Haydon kerk Motion Solutions

AMETEK

Full Line Catalog

Lead Screw and Nut Assemblies
Linear Actuators
Linear Rail Systems

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Custom assemblies also available.Contact our Application Engineers for assistance.
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Lead Screw and Nut Assemblies

Kerk Lead Screw Assemblies are modified Acme thread forms optimized for performance and available in a broad range of lead screw diameters, leads and nut styles, custom designed for your application. Kerk lead screws are self-adjusting, maintenance-free and require no lubrication. Providing maximum accuracy, high reliability, smooth, quiet operation and low cost, Kerk lead screw assemblies are your best choice for high performance linear motion control.

Kerk Lead Screws

- Available in standard diameters from 5/64-in (2 mm) to 15/16-in (23 mm)
- Standard leads from .012-in to almost 4-in (0.30 mm to 92 mm) including native metric and left hand threads
- Custom sizes and leads can be special ordered
- 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)
- Standard lead accuracy of .0006 in/in, with up to .0001 in/in available on selected screws; Contact factory for availability
- Complete in-house manufacturing and quality control assure uniform and consistent products

Kerk Nuts

- Available in 7 standard anti-backlash designs (ZBX, WDG, NTB, KHD, VHD, NTG, ZBA); general purpose BFW Series plus the Mini Series
- Custom nut configurations and mountings are also readily available
- Custom free-wheeling fabricated and molded solutions are available, onsite molding design & production
- 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

Nut and Screw Materials

In addition to the Kerk self-lubricating acetal nut material, we offer a variety of custom compounded **Kerkite® composite polymers**, formulated to provide optimum performance in their target conditions and applications.

- High performance materials
- Exceptional wear properties
- Cost and design advantages afforded through injection molding
- Mechanical, thermal and electrical properties; compatible with many chemicals and environmental conditions: temperature, chemical resistance, radiation resistance, etc.
- Compounded with lubricants, reinforcements and thermoplastic polymers

Kerk brand lead screws and linear rails start with premium grade 303 stainless steel. Kerk stainless steel lead screws 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. We can also roll screws in many materials and produce nuts in alternative plastics. If the material can be molded, machined, ground, or rolled, we can likely process it.

Properties of Standard vs. Kerkite Materials			
	Standard Acetal	**Kerkite KN30**	**Kerkite KP20**
Material	Acetal w/Lubrication	Carbon Reinforced Nylon w/Lubrication	Carbon Reinforced PPS w/Lubrication
Color	Black	Blue	Black
Tensile Strength (PSI)	7,000-9,000	24,000-27,000	23,800
Flexural Modulus (PSI)	300,000-450,000	1,750,000	2,500,000
Deflection Temp (°F)	255	485	500
Thermal Exp. Coeff (IN/IN/F)	5.8 X 10^{-5}	1.1 X 10^{-5}	0.8 X 10^{-5}
Constant Use Temp (°F)	150	300	400
Water Absorption (%)	.2	.9	.02
*Coefficient of Friction	.08-.12	.10-.15	.15-.20
**PV Limit (@ 20 IN/SEC) PSI FPM	15,000	43,000	70,000***

Please note the above values are based on polymer industry standards and should be used as reference only. Materials need to be tested in individual applications to ensure that properties will be sufficient.
*The actual value of coefficient of friction will depend on surface finish, environment and any additional lubrication.
**Please note manufacturers vary the PV listed values as well as the way PV is calculated. Please use these numbers for PV as a reference guide between materials. Higher PV materials are available.
***Please consult factory for proper use and alternative PPS materials with higher PV values.

Kerk Lead Screw TFE Coatings

We offer multiple options for lubrication. All Kerk lead screw nuts feature self-lubricating polymers. However, when maximum performance is required, Kerkote® and Black Ice® Teflon 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.

Kerkote TFE Coating

Lubrication to the nut/screw interface occurs by the nut picking up Kerkote® TFE particles from the soft coating as well as from the migration of the internal lubricant within the plastic nut. The lubricant, although solid, has some “spreading” ability as in fluid lubric

- Ideal for most environments (Black Ice recommended for harsh environments)
- Soft coating
- Dry lubricant
- Long term
- Maintenance-free
- Can be re-machined
- Optimized for softer plastics (acetals/nylons), with or without mechanical reinforcement
- Provides maximum level of self-lubrication
- Not intended to be used with additional lubricants
- Should not be used in environments where oils or other lubricant contamination is possible

Black Ice TFE Coating

Hard coating that remains on the screw. Rather than acting as a dry lubricant, it is an anti-friction coating whose surface properties displace the metal to which it is applied.

- Ideal for harsh environments or if reduced friction and a permanent coating is desired
- Hard coating
- Long term
- Maintenance free
- Low friction surface upon which the nut travels
- Exceptionally durable with virtually any type of polymer nut
- Not intended for use with metal or glass fiber reinforced nuts, although can withstand abrasion from contamination, rigid polymer systems, fluid impingement and wash down applications
- Not intended to be used with additional lubricants

Greases

Teflon TFE coatings are intended to be used without additional lubricants. However, there are certain applications where external lubrication may be desired. These include the use of nut materials such as glass reinforced plastic or metal. We offer a selection of greases developed specifically for these applications.

Lead Screw Nut Selection

Kerk Lead Screw Assemblies are modified acme thread forms optimized for performance and available in a broad range of lead screw diameters, leads and nut styles, custom designed for your application. Kerk lead screws are self-adjusting, maintenance-free and require no lubrication. Providing maximum accuracy, high reliability, smooth, quiet operation and low cost, Kerk lead screw assemblies are your best choice for high performance linear motion control.

			Nut Styles							
			• = Good •• = Better ••• = Best							
		Units								
			ZBX	ZBA	ZBM	KHD	WDG	NTB	VHD	BFW
Max Dynamic Load		lb	35	55	1	20	75	200	350	500
		N	155	245	4.4	89	333	890	1557	2224
Compactness			••	••	•••	••	•••	••	•	•••
Typical Drag Torque			••	••	••	•••	••	••	•••	N/A
Vibration Damping	[horizontal]		•••	•••	•••	••	•	•	••	N/A
	[vertical]		•••	•••	•••	•	•	•	•	N/A
Smoothness			••	•••	••	••	••	••	••	•
Backlash Compensation			••	•	••	•••	•••	•••	•••	N/A
Drag Adujusted			N/A	•••	N/A	••	N/A	•	••	N/A
Stiffness			••	••	••	•••	•••	•••	•••	N/A
Easy to Modify			••	•	•	•	•	•••	•	•••
Custom Materials Available			••	••	•	•	•	•••	•	•••
Best for Fine Leads		<.2",5mm	•••	•••	•••	•••	•••	•	•••	•••
Best for Long Leads		>1",25mm	•••	•••	N/A	•••	•••	•••	•••	•••

Lead Screw by Size

Kerk Lead Screws utilize the latest in precision rolling technology. Lead screws are available in standard diameters from 5/64" to 15/16" and includes metric and left hand threads. Most standard lead screws are manufactured from 303 stainless steel and are produced using our exclusive precision rolling process. Other lead screw materials are available for application specific requirements.

Dynamic Load by Nut Type										
Diameter	Lead Range	Units	ZBX	ZBA	ZBM	KHD	WDG	NTB	VHD	BFW
5/64 inch (2mm)	0.012-0.079 in (0.3-2.00 mm)				1 (4.4)					10 (44)
1/8 inch (3.2mm)	0.024-0.125 in (0.61-3.18 mm)							5 (22)		25 (111)
0.132 inch (3.3mm)	0.020-0.315 in (0.50-8.00 mm)							5 (22)		25 (111)
9/64 inch (3.6mm)	0.012-0.394 in (0.30-10.00 mm)							5 (22)		25 (111)
5/32 inch (4mm)	0.033-0.500 in (0.84-12.70 mm)							5 (22)		25 (111)
3/16 inch (5mm)	0.020-0.050 in (0.50-12.70 mm)						10 (44)	5 (22)		25 (111)
7/32 inch (5.6mm)	0.024-0.384 in (0.61-9.75 mm)						10 (44)	5 (22)		25 (111)
1/4 inch (6mm)	0.024-1.000 in (0.61-25.4 mm)	lbs	5 (22)	5 (22)			10 (44)	10 (44)		50 (222)
5/16 inch (8mm)	0.039-0.800 in (1.00-20.32 mm)	N	10 (44)	10 (44)		20 (89)	25 (111)	20 (89)		75 (334)
3/8 inch (10mm)	0.025-1.500 in (0.64-38.10 mm)		10 (44)	10 (44)		20 (89)	25 (111)	20 (89)		75 (334)
7/16 inch (11mm)	0.050-0.615 in (1.27-15.62 mm)		15 (67)	15 (67)			75 (334)	30 (133)		90 (400)
1/2 inch (13mm)	0.050-2.000 in (1.27-50.80 mm)		25 (111)	25 (111)			75 (334)	100 (445)	150 (667)	150 (667)
5/8 inch (16mm)	0.100-2.000 in (2.54-50.80 mm)		35 (156)	35 (156)				125 (556)	250 (1112)	225 (1001)
3/4 inch (19mm)	0.0625-3.622 in (1.59-92.00 mm)			55 (245)				150 (667)	350 (1557)	350 (1557)
7/8 inch (22mm)	0.200-1.000 in (5.08-25.4 mm)			55 (245)				200 (890)	350 (1557)	500 (2224)
15/16 inch (24mm)	0.050-3.000 in (1.27-76.20 mm)			55 (245)				200 (890)		500 (2224)

Terminology

Screw Accuracy

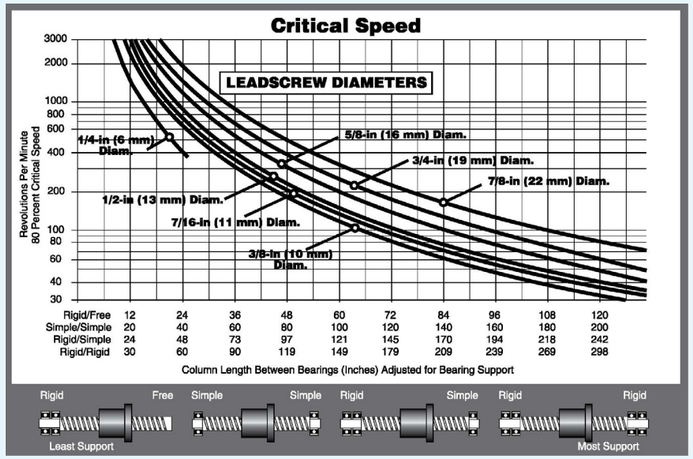
HKP uses a unique precision rolling process for screw manufacturing. Standard lead accuracy for Kerk screws is .0006 in.Jin. (mm/mm). Lead accuracies are available up to .0001 in.Jin. (mm/mm). Please consult the factory for higher lead accuracies. Assemblies have an extremely high bi-directional repeatability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

End Machining

HKP 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: $T_L = \dfrac{\text{LOAD x LEAD}}{2\pi \text{ x EFFICIENCY}}$

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.

Standard/Block 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

Mechanical Properties

Screw Inertia

Screw Size	Screw Inertia	
inch (mm)	(oz-inch sec2 /inch)	(g-cm2/cm)
5/64 (2)	3.4×10^{-8}	9.5×10^{-4}
1/8 (3.2)	1.8×10^{-7}	5.0×10^{-3}
9/64 (3.5)	3.4×10^{-7}	9.5×10^{-3}
5/32 (3.97)	4.9×10^{-7}	1.4×10^{-2}
3/16 (4.76)	1.1×10^{-6}	3.1×10^{-2}
7/32 (5.55)	1.8×10^{-6}	5.0×10^{-2}
1/4 (6)	3×10^{-5}	8.3×10^{-2}
5/16 (8)	5×10^{-5}	1.4
3/8 (10)	1.5×10^{-5}	0.4
7/16 (11)	3.5×10^{-5}	1.0
1/2 (13)	5.2×10^{-5}	1.4
5/8 (16)	14.2×10^{-5}	3.9
3/4 (19)	30.5×10^{-5}	8.5
7/8 (22)	58.0×10^{-5}	16.1
15/16 (24)	73.0×10^{-5}	20.3

Anti-Backlash Life

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

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	6.0×10^{-5} in/in/°F

*Other Kerkite materials available

Assembly

Standard Operating Temp. Range	Coefficient of Friction		
32 - 200° F* (0 - 93° C)*	**Polyacetal Nut to Screw**	Static = .08 Dynamic = .15	.08 ** .09 **
-40 - 311° F (-40 - 155° C)	**Polyester/Fiberglass Nut to Screw*** **	Static = .07 Dynamic = .08	

* 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
*** This material is only recommended to be used with grease, Coefficent of Friction numbers are with HSS-06 grease

Grease Compatibility Chart

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

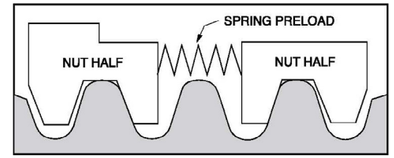
Anti-Backlash Nuts

Haydon Kerk offers a renowned portfolio of anti-backlash designs that create lead screw assemblies which are wear compensating, with low frictional drag and exceptional positional repeatability. Seven standard anti-backlash nut styles cover the range of axial, radial and torsional designs to suit a wide range of applications. Haydon Kerk provides nuts in a wide range of wear resistant, self-lubricating thermoplastic materials.

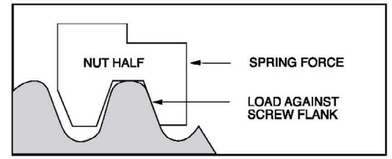
Anti-Backlash Technology

Axial Take-up Mechanism

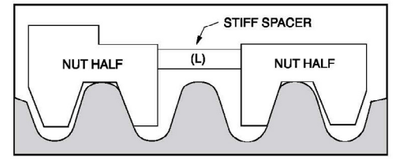
The standard method for taking up backlash is to bias two nut halves axially using some type of compliant spring. (Wavy washer, compression spring, rubber washer, etc.) The unit is very stiff in the direction in which the nut half is loaded against the flank of the screw thread. However, in the direction away from the screw thread, the nut is only as axially stiff as the amount of preload which the spring exerts.



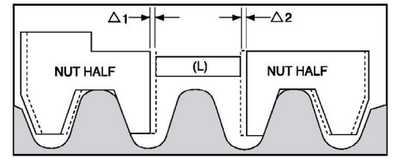
For example, if the maximum axial load to which the system is subjected is 50 lbs., the amount of spring preload must be equal to, or greater than, 50 lbs. in order to maintain intimate screw/nut contact. The problems arising from preloading in this manner are increased drag torque and nut wear. Obviously,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

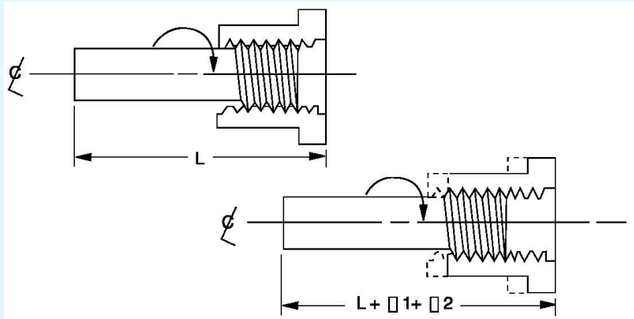


This gap (1 + LI2) is now the amount of backlash which has developed in the unit. This backlash can be removed by replacing the stiff spacer with a new spacer equal to (L + 1 +LI2). This process, although effective, would be extremely costly and difficult to implement on a continuous basis.



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.



KHD Nut Series

Eliminates the need for load compensating preload forces. The 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.

KHD Series Nut Assemblies

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	NO

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
80 to 100 million (200 to 250 million)	180 to 230 million (450 to 580 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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Identifying the KHD Series Nut Part Number Codes when Ordering

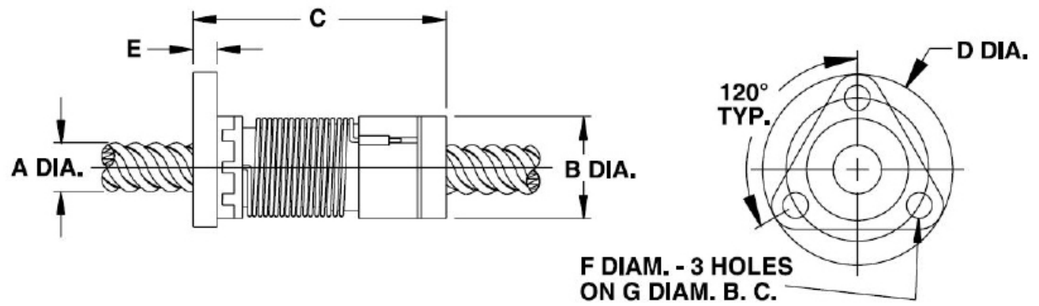
KHD	A	K	R	—	031	—	0039	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
KHD	**A** = Flanged (Triangular) **T** = Threaded **X** = Custom	**S** = Uncoated **K** = Kerkote® TFE Coating **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Not Available for Micro Series) (Refer to lead screw charts for availability		**031** = .313 in (8 mm) **037** = .375 in (10 mm)		(Refer to LEAD CODE Specifications chart, page 3)		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 call our Engineering Team at 603 213 6290.

Dimensional Drawings

KHDA Flange Mount

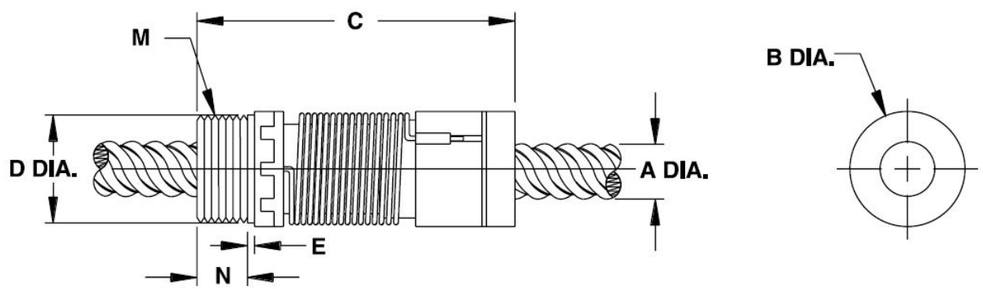
KHDA Flange Mount	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Thread M* inch	Thread Length N inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
	5/16 (8)	.80 (20.3)	2.2	.75 (19.1)	.05 (1.27)	3/4-20	.35 (8.9)	20 (10)	1-3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



KHDT Thread Mount

KHDT 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)
	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 numbers are for reference only.



Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3

Lead Screw Compatibility: KHD Series

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 %*
5/16	8	031	0.039	1.00	**0039**		0.315	8.00	0.261	6.63	34
			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
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

NTB Nut Series

For higher load applications. The 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 Nut Assembies

NTB Mini Nut Series

Miniature style asemblies, with an "anti-backlash" function. The Mini Series brings Haydon Kerk quality, precision and value to products that were previously off limits to lead screw technology.

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
100 to 125 million (250 to 315 million)	200 to 250 million (500 to 635 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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	NO

Identifying the NTB Series Nut Part Number Codes when Ordering

NTB	T	K	R	—	025	—	0050	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
NTB	**A** = Flanged (Triangular) **F** = Flanged (Round) **T** = Threaded **X** = Custom Mini Series Only: **B** = Barrel [m] **R** = Rectangular [m] [m] **NTB Mini Series**	**S** = Uncoated **K** = Kerkote® TFE Coating **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Not Available for Micro Series) (Refer to lead screw charts for availability		**012**[m] = .125 in (3.2 mm) **013**[m] = .133 in (3.3 mm) **014**[m] = .141 in (3.6 mm) **016**[m] = .156 in (4 mm) **018**[m] = .188 in (5 mm) **021**[m] = .219 in (5.6 mm) **025** = .250 in (6 mm) **031** = .313 in (8 mm) [m] **NTB Mini Series**		(Refer to LEAD CODE Specifications charts, pages 4 to 8)		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 call our Engineering Team at 603 213 6290.

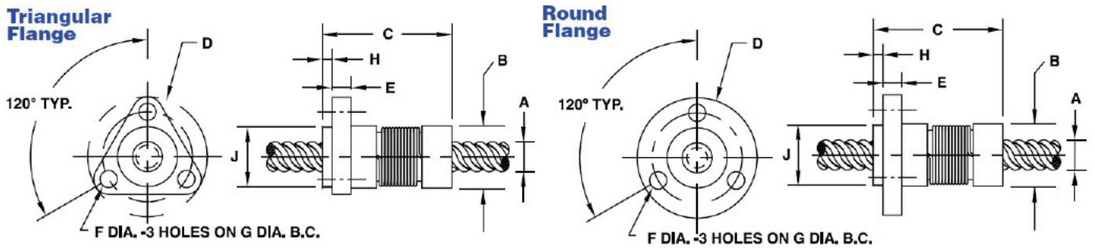
Dimensional Drawings

NTB 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)	1.125 (28.6)	.10 (2.54)	.875 (22.2)	30 (13.6)	1-3 (.007-.02)

Metric numbers are for reference only.

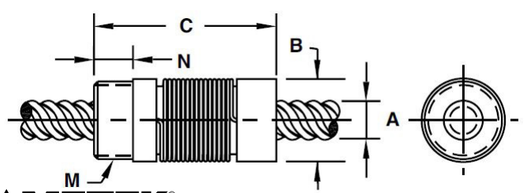
	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Mounting Hole Diam. F inch (mm)	Bolt Circle Diam. G inch (mm)	Hub Width H inch (mm)	Hub Diam. J inch (mm)	Dynamic Load lbs (Kg)	Drag Torque oz-in (N-m)
NTBF Round Flange	1/2 (13)	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)



NTB 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)
NTBT Thread Mount	1/8 (3)	.40 (10.2)	.50 (28)	3/8-24	1.25 (3.18)	5 (2.3)	.5 (.004)
	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)

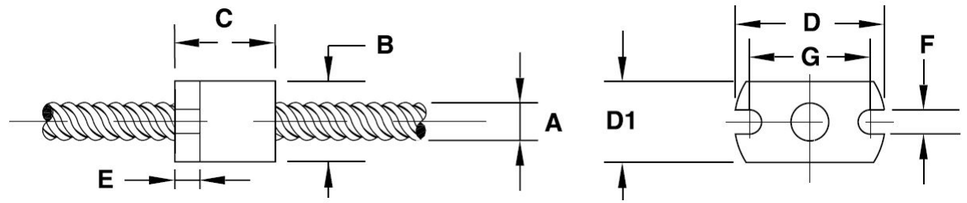
Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3



NTB Mini Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 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)
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)

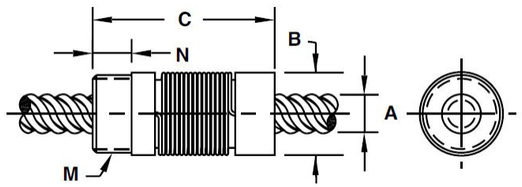
Metric numbers are for reference only.



NTB Mini 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)
NTBT 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	1.25 (3.18)	5 (2.3)	0.5 (.004)

Metric numbers are for reference only.



Lead Screw Compatibility: NTB Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/8	3.2	012	0.024	0.61	**0024**		0.129	3.28	0.093	2.36	44
			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
.132	3.3	013	0.020	0.50	**0020**		0.132	3.35	0.104	2.64	42
			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
			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
			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
316	5	018	0.020	0.50	**0020**		0.188	4.78	0.163	4.14	30
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

NTB Nut Series • Highly Customizable Anti-Backlash

Lead Screw Compatibility: NTB Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
7/32	5.6	021	0.024	0.61	**0024**		0.218	5.54	0.181	4.60	31
			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
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: NTB Series

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 %*
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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
			0.0625	1.59	**0063**	•	0.436	11.07	0.358	9.09	38
			0.079	2.00	**0079**		0.472	11.99	0.374	9.50	42
			0.111	2.82	**0111**		0.437	11.10	0.327	8.31	52
			0.118	3.00	**0118**		0.438	11.13	0.363	9.22	52
			0.125	3.18	**0125**		0.438	11.13	0.357	9.07	54
			0.197	5.00	**0197**		0.438	11.13	0.315	8.00	65
			0.236	6.00	**0236**		0.433	11.00	0.313	7.95	70
			0.250	6.35	**0250**		0.442	11.23	0.325	8.26	70
			0.307	7.80	**0307**		0.445	11.30	0.343	8.71	73
			0.325	8.26	**0325**		0.444	11.28	0.342	8.69	74
			0.394	10.00	**0394**		0.446	11.33	0.331	8.41	78
			0.472	12.00	**0472**		0.438	11.13	0.318	8.08	80
			0.500	12.70	**0500**		0.452	11.48	0.327	8.31	80
			0.615	15.62	**0615**		0.475	12.07	0.376	9.55	82

Lead Screw Compatibility: NTB Series

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 %*
1/2	13	050	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: NTB Series

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 %*
3/4	19	075	0.0625	1.59	**0063**		0.750	19.05	0.671	17.04	25
			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
			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
5/16	24	093	0.050	1.27	**0050**	LH Only	0.938	23.83	0.874	22.20	17
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

NTG Nut Series

Compact size, zero backlash, minimal drag torque. The adjustable 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.

NTG Mini Nut Series

The 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 Series Nut Assembly

NTG Mini Series Nut Assembly

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	YES

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Identifying the NTG Series Nut Part Number Codes when Ordering

NTG	A	K	R	—	025	—	0050	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
NTG	**A** = Flanged (Triangular) **T** = Threaded **X** = Custom Mini Series Only: **B** = Barrel [m] **R** = Rectangular [m]	**S** = Uncoated **K** = Kerkote® TFE Coating **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Not Available for Micro Series) (Refer to lead screw charts for availability		**012**[m] = .125 in (3.2 mm) **013**[m] = .133 in (3.3 mm) **014**[m] = .141 in (3.6 mm) **016**[m] = .156 in (4 mm) **018**[m] = .188 in (5 mm) **021**[m] = .219 in (5.6 mm) **025** = .250 in (6 mm) **031** = .313 in (8 mm) **037** = .375 in (10 mm) [m] **NTG Mini Series**		(Refer to LEAD CODE Specifications charts, pages 4 to 6)		Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

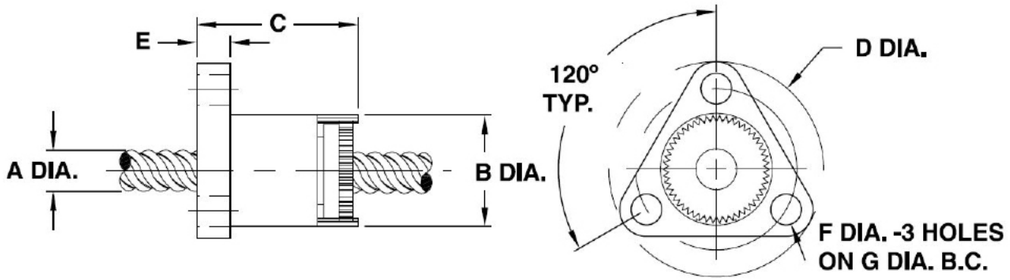
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Dimensional Drawings

NTG Flange Mount

NTGA 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)
	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)

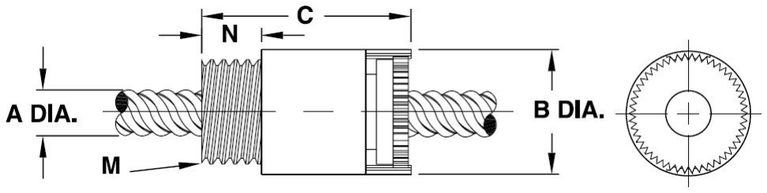
Metric numbers are for reference only.



