

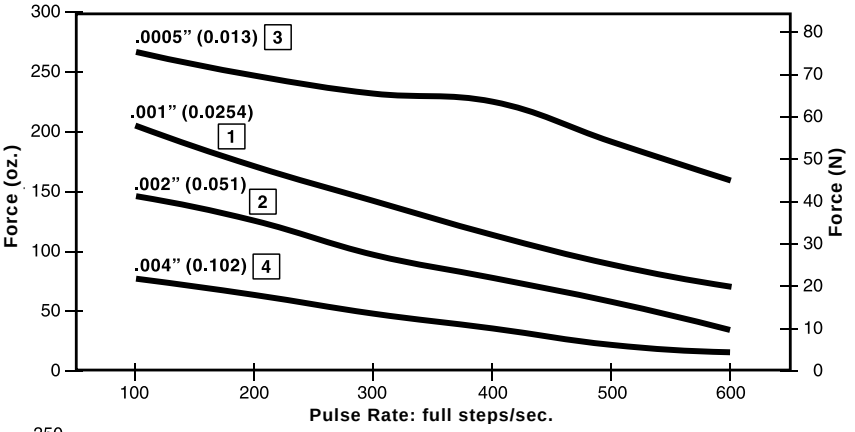
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

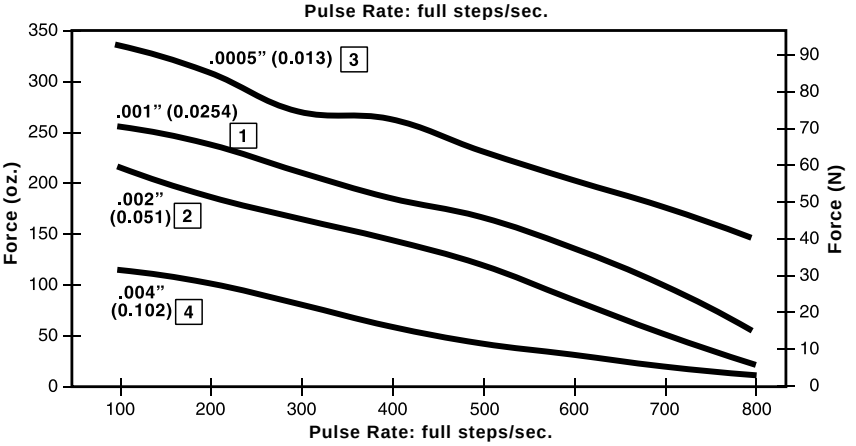
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

G4 25000 Series, Non-captive

TFE coated lead-screws for applications that require a permanent, dry lubricant

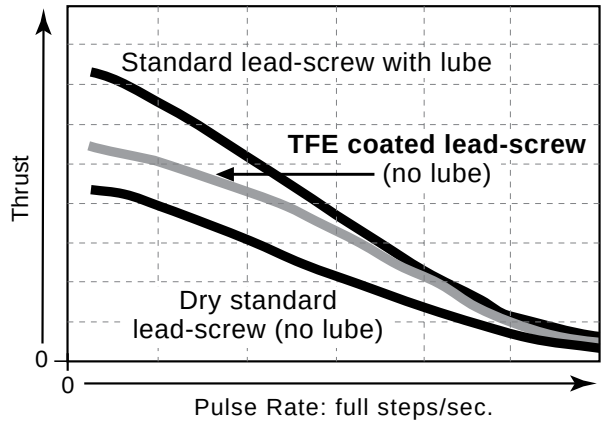
Haydon Kerk Motion Solutions, Inc. offers a TFE coated lead-screw option for its Can-Stack 25000 G4 Series linear actuators. This lead-screw option is ideal for applications where conventional oils and greases can not be used for lead-screw lubrication.

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the Haydon® captive, non-captive and external linear linear actuators.

The TFE coated lead-screw is typically used for applications where contamination from grease or lubricants must be avoided, such as silicon wafer handling, clean rooms, medical equipment, laboratory instrumentation or anywhere precise linear motion is required.

Lead-Screw Comparison

FORCE vs. PULSE RATE L/R Drive • 100% Duty Cycle

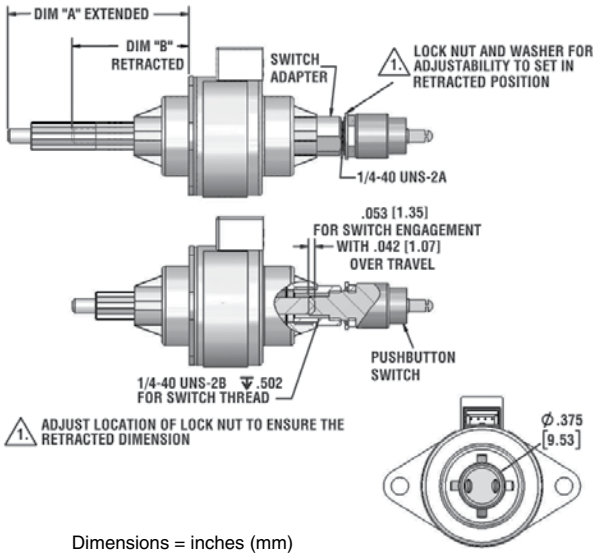


Home Position Switch

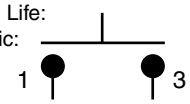
A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S."

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.



Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	

Multiple contact options available.

Dimensions = inches (mm)

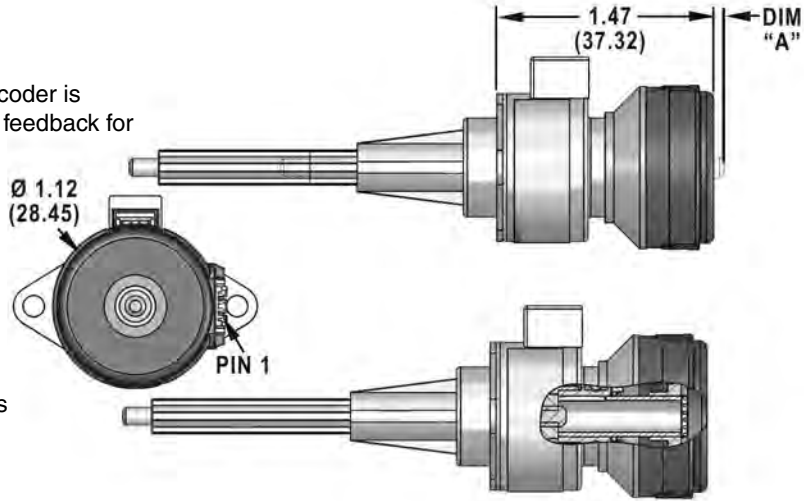
S25000 Series Home Position Switch		
STROKE	**DIM "A" Extended**	**DIM "B" Retracted**
.512 (13)	1.329 (33.76)	.787 (19.99)
.708 (18)	1.743 (44.27)	.994 (25.25)
.984 (25)	2.293 (58.24)	1.269 (32.23)
1.22 (31)	2.765 (70.23)	1.505 (38.23)

G4 25000 Series E8T Encoder

The **G4 25000 Series E8T** transmissive optical encoder is designed to provide the digital quadrature encoder feedback for high volume, compact space applications.

Features:
- Resolutions from 180 to 720
- Single ended / Differential
- Frequency response to 100 kHz
- Low power consumption, 5 V @ 30 mA max.
- High retention polarized connector

Assembly Options:
- Differential line driver with complementary outputs
- Detachable cable
- Through hole cover



Dimensions = inches (mm)

25000 G4 SERIES with E8T	
STROKE	**DIM "A"**
.512 (13)	0
.708 (18)	0
.984 (25)	.071 (1.80)
1.22 (31)	.307 (7.80)

25000 G4 SERIES SINGLE ENDED PINS	
PIN #	**DESCRIPTION**
1	+5 VDC Power
2	A Channel
3	Ground
4	B Channel

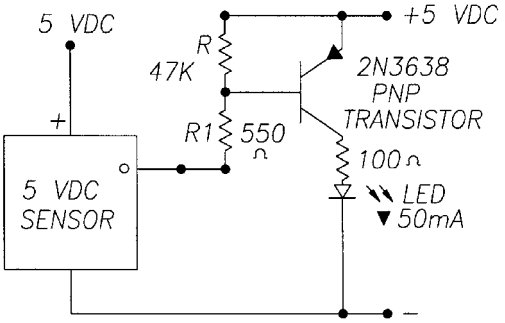
25000 G4 SERIES DIFFERENTIAL	
PIN #	**DESCRIPTION**
1	Ground
2	A Channel
3	A– Channel
4	+5 VDC Power
5	B Channel
6	B– Channel

End of Stroke Proximity Sensor

The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

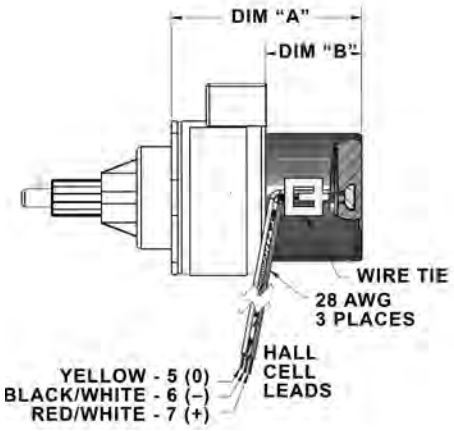
Specifications

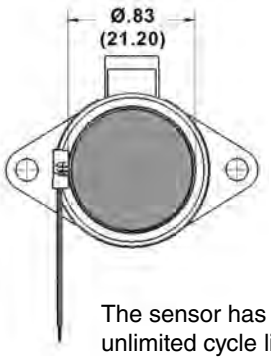
Supply Voltage (VDC): 3.8 min. to 24 max.
Current consumption: 10 mA max.
Output voltage (operated): 0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current: 20 mA max.
Output leakage current (released): 10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time
Rise, 10 to 90%: .05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%: .15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature: – 40 to +150°C



Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.

Dimensional Drawings





The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

Dimensions = inches (mm)

P25000 G4 SERIES		
STROKE	**DIM "A"**	**DIM "B"**
.512 (13)	1.248 (31.71)	.632 (16.05)
.708 (18)	1.449 (36.81)	.833 (21.15)
.984 (25)	1.723 (43.76)	1.106 (28.10)
1.22 (31)	1.959 (49.76)	1.343 (34.10)

Haydon® 37000 Series – exceptionally high linear force-to-size ratio, ideal for precision motion.

Outstanding durability and high performance.
The G4 Series features high energy neodymium magnets and dual ball bearings.

Ø36 mm (1.4-in)
Non-captive

Ø36 mm (1.4-in)
External Linear

Ø36 mm (1.4-in)
Captive

Specifications

Ø 36 mm (1.4-in) motor					
Wiring		Bipolar			
Part No.	Captive	3744 ■–■■–■■■■		3754 ■–■■–■■■■	
	Non-captive	3734 ■–■■–■■■■		3784 ■–■■–■■■■	
	External	E3744 ■–■■–■■■■		E3754 ■–■■–■■■■	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		561 mA	230 mA	561 mA	230 mA
Resistance/phase		8.9 Ω	52 Ω	8.9 Ω	52 Ω
Inductance/phase		11.6 mH	65 mH	8.5 mH	46 mH
Rotor inertia		8.5 gcm^2			
Power consumption		5.6 W			
Insulation Class		Class B			
Weight		4.2 oz (49 g)			
Insulation resistance		20 MΩ			

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
15° Angle	0.001	0.0254	1
	0.002	0.051	2
	0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

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www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the Can-Stack part number codes when ordering

E – ***Prefix*** (include only when using the following)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Position Switch

37 – ***Series number designation***
37 = 37000
(Series numbers represent approximate diameters of motor body)

4 – ***Style***
- **3** = 7.5° non-captive
- **4** = 7.5° Captive or External (use "E" or "K" Prefix for External version)
- **5** = 15° Captive or External (use "E" or "K" Prefix for External version)
- **8** = 15° non-captive

4 – ***Coils***
- **4** = Bipolar (4 wire)

2 – ***Code ID Resolution Travel/Step***
- **1** = .001-in (.0254)
- **2** = .002-in (.051)
- **3** = .0005-in (.013)
- **4** = .004-in (.102)

05 – ***Voltage***
- **05** = 5 VDC
- **12** = 12VDC

Custom V available

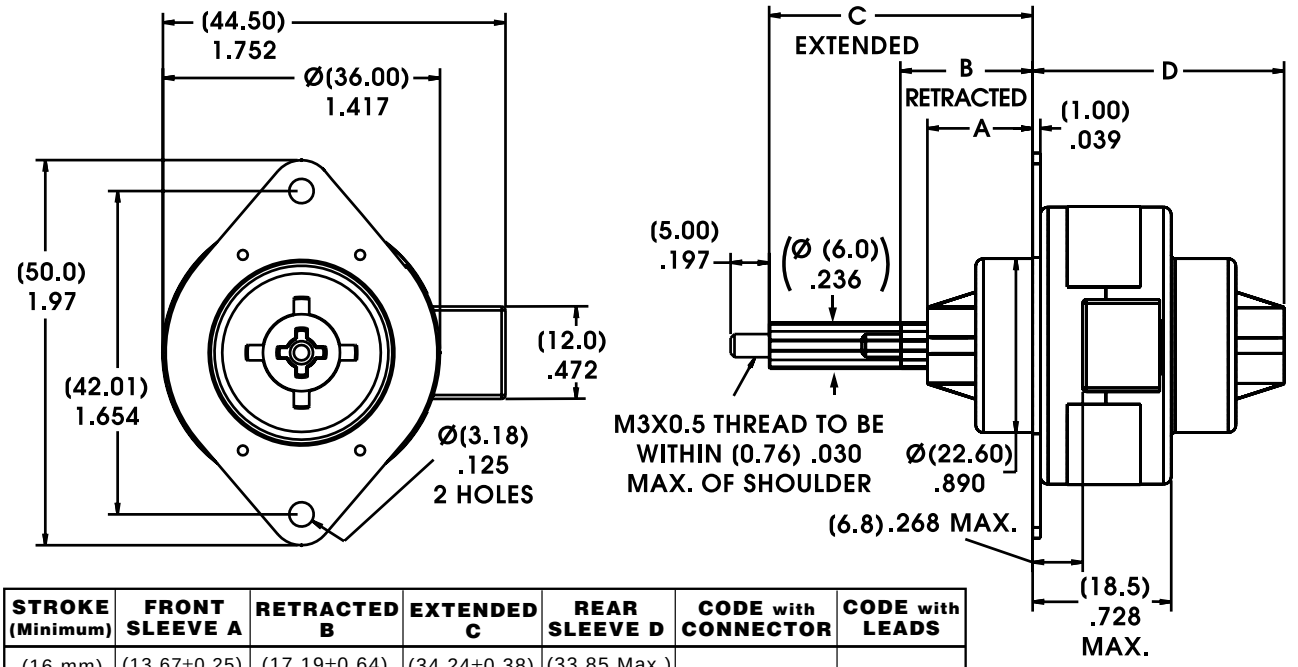
1015 – ***Suffix***
Stroke
Example: –1015 = captive 38.1mm stroke with leads
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

SCREW LENGTH OPTIONS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

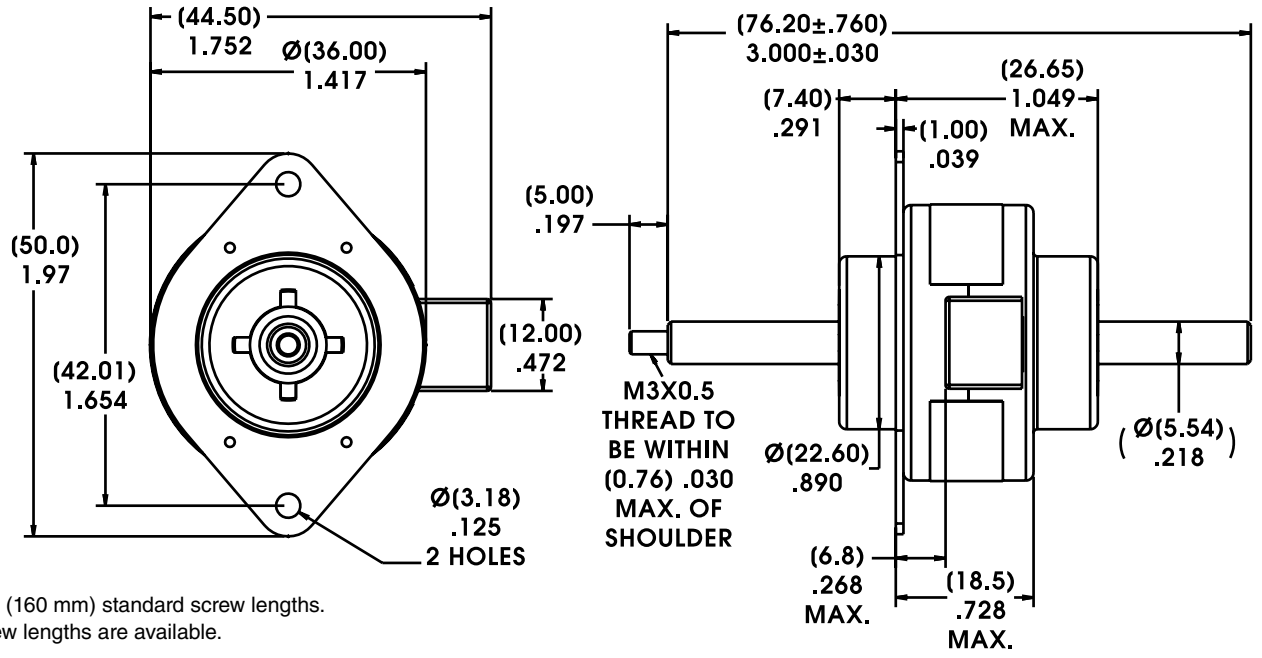
Dimensions = (mm) inches



STROKE (Minimum)	FRONT SLEEVE A	RETRACTED B	EXTENDED C	REAR SLEEVE D	CODE with CONNECTOR	CODE with LEADS
(16 mm) .631	(13.67±0.25) .538±.010	(17.19±0.64) .677±.025	(34.24±0.38) 1.348±.015	(33.85 Max.) 1.333 Max.	– 905	– 1005
(25.4 mm) 1.00	(26.37±0.25) 1.038±.010	(29.89±0.64) 1.177±.025	(56.94±0.38) 2.348±.015	(46.55 Max.) 1.833 Max.	– 910	– 1010
(38.1 mm) 1.50	(39.07±0.25) 1.538±.010	(42.59±0.64) 1.677±.025	(85.04±0.38) 3.348±.015	(59.25 Max.) 2.333 Max.	– 915	– 1015

Non-Captive Lead-screw

Dimensions = (mm) inches



Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.

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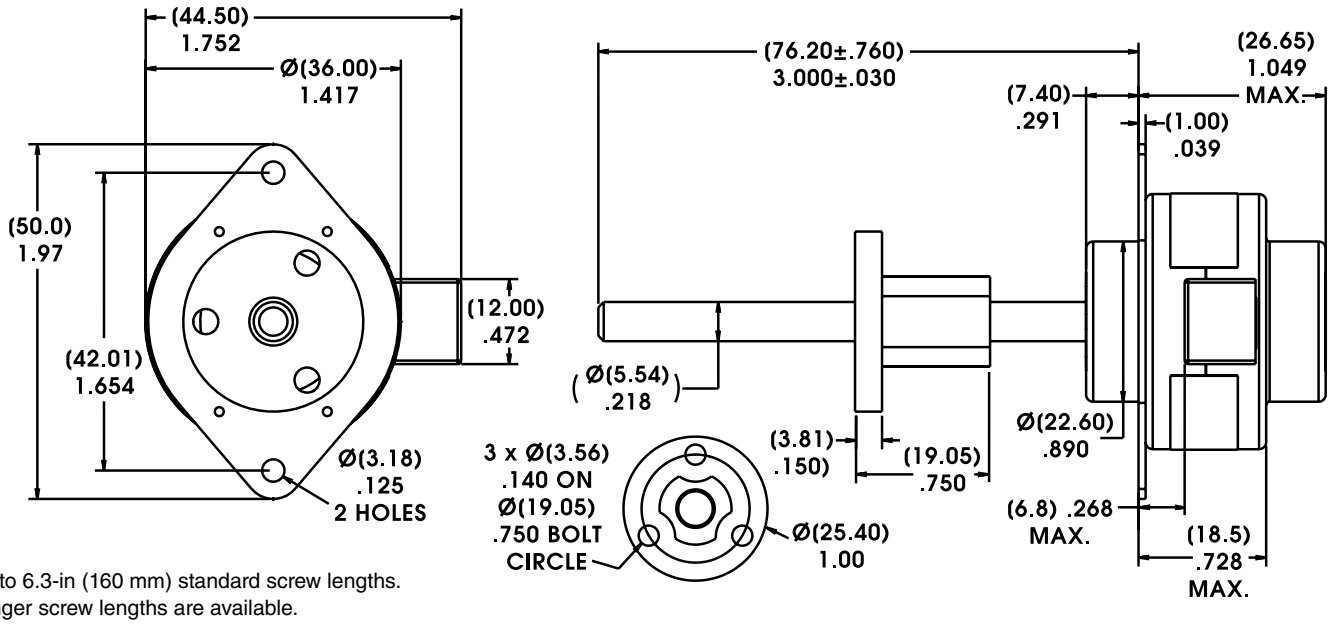
External Linear

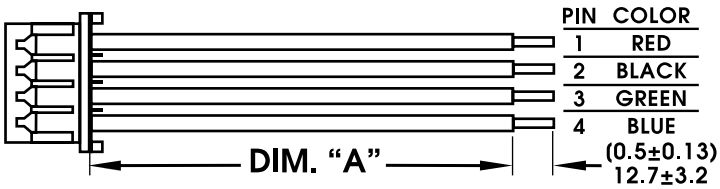
Dimensions = (mm) inches



Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.

Connector

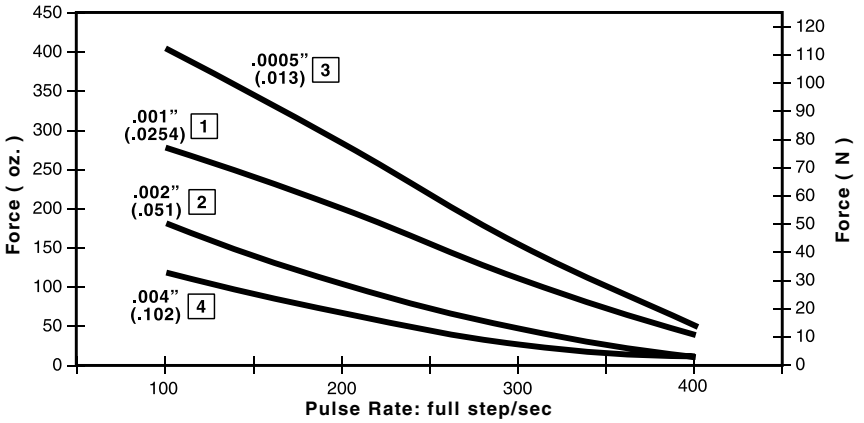
CONNECTOR:
JST PHR-4
TERMINAL: JST
SPH-002T-PO.5S



Part Number	Dimension "A"
56-1436-1	(6.0 ±0.39) 152 ±10 mm
56-1436-2	(12 ±0.39) 305 ±10 mm

FORCE vs. PULSE RATE

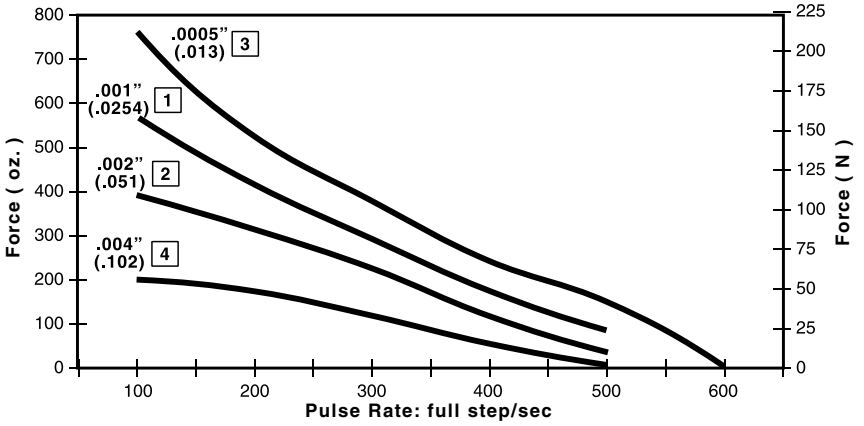
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

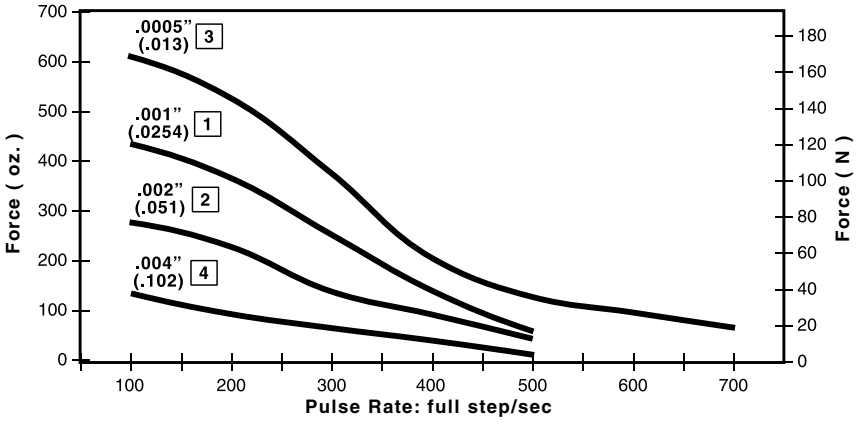
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

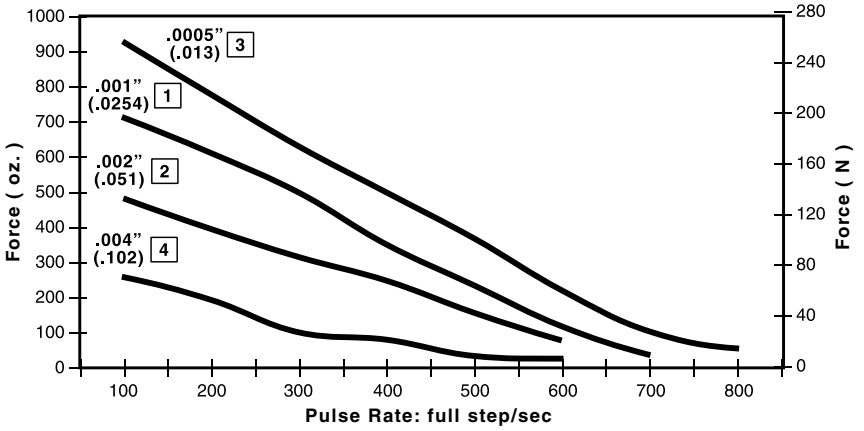
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

G4 37000 Series, External Linear

TFE coated lead-screws for applications that require a permanent, dry lubricant

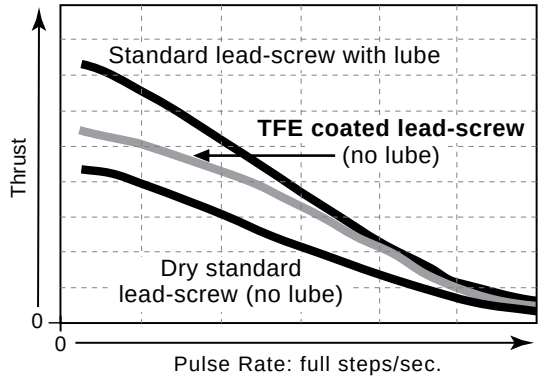
Haydon Kerk Motion Solutions, Inc. offers a TFE coated lead-screw option for its Can-Stack 37000 G4 Series linear actuators. This lead-screw option is ideal for applications where conventional oils and greases can not be used for lead-screw lubrication.

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the Haydon® captive, non-captive and external linear linear actuators.

The TFE coated lead-screw is typically used for applications where contamination from grease or lubricants must be avoided, such as silicon wafer handling, clean rooms, medical equipment, laboratory instrumentation or anywhere precise linear motion is required.

Lead-Screw Comparison

FORCE vs. PULSE RATE L/R Drive • 100% Duty Cycle

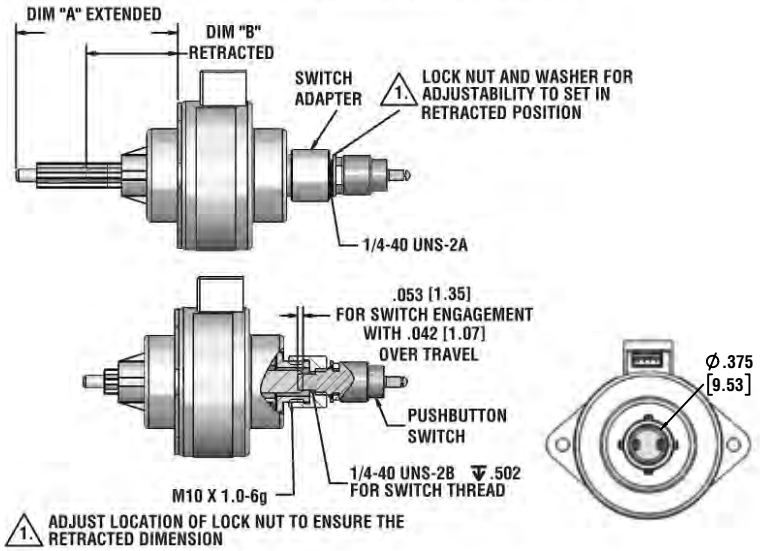


Home Position Switch

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

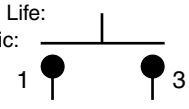
The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S".

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.



Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	



Dimensions = inches (mm)

S37000 G4 SERIES		
STROKE	**DIM "A"**	**DIM "B"**
.631 (16)	1.348 (34.24)	.677 (17.19)
1.00 (25.4)	2.348 (56.94)	1.177 (28.89)
1.50 (38.1)	3.348 (85.04)	1.677 (42.59)

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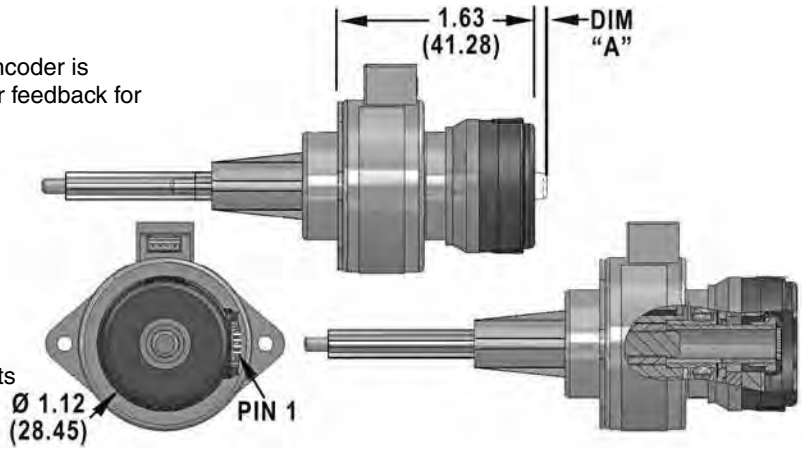
G4 37000 Series E8T Encoder

The **G4 37000 Series E8T** transmissive optical encoder is designed to provide the digital quadrature encoder feedback for high volume, compact space applications.

Features:
- Resolutions from 180 to 720
- Single ended / Differential
- Frequency response to 100 kHz
- Low power consumption, 5 V @ 30 mA max.
- High retention polarized connector

Assembly Options:
- Differential line driver with complementary outputs
- Detachable cable
- Through hole cover



Dimensions = inches (mm)

37000 G4 SERIES with E8T	
STROKE	**DIM "A"**
.631 (16)	0
1.00 (25.4)	.098 (2.50)
1.50 (38.1)	.598 (15.20)

37000 G4 SERIES SINGLE ENDED PINS	
PIN #	**DESCRIPTION**
1	+5 VDC Power
2	A Channel
3	Ground
4	B Channel

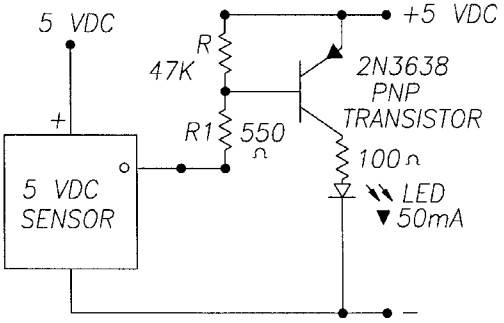
37000 G4 SERIES DIFFERENTIAL	
PIN #	**DESCRIPTION**
1	Ground
2	A Channel
3	A– Channel
4	+5 VDC Power
5	B Channel
6	B– Channel

End of Stroke Proximity Sensor

The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

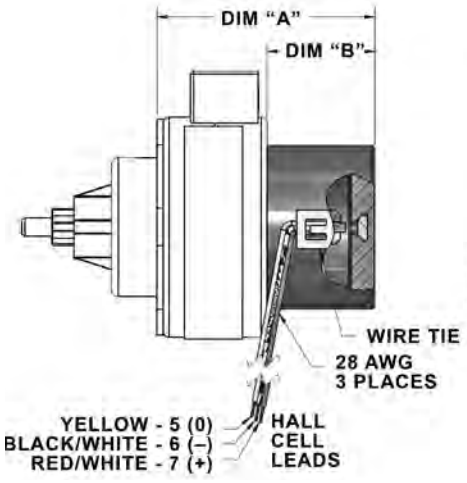
Specifications

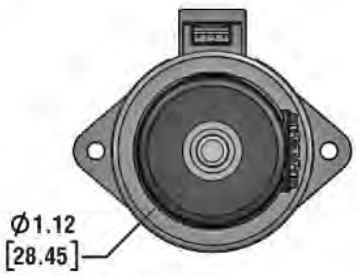
Supply Voltage (VDC): 3.8 min. to 24 max.
Current consumption: 10 mA max.
Output voltage (operated): 0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current: 20 mA max.
Output leakage
current (released): 10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time
Rise, 10 to 90%: .05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%: .15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature: – 40 to +150°C



Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.

Dimensional Drawings





The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

Dimensions = inches (mm)

P37000 G4 SERIES		
STROKE	**DIM "A"**	**DIM "B"**
.631 (16)	1.404 (35.65)	.695 (17.65)
1.00 (25.4)	1.906 (48.41)	1.197 (30.41)
1.50 (38.1)	2.409 (61.18)	1.700 (43.18)

Haydon® 15000 Series: The world's smallest commercial linear stepper motor.

The motor features bi-directional travel, ball bearings and a light weight. Motors are available in captive and external linear versions.

Linear Travel / Step inches	mm	Order Code I.D.
.00079*	.02	W
.00098*	.025	AQ
.00197*	.05	BH
.00394*	.10	DC

* Values truncated

Specifications

Ø 15 mm (.59-in) motor				
Wiring		Bipolar		
Part No.	Captive	LC1574 ■–■■–■■■		
	External Linear	LE1574 ■–■■–■■■		
Step angle		18°		
Winding voltage		4 VDC	5 VDC	12 VDC
Current (RMS)/phase		0.2 A	0.16 A	0.07 A
Resistance/phase		20 Ω	31 Ω	180 Ω
Inductance/phase		5.6 mH	8.7 mH	48.8 mH
Power consumption		1.6 W		
Rotor inertia		0.09 gcm^2		
Insulation Class		Class B		
Weight		1 oz (28 g)		
Insulation resistance		100 MΩ		
Stroke		0.5-in. (12.7 mm)		

Connectors for Series 15000

Standard Connectors Available	JST PHR-4
	12 inches (304.8 mm) flying leads
	Molex 51021-0400

Connector Information

Connector	PIN			
	1	2	3	4
JST PHR-4	Red	White	Green	Black
Molex 51021-0400	Black	Green	White	Red

Flying Leads

Length inches	mm	Order Code I.D. Suffix (add to end on I.D.)
12.0	304.8	– 999

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Identifying the Can-Stack part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

LC	15	7	4	W	–	04	–	999

Prefix
LC = Captive
LE = External Linear

Series number designation
15 = 15000
(Series numbers represent approximate diameters of motor body)

Style
7 = 18° captive

Coils
4 = Bipolar (4 wire)

Code ID Resolution Travel/Step
W = .00079-in (.02)
AQ = .00098-in (.025)
BH = .00197-in (.05)
DC = .00394-in (.10)

Voltage
04 = 4 VDC
05 = 5 VDC
12 = 12VDC
Custom V available

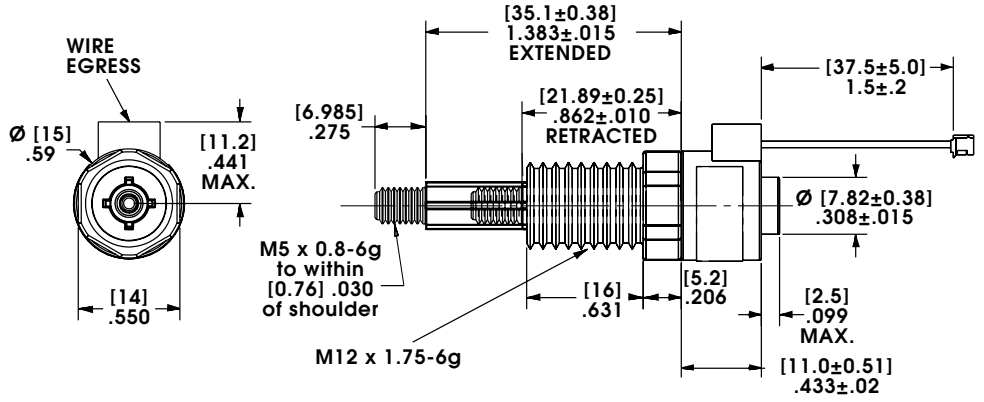
Suffix
Example: –999 = 12-in. leads
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

SCREW LENGTH OPTIONS and other **OPTIONAL ASSEMBLIES** also available

Captive Lead-screw

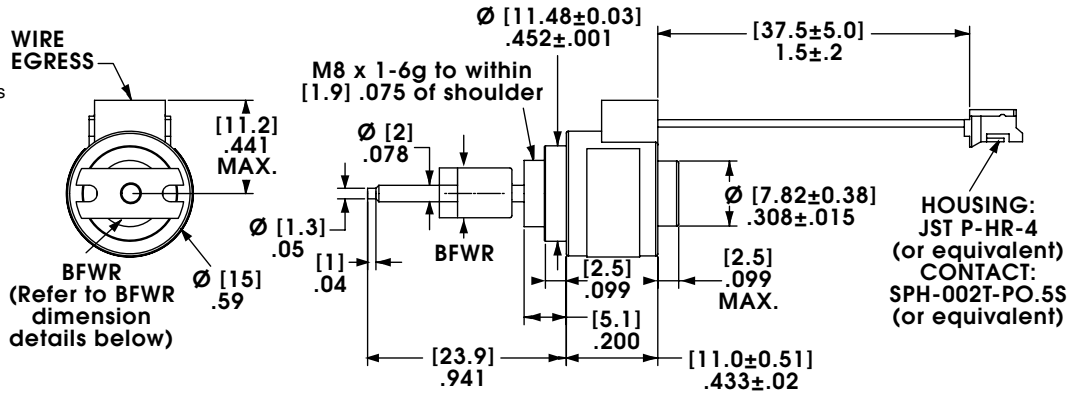
Dimensions = (mm) inches



External Linear

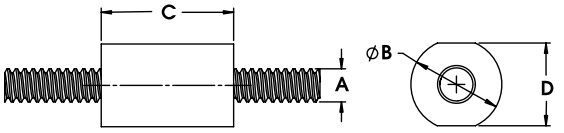
Dimensions = (mm) inches

Up to 2.36-in (59.9 mm) standard screw lengths. Consult factory for longer screws.



MICRO Series Nut Styles

Standard nut styles. Consult the factory for custom solutions.

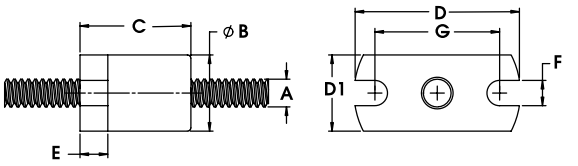


Barrel Nut Style

BFW Nut Style		Screw Diameter A inch (mm)	Nut Diameter B inch (mm)	Nut Length C inch (mm)	Nut Flats D inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in. (N-m)
BFWB	Barrel Mount	5/64 (2)	0.22 (5.5)	0.32 (8)	0.20 (5.08)	10 (4.5)	Free Wheeling

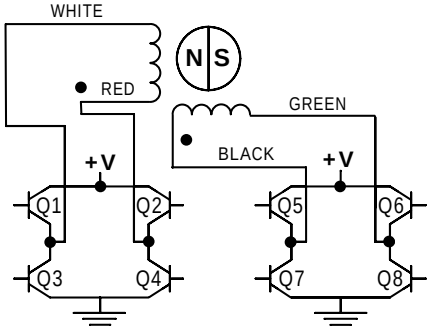
Rectangular Nut Style

An optional **ZBMR Anti-Backlash Nut** is also available, please see page 29 for more information.



BFW Nut Style		Screw Diameter A inch (mm)	Nut Diameter B inch (mm)	Nut Length C inch (mm)	Flange Height D1 inch (mm)	Flange Width D inch (mm)	Flange Thickness E inch (mm)	Slot Width F inch (mm)	Bolt Circle Diameter G inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in. (N-m)
BFWR	Rectangular Flange	5/64 (2)	0.22 (5.5)	0.32 (8)	0.22 (5.5)	0.47 (11.9)	0.08 (2.0)	0.07 (1.8)	0.35 (9.0)	10 (4.5)	Free Wheeling

15000 L Series Wiring



15000 L Series Stepping Sequence

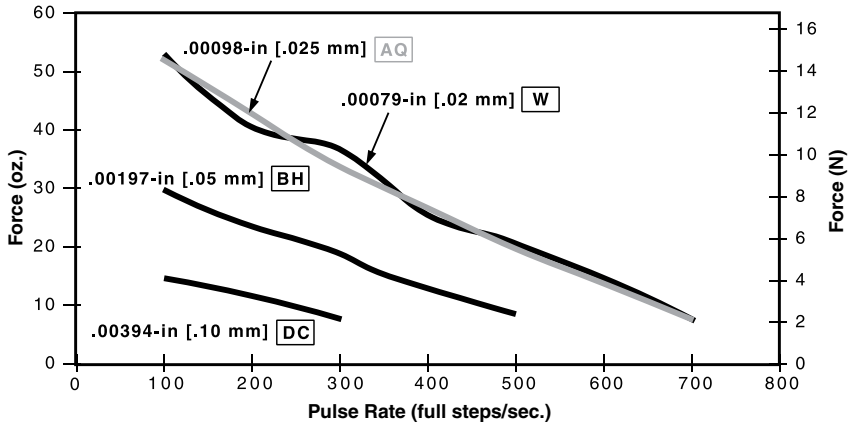
Bipolar Step	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

EXTEND CW ↓ RETRACT CCW ↑

Note: Half stepping is accomplished by inserting an off state between transitioning phases.

FORCE vs. PULSE RATE

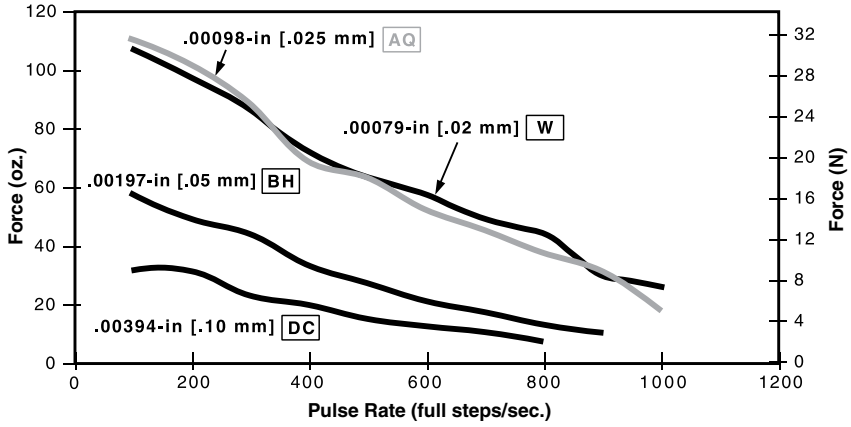
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

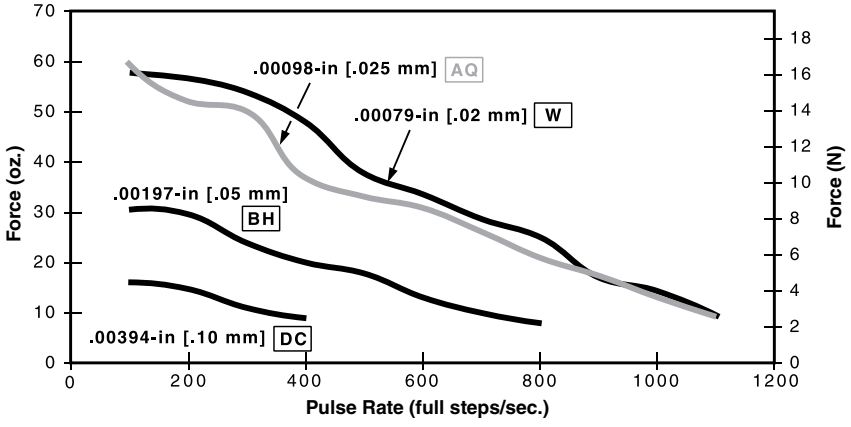
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

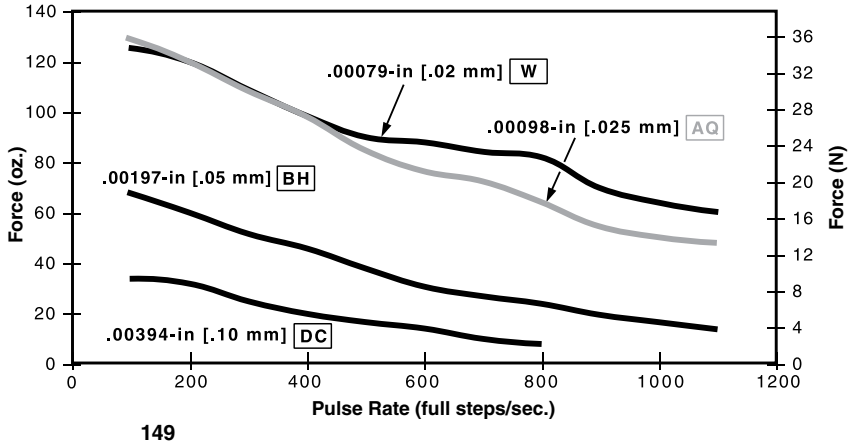
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Haydon® Z20000 Series – economical stepper motors for high volume, applications.

Utilizing rare earth (neodymium) magnets, the Haydon® Z-Series linear actuators consistently deliver exceptional performance at an economical price. Also available in a special "earless" configuration without a mounting flange, which is ideal for space constrained applications.

Three motors are available... captive, non-captive and external linear. All units are built with reliable dual ball bearings.

Specifications

Ø 20 mm (.79-in) Z-Series motor			
Wiring		Bipolar	
Part No.	Captive	Z2054 ■-■■-■■■	
	Non-captive	Z2084 ■-■■-■■■	
	External*	Z2054 ■-■■-9■■*	
Step angle		15°	
Winding voltage		5 VDC	12 VDC
Current (RMS)/phase		250 mA	100 mA
Resistance/phase		20 Ω	118 Ω
Inductance/phase		5.4 mH	27 mH
Power consumption		2.5 W	
Rotor inertia		1.13 gcm^2	
Insulation Class		Class B	
Weight		.85 oz. (24.1 g)	
Insulation resistance		20 M Ω	

Linear Travel / Step 15° Step Angle		Order Code I.D.
inches	mm	
0.001	0.0254	1
0.002	0.051	2
0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

*When ordering Z-Series External Linear motors, add -900 to end of the Part Number.

Identifying the Can-Stack part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Z	20	5	4	2	–	05	–	900

Prefix
Z = Series Code

(For a AC Synchronous compatibility information, see page 190.)

Series number designation
20 = 20000

(Series numbers represent approximate diameters of motor body)

Style
5 = 15° Captive or External (use –900 Suffix for External version)
8 = 15° non-captive

Coils
4 = Bipolar (4 wire)

Code ID Resolution Travel/Step
1 = .001-in (.0254)
2 = .002-in (.051)
4 = .004-in (.102)

Voltage
05 = 5 VDC
12 = 12VDC

Custom V available

Suffix

Stroke
Example: –900 used to code Z-Series external linear

Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

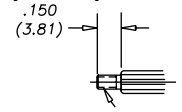
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

OPTIONS
- SCREW LENGTH OPTIONS
- "EARLESS" NO FLANGE
- TFE COATED LEAD-SCREWS
- HIGH TEMPERATURE ASSEMBLY
- HOME POSITION SWITCH
- PROXIMITY SENSOR
- OPTIONAL ASSEMBLIES

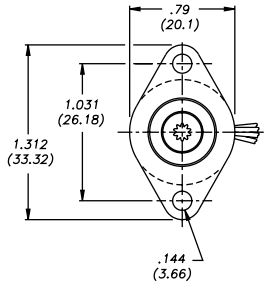
Captive Lead-screw

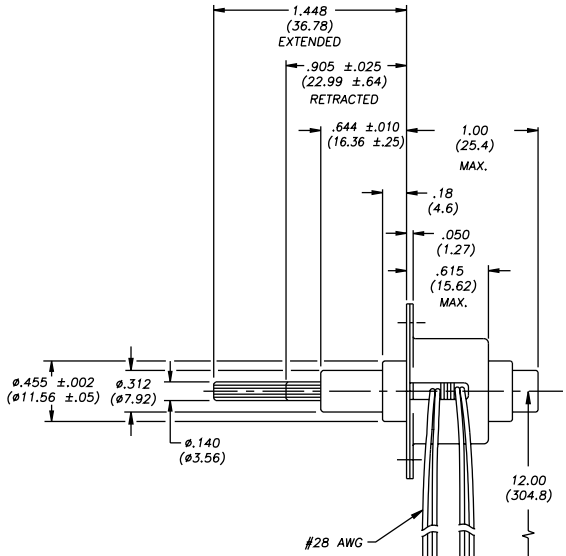
Dimensions = inches (mm)

Spline Options



Spline is also available with optional #4-40 UNC-2A or M3 x 0.5 threaded adapter as shown in non-captive drawing.

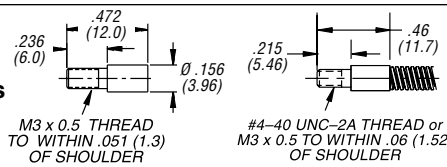




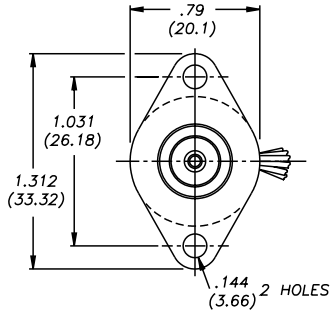
Non-Captive Lead-screw

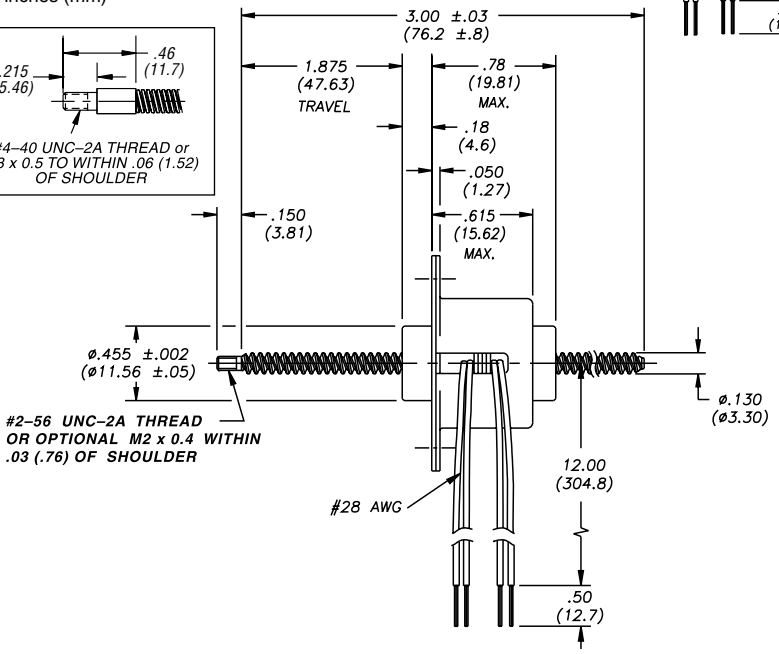
Dimensions = inches (mm)

Optional Adapters



Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

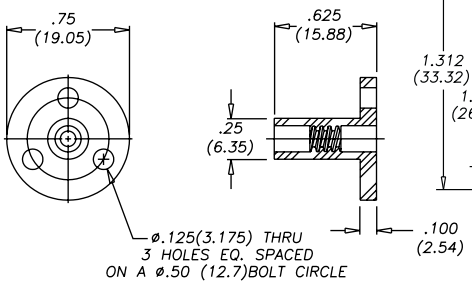


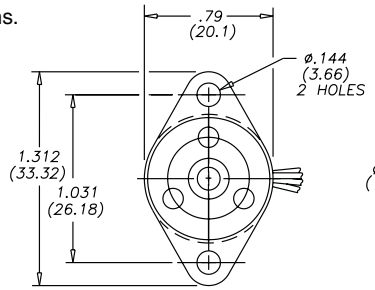


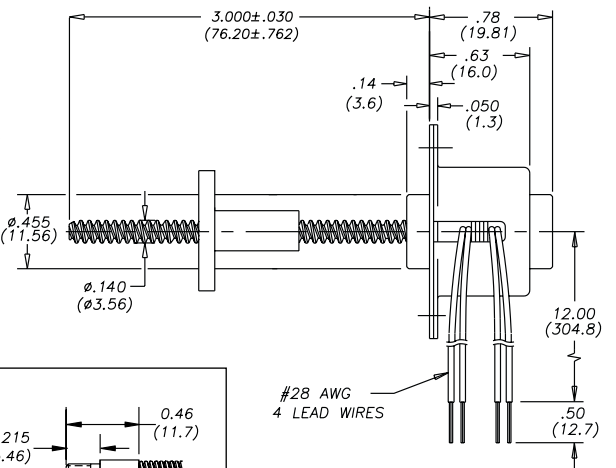
External Linear

Dimensions = inches (mm)

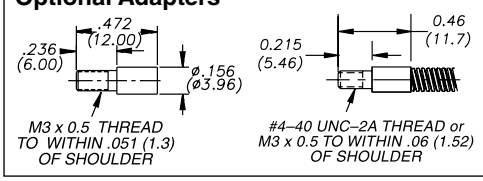
Up to 6-in (152 mm) standard screw lengths.
Longer screw lengths are available.





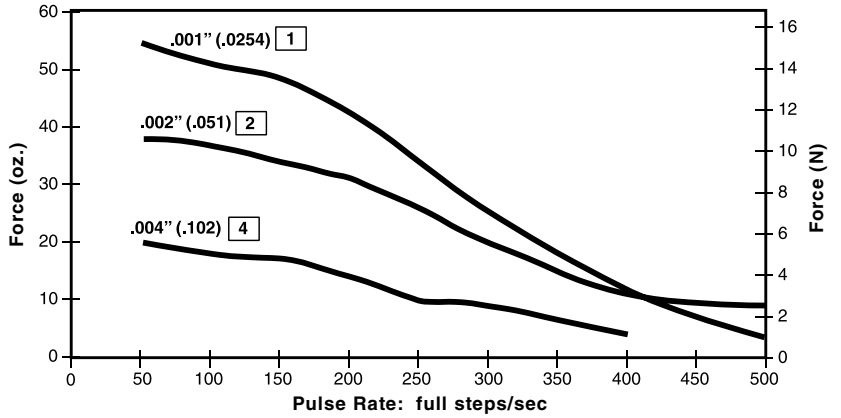


Optional Adapters



FORCE vs. PULSE RATE

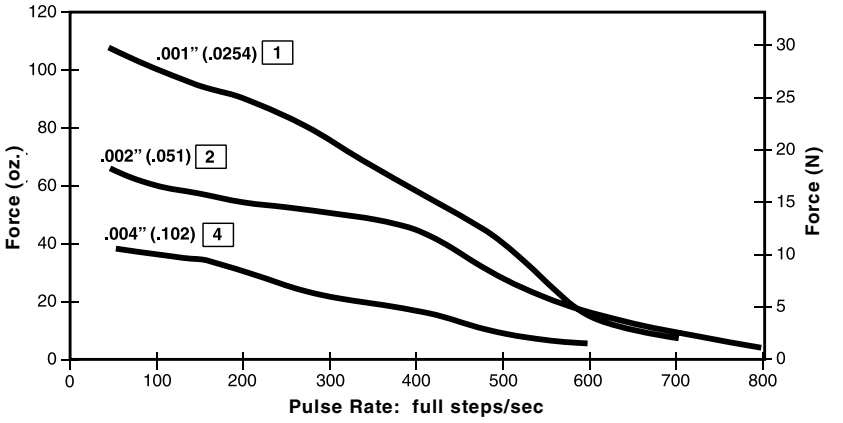
- **L/R Drive**
- **Bipolar**
- **100% Duty Cycle**



FORCE vs. PULSE RATE

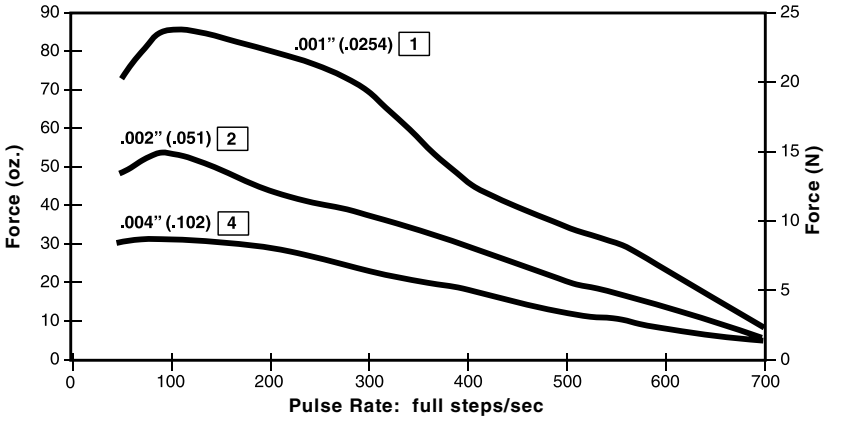
- **L/R Drive**
- **Bipolar**
- **25% Duty Cycle**

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

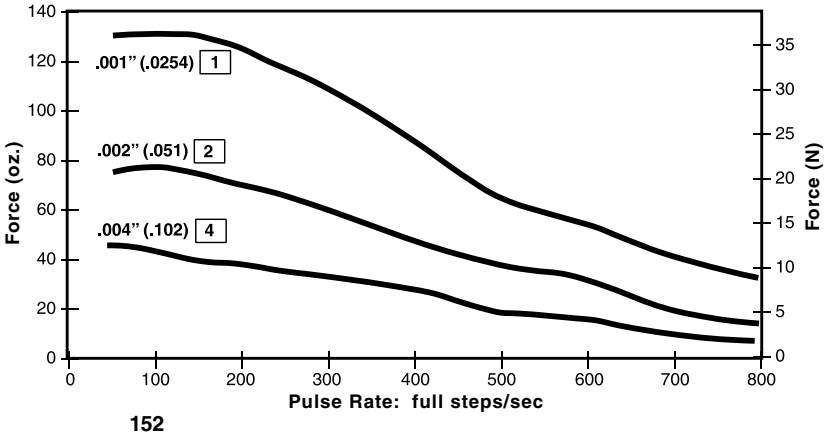
- **Chopper Drive**
- **Bipolar**
- **100% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**



FORCE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **25% Duty Cycle**
- **8:1 Motor Coil to Drive Supply Voltage**

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

TFE Coated Lead-screws

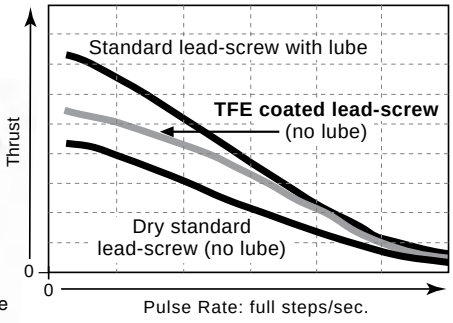
Haydon Kerk Motion Solutions, Inc. offers a TFE coated lead-screw option for its Can-Stack Series linear actuators. This lead-screw option is ideal for applications where conventional oils and greases can not be used for lead-screw lubrication.

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the Haydon® captive, non-captive and external linear linear actuators.

Z20000 Series, non-captive

Lead-Screw Comparison
FORCE vs. PULSE RATE

L/R Drive
100% Duty Cycle

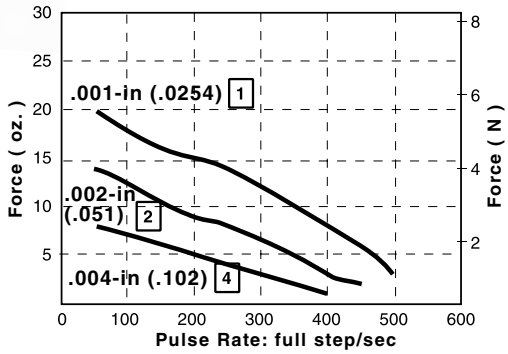


Specially engineered can-stack linear actuators for high temperature applications

Haydon Kerk Motion Solutions, Inc. offers a line of stepping motors specially designed for high temperature environments. The motors are constructed using the proven techniques employed for Haydon® motors. Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Z20000 Series HIGH TEMPERATURE
FORCE vs. PULSE RATE

L/R Drive
100% Duty Cycle



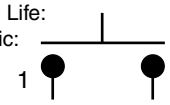
Home Position Switch

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S".

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	 Multiple contact options available.

End of Stroke Proximity Sensor

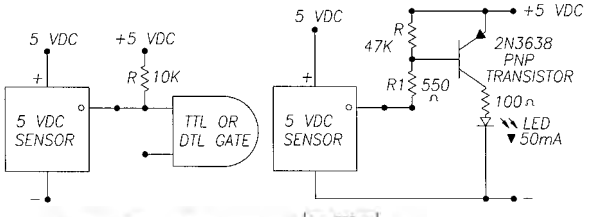
The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

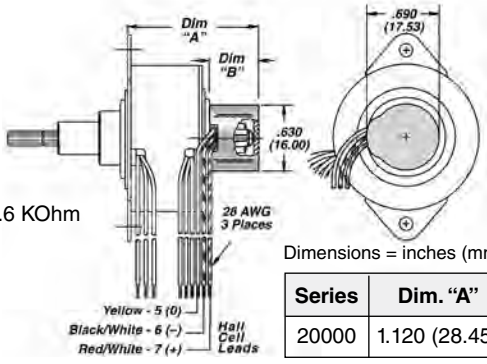
The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

Specifications

Supply Voltage (VDC):	3.8 min. to 24 max.
Current consumption:	10 mA max.
Output voltage (operated):	0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current:	20 mA max.
Output leakage current (released):	10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time	
Rise, 10 to 90%:	.05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%:	.15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature:	– 40 to +150°C

Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.





Dimensions = inches (mm)

Series	Dim. "A"	Dim. "B"
20000	1.120 (28.45)	.470 (12.0)

Haydon® Z26000 Series – designed to accommodate high volume applications.

Specifications

Ø 26 mm (1-in) Z-Series motor					
Wiring		Bipolar			
Part No.	Captive	Z2644 ■-■■-■■■†		Z2654 ■-■■-■■■†	
	Non-captive	Z2634 ■-■■-■■■†		Z2684 ■-■■-■■■†	
	External**	Z2644 ■-■■-■■■†**		Z2654 ■-■■-9■■†**	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		340 mA	140 mA	340 mA	140 mA
Resistance/phase		14.7 Ω	84 Ω	14.7 Ω	84 Ω
Inductance/phase		8.5 mH	55 mH	6.7 mH	44 mH
Power consumption		3.4 W			
Rotor inertia		1.4 gcm²			
Insulation Class		Class B			
Weight		1.2 oz (34 g)			
Insulation resistance		20 MΩ			

Ø 26 mm (1-in) Z-Series motor					
Wiring		Unipolar*			
Part No.	Captive	Z2646 ■-■■-■■■†		Z2656 ■-■■-■■■†	
	Non-captive	Z2636 ■-■■-■■■†		Z2686 ■-■■-■■■†	
	External**	Z2646 ■-■■-9■■†**		Z2656 ■-■■-9■■†**	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		340 mA	140 mA	340 mA	140 mA
Resistance/phase		14.7 Ω	84 Ω	14.7 Ω	84 Ω
Inductance/phase		4.3 mH	24 mH	3.4 mH	19 mH
Power consumption		3.4 W			
Rotor inertia		1.4 gcm²			
Insulation Class		Class B			
Weight		1.2 oz (34 g)			
Insulation resistance		20 MΩ			

† Part numbering information on page 155.
* Unipolar drive gives approximately 40% less thrust compared to bipolar drive.
** When ordering Z-Series External Linear motors, add –900 to end of the Part Number.

The Z26000 Series motors are ideal for high volume. Utilizing rare earth (neodymium) magnets. Also, available in a special "earless" configuration without a mounting flange.

All units are built with durable dual ball bearings.

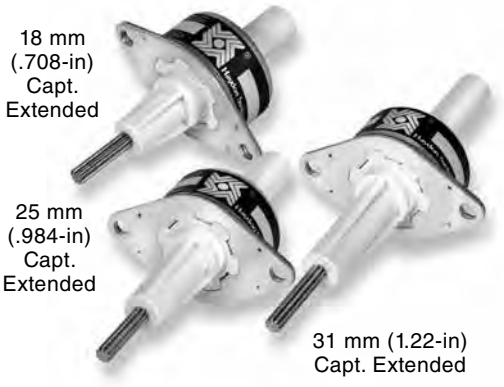
Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
15° Angle	0.00164	0.04166	AS
	0.002	0.051	2
	0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Also available...

Specially engineered Z26000 (Ø 26 mm, 1-in) linear actuators that extend captive lead-screw travel beyond 12.7 mm (1/2-in).



Identifying the Can-Stack part number codes when ordering

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Z	26	4	4	2	–	05	–	900

Prefix

Z = Series Code

(For a AC Synchronous compatibility information, see page 190.)

Series number designation

26 = 26000

(Series numbers represent approximate diameters of motor body)

Style

3 = 7.5° non-captive
4 = 7.5° Captive or External (use "E" or "K" Prefix for External version)
5 = 15° Captive or External (use "E" or "K" Prefix for External version)
8 = 15° non-captive

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)
AS = .04166-in (.00164)

Voltage

05 = 5 VDC
12 = 12VDC

Custom V available

Suffix

Stroke
Example: –900 used to code Z-Series external linear

Suffix also represents:

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

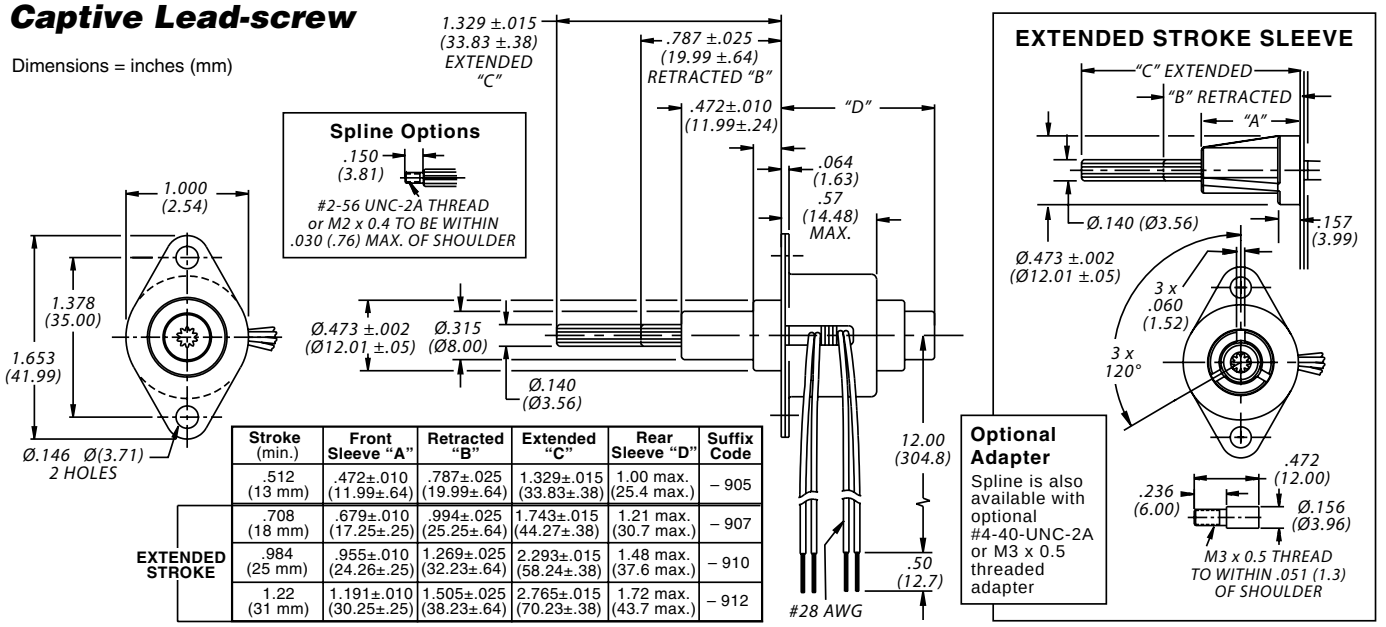
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

OPTIONS

- SCREW LENGTH OPTIONS
- EXTENDED CAPTIVE LEAD-SCREW
- TFE COATED LEAD-SCREWS
- HIGH TEMPERATURE ASSEMBLY
- HOME POSITION SWITCH
- PROXIMITY SENSOR
- OPTIONAL ASSEMBLIES

Captive Lead-screw

Dimensions = inches (mm)

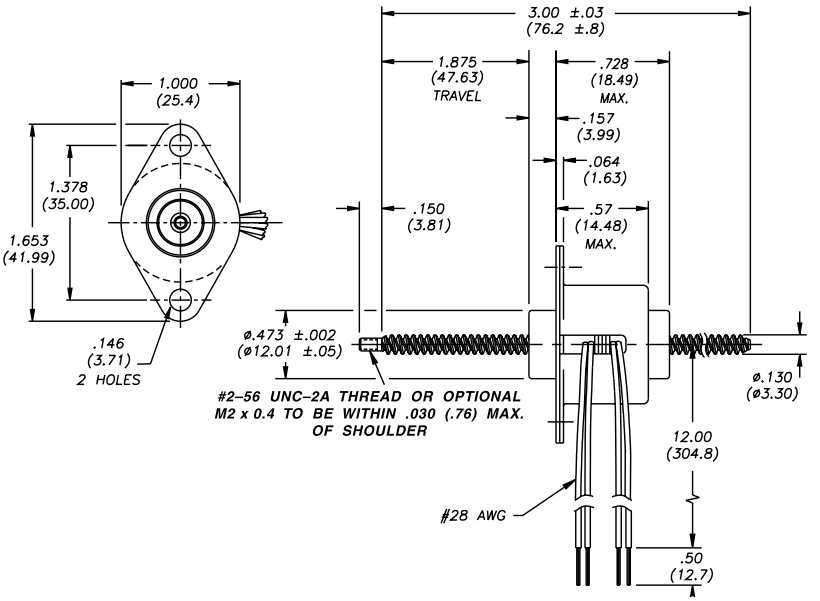


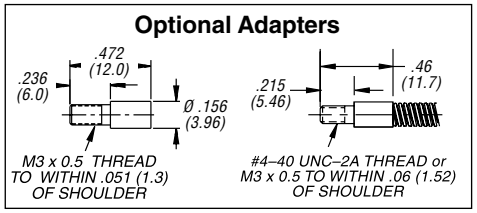
	Stroke (min.)	Front Sleeve "A"	Retracted "B"	Extended "C"	Rear Sleeve "D"	Suffix Code
	.512 (13 mm)	.472±.010 (11.99±.64)	.787±.025 (19.99±.64)	1.329±.015 (33.83±.38)	1.00 max. (25.4 max.)	– 905
EXTENDED STROKE	.708 (18 mm)	.679±.010 (17.25±.25)	.994±.025 (25.25±.64)	1.743±.015 (44.27±.38)	1.21 max. (30.7 max.)	– 907
	.984 (25 mm)	.955±.010 (24.26±.25)	1.269±.025 (32.23±.64)	2.293±.015 (58.24±.38)	1.48 max. (37.6 max.)	– 910
	1.22 (31 mm)	1.191±.010 (30.25±.25)	1.505±.025 (38.23±.64)	2.765±.015 (70.23±.38)	1.72 max. (43.7 max.)	– 912

Non-Captive Lead-screw

Dimensions = inches (mm)

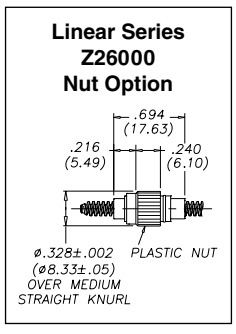
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

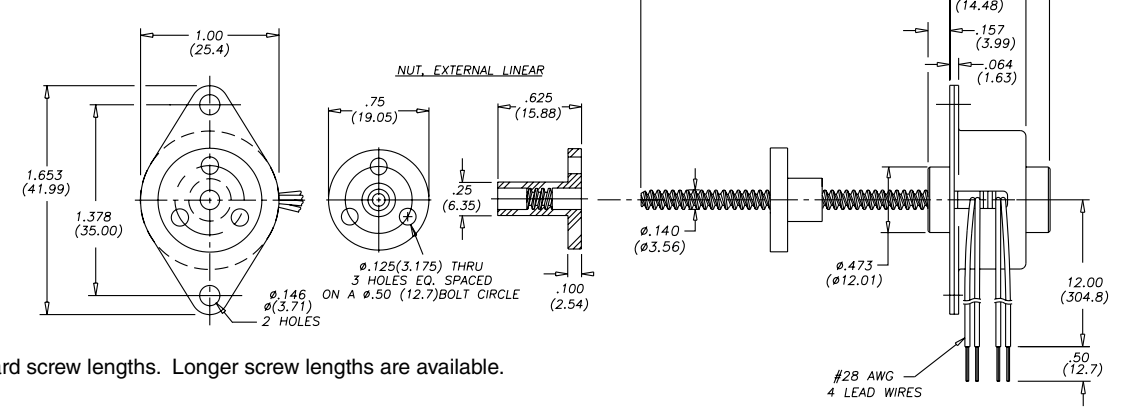




External Linear

Dimensions = inches (mm)

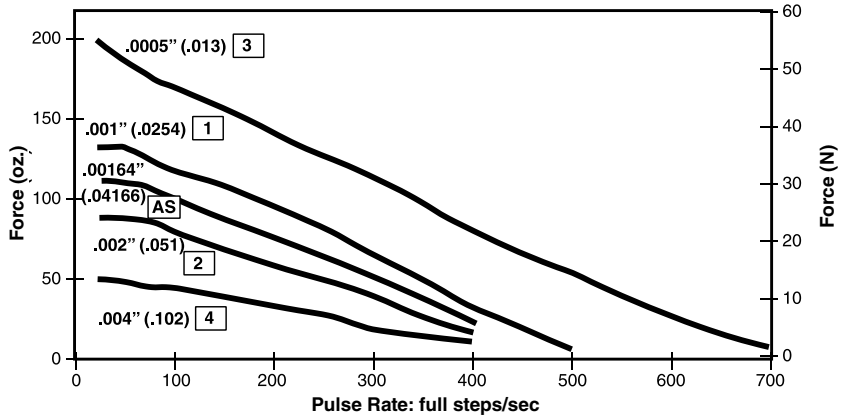




Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

FORCE vs. PULSE RATE

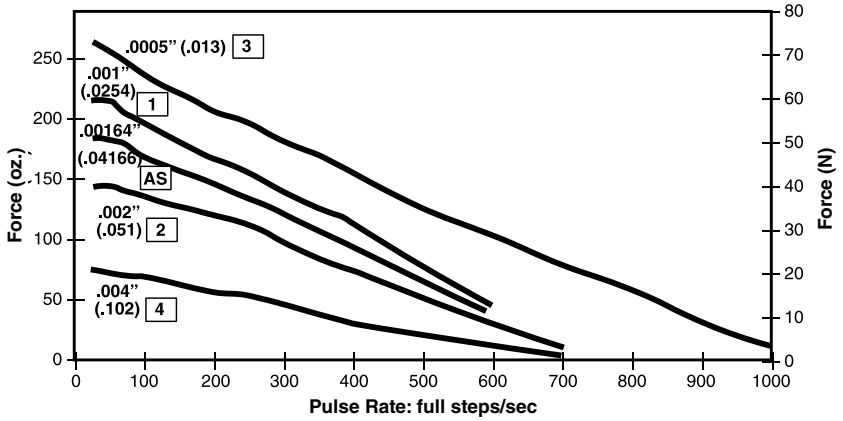
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

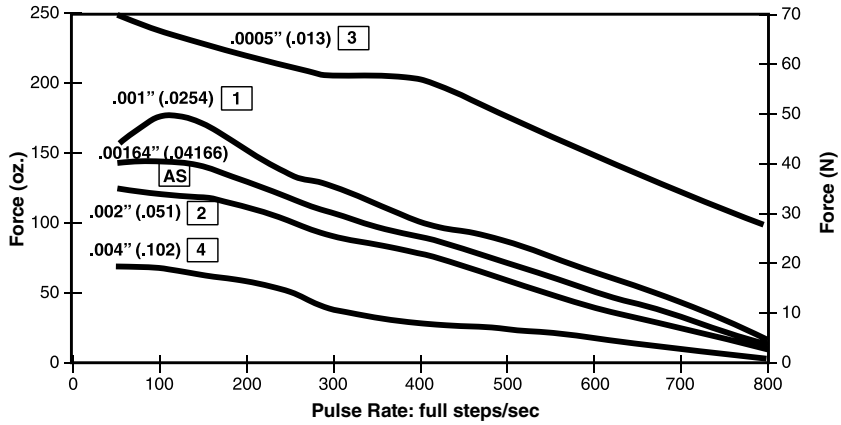
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

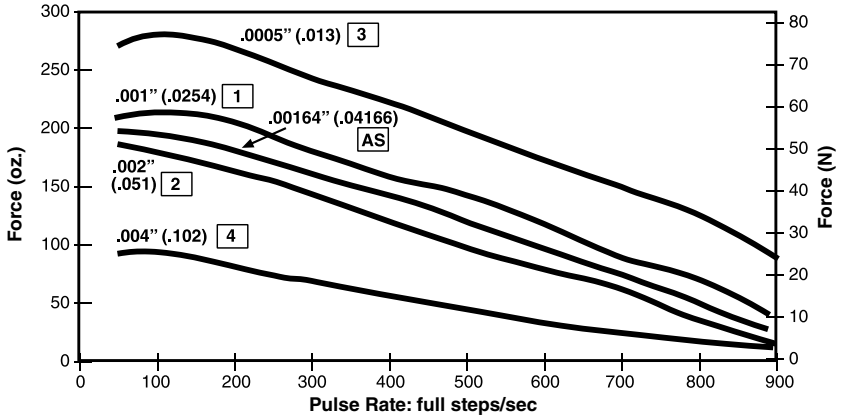
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

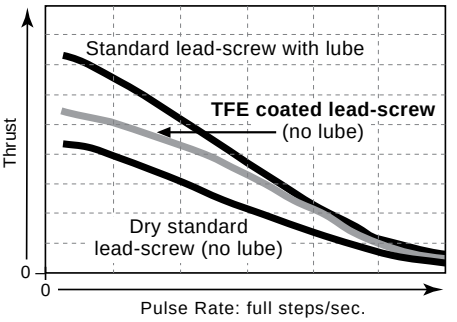
TFE Coated Lead-screws

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the Haydon® captive, non-captive and external linear linear actuators.

Z26000 Series, external linear

Lead-Screw Comparison *FORCE vs. PULSE RATE*

L/R Drive
100% Duty Cycle

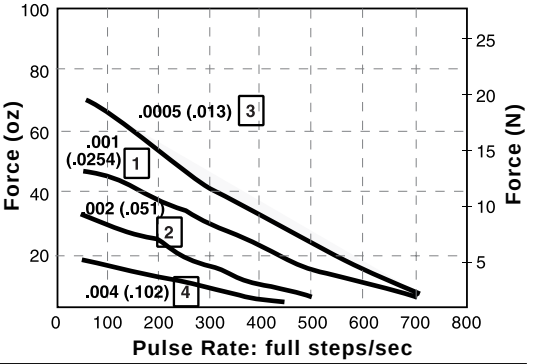


Specially engineered can-stack linear actuators for high temperature applications

Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Z26000 Series HIGH TEMPERATURE *FORCE vs. PULSE RATE*

L/R Drive
100% Duty Cycle



Home Position Switch

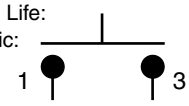
A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S".

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles
Schematic:	at full load

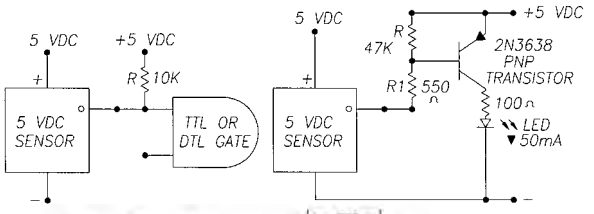


Multiple contact options available.

End of Stroke Proximity Sensor

The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

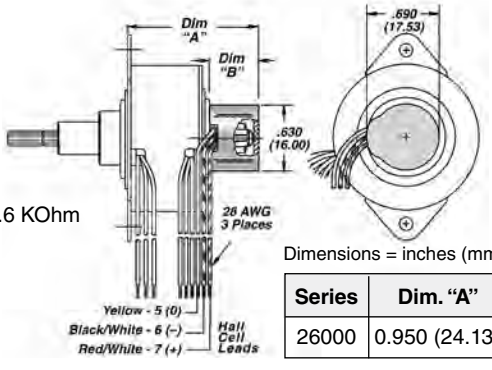
The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.



Specifications

Supply Voltage (VDC):	3.8 min. to 24 max.
Current consumption:	10 mA max.
Output voltage (operated):	0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current:	20 mA max.
Output leakage current (released):	10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time	
Rise, 10 to 90%:	.05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%:	.15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature:	– 40 to +150°C

Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.



Dimensions = inches (mm)

Series	Dim. "A"	Dim. "B"
26000	0.950 (24.13)	.370 (9.4)

Haydon® 36000 Series – more powerful, versatile and robust

Specifications

Ø 36 mm (1.4-in) motor					
Wiring		Bipolar			
Part No.	Captive	3644 ■–■■–■■■†		3654 ■–■■–■■■†	
	Non-captive	3634 ■–■■–■■■†		3684 ■–■■–■■■†	
	External	E3644 ■–■■–■■■†		E3654 ■–■■–■■■†	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		460 mA	190 mA	460 mA	190 mA
Resistance/phase		11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase		7.2 mH	45 mH	5.5 mH	35 mH
Power consumption		4.6 W			
Rotor inertia		10.5 gcm^2			
Insulation Class		Class B			
Weight		3 oz (86 g)			
Insulation resistance		20 MΩ			

Ø 36 mm (1.4-in) motor					
Wiring		Unipolar**			
Part No.	Captive	3646 ■–■■–■■■†		3656 ■–■■–■■■†	
	Non-captive	3636 ■–■■–■■■†		3686 ■–■■–■■■†	
	External	E3646 ■–■■–■■■†		E3656 ■–■■–■■■†	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		460 mA	190 mA	460 mA	190 mA
Resistance/phase		11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase		3.8 mH	19 mH	3 mH	15 mH
Power consumption		4.6 W			
Rotor inertia		10.5 gcm^2			
Insulation Class		Class B			
Weight		3 oz (86 g)			
Insulation resistance		20 MΩ			

† Part numbering information on page 161.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
15° Angle	0.002	0.051	2
	0.004	0.102	4

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

*** High resolution steppers for applications requiring fine step increments down to 0.000125-in (0.0032 mm).** See page 160.

Motors can also be electronically micro-stepped.

Other 36000 Series styles available...

- TFE lead-screw
- High Temperature Option

Haydon® 36000 Series High Resolution – the big motor with more precise control with resolutions down to .00025 inches (.0064 mm) and 0.000125-in (.0032 mm)

Specifications

Ø 36 mm (1.4") High Resolution Motor					
Wiring		Bipolar		Unipolar**	
Part No.	Captive	3624 ■-■■-■■■†		3626 ■-■■-■■■†	
	Non-captive	3614 ■-■■-■■■†		3616 ■-■■-■■■†	
	External	E3624 ■-■■-■■■†		3626 ■-■■-■■■†	
Step angle		3.75°			
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		460 mA	190 mA	460 mA	190 mA
Resistance/phase		11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase		9.2 mH	53 mH	4.6 mH	26 mH
Power consumption		4.6 W			
Rotor inertia		10.5 gcm²			
Insulation Class		Class B			
Weight		3 oz (86 g)			
Insulation resistance		20 MΩ			

† Part numbering information on page 161.

** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
3.75° Angle	0.000125	0.0032	7
	0.00025	0.0064	9

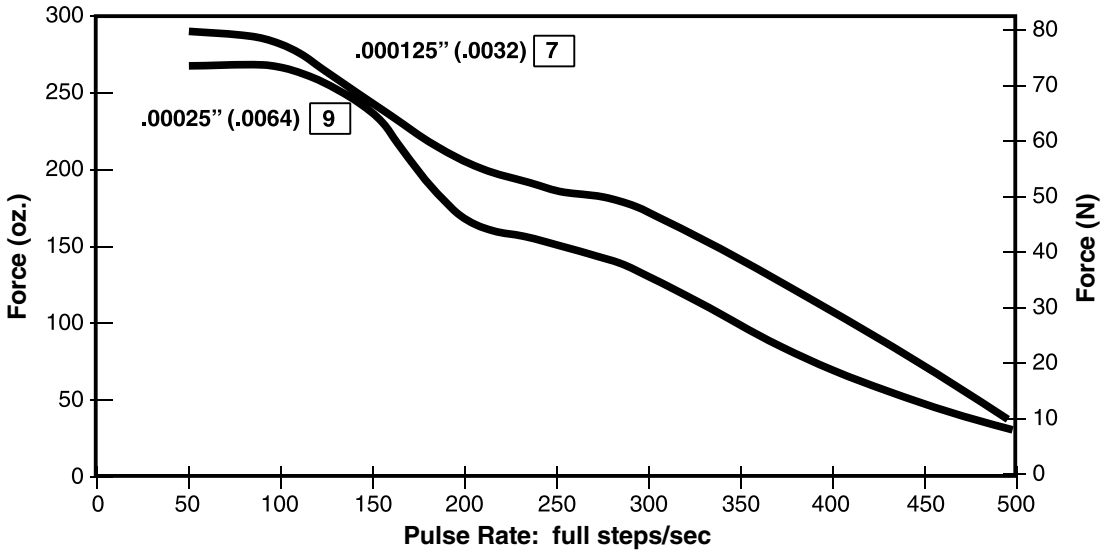
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

The Haydon® High Resolution 36000 Series features a choice of two extremely small step increments, 0.000125-in (0.0032 mm) and 0.00025-in (0.0064 mm). Motors can also be electronically micro-stepped.

FORCE vs. PULSE RATE
for the Can-Stack 36000 High Resolution Motor

- **L/R Drive**
- **Bipolar**
- **100% Duty Cycle**



NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack part number codes when ordering

E	36	4	4	2	–	05	–	900

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous page 190)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Position Switch
R = Rare Earth Magnet

Series number designation

36 = 36000

(Series numbers represent approximate diameters of motor body)

Style

1 = High Resolution 3.75° non-captive
2 = High Resolution 3.75° Captive or External (use "E" or "K" Prefix for External version)
3 = 7.5° non-captive
4 = 7.5° Captive or External (use "E" or "K" Prefix for External version)
5 = 15° Captive or External (use "E" or "K" Prefix for External version)
8 = 15° non-captive

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)

High Resolution

7 = .000125-in (.0032)
9 = .00025-in (.00635)

Voltage

05 = 5 VDC
12 = 12VDC

Custom V available

Suffix

Stroke
Example: –900 = external linear with grease & flanged nut

Suffix also represents:

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

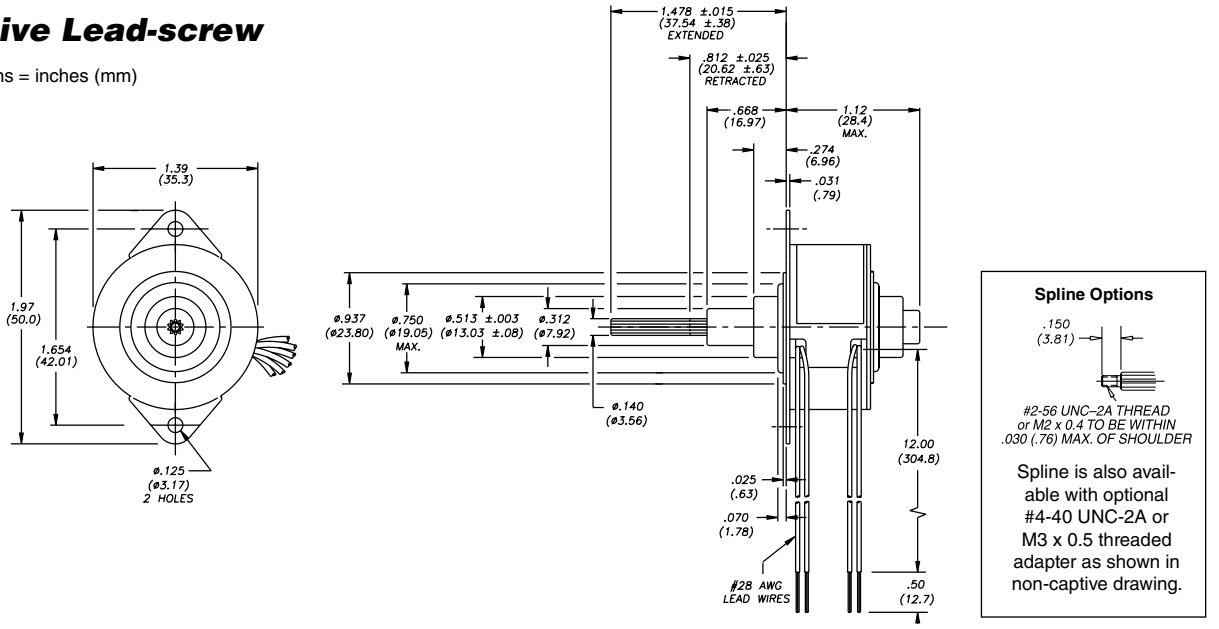
Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

OPTIONS

- SCREW LENGTH OPTIONS
- TFE COATED LEAD-SCREWS
- HIGH TEMPERATURE ASSEMBLY
- HOME POSITION SWITCH
- PROXIMITY SENSOR
- OPTIONAL ASSEMBLIES

Captive Lead-screw

Dimensions = inches (mm)



Spline Options

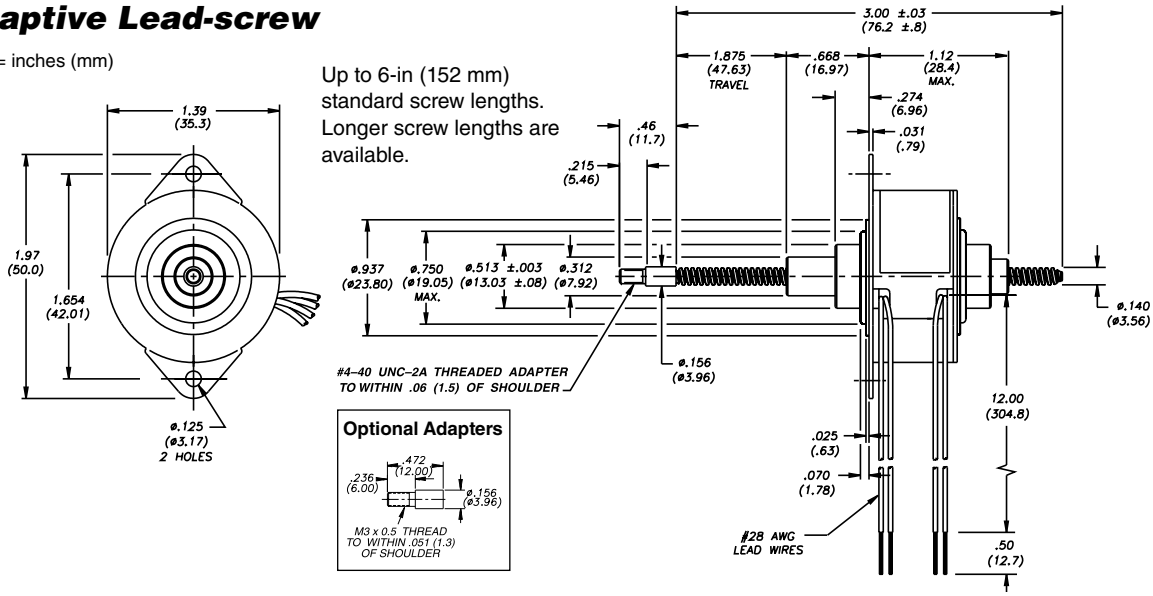
#2-56 UNC–2A THREAD
or M2 x 0.4 TO BE WITHIN
.030 (.76) MAX. OF SHOULDER

Spline is also available with optional #4-40 UNC-2A or M3 x 0.5 threaded adapter as shown in non-captive drawing.

Non-Captive Lead-screw

Dimensions = inches (mm)

Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.

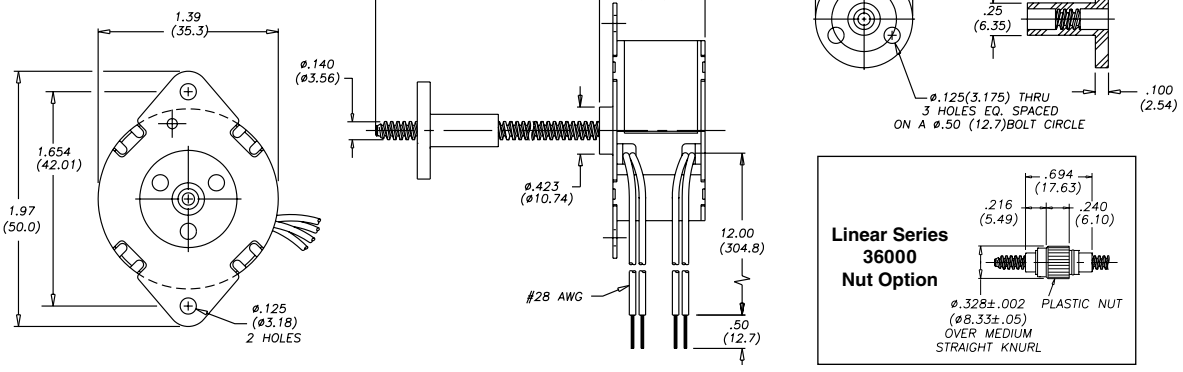


Optional Adapters

External Linear

Dimensions = inches (mm)

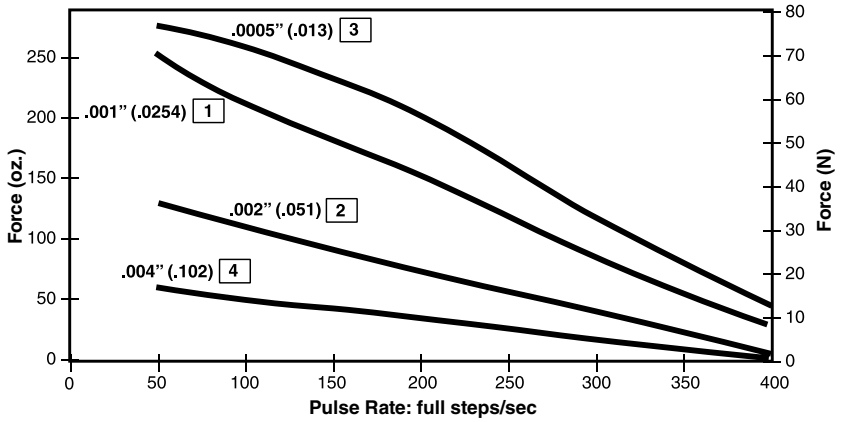
Up to 6-in (152 mm) standard screw lengths. Longer screw lengths are available.



Linear Series 36000 Nut Option

FORCE vs. PULSE RATE

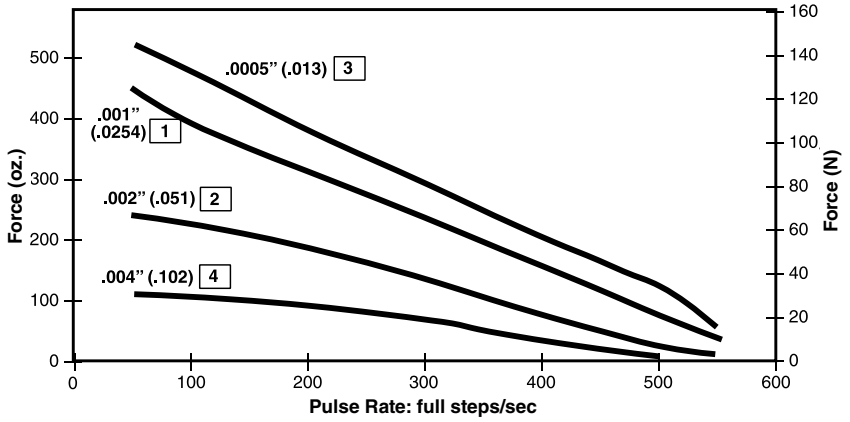
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

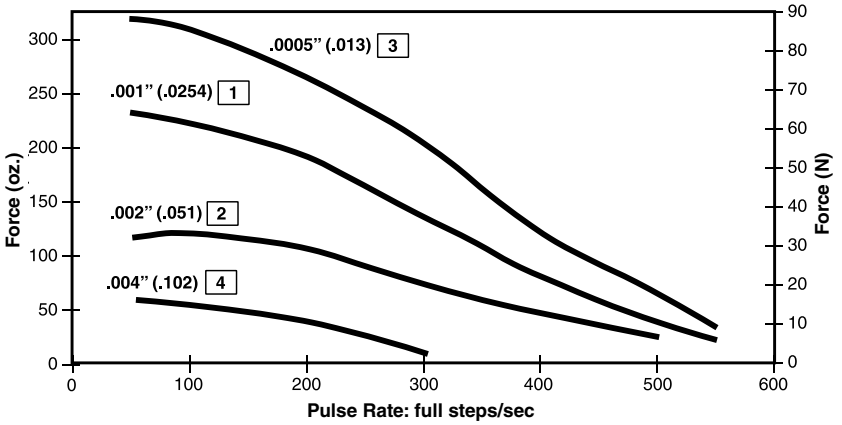
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

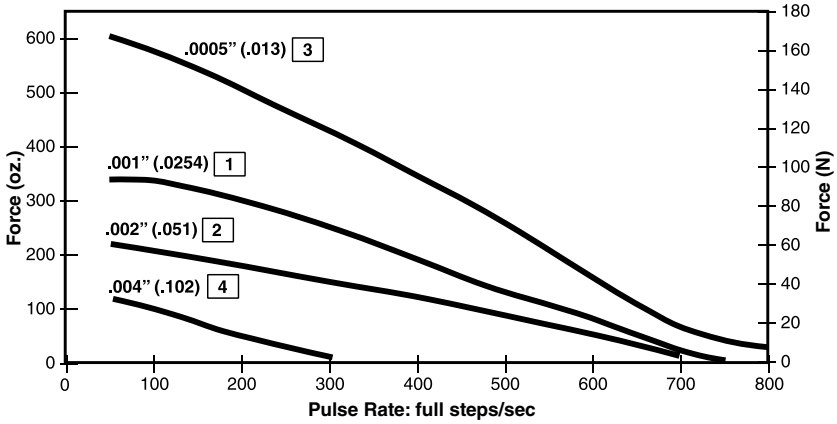
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

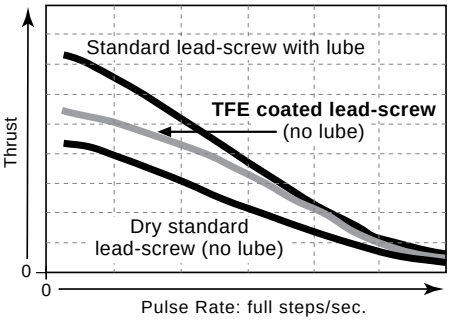
TFE Coated Lead-screws


36000 Series, non-captive

A non-lubricated TFE coated lead-screw provides improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for the 36000 Series captive, non-captive and external linear linear actuators.

Lead-Screw Comparison *FORCE vs. PULSE RATE*

L/R Drive
100% Duty Cycle

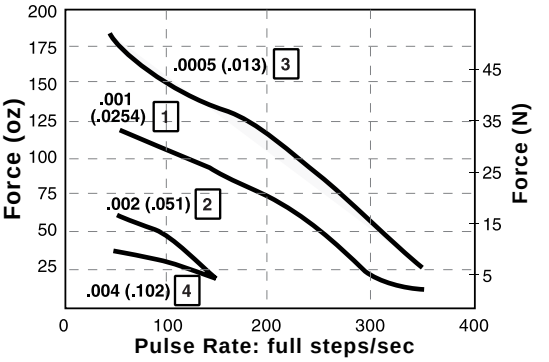


Specially engineered can-stack linear actuators for high temperature applications

Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

36000 Series HIGH TEMPERATURE *FORCE vs. PULSE RATE*

L/R Drive
100% Duty Cycle



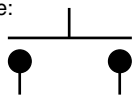
Home Position Switch for 36000 Series Can-Stack

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S".

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

Specifications

Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	

Multiple contact options available.

End of Stroke Proximity Sensor

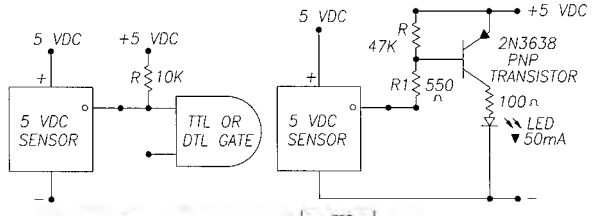
The sensor incorporates a hall effect device, which is activated by a rare earth magnet embedded in the end of the internal screw. The compact profile of the sensor allows for installation in limited space applications.

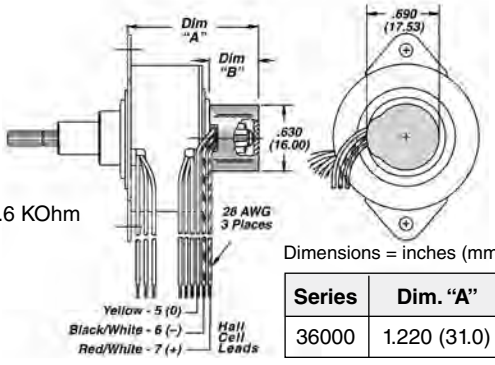
The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

Specifications

Supply Voltage (VDC):	3.8 min. to 24 max.
Current consumption:	10 mA max.
Output voltage (operated):	0.15 typ., 0.40 max.; Sinking 20 mA max.
Output current:	20 mA max.
Output leakage current (released):	10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output switching time	
Rise, 10 to 90%:	.05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
Fall, 90 to 10%:	.15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature:	– 40 to +150°C

Note: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.





Dimensions = inches (mm)

Series	Dim. "A"	Dim. "B"
36000	1.220 (31.0)	.470 (12.0)

Haydon® 46000 Series - heavy-duty power, versatility and high output force

Specifications

Ø 46 mm (1.8-in) motor					
Wiring		Bipolar			
Part No.	Captive	4644 ■-■■-■■■†		4654 ■-■■-■■■†	
	Non-captive	4634 ■-■■-■■■†		4684 ■-■■-■■■†	
	External	E4644 ■-■■-■■■†		E4654 ■-■■-■■■†	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.0 A	.41 A	1.0 A	.41 A
Resistance/phase		5 Ω	29 Ω	5 Ω	29 Ω
Inductance/phase		9 mH	52 mH	7.1 mH	39 mH
Power consumption		10 W			
Rotor inertia		25.0 gcm^2			
Insulation Class		Class B			
Weight		9.0 oz (255 g)			
Insulation resistance		20 MΩ			

Ø 46 mm (1.8-in) motor					
Wiring		Unipolar*			
Part No.	Captive	4646 ■-■■-■■■†		4656 ■-■■-■■■†	
	Non-captive	4636 ■-■■-■■■†		4686 ■-■■-■■■†	
	External	E4646 ■-■■-■■■†		E4656 ■-■■-■■■†	
Step angle		7.5°		15°	
Winding voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		1.0 A	.41 A	1.0 A	.41 A
Resistance/phase		5 Ω	29 Ω	5 Ω	29 Ω
Inductance/phase		4.5 mH	26 mH	3.5 mH	20 mH
Power consumption		10 W			
Rotor inertia		25.0 gcm^2			
Insulation Class		Class B			
Weight		9.0 oz (255 g)			
Insulation resistance		20 MΩ			

† Part numbering information on page 166.

Linear Travel/Step			Order Code I.D.
Step	inches	mm	
7.5° Angle	0.0005	0.013	3
	0.001	0.0254	1
	0.002	0.051	2
	0.004	0.102	4
	0.008	0.203	8
15° Angle	0.004	0.102	4
	0.008	0.203	8
	0.016	0.406	G

Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Other 46000 Series styles available...

- TFE lead-screw
- High Temperature Option

Identifying the Can-Stack part number codes when ordering

E	46	4	4	3	–	05	–	900

Prefix
(include only when using the following)

- **A** = A Coil (See AC Synchronous page 190)
- **E** = External
- **K** = External with 40° thread form
- **P** = Proximity Sensor
- **S** = Home Position Switch
- **R** = Rare Earth Magnet

Series number designation

46 = 46000

(Series numbers represent approximate diameters of motor body)

Style

- **3** = 7.5° non-captive
- **4** = 7.5° Captive or External (use "E" or "K" Prefix for External version)
- **5** = 15° Captive or External (use "E" or "K" Prefix for External version)
- **8** = 15° non-captive

Coils

- **4** = Bipolar (4 wire)
- **6** = Unipolar (6 wire)

Code ID Resolution Travel/Step

- **1** = .001-in (.0254)
- **2** = .002-in (.051)
- **3** = .0005-in (.013)
- **4** = .004-in (.102)
- **8** = .0008-in (.203)
- **G** = .016-in (.406)

Voltage

05 = 5 VDC
12 = 12VDC

Custom V available

Suffix

Stroke
Example: –900 = external linear with grease & flanged nut

Suffix also represents:

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

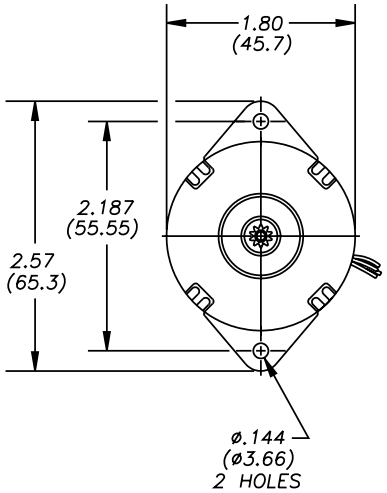
OPTIONS

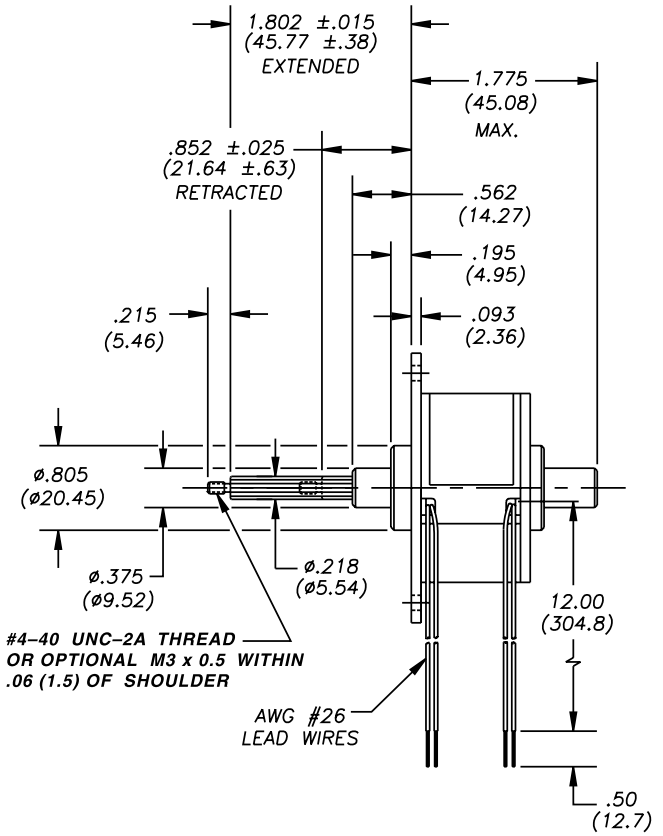
- SCREW LENGTH OPTIONS
- TFE COATED LEAD-SCREWS
- HIGH TEMPERATURE ASSEMBLY
- HOME POSITION SWITCH
- NEMA FLANGE (SIZE 23)
- OPTIONAL ASSEMBLIES

46000 Series Can-Stack Dimensional Drawings

Captive Lead-screw

Dimensions = inches (mm)

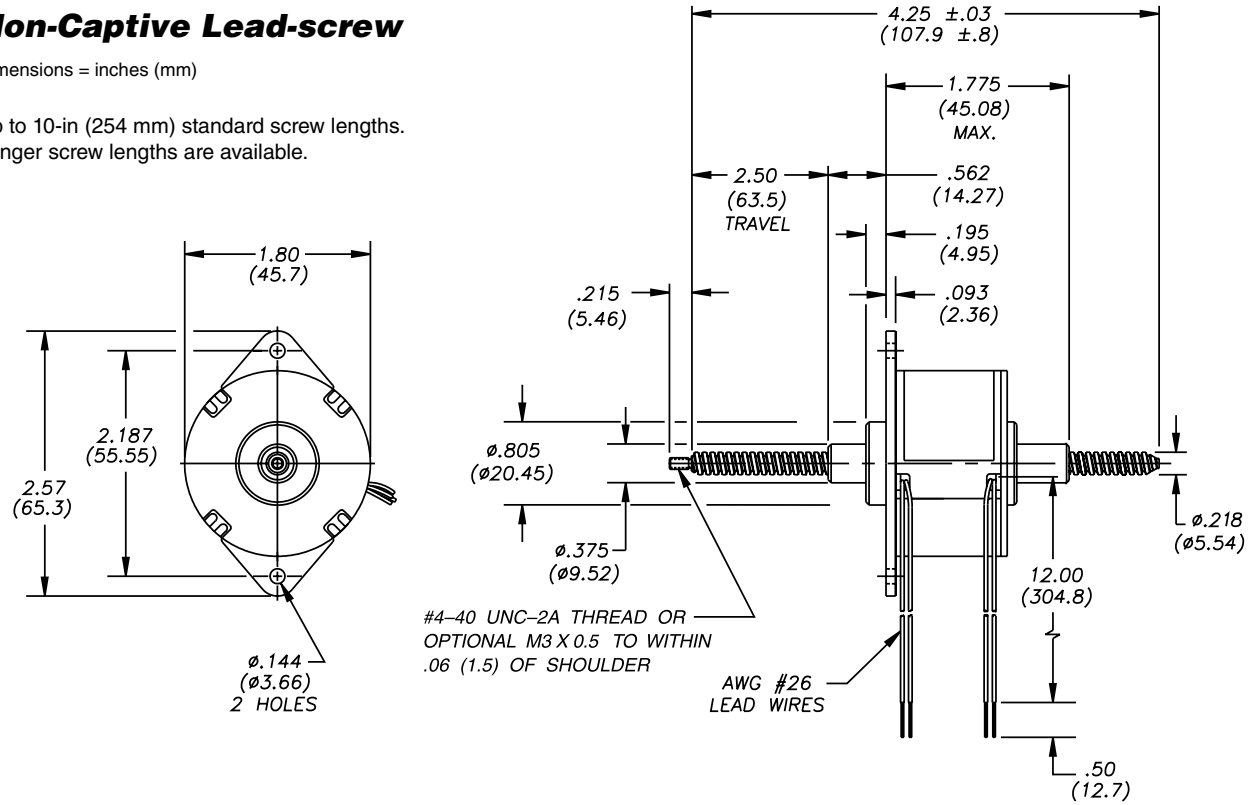




Non-Captive Lead-screw

Dimensions = inches (mm)

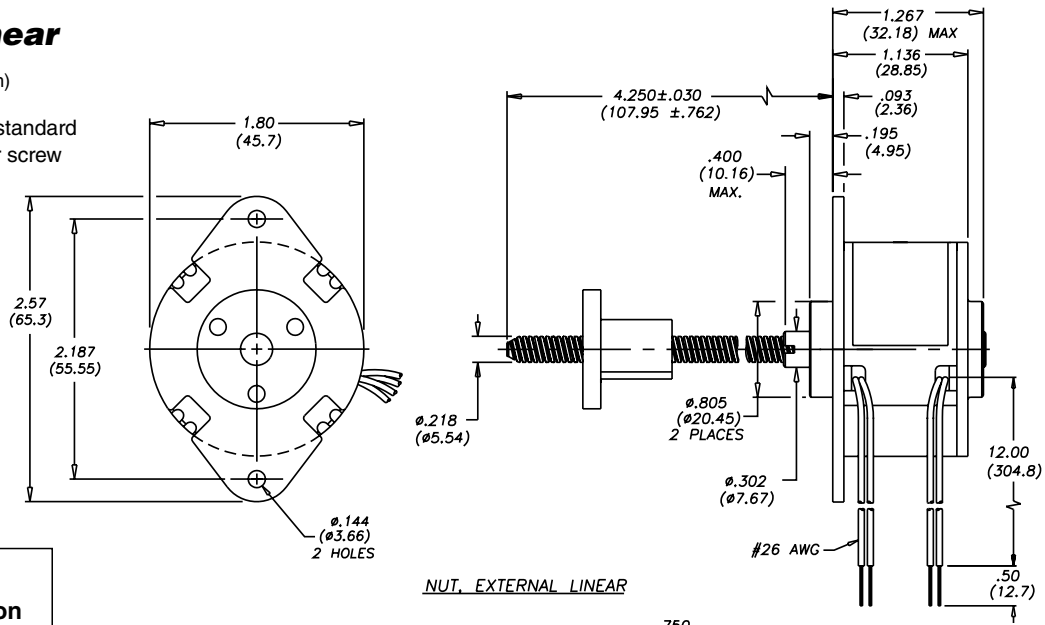
Up to 10-in (254 mm) standard screw lengths.
Longer screw lengths are available.