NTG Thread Mount

NTGT Tread 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)
	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.

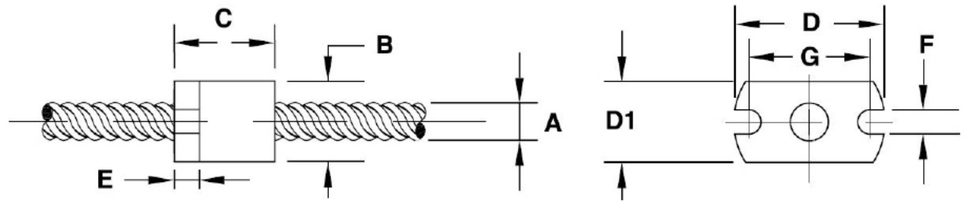


Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3

NTG Mini Flange Mount

NTGR Mini Flange Mount	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flang Height D1 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)
	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)

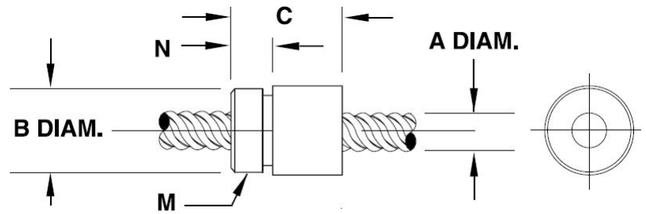
Metric numbers are for reference only.



NTG Mini Thread Mount

NTGT Tread 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)
	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 numbers are for reference only.



Lead Screw Compatibility: NTG Series

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 %*
1/8	3.2	012	0.024	0.61	**0024**		0.129	3.28	0.093	2.36	44
			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
.132	3.3	013	0.020	0.50	**0020**		0.132	3.35	0.104	2.64	42
			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
			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
			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
316	5	018	0.020	0.50	**0020**		0.188	4.78	0.163	4.14	30
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: NTG Series

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 %*
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: NTG Series

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 %*
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

VHD Nut Series

The 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 Nut Assemblies

VHD Series Nut

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	NO

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
200 to 225 million (500 to 570 million)	300 to 350 million (760 to 880 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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Identifying the VHD Series Nut Part Number Codes when Ordering

VHD	F	S	R	—	062	—	0125	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
VHD	**F** = Flanged (Round) **T** = Threaded **X** = Custom	**S** = Uncoated **K** = Kerkote® TFE Coating **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Not Available for Micro Series) (Refer to lead screw charts for availability		**050** = .500 in (13 mm) **062** = .625 in (16 mm) **075** = .750 in (19 mm) **087** = .875 in (22 mm)		(Refer to LEAD CODE Specifications charts, pages 3 to 4)		Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

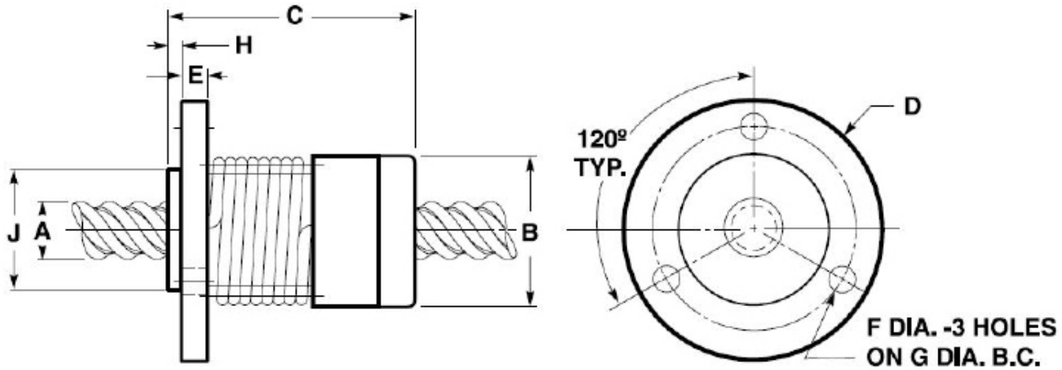
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Dimensional Drawings

VHD 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-.02)
	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-.02)
	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.

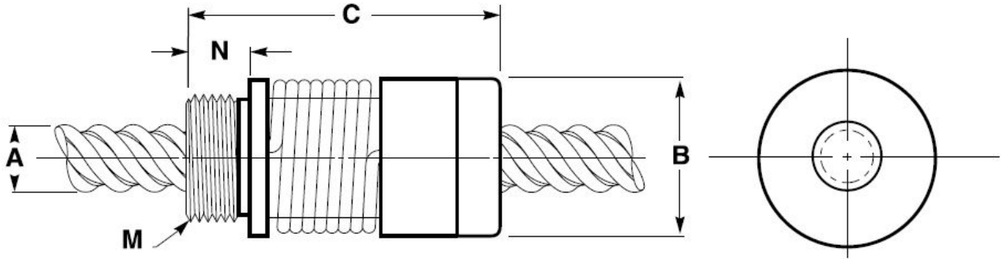


VHD Thread Mount

	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 Tread 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.

Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3



Lead screw Compatibility: VHD Series

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 %*
1/2	13	050	0.050	1.27	0050		0.495	12.57	0.433	11.00	29
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: VHD Series

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 %*
3/4	19	075	0.0625	1.59	**0063**		0.750	19.05	0.671	17.04	25
			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
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

WDG Nut Series

An economical anti-backlash nut assembly that provides precise positional accuracy and repeatability.

The 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 WDG 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.

WDG Series Nut Assembly

Highlights

– Compact Size, Moderate Load
– Cost Effective

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	NO

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
100 to 125 million (250 to 315 million)	200 to 250 million (500 to 635 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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Identifying the WDG Series Nut Part Number Codes when Ordering

WDG	A	K	R	—	018	—	0039	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
WDG	**A** = Flanged (Triangular) **P** = Flange (Triangular with pilot) **T** = Threaded Micro Series **X =** Custom	**S =** Uncoated **K =** Kerkote® TFE Coating **N =** Nut only **B =** Black Ice® TFE Coating	**R =** Right hand **L =** Left hand (Refer to lead screw charts for availability		**018** = .188 in (5 mm) **021** = .219 in (5.6 mm) **025 =** .250 in (6 mm) **031 =** .313 in (8 mm) **037 =** .375 in (10 mm) **043 =** .438 in (11 mm) **050 =** .500 in (13 mm)		(Refer to LEAD CODE Specifications charts, pages 3 to 5)		Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

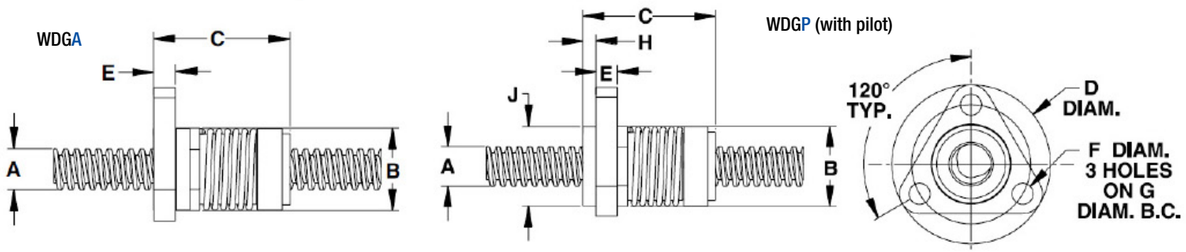
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Dimensional Drawings

WDG Flange Mount and with pilot

	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 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)

[1]metric available as required
[2]*other spring pre-loads available
Metric numbers are for reference only.

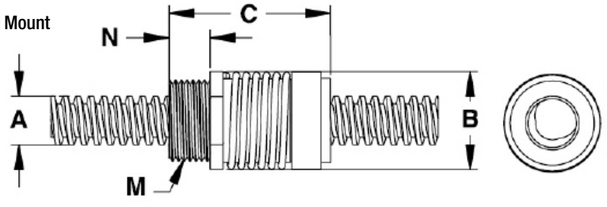


WDG Thread Mount

	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)
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)

[1]metric available as required
[2]*other spring pre-loads available
Metric numbers are for reference only.

Thread Mount



Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3

Lead Screw Compatibility: WDG Series

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 %*
3/16	5	018	0.020	0.50	0020		0.188	4.78	0.163	4.14	30
			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
			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
1/4	6	025	0.024	0.61	0024		0.250	6.35	0.218	5.54	28
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: WDG Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
5/16	8	031	0.039	1.00	**0039**		0.315	8.00	0.261	6.63	34
			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
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: WDG Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
7/16	11	043	0.050	1.27	**0050**		0.437	11.10	0.362	9.19	30
			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
1/2	13	050	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

ZBA Nut Series

Developed specifically for those applications that require very smooth and consistent motion, the patented 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.

ZBA Series Nut Assembly

Highlights

- Adjustable Drag Torque
- Cost Effective
- Smooth and Consistent Motion

Grease Compatibility

Coatings	Compatible
Kerkote TFE Coating	YES
Black Ice TFE Coating	YES
Grease	YES

Dimensional Tolerances

Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3

Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Identifying the ZBA Micro Series Nut Part Number Codes when Ordering

ZBA	A	K	R	—	062	—	0100	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
ZBA	**A** = Flanged (Triangular) **T** = Threaded Micro Series **X** =Custom	**S** = Uncoated **K** = Kerkote® TFE Coating **G** = Grease **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Refer to lead screw charts for availability		**025** = .250 in (6 mm) **031** = .313 in (8 mm) **037** = .375 in (10 mm) **043** = .438 in (11 mm) **050** = .500 in (13 mm) **062** = .625 in (16 mm) **075** = .750 in (19 mm) **087** = .875 in (22 mm) **093** = .938 in (24 mm)		(Refer to LEAD CODE Specifications charts, pages 3 to 6)		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 call our Engineering Team at 603 213 6290.

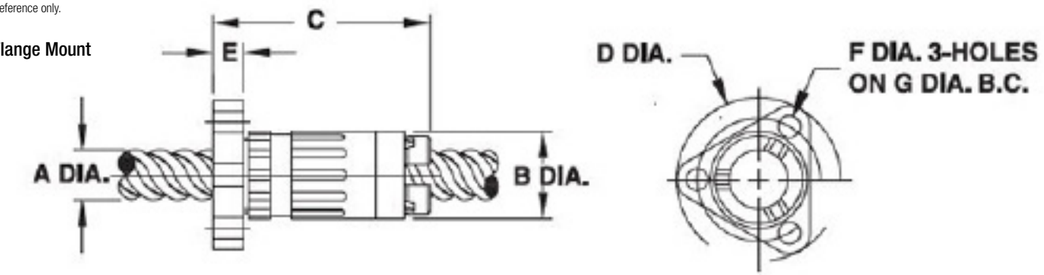
Dimensional Drawings

ZBA 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)	.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)	1.125 (28.6)	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)
	3/4 (19)	1.70 (43.2)	2.88 (73.2)	2.63 (66.8)	0.38 (9.6)	0.218 (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)	0.38 (9.6)	0.218 (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)	0.38 (9.6)	0.218 (5.5)	2.25 (57.2)	55 (25)	5-9 (.03-.064)

†metric available as required
2*other spring pre-loads available
Metric numbers are for reference only.

Flange Mount

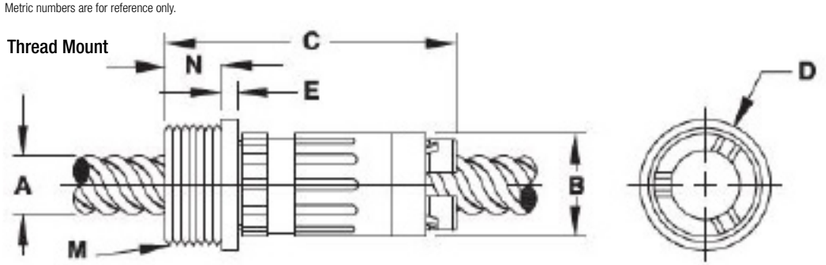


ZBX Thread Mount

	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 (mm)	Thread Length N inch (mm)	Dynamic Load** lbs (Kg)	Drag Torque** oz-in (N-m)
ZBXT 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	.38 (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
2*other spring pre-loads available
Metric numbers are for reference only.

Thread Mount



Lead Screw Compatibility: ZBA Series

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 %*
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

ZBA Nut Series • Adjustable Drag Anti-Backlash

Lead Screw Compatibility: ZBA Series

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 %*
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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
			0.0625	1.59	**0063**	•	0.436	11.07	0.358	9.09	38
			0.079	2.00	**0079**		0.472	11.99	0.374	9.50	42
			0.111	2.82	**0111**		0.437	11.10	0.327	8.31	52
			0.118	3.00	**0118**		0.438	11.13	0.363	9.22	52
			0.125	3.18	**0125**		0.438	11.13	0.357	9.07	54
			0.197	5.00	**0197**		0.438	11.13	0.315	8.00	65
			0.236	6.00	**0236**		0.433	11.00	0.313	7.95	70
			0.250	6.35	**0250**		0.442	11.23	0.325	8.26	70
			0.307	7.80	**0307**		0.445	11.30	0.343	8.71	73
			0.325	8.26	**0325**		0.444	11.28	0.342	8.69	74
			0.394	10.00	**0394**		0.446	11.33	0.331	8.41	78
			0.472	12.00	**0472**		0.438	11.13	0.318	8.08	80
			0.500	12.70	**0500**		0.452	11.48	0.327	8.31	80
			0.615	15.62	**0615**		0.475	12.07	0.376	9.55	82

Lead Screw Compatibility: ZBA Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/2	13	050	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: ZBA Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
3/4	19	075	0.0625	1.59	**0063**		0.750	19.05	0.671	17.04	25
			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
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

ZBX Nut Series

An economical anti-backlash nut assembly that provides precise positional accuracy and repeatability. The patented 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 Nut Series

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 standalone 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.

Highlights

- Economical anti-backlash nut assembly
- Light Loads
- Ultra-Smooth Motion
- Precise positional accuracy and repeatability

ZBX Series Nut Assembly

ZBM Micro Series Nut Assembly

ZBX Technical Data

Material	Polyacetal with Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 x 10 –5 in/in/°F
Coefficient 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

ZBX Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	YES

ZBX Anti-Backlash Life

Without Kerkote® TFE Coating inch / (cm)	With Kerkote® TFE Coating inch / (cm)
40 to 60 million (100 to 150 million)	150 to 200 million (380 to 500 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. Life will vary with loading, operating environment, and duty cycle. The longer screw leads generally provide longer life.

Identifying the ZBX and ZBM Micro Series Nut Part Number Codes when Ordering

ZBX	T	S	R	—	025	—	0050	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
ZBX **ZBM** = Micro Series	**A** = Flanged (Triangular) **T** = Threaded Micro Series **R** =Rectangular **X** =Custom	**S** = Uncoated **K** = Kerkote® TFE Coating **G** = Grease **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Refer to lead screw charts for availability		**008*** =.078 in (2 mm) **025** = .250 in (6 mm) **031** = .313 in (8 mm) **037** = .375 in (10 mm) **043** = .438 in (11 mm) **050** = .500 in (13 mm) **062** = .625 in (16 mm) ***Micro Series only**		(Refer to LEAD CODE Specifications charts, pages 4 to 6)		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 call our Engineering Team at 603 213 6290.

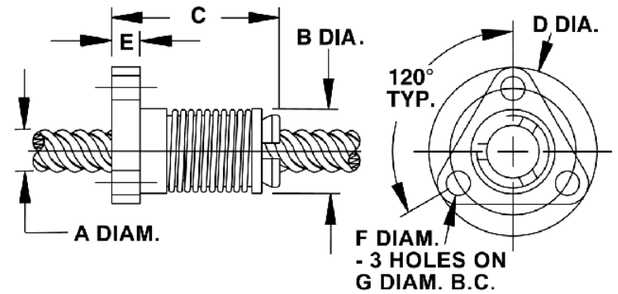
Dimensional Drawings

ZBX Flange Mount

ZBXA 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)
	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)	1.125 (28.6)	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)

†metric available as required
2*other spring pre-loads available
Metric numbers are for reference only.

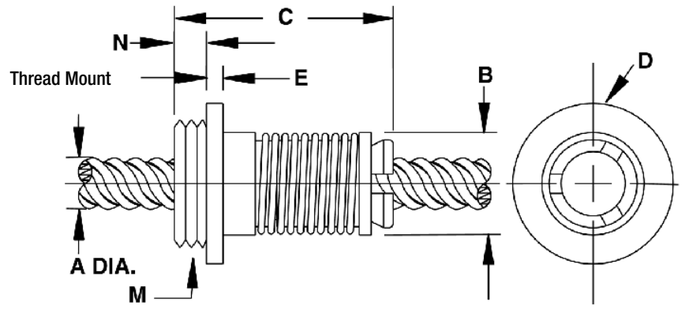
Flange Mount



ZBX Thread Mount

ZBXT 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 (mm)	Thread Length N inch (mm)	Dynamic Load** lbs (Kg)	Drag Torque** oz-in (N-m)
	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	.38 (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
2*other spring pre-loads available
Metric numbers are for reference only.



ZBX Dimensional Tolerances			
Inches		Metric (mm)	
.X	± .02	< L 4	± 0.1
.XX	± .010	4 < L ≤ 16	± 0.15
.XXX	± .005	16 < L ≤ 63	± 0.2
		63 < L ≤ 250	± 0.3

ZBM Micro Series Rectangular Anti-Backlash Nut Style for Micro Lead screws

ZBMR	ZBMW Nut Style	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Diam. D1 inch (mm)	Flange Diam. D inch (mm)	Flange Thickness E inch (mm)	Thread M * inch (mm)	Thread Length N inch (mm)	Dynamic Load** lbs (Kg)	Drag Torque** oz-in (N-m)
	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.

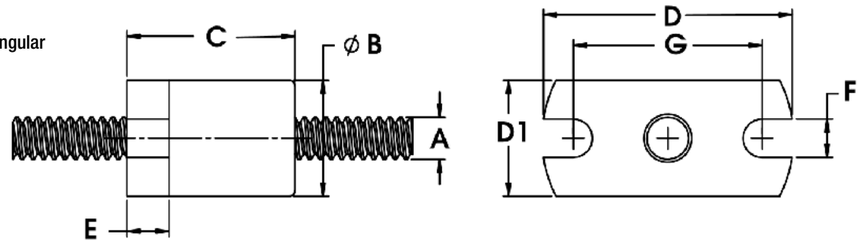
[1]metric available as required
[2]*other spring pre-loads available
Metric numbers are for reference only.

Micro Lead Screw Size List	Diameter (inches)	Diameter (mm)	Diam. 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)	Effi-ciency %**
	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

Rectangular



Lead Screw Compatibility: ZBX Series

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 %*
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**
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
			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
			0.80	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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: ZBX Series

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 %*
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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
			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

Contact Details

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: ZBX Series

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 %*
1/2	13	050	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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
			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.

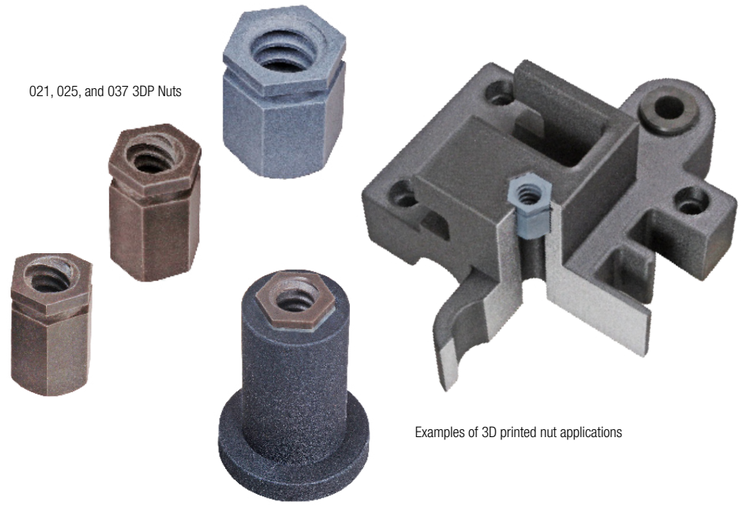
* Listed efficiencies are theoretical values based on Kerkote® TFE coated lead screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Free Wheeling and Specialty Nuts

Haydon Kerk offers conventional style free-wheeling nuts – without anti-backlash features – in our standard self-lubricating polyacetal material, as well as a wide range of proprietary engineered thermoplastics to suit a wealth of applications. Catalog configurations provide several mounting options for quick and affordable implementation, and our extensive inhouse molding capabilities allow for highly custom and tightly integrated conformations for our OEM customers.

3DP Nut Series

Advanced technology for custom motion control prototype development. The 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 Nuts

Examples of 3D printed nut applications

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	YES

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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

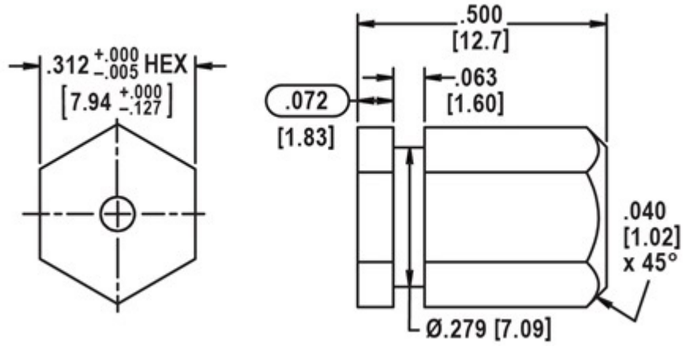
Identifying the 3DP Series Nut Part Number Codes when Ordering

3DP	H	K	R	—	012	—	0012	—	BZ00
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
3DP	**H** = Hex	**S =** Uncoated **K =** Kerkote® TFE Coating **G =** Grease **N =** Nut only **B =** Black Ice® TFE Coating	**R =** Right hand **L =** Left hand (Refer to lead screw charts for availability		**012 =** .125 in (3.2 mm) **013 =** .133 in (3.3 mm) **014 =** .141 in (3.6 mm) **016 =** .156 in (4 mm) **018 =** .188 in (5 mm) **021 =** .219 in (5.6 mm) **025 =** .250 in (6 mm) **037 =** .375 in (10 mm)		(Refer to LEAD CODE Specifications charts, pages 3 to 4)		**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)

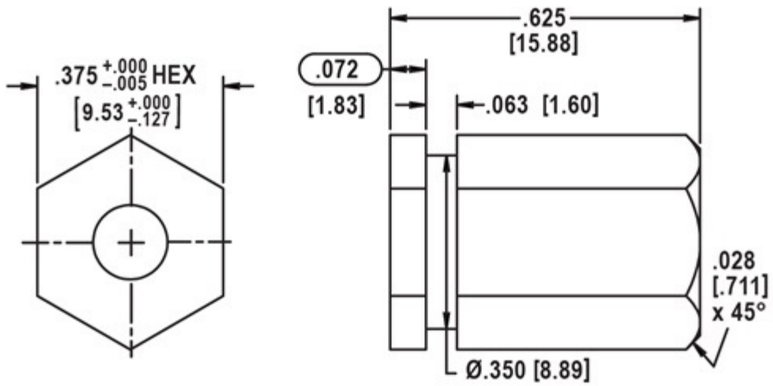
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Dimensional Drawings inch [mm]

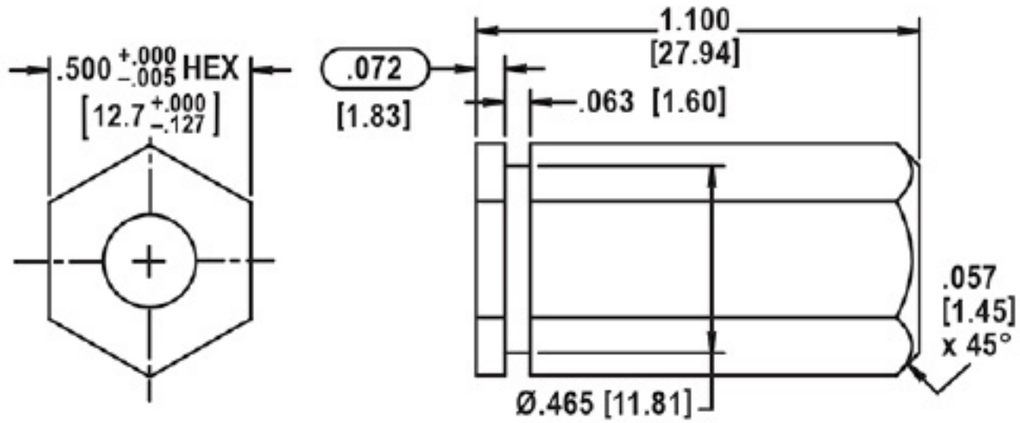
3DP Hex Nut: 012 to 021 Series



3DP Hex Nut: 025 Series



3DP Hex Nut: 037 Series



Lead Screw Compatibility: 3DP Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/8	3.2	012	0.024	0.61	**0024**		0.129	3.28	0.093	2.36	44
			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
.132	3.3	013	0.020	0.50	**0020**		0.132	3.35	0.104	2.64	42
			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
			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
			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
			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
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: 3DP Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

BFW Nut Series

Conventional style, without “anti-backlash” function. The 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.

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 requirementsand Kerkote® TFE screw coating are optional.

BFW Micro Nut Series

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

BFW Series Nut Assemblies

BFW Micro Series Nut Assemblies

Backlash

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

Grease Compatibility

Coatings	Compatible
Kerkote® TFE Coating	YES
Black Ice® TFE Coating	YES
Grease	NO

Technical Data

Material	Polyacetal, Lubricant Additive
Tensile Strength	9,700 psi
Coefficient of Expansion	6.0 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 HKP Engineering Team at 603 213 6290 for optional temperature range materials.
** with Kerkote® TFE Coating.