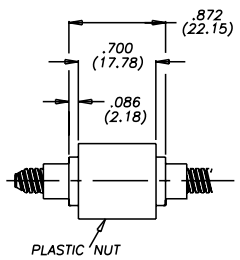
External Linear

Dimensions = inches (mm)

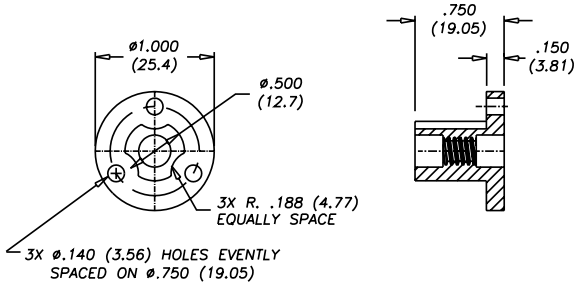
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



Linear Series 46000 Nut Option

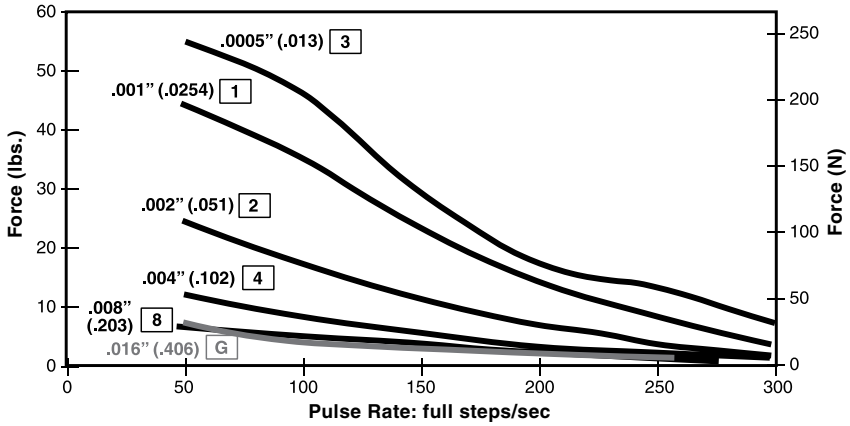


NUT, EXTERNAL LINEAR



FORCE vs. PULSE RATE

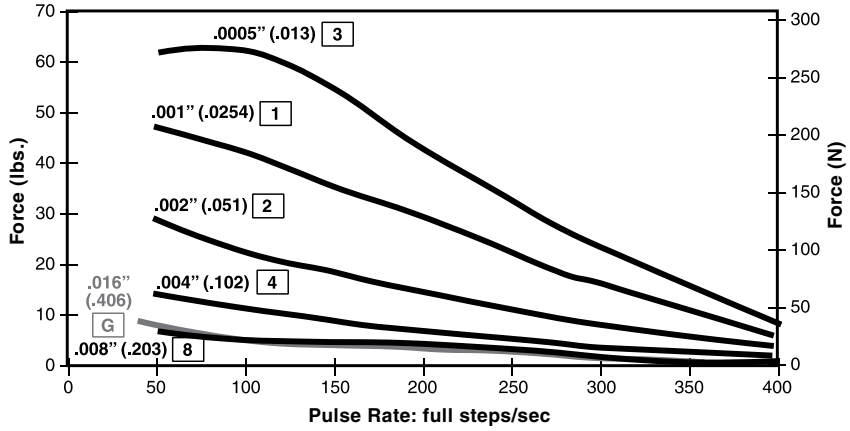
- L/R Drive
- Bipolar
- 100% Duty Cycle



FORCE vs. PULSE RATE

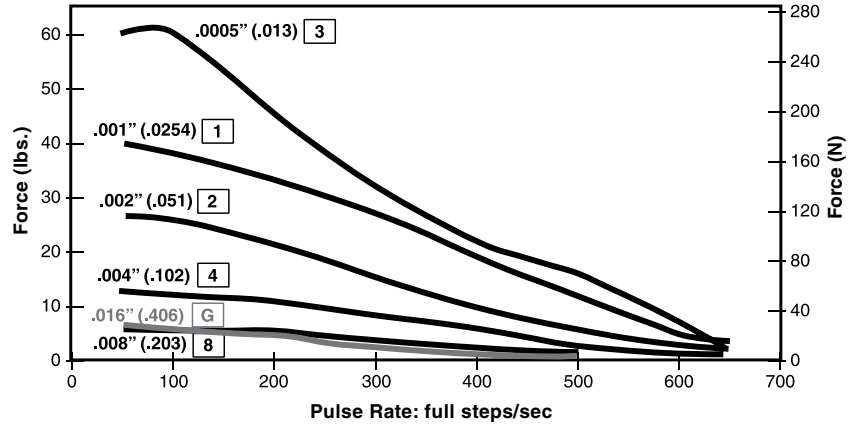
- L/R Drive
- Bipolar
- 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



FORCE vs. PULSE RATE

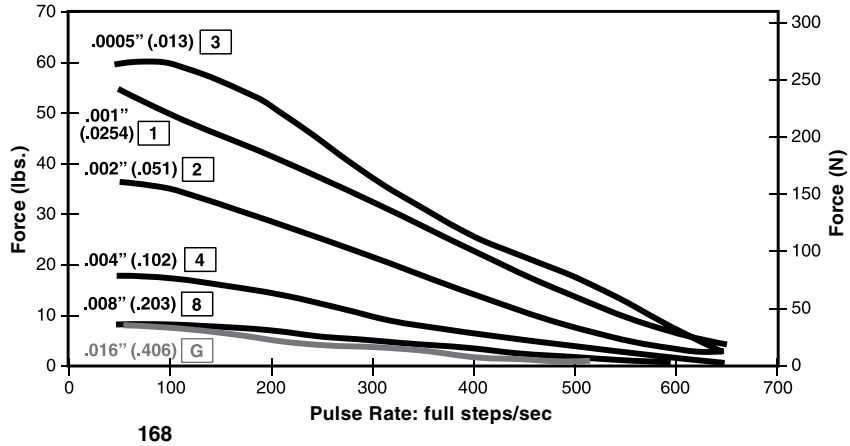
- Chopper Drive
- Bipolar
- 100% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage



FORCE vs. PULSE RATE

- Chopper Drive
- Bipolar
- 25% Duty Cycle
- 8:1 Motor Coil to Drive Supply Voltage

Obtained by a special winding or by running a standard motor at double the rated current.



NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.

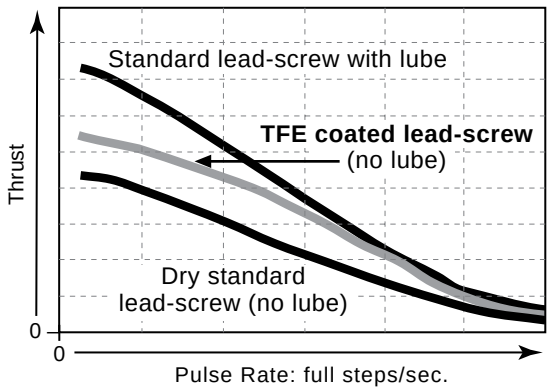
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

TFE coated lead-screws for 46000 Series

46000 Series, external linear

46000 series is also available with an optional, non-lubricated TFE coated lead-screw for improved performance in both life and thrust as compared to a "dry" stainless steel lead-screw. TFE can be applied to a wide variety of lead-screw pitches and is available for captive, non-captive and external linear linear actuators.

Lead-Screw Comparison
FORCE vs. PULSE RATE
L/R Drive • 100% Duty Cycle



Specially engineered can-stacks for high temperature applications

Haydon Kerk Motion Solutions, Inc. offers a line of stepping motors specially designed for high temperature environments. The motors are constructed using the proven techniques employed for Haydon® motors. Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Home Position Switch for 46000 Series Can-Stacks

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. Depending on your preference, contacts can be normally open or normally closed. The contact closure is repeatable to within one step position, identifying linear movements as low as 0.0005-in (0.0013 cm) per step. Multiple contact switches are also available.

The switch allows device manufacturers the ability to monitor movements more precisely for greater control and improved Q.C. When ordering motors with the home position switch, the part number should be preceded by an "S". Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

Specifications

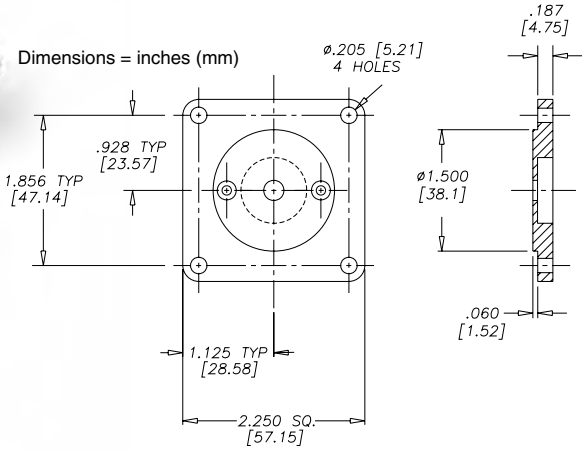
Contact Ratings (Standard):	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature:	-30°C to +55°C (-22°F to 131°F)
Contact Resistance:	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA
Electrical Life:	Tested to 60,000 make-and-break cycles at full load
Schematic:	1 — 3

Multiple contact options available.

NEMA Flange for Series 46000

Assembly option available for applications that require a Size 23 mount.

Dimensions = inches (mm)



Can-Stack Rotary Stepper Motors

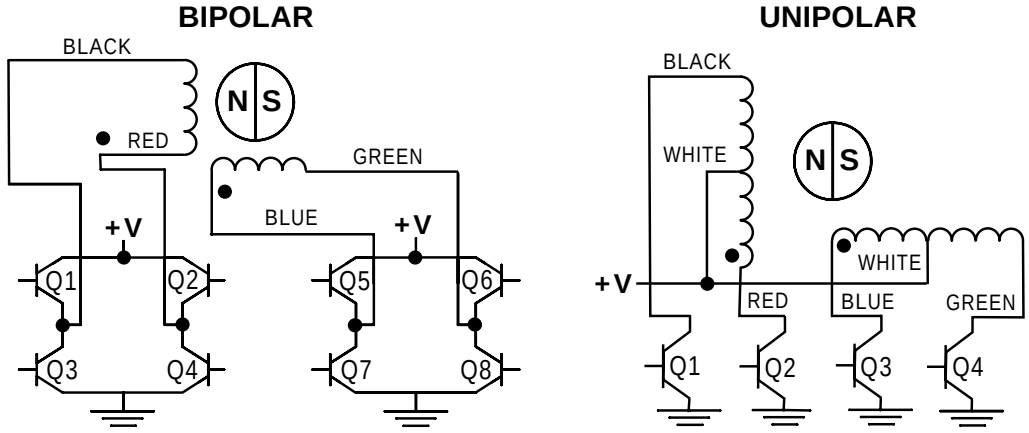
Haydon Kerk Motion Solutions, Inc. also offers rotary motors that are built to provide exceptionally high torque to size ratios.

By utilizing a patented enlarged rotor with low inductance coils, the motors provide superior torque and continuous, reliable high performance. At rated voltage, the 46 mm motor produces 16 oz.-in. of holding torque, the 36 mm motor produces 4.5 oz.-in., the 26 mm motor produces 1.8 oz.-in. and the 20 mm motor produces 0.65 oz.-in. Optional rare earth magnets may be specified for even higher torque. Bronze sleeve bearings are standard, ball bearings are also available.

Haydon Kerk Motion Solutions, Inc. has patented technology and the facilities to produce these motors in high volume. We provide rapid turn-around for prototypes and production orders. Custom designs and special engineering requirements such as special shaft diameters, lengths and mounting flanges are welcome.

Some typical applications for Haydon rotary motors include medical equipment, bar code scanning devices, printing equipment, laboratory instrumentation and other high torque, small space mechanisms.

*Rotary Stepper Motors: **Wiring***



*Rotary Stepper Motors: **Stepping Sequence***

Note: Half stepping is accomplished by inserting an off state between transitioning phases. Shaft rotation as viewed from the output shaft.

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Unipolar	Q1	Q2	Q3	Q4
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

CW ↓ CCW ↑

Haydon® Rotary Motors Z20000 Series Sleeve or Ball Bearing economically designed rotary motors.

Ø 20mm (.79-in)
Sleeve Bearing
Z20000 Series

Ø 20mm (.79-in)
Ball Bearing
Z20000 Series

Specifications

Ø 20 mm (3/4 - .79 inch) Z Series Rotary Motor		
Wiring	**Bipolar**	
Part No. (Sleeve)*	Z20540-05	Z20540-12
Step angle	15°	
Winding voltage	5 VDC	12 VDC
Current (RMS)/phase	250 mA	100 mA
Resistance/phase	20 Ω	118 Ω
Inductance/phase	5.5 mH	32 mH
Hold torque	.65 oz-in. (.46 N-cm)	
Detent torque	.17 oz-in. (.12 N-cm)	
Power consumption	2.5 W	
Rotor Inertia	1.13 gcm^2	
Weight	.80 oz. (22.7 g)	
Insulation resistance	20 MΩ	
Insulation Class	Class B	

*For Ball Bearings add " –999" to the end of this number

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the rotary motor part number codes when ordering

Z	20	5	4	0	–	05	–	001

Prefix
Z = Economy Series

Series number designation
20 = 20000
(Series numbers represent approximate diameters of motor body)

Style
5 = 15°

Coils
4 = Bipolar

Code ID Resolution Travel/Step
0 = Rotary motor

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

Suffix
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings

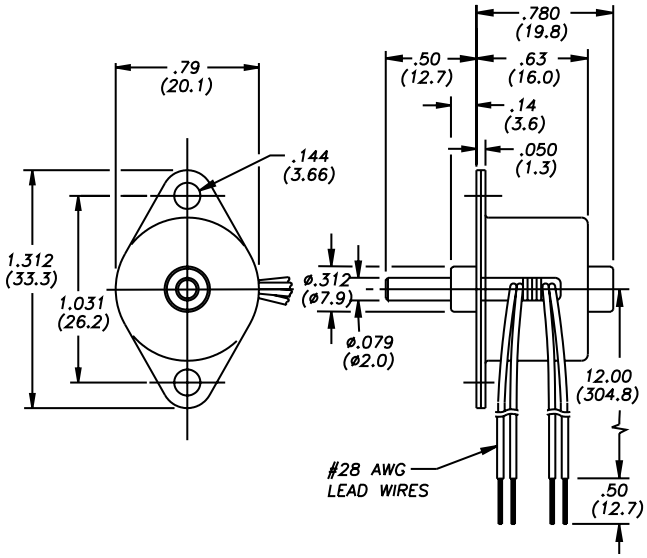
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Z20000 Series: Ø 20 mm (.79-in) Rotary Motors

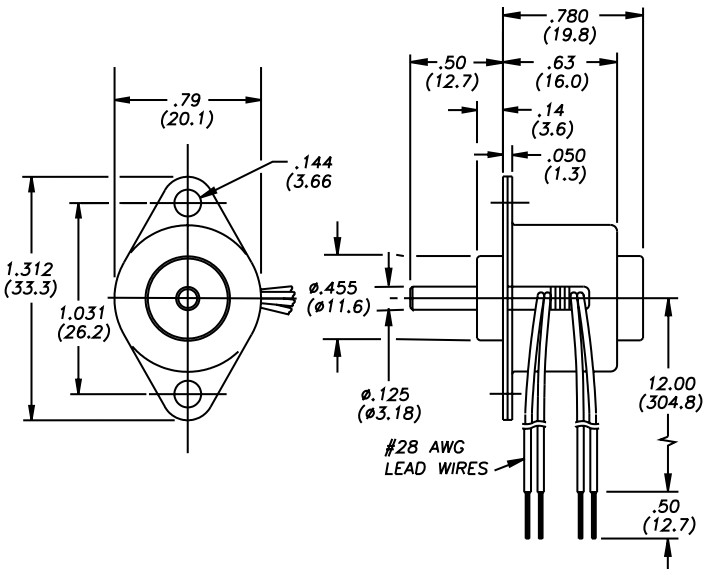
Sleeve Bearing Motor

Dimensions = inches (mm)



Ball Bearing Motor

Dimensions = inches (mm)

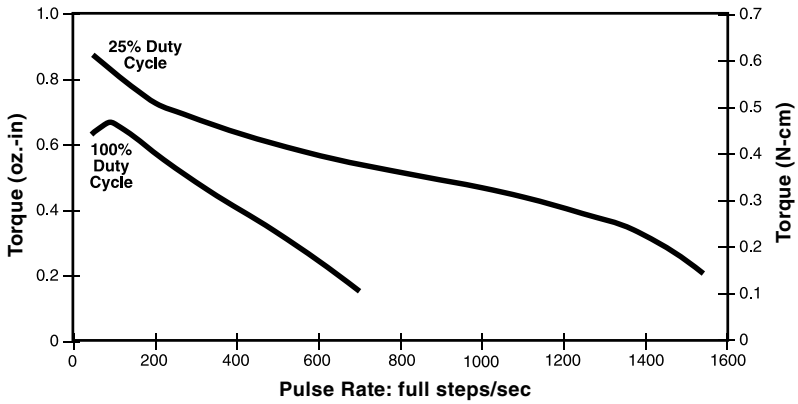


TORQUE vs. PULSE RATE

L/R Drive • Bipolar • 15% Step Angle

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.

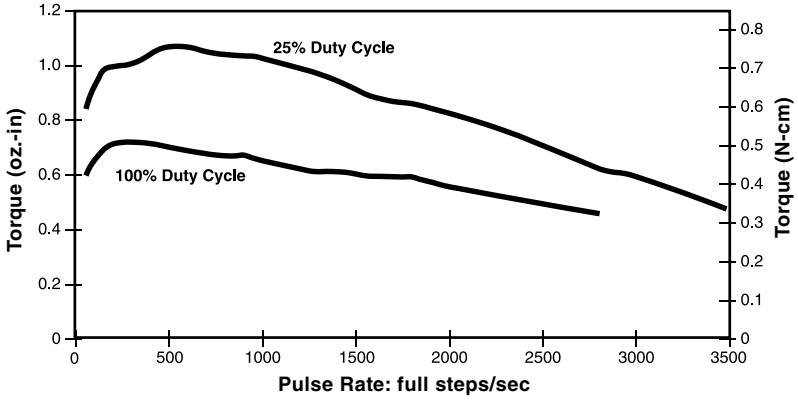
NOTE: All chopper drive curves were created with a 5 Volt motor and a 40 Volt power supply.



TORQUE vs. PULSE RATE

Chopper • Bipolar • 15% Step Angle • 8:1 Motor Coil to Drive Supply Voltage

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



Haydon® Rotary Motors 26000 Series Sleeve or Ball Bearing designs

A HIGH TEMPERATURE option is also available for this motor. Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Specifications

Ø 26 mm (1-in) Rotary Motor				
Wiring	Bipolar			
Part No. (Sleeve)*	26440-05	26440-12	26540-05	26540-12
Step angle	7.5°		15°	
Winding voltage	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	340 mA	140 mA	340 mA	140 mA
Resistance/phase	14.7 Ω	84 Ω	14.7 Ω	84 Ω
Inductance/phase	8.5 mH	55 mH	6.7 mH	44 mH
Hold torque	1.6 oz-in. (1.13 N-cm)		1.3 oz-in. (.92 N-cm)	
Detent torque	.12 oz-in. (.09 N-cm)		.14 oz-in. (.10 N-cm)	
Power consumption	3.4 W			
Rotor Inertia	1.2 gcm^2			
Weight	1 oz. (28 g)			
Insulation resistance	20 MΩ			
Insulation Class	Class B			

Ø 26 mm (1-in) Rotary Motor			
Unipolar			
26460-05	26460-12	26560-05	26560-12
7.5°		15°	
5 VDC	12 VDC	5 VDC	12 VDC
340 mA	140 mA	340 mA	140 mA
14.7 Ω	84 Ω	14.7 Ω	84 Ω
4.3 mH	24 mH	3.4 mH	19 mH
1.2 oz-in (.85 N-cm)		.9 oz-in. (.64 N-cm)	
.12 oz-in (.09 N-cm)		.14 oz-in. (.10 N-cm)	
3.4 W			
1.2 gcm^2			
1 oz. (28 g)			
20 MΩ			
Class B			

*For Ball Bearings add " –999" to the end of this number

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the rotary motor part number codes when ordering

	26	4	4	0	–	05	–	999

Prefix (include only when using the following)
T = High Temperature
R = Rare Earth Magnet

Series number designation
26 = 26000
(Series numbers represent approximate diameters of motor body)

Style
4 = 7.5°
5 = 15°

Coils
4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step
0 = Rotary motor

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

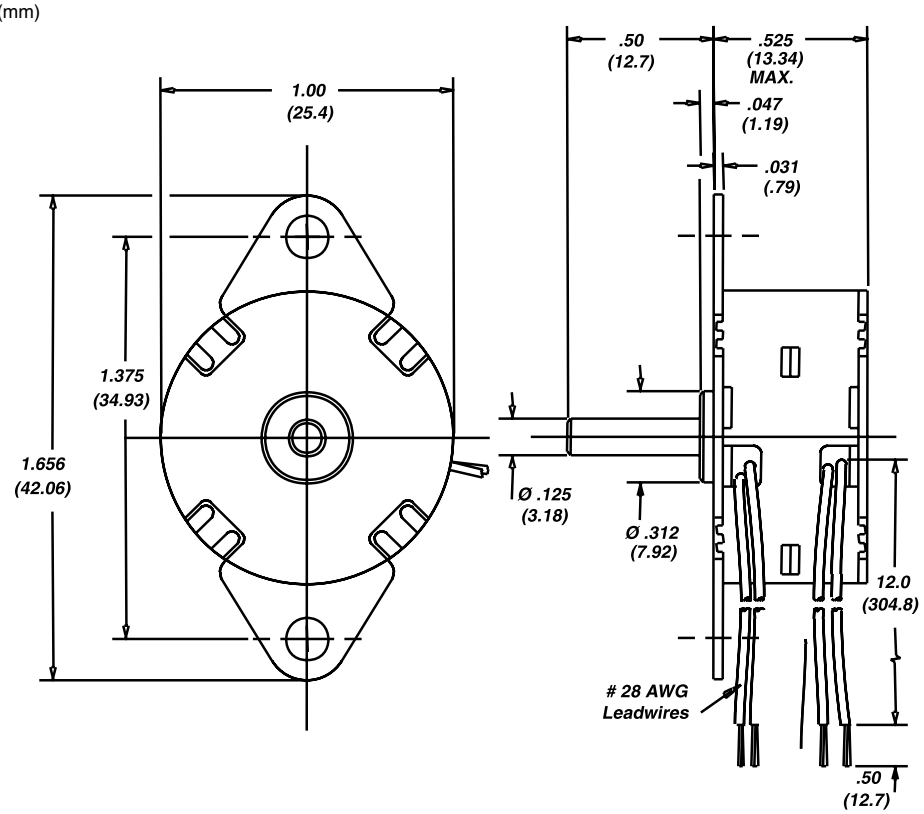
Suffix
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

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

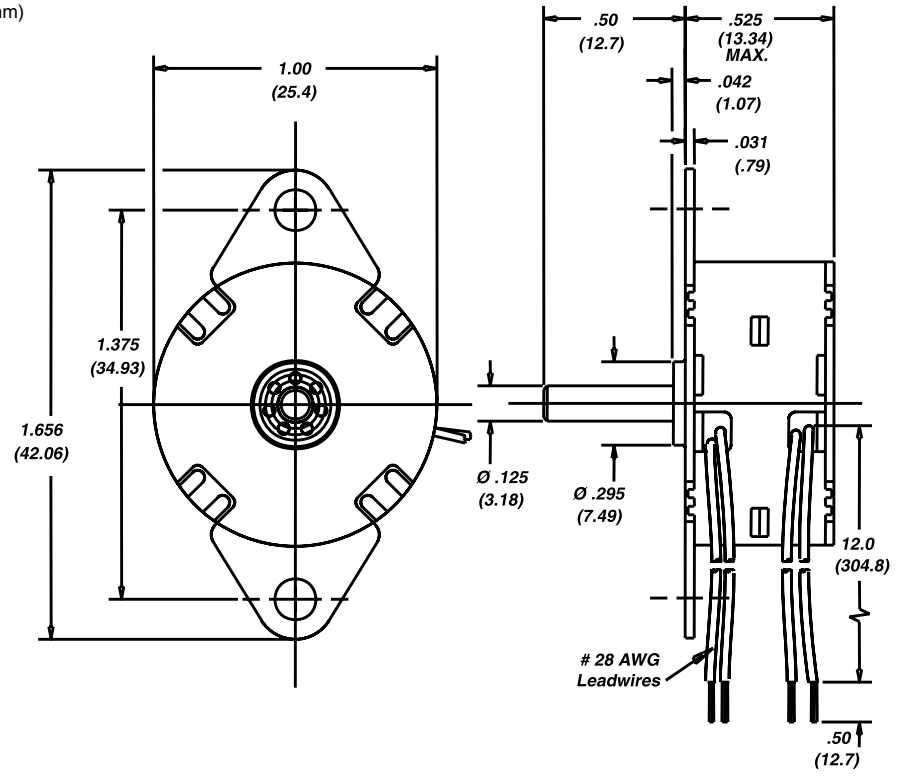
Dimensional Drawings: Sleeve Bearing

Dimensions = inches (mm)



Dimensional Drawings: Ball Bearing

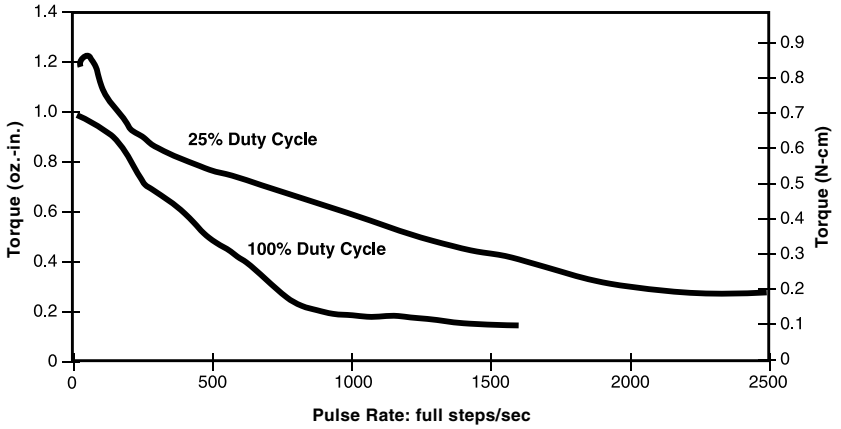
Dimensions = inches (mm)



TORQUE vs. PULSE RATE

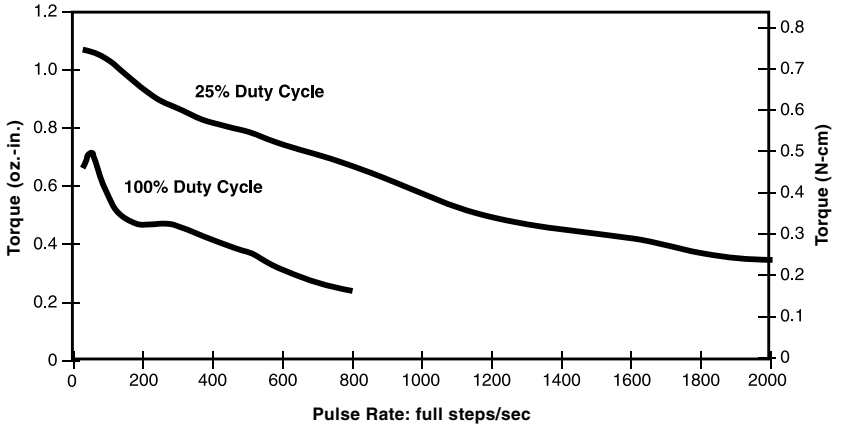
- L/R Drive
- Bipolar
- 7.5° Step Angle

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

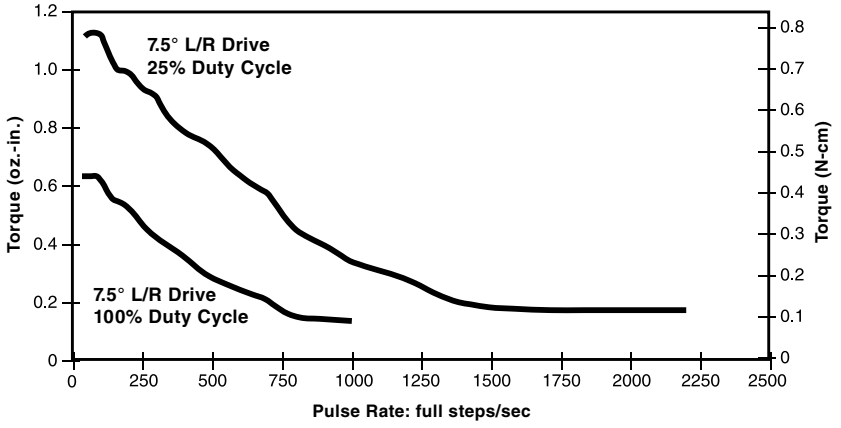
- L/R Drive
- Bipolar
- 15° Step Angle



TORQUE vs. PULSE RATE

- L/R Drive
- Unipolar
- 7.5° Step Angle

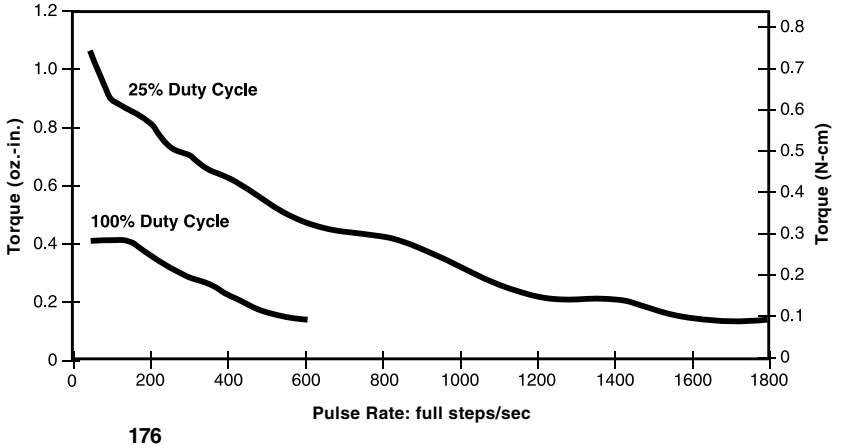
25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

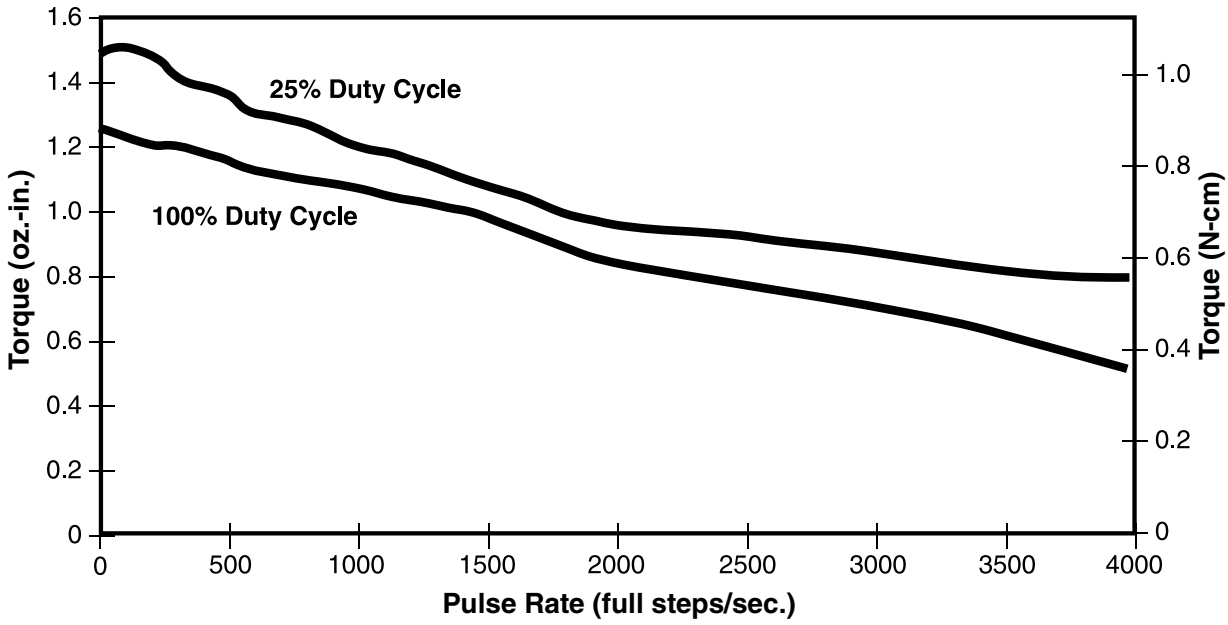
- L/R Drive
- Unipolar
- 15° Step Angle

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



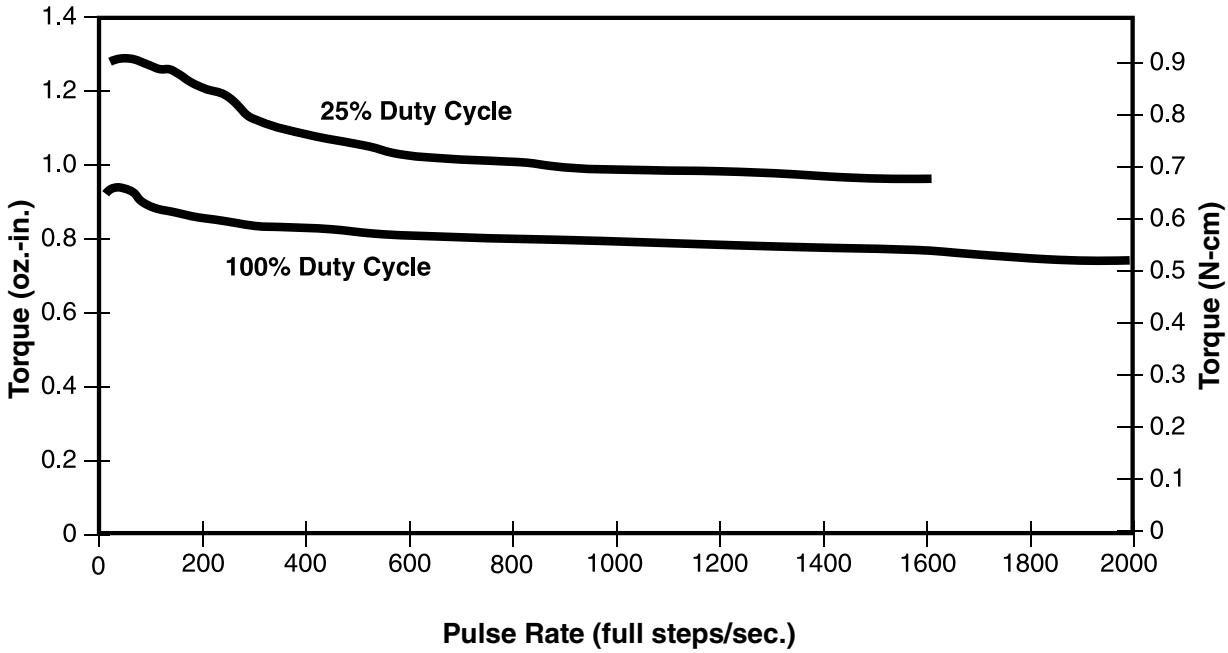
TORQUE vs. PULSE RATE

Chopper Drive • Bipolar • 7.5% Step Angle • 8:1 Motor Coil to Drive Supply Voltage



TORQUE vs. PULSE RATE

Chopper Drive • Bipolar • 15% Step Angle • 8:1 Motor Coil to Drive Supply Voltage



25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.

NOTE: All chopper drive curves were created with a 5 Volt motor and a 40 Volt power supply.

Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Haydon® Rotary Motors Z26000 Series Sleeve or Ball Bearing designs for high volume production

Ø 26mm (1-in) Ball Bearing Z26000 Series

Ø 26mm (1-in) Sleeve Bearing Z26000 Series

Specifications

Ø 26 mm (1-in) Z Series Rotary Motor				
Wiring	Bipolar			
Part No. (Sleeve)*	Z26440-05	Z26440-12	Z26540-05	Z26540-12
Step angle	7.5°		15°	
Winding voltage	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	340 mA	140 mA	340 mA	140 mA
Resistance/phase	14.7 Ω	84 Ω	14.7 Ω	84 Ω
Inductance/phase	8.5 mH	55 mH	6.7 mH	44 mH
Hold torque	1.8 oz-in. (1.27 N-cm)		1.5 oz-in. (1.06 N-cm)	
Detent torque	.25 oz-in (.18 N-cm)		.35 oz-in. (.25 N-cm)	
Power consumption	3.4 W			
Rotor Inertia	1.40 gcm^2			
Weight	1.15 oz. (32.6 g)			
Insulation resistance	20 MΩ			
Insulation Class	Class B			

Ø 26 mm (1-in) Z Series Rotary Motor			
Unipolar			
Z26460-05	Z26460-12	Z26560-05	Z26560-12
7.5°		15°	
5 VDC	12 VDC	5 VDC	12 VDC
340 mA	140 mA	340 mA	140 mA
14.7 Ω	84 Ω	14.7 Ω	84 Ω
4.3 mH	24 mH	3.4 mH	19 mH
1.3 oz-in. (.92 N-cm)		1 oz-in. (.71 N-cm)	
.25 oz-in (.18 N-cm)		.35 oz-in (.25 N-cm)	
3.4 W			
1.40 gcm^2			
1.15 oz. (32.6 g)			
20 MΩ			
Class B			

*For Ball Bearings add " –999" to the end of this number

Identifying the rotary motor part number codes when ordering

Haydon kerk Express℠ www.HaydonKerkExpress.com
Standard products available 24-hrs.

Z	26	4	4	0	–	05	–	001

Prefix
Z = Economy Series

Series number designation
26 = 26000
(Series numbers represent approximate diameters of motor body)

Style
4 = 7.5°
5 = 15°

Coils
4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step
0 = Rotary motor

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

Suffix
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

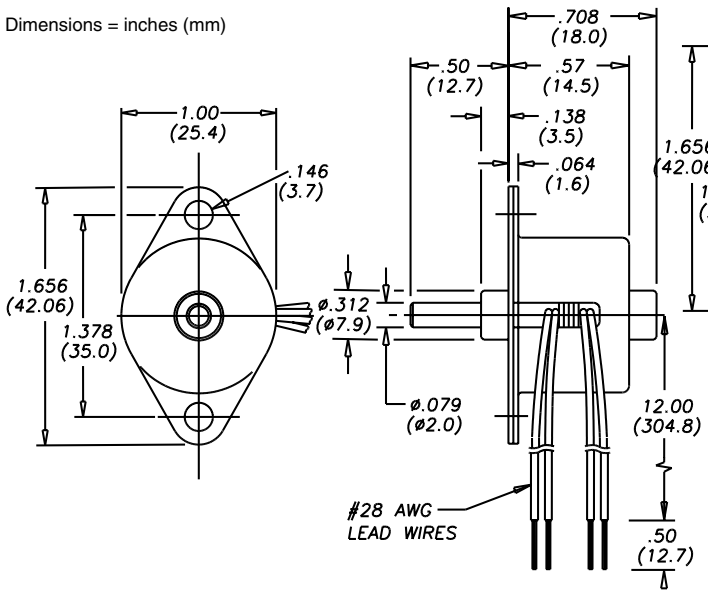
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

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

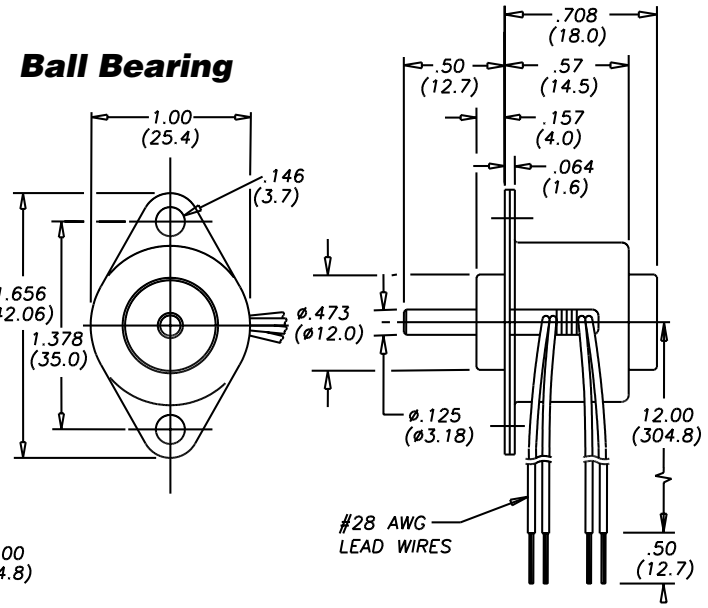
Dimensional Drawings: Z26000 Series

Sleeve Bearing

Dimensions = inches (mm)



Ball Bearing



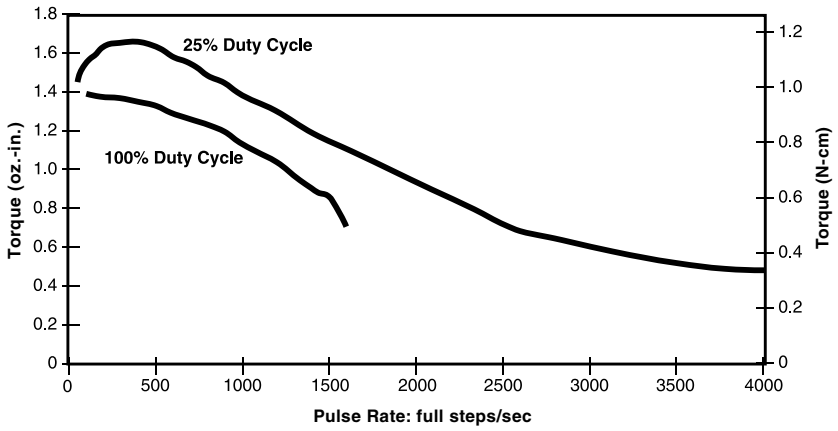
Z26000 ROTARY SERIES: Chopper Drive Performance Curves

TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **7.5° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.

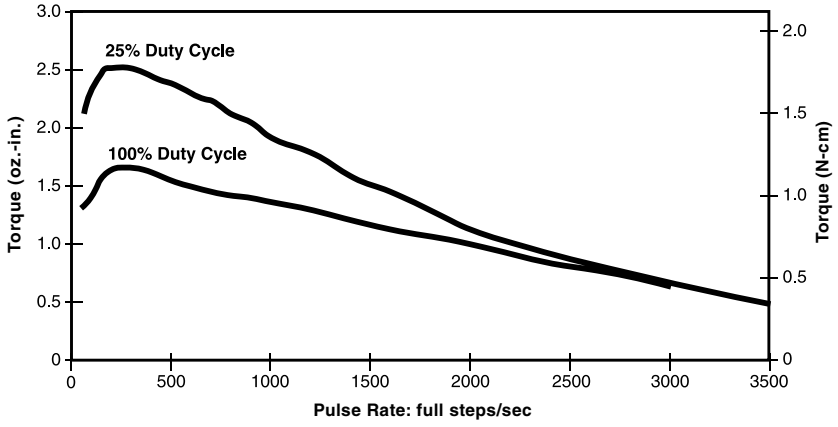
NOTE: All chopper drive curves were created with a 5 Volt motor and a 40 Volt power supply.



TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **15° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

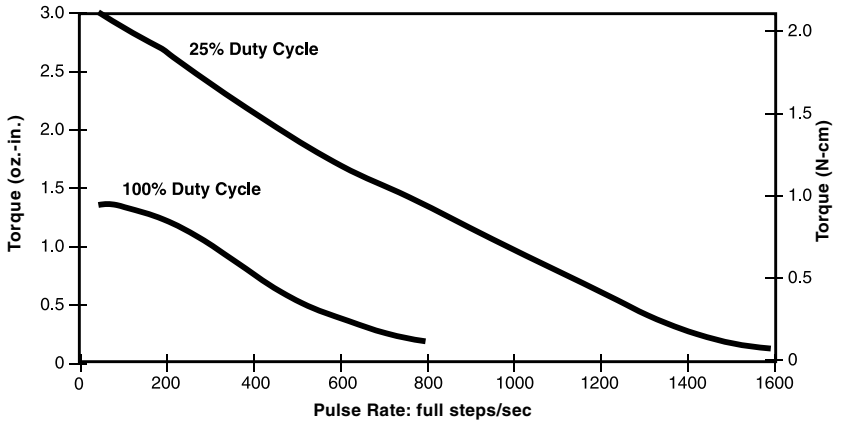
NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



TORQUE vs. PULSE RATE

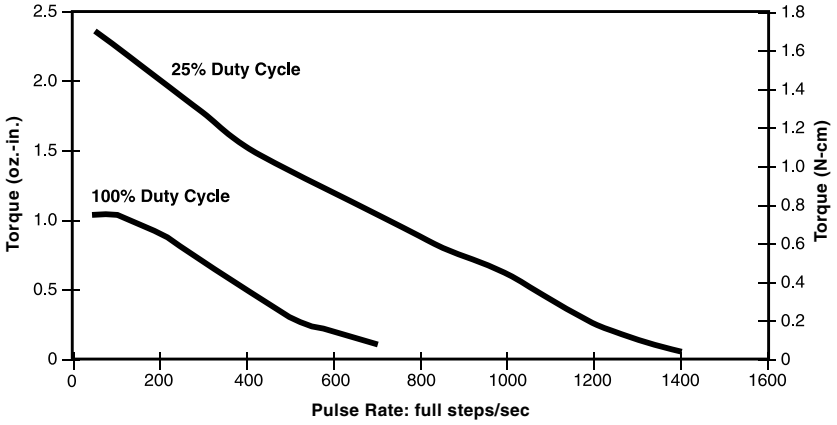
- **L/R Drive**
- **Bipolar**
- **7.5° Step Angle**

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

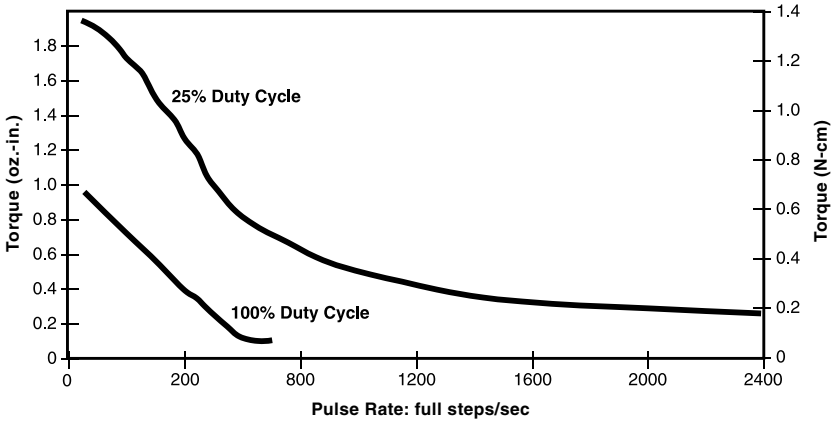
- **L/R Drive**
- **Bipolar**
- **15° Step Angle**



TORQUE vs. PULSE RATE

- **L/R Drive**
- **Unipolar**
- **7.5° Step Angle**

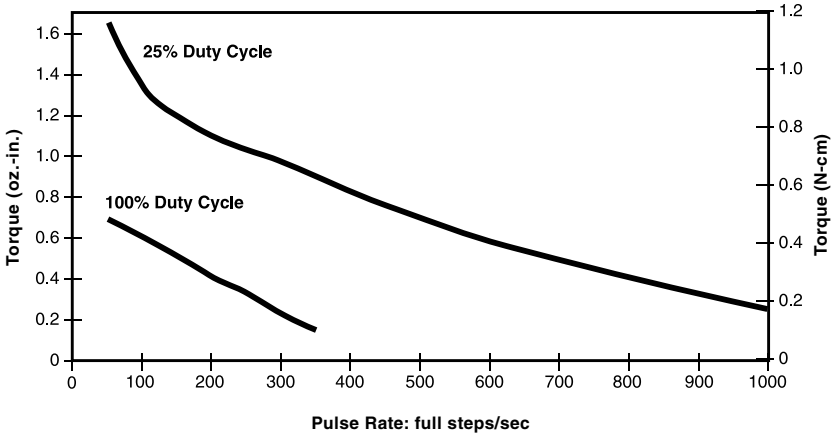
25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

- **L/R Drive**
- **Unipolar**
- **15° Step Angle**

NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



Haydon® Rotary Motors 36000 Series Sleeve or Ball Bearing designs

A HIGH TEMPERATURE option is also available for this motor. Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Ø 36mm (1.4-in) Ball Bearing 36000 Series

Ø 36mm (1.4-in) Sleeve Bearing 36000 Series

Specifications

Ø 36 mm (1.4-in) Rotary Motor				
Wiring	Bipolar			
Part No. (Sleeve)*	36440-05	36440-12	36540-05	36540-12
Step angle	7.5°		15°	
Winding voltage	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	460 mA	190 mA	460 mA	190 mA
Resistance/phase	11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase	7.2 mH	45 mH	5.5 mH	35 mH
Hold torque	4.5 oz-in. (3.18 N-cm)		2.9 oz-in. (2.05 N-cm)	
Detent torque	.28 oz-in. (.20 N-cm)		.37 oz-in. (.26 N-cm)	
Power consumption	4.6 W			
Rotor Inertia	10.5 gcm^2			
Weight	2.5 oz. (70 g)			
Insulation resistance	20 MΩ			
Insulation Class	Class B			

Ø 36 mm (1.4-in) Rotary Motor			
Unipolar			
36460-05	36460-12	36560-05	36560-12
7.5°		15°	
5 VDC	12 VDC	5 VDC	12 VDC
460 mA	190 mA	460 mA	190 mA
11 Ω	63 Ω	11 Ω	63 Ω
3.8 mH	19 mH	3.0 mH	15 mH
3.0 oz-in. (2.12 N-cm)		2.0 oz-in. (1.41 N-cm)	
.28 oz-in. (.20 N-cm)		.37 oz-in. (.26 N-cm)	
4.6 W			
10.5 gcm^2			
2.5 oz. (70 g)			
20 MΩ			
Class B			

*For Ball Bearings add " –999" to the end of this number

Haydon kerk Motion Solutions Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the rotary motor part number codes when ordering

E	36	5	4	0	–	12	–	000

Prefix (include only when using the following)
T = High Temperature
R = Rare Earth Magnet

Series number designation
36 = 36000
(Series numbers represent approximate diameters of motor body)

Style
4 = 7.5°
5 = 15°

Coils
4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step
0 = Rotary motor

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

Suffix
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

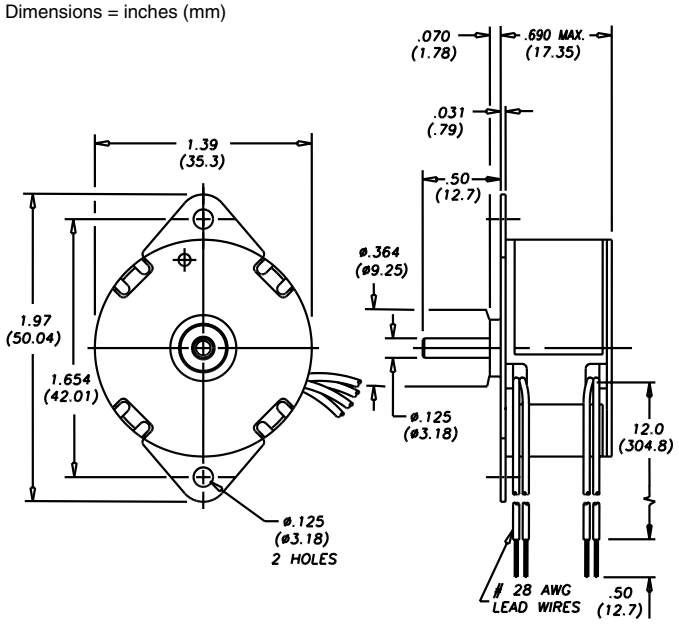
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

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

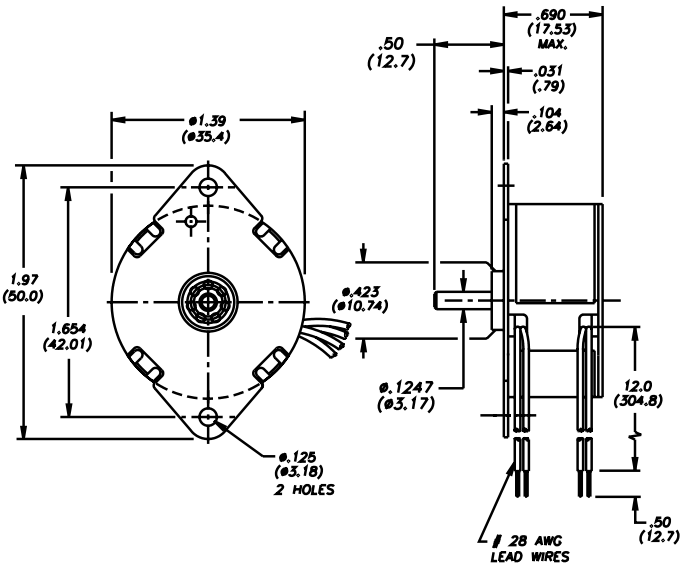
Dimensional Drawings: 36000 Series

Sleeve Bearing

Dimensions = inches (mm)



Ball Bearing



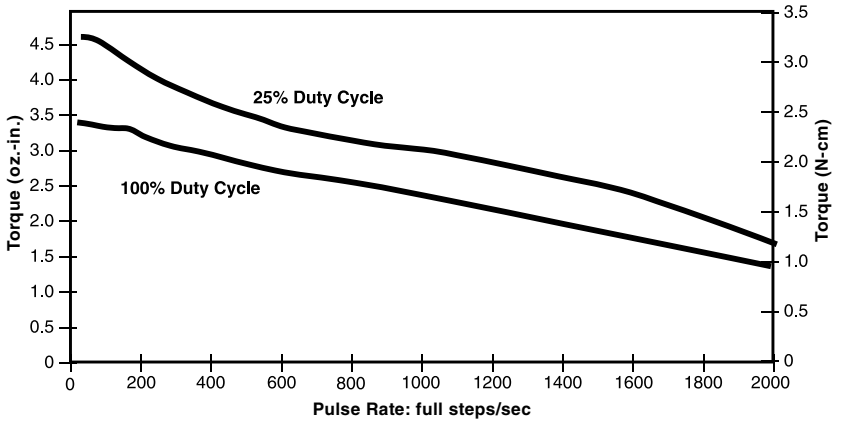
36000 ROTARY SERIES: Chopper Drive Performance Curves

TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **7.5° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.

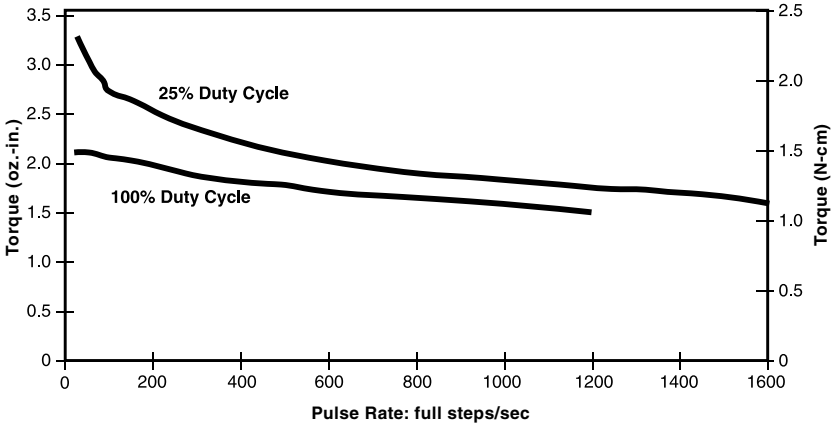
NOTE: All chopper drive curves were created with a 5 Volt motor and a 40 Volt power supply.



TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **15° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

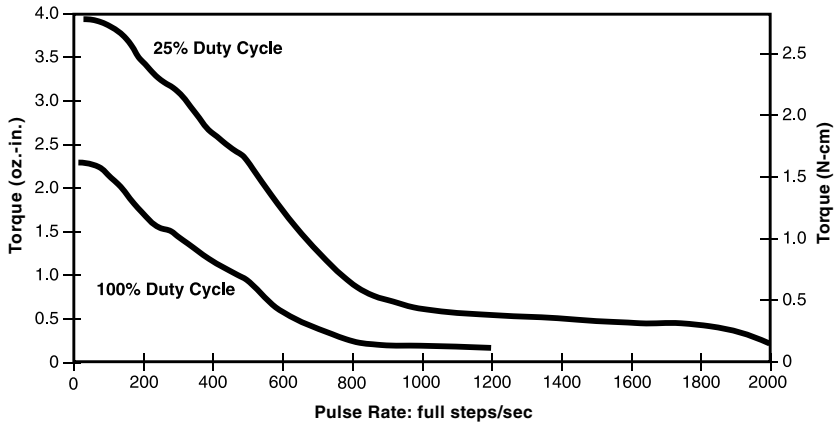
NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



TORQUE vs. PULSE RATE

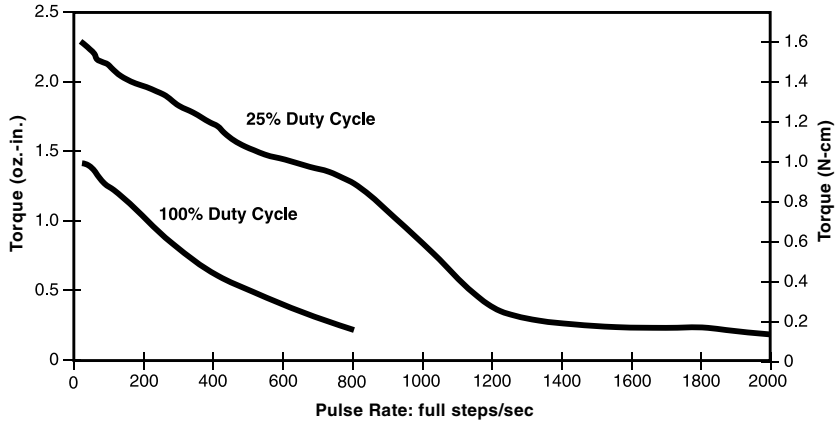
- L/R Drive
- Bipolar
- 7.5° Step Angle

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

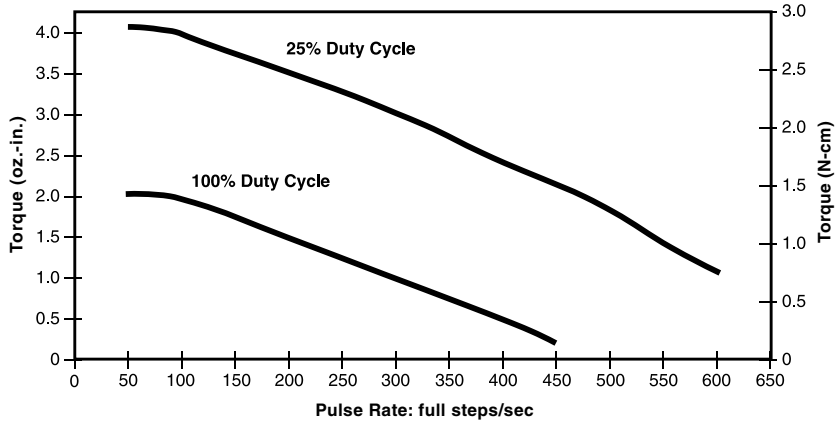
- L/R Drive
- Bipolar
- 15° Step Angle



TORQUE vs. PULSE RATE

- L/R Drive
- Unipolar
- 7.5° Step Angle

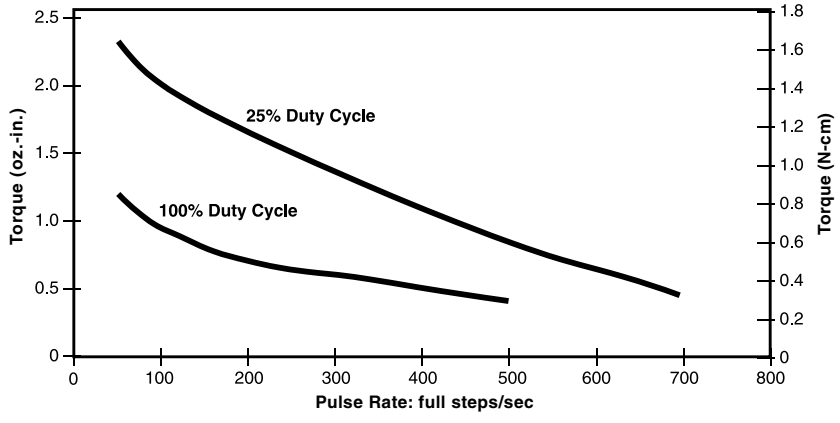
25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

- L/R Drive
- Unipolar
- 15° Step Angle

NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



Haydon® Rotary Motors 46000 Series Sleeve or Ball Bearing designs

Our most powerful rotary motor

A HIGH TEMPERATURE option is also available for this motor. Special materials which meet class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives. For more information contact our applications group.

Ø 46mm (1.8-in) Ball Bearing 46000 Series

Ø 46mm (1.8-in) Sleeve Bearing 46000 Series

Specifications

Ø 46 mm (1.8-in) Rotary Motor				
Wiring	Bipolar			
Part No. (Sleeve)*	46440-05	46440-12	46540-05	46540-12
Step angle	7.5°		15°	
Winding voltage	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase	1.0 A	.41 A	1.0 A	.41 A
Resistance/phase	5 Ω	29 Ω	5 Ω	29 Ω
Inductance/phase	9.0 mH	52 mH	7.1 mH	39 mH
Hold torque	16 oz-in. (11.30 N-cm)		8.5 oz-in. (6.00 N-cm)	
Detent torque	.90 oz-in. (.64 N-cm)		1.0 oz-in. (.71 N-cm)	
Power consumption	10 W			
Rotor Inertia	25.0 gcm^2			
Weight	7.8 oz. (220 g)			
Insulation resistance	20 MΩ			
Insulation Class	Class B			

Ø 46 mm (1.8-in) Rotary Motor			
Unipolar			
46460-05	46460-12	46560-05	46560-12
7.5°		15°	
5 VDC	12 VDC	5 VDC	12 VDC
1.0 A	.41 A	1.0 A	.41 A
5 Ω	29 Ω	5 Ω	29 Ω
4.5 mH	26 mH	3.5 mH	20 mH
13.0 oz-in. (9.18 N-cm)		6.0 oz-in. (4.24 N-cm)	
.90 oz-in (.64 N-cm)		1.0 oz-in. (.71 N-cm)	
10 W			
25 gcm^2			
7.8 oz. (220 g)			
20 MΩ			
Class B			

*For Ball Bearings add " –999" to the end of this number

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

Identifying the rotary motor part number codes when ordering

T	46	4	4	0	–	12	–	999

Prefix (include only when using the following)
T = High Temperature
R = Rare Earth Magnet

Series number designation
36 = 36000
(Series numbers represent approximate diameters of motor body)

Style
4 = 7.5°
5 = 15°

Coils
4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

Code ID Resolution Travel/Step
0 = Rotary motor

Voltage
05 = 5 VDC
12 = 12VDC
Custom V available

Suffix
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings

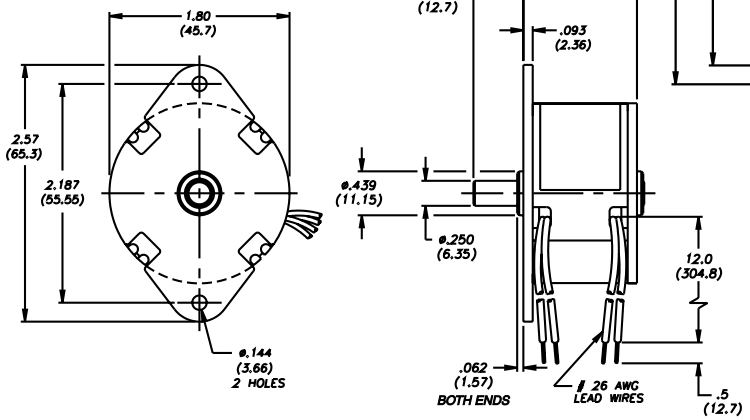
Suffix also represents:
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

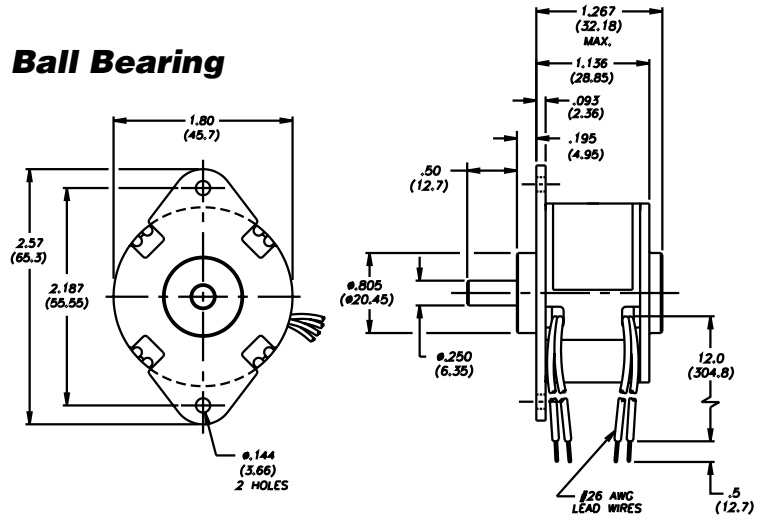
Dimensional Drawings:

Sleeve Bearing

Dimensions = inches (mm)



Ball Bearing



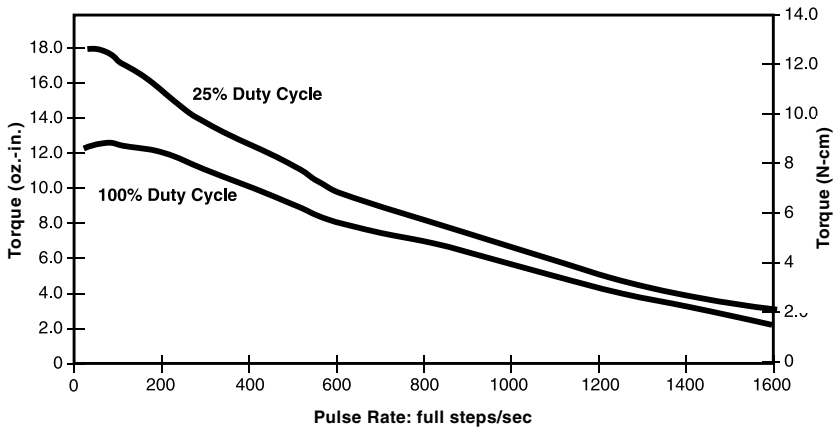
46000 ROTARY SERIES: Chopper Drive Performance Curves

TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **7.5° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.

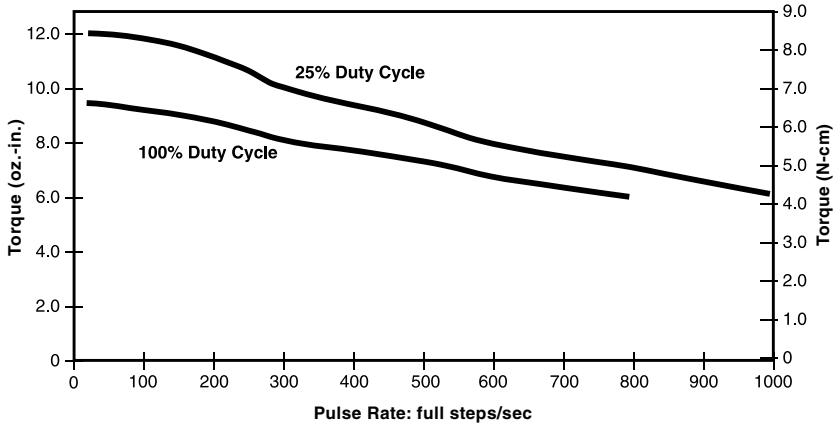
NOTE: All chopper drive curves were created with a 5 Volt motor and a 40 Volt power supply.



TORQUE vs. PULSE RATE

- **Chopper Drive**
- **Bipolar**
- **15° Step Angle**
- **8:1 Motor Coil to Drive Supply Voltage**

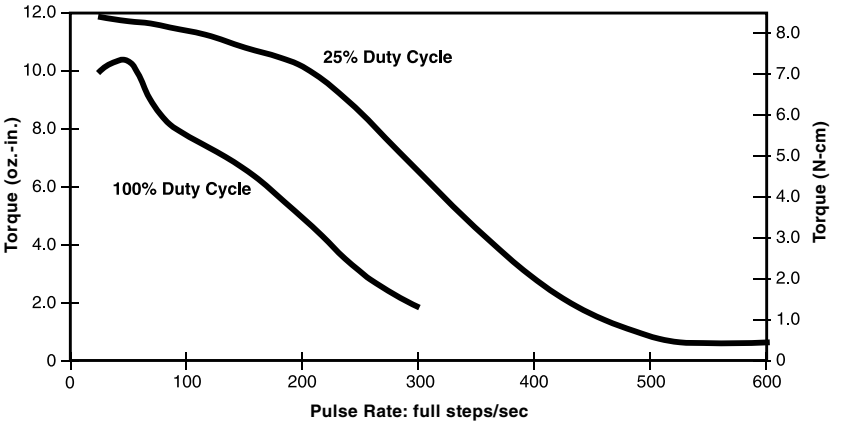
NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.



TORQUE vs. PULSE RATE

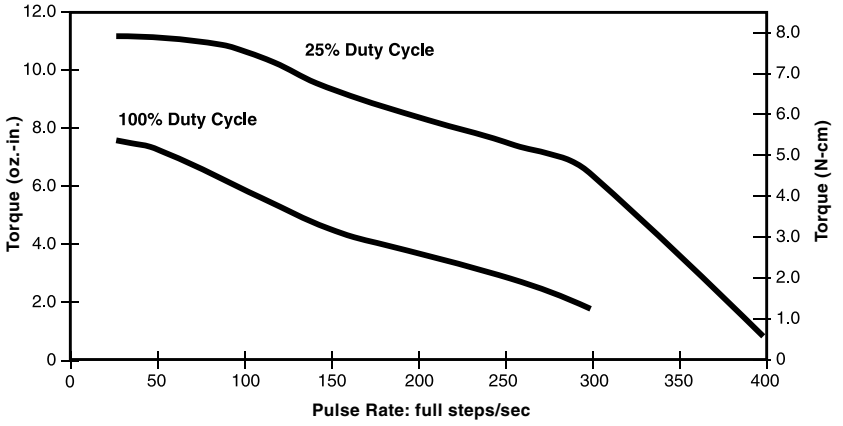
- L/R Drive
- Bipolar
- 7.5° Step Angle

25% duty cycle is obtained by a special winding or running a standard motor at double the rated voltage.



TORQUE vs. PULSE RATE

- L/R Drive
- Bipolar
- 15° Step Angle



TORQUE vs. PULSE RATE

- L/R Drive
- Unipolar
- 7.5° Step Angle

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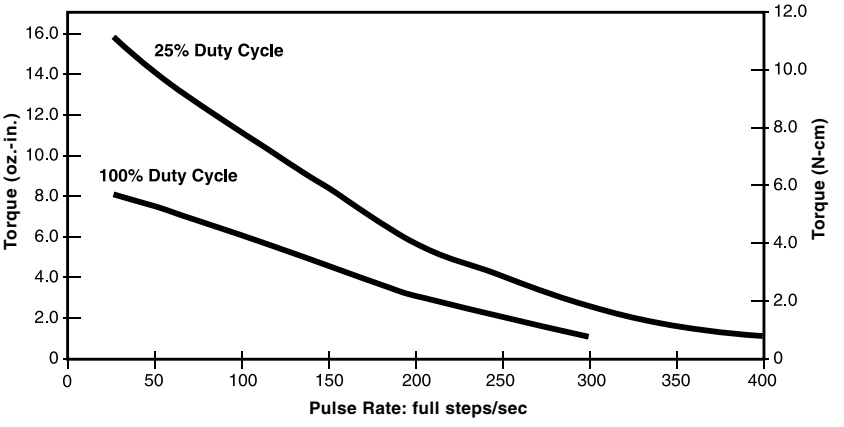
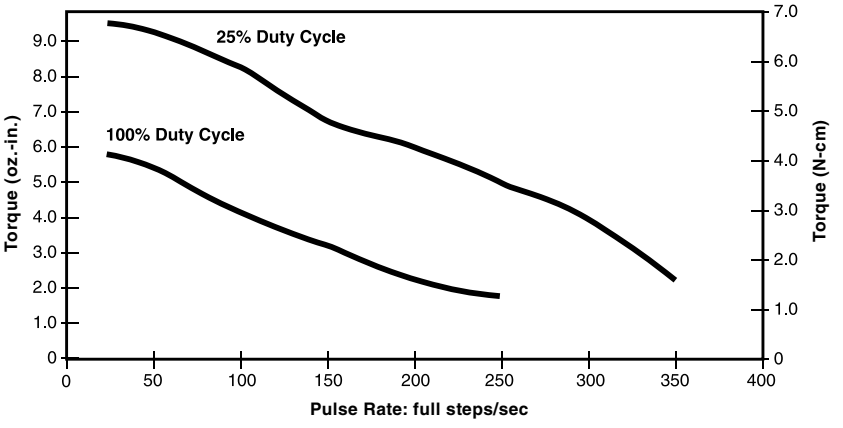


TORQUE vs. PULSE RATE

- L/R Drive
- Unipolar
- 15° Step Angle

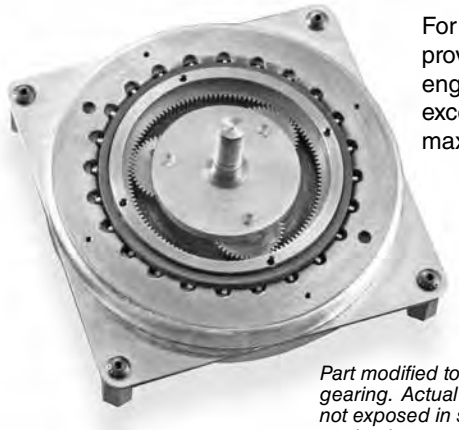


NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.


Pancake
Low Profile
and
AC Synchronous
Motors

80000 Pancake Series Planetary Gear Train

0.75-in (20 mm) height, 3.15-in (80 mm) sq. and 100 oz.-in. (70 N-cm) of torque



Part modified to illustrate gearing. Actual gears are not exposed in standard packaging.

For a given size motor, the larger the rotor the greater the torque. Haydon Kerk provides an advanced, compact, low profile pancake stepper motor with a specially engineered, rotor-embedded, single-stage planetary gear train... designed to meet or exceed your most demanding small space high-torque applications. This motor has a maximum diameter of 3.15-in (80mm) and is .75-in (20mm) thick.

Specifications

Ø 80 mm (3.15-in.) Pancake Stepper		
Wiring	Bipolar	
Gear Ratios/Step angle	4:1 = 0.9375°	
Winding voltage	5 VDC	12 VDC
Current (RMS)/phase	1.4 A	.58 A
Resistance/phase*	3.6 Ω	20.6 Ω
Step Angle	3.75	
Insulation resistance	20 mΩ	
Power consumption	14 W	
Weight	12 oz (343 g)	
Insulation Class	Class A	
Operating Temp. Rise	32°-122°F (0-50°C)	
Travel direction	Reversible	
Bearings	Radial Ball	

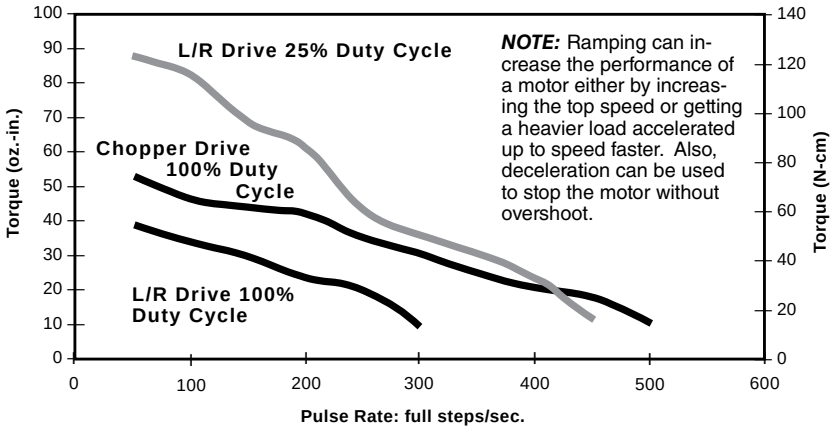
*±10% at 25°C (77°F) ambient

Identifying the Planetary Gear Train part number codes when ordering

80	GH	04	–	12	–	42
Series number	***Style***	***Gear Ratio/ Step Angle***		***Voltage***		***Suffix***
80 = Pancake Motor	**GH** = Gear Train	**04** = 4:1 Gear Ratio 3.75° Step Angle		**05** = 5VDC **12** = 12VDC		**42** = Bipolar wiring

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

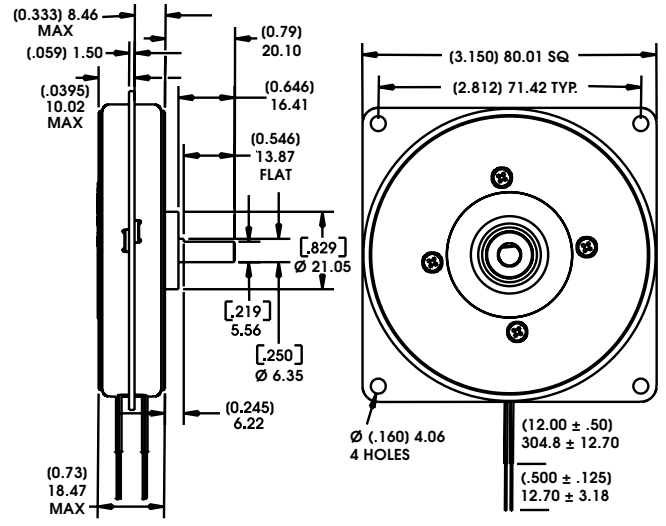
TORQUE vs. PULSE RATE



NOTE: Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Dimensional Drawings

Dimensions = (inches) mm



Stepping Sequence

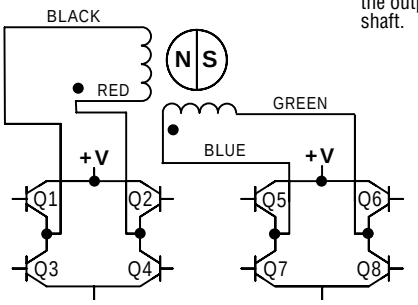
Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

↓ *Clockwise Rotation* ↑ *Counter Clockwise Rotation*

Note: Half stepping is accomplished by inserting an off state between transitioning phases. Shaft rotation as viewed from the output shaft.

Wiring

Bipolar

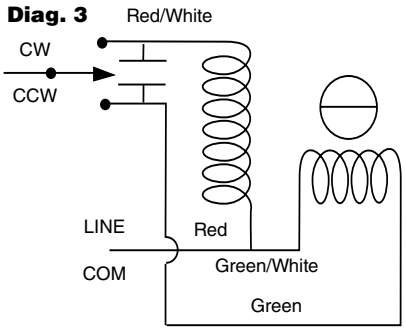


Haydon® AC Hybrid Linear Actuators

Stepping motors can also be run on AC (Alternating Current). However, one phase must be energized through a properly selected capacitor. In this case the motor is limited to only one synchronous speed. For instance, if 60 hertz is being supplied, there are 120 reversals or alterations of the power source. The phase being energized by a capacitor is also producing the same number of alterations at an offset time sequence. The motor is really being energized at the equivalent of 240 steps per second.

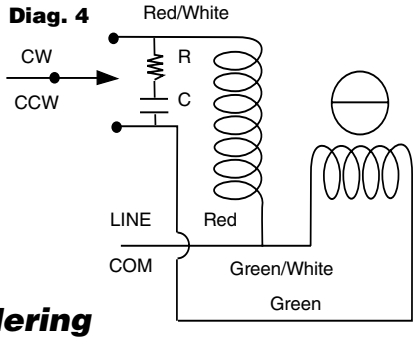
In the case of a linear actuator the linear speed produced is dependent on the resolution per step of the motor. For example if 60 hertz is supplied to a .001-in/step motor the resulting speed is .240-in per second (240 steps per second times .001-in/step). Many of the Haydon® stepping motors are available as 300 or 600 RPM AC synchronous motors.

Diag. 3



Capacitors and resistors not furnished (with production units)

Diag. 4



Electrical Data

Series	Size	Watts	AMPS	Capacitor (Mfd) @ 60 Hz	Capacitor (Mfd) @ 50 Hz	Coil Resistance (Ohms) Main Wind.	Coil Resistance (Ohms) Cap. Wind.	Connection Diagram
35000	14	5.7	0.21	15	15	300	300	3
43000	17	6.5	0.27	15	15	104	104	3
57000	23	13.0	0.60	30	40	35	35	3
87000*	34	30.0	2.00	200	200	2.3	2.3	4

* With 12 OHM, 100 watt resistor in series

Identifying the AC Hybrid part number codes when ordering

A	35	H	4	N	–	24	–	800

Prefix

A = A Coil

Series number designation

35 = 35000 (Size 14)
43 = 43000 (Size 17)
57 = 57000 (Size 23)
87 = 87000 (Size 34)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)
J = 0.9° Non-captive
K = 0.9° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)

35000 and 43000 Series Code ID Resolution Travel/Step

N = .00012-in (.0030)
K = .00024-in (.0060)
J = .00048-in (.0121)
Q = .00096-in (.0243)
P = .00015625-in (.0039)
A = .0003125-in (.0079)
B = .000625-in (.0158)
C = .00125-in (.0317)
R = .00192-in (.0478)

High Resolution

U = .00006-in (.0015)
V = .000078-in (.00198)

57000 Series Code ID Resolution Travel/Step

7 = .000125-in (.0031)
S = .0004167-in (.01058418)
3 = .0005-in (.0127)
1 = .001-in (.0254)
A = .0003125-in (.0079)
T = .0008333-in (.0211)
2 = .002-in (.0508)

High Resolution

P = .00015625-in (.003969)
X = .00020833-in (.00529166)
9 = .00025-in (.0635)

87000 Series Code ID Resolution Travel/Step

3 = .0005-in (.0127)
B = .000625-in (.0158)
C = .00125-in (.0317)
Y = .0025-in (.0635)
Z = .005-in (.127)

Voltage

24 = 24 VDC

Suffix

–800 = External linear (added to Captive shaft part number)

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

For more information about Hybrid linear actuator stepper motors please see the data for:

35000 Series (Size 14) page 87
43000 Series (Size 17) page 95
57000 Series (Size 23) page 106
87000 Series (Size 34) page 114

Motor part numbers are for a captive shaft. **For a non-captive shaft**, change the middle letter from an "**H**" to an "**F**." Example 1: A35**H**4N – 24 with a non-captive shaft becomes A35**F**4N – 24.

Exception: A43**K**4U – 24 (high resolution) and A43**K**4V – 24 (High resolution), for a non-captive shaft substitute "**J**" in place of the "**K**." Example 2: A43**K**4U – 24 with a non-captive shaft becomes A43**J**4U – 24.

For an external linear shaft, add the three digit suffix – 800 to the captive shaft part number. Example 3: A35H4N – 24 *with an external linear shaft* becomes A35H4N-24 – **800**.

All standard motors operate at 24 Volts, represented in the part number by the number – 24 (A35H4N – **24**). No other suffix is required.

Haydon® AC Can-Stack Linear Actuators

Stepping motors can also be run on AC (Alternating Current). However, one phase must be energized through a properly selected capacitor. In this case the motor is limited to only one synchronous speed. For instance, if 60 hertz is being supplied, there are 120 reversals or alterations of the power source. The phase being energized by a capacitor is also producing the same number of alterations at an offset time sequence. The motor is really being energized at the equivalent of 240 steps per second.

In the case of a linear actuator the linear speed produced is dependent on the resolution per step of the motor. For example if 60 hertz is supplied to a .001-in/step motor the resulting speed is .240-in per second (240 steps per second times .001-in/step). Many of the Haydon® stepping motors are available as 300 or 600 RPM AC synchronous motors.

$$\frac{\text{240 Steps per Revolution x 60 seconds}}{\text{24 Steps per Revolution}} = \text{600 RPM}$$

AC SYNCHRONOUS

Ø 36mm (1.4-in)
Non-captive
36000 Series

Identifying the AC Can-Stack part number codes when ordering

A	36	5	4	2	–	24	–	800

Prefix

A = A Coil
Z = Economy series (For 20000 and 26000 Series only)

Series number designation

20 = 20000 (Ø20mm, .79-in)
26 = 26000 (Ø26mm, 1-in)
36 = 36000 (Ø36mm, 1.4-in)
46 = 46000 (Ø46mm, 1.8-in)

Style

3 = 7.5° non-captive
4 = 7.5° Captive or External (use "E" or "K" Prefix for External version)
5 = 15° Captive or External (use "E" or "K" Prefix for External version)
8 = 15° non-captive

Coils

4 = Bipolar (4 wire)

Z20000 Series Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
4 = .004-in (.102)

Z26000 Series Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)
AS = .04166-in (.00164)

36000 Series Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)

High Resolution

7 = .000125-in (.0032)
9 = .00025-in (.00635)

46000 Series Code ID Resolution Travel/Step

1 = .001-in (.0254)
2 = .002-in (.051)
3 = .0005-in (.013)
4 = .004-in (.102)
8 = .0008-in (.203)
G = .016-in (.406)

Voltage

24 = 24 VDC

Suffix

–800 = External linear (added to Captive shaft part number)

–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Motor part numbers are for a captive shaft.
For a non-captive shaft, change the third digit from a "**4**" to an "**3**".
Example 1: A36**4**41**–**24 with a non-captive shaft becomes A36**3**41**–**24.
Exception: When the third digit is "**5**" for a non-captive shaft substitute "**8**".
Example 2: A36**5**44-24 with a non-captive shaft becomes A26**8**44**–**2424.

For an external linear shaft, add the three digit suffix – 800 to the captive shaft part number.
Example 3: A34441**–**2424 with an external linear shaft becomes A36441-24 **– 800**.

All standard motors operate at 24 Volts, represented in the part number by the suffix **–** 24 (A36443 **– 24**).

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

For more information about Can-Stack linear actuator stepper motors please see the data for:

Z20000 Series page 150
Z26000 Series page 154
36000 Series page 159
46000 Series page 165

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Haydon® AC Can-Stack Linear Actuator Stepper Motors

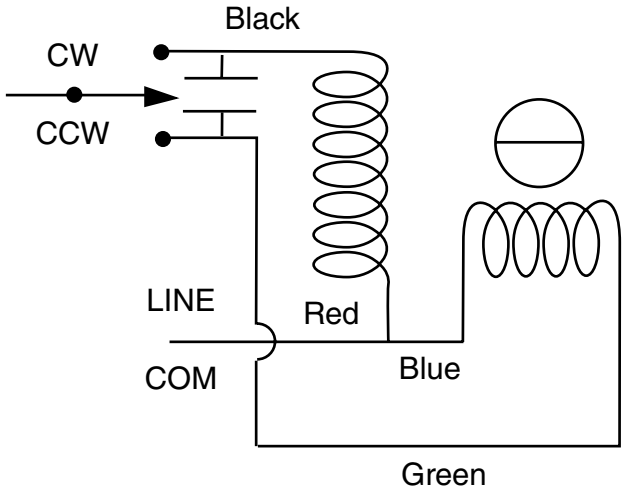
Specifications

Motor Part No.	Linear Speed @ 60 Hz (inches/sec.)	(cm/sec.)	Linear Speed @ 50 Hz (inches/sec.)	(cm/sec.)	Maximum Force (lbs.)	(Newtons)
Z20541-24-700	0.24	0.610	0.20	0.508	5.5	24
Z20542-24-700	0.48	1.219	0.40	1.016	3.0	13
Z20544-24-700	0.96	2.438	0.80	2.032	1.8	8
Z26443-24-700	0.12	0.305	0.10	0.254	13.0	58
Z26441-24-700	0.24	0.610	0.20	0.508	8.3	37
Z26542-24-700	0.48	1.219	0.40	1.016	6.6	29
Z26544-24-700	0.96	2.438	0.80	2.032	3.3	15
A36443-24 **	0.12	0.305	0.10	0.254	16.0	71
A36441-24 **	0.24	0.610	0.20	0.508	12.0	53
A36442-24 **	0.48	1.219	0.40	1.016	6.0	27
A36544-24 **	0.96	2.438	0.80	2.032	3.0	13
A46443-24 **	0.12	0.305	0.10	0.254	43	191
A46441-24 **	0.24	0.610	0.20	0.508	34	151
A46442-24 **	0.48	1.219	0.40	1.016	20	89
A46544-24 **	0.96	2.438	0.80	2.032	11	49
A46548-24 **	1.92	4.877	1.60	4.064	5.4	24
A4654G-24 **	3.84	9.754	3.20	8.128	2.7	12

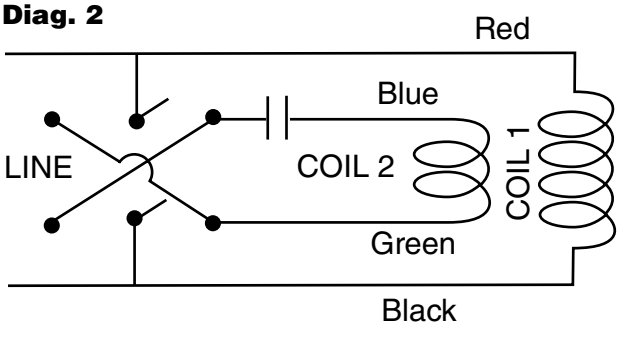
** Select motors available with 24 Volts or 120 Volts (replace 24 with 120).

Capacitors not furnished
(with production units)

Diag. 1



Diag. 2



AC SYNCHRONOUS

Ø 26mm (1-in) Ball Bearing 26000 Series

Haydon® AC Rotary Motors

Stepping motors can also be run on AC (Alternating Current). However, one phase must be energized through a properly selected capacitor. In this case the motor is limited to only one synchronous speed. For instance, if 60 hertz is being supplied, there are 120 reversals or alterations of the power source. The phase being energized by a capacitor is also producing the same number of alterations at an offset time sequence. The motor is really being energized at the equivalent of 240 steps per second.

Motor Part No.	Rotary Speed (RPMs) @ 60 Hz	50 Hz	Torque (oz-in)	(N-cm)	Watts	Amps	Capacitor @ 60 Hz	50 Hz	Connection Diagram	Coil Resistance (Ohms) Main Wind.	Cap. Wind.
Z20540-24-700	600	500	0.5	0.4	2.5	.15	12.5	12.5	2	300	75
A26440-24	300	250	0.9	0.6	3.4	.20	15.0	15.0	2	214	54
A26540-24	600	500	0.9	0.6	3.4	.20	15.0	20.0	2	214	54
Z26440-24-700	300	250	1.2	0.8	3.4	.19	15.0	15.0	2	214	54
Z26540-24-700	600	500	1.5	1.1	3.4	.19	15.0	15.0	2	214	54
A36240-24	150	125	2.5	1.8	4.6	.23	20.0	20.0	2	160	40
A36440-24	300	250	2.6	1.8	4.6	.23	20.0	20.0	2	160	40
A36540-24	600	500	1.3	0.9	4.6	.23	20.0	20.0	2	160	40
A46440-24	300	250	8.5	6.0	10.0	.38	20.0	20.0	1	29	29
A46540-24	600	500	6.5	4.6	10.0	.38	20.0	25.0	1	58	58
A36240-120	150	125	2.5	1.8	4.6	.05	0.8	0.8	2	4000	1000
A36440-120	300	250	2.6	1.8	4.6	.05	0.8	0.8	2	4000	1000
A36540-120	600	500	1.3	0.9	4.6	.05	0.8	0.8	2	4000	1000
A46440-120	300	250	8.5	6.0	10.0	.08	0.8	0.8	1	725	725
A46540-120	600	500	6.5	4.6	10.0	.08	0.8	1.0	1	1450	1450

Identifying the AC Rotary part number codes when ordering

Z – **26** – **5** – **4** – **0** – **24** – **700**

Prefix

A = A Coil
Z = Economy series (For **20000** and **26000 Series** only, use –700 suffix to identify AC motor)

Series number designation

20 = 20000 (Ø20mm, .79-in)
26 = 26000 (Ø26mm, 1-in)
36 = 36000 (Ø36mm, 1.4-in)
46 = 46000 (Ø46mm, 1.8-in)

Style

4 = 7.5°
5 = 15°

Coils

4 = Bipolar (4 wire)

Code ID Resolution Travel/Step

0 = Rotary motor

Voltage

24 = 24 VDC

120 = 120 VDC *(Optional VDC for select 36000 and 46000 Series)*

Suffix

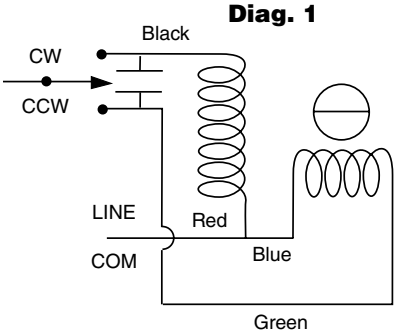
–700 = indicates AC for Z Series motors
–999 = ball bearings
–001 = ball bearings for Z Series Rotary Stepper Motors
–000 = sleeve bearings

Suffix also represents:

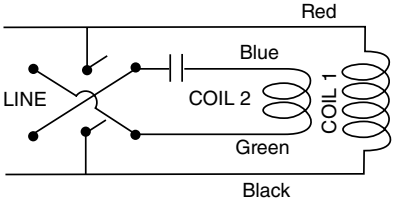
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Diag. 1



Diag. 2



Capacitors not furnished
(with production units)

For more information about AC Rotary motors please see the data for:

Z20000 Series page 172
26000 Series page 174
Z26000 Series page 178
36000 Series page 181
46000 Series page 184

Electronic Drives for Stepper Motors

Haydon® IDEA™ Drives PCM4806E/PCM4826E and ACM4806E/ACM4826E – stepper motor drives featuring a fully programmable control unit that uses an intuitive patent-pending Graphic User Interface (GUI). The IDEA Drive technology is available in several different configurations including an external programmable drive and controller, or integrated with a linear actuator to form a complete package of motor, actuator, and programmable drive.

IDEA™ Drive software is simple to use with on-screen buttons and easy-to-understand programming guides.

The software program generates motion profiles directly into the system and also contains a "debug" utility allowing line-by-line execution of a motion program for easy troubleshooting.

Specifications

IDEA Drive Part Number	PCM4806E	PCM4826E	ACM4806E	ACM4826E
Drive Input Voltage Range	12 to 48 VDC	12 to 48 VDC	12 to 48 VDC	12 to 48 VDC
Max Drive Current / Phase	0.6 A rms	2.6 A rms	0.6 A rms	2.6 A rms
Current Boost Capability	Optional 30% current boost capability during ramping		Optional 30% current boost capability during ramping	
Communication	**USB (mini B)**		**RS-485**	
Step Modes	Full, Half, 1/4, 1/8, 1/16, 1/32, 1/64		Full, Half, 1/4, 1/8, 1/16, 1/32, 1/64	
Digital I/O Voltage Range	5 to 24 VDC		5 to 24 VDC	
Digital Inputs	4		4	
Digital Input Max Current	8 mA (each)		8 mA (each)	
Digital Outputs (Sinking)	4		4	
Digital Output Max Current (Sinking)	200 mA		200 mA	
Maximum Temperature	70° measured at heat sink		70° measured at heat sink	
Program Storage Size	85 Kbytes		85 Kbytes	
Program Storage Memory Type	Flash		Flash	
Maximum Number Stored Programs	85 - referenced by 10 character program names		85 - referenced by 10 character program names	
Position Counter Range	64 bit		64 bit	
Ramping	Trapezoidal		Trapezoidal	
Interrupt Sources	4 inputs (rising, falling or both edges) Internal Position Counter (when reaching a programmed position)		4 inputs (rising, falling or both edges) Internal Position Counter (when reaching a programmed position)	
Max. # Drives per Communication Bus	1		225	

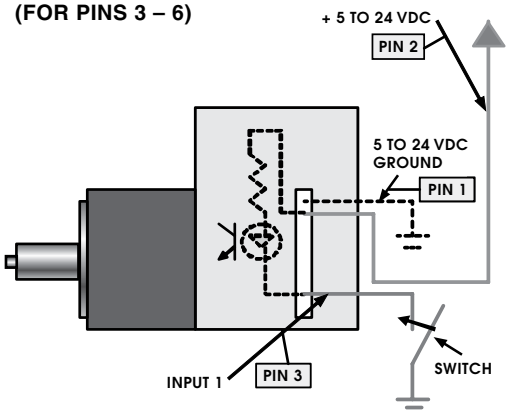
Features include:

- **RoHS Compliant**
- **Stand-alone unit or integrated with Haydon linear actuators / rail systems**
- **Programming done through Graphic User Interface (GUI)**
- **Automatic population of motor and drive parameters**
- **Programmable Speed / Current / Accel-Decel / Current Boost / Interrupts / I/O**
- **Encoder Input / Stall Detection with Compensation / Position Verification**
- **USB or RS-485 Communication protocols**
- **Movement profile plotter**
- **Interactive program debug feature**

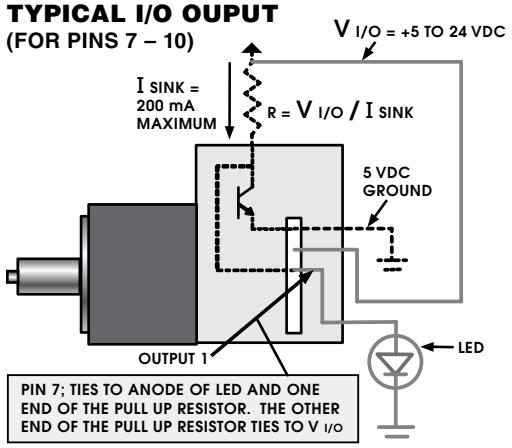
Accessories	Part No.
USB Cable (A to Mini B), 2 meters	56-1346
Power Cable, 1 meter	56-1348
I/O Cable, 1 meter	56-1352
RS-485 Cable, 1 meter	56-1536-4
Encoder Cable, 0.3 meter	56-1715
Software Installation Disk	55-010
Motor Connector Assembly	56-1453
USB to RS-485 Adapter	UTR4852

IDEA™ Drive Stepper Motor Controller Typical I/O Input and I/O Output

TYPICAL I/O OUPUT (FOR PINS 3 – 6)



TYPICAL I/O OUPUT (FOR PINS 7 – 10)



Engineering Drawings: IDEA™ Drive PCM4806E and PCM4826E with USB (Mini B) Connector

Dimensions = (mm) inches

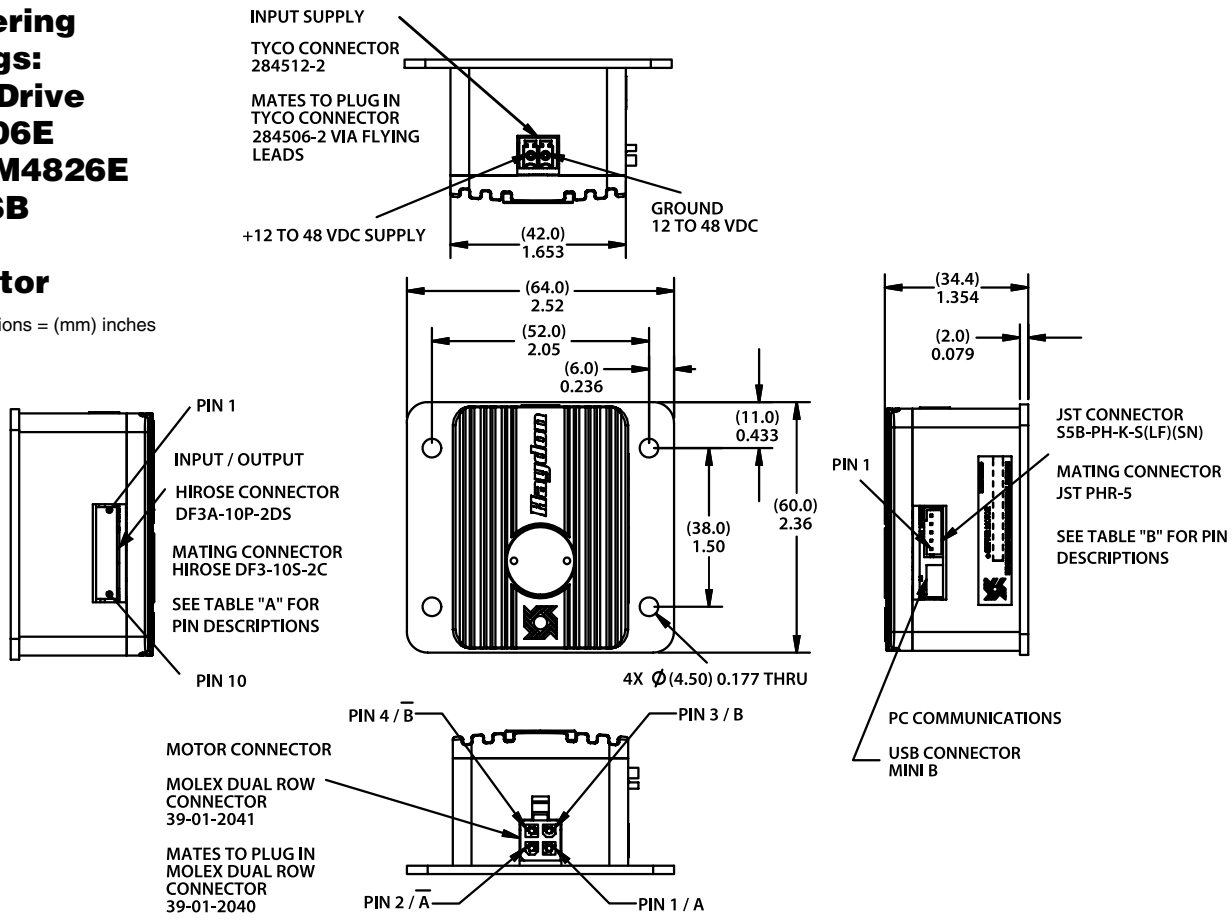


TABLE "A"

PIN POSITION	DESCRIPTION	NOTES
PIN 1	GROUND I/O SUPPLY	5 TO 24 VDC
PIN 2	+ I/O SUPPLY	5 TO 24 VDC
PIN 3	INPUT 1	
PIN 4	INPUT 2	
PIN 5	INPUT 3	
PIN 6	INPUT 4	
PIN 7	OUTPUT 1	
PIN 8	OUTPUT 2	
PIN 9	OUTPUT 3	
PIN 10	OUTPUT 4	

TABLE "B"

PIN #	DESCRIPTION
1	+5V
2	GROUND
3	INDEX / NO CONNECTION
4	"B" CHANNEL
5	"A" CHANNEL

IDEA™ Drive ACM4806E and ACM4826E Stepper Motor Controller with RS-485 Connector

Dimensions = (mm) inches

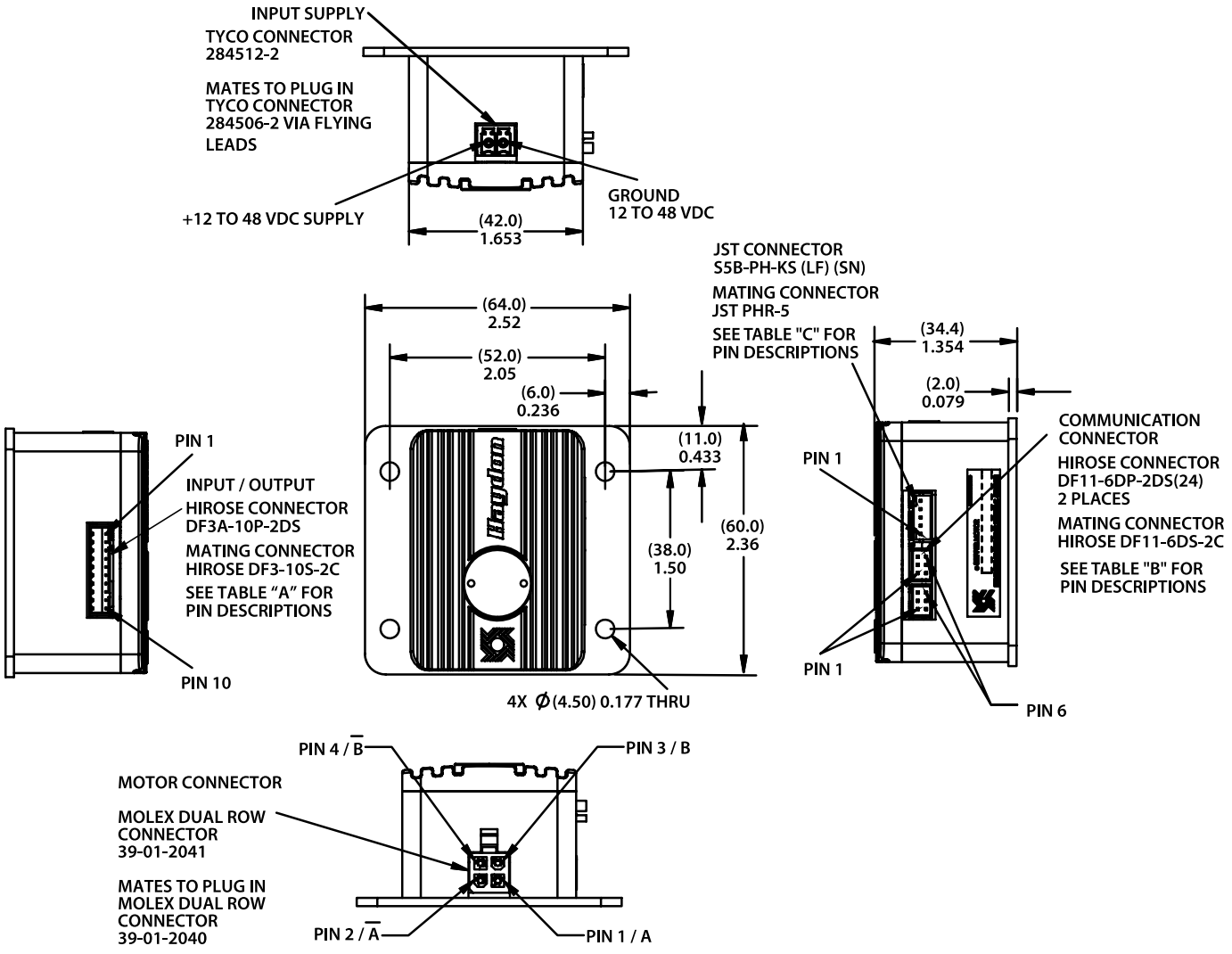


TABLE "A"

PIN POSITION	DESCRIPTION	NOTES
PIN 1	GROUND I/O SUPPLY	5 TO 24 VDC
PIN 2	+ I/O SUPPLY	5 TO 24 VDC
PIN 3	INPUT 1	
PIN 4	INPUT 2	
PIN 5	INPUT 3	
PIN 6	INPUT 4	
PIN 7	OUTPUT 1	
PIN 8	OUTPUT 2	
PIN 9	OUTPUT 3	
PIN 10	OUTPUT 4	

TABLE "B"

PIN #	DESCRIPTION
1	Y / NON-INVERTING DRIVER OUTPUT
2	Z / INVERTING DRIVER OUTPUT
3	GROUND
4	GROUND
5	A / NON-INVERTING RECEIVER INPUT
6	B / INVERTING RECEIVER INPUT

TABLE "C"

PIN #	DESCRIPTION
1	+5 V
2	GROUND
3	INDEX / NO CONNECTION
4	"B" CHANNEL
5	"A" CHANNEL

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

The Haydon® DCM4826X IDEA Stepper Motor Drive is ideal for controlling both rotary stepper motors and stepper motor based linear actuator systems using a simple "pulse", "direction", and "enable" signal from a stepper motor control board.

Input voltage to the drive is 12-48 VDC. The stepper motor drive can provide a load current of 2.6 A rms per phase. The PDE signals are optically isolated from the rest of the drive, providing the ability to reference a separate electrical ground.

Specifications

DCM4826X PDE Controller	Technical Data
Drive Input Voltage Range	12 to 48 VDC
Max Drive Current / Phase	2.6 A rms
Step Modes	Full, Half, 1/4, 1/8, 1/16, 1/32, 1/64
Communications	RS-485
Digital Inputs Voltage Range	0 to 24 VDC
Digital Input Maximum Current	35 mA (each)
Digital Input Minimum Pulse Width	5 µs
Maximum Pulse Input Frequency (0-5 V Square Wave)	100 Khz
Maximum Temperature	70°C (Measured at heat sink)

Engineering Drawings: IDEA™ Drive DCM4826X PDE Stepper Motor Controller

Dimensions = (mm) inches

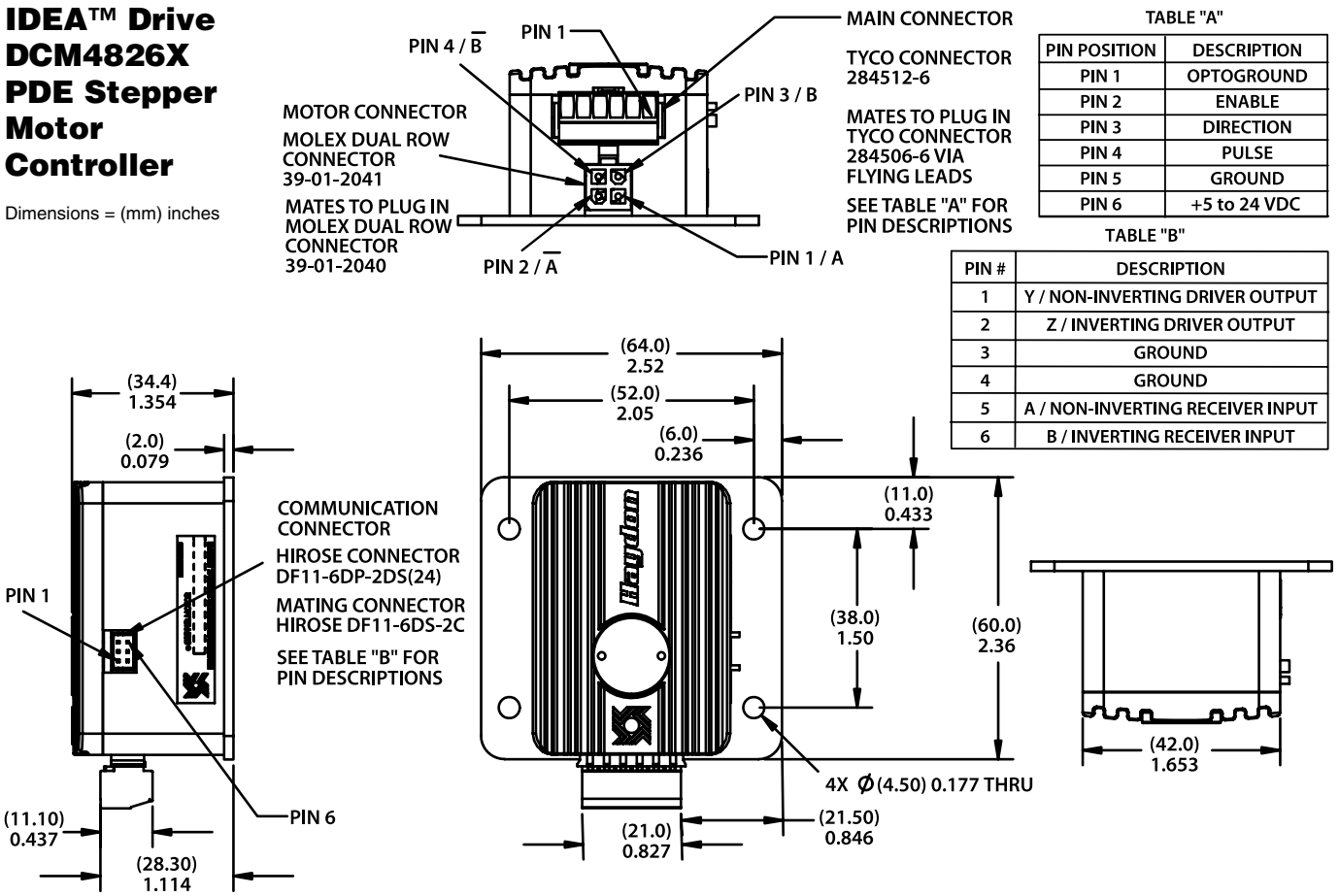


TABLE "A"

PIN POSITION	DESCRIPTION
PIN 1	OPTOGROUND
PIN 2	ENABLE
PIN 3	DIRECTION
PIN 4	PULSE
PIN 5	GROUND
PIN 6	+5 to 24 VDC

TABLE "B"

PIN #	DESCRIPTION
1	Y / NON-INVERTING DRIVER OUTPUT
2	Z / INVERTING DRIVER OUTPUT
3	GROUND
4	GROUND
5	A / NON-INVERTING RECEIVER INPUT
6	B / INVERTING RECEIVER INPUT

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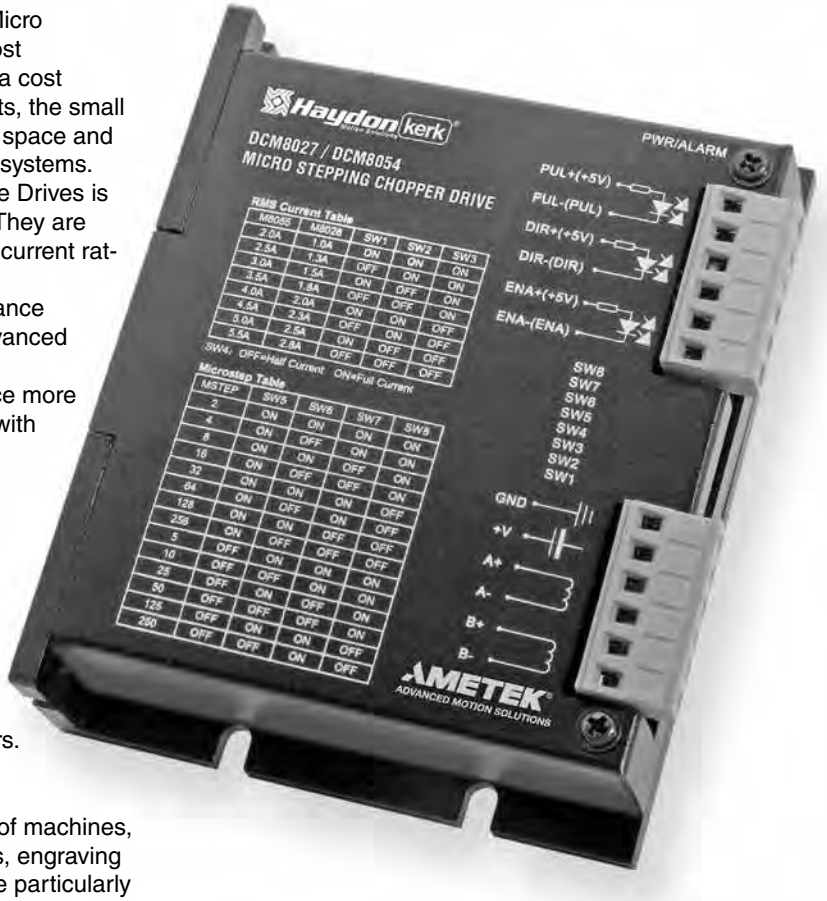
Micro Stepping Drives DCM8027 and DCM8054

Haydon Kerk Motion Solutions High Performance Micro Stepping Chopper Drives based on some of the most advanced technology in the world today. Providing a cost effective solution for production volume requirements, the small size allows designers to use these Drives in limited space and they are also easily integrated with other electronic systems. Design time is reduced because incorporating these Drives is far simpler than developing a custom drive circuit. They are suitable for driving 2-phase step motors (maximum current ratings of 2.8 A and 5.5 A rms per phase). These specially designed Drives deliver optimum performance throughout a greater speed range. By using an advanced bipolar constant-current chopping technique, and a maximum input voltage of 80 VDC, they can produce more speed and power from the same motor, compared with traditional technologies such as L/R drives.



The DCM8027 and DCM8054 feature high performance, low cost, compact size, mixed decay current control for less motor heating, automatic idle-current reduction and micro step resolutions from 1/2 step to 1/256. There are fourteen micro step resolutions selectable in decimal and binary. The output current levels and micro step resolutions are easily set via the 8 bit DIP switch. These Drives are suitable for 4, 6, and 8 lead motors.

Ideal for a wide range of stepping motors such as low voltage linear motors, used in various kinds of machines, such as X-Y tables, labeling machines, laser cutters, engraving machines, and pick-place devices. These Drives are particularly useful in motor applications requiring low noise, low vibration, high speed and high precision requirements.

DCM8027/DCM8054 Drive Features

- User friendly Chopper Drive
- Input voltage range 20 to 80 VDC*, current up to 5.5 A rms/phase
- Suitable for 4, 6, 8 lead motors
- Inaudible 20 khz chopping frequency
- TTL compatible and optically isolated input signals
- 14 selectable microstep resolutions in decimal and binary
- Automatic idle current reduction
- Requires external pulse generator

* For Europe the maximum input voltage must be limited to 70 VDC (CE Regulations)

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Bipolar Chopper Drive DCS4020

The Haydon® DCS4020 Chopper Drive by Haydon Kerk Motion Solutions, Inc. delivers optimum performance throughout a greater speed range. This new technology drive has been designed for easy set up and use. The Haydon DCS4020 is ideal for development projects where a single power supply is all that is necessary to easily run the motor. The motor current is set using an on-board potentiometer and no external current setting resistors are required.

The DCS4020 is also feature-packed. The Driver provides all the basic motor controls including full or half-stepping of bipolar steppers, directional control, and output enable control. An oscillator circuit is standard on the drive with an on-board speed control potentiometer. In addition, external input/output signals allow complete remote control of all drive functions. All electrical connectors have removable plugs incorporating screw type terminals.

Bipolar Chopper Drive DCS4020 Features

- On-board or external step pulse clock
- On-board or external single step switch
- On-board or external step rate control potentiometer
- On-board or external direction control
- On-board or external full step / half step control
- On-board or external outputs enable control
- On-board current control potentiometer

Bipolar Chopper Drive DCS4020 Technical Data

Size:	4.47-in x 3.38-in x 1.31-in (113.54 mm x 85.85 mm x 33.27 mm)
Power Requirement:	Single unregulated, power supply providing +12 VDC to +40 VDC
Output Current:	Fully adjustable from 66 mA rms/Ø to 2 A rms/Ø continuous duty
Continuous rating:	2 A rms/Ø
Chopper Frequency:	~20 Khz
Onboard Oscillating Range:	<10 pulses/sec. to >2,000 pulses/sec.
Stepping:	Full step/Half step capability
I.C.s:	**S.T. Micro: L297** (control I.C.) and **L298** (dual full wave bridge)

For Europe the maximum input voltage must be limited to 70 VDC (CE Regulations)

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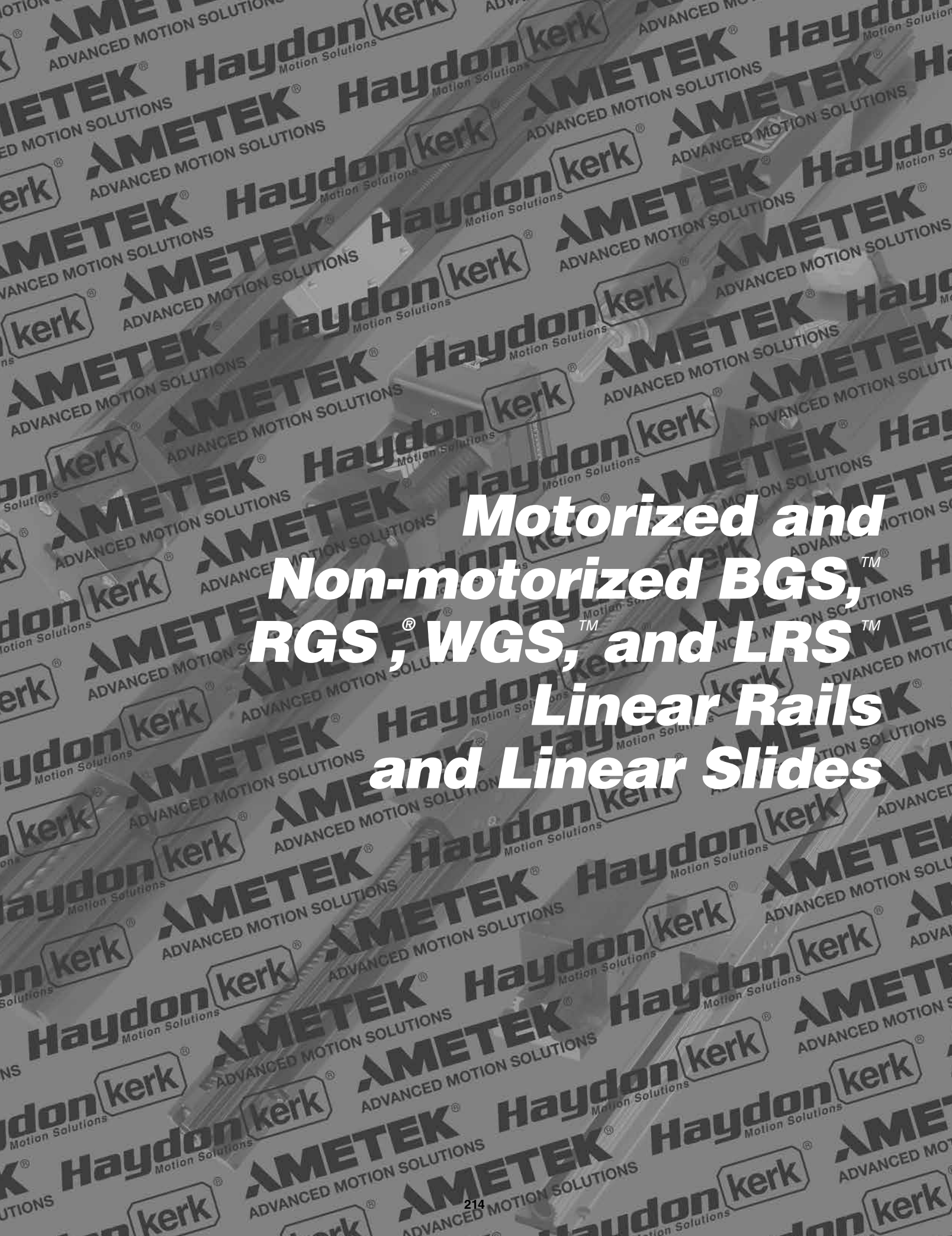

Motorized and Non-motorized BGS,™ RGS,® WGS,™ and LRS™ Linear Rails and Linear Slides

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Motorized and Non-Motorized Linear Rails from Haydon Kerk Motion Solutions... Integrated technologies that provide high precision and accuracy in motion control

The motorized and non-motorized linear rails combine many technologies into a single integrated, linear motion control system. Haydon Kerk Motion Solutions linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include engineered polymers that provide a strong, stable platform for a variety of linear motion applications. When integrated with an IDEA Drive, the system combines Haydon hybrid linear actuator technology with a fully programmable, integrated stepper motor drive. By combining technologies into a single preasssembled unit, Haydon Kerk Motion Solutions is able to improve system integration for the equipment OEM or end user. The overall cost for the customer is also lowered by offering a complete solution as it eliminates the need for rotary-to-linear conversion, as well as simplifies product development with fewer components required.

BGS™ products are designed to position heavy loads and maintain repeatability and accuracy while withstanding significant cantilevered loading. A Black Ice® TFE coated lead-screw drives a precision nut embedded in a machined aluminum carriage mounted to a stainless-steel ball rail. The result is a smooth operating, yet rigid linear motion system. Maximum stroke lengths: BGS04 – 18 in. (460 mm); BGS06 – 24 in. (610 mm); BGS08 – 30 in. (760 mm).

The **RGS®** Linear Rail is a screw driven rail system that offers exceptional linear speed, torsional stiffness and stability, accurate positioning, and long life in a compact, value-priced assembly. The integral mounting base allows support over the entire length if desired. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans. Lengths up to 8 feet (2.4 meters) can readily be built, and longer lengths are possible on a special order basis.

RGS linear rails come standard with a wear-compensating, anti-backlash driven carriage. Additional driven or passive carriages can be added, along with application specific customization. Linear guides, without the drive screw, are also available.

WGS™ Linear Rails feature a more compact profile and improved torsional stiffness and stability. Made of the same quality components used in the RGS® series. The integral mounting base can provide support over the entire length that can extend up to 8 feet (2.4 meters). Longer lengths are possible on a special order basis.

The WGS utilizes sliding plane bearings on a low-profile aluminum guide rail that keeps the motion smooth throughout the travel distance. The lead-screw is precision made of high-quality stainless steel rolled on-site at a Haydon Kerk manufacturing facility.

LRS™ Linear Rail Systems use a precision lead-screw assembly mechanism to provide controlled positioning along the axis of a robust aluminum linear slide. The carriage is a small platform with sliding element linear bearings that glide within this specially configured extrusion. The lead-screw used in the system is provided with various leads and shaft end configurations that accommodate virtually any source of rotary power.

When integrated with Haydon Kerk Stepper Motors and electronic drives the various linear rail systems offer virtually limitless linear motion control possibilities – from high-efficiency industrial automation systems to extremely precise analytical and diagnostic equipment systems used by the medical industry.

More importantly, every Haydon Kerk linear rail product is supported by an experienced technical team recognized for innovation, customization, and dedicated customer service.

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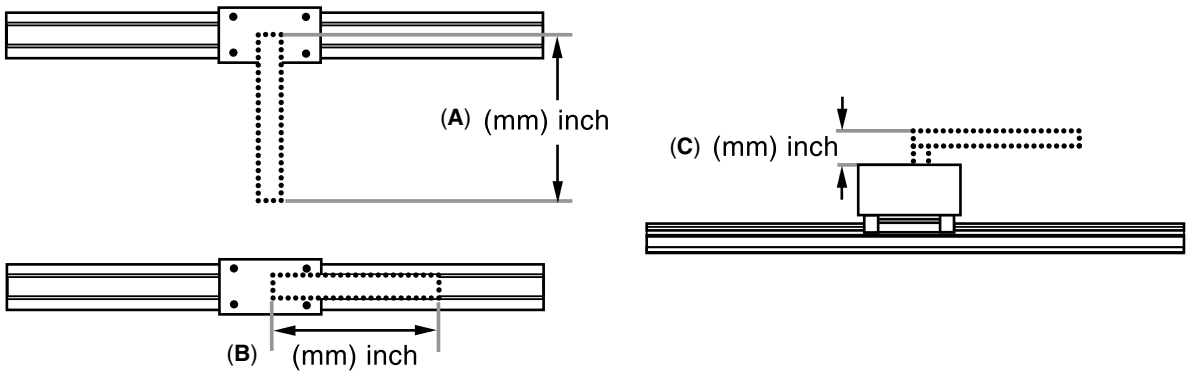
Information needed to properly size a linear rail system

Haydon Kerk® Linear Rail Systems are designed to be **precision motion devices**. Many variables must be considered before applying a particular rail system in an application. The following is a basic checklist of information needed that will make it easier for the Haydon Kerk engineering team to assist you in choosing the proper linear rail. See order form on last page of this catalog.

Linear Rail Application Checklist

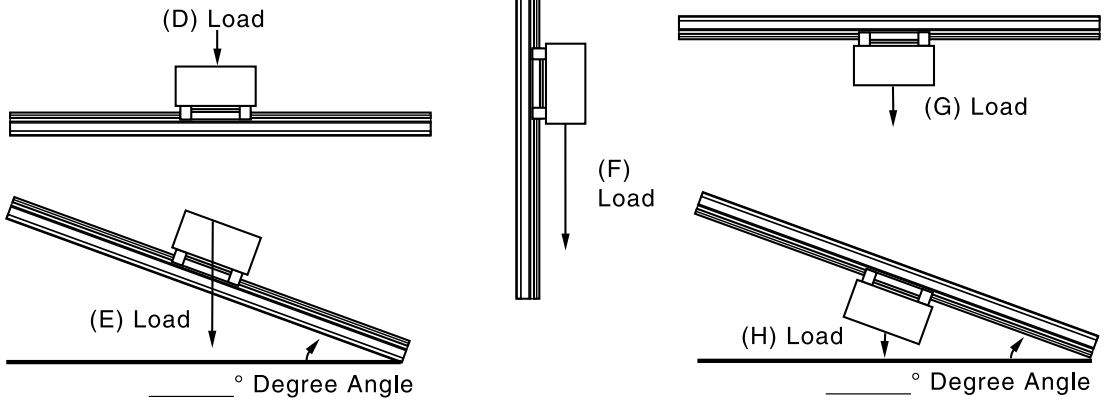
1) ❑ **Maximum Load?** _____ (N or lbs.)

2) ❑ **Load Center of Gravity (cg) Distance and Height** (mm or inches)**?** See illustrations (A) (B) (C) below.
Dimensions (❑ **mm /** ❑ **inch)**:
❑ **(A)** _____ **... OR...** ❑ **(B)** _____ **AND...** ❑ **(C)** _____



3) ❑ **Rail Mount Orientation?** The force needed to move the load is dependent on the orientation of the load relative to the force of gravity. For example, total required force in the horizontal plane (D) is a function of friction and the force needed for load acceleration ($F_f + F_a$). Total force in the vertical plane is a function of friction, load acceleration, and gravity ($F_f + F_a + F_g$).

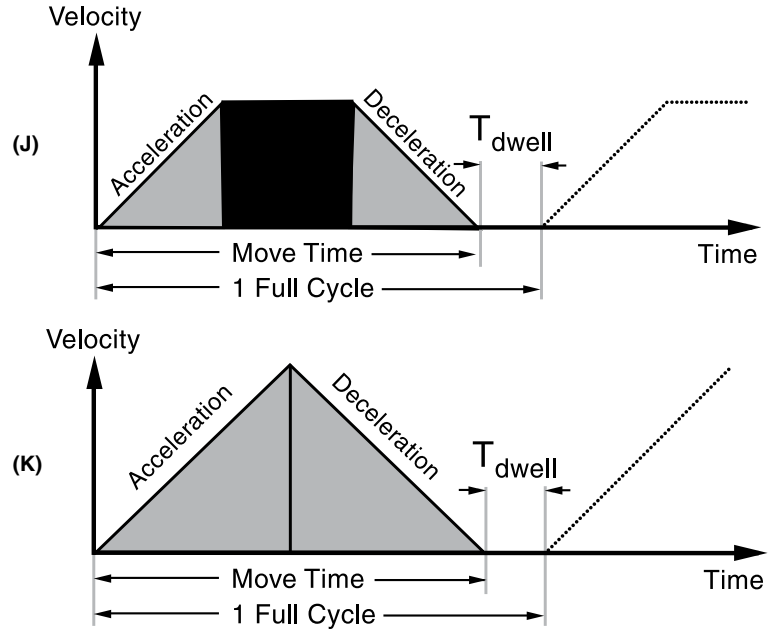
Orientation:
❑ **(D)**
❑ **(E)** _____°
❑ **(F)**
❑ **(G)**
❑ **(H)** _____°



Linear Rail Application Checklist *(Continued)*

4) ❑ **Stroke Length to Move Load?** _____ (mm or inches)
Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether or not an integrated stepper motor programmable drive system is added.

5) ❑ **Move Profile?**
A **trapezoidal** move profile divided into 3 equal segments (J) is a common move profile and easy to work with. Another common move profile is a **triangular** profile divided into 2 equal segments (K).



If using a **trapezoidal** (J) or **triangular** (K) move profile, the following is needed…

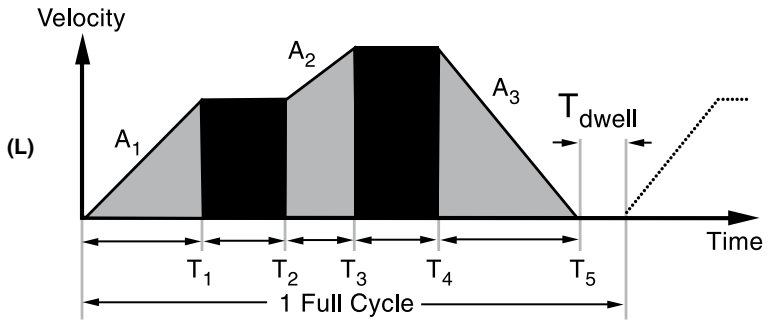
a) ❑ Point to point move distance _____ (mm or inches)
b) ❑ Move time _____ (seconds) including time of acceleration and deceleration
c) ❑ Dwell time between moves _____ (seconds)

The trapezoidal move profile (J) is a good starting point in helping to size a system for prototype work.

A **complex** move profile (L) requires more information.

a) ❑ Time (in seconds) including: $T_1, T_2, T_3, T_4, T_5 \ldots T_n$ and T_{dwell}
b) ❑ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: $A_1, A_2, A_3 \ldots A_n$

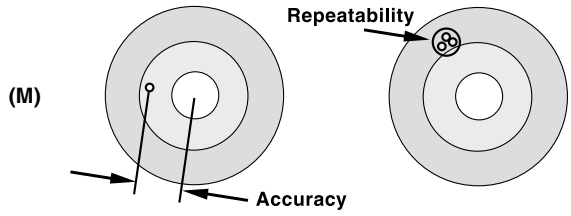
For more information call Haydon Kerk Motion Solutions Engineering at 203 756 7441.



Linear Rail Application Checklist *(Continued)*

6) ❑ **Position Accuracy Required?** _____ (mm or inches)
Accuracy is defined as the difference between the theoretical position and actual position capability of the system. Due to manufacturing tolerances in components, actual travel will be slightly different than theoretical "commanded" position. See figure (M) below.

7) ❑ **Position Repeatability Required?** _____ (mm or inches)
Repeatability is defined as the range of positions attained when the rail is commanded to approach the same position multiple times under identical conditions. See figure (M) below.



8) ❑ **Positioning Resolution Required?** _____ (mm/step or inches/step)
Positioning resolution is the smallest move command that the system can generate. The resolution is a function of many factors including the drive electronics, lead-screw pitch, and encoder (if required). The terms "resolution" and "accuracy" should never be used interchangeably.

9) ❑ **Closed-Loop Position Correction Required?** ❑ YES ❑ NO
In stepper motor-based linear rail systems, position correction is typically accomplished using a rotary incremental encoder (either optical or magnetic).

10) ❑ **Life Requirement?** (select the most important application parameter)
a) ❑ Total mm or inches _____
... or ... b) ❑ Number of Full Strokes _____
... or ... c) ❑ Number of Cycles _____

11) ❑ **Operating Temperature Range** _____ (°C or °F)
a) ❑ Will the system operate in an environment in which the worst case temperature is above room temperature?
b) ❑ Will the system be mounted in an enclosure with other equipment generating heat?

12) ❑ **Controller / Drive Information?**
a) ❑ Haydon Kerk IDEA™ Drive (with Size 17 Stepper Motors only)
b) ❑ Customer Supplied Drive... Type? ❑ Chopper Drive ❑ L / R Drive
Model / Style of Drive: _____

13) ❑ **Power Supply Voltage?** _____ (VDC)

14)* ❑ **Step Resolution?** a) ❑ Full Step b) ❑ Half-Step c) ❑ Micro-Step

15)* ❑ **Drive Current?** _____ (A_{rms} / Phase) and _____ (A_{peak} / Phase)

16)* ❑ **Current Boost Capability?** _____ (%)

** If the Haydon Kerk IDEA™ Drive is used disregard items 14, 15, and 16.*

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BGS™ Linear Rails with Recirculating Ball Slide

The **BGS**™ Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capability and is engineered for both normal and overhanging loads. High roll, pitch, and yaw moment loading capability allows the system to maintain tight accuracy and repeatability, even in applications requiring significant cantilevered loading.

At the heart of the BGS Linear Rail system is a Haydon® hybrid linear actuator with a precision 303 stainless steel lead-screw. The lead-screw drives a machined aluminum carriage mounted to a precision stainless steel ball slide resulting in a rigid, smooth-operating motion system. The screw is coated with Black Ice® TFE coating providing a permanent wear-resistant dry lubrication.

Motorized BGS™ Product Selector Chart

	BGS04	BGS06	BGS08
Hybrid Linear Actuator Motor...	**Size 11 Double Stack Size 17 Single Stack***	**Size 17 Single Stack* Size 17 Double Stack***	**Size 23 Single Stack* Size 23 Double Stack***
Max. Stroke Length	**18-in (460 mm)**	**24-in (610 mm)**	**30-in (760 mm)**
Max. Load (Horizontal)**	**22 lbs (100 N)**	**135 lbs (600N)**	**225 lbs (1,000 N)**
Roll Moment	**5.72 lbs-ft (7.75 N-m)**	**11.62 lbs-ft (15.75 N-m)**	**22.50 lbs-ft (30.5 N-m)**
Pitch Moment	**4.88 lbs-ft (6.60 N-m)**	**7.93 lbs-ft (10.75 N-m)**	**19.36 lbs-ft (26.25 N-m)**
Yaw Moment	**5.68 lbs-ft (7.70 N-m)**	**9.15 lbs-ft (12.40 N-m)**	**22.27 lbs-ft (30.20 N-m)**

Nominal Thread Lead inches	Nominal Thread Lead mm	Lead Code	BGS04	BGS06	BGS08
0.025	0.635	**0025**	●		
0.039	1.00	**0039**	●		
0.050	1.27	**0050**	●	●	
0.0625	1.59	**0063**	●		
0.079	2.00	**0079**	●	●	
0.098	2.50	**0098**			●
0.100	2.54	**0100**	●	●	●
0.118	3.00	**0118**	●		
0.125	3.18	**0125**			
0.157	4.00	**0157**		●	
0.197	5.00	**0197**		●	●
0.200	5.08	**0200**	●	●	●
0.250	6.35	**0250**	●	●	
0.315	8.00	**0315**			
0.375	9.53	**0375**		●	
0.394	10.00	**0394**	●		
0.400	10.16	**0400**		●	
0.472	12.00	**0472**		●	
0.500	12.70	**0500**	●	●	●
0.630	16.00	**0630**			●
0.750	19.05	**0750**	●	●	
0.984	25.00	**0984**		●	
1.000	25.40	**1000**	●	●	●
1.200	30.48	**1200**		●	

Size 11 = 28000 Series
Size 17 = 43000 Series
Size 23 = 57000 Series

* Size 17 (43000 Series) Single and Double Stack Hybrid Linear Actuator Stepper Motors (BGS06) are available with an optional programmable IDEA™ Drive. Integrated IDEA™ Drives are not available with the BGS08 style linear rail.

** For vertical load information see specifications for Size 11 (28000 Series, page 84), Size 17 (43000 Series, page 95), and Size 23 (57000 Series, page 106).

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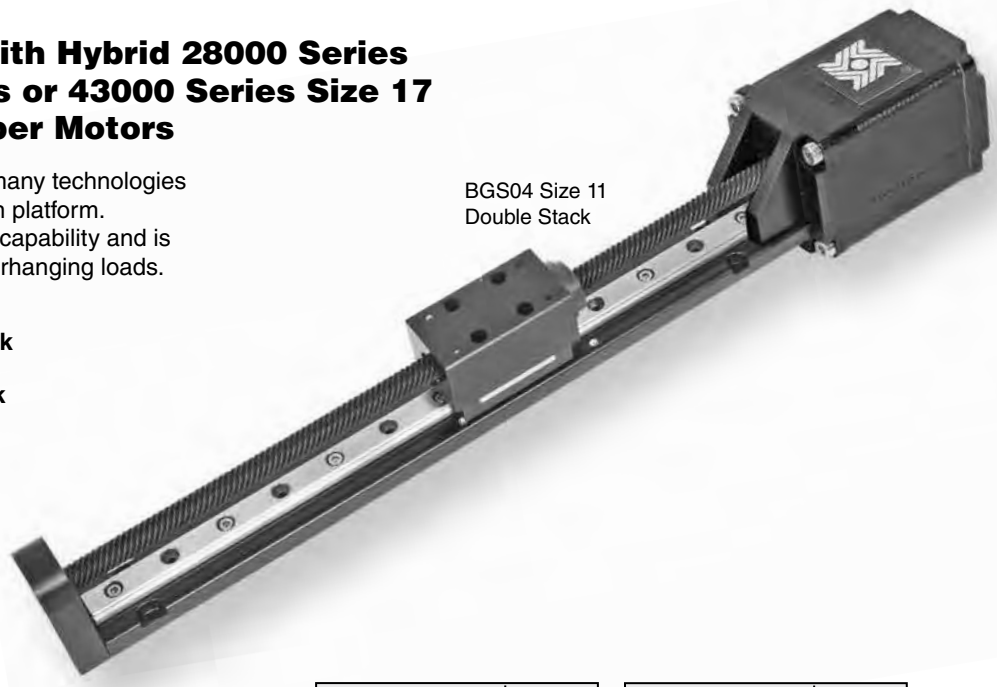
BGS04™ Linear Rail with Hybrid 28000 Series Size 11 Double Stacks or 43000 Series Size 17 Linear Actuator Stepper Motors

The **BGS**™ Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capability and is engineered for both normal and overhanging loads.



BGS04 Size 11 Double Stack

Hybrid Motor Specifications:

28000 Series Size 11 Double Stack
• See page 84
43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 IDEA Drive
• See page 100
Programmable IDEA Drive
• See page 194
Integrated Connector Option
• See page 117

BGS04 Specifications

BGS04 with Hybrid Linear Actuator Motor...	Size 11 Double Stack Size 17 Single Stack*
Max. Stroke Length	18-in (460 mm)
Max. Load (Horizontal)**	22 lbs (100 N)
Roll Moment	5.72 lbs-ft (7.75 N-m)
Pitch Moment	4.88 lbs-ft (6.60 N-m)
Yaw Moment	5.68 lbs-ft (7.70 N-m)

Nominal Thread Lead		Lead Code
inches	mm	
0.025	0.635	**0025**
0.039	1.00	**0039**
0.050	1.27	**0050**
0.0625	1.59	**0063**
0.079	2.00	**0079**
0.100	2.54	**0100**
0.118	3.00	**0118**
0.200	5.08	**0200**

Nominal Thread Lead		Lead Code
inches	mm	
0.250	6.35	**0250**
0.394	10.00	**0394**
0.500	12.70	**0500**
0.750	19.05	**0750**
1.000	25.40	**1000**

* Size 17 is available with an optional programmable IDEA™ Drive.

** To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

Identifying the Motorized BGS04 part number codes when ordering

BG	S	04	B	–	M	0025	–	XXX

Prefix
BG = Ball Guide System

Frame Style
S = Standard

Frame Size Load*
04 = Max. static load 22 lbs (100 N)

Coating
B = TFE wear resist, dry lubricant Black Ice®

Drive / Mounting
M = Motorized

For 43000 Series Size 17 Only
G = IDEA™ integrated programmable drive – USB communications

J = IDEA™ integrated programmable drive – RS485 communications

Nominal Thread Lead Code
0025 = .025-in (.635)
(see Lead Code charts above)

Unique Identifier
Suffix used to identify Size 11 or Size 17 motor

– or a proprietary suffix assigned to a specific customer application.The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Carriage holes available in Metric sizes
M3
M4
M5
M6

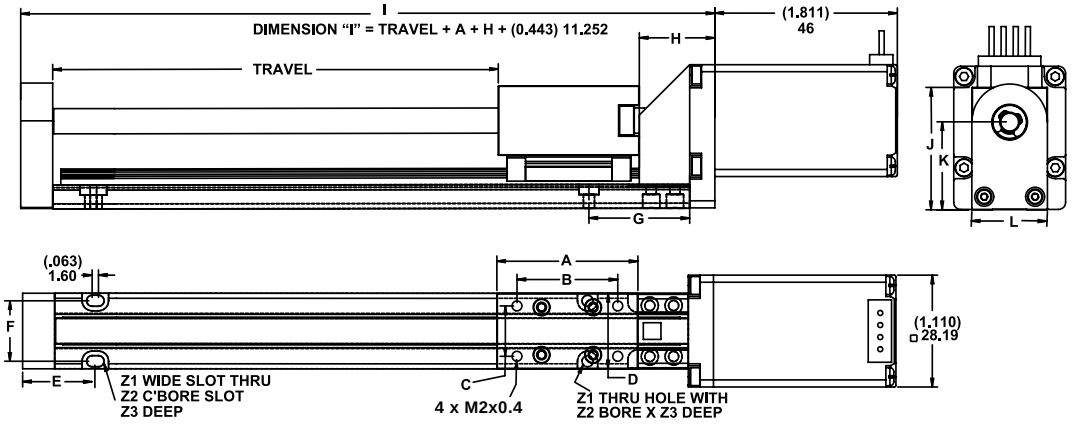
BGS04™ Linear Rail with 28000 Series Size 11 Double Stack linear motors

Recommended for horizontal loads up to 22 lbs (100 N)

	A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(1.40)	(1.0)	(0.50)	(0.75)	(0.69)	(0.60)	(1.00)	(0.75)	*	(1.22)	(0.87)	(0.75)	(0.11)	(0.20)	(0.09)
mm	33.56	25.40	12.70	19.05	17.53	15.24	25.40	19.05	*	30.86	22.10	19.05	2.8	5.1	2.3

* Dimension "I" is a function of required travel distance.

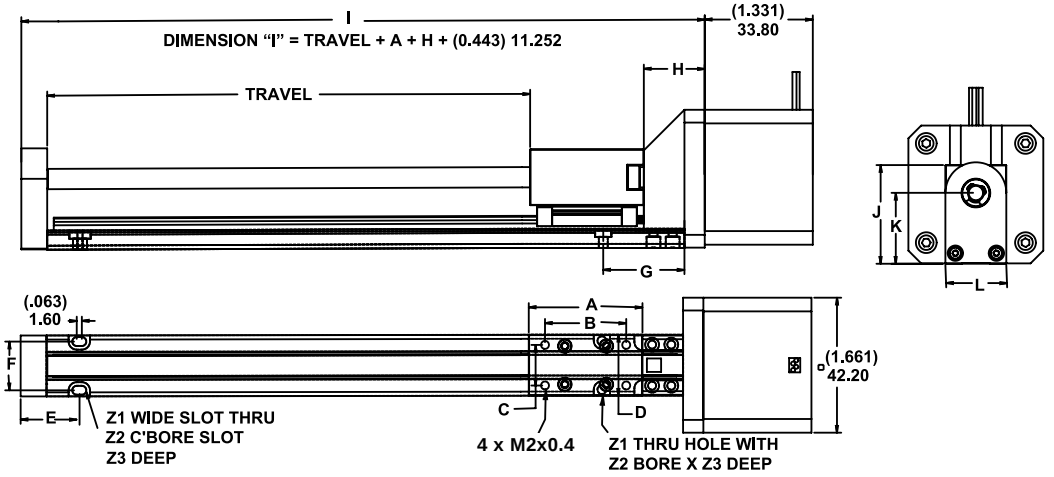
Dimensions = (inches) mm



BGS04™ Linear Rail with 43000 Series Size 17 Single Stack linear motors

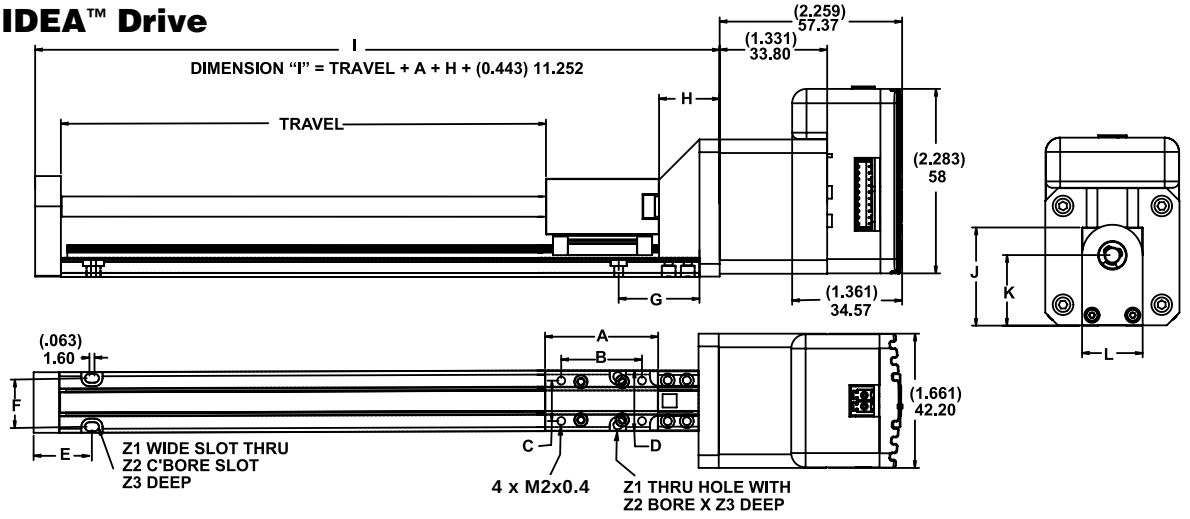
Recommended for horizontal loads up to 22 lbs (100 N)

Dimensions = (inches) mm



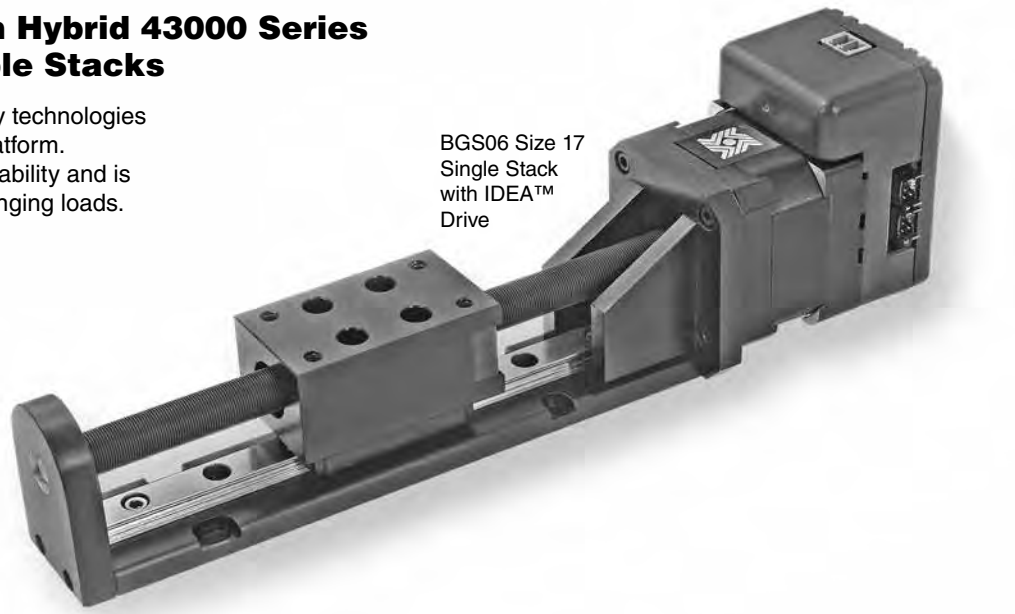
...with IDEA™ Drive

Dimensions = (inches) mm



BGS06™ Linear Rail with Hybrid 43000 Series Size 17 Single and Double Stacks

The **BGS**™ Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capability and is engineered for both normal and overhanging loads.



BGS06 Size 17 Single Stack with IDEA™ Drive

Hybrid Motor Specifications:
43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 Double Stack
• See page 102
43000 Series Size 17 IDEA™ Drive
• See page 100
Programmable IDEA™ Drive
• See page 194
Integrated Connector Option
• See page 117

BGS06
Specifications

BGS06 with Hybrid Linear Actuator Motor...	Size 17 Single Stack* Size 17 Double Stack*
Max. Stroke Length	24-in (610 mm)
Max. Load (Horizontal)**	135 lbs (600 N)
Roll Moment	11.62 lbs-ft (15.75 N-m)
Pitch Moment	7.93 lbs-ft (10.75 N-m)
Yaw Moment	9.15 lbs-ft (12.40 N-m)

Nominal Thread Lead		Lead Code
inches	mm	
0.050	1.27	**0050**
0.079	2.00	**0079**
0.100	2.54	**0100**
0.157	4.00	**0157**
0.197	5.00	**0197**
0.200	5.08	**0200**
0.250	6.35	**0250**
0.375	9.53	**0375**

Nominal Thread Lead		Lead Code
inches	mm	
0.400	10.16	**0400**
0.472	12.00	**0472**
0.500	12.70	**0500**
0.750	19.05	**0750**
0.984	25.00	**0984**
1.000	25.40	**1000**
1.200	30.48	**1200**

* Available with an optional programmable IDEA™ Drive.

** To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

Identifying the Motorized BGS part number codes when ordering

BG	S	06	B	–	G	0079	–	XXX

Prefix
BG = Ball Guide System

Frame Style
S = Standard

Frame Size Load*
06 = Max. static load 135 lbs (600 N)

Coating
B = TFE wear resist, dry lubricant Black Ice®

Drive / Mounting
M = Motorized

G = IDEA™ integrated programmable drive - USB communications
J = IDEA™ integrated programmable drive - RS485 communications

Nominal Thread Lead Code
0079 = .079-in (2.0)
(see Lead Code charts above)

Unique Identifier
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

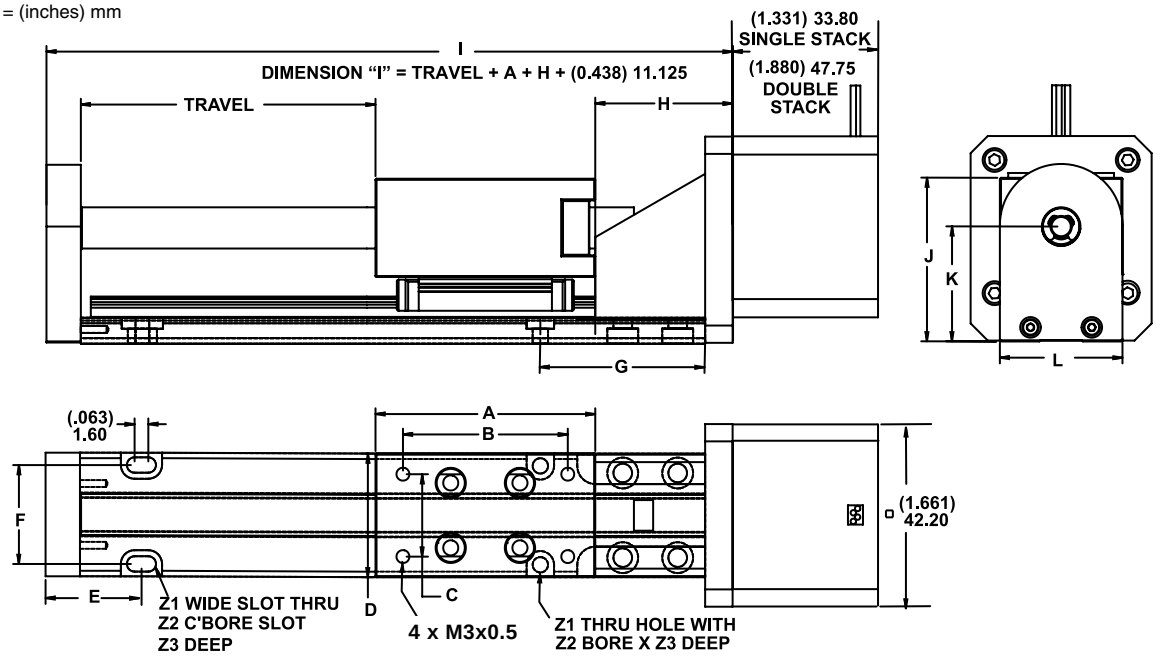
Carriage holes available in Metric sizes
M3
M4
M5
M6

BGS06™ Linear Rail with Hybrid 43000 Size 17 linear motors are recommended for horizontal loads up to 135 lbs (600 N)

	A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(2.00)	(1.50)	(0.75)	(1.13)	(0.81)	(0.90)	(1.50)	(1.25)	*	(1.50)	(1.05)	(1.13)	(0.14)	(0.25)	(0.13)
mm	50.80	38.10	19.05	28.58	20.57	22.86	38.10	31.75	*	38.15	26.77	28.58	3.6	6.4	3.3

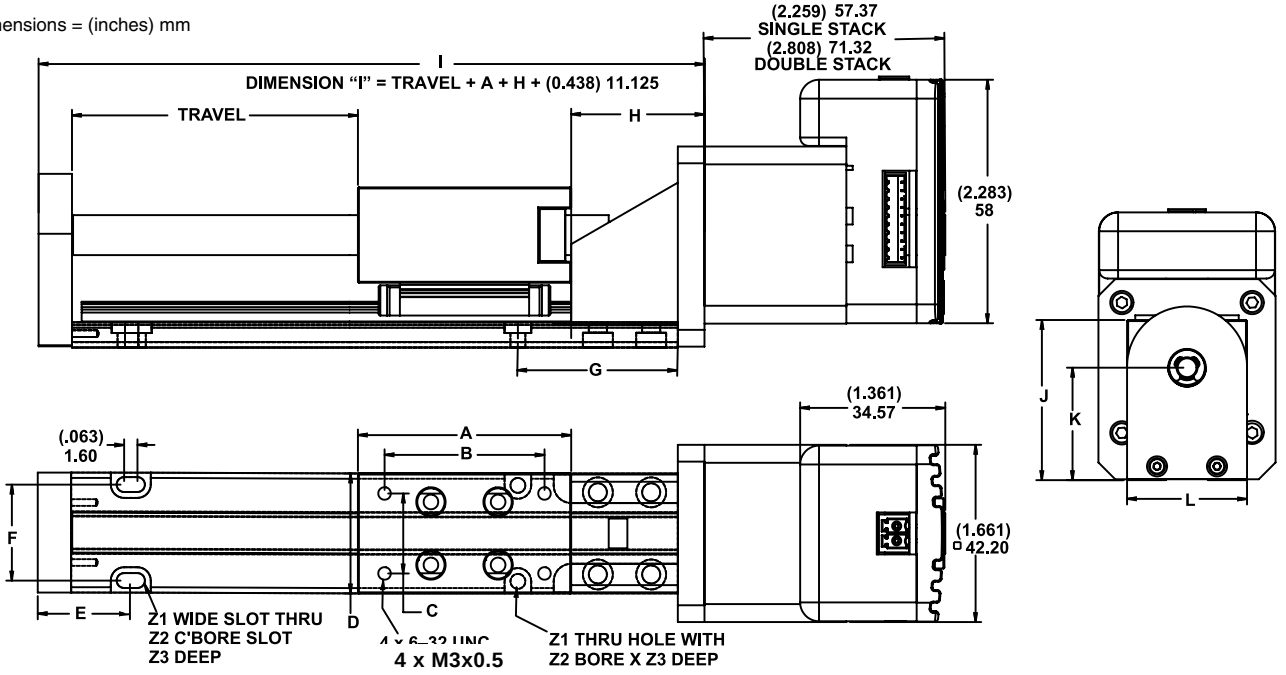
* Dimension "I" is a function of required travel distance.

Dimensions = (inches) mm



BGS06™ Linear Rail with Hybrid 43000 Size 17 linear motors with programmable IDEA™ Drive

Dimensions = (inches) mm



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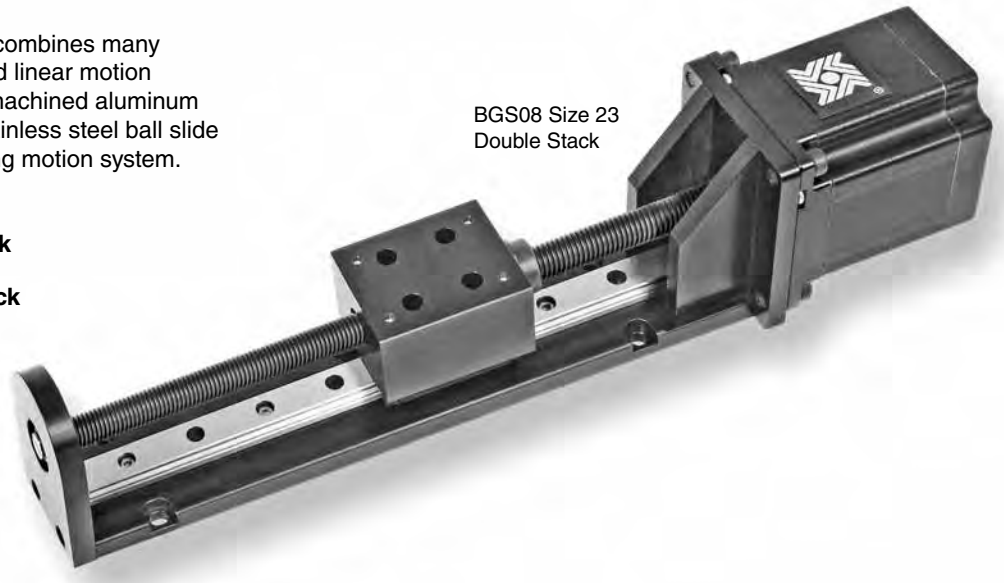
BGS08™ Linear Rail with Hybrid 57000 Series Size 23 Single and Double Stacks

This **BGS™** heavy-duty linear rail combines many technologies into a single integrated linear motion platform. The lead-screw drives a machined aluminum carriage mounted to a precision stainless steel ball slide resulting in a rigid, smooth-operating motion system.

Hybrid Motor Specifications:
57000 Series Size 23 Single Stack
• See page 106
57000 Series Size 23 Double Stack
• See page 111



BGS08 Size 23
Double Stack

BGS08 Specifications

BGS08 with Hybrid Linear Actuator Motor...	Size 23 Single Stack Size 23 Double Stack
Max. Stroke Length	30-in (760 mm)
Max. Load (Horizontal)**	225 lbs (1,000 N)
Roll Moment	22.50 lbs-ft (30.5 N-m)
Pitch Moment	19.36 lbs-ft (26.25 N-m)
Yaw Moment	22.27 lbs-ft (30.20 N-m)

** To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

Nominal Thread Lead		Lead Code
inches	mm	
0.098	2.50	**0098**
0.100	2.54	**0100**
0.197	5.00	**0197**
0.200	5.08	**0200**
0.500	12.70	**0500**
0.630	16.00	**0630**
1.000	25.40	**1000**

Identifying the Motorized BGS part number codes when ordering

BG	S	08	B	–	M	0197	–	XXX

Prefix
BG = Ball Guide System

Frame Style
S = Standard

Frame Size Load*
08 = Max. static load 225 lbs (1,000 N)

Coating
B = TFE wear resist, dry lubricant Black Ice®

Drive / Mounting
M = Motorized

Nominal Thread Lead Code
0197 = .197-in (5.0)
(see Lead Code charts above)

Unique Identifier
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

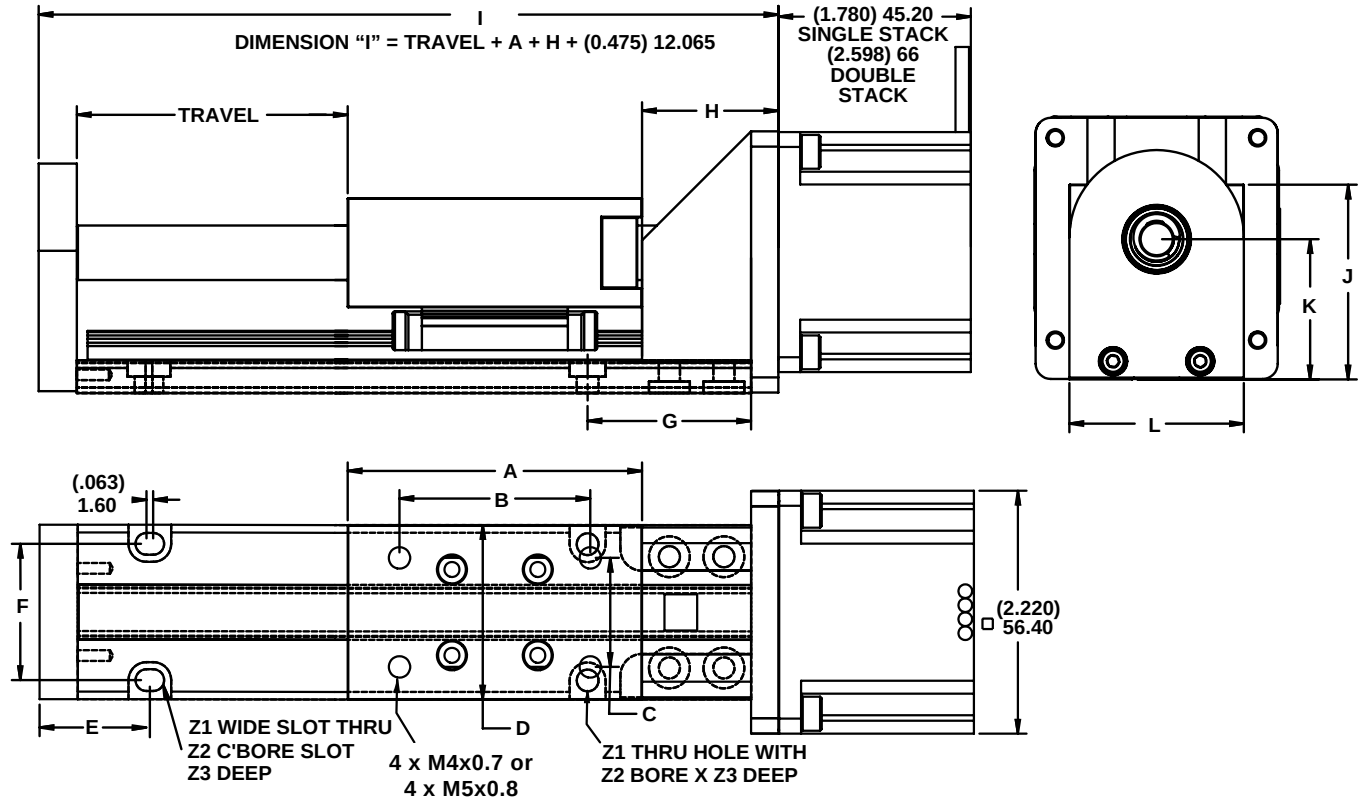
Carriage holes available in Metric sizes
M3
M4
M5
M6

BGS08™ Linear Rail with Hybrid 57000 Size 23 linear motors are recommended for horizontal loads up to 225 lbs (1,000 N)

	A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(2.70)	(1.75)	(1.00)	(1.60)	(0.98)	(1.25)	(1.50)	(1.25)	*	(1.79)	(1.29)	(1.60)	(0.20)	(0.33)	(0.19)
mm	68.58	44.45	25.40	40.64	24.89	31.75	38.10	31.75	*	45.39	32.69	40.64	5.1	8.4	4.8

* Dimension "I" is a function of required travel distance.

Dimensions = (inches) mm



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Motorized RGS® Rapid Guide Screw Linear Rails

The **Motorized RGS® Rapid Guide Screw** is a screw-driven rail that offers exceptional linear speed, accurate positioning, and long life in a compact, value-priced assembly. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans. Lengths up to 8 feet (2.4 meters) can readily be built, and longer lengths are possible on a special order basis.

This system combines many Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. The Motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications. When integrated with an IDEA™ Drive, the system combines Haydon® hybrid linear actuator technology with a fully programmable, integrated stepper motor drive. By combining technologies into a single preassembled unit, Haydon Kerk Motion Solutions is able to improve system integration for the equipment OEM or end user. The overall cost for the customer is also lowered by offering a complete solution as it eliminates the need for rotary-to-linear conversion, as well as simplifies product development with fewer components required.

Motorized RGS04 with 28000 Series Double Stack

Motorized RGW10 with 57000 Series Double Stack

Motorized RGW06 with 43000 Series Double Stack

Motorized RGS Selector Chart

Nominal Thread Lead inches	Nominal Thread Lead mm	Lead Code	RGS04 Size 11DS Size 17SS Size 17DS	RGS06 Size 17SS Size 17DS Size 23SS Size 23DS	RGW06 Size 17SS Size 17DS Size 23SS Size 23DS	RGS08 Size 23SS Size 23DS	RGS10 Size 23SS Size 23DS	RGW10 Size 23SS Size 23DS
0.025	0.635	**0025**	●					
0.039	1.00	**0039**	●					
0.050	1.27	**0050**	●	●	●			
0.0625	1.59	**0063**	●					
0.079	2.00	**0079**	●	●	●			
0.098	2.50	**0098**				●		
0.100	2.54	**0100**	●	●	●	●	●	●
0.118	3.00	**0118**	●					
0.125	3.18	**0125**					●	●
0.157	4.00	**0157**		●	●			
0.197	5.00	**0197**		●	●	●		
0.200	5.08	**0200**	●	●	●	●	●	●
0.250	6.35	**0250**	●	●	●		●	●
0.315	8.00	**0315**					●	●
0.375	9.53	**0375**		●	●			
0.394	10.00	**0394**	●					
0.400	10.16	**0400**		●	●			
0.472	12.00	**0472**		●	●			
0.500	12.70	**0500**	●	●	●	●	●	●
0.630	16.00	**0630**				●	●	●
0.750	19.05	**0750**	●	●	●			
0.984	25.00	**0984**		●	●			
1.000	25.40	**1000**		●	●	●	●	●
1.200	30.48	**1200**		●	●			
1.500	38.10	**1500**					●	●
2.000	50.80	**2000**					●	●

Size 11 = 28000 Series
Size 17 = 43000 Series
Size 23 = 57000 Series

SS = Single Stack, standard Hybrid Linear Actuator Stepper Motor

DS = Double Stack Hybrid Linear Actuator Stepper Motor

RGW = wide base with parallel guide tracks for traversing sensor mount devices

Please consult factory for other available leads

The RGS and RGW style numbers 04, 06, 08 and 10 indicate the recommended load capacity of the system.

For motor specifications: Size 11 DS (28000 Series), see page 84; Size 17 SS (43000 Series), see page 95; Size 17 DS (43000 Series), see page 102; Size 23 SS (57000 Series), see page 106; Size 23 DS (57000 Series), see page 111.

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Non-Motorized RGS Linear Rails
Product Selector Chart

Rapid Guide Screw	Inch Lead inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load* oz-in/lb (N-m/Kg)	Design Load* lbs (N)	Screw Inertia oz-in sec^2/in (KgM^2/M)
RGS 04	.100 (2.54)	**0100**	0.4 (10.2)	1/4 (6.4)	3.0 (.02)	100,000,000 (254,000,000)	1.0 (.016)	15 (67)	$.3 \times 10^{-5}$ (6.5×10^{-6})
RGS 04	.200 (5.08)	**0200**	0.4 (10.2)	1/4 (6.4)	4.0 (.03)	100,000,000 (254,000,000)	1.5 (.023)	15 (67)	$.3 \times 10^{-5}$ (6.5 x 10)
RGS 04	.500 (12.70)	**0500**	0.4 (10.2)	1/4 (6.4)	5.0 (.04)	100,000,000 (254,000,000)	2.5 (.039)	15 (67)	$.3 \times 10^{-5}$ (6.5×10^{-6})
RGS 04	1.000 (25.40)	**1000**	0.4 (10.2)	1/4 (6.4)	6.0 (.04)	100,000,000 (254,000,000)	4.5 (.070)	15 (67)	$.3 \times 10^{-5}$ (6.5×10^{-6})
RGS 06	.100 (2.54)	**0100**	0.6 (15.2)	3/8 (9.5)	4.0 (.03)	100,000,000 (254,000,000)	1.0 (.016)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
RGS 06	.200 (5.08)	**0200**	0.6 (15.2)	3/8 (9.5)	5.0 (.04)	100,000,000 (254,000,000)	1.5 (.023)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
RGS 06	.500 (12.70)	**0500**	0.6 (15.2)	3/8 (9.5)	6.0 (.04)	100,000,000 (254,000,000)	2.5 (.039)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
RGS 06	1.000 (25.40)	**1000**	0.6 (15.2)	3/8 (9.5)	7.0 (.05)	100,000,000 (254,000,000)	4.5 (.070)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
RGS 08	.100 (.254)	**0100**	0.8 (20.3)	1/2 (12.7)	5.0 (.04)	100,000,000 (254,000,000)	1.1 (.018)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
RGS 08	.200 (5.08)	**0200**	0.8 (20.3)	1/2 (12.7)	6.0 (.04)	100,000,000 (254,000,000)	1.7 (.027)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
RGS 08	.500 (12.70)	**0500**	0.8 (20.3)	1/2 (12.7)	7.0 (.05)	100,000,000 (254,000,000)	3.0 (.047)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
RGS 08	1.000 (25.40)	**1000**	0.8 (20.3)	1/2 (12.7)	8.0 (.06)	100,000,000 (254,000,000)	6.0 (.096)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
RGS 10	.100 (2.54)	**0100**	1.0 (25.4)	5/8 (15.9)	5.0 (.04)	100,000,000 (254,000,000)	1.3 (.020)	100 (445)	14.2×10^{-5} (3.9×10^{-5})
RGS 10	.200 (5.08)	**0200**	1.0 (25.4)	5/8 (15.9)	6.5 (.05)	100,000,000 (254,000,000)	2.0 (.031)	100 (445)	14.2×10^{-5} (3.9×10^{-5})
RGS 10	.500 (12.70)	**0500**	1.0 (25.4)	5/8 (15.9)	7.0 (.05)	100,000,000 (254,000,000)	3.0 (.047)	100 (445)	14.2×10^{-5} (3.9×10^{-5})
RGS 10	1.000 (25.40)	**1000**	1.0 (25.4)	5/8 (15.9)	8.5 (.06)	100,000,000 (254,000,000)	6.5 (.101)	100 (445)	14.2×10^{-5} (3.9×10^{-5})

NOTE: RGS® assemblies with lengths over 36-in. (914.4 mm) and/or leads higher than .5-in (12.7 mm) will likely have higher drag torque than listed values.