Identifying the BFW Series Nut Part Number Codes when Ordering

BFW	A	K	R	—	018	—	0020	—	XXXX
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
BFW	**A** = Flanged (Triangular) **F** = Flanged (Round) **T** = Threaded **X** = Custom For Mini and Micro Series Only: **B** = Barrel m µ **R** = Rectangular m µ [m] **BFW Mini Series** [µ] **BFW Micro Series**	**S** = Uncoated **K** = Kerkote® TFE Coating **G** = Grease **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Not Available for Micro Series) (Refer to lead screw charts for availability		**008**[µ] = .078 in (2 mm) **012**[m] = .125 in (3.2 mm) **013**[m] = .133 in (3.3 mm) **014**[m] = .141 in (3.6 mm) **016**[m] = .156 in (4 mm) **018**[m] = .188 in (5 mm) **021**[m] = .219 in (5.6 mm) **025** = .250 in (6 mm) **031** = .313 in (8 mm) **037** = .375 in (10 mm) **043** = .438 in (11 mm) **050** = .500 in (13 mm) **062** = .625 in (16 mm) **075** = .750 in (19 mm) **087** = .875 in (22 mm) **093** = .938 in (24 mm) [m] **BFW Mini Series** [µ] **BFW Micro Series**		(Refer to LEAD CODE Specifications charts, pages 5 to 9)		Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

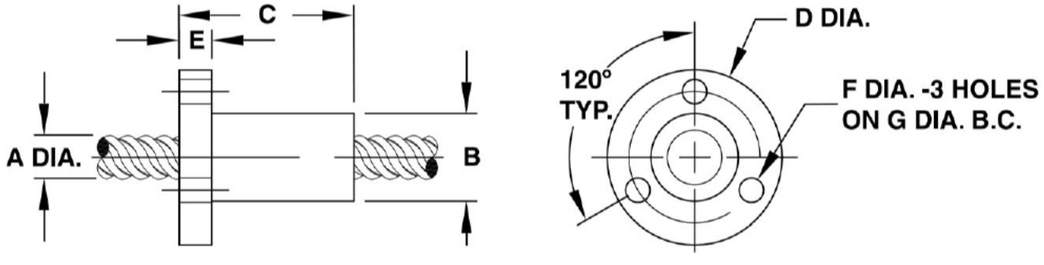
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Dimensional Drawings

BFW Round 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)
BFWF Flange Mount	1/4 (6)	.50 (12.7)	1.0 (25.4)	100 (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)

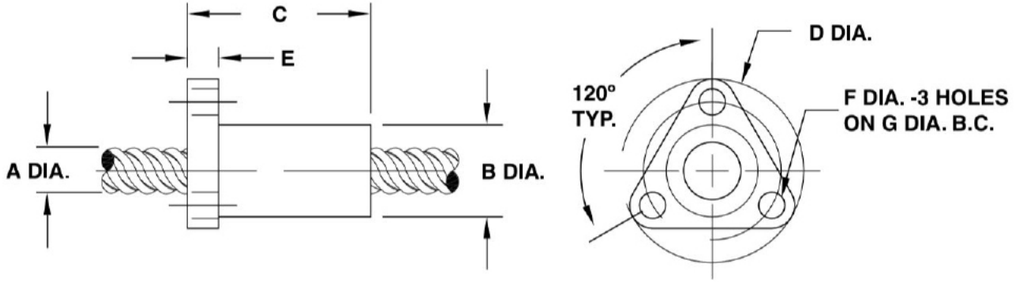
Metric numbers are for reference only.



BFW Triangular 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)
BFWA Triangular Flange Mount	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)

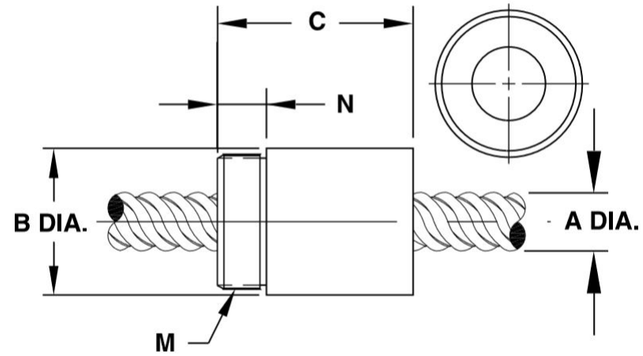
Metric numbers are for reference only.



BFW 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)

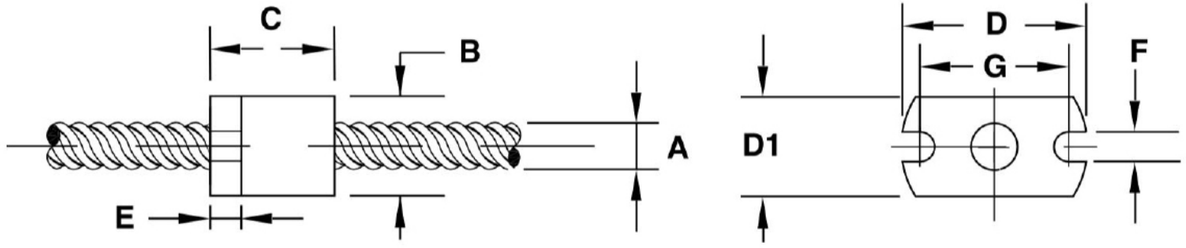
Metric numbers are for reference only.



BFW Mini Rectangular Flange Mount

	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 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)
BFWR Rectangular 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

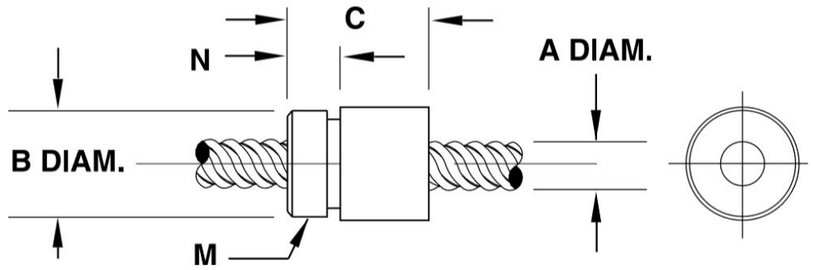
Metric numbers are for reference only.



BFW Mini Thread Mount

BFWT 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)
	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

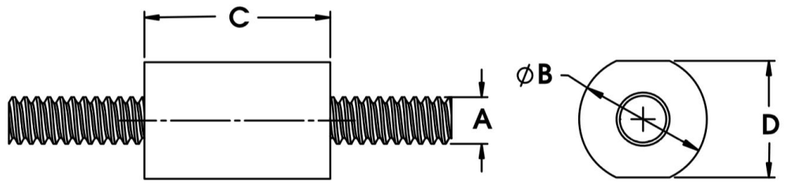
Metric numbers are for reference only.



BFW Micro Barrel Mount

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

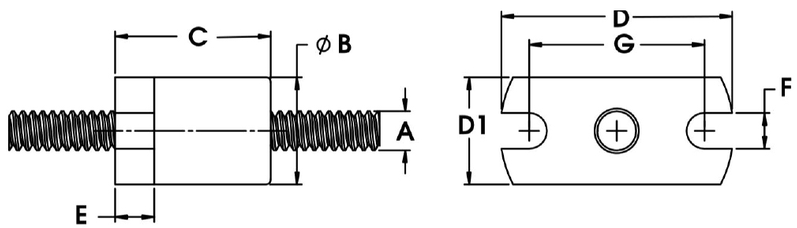
Metric numbers are for reference only.



BFW Micro Rectangular Flange Mount

BFWR Rectangular Flange Mount	Screw Diam. A inch (mm)	Nut Diam. B inch (mm)	Nut Length C inch (mm)	Flange Height D1 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)
	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.



Lead Screw Compatibility: BFW Series

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 %*
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**
1/8	3.2	012	0.024	0.61	0024		0.129	3.28	0.093	2.36	44
			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
.132	3.3	013	0.020	0.50	0020		0.132	3.35	0.104	2.64	42
			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
			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
			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
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: BFW Series

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 %*
7/32	5.6	021	0.024	0.61	**0024**		0.218	5.54	0.181	4.60	31
			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
1/4	6	025	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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
			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.

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** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: BFW Series

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 %*
3/8	10	037	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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
			0.0625	1.59	**0063**	•	0.436	11.07	0.358	9.09	38
			0.079	2.00	**0079**		0.472	11.99	0.374	9.50	42
			0.111	2.82	**0111**		0.437	11.10	0.327	8.31	52
			0.118	3.00	**0118**		0.438	11.13	0.363	9.22	52
			0.125	3.18	**0125**		0.438	11.13	0.357	9.07	54
			0.197	5.00	**0197**		0.438	11.13	0.315	8.00	65
			0.236	6.00	**0236**		0.433	11.00	0.313	7.95	70
			0.250	6.35	**0250**		0.442	11.23	0.325	8.26	70
			0.307	7.80	**0307**		0.445	11.30	0.343	8.71	73
			0.325	8.26	**0325**		0.444	11.28	0.342	8.69	74
			0.394	10.00	**0394**		0.446	11.33	0.331	8.41	78
			0.472	12.00	**0472**		0.438	11.13	0.318	8.08	80
			0.500	12.70	**0500**		0.452	11.48	0.327	8.31	80
			0.615	15.62	**0615**		0.475	12.07	0.376	9.55	82

Lead Screw Compatibility: BFW Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/2	13	050	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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
			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

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** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screw Compatibility: BFW Series

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
3/4	19	075	0.0625	1.59	**0063**		0.750	19.05	0.671	17.04	25
			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
			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
			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.

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** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Lead Screws

Kerk Lead Screws utilize the latest in precision rolling technology. Lead screws are available in standard diameters from 5/64" to 15/16" and includes metric and left hand threads. Most standard lead screws are manufactured from 303 stainless steel and are produced using our exclusive precision rolling process. Other lead screw materials are available for application specific requirements.

Kerk® Lead Screws

Manufactured from 303 stainless steel and produced with Kerk's exclusive precision rolling process. 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. 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). The surface finish is better than 16 micro-inches (0.4 µm). Please consult factory for more details. Kerk stainless steel lead screws and guide rails are corrosion resistant, non-magnetic, and compatible with many demanding processes.

Identifying the Lead Screw Part Number Codes when Ordering

LSS	S	K	R	—	025	—	0024	—	EY10
Prefix	**Nut Mounting Style**	**Lubrication**	**Thread Direction**		**Diameter Code**		**Nominal Thread Lead Code**		**Unique Identifier**
LSS = Screw Only	**S** = Screw Only **X** = Custom	**S** = Uncoated **K** = Kerkote® TFE Coating **G** = Grease **N** = Nut only **B** = Black Ice® TFE Coating	**R** = Right hand **L** = Left hand (Refer to lead screw charts for availability		**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) [m] **BFW Mini Series** [µ] **BFW Micro Series**		(Refer to LEAD CODE Specifications charts, pages 2 to 6)		**FY06** = 6" CTL Kerk threadform **EY10** = 10" C-T-L Haydon threadform

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Material & Teflon TFE Coating Options

Materials		Teflon TFE Coatings	
Kerkite® Composite Polymer Nuts	In addition to the Kerk® self-lubricating acetal nut material, we offer 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. 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.	**Kerkote® TFE Coating**	Soft coating that is a long-term. maintenance-free. dry lubricant, 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. 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.
Special Materials	Kerk® has rolled screws in many materials, including 316 stainless, 400 series stainless, precipitate hardening materials, carbon steel, aluminum, and titanium. Kerk® nuts have been produced in many alternative plastics including PEEK, polyester, Torlon®, Vespel®, PVDF, UHMW, Ertalyte®, customer-supplied specialty materials, and metal nuts made from bronze, brass, and stainless steel. If the material can be molded, machined, ground, or rolled, we can likely process it.	**Black Ice® TFE Coating**	Hard coating that is long term, maintenance-free and is exceptionally durable 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 more aggressive environment conditions, or anywhere reduced friction and a permanent coating is desired. Not intended to be used with additional lubricants.

Note: 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.

Diameter and Lead Codes

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
5/64 (.078) Micro Series	**2**	**008** [μ]	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**
1/8 (.125)	**3.2**	**012** [m]	0.024	0.61	**0024**		0.129	3.28	0.093	2.36	44
			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
17/128 (.132)	**3.3**	**013** [m]	0.020	0.50	**0020**		0.132	3.35	0.104	2.64	42
			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 (.141)	**3.6**	**014** [m]	0.012	0.30	**0012**		0.140	3.56	0.123	3.12	26
			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 (.156)	**4**	**016** [m]	0.033	0.84	**0033**	•	0.156	3.96	0.116	2.95	45
			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
316 (.188)	**5**	**018** [m]	0.020	0.50	**0020**		0.188	4.78	0.163	4.14	30
			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

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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Diameter and Lead Codes

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
7/32 (.219)	**5.6**	**021** [m]	0.024	0.61	**0024**		0.218	5.54	0.181	4.60	31
			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
1/4 (.250)	**6**	**025**	0.024	0.61	**0024**		0.250	6.35	0.218	5.54	28
			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 (.313)	**8**	**031**	0.039	1.00	**0039**		0.315	8.00	0.261	6.63	34
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Diameter and Lead Codes

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
3/8 (.375)	**10**	**037**	0.025	0.64	**0025**		0.375	9.53	0.337	8.56	21
			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
			0.667	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 (.438)	**11**	**043**	0.050	1.27	**0050**		0.437	11.10	0.362	9.19	30
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Diameter and Lead Codes

Diameter		Diameter Code	Lead		LEAD CODE	Left Hand Available	Outside Diameter (for reference)		Root Diameter (for reference)		Efficiency %*
inches	mm		inches	mm			inches	mm	inches	mm	
1/2 (.500)	**13**	**050**	0.050	1.27	**0050**		0.495	12.57	0.433	11.00	29
			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 (.625)	**16**	**062**	0.100	2.54	**0100**		0.615	15.62	0.498	12.65	40
			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 screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Diameter and Lead Codes

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 %*
3/4 (.750)	19	075	0.0625	1.59	0063		0.750	19.05	0.671	17.04	25
			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 (.875)	22	087	0.200	5.08	0200	•	0.870	22.10	0.742	18.85	48
			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
5/16 (.938)	24	093	0.050	1.27	0050	LH Only	0.938	23.83	0.874	22.20	17
			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.

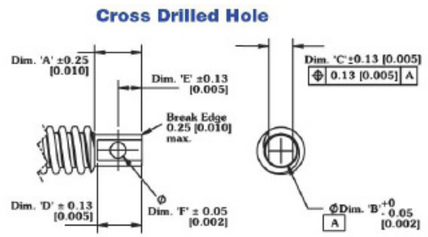
* Listed efficiencies are theoretical values based on Kerkote® TFE coated lead screw
** Listed efficiencies for Micro screws are theoretical values based on non-coated lead screws
***Back-drive threshold is 50±10%

Screw Inertia

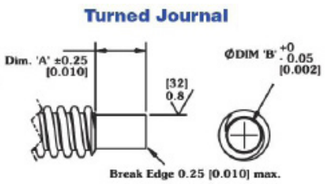
Screw Size inch [mm]	Screw Inertia [oz-inch–sec2/inch]	[g-cm2/cm]
5/64 (2)	3.4×10^{-8}	9.5×10^{-4}
1/8 (3.2)	1.8×10^{-7}	5.0×10^{-3}
9/64 (3.5)	3.4×10^{-7}	9.5×10^{-3}
5/32 (3.97)	4.9×10^{-7}	1.4×10^{-2}
3/16 (4.76)	1.1×10^{-6}	3.1×10^{-2}
7/32 (5.55)	1.8×10^{-6}	5.0×10^{-2}
1/4 (6)	3×10^{-5}	8.3×10^{-2}
5/16 (8)	5×10^{-5}	1.4
3/8 (10)	1.5×10^{-5}	0.4
7/16 (11)	3.5×10^{-5}	1.0
1/2 (13)	5.2×10^{-5}	1.4
5/8 (16)	14.2×10^{-5}	3.9
3/4 (19)	30.5×10^{-5}	8.5
7/8 (22)	58.0×10^{-5}	16.1
15/16 (24)	73.0×10^{-5}	20.3

Standard End Machining mm[inches]

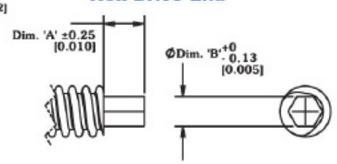
Cross Drilled Hole



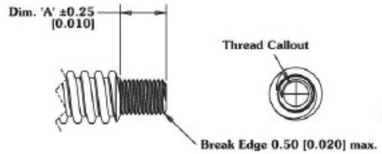
Turned Journal



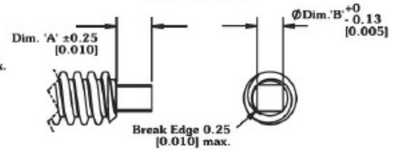
Hex Drive End



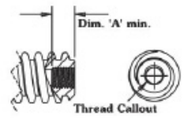
Male Thread



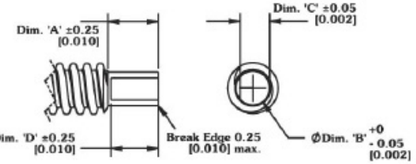
Square End



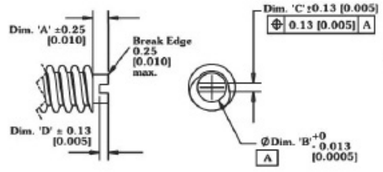
Female Thread



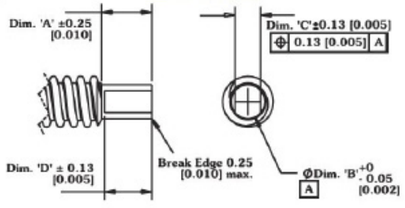
Single Flat



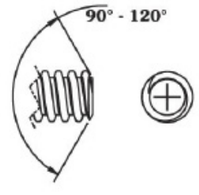
Screwdriver Slot



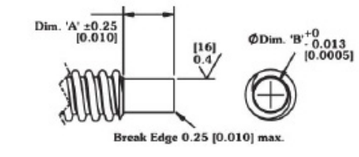
Double Flat



Standard Break Edge



Ground Journal



AMETEK Haydon Kerk **Lead Screw and Nut Customization**

Haydon Kerk takes great pride in designing and developing customized solutions for your application needs.

Our Design and Development Engineers begin with our standard catalog products and build ideal solutions for your motion needs. Our factories bring your solutions into production.

Stepper Motor Linear Actuators

Our various patented designs use a proprietary manufacturing process which incorporates engineered thermoplastics in the rotor drive nut and a stainless steel lead screw. This design allows the linear actuator to be much quieter, more efficient and more durable than a v-thread and bronze nut configuration commonly used in other linear actuators.

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 I2R (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 is running 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 offers a unique line of hybrid stepper motor linear actuators that open new avenues for equipment designers who require high performance and exceptional endurance in a very small package.The various patented and patent pending designs use a proprietary manufacturing process, which incorporates engineering thermoplastics in the rotor drive nut and a stainless steel acme lead screw. This allows the linear actuator to be much quieter, more efficient and more durable than the v-thread and bronze nut configuration commonly used in other linear actuators.

21000 Series
Size 8 Hybrid Linear Actuators

Size 8 Hybrid Precision Stepper Motor is part of our extensive, award winning miniature motor product line and is one of the world's smallest linear actuators.

More Compact Option for Motion Applications

The 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.

3 Available Designs

– Captive
– Non-Captive
– External Linear

The 21000 Series is available in a wide variety of resolutions - from 0.00006" (.0015mm) per step to 0.00157" (0.0 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 Linear	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 79.

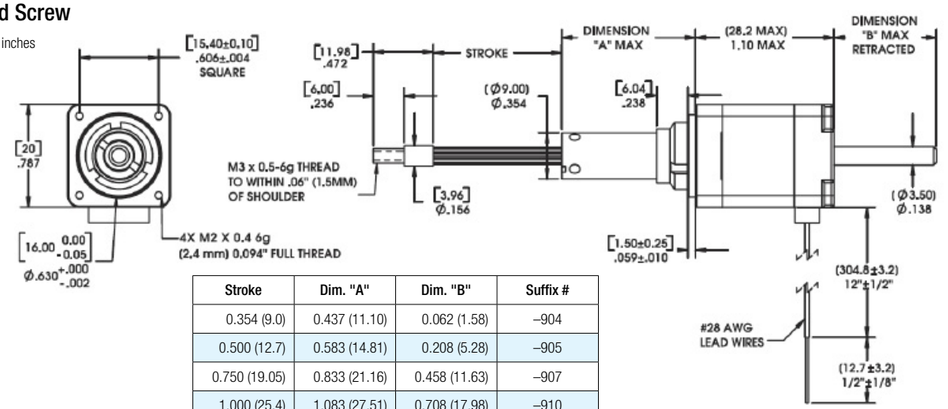
Linear Travel / Step Screw Ø.14-in (3.56mm)		Order Code I.D.
inches	mm	
.00006	.0015*	U**
.000098*	.0025	AA**
.00012	.0030*	N
.00019*	.005	AB
.00024	.006*	K
.00039*	.01	AC
.00048	.0121*	J
.00078*	.02	AD
.00157	.04	AE

*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.

Captive Lead Screw

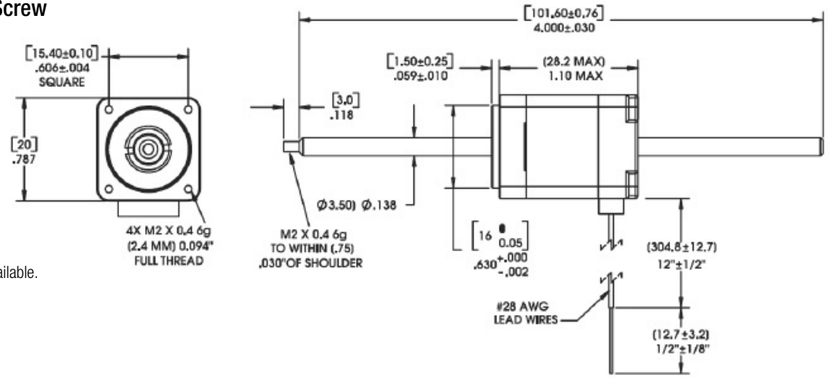
Dimensions = (mm) inches



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

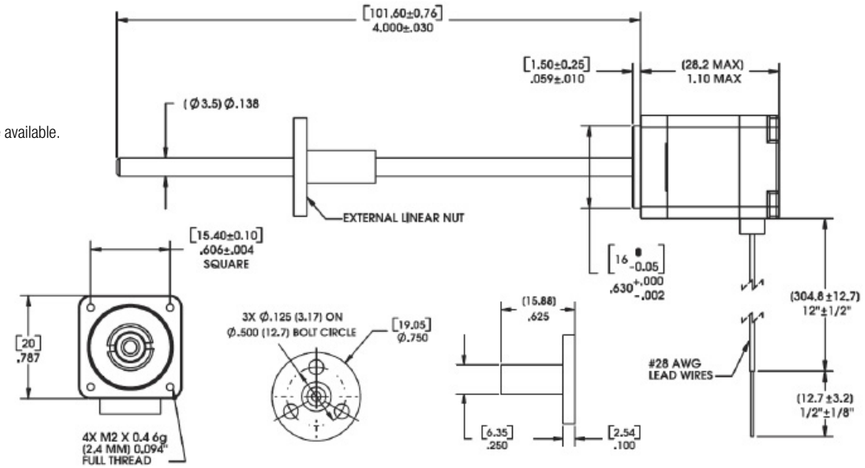
Dimensions = (mm) inches



4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

External Linear

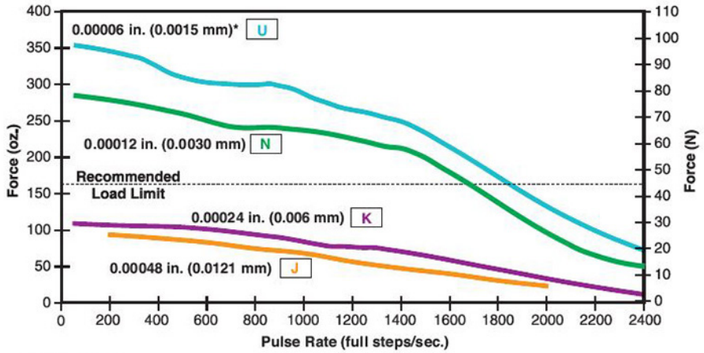
Dimensions = (mm) inches

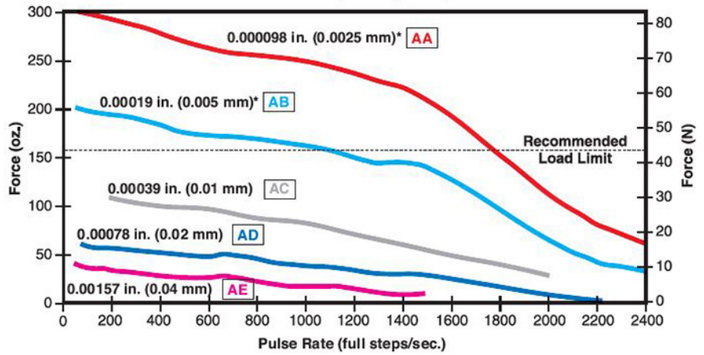


4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

FORCE vs. PULSE RATE

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .14 (3.56) Lead Screw





FORCE vs. LINEAR VELOCITY

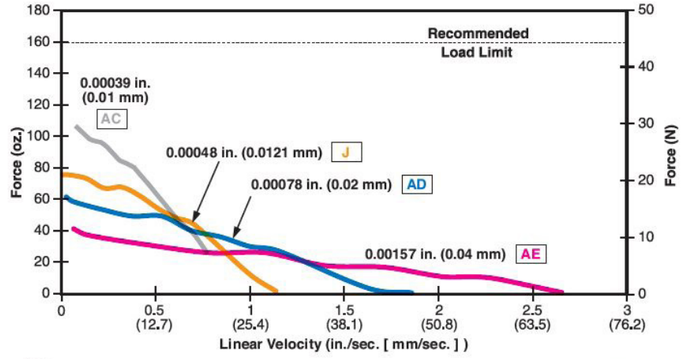
– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .14 (3.56) Lead Screw

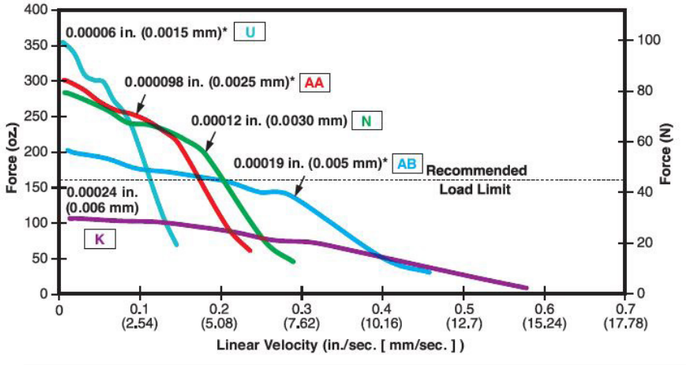
*Care should be taken when utilizing these screw pitches to ensure that the physical load limits of the motor are not exceeded. Please consult the factory for advice in selecting the proper pitch for your application.