* Determined with load in a horizontal position

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RGS04 Linear Rail with a 28000 Series Size 11 Double Stack

The RGS04 is a screw-driven rail that offers exceptional linear speed, accurate positioning, and long life in a compact, value-priced assembly. The RGS04 28000 Series is smallest available screw-driven slide. It offers a compact profile, reliable linear speed, accurate positioning, and long life in a high quality assembly. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans.

Hybrid Motor Specifications:
28000 Series Size 11 Double Stack
• See page 84
Integrated Connector Option
• See page 117

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

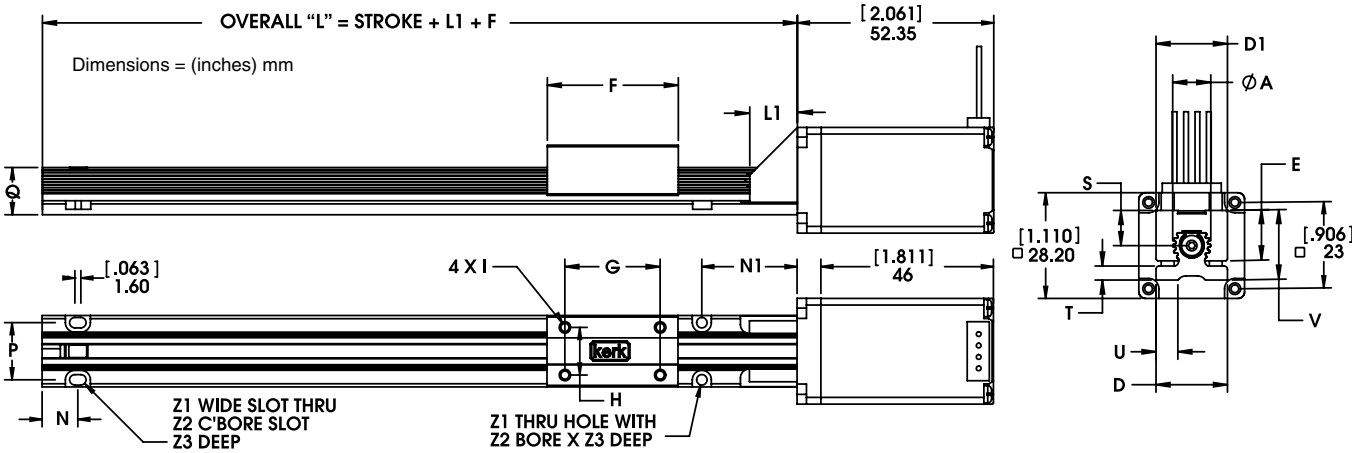
RGS04
28000 Series
Size 11
Double Stack

RGS04 Linear Rail with Hybrid 28000 Series Size 11 Double Stack linear motors

Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.7)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	18	5.1	2.3

* Metric threads also available for carriage.



Identifying the Motorized RGS part number codes when ordering

RG	S	04	K	–	M	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard

Frame Size Load*
04 = 15 lbs (67 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
M = Motorized (Double Stack only)

Nominal Thread Lead Code

0025 = .025-in (.635)	**0118** = .118-in (3.00)
0039 = .039-in (1.00)	**0200** = .200-in (5.08)
0050 = .050-in (1.27)	**0250** = .250-in (6.35)
0063 = .0625-in (1.59)	**0394** = .394-in (10.00)
0079 = .079-in (2.00)	**0500** = .500-in (12.70)
0100 = .100-in (2.54)	**0750** = .750-in (19.05)

Unique Identifier
Suffix used to identify specific motors (28000 Double Stack)

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

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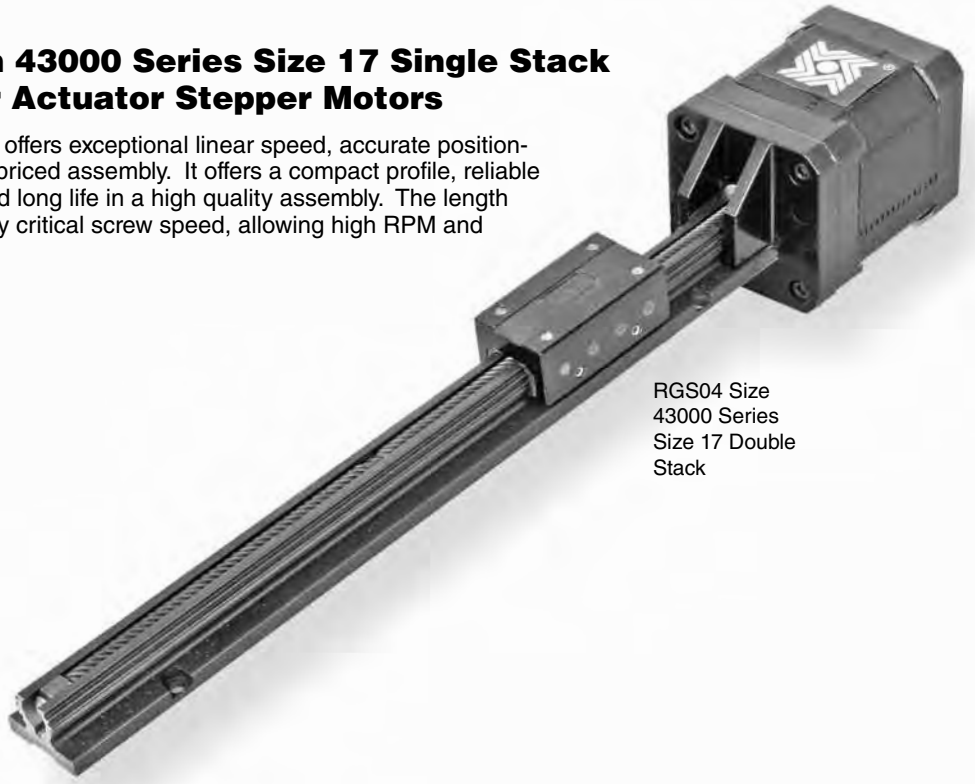
RGS04 Linear Rail with 43000 Series Size 17 Single Stack or Double Stack Linear Actuator Stepper Motors

The RGS04 is a screw-driven rail that offers exceptional linear speed, accurate positioning, and long life in a compact, value-priced assembly. It offers a compact profile, reliable linear speed, accurate positioning, and long life in a high quality assembly. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans.

Hybrid Motor Specifications:
43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 Double Stack
• See page 102
43000 Series Size 17 IDEA™ Drive
• See page 100
Programmable IDEA Drive
• See page 194
Integrated Connector Option
• See page 117

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.



RGS04 Size 43000 Series Size 17 Double Stack

Identifying the Motorized RGS part number codes when ordering

RG	S	04	K	–	M	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard

Frame Size Load*
04 = 15 lbs (67 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
M = Motorized
G = IDEA™ integrated programmable drive – USB communications
J = IDEA™ integrated programmable drive – RS485 communications

Nominal Thread Lead Code
0025 = .025-in (.635)
0039 = .039-in (1.00)
0050 = .050-in (1.27)
0063 = .0625-in (1.59)
0079 = .079-in (2.00)
0100 = .100-in (2.54)
0118 = .118-in (3.00)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0394 = .394-in (10.00)
0500 = .500-in (12.70)
0750 = .750-in (19.05)

Unique Identifier
Suffix used to identify specific motors (43000 Single/ Double Stack)

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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Standard products available 24-hrs.

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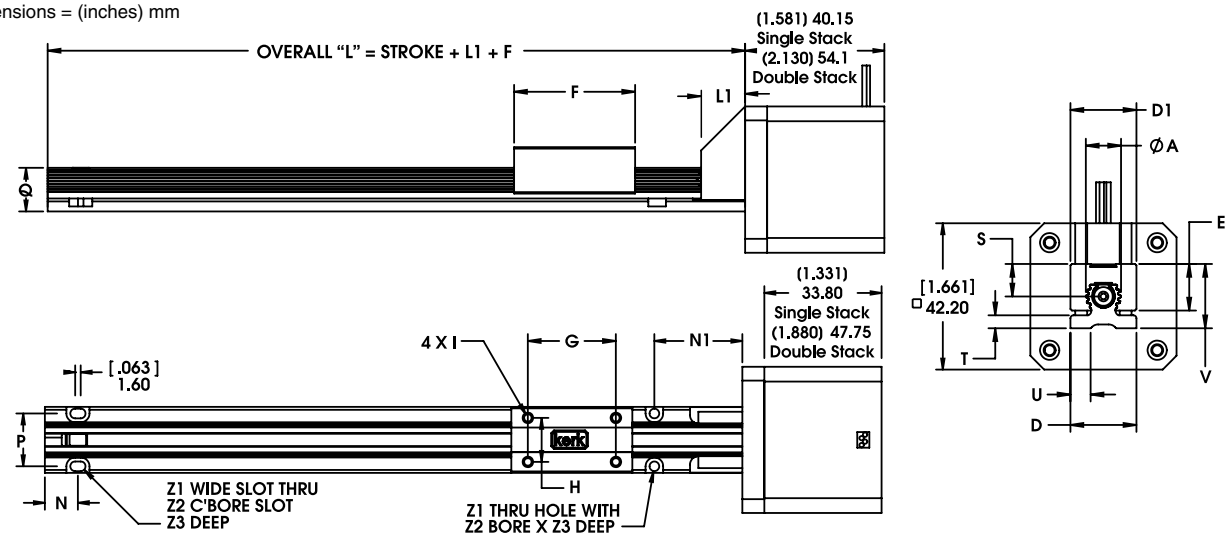
RGS04 with 43000 Series Size 17 Single Stack and Double Stack linear actuator stepper motors

Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.73)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	2.8	5.1	2.3

* Metric threads also available for carriage.

Dimensions = (inches) mm



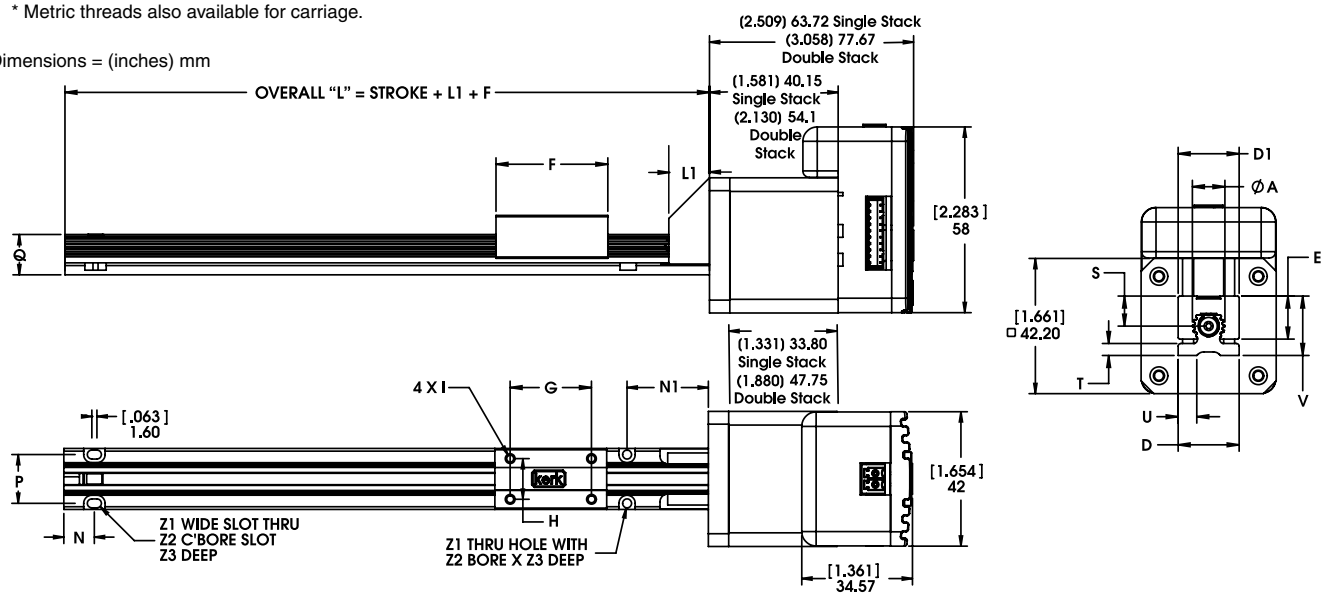
RGS04 with 43000 Series Size 17 Single Stack and Double Stack linear actuator stepper motors with an integrated programmable IDEA™ Drive

Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.73)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	2.8	5.1	2.3

* Metric threads also available for carriage.

Dimensions = (inches) mm

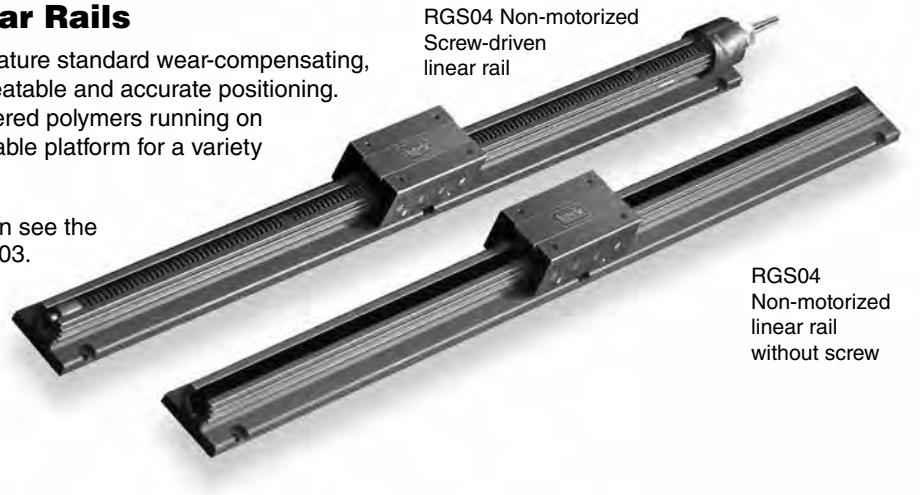


RGS04 Non-Motorized Linear Rails

The Non-motorized RG Series linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

RGS04 Non-motorized Screw-driven linear rail



RGS04 Non-motorized linear rail without screw

Identifying the Non-Motorized RGS part number codes when ordering

RG	S	04	K	–	A	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard

Frame Size Load
04 = 15 lbs (67 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
A = None

Nominal Thread Lead Code
0000 = No screw
0100 = .100-in (2.54)
0200 = .200-in (5.08)
0500 = .500-in (12.70)
1000 = 1.000-in (25.4)

Unique Identifier
Suffix used to identify specific features

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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www.HaydonKerkExpress.com
Standard products available 24-hrs.

RGS04® Screw-Driven linear rail WITHOUT MOTOR Standard Series

Specifications

	Inch Lead inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load* oz-in/lb (N-m/Kg)	Design Load* lbs (N)	Screw Inertia oz-in sec²/in (KgM²/M)
RGS04 Non-Motorized with Guide Screw	.100 (2.54)	**0100**	0.4 (10.2)	1/4 (6.4)	3.0 (.02)	100,000,000 (254,000,000)	1.0 (.016)	15 (67)	.3 x 10^{-5} (6.5 x 10^{-6})
	.200 (5.08)	**0200**	0.4 (10.2)	1/4 (6.4)	4.0 (.03)	100,000,000 (254,000,000)	1.5 (.023)	15 (67)	.3 x 10^{-5} (6.5 x 10)
	.500 (12.70)	**0500**	0.4 (10.2)	1/4 (6.4)	5.0 (.04)	100,000,000 (254,000,000)	2.5 (.039)	15 (67)	.3 x 10^{-5} (6.5 x 10^{-6})
	1.000 (25.40)	**1000**	0.4 (10.2)	1/4 (6.4)	6.0 (.04)	100,000,000 (254,000,000)	4.5 (.070)	15 (67)	.3 x 10^{-5} (6.5 x 10^{-6})

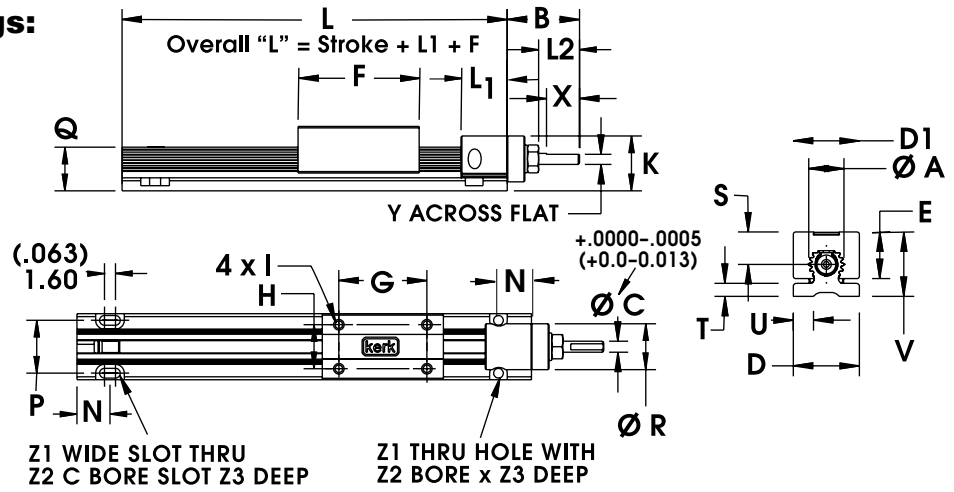
NOTE: RGS® assemblies with lengths over 36-in. (914.4 mm) and/or leads higher than .5-in (12.7 mm) will likely have higher drag torque than listed values.

* Determined with load in a horizontal position

Dimensional Drawings: RGS04 Screw-Driven linear rail WITHOUT MOTOR

Recommended for horizontal loads up to 15 lbs (67 N)

Dimensions = inches (mm)



Dimensions: RGS04

Standard, non-motorized with guide screw

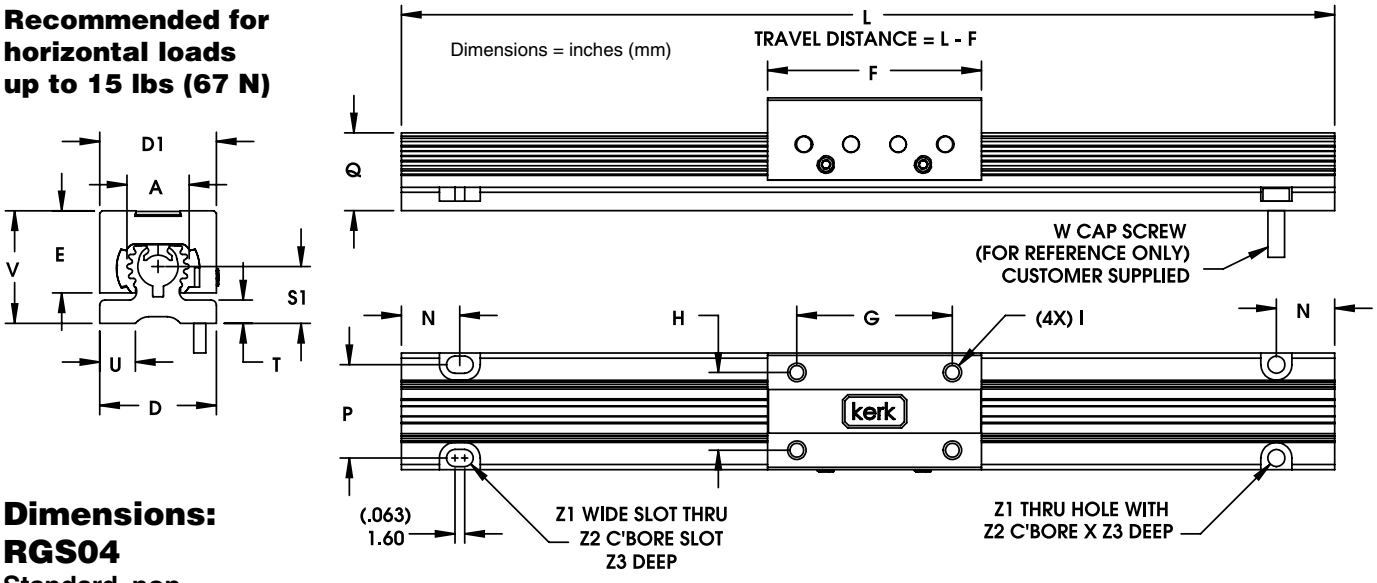
	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGS04	.40 (10.2)	.83 (21.1)	.1250 (3.175)	.75 (19.1)	.75 (19.1)	.53 (13.5)	1.38 (35.1)	1.000 (25.40)	.500 (12.7)	4-40 UNC	.6 (15)	.53 (13.5)	.47 (11.9)	.375 (9.53)

	P inch (mm)	Q inch (mm)	R inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS04	.600 (15.24)	.50 (12.7)	.52 (13.2)	.37 (9.4)	.15 (3.8)	.23 (5.8)	.7 (18)	.38 (9.7)	.115 (2.92)	.11 (2.8)	.20 (5.1)	.09 (2.3)

* Metric carriage hole sizes available: M3 and M4

Dimensional Drawings: RGS04 WITHOUT MOTOR or GUIDE SCREW Standard Series

Recommended for horizontal loads up to 15 lbs (67 N)



Dimensions: RGS04

Standard, non-motorized without guide screw

	A inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS04	.40 (10.2)	.75 (19.1)	.75 (19.1)	.53 (13.5)	1.4 (36)	1.000 (25.40)	.500 (12.70)	4-40 UNC	.375 (9.53)	.600 (15.24)	.50 (12.7)	.37 (9.4)	.15 (3.8)	.23 (5.8)	.7 (18)	.11 (2.8)	.20 (5.1)	.09 (2.3)

* Metric carriage hole sizes available: M3 and M4

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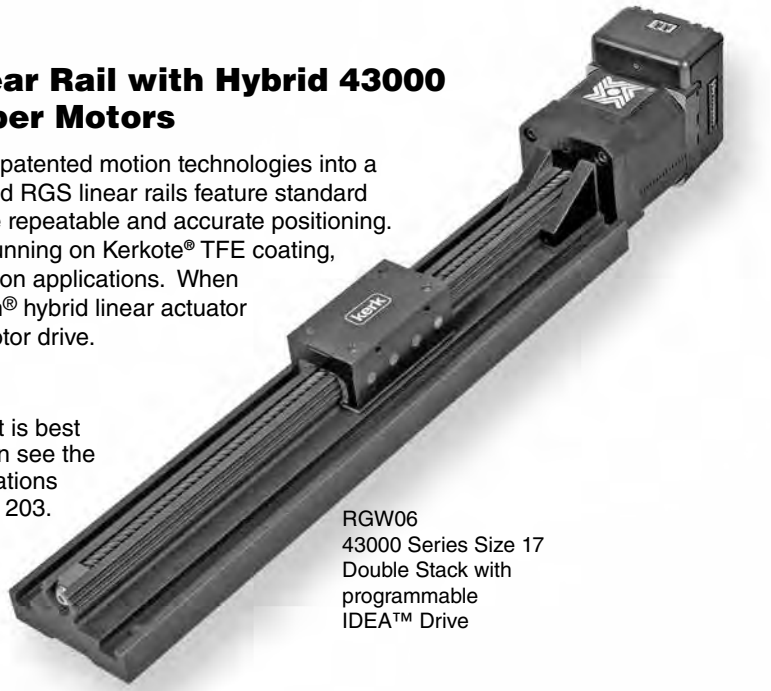
RGS06 and RGW06 WIDE Series Linear Rail with Hybrid 43000 Series Size 17 Linear Actuator Stepper Motors

This system combines many Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. The Motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications. When integrated with an IDEA Drive, the system combines Haydon® hybrid linear actuator technology with a fully programmable, integrated stepper motor drive.

Hybrid Motor Specifications:

43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 Double Stack
• See page 102
43000 Series Size 17 IDEA™ Drive
• See page 100
Programmable IDEA™ Drive
• See page 194
Integrated Connector Option
• See page 117

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.



RGW06
43000 Series Size 17
Double Stack with
programmable
IDEA™ Drive

Identifying the Motorized RGS part number codes when ordering

RG	S	06	K	–	M	0100	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard
W = Wide sensor mount capability

Frame Size Load

06 = 35 lbs (156 N) (Maximum static load)

Coating

K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting

M = Motorized

G = Motorized + IDEA™ integrated programmable drive – USB communications

J = Motorized + IDEA™ integrated programmable drive – RS485 communications

Nominal Thread Lead Code

0050 = .050-in (1.27)
0079 = .079-in (2.00)
0100 = .100-in (2.54)
0157 = .157-in (4.00)
0197 = .197-in (5.00)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0375 = .375-in (9.53)
0400 = .400-in (10.16)
0472 = .472-in (12.00)
0500 = .500-in (12.70)
0750 = .750-in (19.05)
0984 = .984-in (25.00)
1000 = 1.000-in (25.4)
1200 = 1.200-in (30.48)

Unique Identifier

Suffix used to identify specific motors (43000 Single/ Double Stack

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

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Standard products available 24-hrs.

Carriage holes available in Metric sizes
M3
M4
M5
M6

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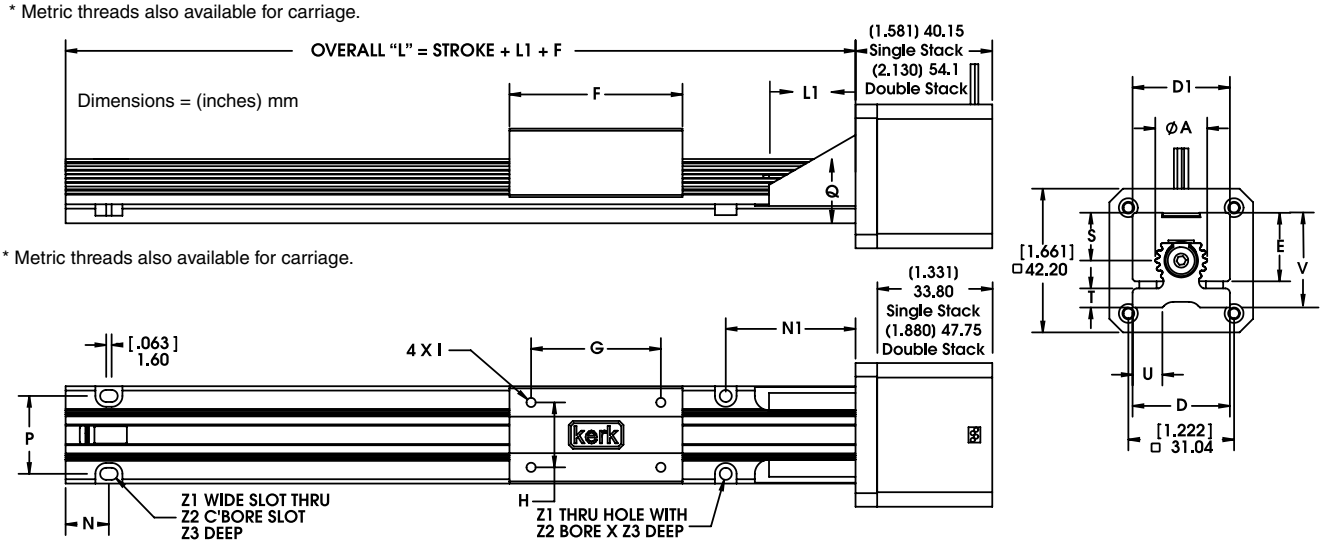
RGS06 STANDARD Series with 43000 Series Size 17 Single and Double Stack

Recommended for horizontal loads up to 35 lbs (156 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0	UNC	25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.8	3.6	6.3	3.3

* Metric threads also available for carriage.



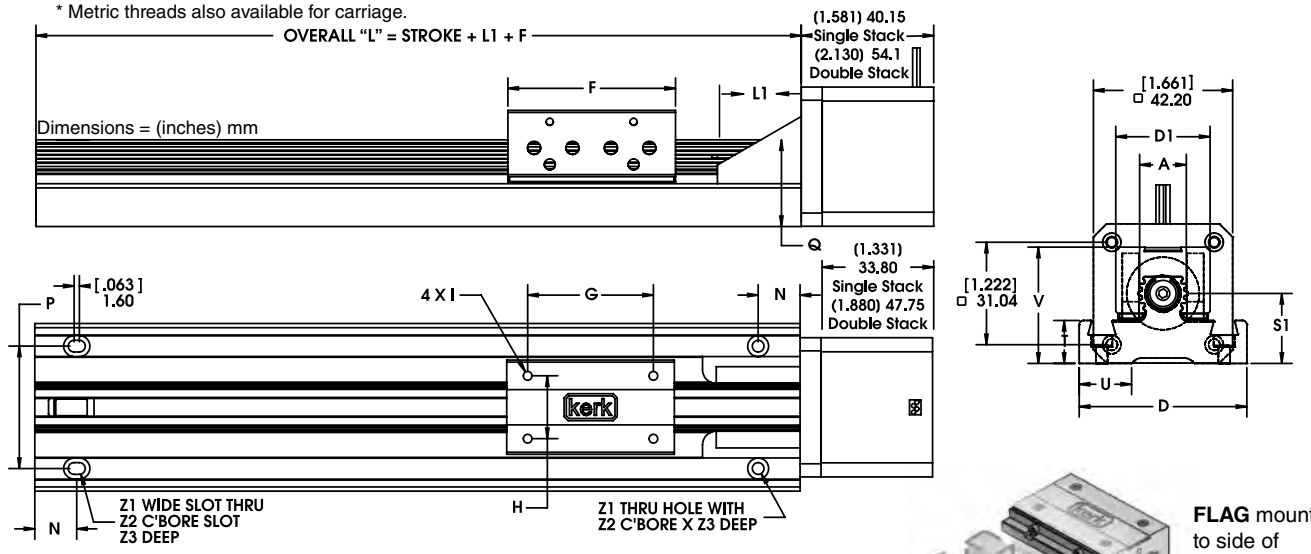
* Metric threads also available for carriage.

RGW06 WIDE Series with 43000 Series Size 17 Single and Double Stack

Recommended for horizontal loads up to 35 lbs (156 N)

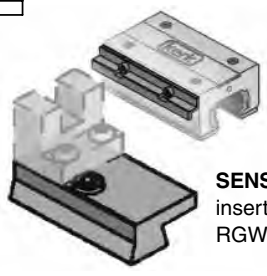
	A	D	D1	F	G	H	I*	L1	N	P	Q	S1	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0	UNC	25.4	12.7	37.1	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

* Metric threads also available for carriage.



RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.



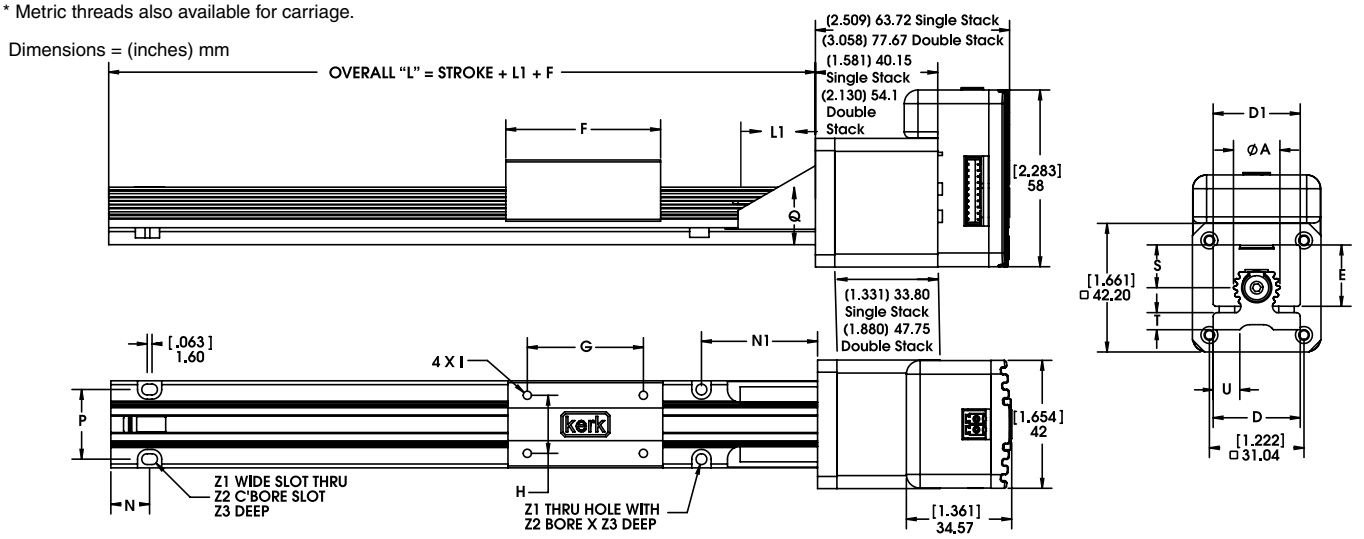
FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

RGS06 STANDARD Series with 43000 Series Size 17 Single and Double Stack linear motors with IDEA Drive Recommended for horizontal loads up to 35 lbs (156 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0	UNC	25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.9	3.6	6.3	3.3

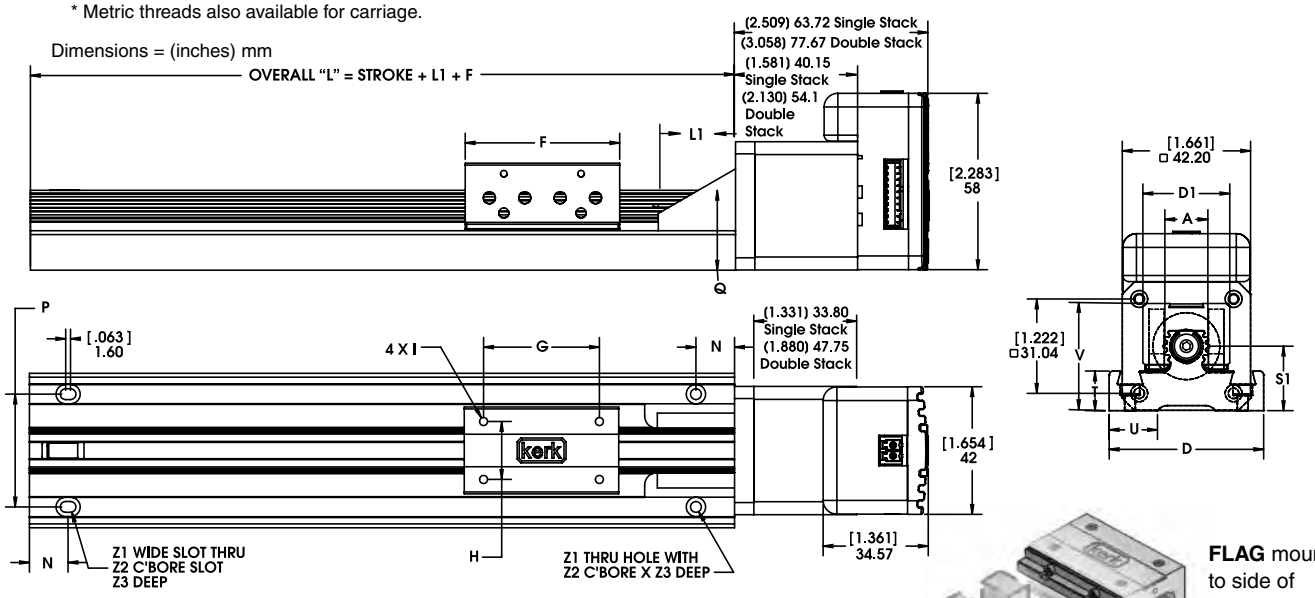
* Metric threads also available for carriage.



RGW06 WIDE Series with 43000 Series Size 17 Single and Double Stack linear motors with IDEA Drive Recommended for horizontal loads up to 35 lbs (156 N)

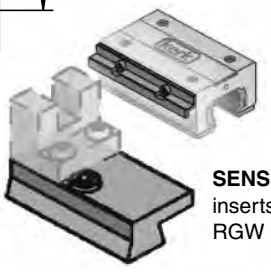
	A	D	D1	F	G	H	I*	L1	N	P	Q	S1	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0	UNC	25.4	12.7	37.1	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

* Metric threads also available for carriage.



RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.



FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

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RGS06 Series and RGW06 Wide Series Linear Rail with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors

A combination of Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

Hybrid Motor Specifications:
57000 Series Size 23 Single Stack
• See page 106
57000 Series Size 23 Double Stack
• See page 111

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

RGW06
57000 Series Size 23
Double Stack

Identifying the Motorized RGS part number codes when ordering

RG	S	06	K	–	M	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard
W = Wide sensor mount capability

Frame Size Load
06 = 35 lbs (156 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
M = Motorized

Nominal Thread Lead Code
0050 = .050-in (1.27)
0079 = .079-in (2.00)
0100 = .100-in (2.54)
0157 = .157-in (4.00)
0197 = .197-in (5.00)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0375 = .375-in (9.53)
0400 = .400-in (10.16)
0472 = .472-in (12.00)
0500 = .500-in (12.70)
0750 = .750-in (19.05)
0984 = .984-in (25.00)
1000 = 1.000-in (25.4)
1200 = 1.200-in (30.48)

Unique Identifier
Suffix used to identify specific motors (57000 Single/ Double Stack)

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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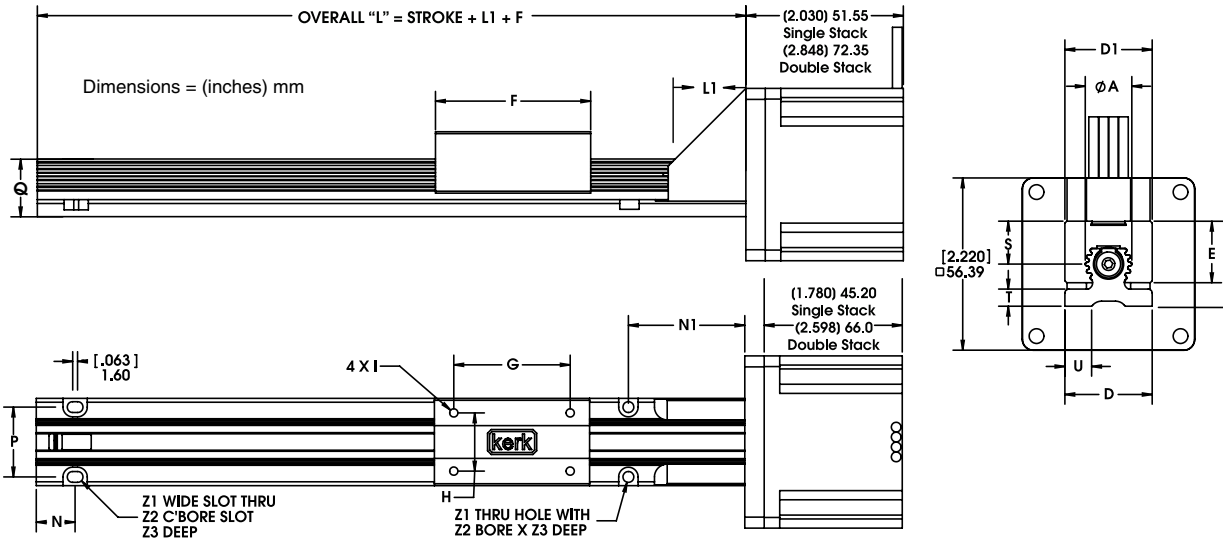
Standard products available 24-hrs.

RGS06 STANDARD Series with 57000 Series Size 23 Single and Double Stack

Recommended for horizontal loads up to 35 lbs (156 N)

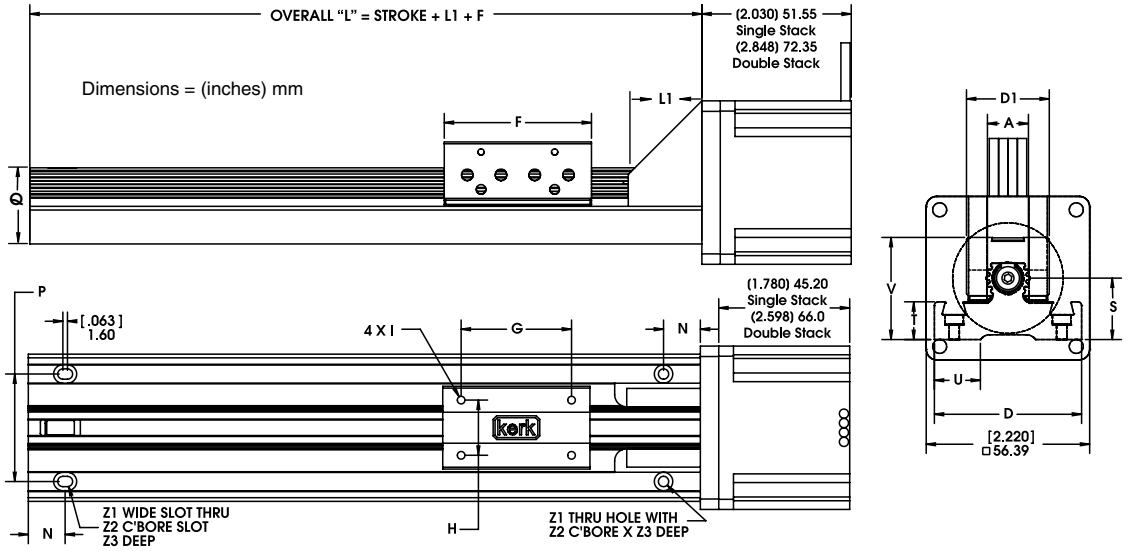


	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0	UNC	25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.9	3.6	6.3	3.3

* Metric threads also available for carriage.

RGW06 WIDE Series with 57000 Series Size 23 Single and Double Stack

Recommended for horizontal loads up to 35 lbs (156 N)

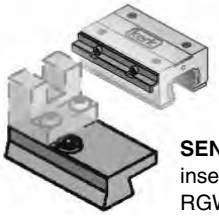


	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0	UNC	25.4	12.7	37.1	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

* Metric threads also available for carriage.

RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.



FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

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RGS06 Standard Series and RGW06 Wide Series Non-Motorized Linear Rails

Non-motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

RGW06 non-motorized with drive screw

RGW06 non-motorized without drive screw

Identifying the Non-Motorized RGS part number codes when ordering

RG	S	06	K	–	A	0100	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard
W = Wide sensor mount capability

Frame Size Load

06 = 35 lbs (156 N) (Maximum static load)

Coating

K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting

A = None

B = In-line screw motor mount

Nominal Thread Lead Code

0000 = No screw

0100 = .100-in (2.54)
0200 = .200-in (5.08)
0500 = .500-in (12.70)
1000 = 1.000-in (25.4)

Unique Identifier

Suffix used to identify specific features

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Carriage holes available in Metric sizes
M3
M4
M5
M6

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RGS06 Screw-Driven STANDARD Series linear rail WITHOUT MOTOR

Specifications

	Inch Lead inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load* oz-in/lb (N-m/Kg)	Design Load* lbs (N)	Screw Inertia oz-in sec²/in (KgM²/M)
RGS06 Non-Motorized with Guide Screw	.100 (2.54)	**0100**	0.6 (15.2)	3/8 (9.5)	4.0 (.03)	100,000,000 (254,000,000)	1.0 (.016)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
	.200 (5.08)	**0200**	0.6 (15.2)	3/8 (9.5)	5.0 (.04)	100,000,000 (254,000,000)	1.5 (.023)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
	.500 (12.70)	**0500**	0.6 (15.2)	3/8 (9.5)	6.0 (.04)	100,000,000 (254,000,000)	2.5 (.039)	35 (156)	1.5×10^{-5} (4.2×10^{-6})
	1.000 (25.40)	**1000**	0.6 (15.2)	3/8 (9.5)	7.0 (.05)	100,000,000 (254,000,000)	4.5 (.070)	35 (156)	1.5×10^{-5} (4.2×10^{-6})

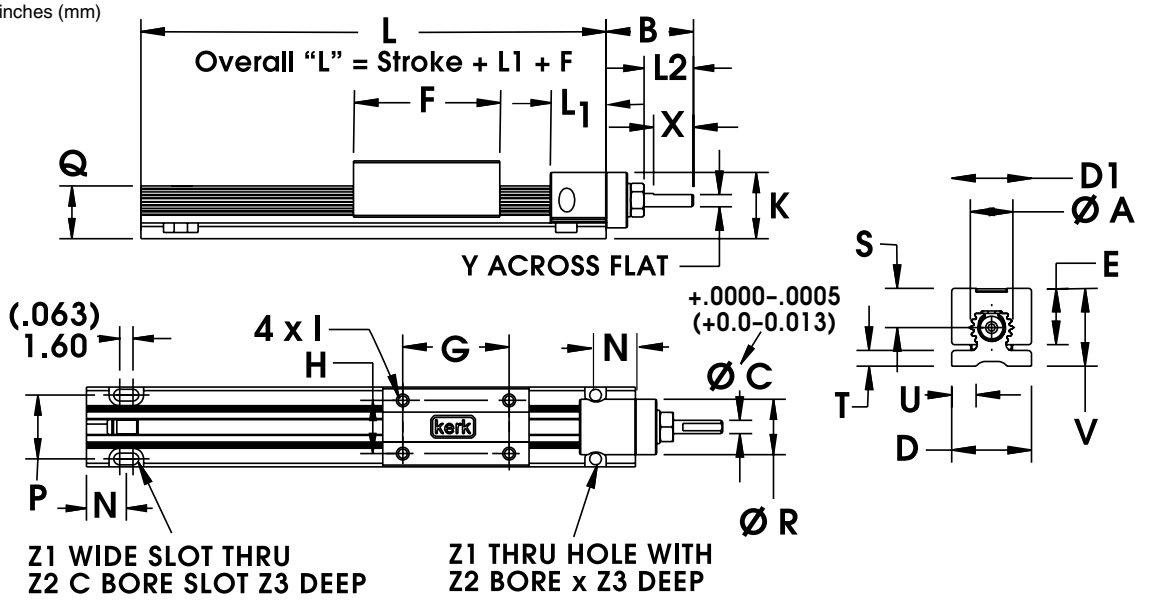
NOTE: RGS® assemblies with lengths over 36-in. (914.4 mm) and/or leads higher than .5-in (12.7 mm) will likely have higher drag torque than listed values.

* Determined with load in a horizontal position

Dimensional Drawings: RGS06 Screw-Driven STANDARD Series linear rail WITHOUT MOTOR

Recommended for horizontal loads up to 35 lbs (156 N)

Dimensions = inches (mm)



Dimensions	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGS06	.60 (15.2)	1.25 (31.8)	.1875 (4.762)	1.13 (28.6)	1.13 (28.6)	.79 (20.1)	2.0 (51)	1.500 (38.10)	.750 (19.1)	6-32 UNC	.9 (23)	.80 (20.3)	.80 (20.3)	.500 (12.70)

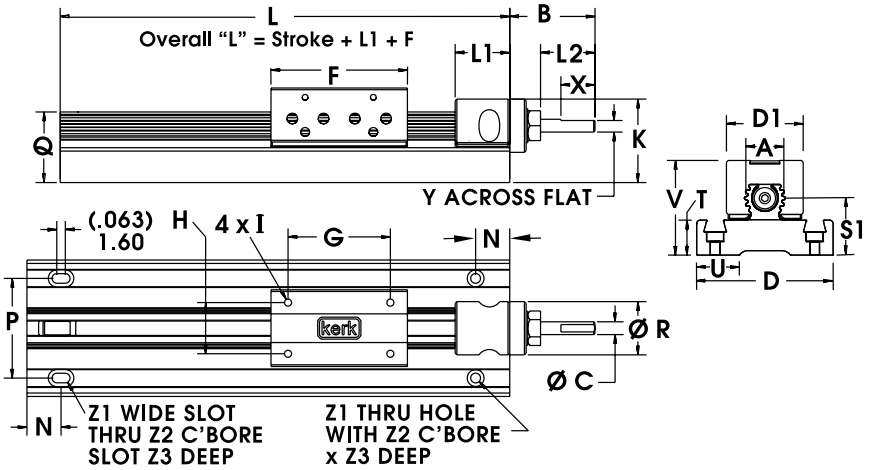
	P inch (mm)	Q inch (mm)	R inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS06	.900 (22.86)	.74 (18.8)	.80 (20.3)	.55 (14.0)	.22 (5.6)	.35 (8.9)	1.1 (28)	.50 (12.7)	.170 (4.32)	.14 (3.6)	.25 (6.4)	.13 (3.3)

* Metric carriage hole sizes available: M3, M4, M5 and M6

Dimensional Drawings: RGW06 WIDE Series Screw-Driven linear rail WITHOUT MOTOR

Recommended for horizontal loads up to 35 lbs (156 N)

Dimensions = inches (mm)

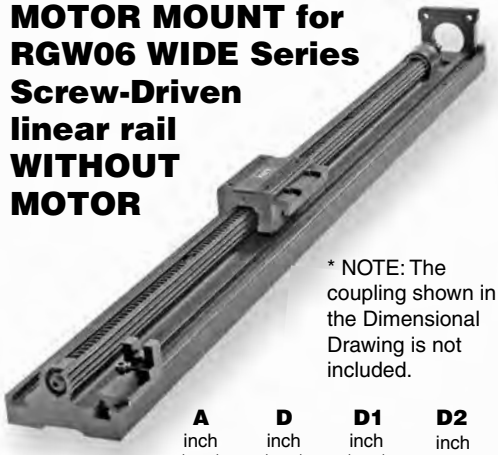


	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGW06	.60 (15.2)	1.25 (31.8)	.1875 (4.762)	2.00 (50.8)	1.13 (28.6)	2.00 (50.8)	1.500 (38.10)	.750 (19.05)	6-32 (UNC)	1.2 (30)	.80 (20.3)	.80 (20.3)	.500 (12.70)

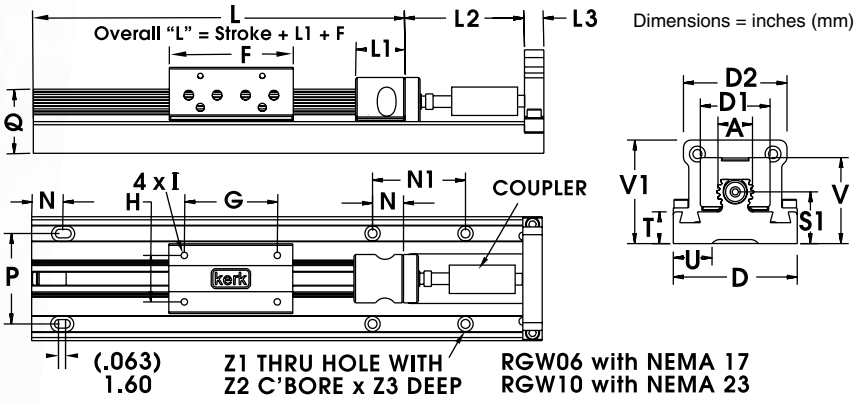
	P inch (mm)	Q inch (mm)	R inch (mm)	S1 inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW06	1.460 (37.08)	1.04 (26.4)	.80 (20.3)	.83 (21.2)	.51 (13.0)	.63 (16.0)	1.4 (36)	.50 (12.7)	.170 (4.32)	.14 (3.6)	.25 (6.4)	.14 (3.6)

* Metric carriage hole sizes available: M3, M4, M5 and M6

MOTOR MOUNT for RGW06 WIDE Series Screw-Driven linear rail WITHOUT MOTOR



* NOTE: The coupling shown in the Dimensional Drawing is not included.



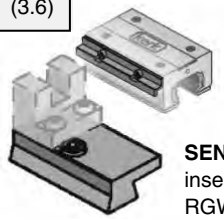
	A inch (mm)	D inch (mm)	D1 inch (mm)	D2 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	L1 inch (mm)	L2 inch (mm)	L3 inch (mm)	N inch (mm)	N1 inch (mm)
RGW06	.60 (15.2)	2.00 (50.8)	1.13 (28.6)	1.67 (42.2)	2.0 (50.8)	1.500 (38.10)	.750 (19.05)	6-32 UNC	.80 (20.3)	1.93 (48.9)	.31 (7.9)	.500 (12.70)	1.50 (38.1)

	P inch (mm)	Q inch (mm)	R inch (mm)	S1 inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	V1 inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW06	1.460 (37.08)	1.04 (26.4)	.78 (19.8)	.83 (21.2)	.51 (13.0)	.63 (16.0)	1.39 (35.3)	1.7 (43)	.14 (3.6)	.25 (6.4)	.14 (3.6)

* Metric carriage hole sizes available: M3, M4, M5 and M6

RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.



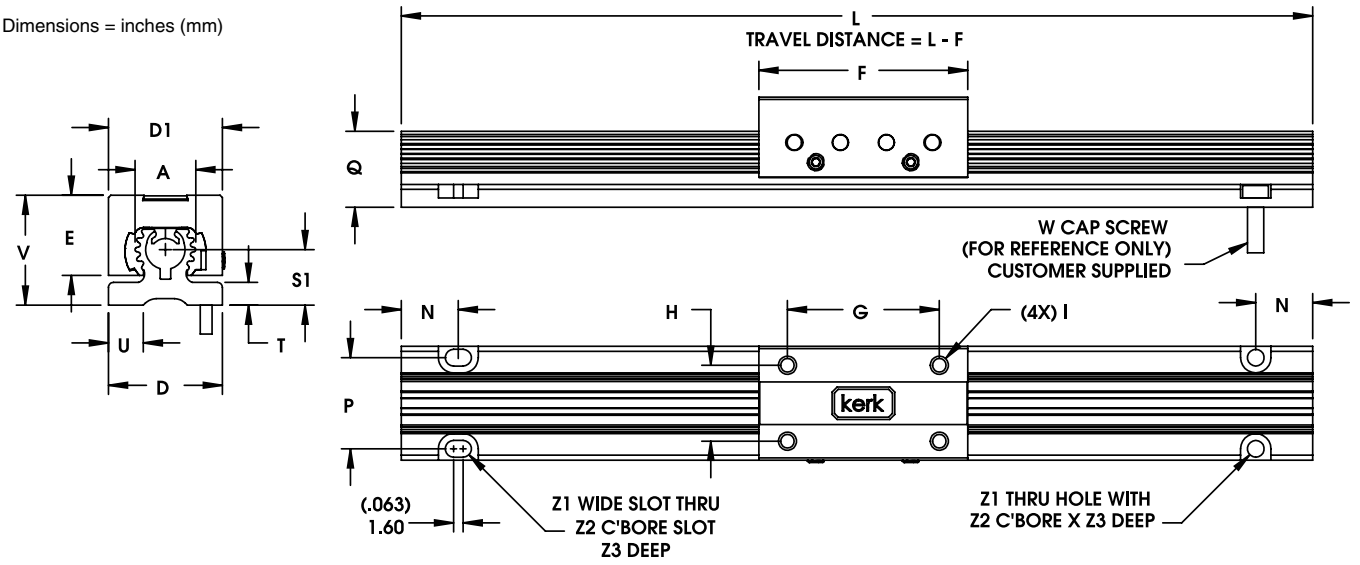
FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

Dimensional Drawings: RGS06 WITHOUT motor and WITHOUT Guide Screw STANDARD Series

Recommended for horizontal loads up to 35 lbs (156 N)

Dimensions = inches (mm)

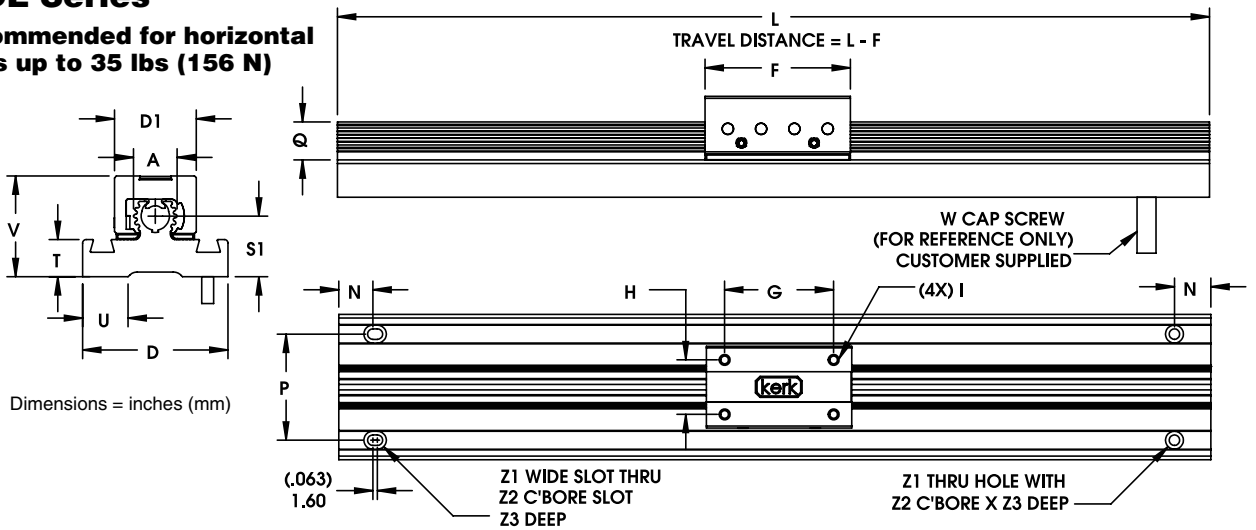


	A inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS06	.60 (15.2)	1.13 (28.6)	1.13 (28.6)	.79 (20.1)	2.0 (51)	1.500 (38.10)	.750 (19.05)	6-32 UNC	.500 (12.70)	.900 (22.86)	.74 (18.8)	.55 (14.0)	.22 (5.6)	.35 (8.9)	1.1 (28)	.14 (3.6)	.25 (6.4)	.13 (3.3)

* Metric carriage hole sizes available: M3, M4, M5 and M6

Dimensional Drawings: RGW06 WITHOUT motor and WITHOUT Guide Screw WIDE Series

Recommended for horizontal loads up to 35 lbs (156 N)



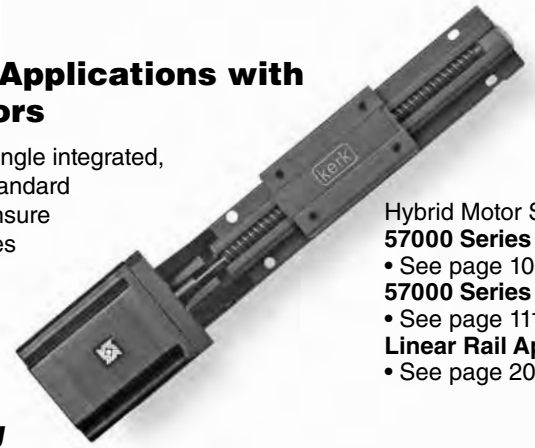
Dimensions = inches (mm)

	A inch (mm)	D inch (mm)	D1 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW06	.60 (15.2)	2.00 (50.8)	1.13 (28.6)	2.00 (50.8)	1.500 (38.10)	.750 (19.05)	6-32 UNC	.500 (12.70)	1.460 (37.08)	1.04 (26.4)	.83 (21.2)	.51 (13.0)	.63 (16.0)	1.4 (36)	.14 (3.6)	.25 (6.4)	.14 (3.6)

* Metric carriage hole sizes available: M3, M4, M5 and M6

RGS08 Series for Heavier Weight Applications with Hybrid 57000 Series Stepper Motors

A combination of patented motion technologies into a single integrated, linear motion control system. RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.



RGS08
57000 Series Size 23
Double Stack

Hybrid Motor Specifications:
57000 Series Size 23 Single Stack
• See page 106
57000 Series Size 23 Double Stack
• See page 111
Linear Rail Applications Checklist
• See page 203

Identifying the Motorized RGS part number codes when ordering

RG	S	08	K	–	M	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard

Frame Size Load
08 = 50 lbs (222 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
M = Motorized

Nominal Thread Lead Code
0098 = .098-in (2.50)
0100 = .100-in (2.54)
0197 = .197-in (5.00)
0200 = .200-in (5.08)
0500 = .500-in (12.70)
0630 = .630-in (16.00)
1000 = 1.000-in (25.4)

Unique Identifier
Suffix used to identify specific motors (57000 Single/ Double Stack – or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

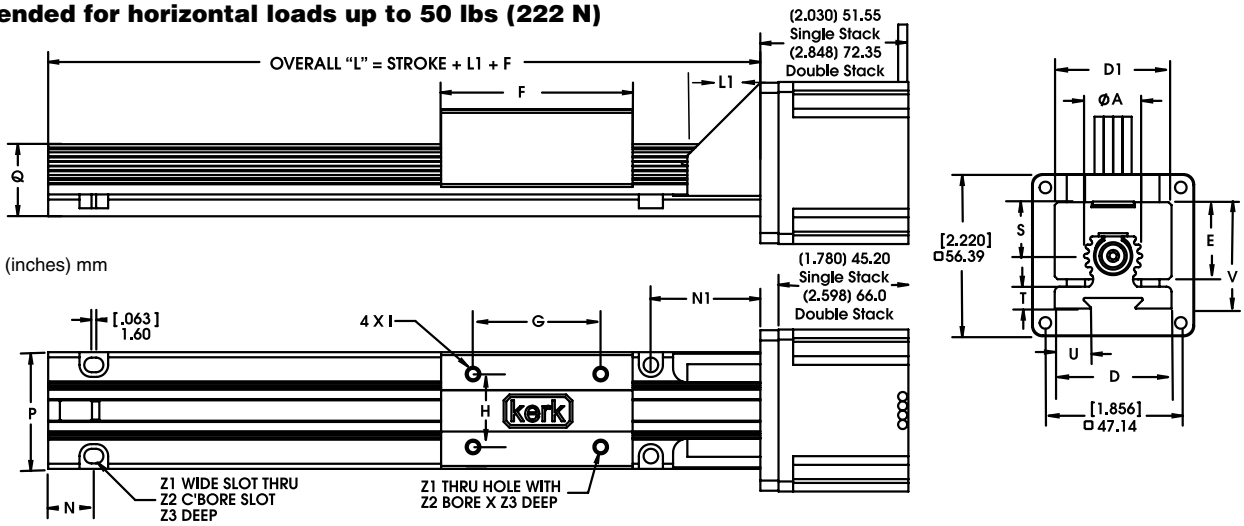
Haydon Kerk Motion Solutions Kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Carriage holes available in Metric sizes
M3
M4
M5
M6

RGS08® with 57000 Series Size 23 Single and Double Stack linear motors

Recommended for horizontal loads up to 50 lbs (222 N)



Dimensions = (inches) mm

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.8)	(1.6)	(1.6)	(1.06)	(2.7)	(1.75)	(1.0)	10-24	(1.0)	(0.625)	(1.5)	(1.25)	(1.0)	(0.74)	(0.3)	(0.51)	(1.47)	(0.2)	(0.33)	(0.19)
mm	20.3	40.6	40.6	26.9	68.6	44.5	25.4	UNC	25.4	15.9	38.1	15.9	25.4	18.8	7.6	12.9	37.3	5.1	8.4	4.8

* Metric threads also available for carriage.

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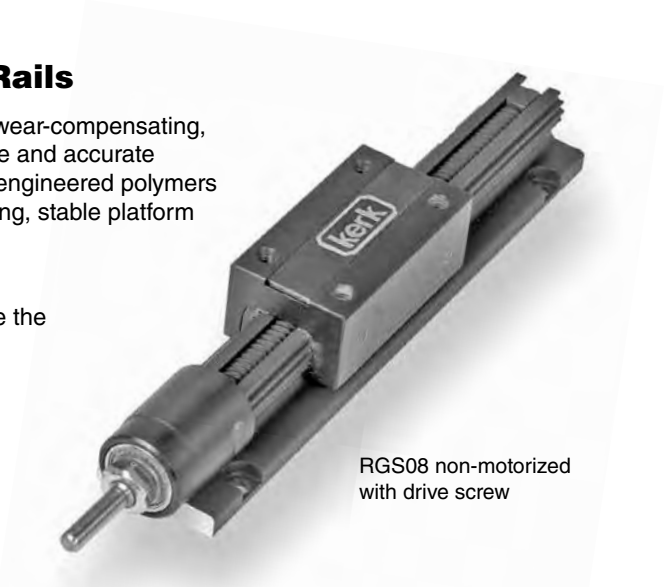
RGS08 Non-Motorized Linear Rails

Non-motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.



RGS08 non-motorized with drive screw

Identifying the Non-Motorized RGS part number codes when ordering

RG	S	08	K	–	A	0200	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard

Frame Size Load

08 = 50 lbs (222 N) (Maximum static load)

Coating

K = TFE Kerkote®

X = Special (example: Kerkote with grease

Drive / Mounting

A = None

Nominal Thread Lead Code

0000 = No screw

0100 = .100-in (2.54)

0200 = .200-in (5.08)

0500 = .500-in (12.70)

1000 = 1.000-in (25.4)

Unique Identifier

Suffix used to identify specific features – or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Carriage holes available in Metric sizes
M3
M4
M5
M6

RGS08 Screw-Driven STANDARD Series linear rail WITHOUT MOTOR

Specifications

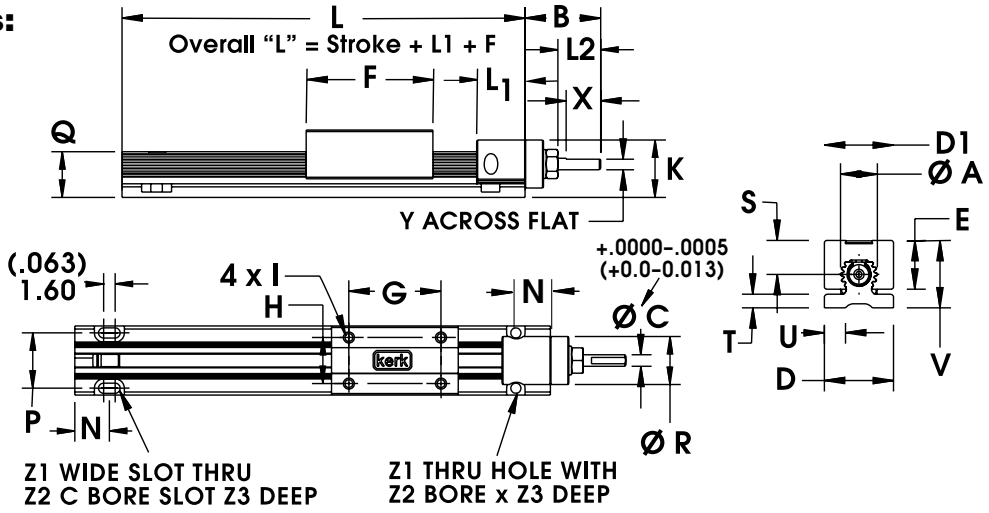
	Inch Lead inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load* oz-in/lb (N-m/Kg)	Design Load* lbs (N)	Screw Inertia oz-in sec²/in (KgM²/M)
RGS08 Non-Motorized with Guide Screw	.100 (2.54)	**0100**	0.8 (20.3)	1/2 (12.7)	5.0 (.04)	100,000,000 (254,000,000)	1.1 (.018)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
	.200 (5.08)	**0200**	0.8 (20.3)	1/2 (12.7)	6.0 (.04)	100,000,000 (254,000,000)	1.7 (.027)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
	.500 (12.70)	**0500**	0.8 (20.3)	1/2 (12.7)	7.0 (.05)	100,000,000 (254,000,000)	3.0 (.047)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
	1.000 (25.40)	**1000**	0.8 (20.3)	1/2 (12.7)	8.0 (.06)	100,000,000 (254,000,000)	6.0 (.096)	50 (222)	5.2×10^{-5} (20.0×10^{-6})

NOTE: RGS® assemblies with lengths over 36-in. (914.4 mm) and/or leads higher than .5-in (12.7 mm) will likely have higher drag torque than listed values.

* Determined with load in a horizontal position

Dimensional Drawings: RGS08 Screw-Driven linear rail WITHOUT Motor STANDARD Series

Recommended for horizontal loads up to 50 lbs (222 N)



Dimensions = inches (mm)

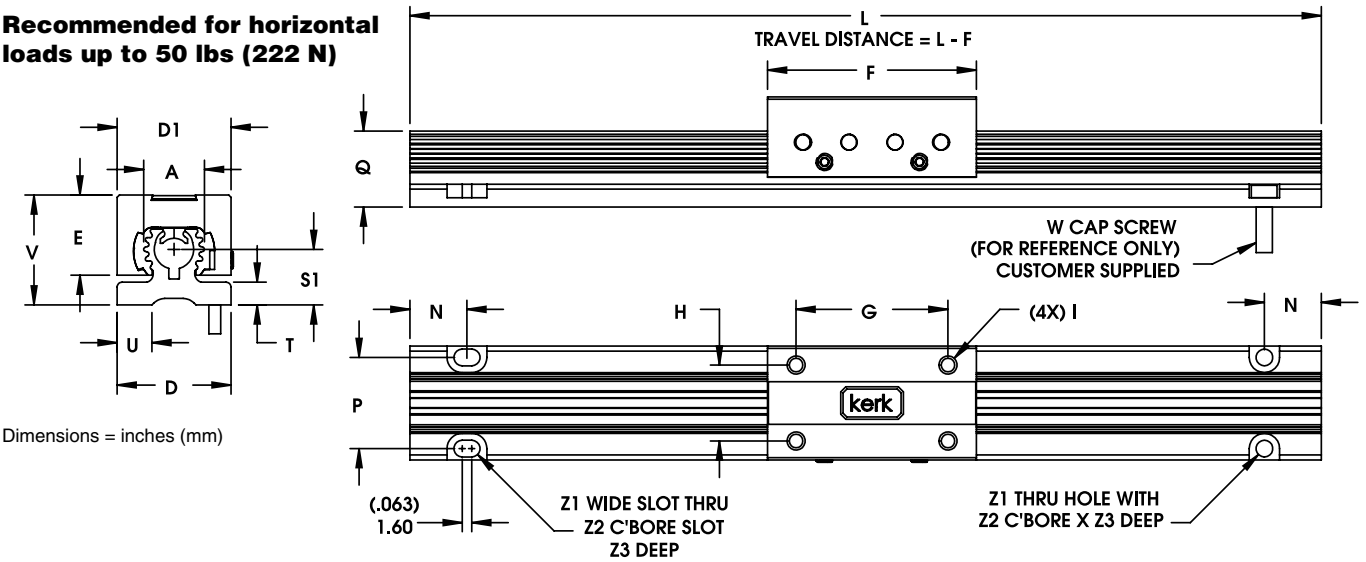
	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGS08	.80 (20.3)	1.50 (38.1)	.2500 (6.350)	1.60 (40.6)	1.60 (40.6)	1.06 (26.9)	2.7 (69)	1.750 (44.45)	1.000 (25.4)	10-24 UNC	1.3 (33)	1.09 (27.7)	.77 (19.6)	.625 (15.88)

	P inch (mm)	Q inch (mm)	R inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS08	1.250 (31.75)	1.00 (25.4)	1.04 (26.4)	.74 (18.8)	.30 (7.6)	.51 (13.0)	1.47 (37.3)	.70 (17.8)	.220 (5.59)	.20 (5.1)	.33 (8.4)	.19 (4.8)

* Metric carriage hole sizes available: M3, M4, M5 and M6

Dimensional Drawings: RGS08 WITHOUT motor and WITHOUT Guide Screw STANDARD Series

Recommended for horizontal loads up to 50 lbs (222 N)



Dimensions = inches (mm)

	A inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS08	.80 (20.3)	1.60 (40.6)	1.60 (40.6)	1.06 (26.9)	2.7 (69)	1.750 (44.45)	1.00 (25.4)	10-24 UNC	.625 (15.88)	1.250 (31.75)	1.0 (25.4)	.74 (18.8)	.30 (7.6)	.51 (13.0)	1.47 (37.3)	.20 (5.1)	.33 (8.38)	.19 (4.82)

* Metric carriage hole sizes available: M3, M4, M5 and M6

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RGS10 Standard and RGW10 Wide Series Linear Rail with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors

Driven by a Size 23 Hybrid motor, the 25.4 mm (1-inch) diameter splined carriage guide has been designed to carry a weight load up to 100 lbs (445 N). A high performance motion control system combines power and precison. The system combines many Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. The Motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

Hybrid Motor Specifications:
57000 Series Size 23 Single Stack
• See page 106
57000 Series Size 23 Double Stack
• See page 111

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.

RGW10
57000 Series Size 23
Double Stack

Identifying the Motorized RGS part number codes when ordering

RG	S	10	K	–	M	0100	–	XXX

Prefix
RG = Rapid Guide Screw

Frame Style
S = Standard
W = Wide sensor mount capability

Frame Size Load
10 = 100 lbs (445 N) (Maximum static load)

Coating
K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting
M = Motorized

Nominal Thread Lead Code
0100 = .100-in (2.54)
0125 = .125-in (3.18)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0315 = .315-in (8.00)
0500 = .500-in (12.70)
0630 = .630-in (16.00)
1000 = 1.000-in (25.4)
1500 = **1**.500-in (38.10)
2000 = **2**.000-in (50.80)

Unique Identifier
Suffix used to identify specific motors (57000 Single/ Double Stack

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

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Standard products available 24-hrs.

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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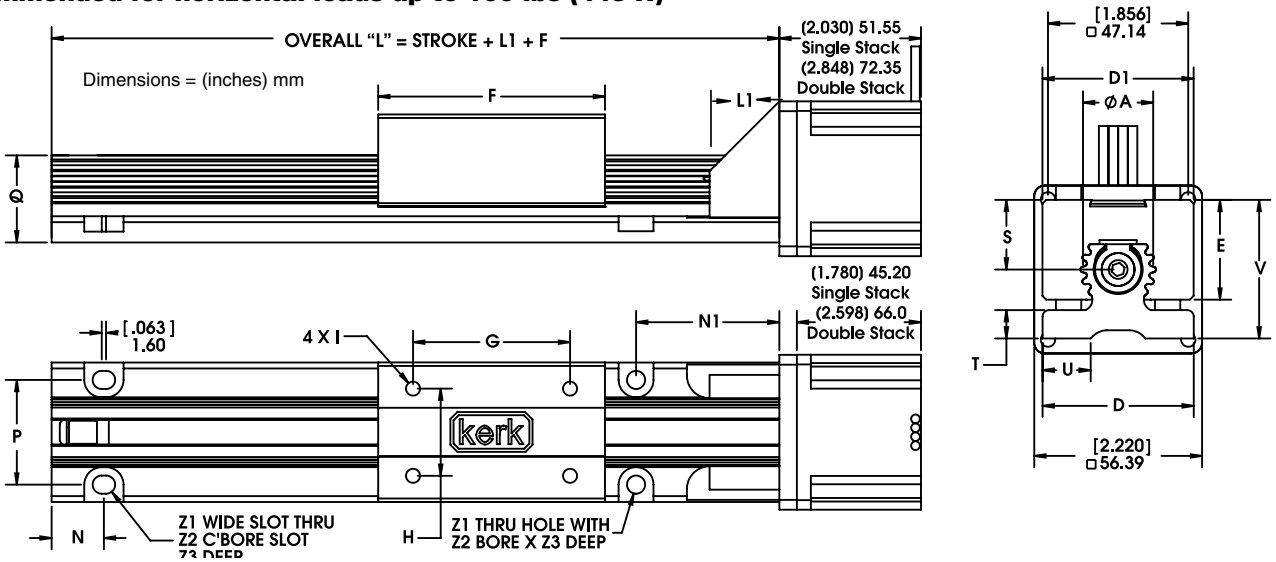
RGS10 STANDARD Series with 57000 Series Size 23 Single and Double Stack

Recommended for horizontal loads up to 100 lbs (445 N)

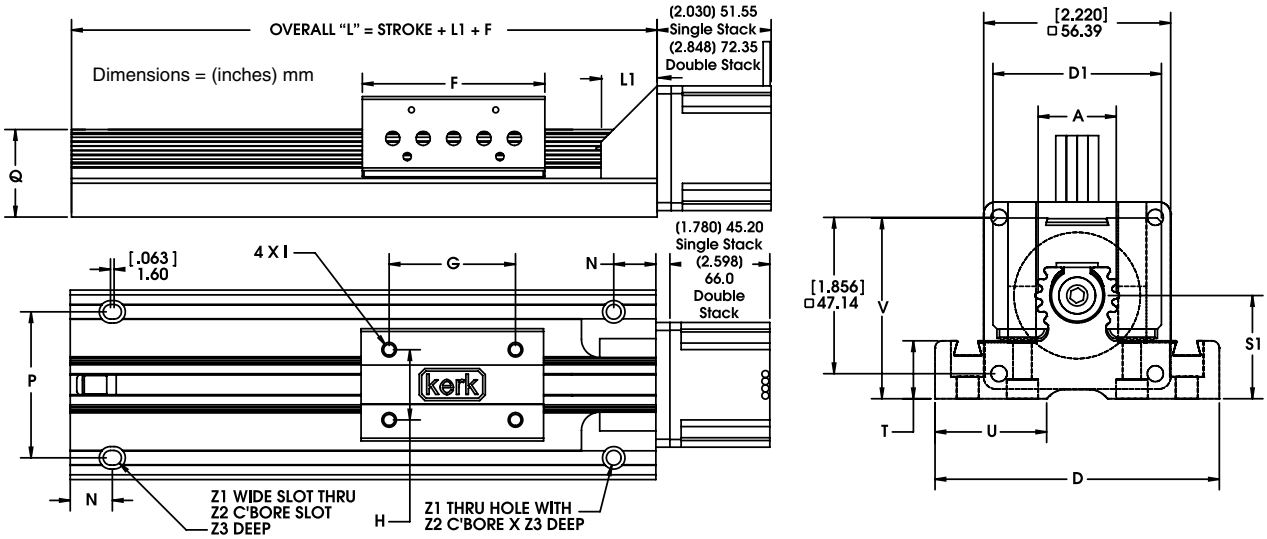


	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(1.0)	(2.0)	((2.0)	(1.32)	(3.3)	(2.25)	(1.25)	1/4-20	(1.0)	(0.75)	(2.054)	(1.5)	(1.25)	(0.92)	(0.375)	(0.64)	(1.83)	(0.26)	(0.5)	(0.22)
mm	25.4	50.8	50.8	33.5	83.8	57.1	31.7	UNC	25.4	19.0	52.2	38.1	37.1	23.4	9.53	16.3	46.5	6.6	12.7	5.6

* Metric threads also available for carriage.

RGW10 WIDE Series with 57000 Series Size 23 Single and Double Stack

Recommended for horizontal loads up to 100 lbs (445 N)



	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(1.0)	(3.38)	(2.0)	(3.3)	(2.25)	(1.25)	1/4-20	(1.0)	(0.75)	(2.6)	(1.56)	(1.22)	(0.69)	(1.33)	(2.15)	(0.26)	(0.4)	(0.43)
mm	25.4	85.9	50.8	83.8	57.1	31.7	UNC	25.4	19.0	66.0	39.6	31.0	17.5	33.8	54.6	6.6	10.2	10.9

* Metric threads also available for carriage.

RGW10 Sensor Mount Kit Part No. RGW10SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.

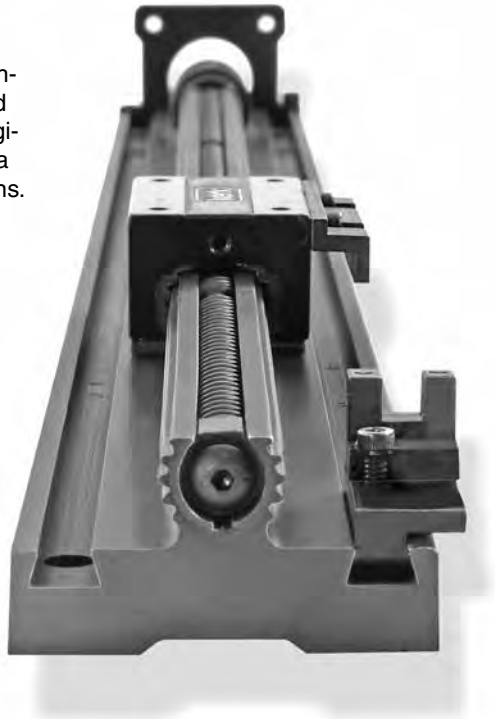
FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

RGS10 Non-Motorized Linear Rails

Non-motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite® engineered polymers running on Kerkote® TFE coating, providing a strong, stable platform for a variety of linear motion applications.

To determine what is best for your application see the Linear Rail Applications Checklist on page 203.



RGW10 non-motorized with drive screw, sensor mount, and motor mount

Identifying the Non-Motorized RGS part number codes when ordering

RG	S	10	K	–	A	0500	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard
W = Wide sensor mount capability

Frame Size Load

10 = 100lbs (445 N) (Maximum static load)

Coating

K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting

A = None

B = In-line screw motor mount

Nominal Thread Lead Code

0000 = No screw

0100 = .100-in (2.54)
0200 = .200-in (5.08)
0500 = .500-in (12.70)
1000 = 1.000-in (25.4)

Unique Identifier

Suffix used to identify specific features

– or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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Standard products available 24-hrs.

RGS10 Screw-Driven linear rail WITHOUT MOTOR STANDARD Series

Specifications

	Inch Lead inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load* oz-in/lb (N-m/Kg)	Design Load* lbs (N)	Screw Inertia oz-in sec^2/in (KgM^2/M)
RGS10 Non-Motorized with Guide Screw	.100 (2.54)	**0100**	1.0 (25.4)	5/8 (15.9)	5.0 (.04)	100,000,000 (254,000,000)	1.3 (.020)	100 (445)	14.2 x 10^{-5} (3.9 x 10^{-5})
	.200 (5.08)	**0200**	1.0 (25.4)	5/8 (15.9)	6.5 (.05)	100,000,000 (254,000,000)	2.0 (.031)	100 (445)	14.2 x 10^{-5} (3.9 x 10^{-5})
	.500 (12.70)	**0500**	1.0 (25.4)	5/8 (15.9)	7.0 (.05)	100,000,000 (254,000,000)	3.0 (.047)	100 (445)	14.2 x 10^{-5} (3.9 x 10^{-5})
	1.000 (25.40)	**1000**	1.0 (25.4)	5/8 (15.9)	8.5 (.06)	100,000,000 (254,000,000)	6.5 (.101)	100 (445)	14.2 x 10^{-5} (3.9 x 10^{-5})

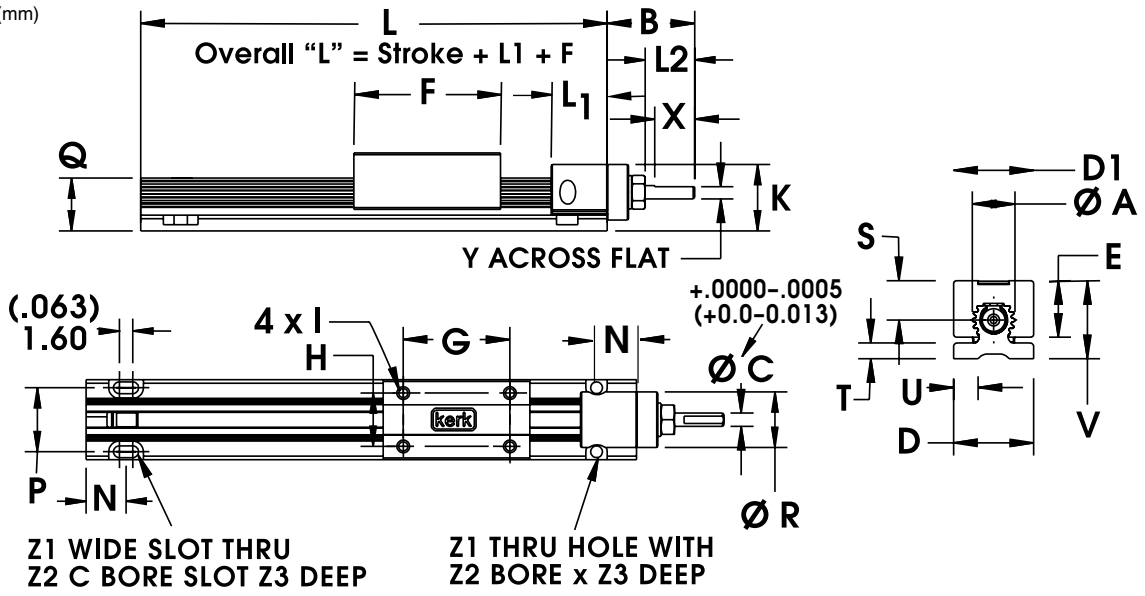
NOTE: RGS® assemblies with lengths over 36-in. (914.4 mm) and/or leads higher than .5-in (12.7 mm) will likely have higher drag torque than listed values.

* Determined with load in a horizontal position

Dimensional Drawings: RGS10 Screw-Driven linear rail WITHOUT MOTOR STANDARD Series

Recommended for horizontal loads up to 100 lbs (445 N)

Dimensions = inches (mm)



	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I* 	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGS10	1.00 (25.4)	1.75 (44.5)	.3125 (7.938)	2.00 (50.8)	2.00 (50.8)	1.32 (33.5)	3.3 (83)	2.250 (57.15)	1.250 (31.8)	1/4-20 UNC	1.6 (41)	1.30 (33.0)	.30 (33.0)	.750 (19.05)

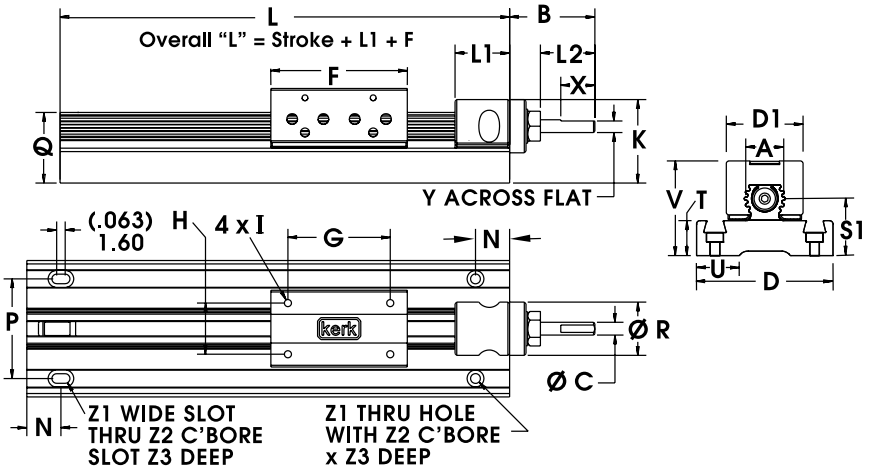
	P inch (mm)	Q inch (mm)	R inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS10	1.500 (38.10)	1.25 (31.8)	1.30 (33.0)	.92 (23.4)	.375 (9.5)	.64 (16.3)	1.83 (46.5)	.88 (22.4)	.280 (7.11)	.26 (6.6)	.50 (12.7)	.22 (5.6)

* Metric carriage hole sizes available: M3, M4, M5 and M6

Dimensional Drawings: RGW10 WIDE Series Screw-Driven linear rail WITHOUT MOTOR

Recommended for horizontal loads up to 100 lbs (445 N)

Dimensions = inches (mm)



	A inch (mm)	B inch (mm)	C inch (mm)	D inch (mm)	D1 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	K inch (mm)	L1 inch (mm)	L2 inch (mm)	N inch (mm)
RGW10	1.00 (25.4)	1.75 (44.5)	.3125 (7.938)	3.38 (85.7)	2.00 (50.8)	3.3 (83)	2.250 (57.15)	1.250 (31.75)	1/4-20 (UNC)	1.9 (48)	1.30 (33.0)	1.30 (33.0)	.750 (19.05)

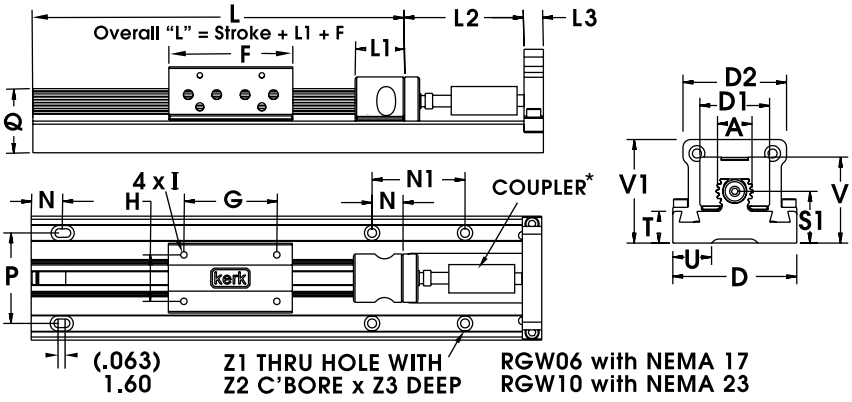
	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	X inch (mm)	Y inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW10	2.600 (66.04)	1.56 (39.6)	1.22 (31.0)	.69 (17.5)	1.33 (33.8)	2.15 (54.6)	.88 (22.4)	.280 (7.11)	.26 (6.6)	.40 (10.2)	.43 (10.9)

* Metric carriage hole sizes available: M3, M4, M5 and M6

MOTOR MOUNT for RGW10 WIDE Series Screw-Driven linear rail WITHOUT MOTOR

Dimensions = inches (mm)

* NOTE: The coupling shown in the Dimensional Drawing is not included.



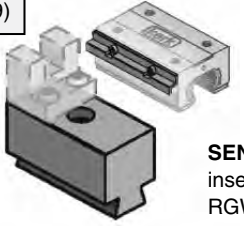
	A inch (mm)	D inch (mm)	D1 inch (mm)	D2 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	L1 inch (mm)	L2 inch (mm)	L3 inch (mm)	N inch (mm)	N1 inch (mm)
RGW10	1.00 (25.4)	3.38 (85.7)	2.00 (50.8)	2.22 (56.4)	3.3 (83)	2.250 (57.15)	1.250 (31.75)	1/4-20 UNC	1.30 (33.0)	2.16 (54.9)	.50 (12.7)	.750 (19.05)	1.50 (38.1)

	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	V1 inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW10	2.600 (66.04)	1.56 (39.6)	1.22 (31.0)	.69 (17.5)	1.33 (33.8)	2.15 (54.6)	2.34 (59.3)	.26 (6.6)	.40 (10.2)	.43 (10.9)

* Metric carriage hole sizes available: M3, M4, M5 and M6

RGW10 Sensor Mount Kit Part No. RGW10SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufacturer.



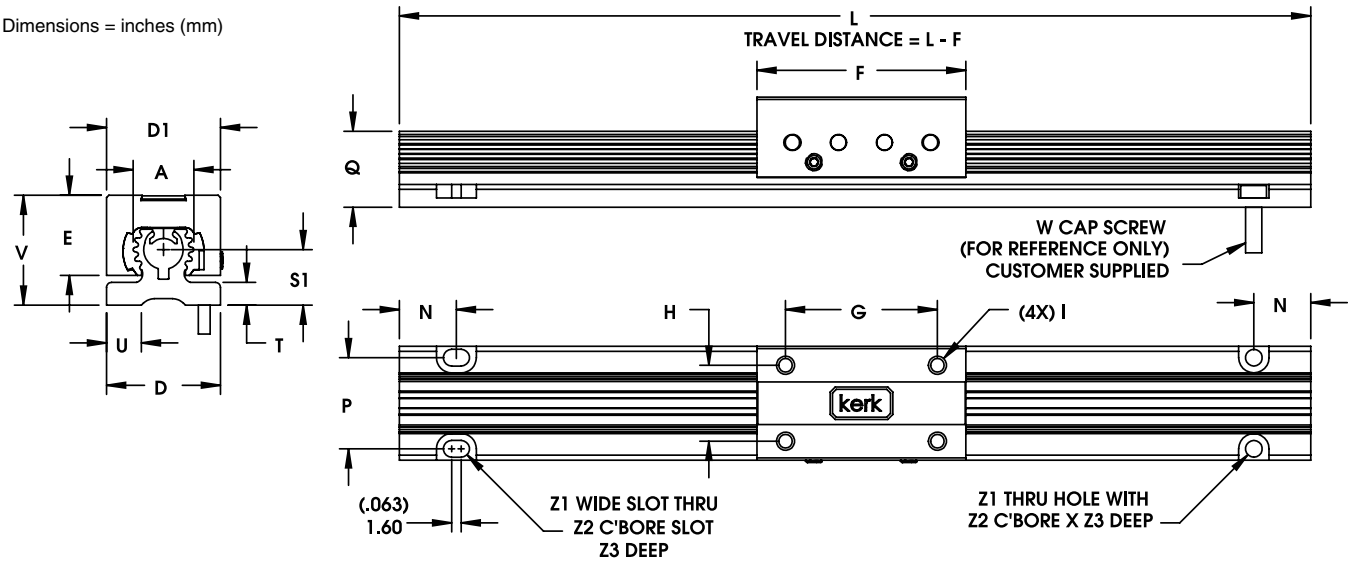
FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

Dimensional Drawings: RGS10 WITHOUT motor and WITHOUT Guide Screw STANDARD Series

Recommended for horizontal loads up to 100 lbs (445 N)

Dimensions = inches (mm)



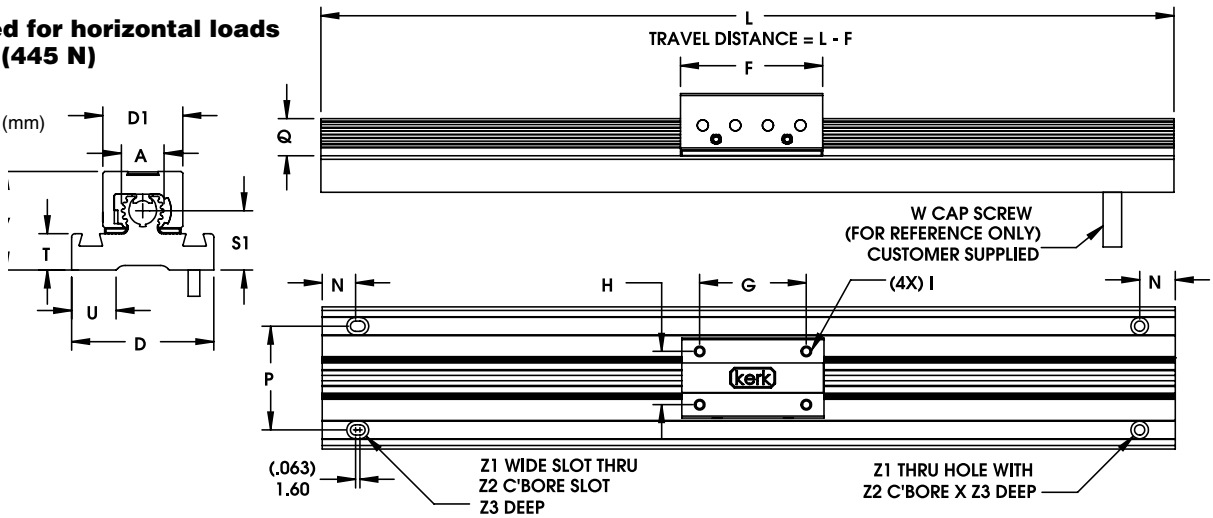
	A inch (mm)	D inch (mm)	D1 inch (mm)	E inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGS10	1.00 (25.4)	2.00 (50.8)	2.00 (50.8)	1.32 (33.5)	3.3 (83)	2.250 (57.15)	1.250 (31.75)	1/4-20 UNC	.750 (19.05)	1.500 (38.10)	1.25 (31.8)	.92 (23.4)	.375 (9.5)	.64 (16.3)	1.83 (46.5)	.26 (6.6)	.50 (12.7)	.22 (5.6)

* Metric carriage hole sizes available: M3, M4, M5 and M6

Dimensional Drawings: RGW10 WITHOUT motor and WITHOUT Guide Screw WIDE Series

Recommended for horizontal loads up to 100 lbs (445 N)

Dimensions = inches (mm)



	A inch (mm)	D inch (mm)	D1 inch (mm)	F inch (mm)	G inch (mm)	H inch (mm)	I*	N inch (mm)	P inch (mm)	Q inch (mm)	S inch (mm)	T inch (mm)	U inch (mm)	V inch (mm)	Z1 inch (mm)	Z2 inch (mm)	Z3 inch (mm)
RGW10	1.00 (25.4)	3.38 (85.7)	2.00 (50.8)	3.3 (83)	2.250 (57.15)	1.250 (31.75	1/4-20 UNC	.750 (19.05	2.600 (66.04)	1.56 (39.6)	1.22 (31)	.69 (17.5)	1.33 (33.8)	2.15 (54.6)	.26 (6.6)	.40 (10.2)	.43 (10.9)

* Metric carriage hole sizes available: M3, M4, M5 and M6

WGS06 Motorized Low Profile Linear Rails 43000 Series Size 17 Single/Double Stack

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

WGS06 Linear Rail with Hybrid 43000 Series Size 17 Single and Double Stacks and 57000 Series Size 23 Single and Double Stacks

Kerk® Motorized WGS Linear Slide utilizes a screw-driven carriage that offers reliable, continuous linear speed while maintaining accurate positioning. The length and speed of the WGS is not limited by critical screw speed, allowing high RPM, linear speed and long stroke lengths. The WGS slide has a unique, compact profile that provides improved torsional stiffness and stability over RGS and RGW products.

Hybrid Motor Specifications:
43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 Double Stack
• See page 102
43000 Series Size 17 IDEA™ Drive
• See page 100
Programmable IDEA™ Drive
• See page 194
57000 Series Size 23 Single Stack
• See page 106
57000 Series Size 23 Double Stack
• See page 111
Integrated Connector Option
• See page 117

To determine which motor assembly is best for your application see the Linear Rail Applications Checklist on page 203.

WGS06 with Size 17 [43 mm] hybrid linear stepper motor
– and –
WGS06 with Size 17 [43 mm] with an optional PC programmable IDEA™ Drive (not available for Size 23 motor)

Identifying the Motorized WGS part number codes when ordering

WG	S	06	K	–	G	0100	–	XXX

Prefix
WG =Wide Guide Screw

Frame Style
S = Standard

Frame Size Load*
06 = Max. static load 35 lbs (156 N)

Coating
K = TFE wear resist, dry lubricant Kerkote®
X = Special coating, *(Example: Kerkote® with grease)*

Drive / Mounting
M = Motorized
G = IDEA™ integrated programmable drive - USB communications
J = IDEA™ integrated programmable drive - RS485 communications

Nominal Thread Lead Code
0100 = 0.1-in (2.54)
0200 = 0.2-in (5.08)
0500 = 0.5-in (12.7)
1000 = 1.0-in (25.4)

Unique Identifier
– M43 = 43000 Series Size 17 Motor
– G43 = 43000 Series Size 17 Motor with IDEA Drive
– M57 = 57000 Series Size 23 Motor
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

WGS06 Motorized Selector Chart

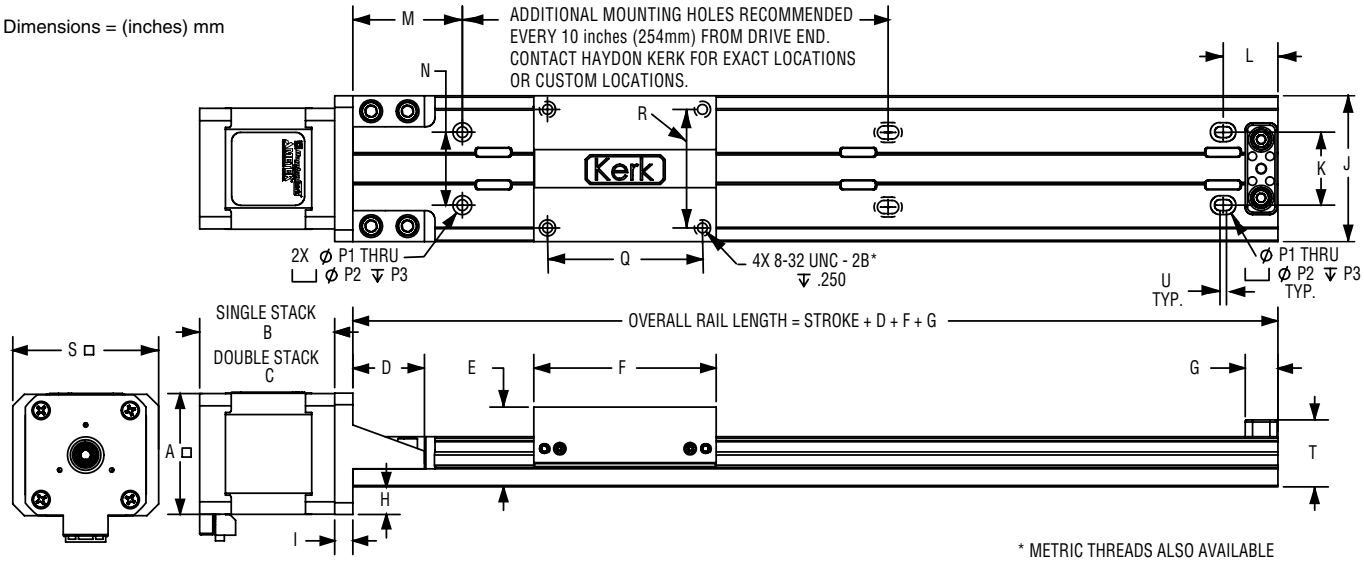
Motorized with Size 17 and Size 23 Single and Double Stack Hybrid Linear Actuator Stepper Motors

Inch Lead	inch (mm)	0.050 (1.27)	0.079 (2.00)	0.100 (2.54)	0.157 (4.00)	0.197 (5.00)	0.200 (5.08)	0.250 (6.35)	0.375 (9.53)	0.400 (10.16)	0.472 (12.00)	0.500 (12.70)	0.750 (19.05)	0.984 (25.00)	1.000 (25.40)	1.200 (30.48)
Thread Lead Code		**0050**	**0079**	**0100**	**0157**	**0197**	**0200**	**0250**	**0375**	**0400**	**0472**	**0500**	**0750**	**0984**	**1000**	**1200**

WGS06 Low Profile Linear Slide with Hybrid 43000 Size 17 Single and Double Stack linear motors

Recommended for horizontal loads up to 35 lbs (156 N)

Dimensions = (inches) mm



* METRIC THREADS ALSO AVAILABLE

(MM) INCH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U
-M43 SIZE 17	(42.2) 1.660 MAX.	(33.8) 1.330 MAX.	(47.75) 1.880 MAX.	(24.9) .98	(27.9) 1.1	(63.5) 2.50	(11.2) .44	(9.7) .38	(6.4) .250	(50.8) 2.00	(25.4) 1.000	(19.1) .75	(38.1) 1.50	(25.4) 1.000	(3.81) .150	(6.60) .260	(6.50) .256	(53.95) 2.124	(41.25) 1.624	(50.8) 2.00	(23.3) .92	(2.3) .090

* Metric carriage hole sizes available: M3, M4, M5 and M6

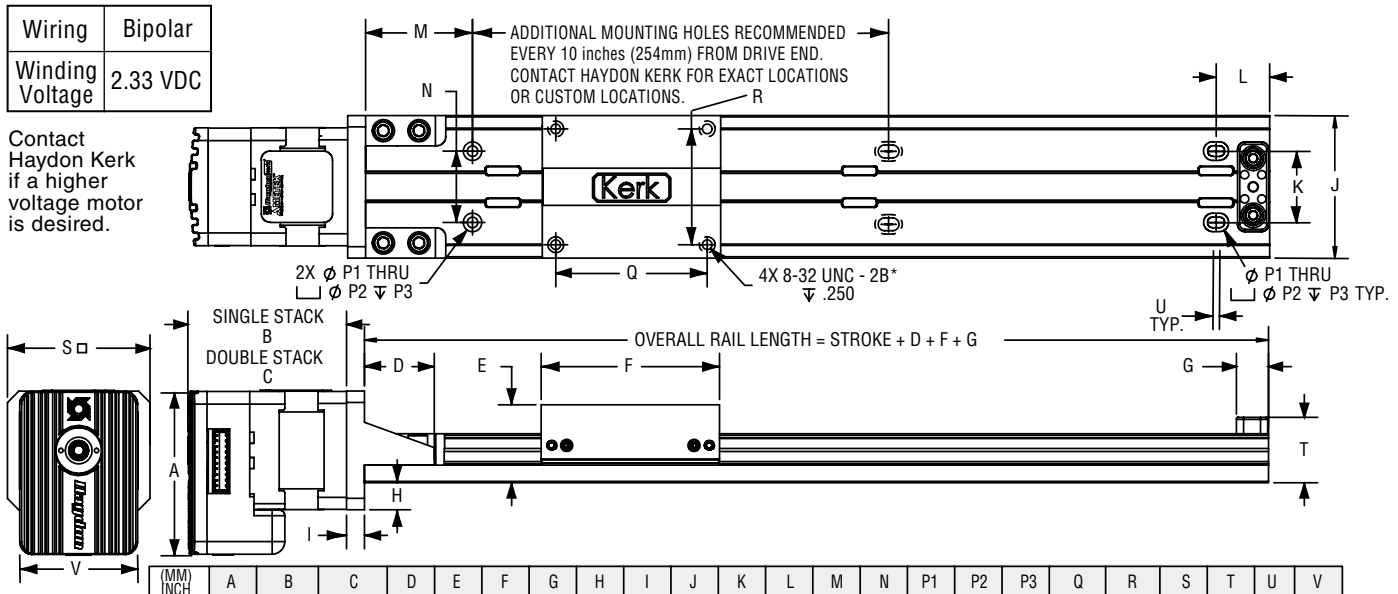
Haydon Kerk Motion Solutions, Inc. • www.haydonkerkpittman.com • Phone: 800 243 2715 • International: 203 756 7441

WGS06 Low Profile Linear Slide with Hybrid 43000 Size 17 Single and Double Stack linear motors with programmable IDEA™ Drive

Recommended for horizontal loads up to 35 lbs (156 N)

Wiring	Bipolar
Winding Voltage	2.33 VDC

Contact Haydon Kerk if a higher voltage motor is desired.



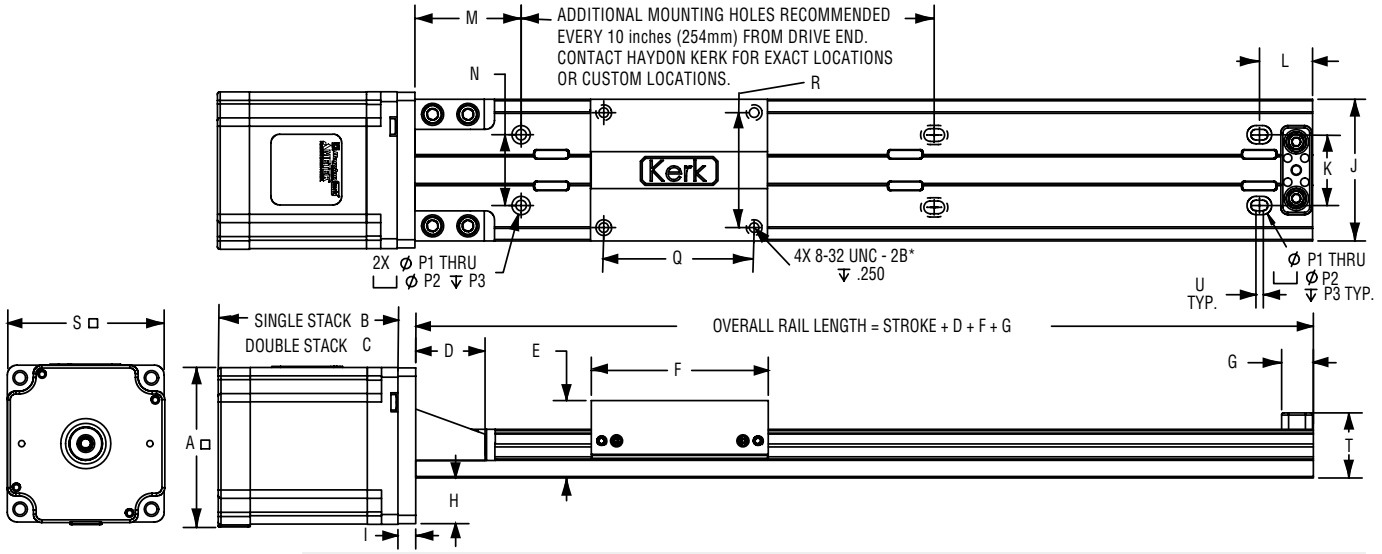
(MM) INCH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U	V
-G43 SIZE 17	(58.0) 2.283 MAX.	(63.72) 2.509 MAX.	(77.67) 3.058 MAX.	(24.9) .98	(27.9) 1.1	(63.5) 2.50	(11.2) .44	(9.7) .38	(6.4) .250	(50.8) 2.00	(25.4) 1.000	(19.1) .75	(38.1) 1.50	(25.4) 1.000	(3.81) .150	(6.60) .260	(6.50) .256	(53.95) 2.124	(41.25) 1.624	(50.8) 2.00	(23.3) .92	(2.3) .090	(42.0) 1.66

Dimensions = (mm) inch

* Metric carriage hole sizes available: M3, M4, M5 and M6

WGS06 Low Profile Linear Slide with Hybrid 57000 Size 23 Single and Double Stack linear motors

Recommended for horizontal loads up to 35 lbs (156 N)



Dimensions = (mm) inch

(MM) INCH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U
-M57 SIZE 23	(56.4) 2.220 MAX.	(45.2) 1.780 MAX.	(66) 2.598 MAX.	(24.9) .98	(27.9) 1.1	(63.5) 2.50	(11.2) .44	(16.5) .65	(6.4) .250	(50.8) 2.00	(25.4) 1.000	(19.1) .75	(38.1) 1.50	(25.4) 1.000	(3.81) .150	(6.60) .260	(6.50) .256	(53.95) 2.124	(41.25) 1.624	(56.4) 2.220 MAX.	(23.3) .92	(2.3) .090

* Metric carriage hole sizes available: M3, M4, M5 and M6

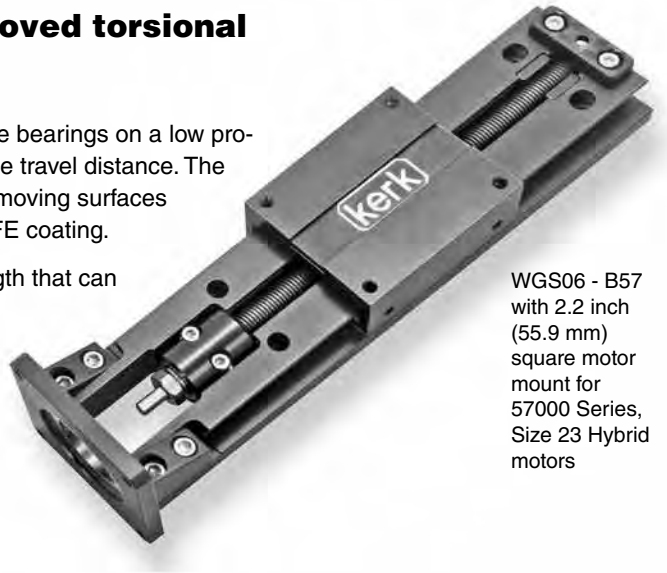
WGS™ Non-Motorized Linear Rail for improved torsional stiffness and linear motion stability

Kerk® Non-Motorized WGS Linear Slide utilizes sliding plane bearings on a low profile aluminum guide rail that keeps the motion smooth throughout the travel distance. The lead-screw is precision-made of high-quality stainless steel and all moving surfaces include Kerkite® high performance polymers running on Kerkote® TFE coating.

The integral mounting base can provide support over the entire length that can extend up to 8 feet (2.4 meters). Longer lengths are possible on a special order basis.

The slides come with a wear-compensating, anti-backlash driven carriage. Additional driven or passive carriages can be added, along with application specific customization. Linear guides, without the drive screw, are also available.

To determine which motor assembly is best for your application see the Linear Rail Applications Checklist on page 203.



WGS06 - B57 with 2.2 inch (55.9 mm) square motor mount for 57000 Series, Size 23 Hybrid motors

Identifying the Non-Motorized WGS part number codes when ordering

WG	S	06	K	–	G	0100	–	A00

Prefix

WG = Wide Guide Screw

Frame Style

S = Standard

Frame Size Load*

06 = Max. static load 35 lbs (156 N)

Coating

K = TFE wear resist, dry lubricant Kerkote®

X = Special coating, *(Example: Kerkote® with grease)*

Drive / Mounting

A = None

B = In-line motor mount

Nominal Thread Lead Code

0050 = 0.05-in (1.27)
0079 = 0.079-in (2.0)
0157 = 0.157-in (4.0)
0197 = 0.197-in (5.0)
0250 = 0.25-in (6.35)
0375 = 0.375-in (9.53)
0400 = 0.40-in (10.16)
0472 = 0.472--in (12.0)
0750 = 0.75-in (19.05)
0984 = 0.984-in (25.0)
0100 = 0.1-in (2.54)
0200 = 0.2-in (5.08)
0500 = 0.5-in (12.7)
1000 = 1.0-in (25.4)
1200 = 1.20-in (30.48)

Unique Identifier

– A00 = Without Motor Mount
– B43 = Motor Mount for Size 17
– B57 = Motor Mount for Size 23

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Carriage holes available in Metric sizes
M3
M4
M5
M6

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

WGS Non-Motorized Product Selector Chart

	Inch Lead** inch (mm)	Thread Lead Code	Nominal Screw Diam. inch (mm)	Typical Drag Torque oz - in (N-m)	Life @ 1/4 Design Load* inch (cm)	Torque-to-Move Load oz-in/lb (N-m/Kg)	Design Load lbs (N)	Screw Inertia oz-in-sec^2/in (kg-m-sec^2/m)
WGS	.100 (2.54)	**0100**	3/8 (9.5)	4.0 (.03)	100,000,000 (254,000,000)	1.0 (.016)	35 (156)	1.5 x 10^{-5} (4.2 x 10^{-6})
	.200 (5.08)	**0200**	3/8 (9.5)	5.0 (.04)	100,000,000 (254,000,000)	1.5 (.023)	35 (156)	1.5 x 10^{-5} (4.2 x 10^{-6})
	.500 (12.70)	**0500**	3/8 (9.5)	6.0 (.04)	100,000,000 (254,000,000)	2.5 (.039)	35 (156)	1.5 x 10^{-5} (4.2 x 10^{-6})
	1.000 (25.40)	**1000**	3/8 (9.5)	7.0 (.05)	100,000,000 (254,000,000)	4.5 (.070)	35 (156)	1.5 x 10^{-5} (4.2 x 10^{-6})

NOTE: WGS assemblies with lengths over 36 inches (914.4 mm) and/or leads higher than .5 inch (12.7 mm) will likely have higher drag torque than listed values.