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.



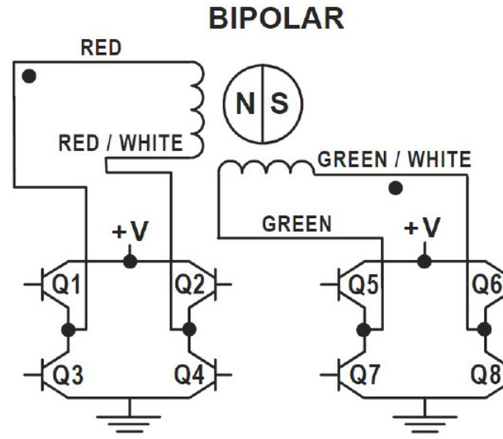


Identifying the Hybrid Part Number Codes when Ordering

E	21	H	4	AB	—	7.5	—	910
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** **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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

Integrated Connector for Hybrid Size 8

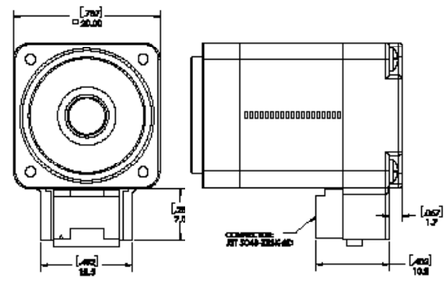
Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 2 amps and the mating connector will handle a range of wire gauges from 24 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

Motor Connector:
JST part # S04B-ZESK-2D

Mating Connector:
JST part # ZER-04V
Haydon Kerk Part # 56-2369-1 (12 in. Leads)

Wire to Board Connector:
JST part # SZE-002T-P0.3

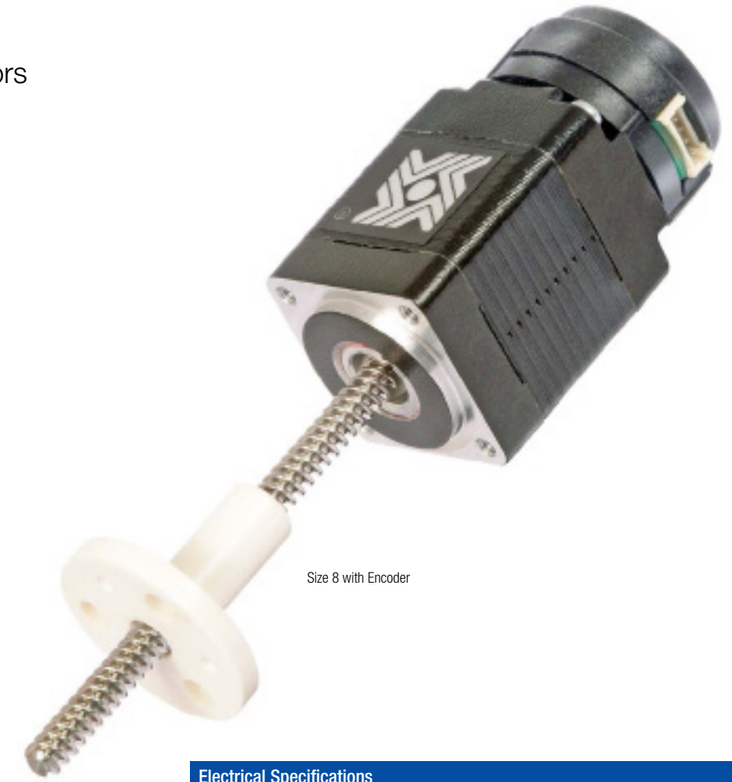
Pin #	Bipolar	Color
1	Phase 2 Start	G/W
2	Phase 2 Finish	Green
3	Phase 1 Finish	R/W
4	Phase 1 Start	Red



Encoders Designed for All Sizes of Hybrid Linear Actuators

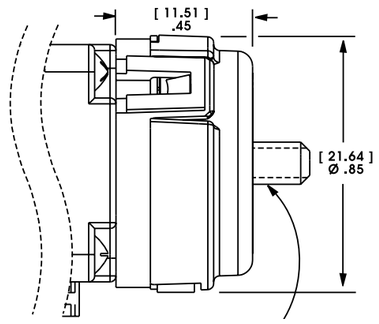
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 8 Encoder provides resolutions for applications that require 250 and 300 counts per revolution. Encoders are available for all motor configurations – captive, non-captive and external linear.

Simplicity and low cost make 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 photo-detector array with signal shaping electronics to produce the two channel bounceless TTL outputs.



Size 8 with Encoder

21mm 21000 Series Size 8



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

Single Ended Encoder - Pinout - Size 8	
Connector Pin #	**Description**
1	+5 VDC Power
2	Channel A
3	Ground
4	Channel B

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

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution			
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)			
Size 8	**CPR**	250	300
	PPR	1000	1200

21000 Series Size 8 Double Stack Hybrid Linear Actuators

Size 8 Double Stack Hybrid Stepper Motor Linear Actuators provide enhanced performance over a single stack.

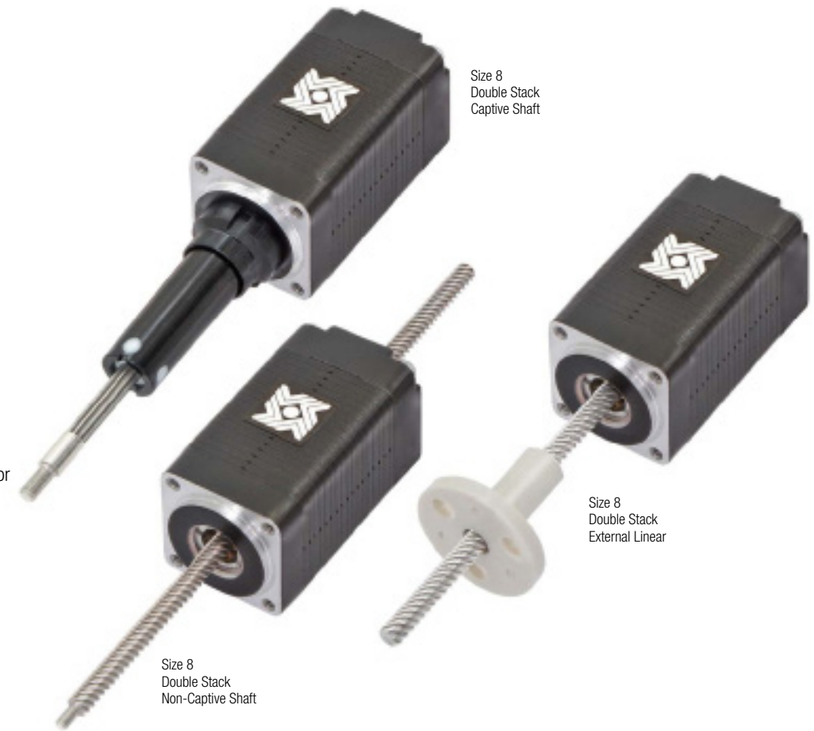
Improved Performance & New Linear Motion Design Opportunities in a 20 mm Frame Size

3 Available Designs

– Captive
– Non-Captive
– External Linear

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.



Size 8
Double Stack
Captive Shaft

Size 8
Double Stack
External Linear

Size 8
Double Stack
Non-Captive Shaft

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 Linear	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 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	2.4 oz (43 g)		
Insulation Resistance	20 MΩ		

†Part numbering information on page 84.

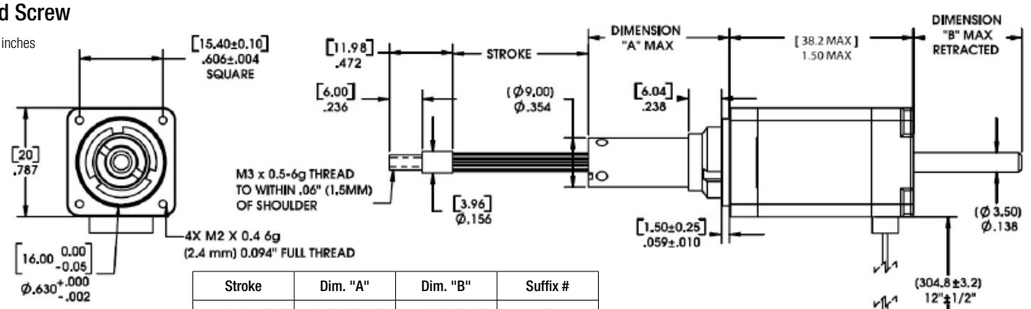
Linear Travel / Step Screw Ø.14-in (3.56mm)		Order Code I.D.
inches	mm	
.000098*	.0025	AA
.00012	.0030*	N
.00019*	.005	AB
.00024	.006*	K
.00039*	0.01	AC
.00048	.0121*	J
.00078*	.02	AD
.00157*	.04	AE
.00157	.04	AE

*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.

Captive Lead Screw

Dimensions = (mm) inches

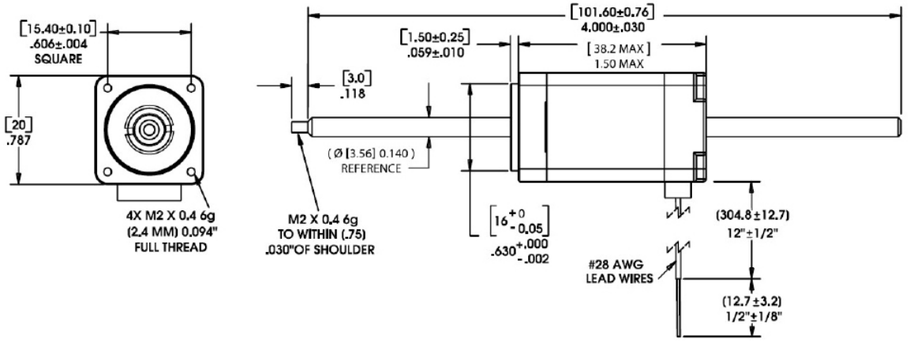


Stroke	Dim. "A"	Dim. "B"	Suffix #
0.354 (9.0)	0.437 (11.10)	0.000 (0.00)	–904
0.500 (12.7)	0.583 (14.81)	0.011 (0.28)	–905
0.750 (19.05)	0.833 (21.16)	0.261 (6.63)	–907
1.000 (25.4)	1.083 (27.51)	0.511 (12.98)	–910
1.250 (31.8)	1.333 (33.86)	0.761 (19.33)	–912
1.500 (38.1)	1.583 (40.21)	1.011 (25.68	–915
2 (50.8)	2.083 (52.91)	1.078 (43.38)	-920

Non-Captive Lead Screw

Dimensions = (mm) inches

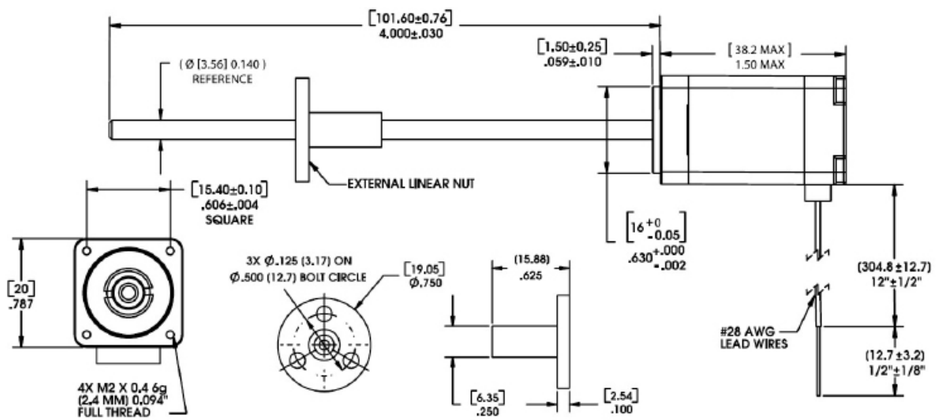
Up to 6 in (152 mm)
standard screw lengths.
Longer screw lengths are available.



External Linear

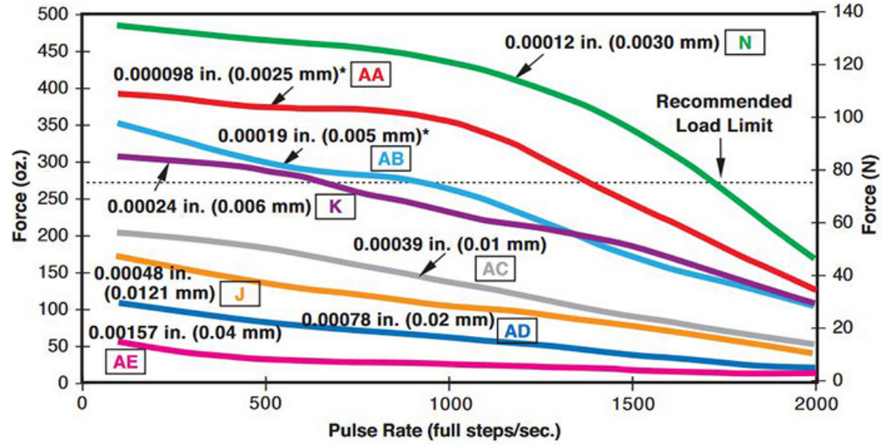
Dimensions = (mm) inches

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



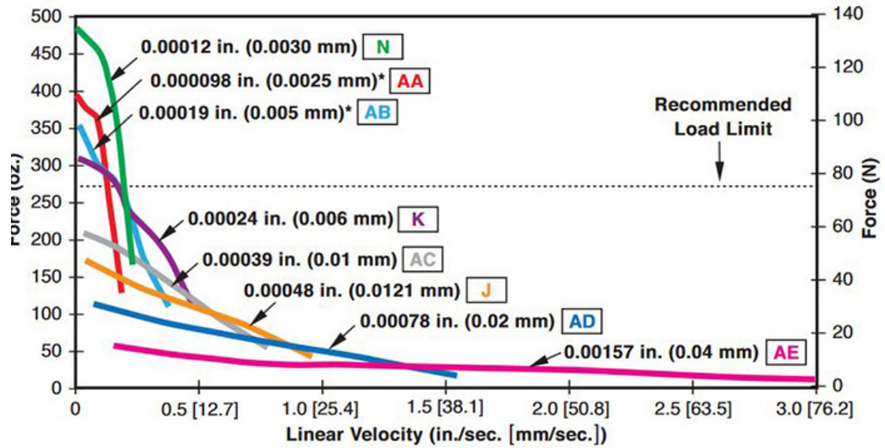
FORCE vs. PULSE RATE

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



FORCE vs. LINEAR VELOCITY

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



*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.

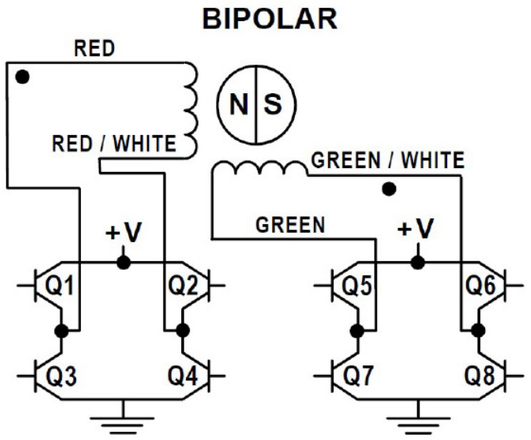
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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 Data Sheet) **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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

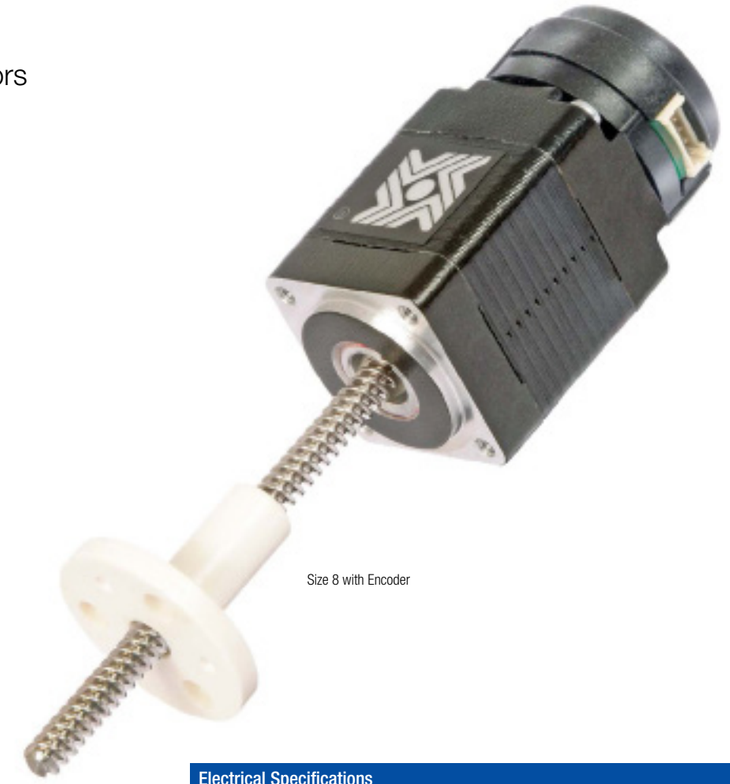
EXTEND CW ↓ RETRACT CCW ↑

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

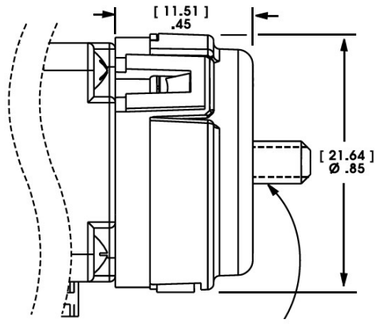
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 8 Encoder provides resolutions for applications that require 250 and 300 counts per revolution. Encoders are available for all motor configurations – captive, non-captive and external linear.

Simplicity and low cost make 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 photo-detector array with signal shaping electronics to produce the two channel bounceless TTL outputs.



Size 8 with Encoder

21mm 21000 Series Size 8



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

Single Ended Encoder - Pinout - Size 8	
Connector Pin #	**Description**
1	+5 VDC Power
2	Channel A
3	Ground
4	Channel B

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

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution			
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)			
Size 8	**CPR**	250	300
	PPR	1000	1200

28000 Series
Size 11 Hybrid Linear Actuators

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.

3 Available Designs

– Captive
– Non-Captive
– External Linear

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).

Size 11: 28 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	28H4 _ _ _ _ _ _ †			28H6 _ _ _ _ _ _ †	
	Non-Captive	28F4 _ _ _ _ _ _ †			28F4 _ _ _ _ _ _ †	
	External Linear	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	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 gcm²				
Insulation Class		Class B (Class F available)				
Weight		4.2 oz (119 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 89. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

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

*Values truncated.

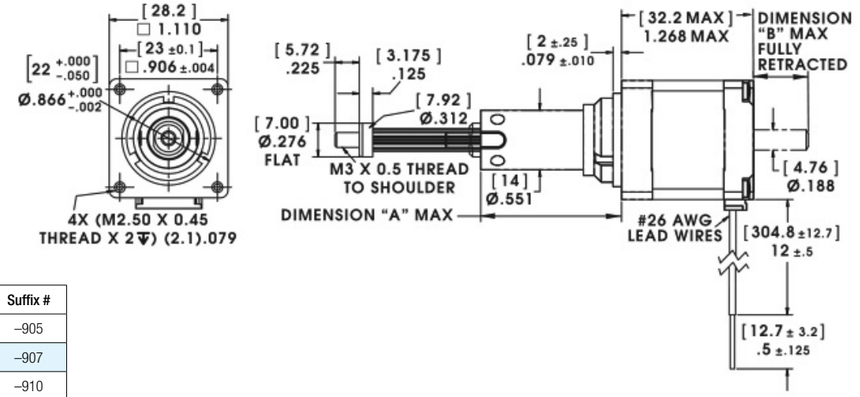
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



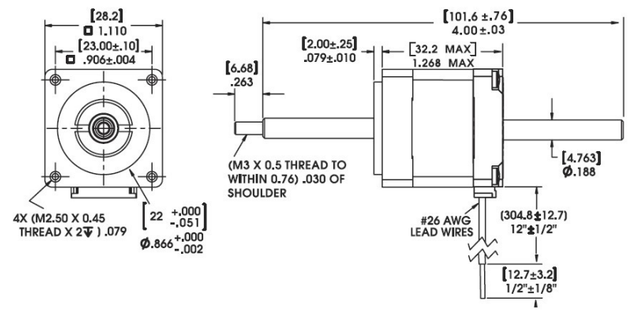
Stroke	Dim. "A"	Dim. "B"	Suffix #
0.500 (12.7)	0.806 (20.47)	0.208 (5.28)	–905
0.750 (19.05)	1.056 (26.82)	0.458 (11.63)	–907
1.000 (25.4)	1.306 (33.17)	0.708 (17.98)	–910
1.250 (31.8)	1.556 (39.52)	0.958 (24.33)	–912
1.500 (38.1)	1.806 (45.87)	1.208 (30.68)	–915
2.00 (50.8)	2.306 (58.57)	1.208 (30.68)	–920
2.500 (63.5)	2.806 (71.27)	1.208 (30.68)	–925

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

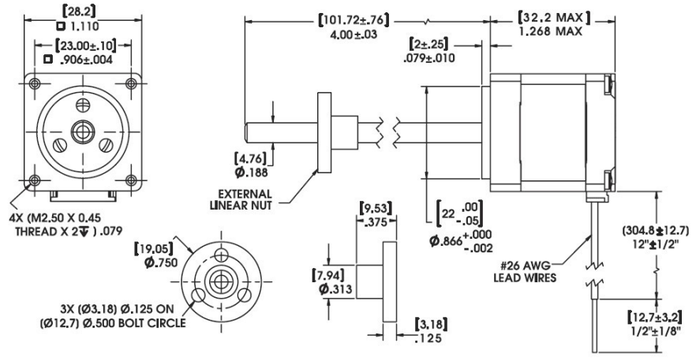


External Linear

Dimensions = (mm) inches

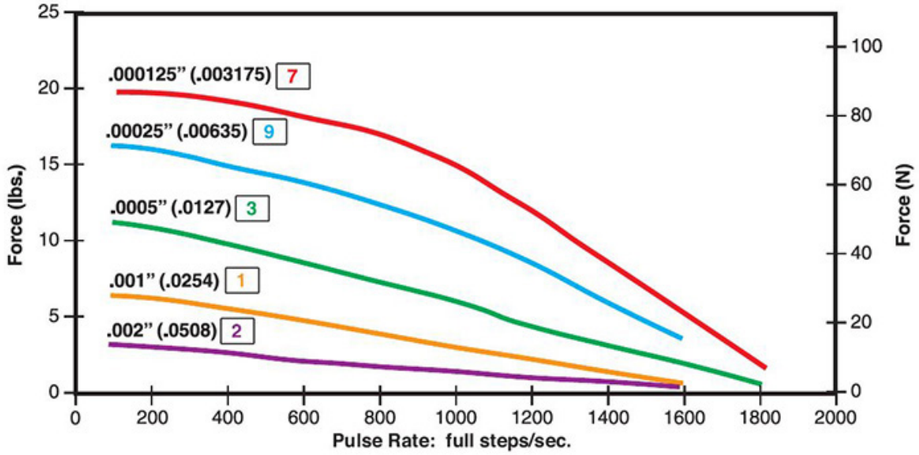
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.



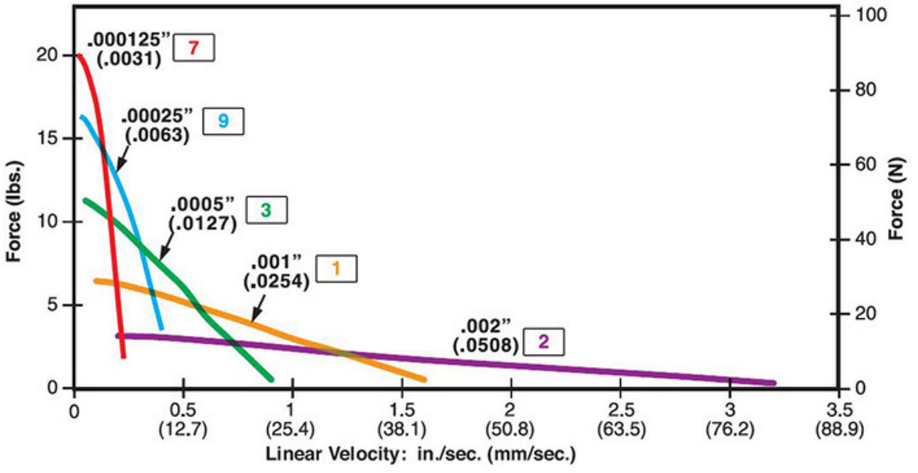
FORCE vs. PULSE RATE

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .1875 (4.75) Lead Screw



FORCE vs. LINEAR VELOCITY

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .1875 (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.

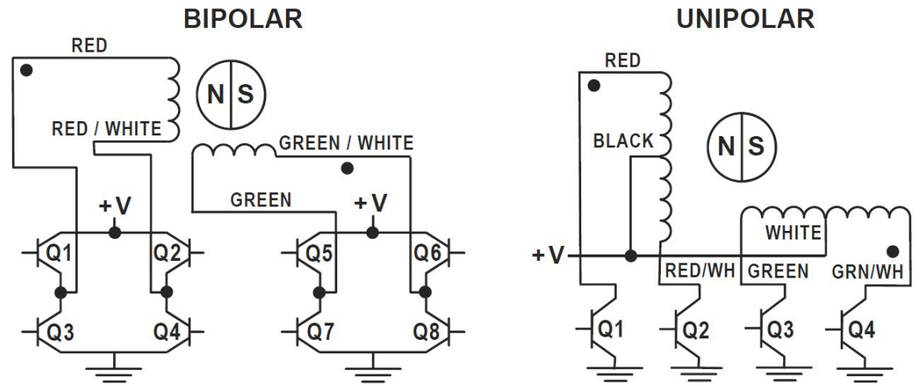
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Identifying the Hybrid Part Number Codes when Ordering

E	28	H	4	7	—	05	—	910
Prefix (include only when using the following) **A =** A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

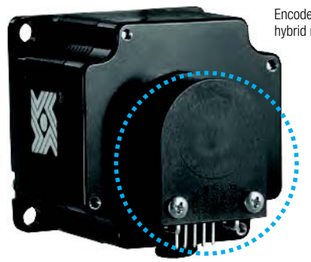
EXTEND CW ↓ ↑ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

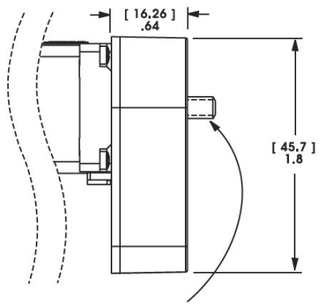
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 11 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

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.



Encoder on Size 23 hybrid motor

30 mm 28000 Series Size 11



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

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		
	Minimum	Maximum
Size 11	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 11	CPR	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Differential Ended Encoder - Pinout - Size 11	
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 +

Single Ended Encoder - Pinout - Size 11			
Connector Pin #	Description	Connector Pin #	Description
1	Ground	4	+5 VDC Power
2	Index (optional)	5	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 11

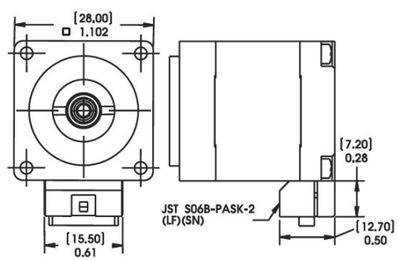
Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

Motor Connector:
JST part # S06B-PASK-2

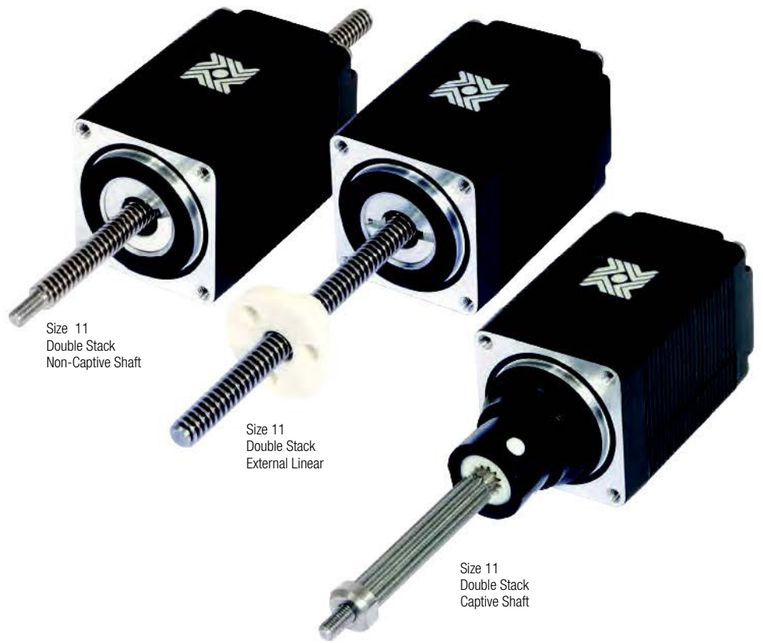
Mating Connector:
JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)

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



28000 Series
Size 11 Double Stack
Hybrid Linear Actuators



Enhanced performance in motion control

The 28000 Series is available in a wide variety of resolutions - from 0.000125" (.003175 mm) per step to 0.002" (.0508 mm) per step.

3 Available Designs

– Captive
– Non-Captive
– External Linear

The Size 11 actuator delivers thrust of up to 30 lbs. (133 N).

Size 11 Double Stack: 28 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	28M4 – – – †		
	Non-Captive	28L4 – – – †		
	External Linear	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 gcm^2		
Insulation Class		Class B (Class F available)		
Weight		5.8 oz (180 g)		
Insulation Resistance		20 MΩ		

†Part numbering information on page 94.

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

*Values truncated.

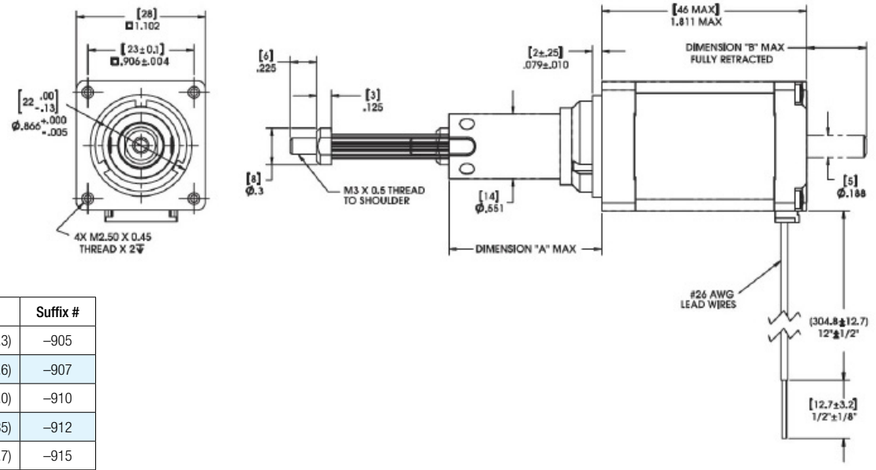
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



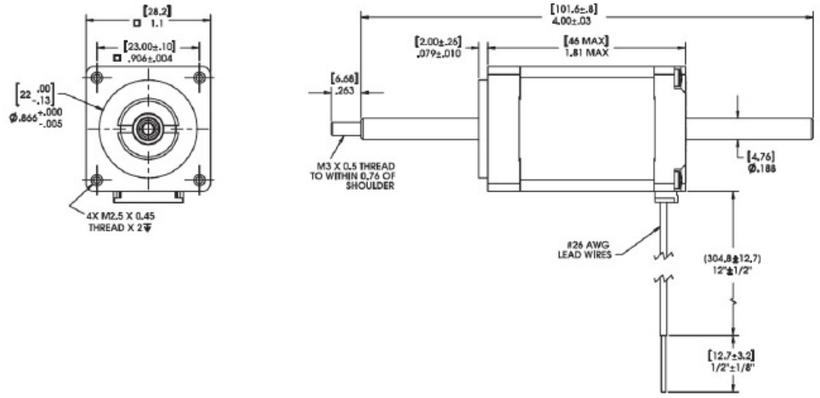
Stroke	Dim. "A"	Dim. "B"	Suffix #
0.500 (12.7)	0.80 (20.5)	0.09 (2.3)	–905
0.750 (19.05)	1.05 (26.8)	0.34 (8.6)	–907
1.000 (25.4)	1.30 (33.17)	0.59 (15.0)	–910
1.250 (31.8)	1.55 (39.5)	0.84 (21.35)	–912
1.500 (38.1)	1.806 (45.87)	1.09 (27.7)	–915
2.00 (50.8)	2.306 (58.57)	1.59 (40.4)	–920
2.500 (63.5)	2.806 (71.27)	2.09 (53.1)	–925

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

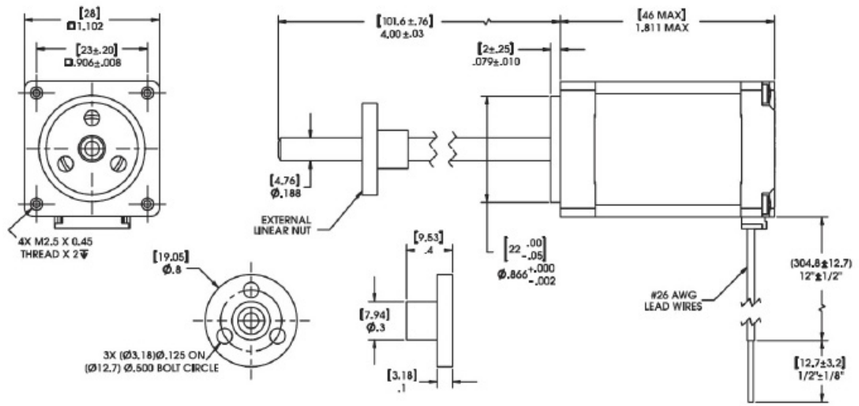


External Linear

Dimensions = (mm) inches

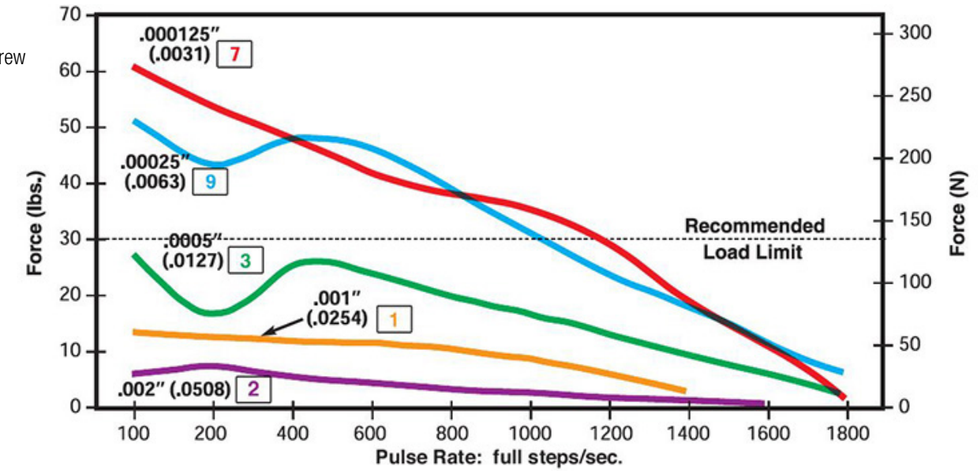
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.



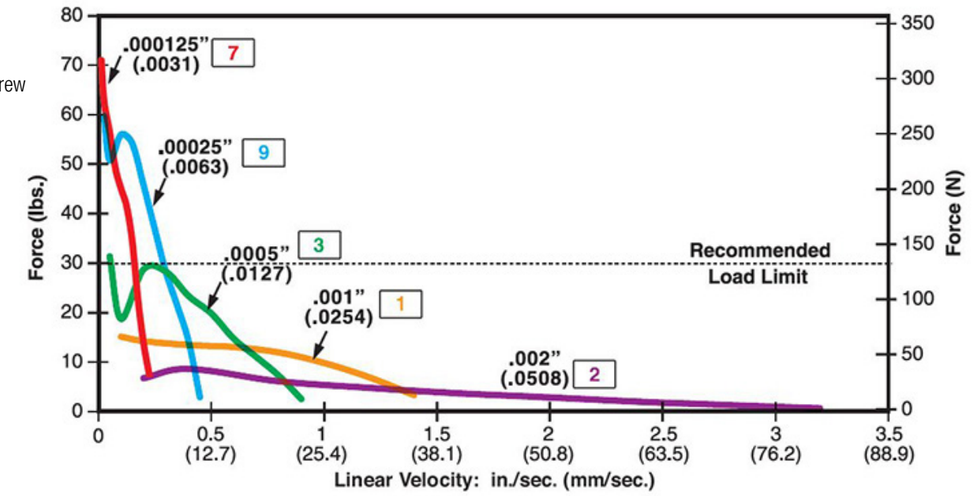
FORCE vs. PULSE RATE

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .1875 (4.75) Lead Screw



FORCE vs. LINEAR VELOCITY

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .1875 (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.

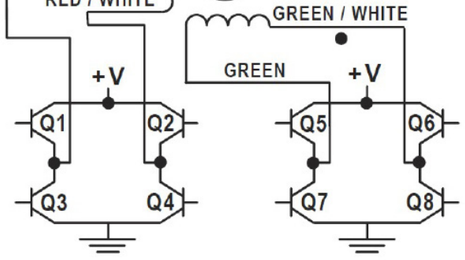
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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 Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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 (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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

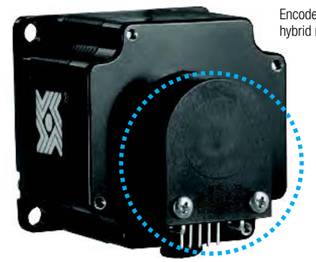
EXTEND CW ↓ — RETRACT CCW ↑

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

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 11 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

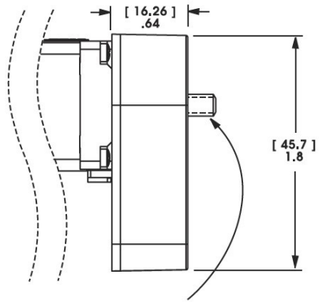
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic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



Encoder on Size 23 hybrid motor

30 mm 28000 Series Size 11

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



Differential Ended Encoder - Pinout - Size 11	
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 +

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		
	Minimum	**Maximum**
Size 11	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 11	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 11			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 11

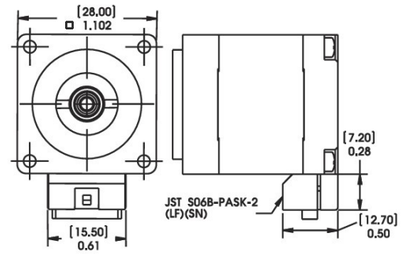
Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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 # 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



35000 Series
Size 14 Hybrid Linear Actuators

Higher force, longer life and improved performance

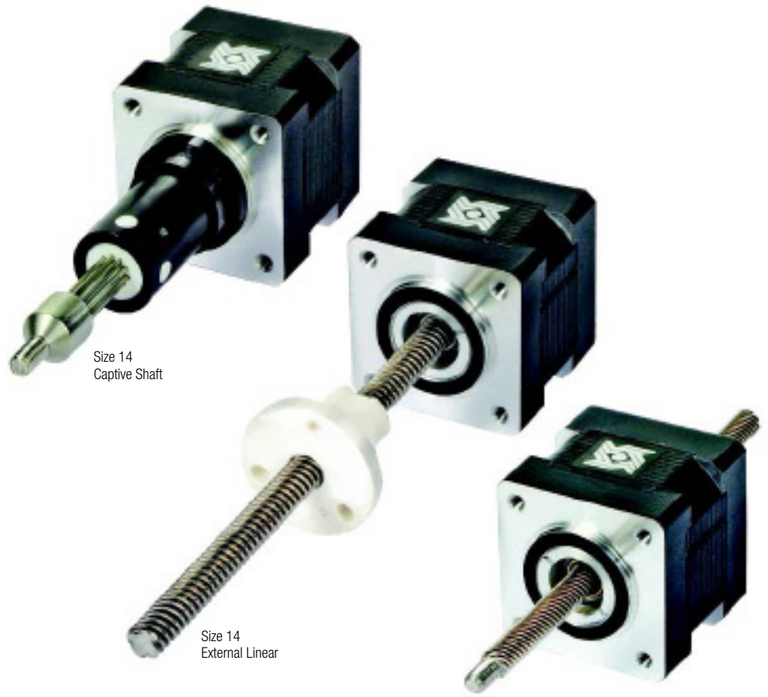
The various patented designs deliver exceptional performance and new linear motion design opportunities.

3 Available Designs

– Captive
– Non-Captive
– External Linear

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
Captive Shaft

Size 14
External Linear

Size 14
Non-Captive Shaft

Size 14: 35 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	35H4 _ _ _ _ _ _ †			35H6 _ _ _ _ _ _ †	
	Non-Captive	35F4 _ _ _ _ _ _ †			35F4 _ _ _ _ _ _ †	
	External Linear	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 gcm²				
Insulation Class		Class B (Class F available)				
Weight		5.7 oz (162 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 100. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q
.00192	.0487*	R

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B
.00125	.0317*	C

*Values truncated.

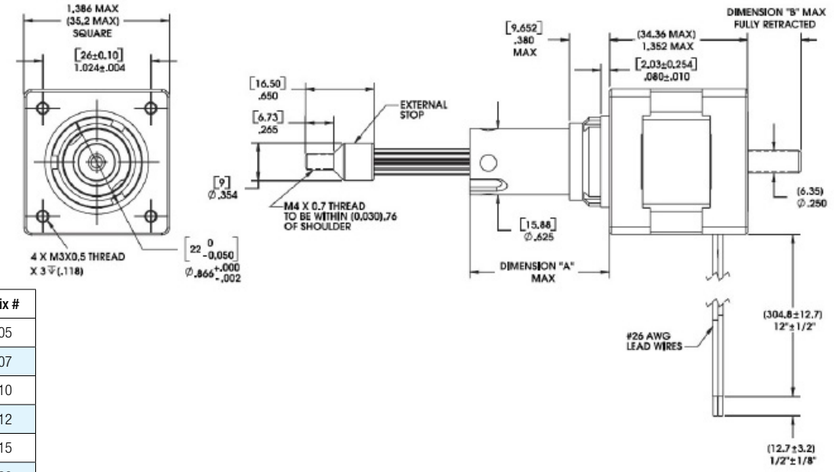
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



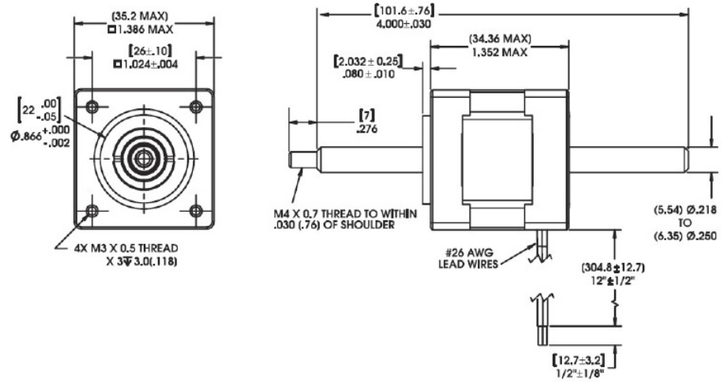
Stroke	Dim. "A"	Dim. "B"	Suffix #
0.500 (12.7)	0.82 (20.8)	0.04 (1.0)	–905
0.750 (19.05)	1.07 (27.2)	0.29 (7.4)	–907
1.000 (25.4)	1.32 (33.5)	0.54 (13.7)	–910
1.250 (31.8)	1.57 (39.9)	0.79 (20.1)	–912
1.500 (38.1)	1.82 (46.2)	1.04 (26.4)	–915
2.00 (50.8)	2.32 (58.9)	1.54 (39.1)	–920
2.500 (63.5)	2.82 (71.6)	2.04 (51.8)	–925

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

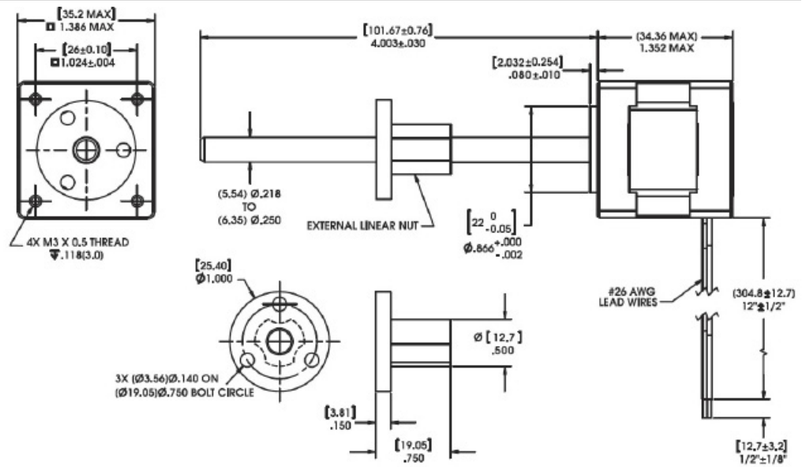


External Linear

Dimensions = (mm) inches

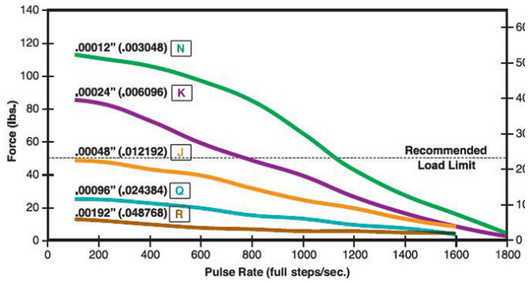
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

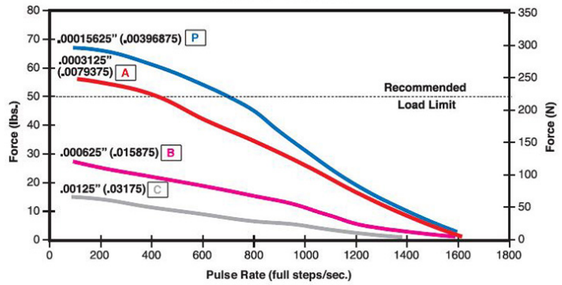


FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle

– Ø .218 (5.54) Lead Screw

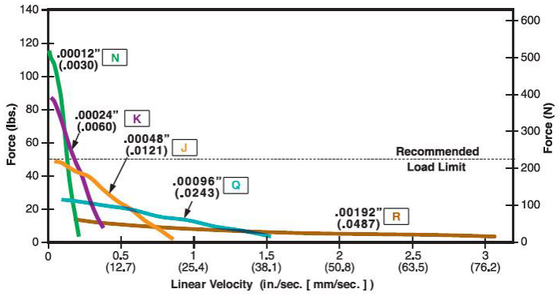


– Ø .250 (6.35) Lead Screw

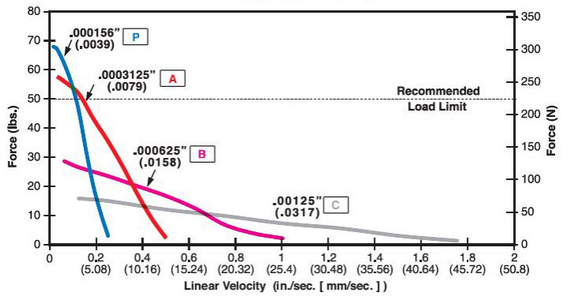


FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle

– 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.

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.

Size 14: 35 mm (1.1-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	35K4 – – – †			35K6 – – – †	
	Non-Captive	35J4 – – – †			35J4 – – – †	
	External Linear	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 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 100. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00006	.0015*	U
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q

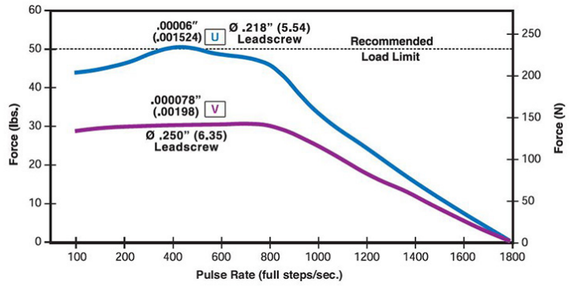
Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.000078*	.00198*	V
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B

*Values truncated.

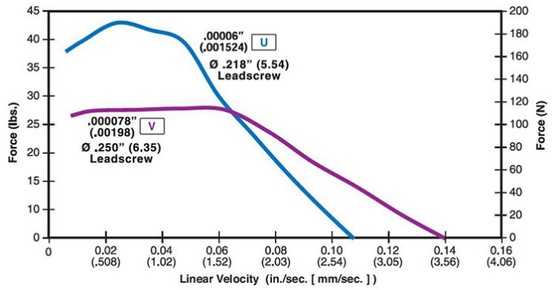
Standard motors are Class B rated for maximum temperature of 130°C.
NOTE: Refer to performance curves on previous page for codes N, K, J, Q, P, A, B

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

FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle
with two available lead screw diameters



FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle
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.

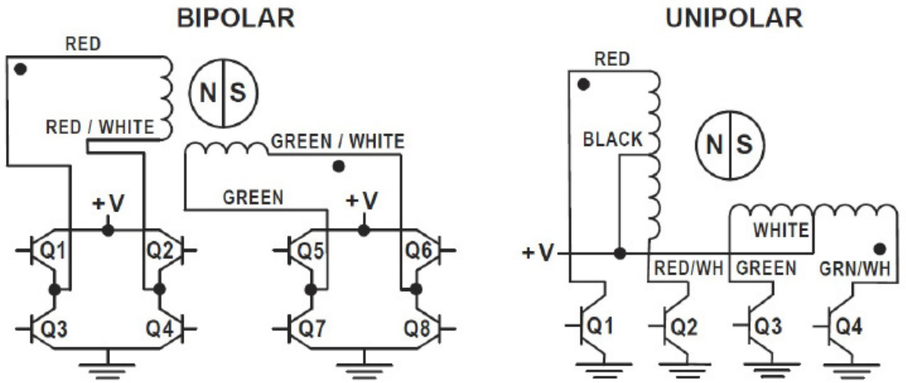
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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 Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

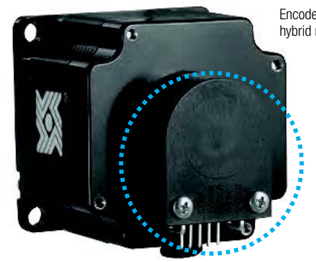
EXTEND CW ⟵ ⟶ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

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 14 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

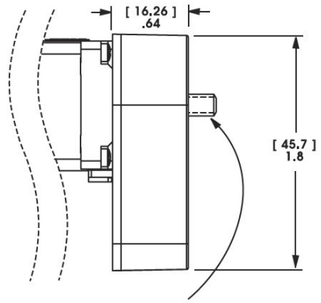
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic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



Encoder on Size 23 hybrid motor

30 mm 35000 Series Size 14

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



Differential Ended Encoder - Pinout - Size 14	
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 +

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 14	**Minimum**	**Maximum**
	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 14	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 14			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 14

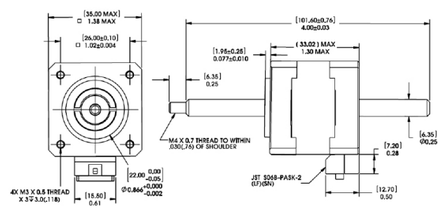
Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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



35000 Series
Size 14 Double Stack
Hybrid Linear Actuators

Improved force and performance

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.

3 Available Designs

– Captive
– Non-Captive
– External Linear

The Size 14 actuator delivers thrust of up to 50 lbs. (222 N).

Size 14 Double Stack: 35 mm (1.4-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	35M4 – – – †		
	Non-Captive	35L4 – – – †		
	External Linear	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 gcm²		
Insulation Class		Class B (Class F available)		
Weight		8.5 oz (240 g)		
Insulation Resistance		20 MΩ		

†Part numbering information on page 105.

Linear Travel / Step Screw Ø.1875"(4.76mm)		Order Code I.D.
inches	mm	
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.00375	.0953	AG
.005	.127	Z

*Values truncated.

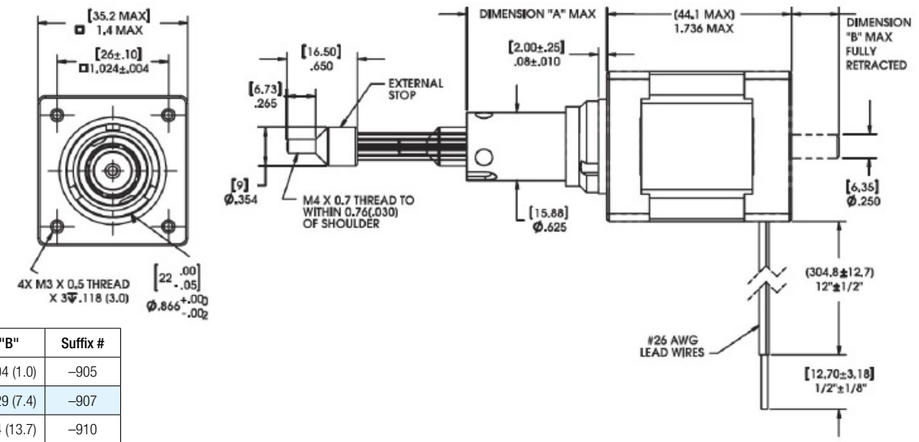
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



Stroke	Dim. "A"	Dim. "B"	Suffix #
0.500 (12.7)	0.82 (20.8)	0.04 (1.0)	–905
0.750 (19.05)	1.07 (27.2)	0.29 (7.4)	–907
1.000 (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 (38.1)	2.82 (71.6)	2.04 (51.8)	–925

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm] standard screw lengths. Longer screw lengths are available.