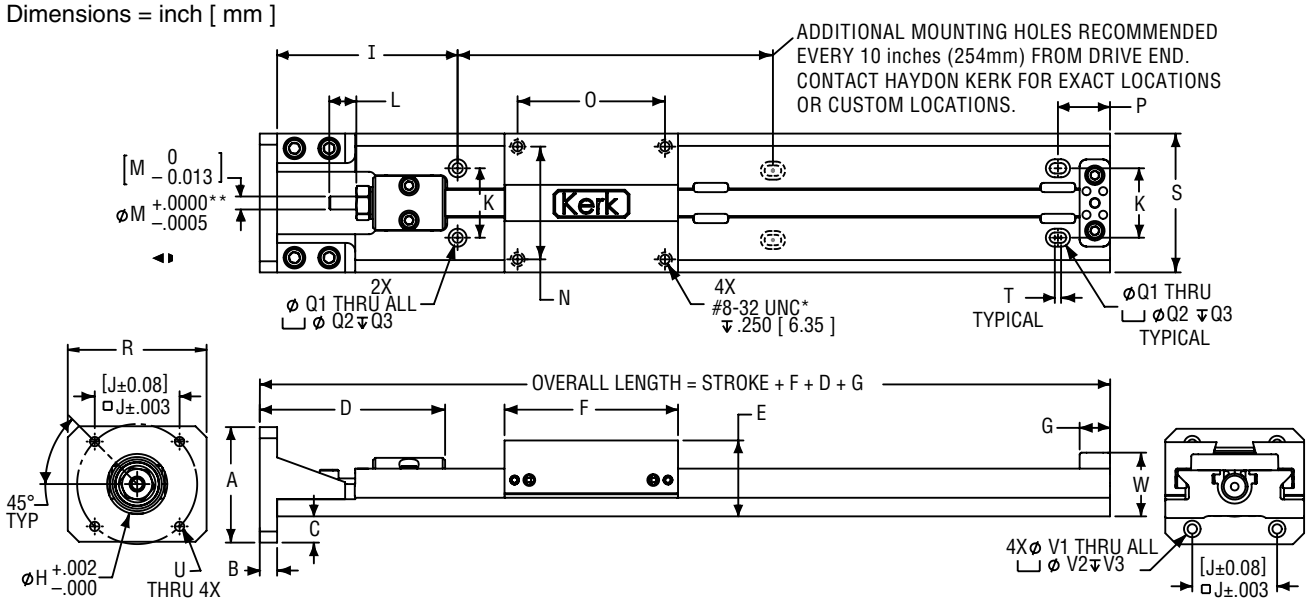
* Determined with load in a horizontal position

** Other inch and metric leads available.

Inch Lead inch (mm)	0.050 (1.27)	0.079 (2.00)	0.157 (4.00)	0.197 (5.00)	0.250 (6.35)	0.375 (9.53)	0.400 (10.16)	0.472 (12.00)	0.750 (19.05)	0.984 (25.00)	1.200 (30.48)
Thread Lead Code	**0050**	**0079**	**0157**	**0197**	**0250**	**0375**	**0400**	**0472**	**0750**	**0984**	**1200**

Dimensional Drawings: WGS Motor Mounts for 43000 Series, Size 17, and 57000 Series, Size 23 Hybrid Linear Actuator Motors

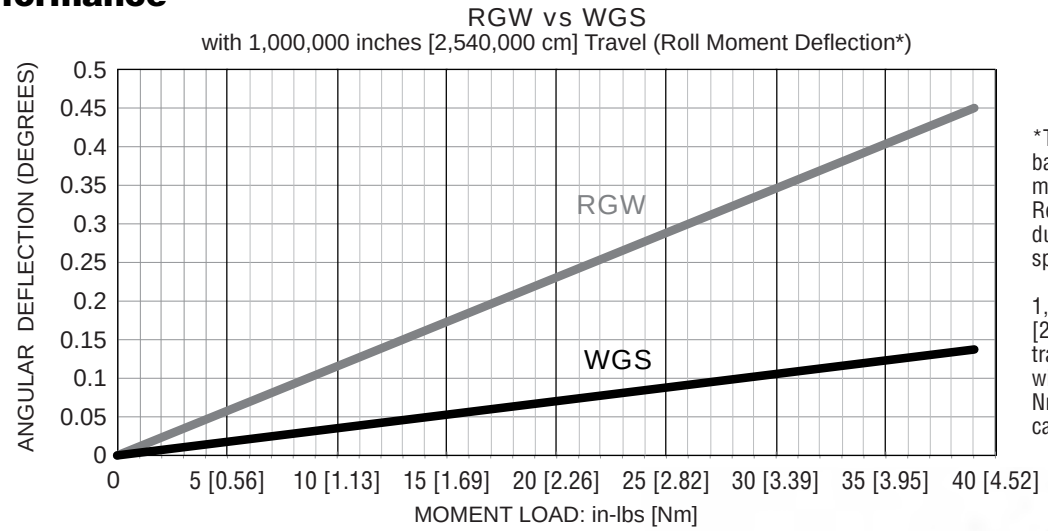
Dimensions = inch [mm]



	A inch [mm]	B inch [mm]	C inch [mm]	D inch [mm]	E inch [mm]	F inch [mm]	G inch [mm]	H inch [mm]	I inch [mm]	J inch [mm]	K inch [mm]	L inch [mm]	M** inch [mm]	N inch [mm]	O inch [mm]	P inch [mm]	Q1 inch [mm]	Q2 inch [mm]	Q3 inch [mm]	R inch [mm]	S inch [mm]	T inch [mm]	U inch [mm]	V1 inch [mm]	V2 inch [mm]	V3 inch [mm]	W inch [mm]
-B43	1.66 [42.2]	.25 [6.4]	.38 [9.7]	2.67 [67.8]	1.1 [28]	2.50 [63.5]	.44 [11.2]	.866 [22]	2.60 [66]	1.222 [31.04]	1.000 [25.4]	.39 [9.9]	.1875 [4.763]	1.624 [41.25]	2.124 [53.95]	.75 [19.05]	.150 [3.81]	.260 [6.60]	.256 [6.50]	2.00 [50.8]	2.00 [50.8]	.09 [2.3]	–	.136 [3.45]	.240 [6.09]	.128 [3.25]	.92 [23.3]
-B57	2.20 [55.9]		.65 [16.5]					1.503 [38.18]		1.856 [47.14]										2.20 [55.9]			#8-32 UNC	–	–	–	

* METRIC THREADS ALSO AVAILABLE **MAXIMUM COUPLING SIZE = .846 inch (21.49 mm) DIAMETER X 1.25 inches (31.8 mm) LENGTH

WGS Performance



*Typical values based on static measurement. Results may vary due to application specific parameters.

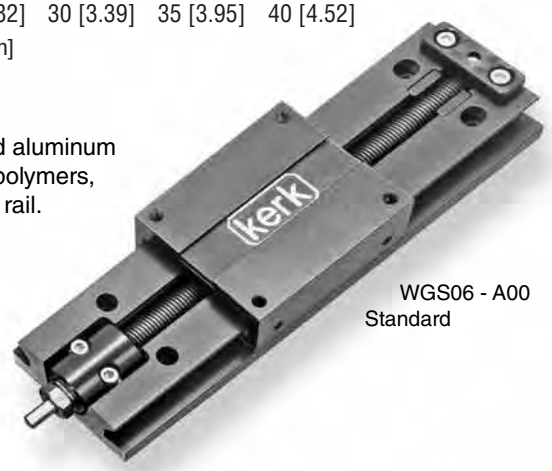
1,000,000 inches [2,540,000 cm] travel performed with 6.5 in-lb [0.73 Nm] roll moment on carriage.

WGS Standard Series

The Wide Guide Screw utilizes sliding plane bearings on a dovetailed aluminum guide rail. The plane bearings, made of Kerkite® high performance polymers, act as gibs securely mating the carriage to the Kerkote® TFE coated rail. This design reduces roll moment deflection of the carriage when compared to the RGS and RGW products.

Recommended horizontal loads:

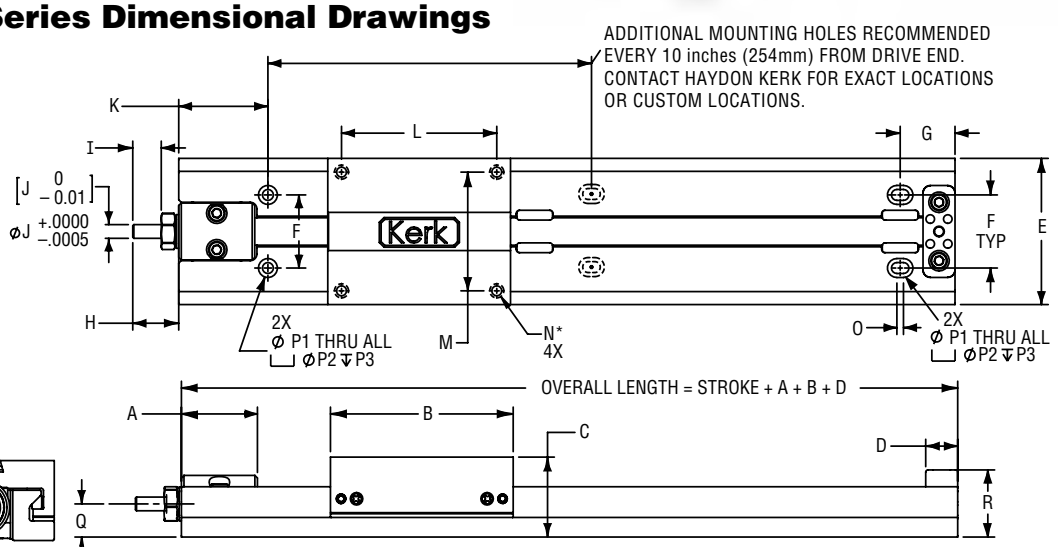
• WGS06 – up to 156 N (35 lbs)



WGS06 - A00
Standard

WGS Standard Series Dimensional Drawings

Dimensions = inch [mm]



	A inch [mm]	B inch [mm]	C inch [mm]	D inch [mm]	E inch [mm]	F inch [mm]	G inch [mm]	H inch [mm]	I inch [mm]	J inch [mm]	K inch [mm]	L inch [mm]	M inch [mm]	N* inch [mm]	O inch [mm]	P1 inch [mm]	P2 inch [mm]	P3 inch [mm]	Q inch [mm]	R inch [mm]
-A00	1.04 [26.4]	2.50 [63.5]	1.1 [28]	.44 [11.2]	2.00 [50.8]	1.000 [25.40]	.75 [19.1]	.63 [16]	.39 [9.9]	.1875 [4.763]	1.220 [39.99]	2.124 [53.95]	1.624 [41.25]	#8-32 UNC-2B	.09 [2.3]	.150 [3.81]	.260 [6.60]	.256 [6.50]	.45 [11.4]	.92 [23.3]

* METRIC THREADS ALSO AVAILABLE

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LRS™ Linear Rail Systems available with a Haydon® Hybrid 43000 Series Size 17 single and double stack linear actuator stepper motor or as a non-motorized linear rail

The LRS Linear Rail System in a variety of configurations, both motorized and non-motorized. These precision linear rail systems consist of a stationary base and a load bearing carriage that travels along a rigid extruded aluminum rail. The LRS Linear Rail System is available with several in-line motor options including a single stack or double stack size 17 stepper motor, a stepper motor with an integral chopper drive, or the IDEA™ programmable linear actuator, consisting of the stepper motor, drive, and controller programmed through a graphic user interface (GUI). The LRS is also available without a motor, easily allowing the designer flexibility to integrate with a variety of motor types and belt and pulley configurations.

LRS with Size 17 Double Stack Hybrid Linear Actuator with IDEA™ programmable Drive and Black Ice® TFE lead-screw.

LRS with Size 17 Double Stack Hybrid Linear Actuator

LRS non-motorized

Key Product Features

- "T" slots integrated into exterior rail bottom and sides that accommodate full length support and various mounting options.
- Loads easily attach to the compact, moving carriage with four or six M4 x 0.7 size screws.
- Load bearing carriage moves efficiently and smoothly within the internal rail geometry of this specially designed aluminum extrusion.
- Rail provides end-to-end axial stability and precise motion system accuracy.
- Automatic adjustments of slide bearing play with a patent pending "anti-backlash" linear bearing.
- Rated life equals that of the existing lead-screws of similar size.
- Lead-screw end configurations adapt to various rotary motion sources.
- Kerkote® or Black Ice® TFE coatings on a 303 stainless steel lead-screw.
- Designed to Metric global engineering standards.
- For extreme control, LRS can be used with CMP or WDG high-precision anti-backlash nuts, as well as a freewheeling general purpose nut.

Hybrid Motor Specifications:
43000 Series Size 17 Single Stack
• See page 95
43000 Series Size 17 Double Stack
• See page 102
43000 Series Size 17 IDEA™ Drive
• See page 100
Programmable IDEA™ Drive
• See page 194

Identifying the LRS part number codes when ordering

LR	W	04	B	–	M	0025	–	XXX

Prefix

LR = Linear Rail System (LRS)

Frame Style

B = BFW nut
C = CMP nut
W = WDG nut
G = Guide only

Frame Size Load

04 = Max. static load 50 lbs (222 N)

Coating

S = Uncoated
B = Black Ice® TFE
K = Kerkote® TFE
N = No screw

Drive / Mounting

A = None

M = Motorized 43000 Series Size 17 Hybrid

G = Motor with IDEA™ integrated programmable drive - USB communications

J = Motor with IDEA™ integrated programmable drive - RS485 communications

Nominal Thread Lead Code

0000 = No screw

0025 = .25-in (.635)
0031 = .03125-in (.794)
0039 = .0394-in (1.0)
0050 = .05-in (1.27)
0063 = .0625-in (1.588)
0079 = .0787-in (2.0)
0100 = .01-in (2.54)
0125 = .125-in (3.175)
0197 = .1969-in (5.0)
0250 = .25-in (6.35)
0394 = .3937-in (10.0)
0500 = .5-in (12.7)
0750 = .75-in (19.05)
1000 = 1.0-in (25.4)

Unique Identifier

Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

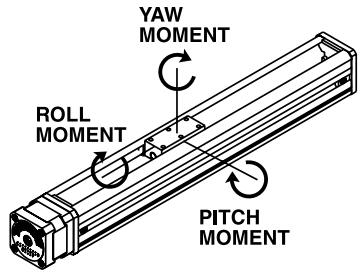
Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Haydon kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

LRS™ Linear Rail with Hybrid 43000 Size 17 linear motors

Recommended for horizontal loads up to 50 lbs (222 N)



Specifications

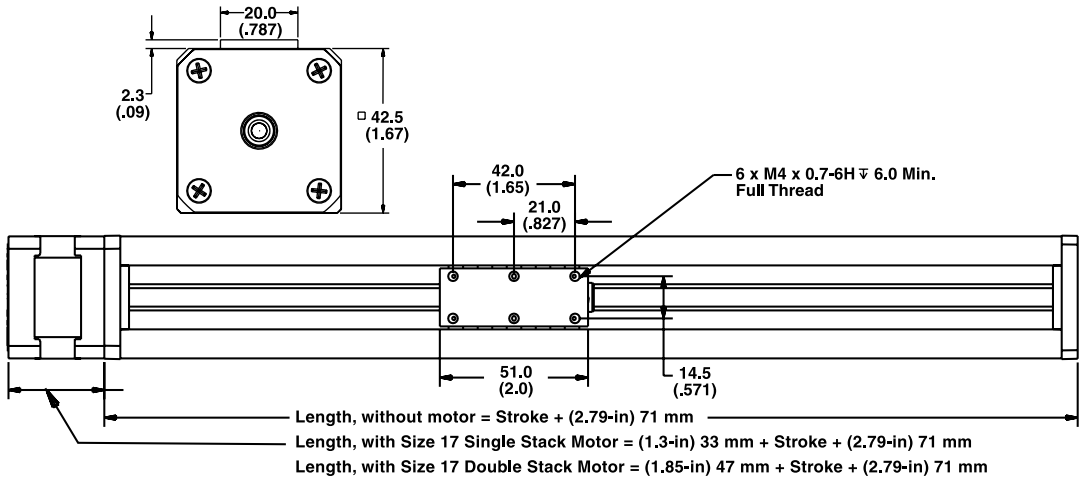
Width	Length of Stroke (max)	Speed (max)	Straight Line Accuracy	Twist
1-5/8-in square (4.3 cm square)	40-in (1000 mm)	20-in/sec (0.5 M/sec)	+/- 0.012-in/ft (+/- 1.0 mm/M)	+/- 0.25°/ft (+/- 0.75°/M)

Load Ratings *(max)*

Top Load "Z" Direction	Hanging / Gantry	Max. Pitch Moment	Max. Moment Roll	Max. Moment Yaw
50 lbs (225 N)	50 lbs (225 N)	75-in – lbs (8.5 N – M)	75-in – lbs (8.5 N – M)	75-in – lbs (8.5 N – M)

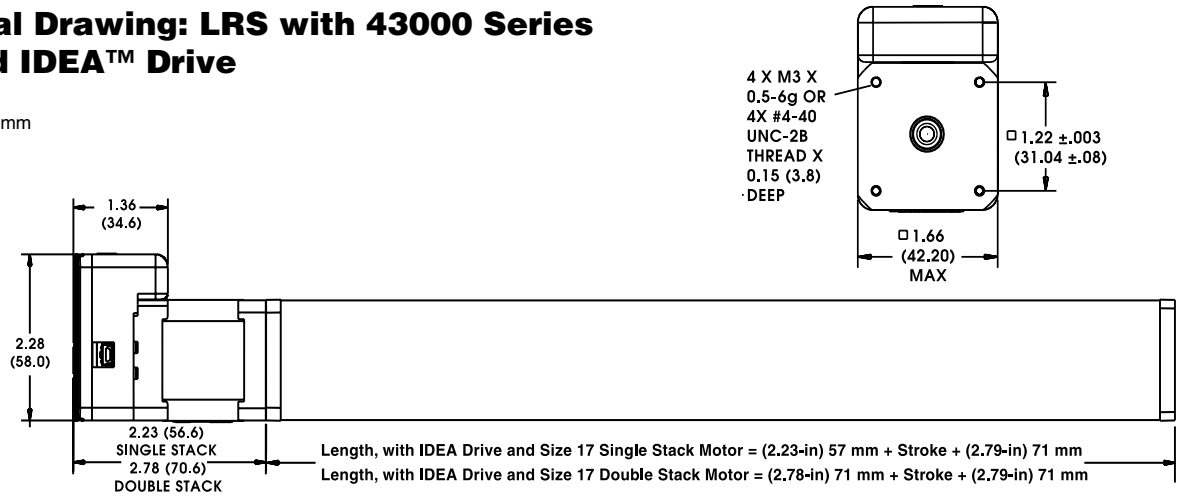
Dimensional Drawing: LRS with 43000 Series Size 17

Dimensions = (inches) mm



Dimensional Drawing: LRS with 43000 Series Size 17 and IDEA™ Drive

Dimensions = (inches) mm



LRS Anti-Backlash and "Freewheeling" Nut Assembly Options

WDG Series Anti-Backlash Assembly – For moderate loads. compact design to provide stiffness and balanced accuracy for precise positioning. For more information see page 32.

CMP Series Anti-Backlash Assembly – For light loads. Self-lubricating acetal nut; ideally suited for applications using oil or grease. See page 28.

BFW Series For applications that do not require anti-backlash, long life at minimal cost. See page 42.


ScrewRails®,
Spline Shafts and
Linear Guide Rails

Kerk® ScrewRail® Linear Actuators

Linear motion has traditionally required separate components to handle both drive and support/guidance. The compact Kerk® ScrewRail® combines both functions in a single, coaxial component. By eliminating the need for external rail-to-screw alignment, the ScrewRail simplifies the design, manufacture and assembly of motion systems. The ScrewRail's coaxial design saves as much as 80% of the space used by a two-rail system and is generally less expensive than the equivalent components purchased separately. The savings can be substantial due to lower component costs and reduced labor. An added benefit is the ability to get three-dimensional motion from a single ScrewRail.

The ScrewRail consists of a precision rolled lead-screw, supported by sealed bearings and contained within a concentric steel guide rail, driving an integrated nut/bushing. Because all the alignment requirements are achieved within the ScrewRail, support and positioning of the ScrewRail is much less critical than with traditional slide assemblies. Kerkote® TFE coating and self-lubricating nut/bushing materials ensure long life without maintenance.

Z-Theta ScrewRail Assembly

When mounted vertically, the ScrewRail can be used to simultaneously lift and rotate (Z-theta motion). With one motor driving the screw and a second rotating the rail, a compact, self-supporting pick and place mechanism can be created.

Identifying the Kerk® ScrewRail part number codes when ordering

Haydon Kerk Express℠
www.HaydonKerkExpress.com
Standard products available 24-hrs.

SR	Z	06	K	–	A	0100	–	XXX

Prefix
SR = ScrewRail®

Nut Style
A = free-wheeling style nut
Z = Anti-Backlash Nut

Nominal Rail Diam.
03 = 3/8-in (10 mm)
04* = 1/2-in (13 mm)
06* = 3/4-in (19 mm)
08* = 1-in (25 mm)
* END SUPPORTS available, see page 251.

Coating
S = Uncoated
K = Kerkote®

Drive Mounting
A = None

Nominal Thread Lead Code

SRA/SRZ03:
0050 = .050-in (1.27)
0100 = .100-in (2.54)
0250 = .250-in (6.35)
0375 = .375-in (9.53)

SRA/SRZ06:
0100 = .100-in (2.54)
0200 = .200-in (5.08)
0500 = .500-in (12.7)
1000 = 1.00-in (25.40)

SRA/SRZ04:
0050 = .050-in (1.27)
0250 = .250-in (6.35)
0500 = .500-in (12.7)
1000 = 1.00-in (25.40)

SRA/SRZ08:
0100 = .100-in (2.54)
0200 = .200-in (5.08)
0500 = .500-in (12.7)
1000 = 1.00-in (25.40)

Unique Identifier
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Note: Right-hand/Left-hand ScrewRail® assemblies are also available.

Identifying the Kerk® ScrewRail End Support part number codes when ordering

SR	06	ES	–	Z00

Prefix:
SR = ScrewRail®

Size
04= 1/2-in
06= 3/4-in
08= 1-in

ES = End Support

Identifier = Standard

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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Kerk® SRA Series General Purpose ScrewRail® Linear Actuators

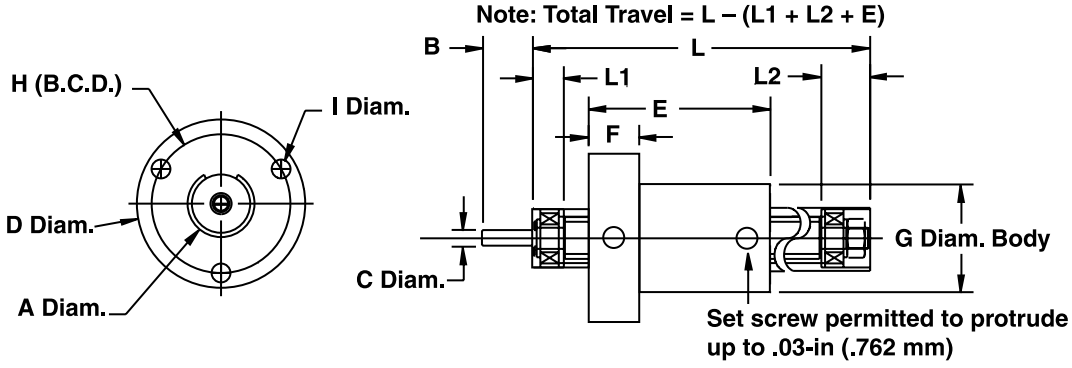
A standard nut for general applications where anti-backlash compensation is not required.

The SRA is recommended anywhere low drag and minimal free play is required.

Note: Right-hand/Left-hand ScrewRail® assemblies are also available.

ScrewRail®: SRA Series General Purpose

	A Diam. inch (mm)	B inch (mm)	C Diam. inch (mm)	D Diam. inch (mm)	E inch (mm)	F inch (mm)	G Diam. inch (mm)	H(B.C.D.) inch (mm)	I inch (mm)	L1 inch (mm)	L2 inch (mm)
SRA 03	.364/.367 (9.24/9.32)	.38 (9.56)	.1245/.1250 (3.16/3.18)	.98 (24.9)	1.0 (25.4)	.28 (7.2)	.562 (14.3)	.75 (19.1)	.094 (2.39)	.37 (9.4)	.38 (9.66)
SRA 04	.489/.492 (12.42/12.5)	0.62 (15.75)	.1870/.1875 (4.75/4.76)	1.25 (31.8)	1.4 (36)	.38 (9.5)	.750 (19.1)	1.03 (26.2)	0.140 (3.56)	0.26 (6.6)	0.36 (9.1)
SRA 06	.739/.742 (18.77/18.85)	0.75 (19.05)	.2490/.2495 (6.33/6.34)	1.75 (44.5)	2.0 (51)	.50 (12.7)	1.120 (28.4)	1.48 (37.6)	0.173 (4.39)	0.38 (9.7)	0.70 (17.8)
SRA 08	.989/.992 (25.12/25.2)	0.75 (19.05)	.2490/.2495 (6.33/6.34)	2.23 (56.6)	2.5 (64)	.63 (15.9)	1.495 (38.0)	1.92 (48.8)	0.200 (5.08)	0.48 (12.2)	0.77 (19.6)



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Kerk® SRZ Series Anti-Backlash ScrewRail® Linear Actuators

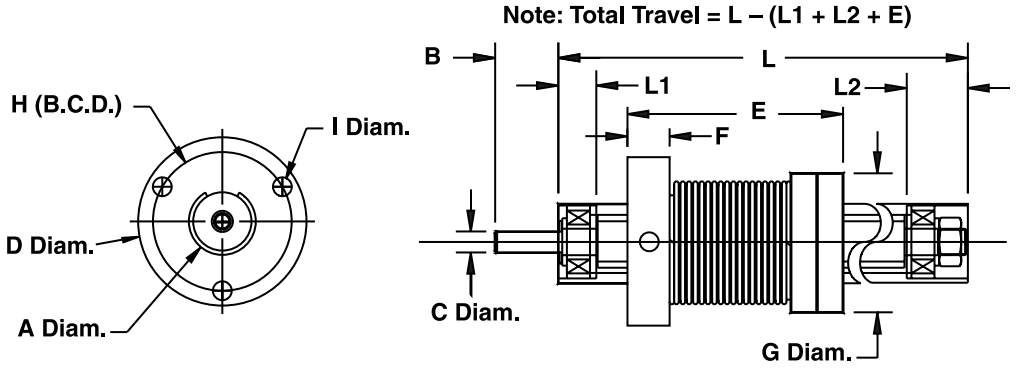
A nut designed and manufactured with our unique axial take-up mechanism providing continuous self-adjusting anti-backlash compensation.

Note: Right-hand/Left-hand ScrewRail® assemblies are also available.

ScrewRail®: SRZ Series Anti-Backlash

	A Diam. inch (mm)	B inch (mm)	C Diam. inch (mm)	D Diam. inch (mm)	E inch (mm)	F inch (mm)	G Diam. inch (mm)	H(B.C.D.) inch (mm)	I (Brass Inserts) inch (mm)	L1 inch (mm)	L2 inch (mm)
SRZ 03	.364/.367 (9.24/9.32)	.38 (9.56)	.1245/.1250 (3.16/3.18)	.98 (24.9)	1.1 (27.94)	.28 (7.2)	.73 (18.5)	.75 (19.05)	#2-56 (*)	.37 (9.4)	.38 (9.66)
SRZ 04	.489/.492 (12.42/12.5)	0.62 (15.75)	.1870/.1875 (4.75/4.76)	1.31 (33.3)	1.4 (36)	.38 (9.5)	.097 (24.7)	1.03 (26.2)	#6-32 (*)	0.26 (6.6)	0.36 (9.1)
SRZ 06	.739/.742 (18.77/18.85)	0.75 (19.05)	.2490/.2495 (6.33/6.34)	1.81 (46.0)	2.0 (51)	.50 (12.7)	1.38 (35.1)	1.48 (37.6)	#10-32 (*)	0.38 (9.7)	0.70 (17.8)
SRZ 08	.989/.992 (25.12/25.2)	0.75 (19.05)	.2490/.2495 (6.33/6.34)	2.30 (58.4)	2.5 (64)	.63 (15.9)	1.72 (43.7)	1.92 (48.8)	#10-32 (*)	0.48 (12.2)	0.77 (19.6)

* metric available as requested



ScrewRail® Linear Actuators: End Supports

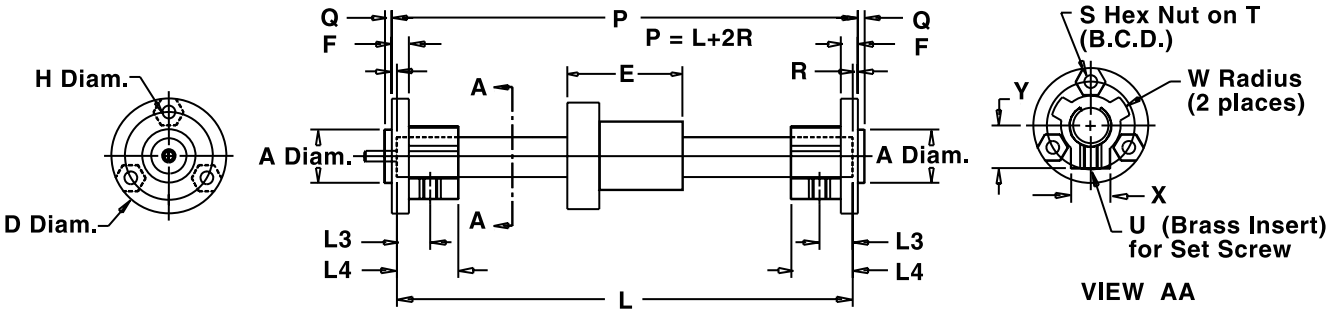
As an additional option for all Kerk® ScrewRails, standard End Supports offer the convenience of simple and compact mounting for the ScrewRail. The End Supports are designed to slide over the outside diameter of each end of the rail and "key" off the slot in the ScrewRail. The Kerkite® composite polymer End Supports come standard with three hex nuts that are captured in the flange for easy assembly. The End Supports are also supplied with a brass threaded insert and a set screw to fasten to the outside diameter of the rail.

With the End Supports, the Kerk ScrewRail can be easily mounted to your assembly. However, if the End Supports are not utilized it is recommended to center the clamping force on each end at the L3 dimension as shown in the drawing below.

ScrewRail®: End Support Styles

	A Diam. inch (mm)	D inch (mm)	F inch (mm)	H Diam. inch (mm)	L3 inch (mm)	L4 inch (mm)	Q inch (mm)	R inch (mm)	S inch (mm)	T (Hex Nut) inch (mm)	U inch (mm)	W Diam. (Brass Insert) inch (mm)	X inch (mm)	Y inch (mm)
SRA 04	.624/.626 (15.85/15.90)	1.35 (34.3)	0.200 (5.08)	0.150 (3.81)	0.390 (9.91)	.720 (18.29)	0.080 (2.03)	0.060 (1.52)	#6-32 (*)	1.03 (26.2)	#8-32	0.47 (12.0)	0.460 (11.68)	0.500 (12.70)
SRA 06	.749/.751 (19.03/19.08)	1.60 (40.6)	0.250 (6.35)	0.173 (4.39)	0.603 (15.32)	0.900 (22.86)	0.100 (2.54)	0.100 (2.54)	#8-32 (*)	1.31 (33.3)	#10-32	0.60 (15.3)	0.594 (15.09)	0.645 (16.38)
SRA 08	.999/1.001 (25.38/25.43)	2.20 (55.9)	0.375 (9.53)	0.200 (5.08)	0.920 (23.37)	1.200 (30.48)	0.125 (3.18)	0.175 (4.45)	#10-32 (*)	1.82 (46.2)	#10-32	0.82 (20.9)	0.800 (20.32)	0.820 (20.83)

* metric available as requested



Dimensions E and L are referenced in the ScrewRail Dimensions
Note: Total Travel = L – (E + 2 [L4])

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SRA Series Selector Chart ScrewRail® Linear Actuators

ScrewRail	Inch Lead ** inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Max. Drag Torque oz - in (N-m)	Life @ 1/4 Design Loadx10⁶ (Non Anti-Backlash) inch (cm)	Torque-to-Move Lead oz-in/lb (N-m/Kg)	Design Load lbs (Kg)	Screw Inertia per unit length oz-in sec²/in (KgM²/M)	Equivalent Diam.* inch (mm)
SRA 03	.050 (1.27)	0050	3/8 (10)	3/16 (5)	1.5 (0.014)	100 to 150 (250 to 380)	0.5 (0.007)	10 (4.5)	.1 x 10^{-5} (.4 x 10^{-6})	30 (7.6)
SRA 03	.100 (2.54)	0100	3/8 (10)	3/16 (5)	2.0 (0.018)	100 to 150 (250 to 380)	1.0 (0.016)	10 (4.5)	.1 x 10^{-5} (.4 x 10^{-6})	30 (7.6)
SRA 03	.250 (6.35)	0250	3/8 (10)	3/16 (5)	2.5 (0.020)	100 to 150 (250 to 380)	1.25 (0.019)	10 (4.5)	.1 x 10^{-5} (.4 x 10^{-6})	30 (7.6)
SRA 03	.375 (9.53)	0375	3/8 (10)	3/16 (5)	3.0 (0.025)	100 to 150 (250 to 380)	2.0 (0.030)	10 (4.5)	.1 x 10^{-5} (.4 x 10^{-6})	30 (7.6)
SRA 04	0.050 (1.27)	0050	1/2 (13)	1/4 (6)	2.0 (0.015)	150 to 200 (380 to 500)	0.5 (0.007)	25 (10)	.3 x 10^{-5} (1.3 x 10^{-6})	.39 (9.9)
SRA 04	0.250 (6.35)	0250	1/2 (13)	1/4 (6)	3.0 (0.020)	150 to 200 (380 to 500)	1.5 (0.023)	25 (10)	.3 x 10^{-5} (1.3 x 10^{-6})	.39 (9.9)
SRA 04	0.500 (12.7)	0500	1/2 (13)	1/4 (6)	4.0 (0.030)	150 to 200 (380 to 500)	2.5 (0.039)	25 (10)	.3 x 10^{-5} (1.3 x 10^{-6})	.39 (9.9)
SRA 04	1.000 (25.40)	1000	1/2 (13)	1/4 (6)	5.0 (0.040)	150 to 200 (380 to 500)	4.5 (.0.70)	25 (10)	.3 x 10^{-5} (1.3 x 10^{-6})	.39 (9.9)
SRA 06	0.100 (2.54)	0100	3/4 (19)	3/8 (10)	3.0 (0.020)	180 to 280 (450 to 710)	1.0 (0.016)	50 (20)	1.5 x 10^{-5} (6.5 x 10^{-6})	.60 (15.2)
SRA 06	0.200 (5.08)	0200	3/4 (19)	3/8 (10)	4.0 (0.030)	180 to 280 (450 to 710)	1.5 (0.023)	50 (20)	1.5 x 10^{-5} (6.5 x 10^{-6})	.60 (15.2)
SRA 06	0.500 (12.70)	0500	3/4 (19)	3/8 (10)	5.0 (0.040)	180 to 280 (450 to 710)	2.5 (0.039)	50 (20)	1.5 x 10^{-5} (6.5 x 10^{-6})	.60 (15.2)
SRA 06	1.000 (25.4)	1000	3/4 (19)	3/8 (10)	6.0 (0.045)	180 to 280 (450 to 710)	4.5 (0.070)	50 (20)	1.5 x 10^{-5} (6.5 x 10^{-6})	.60 (15.2)
SRA 08	0.100 (2.54)	0100	1 (25)	1/2 (13)	4.0 (0.030)	280 to 320 (710 to 810)	1.0 (0.016)	100 (45)	5.2 x 10^{-5} (20.0 x 10^{-6})	.81 (20.5)
SRA 08	0.200 (5.08)	0200	1 (25)	1/2 (13)	5.0 (0.040)	280 to 320 (710 to 810)	1.5 (0.023)	100 (45)	5.2 x 10^{-5} (20.0 x 10^{-6})	.81 (20.5)
SRA 08	0.500 (12.70)	0500	1 (25)	1/2 (13)	6.0 (0.045)	280 to 320 (710 to 810)	2.5 (0.039)	100 (45)	5.2 x 10^{-5} (20.0 x 10^{-6})	.81 (20.5)
SRA 08	1.000 (25.40)	1000	1 (25)	1/2 (13)	8.0 (0.060)	280 to 320 (710 to 810)	4.5 (0.070)	100 (45)	5.2 x 10^{-5} (20.0 x 10^{-6})	.81 (20.5)

*ScrewRail® stiffness may be modeled using Classical Beam Deflection Theory with equivalent stainless steel beam of diameter given.

** Other leads available as custom orders.

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SRZ Series Selector Chart ScrewRail® Linear Actuators

ScrewRail	Inch Lead ** inch (mm)	Thread Lead Code	Nominal Rail Diam. inch (mm)	Nominal Screw Diam. inch (mm)	Max. Drag Torque oz - in (N-m)	Life @ 1/4 Design Loadx10⁶ (Non Anti-Backlash) inch (cm)	Torque-to-Move Lead oz-in/lb (N-m/Kg)	Design Load lbs (Kg)	Screw Inertia per unit length oz-in sec²/in (KgM^2/M)	Equivalent Diam.* inch (mm)
SRZ 03	.050 (1.27)	0050	3/8 (10)	3/16 (5)	2.0 (0.014)	50 to 80 (130 to 200)	0.5 (0.007)	10 (4.5)	$.1 \times 10^{-5}$ ($.4 \times 10^{-6}$)	30 (7.6)
SRZ 03	.100 (2.54)	0100	3/8 (10)	3/16 (5)	2.5 (0.018)	50 to 80 (130 to 200)	1.0 (0.016)	10 (4.5)	$.1 \times 10^{-5}$ ($.4 \times 10^{-6}$)	30 (7.6)
SRZ 03	.250 (6.35)	0250	3/8 (10)	3/16 (5)	3.0 (0.020)	50 to 80 (130 to 200)	1.25 (0.019)	10 (4.5)	$.1 \times 10^{-5}$ ($.4 \times 10^{-6}$)	30 (7.6)
SRZ 03	.375 (9.53)	0375	3/8 (10)	3/16 (5)	3.5 (0.025)	50 to 80 (130 to 200)	2.0 (0.030)	10 (4.5)	$.1 \times 10^{-5}$ ($.4 \times 10^{-6}$)	30 (7.6)
SRZ 04	0.050 (1.27)	0050	1/2 (13)	1/4 (6)	3.0 (0.020)	75 to 100 (190 to 250)	0.5 (0.007)	25 (10)	$.3 \times 10^{-5}$ (1.3×10^{-6})	.39 (9.9)
SRZ 04	0.250 (6.35)	0250	1/2 (13)	1/4 (6)	4.0 (0.030)	75 to 100 (190 to 250)	1.5 (0.023)	25 (10)	$.3 \times 10^{-5}$ (1.3×10^{-6})	.39 (9.9)
SRZ 04	0.500 (12.7)	0500	1/2 (13)	1/4 (6)	5.0 (0.040)	75 to 100 (190 to 250)	2.5 (0.039)	25 (10)	$.3 \times 10^{-5}$ (1.3×10^{-6})	.39 (9.9)
SRZ 04	1.000 (25.40)	1000	1/2 (13)	1/4 (6)	6.0 (0.045)	75 to 100 (190 to 250)	4.5 (.0.70)	25 (10)	$.3 \times 10^{-5}$ (1.3×10^{-6})	.39 (9.9)
SRZ 06	0.100 (2.54)	0100	3/4 (19)	3/8 (10)	6.0 (0.045)	90 to 140 (230 to 350)	1.0 (0.016)	50 (20)	1.5×10^{-5} (6.5×10^{-6})	.60 (15.2)
SRZ 06	0.200 (5.08)	0200	3/4 (19)	3/8 (10)	6.5 (0.047)	90 to 140 (230 to 350)	1.5 (0.023)	50 (20)	1.5×10^{-5} (6.5×10^{-6})	.60 (15.2)
SRZ 06	0.500 (12.70)	0500	3/4 (19)	3/8 (10)	7.0 (0.050)	90 to 140 (230 to 350)	2.5 (0.039)	50 (20)	1.5×10^{-5} (6.5×10^{-6})	.60 (15.2)
SRZ 06	1.000 (25.4)	1000	3/4 (19)	3/8 (10)	7.5 (0.053)	90 to 140 (230 to 350)	4.5 (0.070)	50 (20)	1.5×10^{-5} (6.5×10^{-6})	.60 (15.2)
SRZ 08	0.100 (2.54)	0100	1 (25)	1/2 (13)	8.0 (0.057)	120 to 160 (350 to 410)	1.0 (0.016)	100 (45)	5.2×10^{-5} (20.0×10^{-6})	.81 (20.5)
SRZ 08	0.200 (5.08)	0200	1 (25)	1/2 (13)	8.5 (0.060)	120 to 160 (350 to 410)	1.5 (0.023)	100 (45)	5.2×10^{-5} (20.0×10^{-6})	.81 (20.5)
SRZ 08	0.500 (12.70)	0500	1 (25)	1/2 (13)	9.0 (0.064)	120 to 160 (350 to 410)	2.5 (0.039)	100 (45)	5.2×10^{-5} (20.0×10^{-6})	.81 (20.5)
SRZ 08	1.000 (25.40)	1000	1 (25)	1/2 (13)	9.5 (0.067)	120 to 160 (350 to 410)	4.5 (0.070)	100 (45)	5.2×10^{-5} (20.0×10^{-6})	.81 (20.5)

*ScrewRail® stiffness may be modeled using Classical Beam Deflection Theory with equivalent stainless steel beam of diameter given.

** Other leads available as custom orders.

SS / SZ Series: Spline Shafts

GR Series: Linear Guide Rails and Bushings

Kerk® SS / SZ Series Spline Shafts

The Kerk® Spline Shaft (SS/SZ) series spline shaft system has been designed for light to moderate load applications, where low cost, low friction, and long life are primary design considerations.

Kerk Spline Shafts provide anti-rotation for one axis motion or a drive mechanism with rotation for two axes of motion. They are excellent alternatives for applications where hex shafts, square shafts and high-cost ball splines are typically used.

The assembly consists of a stainless steel spline shaft treated with Haydon Kerk Motion Solutions, Inc. proprietary low friction Kerkote® TFE coating, mated with a Kerkite® composite polymer bushing. The bushing is supplied with an integral brass collar to facilitate various mounting configurations without nut distortion.

Standard shaft straightness is .003-in (.08mm/30cm) per foot. Typical radial and torsional clearance between shaft and bushing for a basic assembly (SSA) is .002-in to .003-in (.05-.08mm). An anti-backlash assembly (SZA) is available for applications requiring minimum torsional play.

As with other Kerk® assemblies, special bushing configurations and end machining configurations are available upon request. Aluminum or carbon steel spline shafts are also available upon request.

Identifying the Kerk® Spline Shafts and Guide Rails part number codes

SZ	A	T	04	1	K	–	08	–	XXX

Prefix
SS = Spline Shaft
SZ = Anti-Backlash Spline Shaft
GR = Guide Rail

Nut Style
A = Assembly
B = Bushing only
S = Shaft only

Mounting
T = Threaded *(for **Spline Shafts** only)*
G = Snap ring groove *(for **Guide Rails** only)*
P = Plain (no features)
S = Shaft only
X = Custom

Rail Diameter
02 = 1/8-in
04 = 1/4-in
06 = 3/8-in
08 = 1/2-in
12 = 3/4-in

Number of Bushings per Rail
0
1
2
3
4
5
Use "0" for Shaft only and "1" if Bushing only

Coating
S = Uncoated
K = Kerkote®
B = Black Ice™
N = Bushing only

Length in Inches *(Rounded up)*
Example:
06 = 6-in
08 = 8-in
00 = Bushing only

Unique Identifier
Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

EXAMPLES:

SZAT041K-12-XXXX = Spline shaft with anti-backlash, shaft and threaded bushing assembly, 1/4-in shaft, 1 bushing per rail, Kerkote® coating, 12-in length, with no special features added.

GRBP041N-00-XXXX = Guide rail, plain bushing only, 1/4-in shaft, with no special features added.

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SS Series Spline Shafts

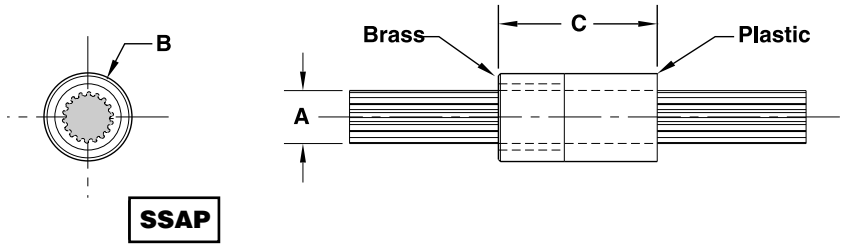
	Rail Diameter Code	Shaft **A** in ± .002 (mm ± 0.05)	Root Diameter in ± .002 (mm ± 0.05)	Tube I.D. in ± .002 (mm ± 0.05)	Bushing Diameter **B** in ± .001 (mm ± 0.025)	Bushing Length **C** in ± .01 (mm ± 0.25)	Thread **M**	Thread Length **N** in ± .002 (mm ± 0.05)	Equivalent Diameter** inch (mm)
SS/SZ	**02**	0.125 (3.18)	0.095 (2.41)	NA	0.375 (9.53)	0.500 (12.70)	3/8-24	0.250 (6.35)	0.110 (2.79)
	04	0.250 (6.35)	0.202 (5.13)	NA	0.500 (12.70)	0.75 (19.1)	7/16-20	0.250 (6.35)	0.226 (5.74)
	06	0.375 (9.53)	0.306 (7.77)	NA	0.625 (15.88)	1.00 (25.4)	9/16-20	0.375 (9.53)	0.341 (8.65)
	08	0.500 (12.70)	0.419 (10.64)	NA	0.813 (20.65)	1.50 (38.1)	3/4-20	0.500 (12.70)	0.458 (11.63)
	12	0.750 (19.05)	0.630 (16.00)	NA	1.125 (28.58)	2.25 (57.2)	1-16	0.750 (19.05)	0.690 (17.53)

MaximumTwist:
3°/ft about Spline Shaft axis

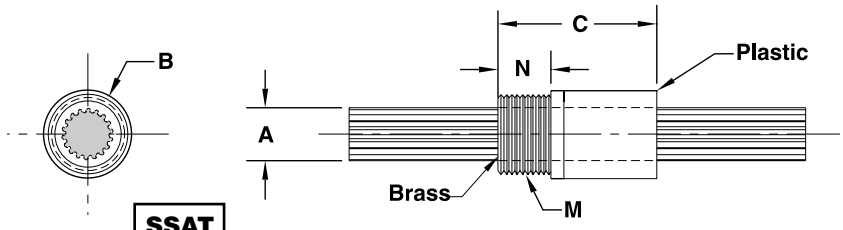
Torsional Clearance (SSA):
3° Bushing to Shaft

Spline Shaft stiffness may be modeled as a round rod with diameters given.

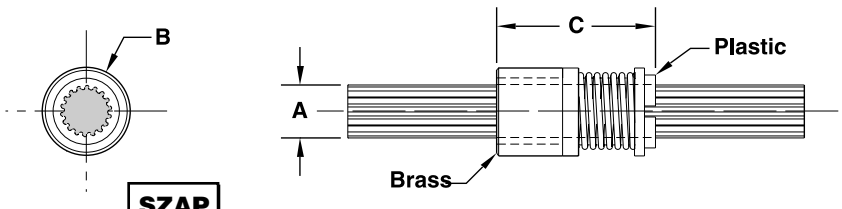
0.125-in rail size only available in SSAP and SSAT styles.



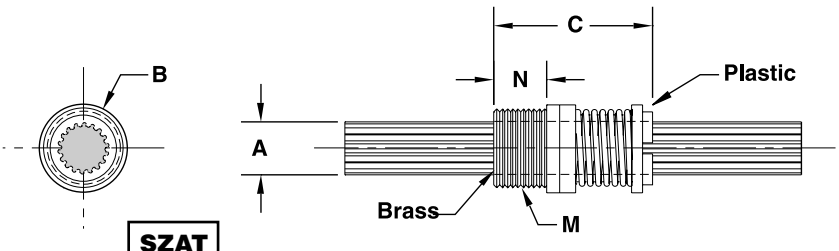
SSAP



SSAT



SZAP



SZAT

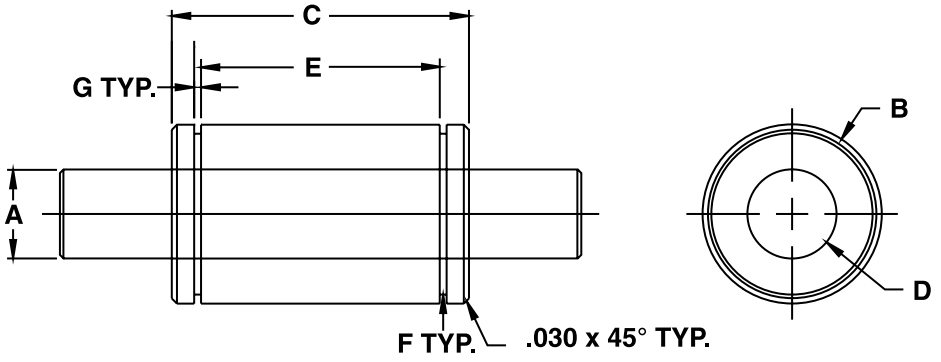
Kerk® GR Series Linear Rails and Bushings

The GR Series linear rail system has been designed for light load applications where low cost, minimum frictional drag and long wear life are primary design considerations.

The assembly consists of a centerless ground and burnished stainless steel shaft mated with a Kerkite® composite polymer bushing. The material combinations have been selected so that thermal fluctuations have minimal effect on system performance. Additional lubricity and extended life can be obtained by using a low friction Kerkote® TFE coating on support shafts available in both stainless and alloy steel.

Standard shaft straightness is .002-in (0.05mm) per foot and typical radial clearance between shaft and bushing is .0005-in (.013mm) on non-coated assemblies and .001-in (.025mm) on Kerkote TFE coated assemblies.

Bushings are manufactured with standard retaining ring grooves.



	Rail Diameter Code	Standard Part Lengths in ±.010 (mm ±0.25)	Rail Diameter A in ±.0006 (mm ±0.015)	Rail Diameter w/TFE A in ±.0006 (mm ±0.015)	Bushing Outside Diam. B in ±.0006 (mm ±0.015)	Bushing Length C in ±.010 (mm ±0.25)	Bushing Inside Diam. D in ±.0005 (mm ±0.013)	Snap Ring Groove Location E in $^{+.010}_{-.000}$ (mm $^{+0.25}_{-0.00}$)	Snap Ring Groove Diam. F in ±.004 (mm ±0.100)	Snap Ring Groove Width G in ±.0003 (mm ±0.008)	Rail Chamfer H in (mm)	Radial Load lbs (Kg)
GR	04	6/8 10/12	.2475 (6.287)	.2472 (6.279)	.5000 (12.700)	.765 (19.43)	.2485 (6.311)	.535 (13.59)	.450 (11.43)	.040 (1.02)	.020 (.51)	5 (2.3)
	06	6/12 15/18	.3715 (9.436)	.3712 (9.428)	.7500 (19.050)	1.275 (32.39)	.3725 (9.462)	.995 (25.27)	.676 (17.17)	.046 (1.17)	.020 (.51)	10 (4.5)
	08	12/15 18/24	.4965 (12.611)	.4962 (12.603)	1.0000 (25.400)	1.660 (42.16)	.4975 (12.637)	1.330 (33.78)	.900 (22.86)	.046 (1.17)	.020 (.51)	15 (6.8)
	12	18/24 36	.7415 (18.834)	.7412 (18.826)	1.2500 (31.750)	2.036 (51.72)	.7425 (18.860)	1.620 (41.15)	1.125 (28.60)	.058 (1.47)	.030 (.76)	25 (11.4)

Linear Rail Application Checklist

Haydon Kerk Linear Rail Systems are designed to be precision motion devices. Many variables must be considered before applying a particular rail system in an application. The following is a basic checklist of information needed that will make it easier for the Haydon Kerk engineering team to assist you in choosing the proper linear rail.

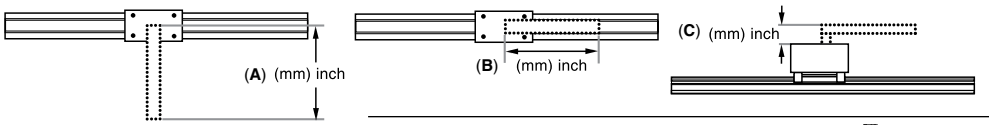
Name _____ Company _____

Address _____ City _____ State _____ Zip _____

Country_____ Phone _____ Email _____

1) ❑ **Maximum Load?** _____ (N or lbs.)

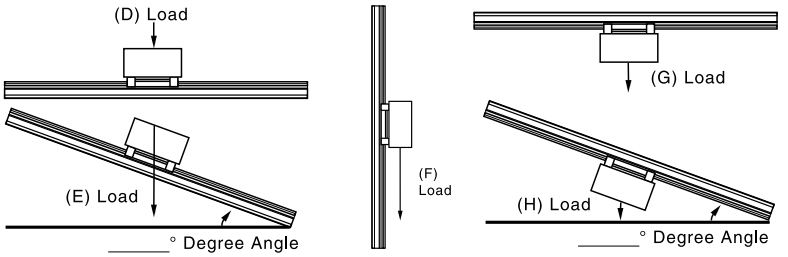
2) ❑ **Load Center of Gravity (cg) Distance and Height?** (mm or inches) See illustrations (A) (B) (C) below.



Dimensions
(❑ **mm** / ❑ **inch**):
❑ **(A)** _____
... OR ❑ **(B)** _____
AND... ❑ **(C)** _____

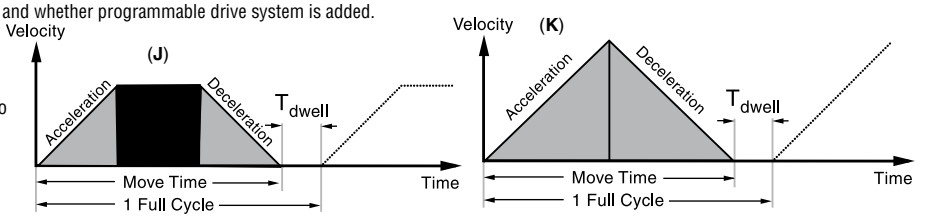
3) ❑ **Rail Mount Orientation?**
The force needed to move the load is dependent on the orientation of the load relative to the force of gravity. For example, total required force in the horizontal plane (D) is a function of friction and the force needed for load acceleration ($F_f + F_a$). Total force in the vertical plane is a function of friction, load acceleration, and gravity ($F_f + F_a + F_g$).

Orientation:
❑ **(D)**
❑ **(E)** ____°
❑ **(F)**
❑ **(G)**
❑ **(H)** ____°



4) ❑ **Stroke Length to Move Load?** _____ (mm or inches). Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether programmable drive system is added.

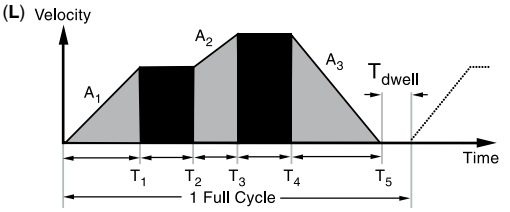
5) ❑ **Move Profile?** A **trapezoidal** move profile divided into 3 equal segments is a common move profile and easy to work with. Another common move profile is a **triangular** profile divided into 2 equal segments.
❑ **(J) Trapezoidal**
❑ **(K) Triangular**
❑ **(L) Complex**



If using a **trapezoidal (J)** or **triangular (K)** move profile, the following is needed…
a) ❑ Point to point move distance _____ (mm or inches)
b) ❑ Move time _____ (seconds) including time of acceleration and deceleration
c) ❑ Dwell time between moves _____ (seconds)

The trapezoidal move profile is a good starting point in helping to size a system for prototype work.

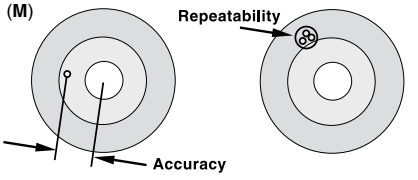
A **complex** move profile **(L)** requires more information.
a) ❑ Time (in seconds) including: $T_1, T_2, T_3, T_4, T_5 \ldots T_n$ and T_{dwell}
b) ❑ Acceleration/Deceleration (in mm/sec.^{2} or inches/sec.^{2}) including: $A_1, A_2, A_3 \ldots A_n$



For details contact Haydon Kerk Motion Solutions Engineering – call 203 756 7441.

6) ❑ **Position Accuracy Required?** _____ (mm or inches). Accuracy = the difference between the theoretical position and actual position capability of the system. Due to manufacturing tolerances, actual travel will be slightly different than theoretical "commanded" position. See figure (M) on right.

7) ❑ **Position Repeatability Required?** _____ (mm or inches) Repeatability = the range of positions attained when the rail is commanded to approach the same position multiple times under identical conditions. See figure (M) on right.



8) ❑ **Positioning Resolution Required?** _____ (mm/step or inches/step).
Positioning resolution is the smallest move command that the system can generate. The resolution is a function of many factors including the drive electronics, lead-screw pitch, and encoder (if required). The terms "resolution" and "accuracy" should never be used interchangeably.

9) ❑ **Closed-Loop Position Correction Required?:** ❑ YES ❑ NO
In stepper motor-based linear rail systems, position correction is typically accomplished using a rotary incremental encoder (either optical or magnetic).

10) ❑ **Life Requirement?:** (select the most important application parameter)
a) ❑ Total mm or inches _____ b) ❑ Number of Full Strokes _____ c) ❑ Number of Cycles _____

11) ❑ **Operating Temperature Range?** _____ (°C or °F)
a) ❑ Will the system operate in an environment in which the worst case temperature is above room temperature?
b) ❑ Will the system be mounted in an enclosure with other equipment generating heat?

12) ❑ **Controller / Drive Information?** a) ❑ Haydon Kerk IDEA™ Drive (with Size 17 Motors only)
b) ❑ Customer Supplied Drive... Type?... ❑ Chopper Drive ❑ L / R Drive Model: _____

13) ❑ **Power Supply Voltage?** _____ (VDC)

14)* ❑ **Step Resolution?** a) ❑ Full Step b) ❑ Half-Step c) ❑ Micro-Step

15)* ❑ **Drive Current?** _____ (A_{rms} / Phase) and _____ (A_{peak} / Phase)

16)* ❑ **Current Boost Capability?** _____ (%)

** If the Haydon Kerk IDEA™ Drive is used disregard items 14, 15, and 16.*

SEE CATALOG PAGES 203 THROUGH 205 FOR EXPLANATIONS

To complement the Haydon Kerk® brand of products AMETEK® Advanced Motion Solutions also offers the PITTMAN® brand of DC motor products. Our experienced team of sales engineers will work with you to help determine the optimum motion solution.

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USA:	Haydon Products Division	+ 1 203 756 7441
	Kerk Products Division	+ 1 603 213 6290
Europe:	France	+ 33 2 40 92 87 51
	Germany	+ 49 9123 96 282 12
Asia:	Haydon Linear Motors Co., Ltd.	+ 86 519 85113316
India:	AMETEK Instruments India Pvt Ltd.	+ 91 080 67823237

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