External Linear

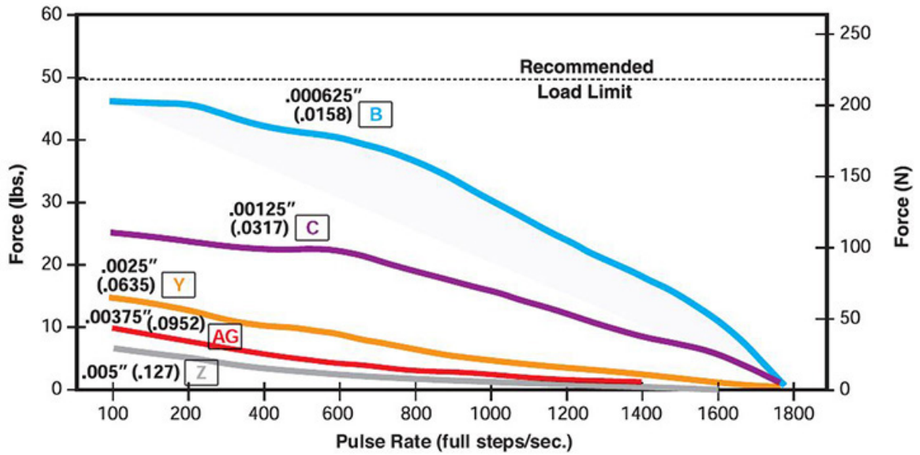
Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm] standard screw lengths. Longer screw lengths are available.

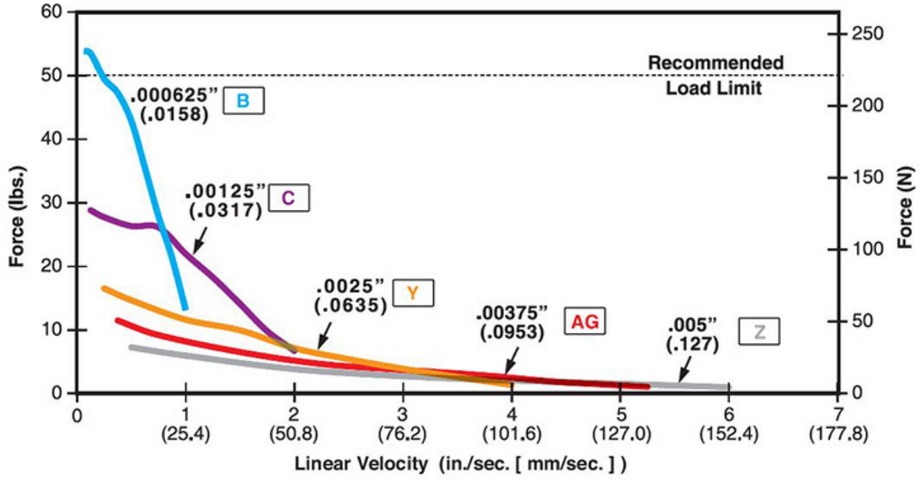
FORCE vs. PULSE RATE

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .250 (6.35)Lead Screw



FORCE vs. LINEAR VELOCITY

– Chopper
– Bipolar
– 100% Duty Cycle
– 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.

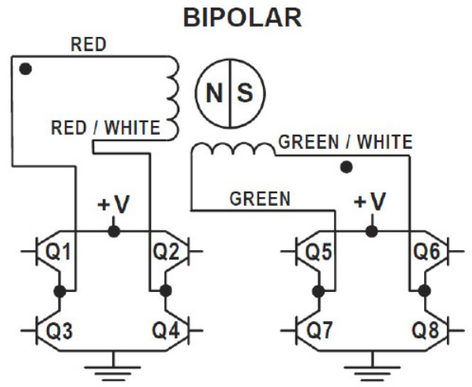
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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 Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

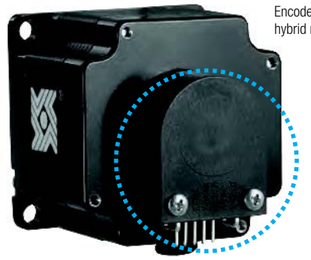
EXTEND CW ↓ ↑ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

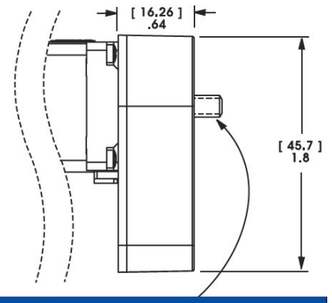
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 14 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

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.



Encoder on Size 23 hybrid motor

30 mm 35000 Series Size 14



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

Differential Ended Encoder - Pinout - Size 14	
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 +

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 14	**Minimum**	**Maximum**
	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 14	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 14			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 14

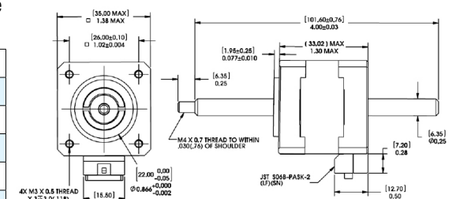
Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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
Size 17 Hybrid Linear Actuators

Our best selling compact hybrid motors

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

3 Available Designs

– Captive
– Non-Captive
– External Linear

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.

Size 17
Captive Shaft

Size 17
External Linear

Size 17
Non-Captive Shaft

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	**Captive**	43H4 _ _ _ _ _ _ †			43H6 _ _ _ _ _ _ †	
	Non-Captive	43F4 _ _ _ _ _ _ †			43F4 _ _ _ _ _ _ †	
	External Linear	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 gcm²				
Insulation Class		Class B (Class F available)				
Weight		8.5 oz (241 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 110. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q
.00192	.0487*	R

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B
.00125	.0317*	C

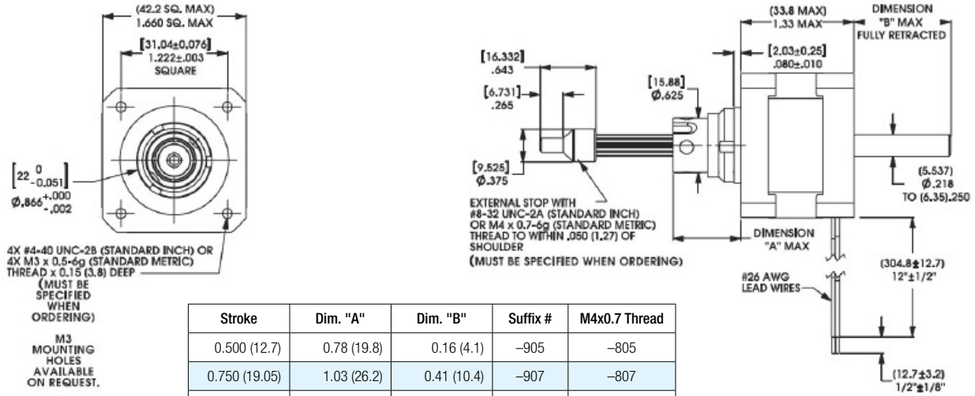
*Values truncated.
Standard motors are Class B rated for maximum temperature of 130°C. Also available, motors with high temperature capability windings up to 155°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



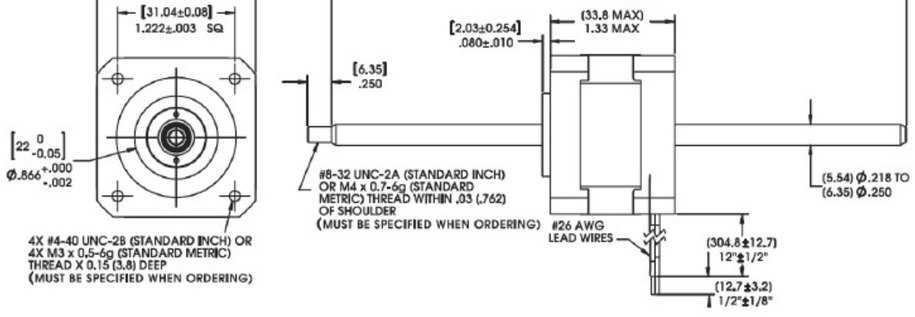
Stroke	Dim. "A"	Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0.16 (4.1)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.41 (10.4)	–907	–807
1.000 (25.4)	1.28 (32.5)	0.66 (16.8)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.91 (23.1)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.16 (29.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.66 (42.2)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.16 (54.9)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

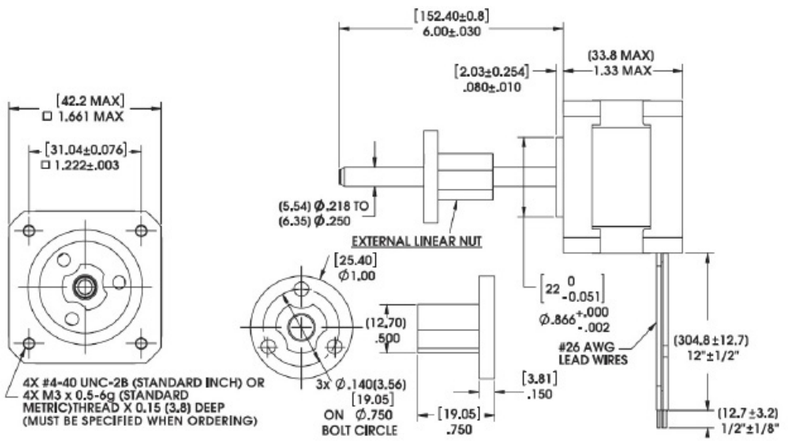


External Linear

Dimensions = (mm) inches

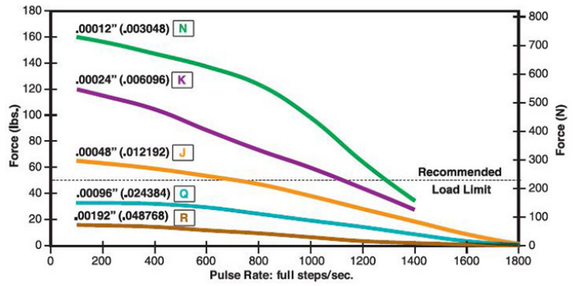
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

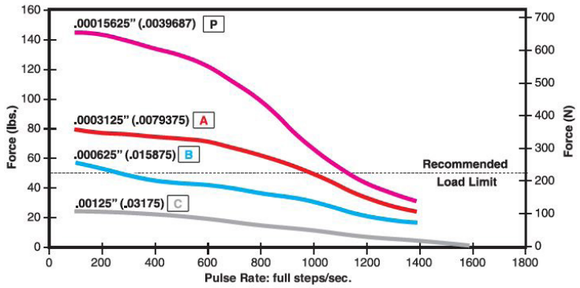


FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– Ø .218 (5.54) Lead Screw

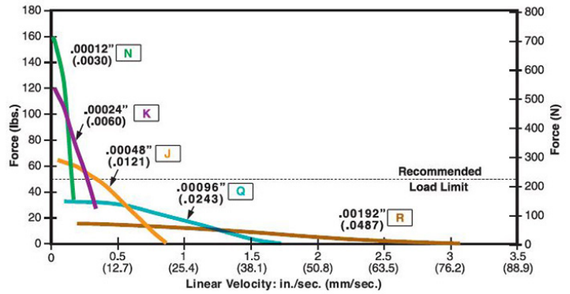


– Ø .250 (6.35) Lead Screw

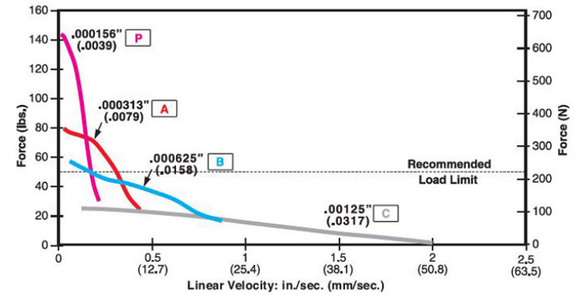


FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– 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.

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.

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	43K4 ☐ – ☐☐ – ☐☐☐ †			43K6 ☐ – ☐☐ – ☐☐☐ †	
	Non-Captive	43J4 ☐ – ☐☐ – ☐☐☐ †			43J4 ☐ – ☐☐ – ☐☐☐ †	
	External Linear	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 mH	70 mH	6 mH	35 mH
Power Consumption		7 W				
Rotor Inertia		37 gcm²				
Insulation Class		Class B (Class F available)				
Weight		8.5 oz (241 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 111. **Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00006	.0015*	U
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q

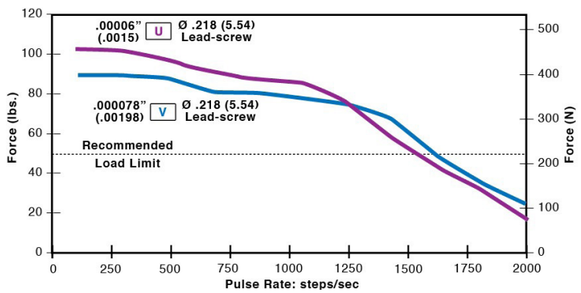
Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.000078*	.00198*	V
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B

*Values truncated.

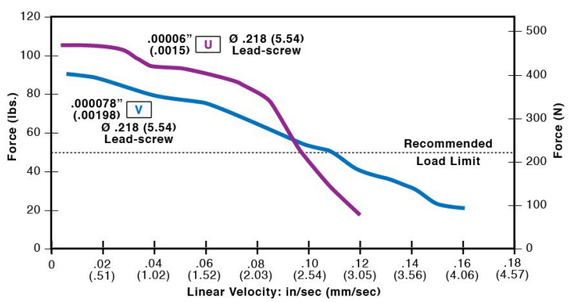
Standard motors are Class B rated for maximum temperature of 130°C.
NOTE: Refer to performance curves on previous page for codes N, K, J, Q, P, A, B

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

FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle – 18:1 Motor Coil to Drive Supply Voltage with two available lead screw diameters



FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle – 18:1 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.

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.

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

3 Available Designs

– Captive – Non-Captive – External Linear

NOTE: For more information see the Haydon Kerk IDEA™ Drive Data Sheet.

Size 17 Single Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)			
		RS-485*	USB**
Part No.	Captive	43HJ ☐ – ☐☐ – ☐☐☐ †	43HG ☐ – ☐☐ – ☐☐☐ †
	Non-Captive	43FJ ☐ – ☐☐ – ☐☐☐ †	43FG ☐ – ☐☐ – ☐☐☐ †
	External Linear	E43HJ ☐ – ☐☐ – ☐☐☐ †	E43HG ☐ – ☐☐ – ☐☐☐ †
Wiring		Bipolar	
Winding Voltage		2.33 VDC***	

†Part numbering information on page 113.
*Complementary RS-485 based drive ** USB-based IDEA drive ***Contact Haydon Kerk if a higher voltage motor is desired.
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q
.00192	.0487*	R

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B
.00125	.0317*	C

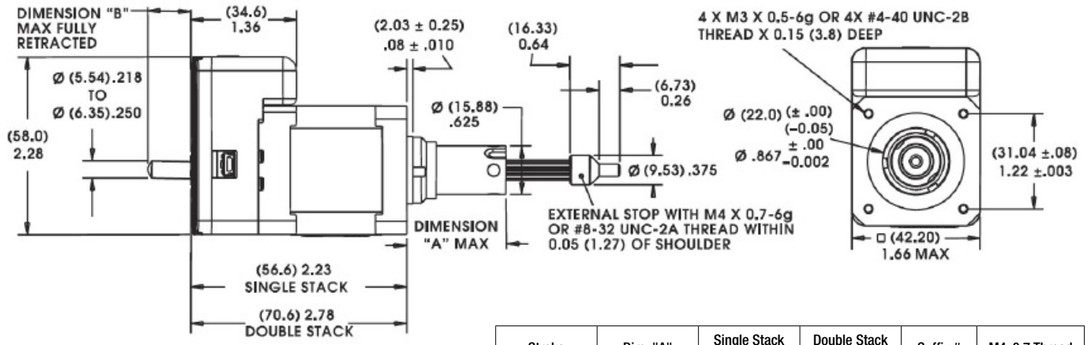
*Values truncated.

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

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

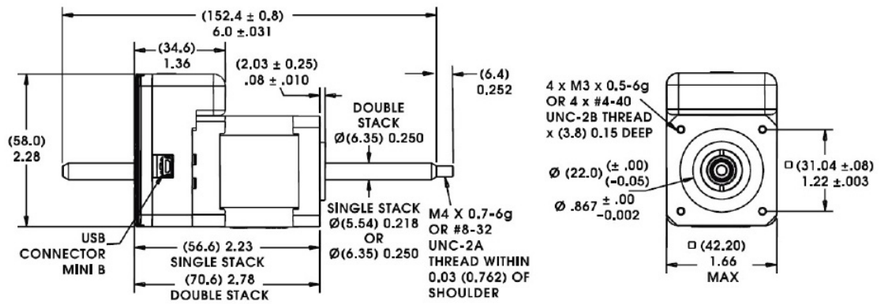


Stroke	Dim. "A"	Single Stack Dim. "B"	Double Stack Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0	0	–905	–805
0.750 (19.05)	1.03 (26.2)	0	0	–907	–807
1.000 (25.4)	1.28 (32.5)	0	0	–910	–810
1.250 (31.8)	1.53 (38.9)	0	0	–912	–812
1.500 (38.1)	1.78 (45.2)	0.232 (5.9)	0.091 (2.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	0.732 (18.6)	0.591 (15.0)	–920	–820
2.500 (63.5)	2.78 (70.6)	1.232 (31.3)	1.091 (27.7)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

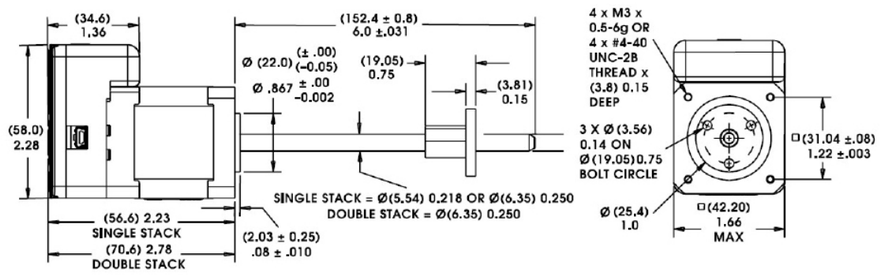
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = (mm) inches

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

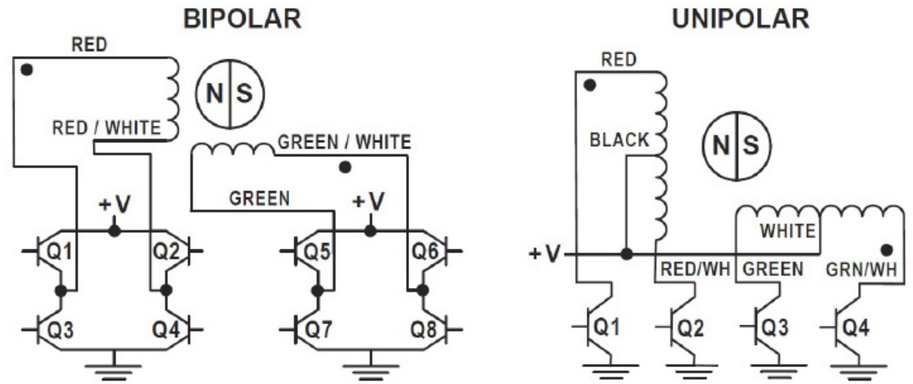


Identifying the Hybrid Part Number Codes when Ordering

E	43	H	6	N	—	2.33	—	910
Prefix (include only when using the following) **A** = A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

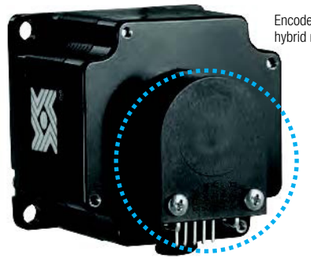
EXTEND CW ↓ ↑ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

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 17 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

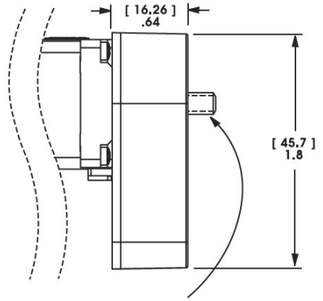
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic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



Encoder on Size 23 hybrid motor

30 mm 43000 Series Size 17

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



Differential Ended Encoder - Pinout - Size 17	
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 +

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 17	**Minimum**	**Maximum**
	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 17	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 17			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 17

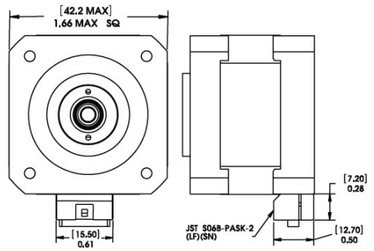
Hybrid Size 17 linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range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

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 Double Stack Size 17 Hybrid Linear Actuators

Exceptional performance and new linear motion design opportunities

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).

3 Available Designs

– Captive
– Non-Captive
– External Linear

Size 17 Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	**Captive**	43M4 □ – □□ – □□□ †		
	Non-Captive	43L4 □ – □□ – □□□ †		
	External Linear	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		13.2 W		
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 120.

Linear Travel / Step Screw Ø.1875"(4.76mm)		Order Code I.D.
inches	mm	
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.00375	.0953	AG
.005	.127	Z

*Values truncated.

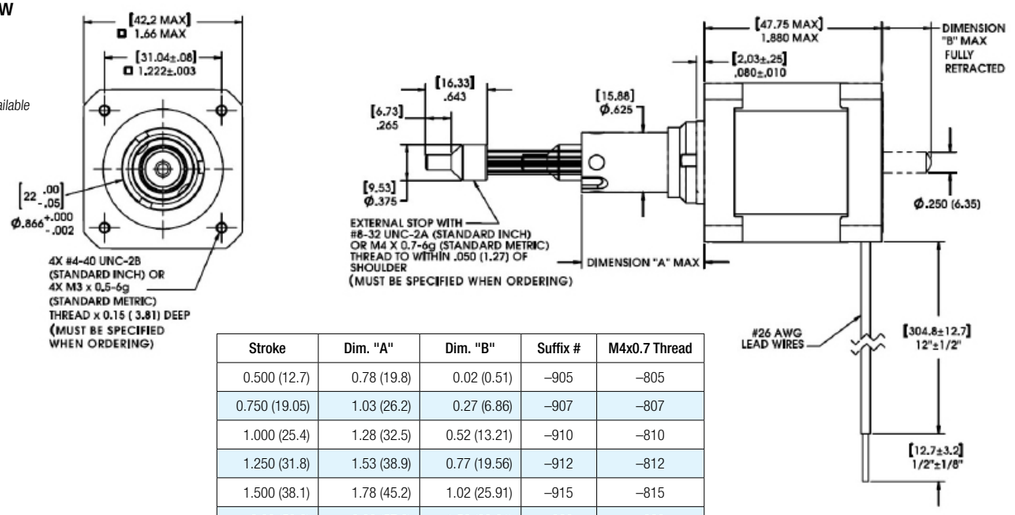
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



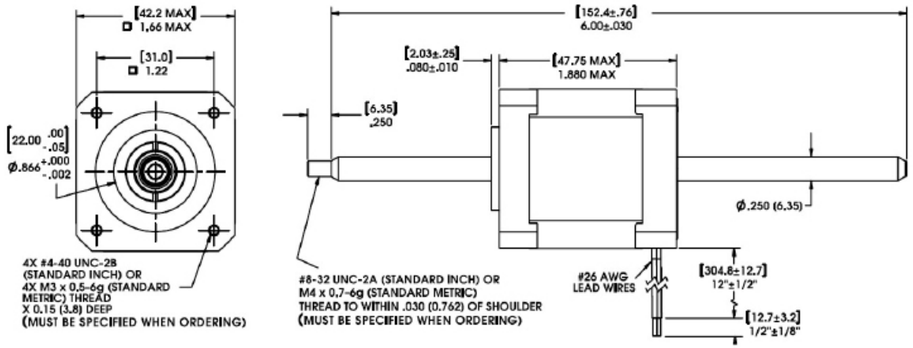
Stroke	Dim. "A"	Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0.02 (0.51)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.27 (6.86)	–907	–807
1.000 (25.4)	1.28 (32.5)	0.52 (13.21)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.77 (19.56)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.02 (25.91)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.52 (38.61)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.02 (51.31)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

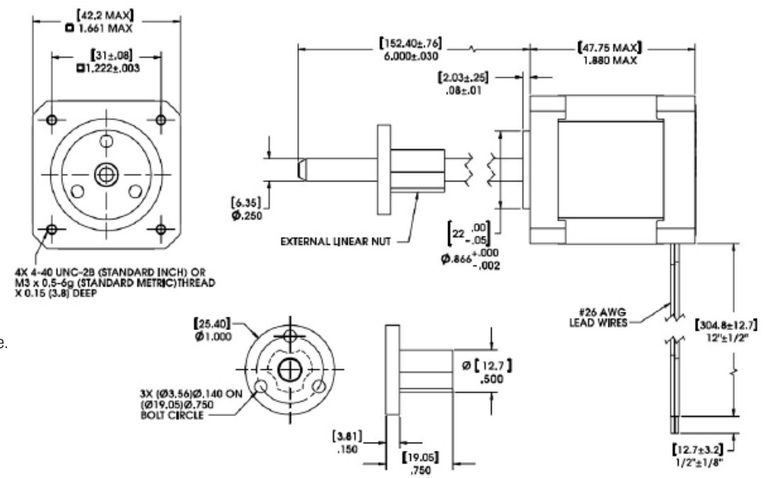


External Linear

Dimensions = (mm) inches

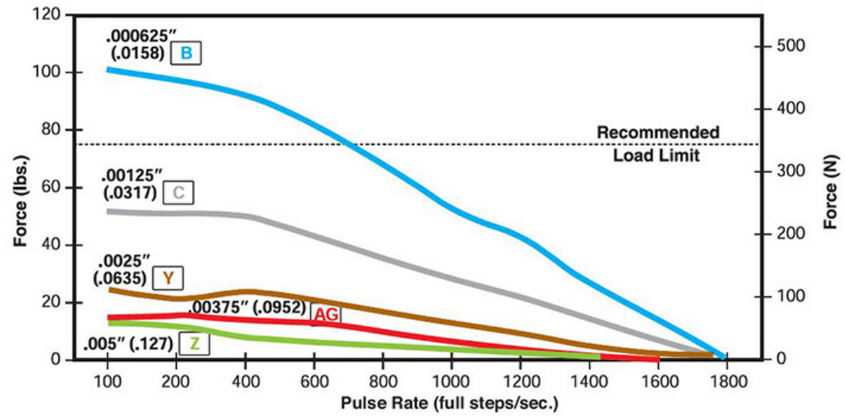
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.



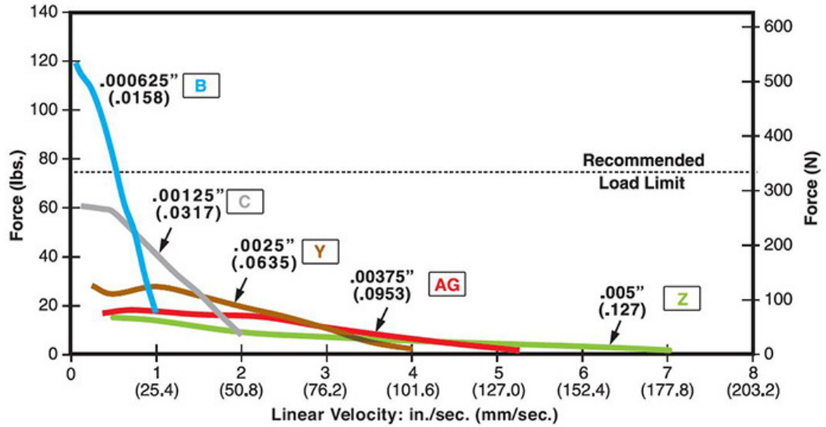
FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– Ø .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.

43000 Series Size 17 Double Stack Hybrid Linear Actuators with integrated IDEA™ Drive

High performance in a compact package

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).

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

3 Available Designs

– Captive – Non-Captive – External Linear

Size 17
Captive Shaft

Size 17
Non-Captive Shaft

Size 17
External Linear

Size 17 Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)			
		RS-485*	USB**
Part No.	Captive	43MJ – – – †	43MG – – – †
	Non-Captive	43LJ – – – †	43LG – – – †
	External Linear	E43MJ – – – †	E43MG – – – †
Wiring		Bipolar	
Winding Voltage		2.33 VDC***	

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

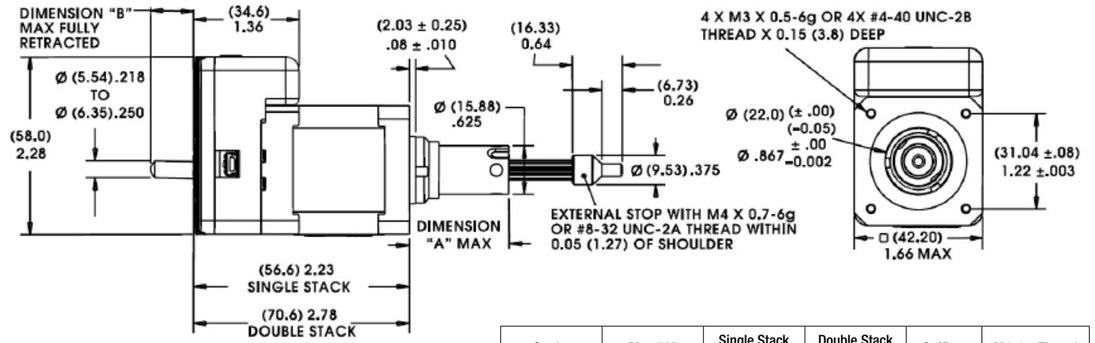
†Part numbering information on page 120.
*Comlimentary complementary RS-485 based drive ** USB-based IDEA drive ***Contact Haydon Kerk if a higher voltage motor is desired.
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

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

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

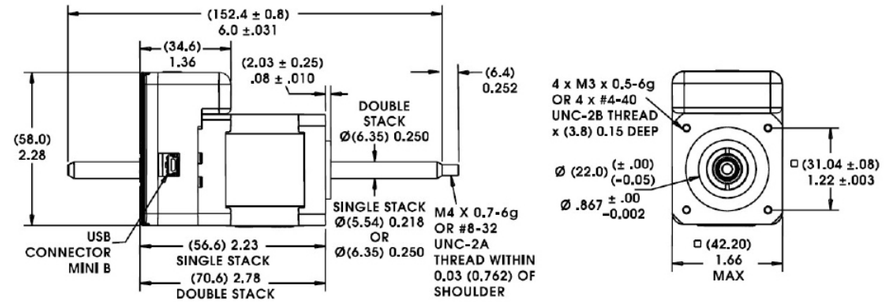


Stroke	Dim. "A"	Single Stack Dim. "B"	Double Stack Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0	0	–905	–805
0.750 (19.05)	1.03 (26.2)	0	0	–907	–807
1.000 (25.4)	1.28 (32.5)	0	0	–910	–810
1.250 (31.8)	1.53 (38.9)	0	0	–912	–812
1.500 (38.1)	1.78 (45.2)	0.232 (5.9)	0.091 (2.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	0.732 (18.6)	0.591 (15.0)	–920	–820
2.500 (63.5)	2.78 (70.6)	1.232 (31.3)	1.091 (27.7)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

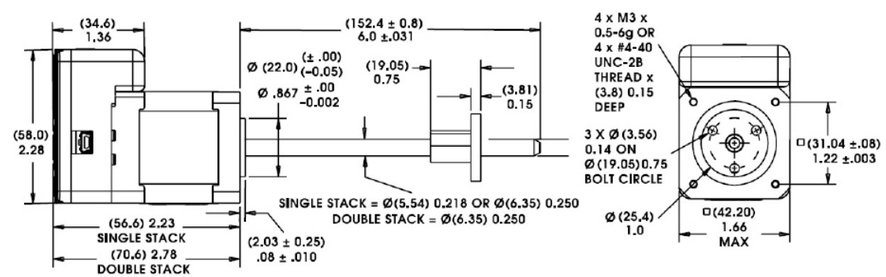
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = (mm) inches

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

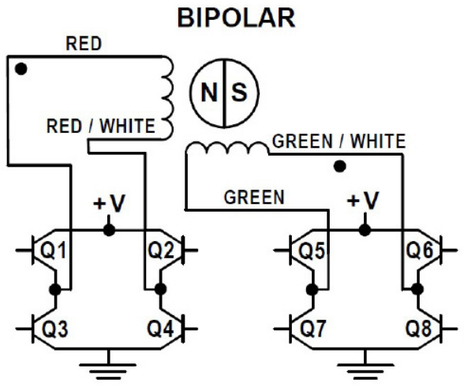


Identifying the Hybrid Part Number Codes when Ordering

E	43	M	G	C	—	2.33	—	910
Prefix (include only when using the following) **A =** A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



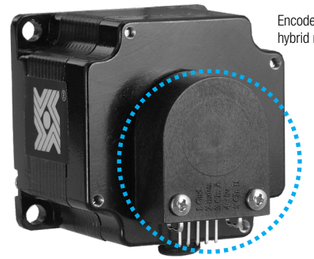
Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

Encoders Designed for All Sizes of Hybrid Linear Actuators



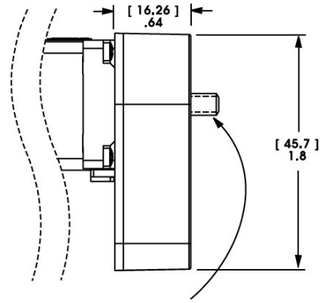
Encoder on Size 23 hybrid motor

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 17 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

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.

30 mm 43000 Series Size 17

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



Differential Ended Encoder - Pinout - Size 17	
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 +

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		
	Minimum	**Maximum**
Size 17	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 17	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 17			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connector for Hybrid Size 17

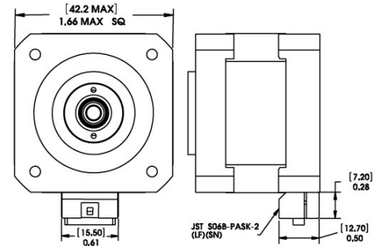
Hybrid Size 17 linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range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

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

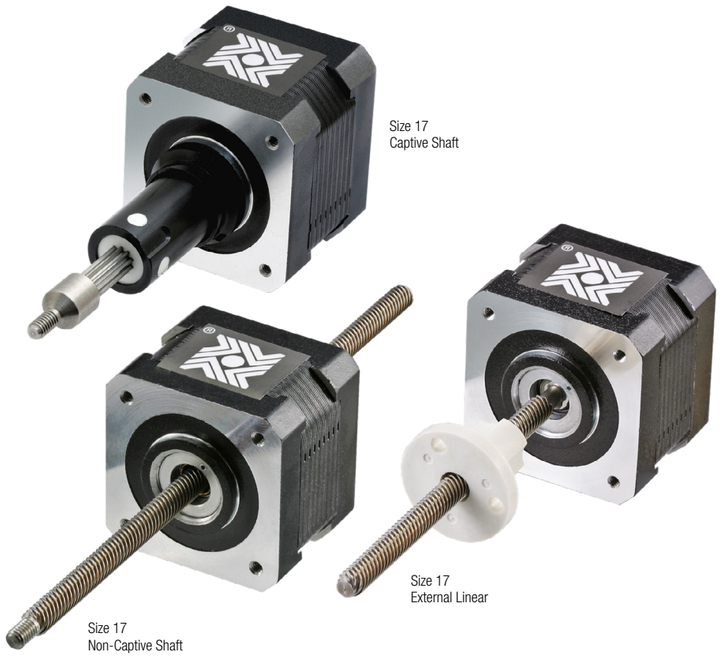
Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	–
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	–
6	Phase 1 Start	Phase 1 Start	Red



New!

MAX Series
30% performance increase
compared to standard Size 17

M43000 MAX Series Single Stack Size 17 Max Hybrid Linear Actuators



Size 17
Captive Shaft

Size 17
External Linear

Size 17
Non-Captive Shaft

Our best selling compact hybrid motors, now with 30% performance increase

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

3 Available Designs

– Captive
– Non-Captive
– External Linear

The M43000 Max 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.

Size 17 Max: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	M43H4 _ _ _ _ _ _ †			M43H6 _ _ _ _ _ _ †	
	Non-Captive	M43F4 _ _ _ _ _ _ †			M43F6 _ _ _ _ _ _ †	
	External Linear	EM43H4 _ _ _ _ _ _ †			EM43H6 _ _ _ _ _ _ †	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.8 VDC	5.8 VDC	13.8 VDC	5.8 VDC	13.8 VDC
Current (RMS)/phase		1.5 A	700 mA	290 mA	700 mA	290 mA
Resistance/phase		1.77 Ω	8.3 Ω	47.6 Ω	8.3 Ω	47.6 Ω
Inductance/phase		2.45 mH	13.5 mH	88.0 mH	6.75 mH	44.0 mH
Power Consumption		8 W				
Rotor Inertia		37.1 gcm²				
Temperature Rise		135° F Rise (70° C Rise)				
Insulation Class		Class B (Class F available)				
Weight		9 oz (255 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 7. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q
.00192	.0487*	R

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B
.00125	.0317*	C

*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.

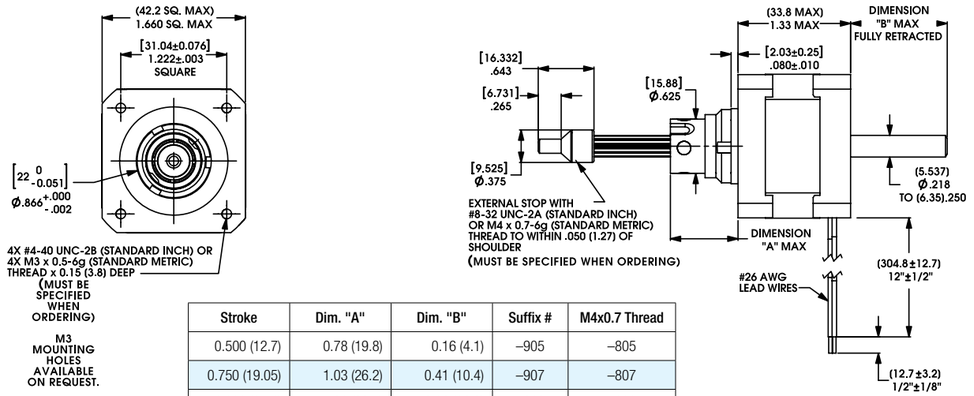
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.



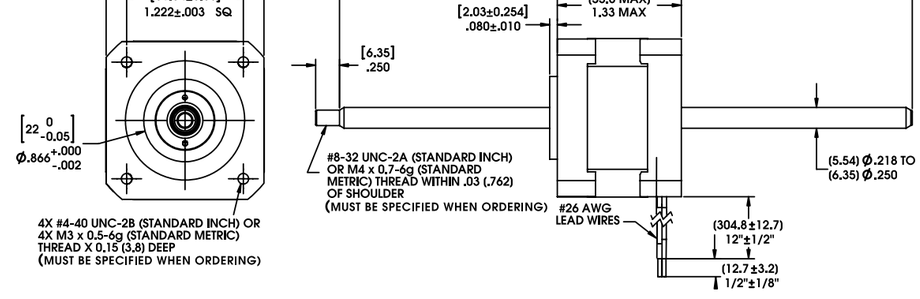
Stroke	Dim. "A"	Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0.16 (4.1)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.41 (10.4)	–907	–807
1.000 (25.4)	1.28 (32.5)	0.66 (16.8)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.91 (23.1)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.16 (29.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.66 (42.2)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.16 (54.9)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

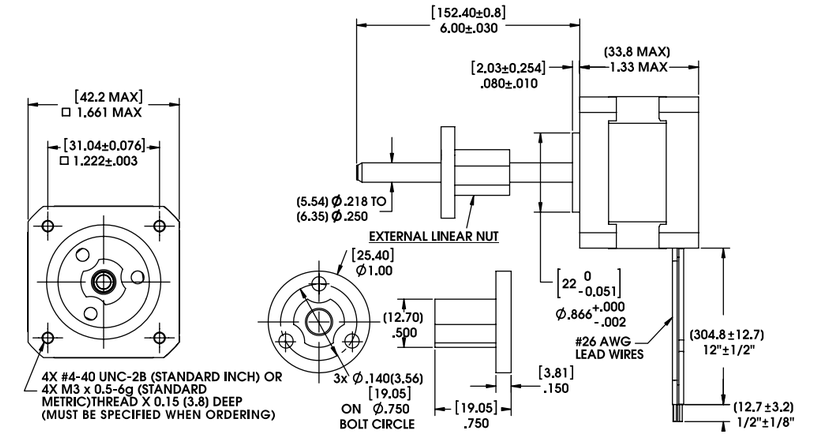


External Linear

Dimensions = (mm) inches

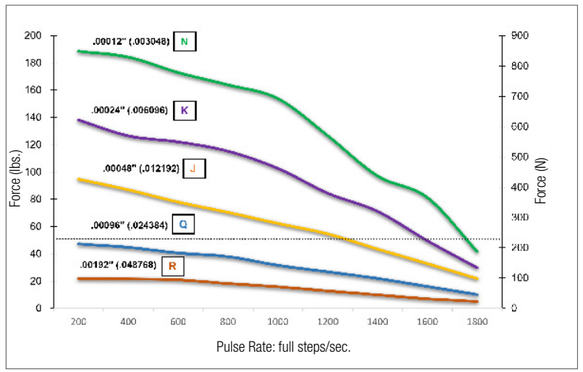
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

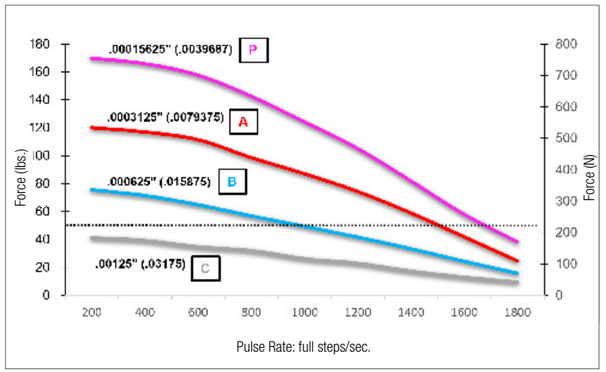


FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– Ø .218 (5.54) Lead Screw

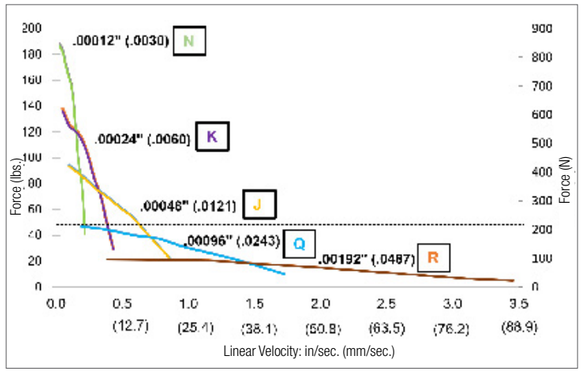


– Ø .250 (6.35) Lead Screw

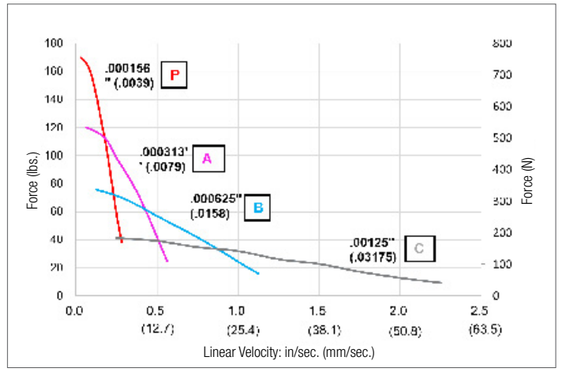


FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– Ø .218 (5.54) Lead Screw



– Ø .250 (6.35) Lead Screw



NOTE: All chopper drive curves were created with a 5.8 volt, 1/2 microstepping 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.

M43000 Series
Size 17, 0.9° High Resolution Motor

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

Size 17 Max: 43 mm (1.7-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	M43K4 _ _ _ _ _ †			M43K6 _ _ _ _ _ †	
	Non-Captive	M43J4 _ _ _ _ _ †			M43J6 _ _ _ _ _ †	
	External Linear	EM43K4 _ _ _ _ _ †			EM43K6 _ _ _ _ _ †	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.8 VDC	5.8 VDC	13.8 VDC	5.8 VDC	13.8 VDC
Current (RMS)/phase		1.5 A	700 mA	290 mA	700 mA	290 mA
Resistance/phase		1.77 Ω	8.3 Ω	47.6 Ω	8.3 Ω	47.6 Ω
Inductance/phase		3.2 mH	17.7 mH	116.2 mH	8.85 mH	58.1.0 mH
Power Consumption		8 W				
Rotor Inertia		37.1 gcm²				
Insulation Class		Class B (Class F available)				
Weight		9 oz (241 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 7. **Unipolar drive gives approximately 30% less thrust than bipolar drive.

Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00006	.0015*	U
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q

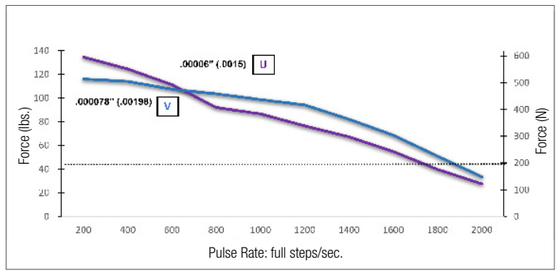
Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.000078*	.00198*	V
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B

*Values truncated.

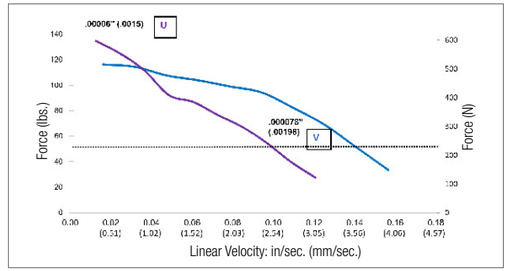
Standard motors are Class B rated for maximum temperature of 130°C.
NOTE: Refer to performance curves on page 3 for codes N, K, J, Q, P, A, B

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

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 5.8 volt, 1/2 microstepping 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.

M43000 MAX Series
Size 17 Hybrid Linear Actuators with integrated IDEA™ Drive

High performance in a compact package

The M43000 Max 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.

M43000 Max 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

3 Available Designs

– Captive – Non-Captive – External Linear

NOTE: For more information see the Haydon Kerk IDEA™ Drive Data Sheet.

Size 17 Single Stack Max: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)		
Part No.	**Captive**	M43HG ☐☐ – ☐☐ – ☐☐☐ †
	Non-Captive	M43FG ☐☐ – ☐☐ – ☐☐☐ †
	External Linear	EM43HG ☐☐ – ☐☐ – ☐☐☐ †
Wiring		Bipolar
Winding Voltage		2.8 VDC**

†Part numbering information on page 7. **Contact Haydon Kerk if a higher voltage motor is desired.
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

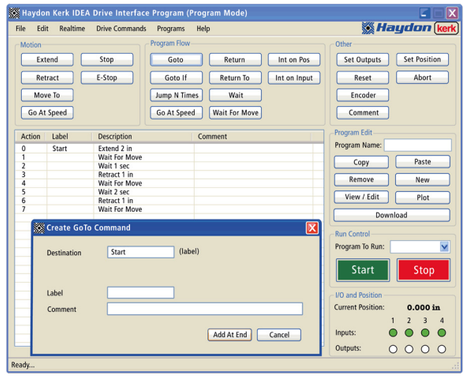
Linear Travel / Step Screw Ø .218" (5.54 mm)		Order Code I.D.
inches	mm	
.00012	.0030*	N
.00024	.0060*	K
.00048	.0121*	J
.00096	.0243*	Q
.00192	.0487*	R

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.00015625	.0039*	P
.0003125	.0079*	A
.000625	.0158*	B
.00125	.0317*	C

*Values truncated.

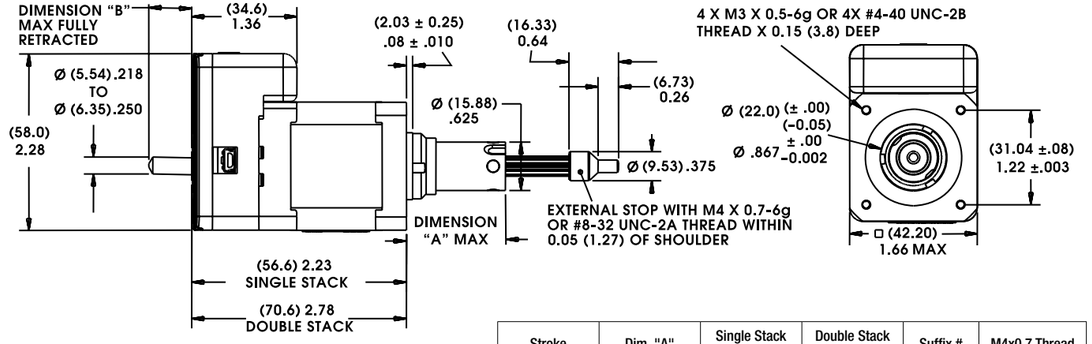
Simple to use IDEA™ Drive software with on-screen buttons and easy-to-understand programming guides

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

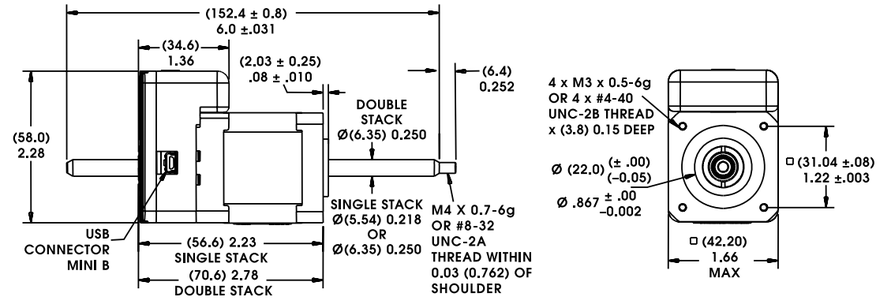


Stroke	Dim. "A"	Single Stack Dim. "B"	Double Stack Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0	0	–905	–805
0.750 (19.05)	1.03 (26.2)	0	0	–907	–807
1.000 (25.4)	1.28 (32.5)	0	0	–910	–810
1.250 (31.8)	1.53 (38.9)	0	0	–912	–812
1.500 (38.1)	1.78 (45.2)	0.232 (5.9)	0.091 (2.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	0.732 (18.6)	0.591 (15.0)	–920	–820
2.500 (63.5)	2.78 (70.6)	1.232 (31.3)	1.091 (27.7)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

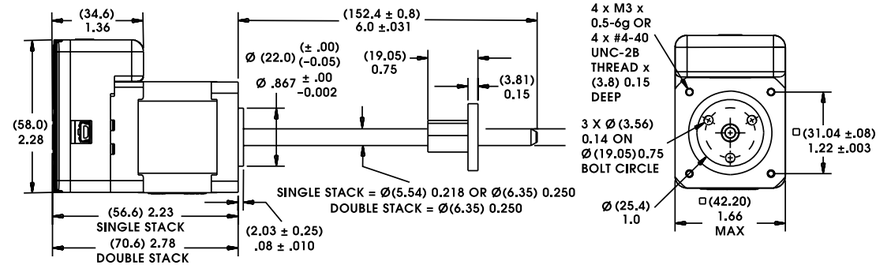
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = (mm) inches

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

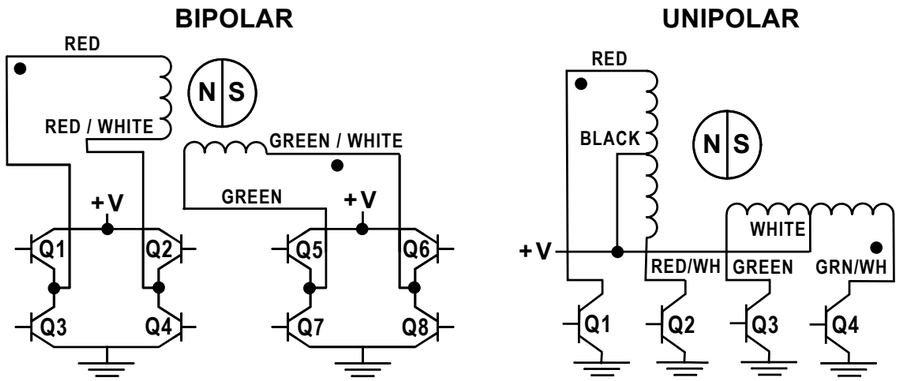


Identifying the Hybrid Part Number Codes when Ordering

E	M43	H	G	N	—	2.8	—	910
Prefix (include only when using the following) **A =** A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position Switch	**Series Number Designation** **M43 =** 43000 Max Series (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** **2.8** = 2.8 VDC **5.8** = 5.8 VDC **13.8** = 13.8 VDC Custom V available		**Suffix** **Stroke** Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

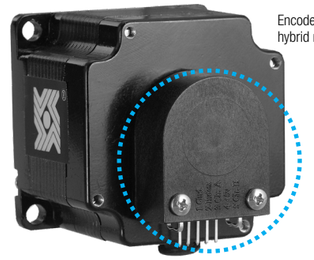
EXTEND CW ↓ / ↑ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

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 17 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

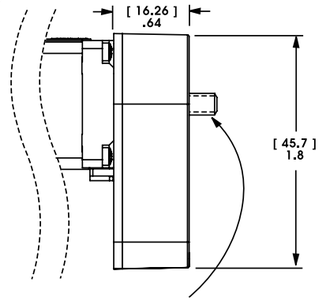
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic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



Encoder on Size 23 hybrid motor

30 mm M43000 Series Size 17

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



Differential Ended Encoder - Pinout - Size 17	
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 +

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		
	Minimum	**Maximum**
Size 17	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 17	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.

Single Ended Encoder - Pinout - Size 17			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connectors

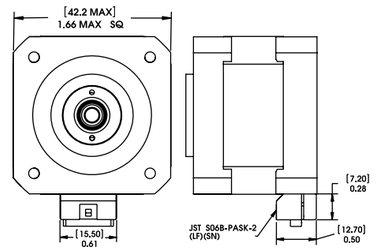
Hybrid Size 17 Max linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range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

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



New!

MAX Series
30% performance increase
compared to standard size 17

M43000 MAX Series Double Stack Size 17 Hybrid Linear Actuators

Exceptional performance and new linear motion design opportunities, now with 30% performance increase

The M43000 Max 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).

3 Available Designs

– Captive
– Non-Captive
– External Linear

Size 17
Non-Captive Shaft

Size 17
External Linear

Size 17
Captive Shaft

Size 17 Max Double Stack Max: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	Captive	M43M4 – – †		
	Non-Captive	M43L4 – – †		
	External Linear	EM43M4 – – †		
Wiring		Bipolar		
Winding Voltage		2.8 VDC	5.8 VDC	13.8 VDC
Current (RMS)/phase		2.6 A	1.3 A	550 mA
Resistance/phase		1.1 Ω	4.5 Ω	25 Ω
Inductance/phase		2.4 mH	10.5 mH	52 mH
Power Consumption		15 W		
Rotor Inertia		78.2 gcm²		
Temperature Rise		135° F Rise (70° C Rise)		
Insulation Class		Class B (Class F available)		
Weight		14 oz (400 g)		
Insulation Resistance		20 MΩ		

†Part numbering information on page 6.

Linear Travel / Step Screw Ø.1875"(4.76mm)		Order Code I.D.
inches	mm	
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.00375	.0953	AG
.005	.127	Z

*Values truncated.

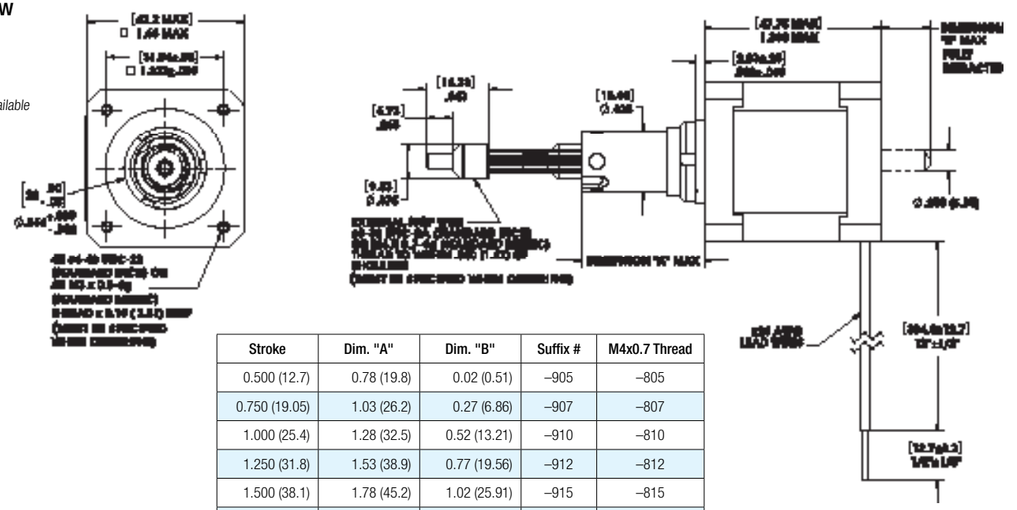
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available



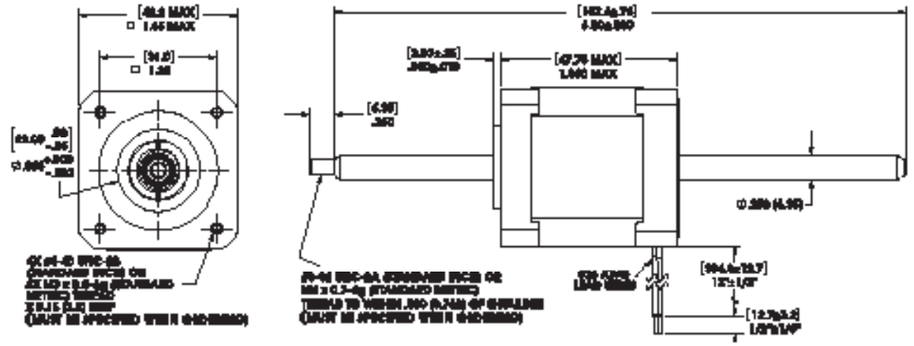
Stroke	Dim. "A"	Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0.02 (0.51)	–905	–805
0.750 (19.05)	1.03 (26.2)	0.27 (6.86)	–907	–807
1.000 (25.4)	1.28 (32.5)	0.52 (13.21)	–910	–810
1.250 (31.8)	1.53 (38.9)	0.77 (19.56)	–912	–812
1.500 (38.1)	1.78 (45.2)	1.02 (25.91)	–915	–815
2.00 (50.8)	2.28 (57.9)	1.52 (38.61)	–920	–820
2.500 (63.5)	2.78 (70.6)	2.02 (51.31)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

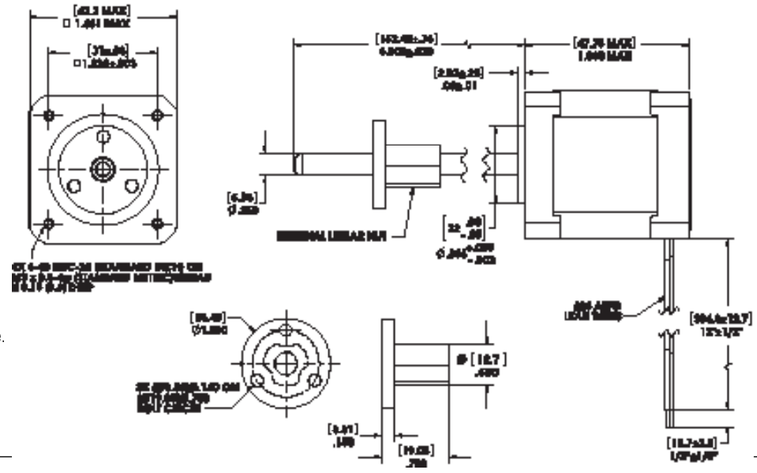


External Linear

Dimensions = (mm) inches

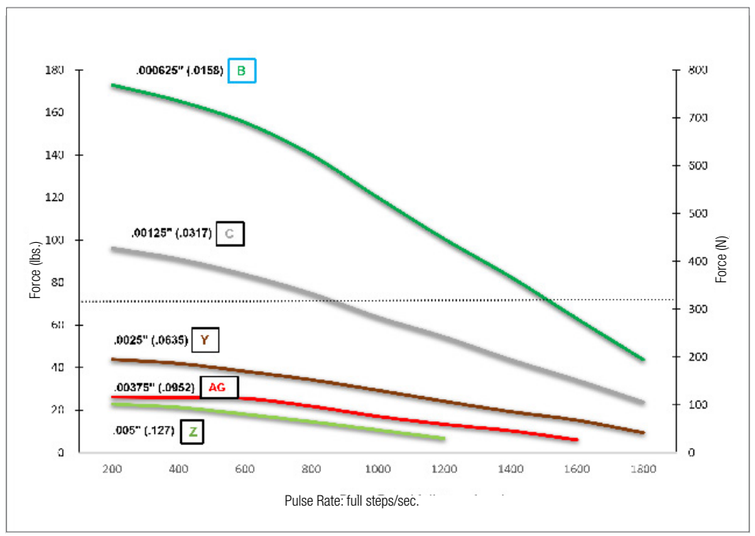
Integrated connector option available

4-in [101.6 mm]
standard screw lengths.
Longer screw lengths are available.

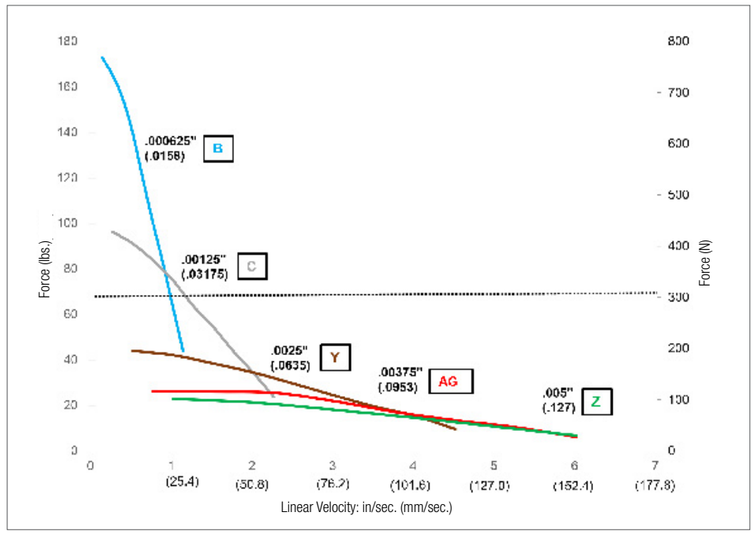


FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle – 8:1 Motor Coil to Drive Supply Voltage

– Ø .250 (6.35) Lead Screw



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 5.8 volt, microstepping 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.

43000 Max Series Size 17 Double Stack Hybrid Linear Actuators with integrated IDEA™ Drive

High performance in a compact package

The M43000 Max 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).

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

3 Available Designs

– Captive – Non-Captive – External Linear

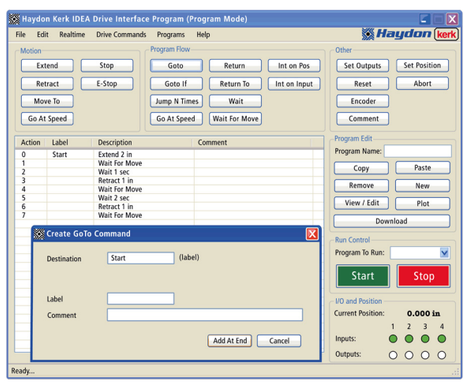
Size 17 Max Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)		
Part No.	Captive	M43MG ☐ – ☐☐ – ☐☐☐ †
	Non-Captive	M43LG ☐ – ☐☐ – ☐☐☐ †
	External Linear	EM43MG ☐ – ☐☐ – ☐☐☐ †
Wiring		Bipolar
Winding Voltage		2.8 VDC**

†Part numbering information on page 7. **Contact Haydon Kerk if a higher voltage motor is desired. Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

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

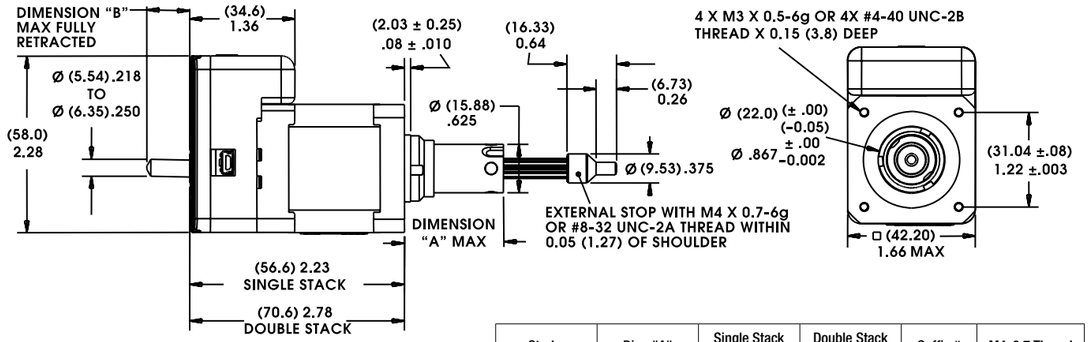
Simple to use IDEA™ Drive software with on-screen buttons and easy-to-understand programming guides

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

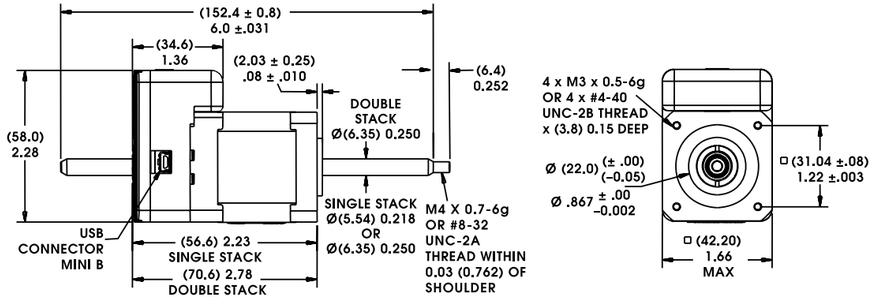


Stroke	Dim. "A"	Single Stack Dim. "B"	Double Stack Dim. "B"	Suffix #	M4x0.7 Thread
0.500 (12.7)	0.78 (19.8)	0	0	–905	–805
0.750 (19.05)	1.03 (26.2)	0	0	–907	–807
1.000 (25.4)	1.28 (32.5)	0	0	–910	–810
1.250 (31.8)	1.53 (38.9)	0	0	–912	–812
1.500 (38.1)	1.78 (45.2)	0.232 (5.9)	0.091 (2.5)	–915	–815
2.00 (50.8)	2.28 (57.9)	0.732 (18.6)	0.591 (15.0)	–920	–820
2.500 (63.5)	2.78 (70.6)	1.232 (31.3)	1.091 (27.7)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

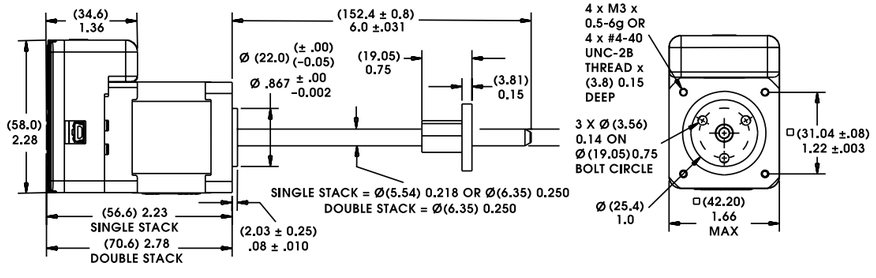
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

Dimensions = (mm) inches

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

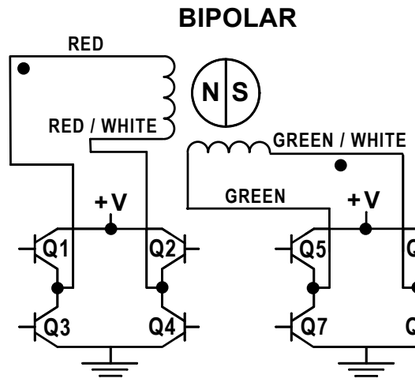


Identifying the Hybrid Part Number Codes when Ordering

E	M43	M	G	C	—	2.8	—	910
Prefix (include only when using the following) **A** = A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position Switch	**Series Number Designation** **M43 =** 43000 Max Series (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** **2.8** = 2.8 VDC **5.8** = 5.8 VDC **13.8** = 13.8 VDC Custom V available		**Suffix** **Stroke** Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

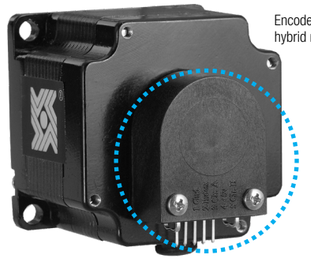
EXTEND CW ↓ RETRACT CCW ↑

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

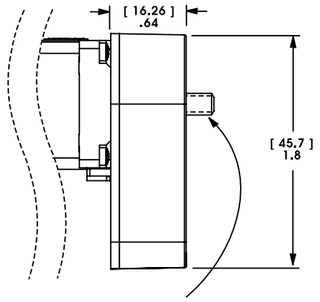
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 17 Encoder provides resolutions for applications that require 200, 400 and 1,000 counts per revolution. Encoders are available for all motor configurations.

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.



Encoder on Size 23 hybrid motor

30 mm M43000 Series Size 17



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

Differential Ended Encoder - Pinout - Size 17	
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 +

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 17	**Minimum**	**Maximum**
	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution				
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)				
Size 17	**CPR**	200	400	1000*
	PPR	800	1600	4000*

*Index Pulse Channel not available.

Single Ended Encoder - Pinout - Size 17			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Integrated Connectors

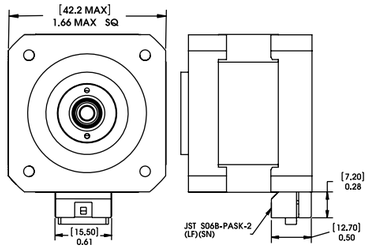
Hybrid Size 17 Max linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range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

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



57000 Series
Size 23 Hybrid Linear Actuators

For applications that require forces up to 200 lbs. (890 N).

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

3 Available Designs

– Captive
– Non-Captive
– External Linear

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.

Size 23 Captive Shaft

Size 23 External Linear

Size 23 Non-Captive Shaft

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	**Captive**	57H4 – – – †			57H6 – – – †	
	Non-Captive	57F4 – – – †			57F4 – – – †	
	External Linear	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 gcm²				
Insulation Class		Class B (Class F available)				
Weight		18 oz (511 g)				
Insulation Resistance		20 MΩ				

†Part numbering information on page 126. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

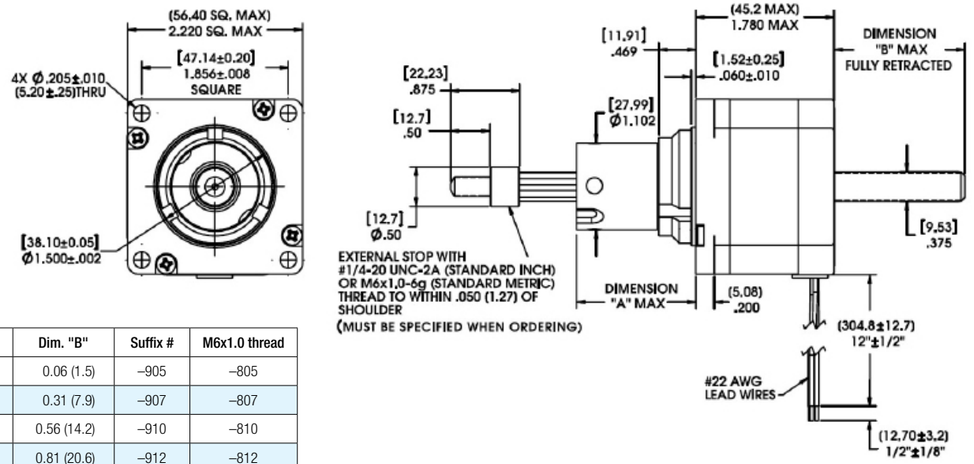
Linear Travel / Step Screw Ø .375" (9.53 mm)		Order Code I.D.
inches	mm	
.0003125	.0079*	A
.0004167	.0105*	S
.0005	.0127	3
.0008333	.0211*	T
.001	.0254	1
.002	.0508	2

*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.

Captive Lead Screw

Dimensions = (mm) inches

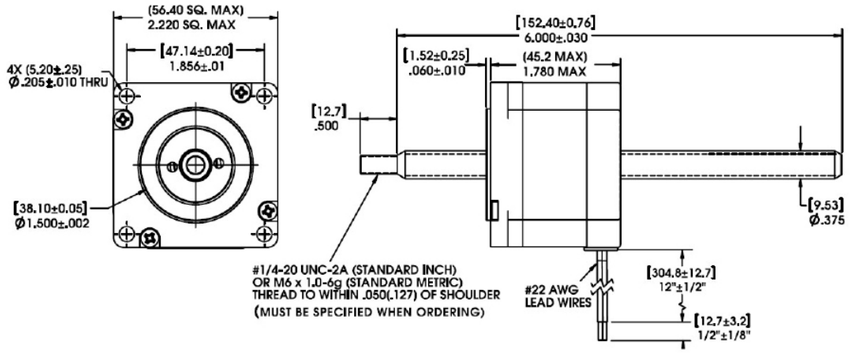


Stroke	Dim. "A"	Dim. "B"	Suffix #	M6x1.0 thread
0.500 (12.7)	1.01 (25.7)	0.06 (1.5)	–905	–805
0.750 (19.05)	1.26 (32.0)	0.31 (7.9)	–907	–807
1.000 (25.4)	1.51 (38.4)	0.56 (14.2)	–910	–810
1.250 (31.8)	1.76 (44.7)	0.81 (20.6)	–912	–812
1.500 (38.1)	2.01 (51.1)	1.06 (26.9)	–915	–815
2.00 (50.8)	2.51 (63.8)	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

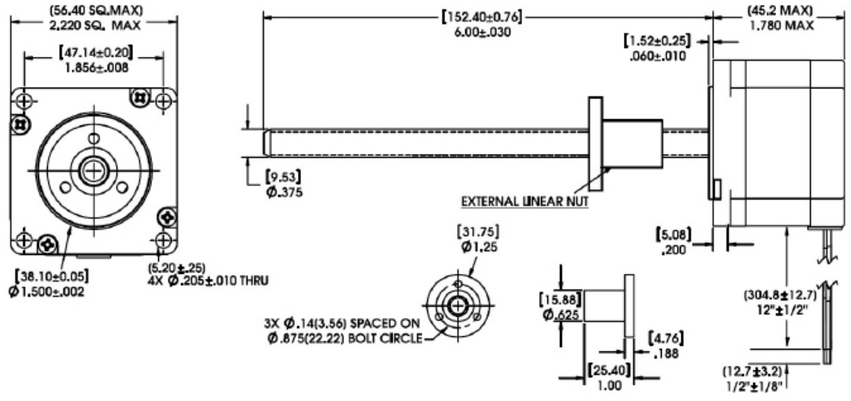
Up to 10-in (254 mm) standard screw lengths. Longer screw lengths are available.



External Linear

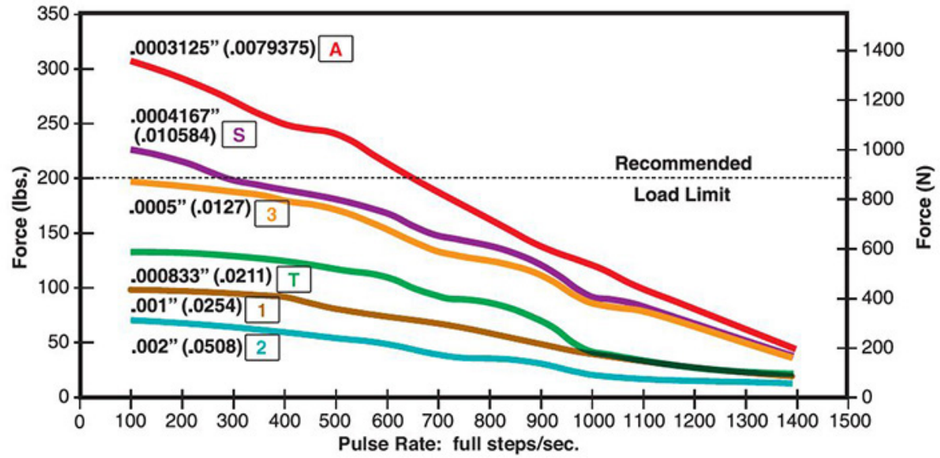
Dimensions = (mm) inches

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



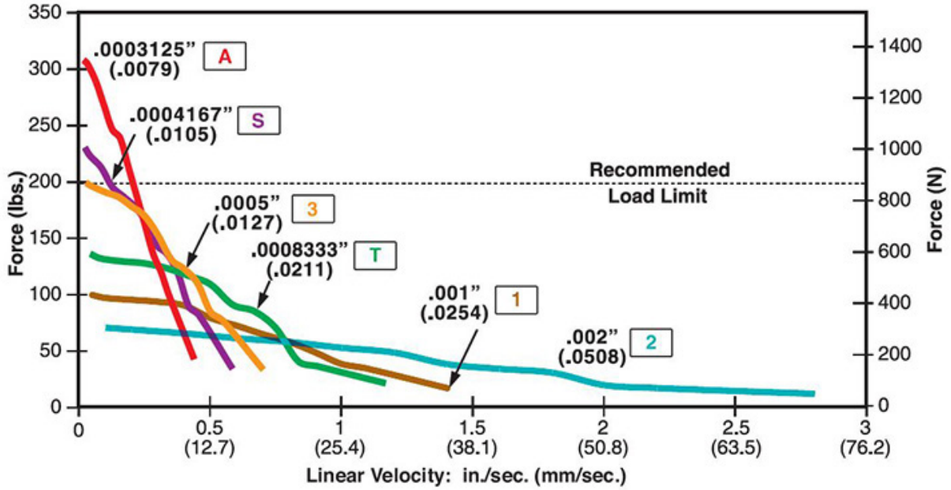
FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle

– Ø .375 (9.53) Lead Screw



FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle

– 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.

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).

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (0.9° Step Angle)						
Part No.	Captive	57K4 ☐☐ – ☐☐ – ☐☐☐ †			57K6 ☐☐ – ☐☐ – ☐☐☐ †	
	Non-Captive	57J4 ☐☐ – ☐☐ – ☐☐☐ †			57J6 ☐☐ – ☐☐ – ☐☐☐ †	
	External Linear	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 gcm²				
Insulation Class		Class B (Class F available)				
Weight		18 oz (511 g)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø .250" (6.35 mm)		Order Code I.D.
inches	mm	
.000125	.0031*	7
.00015625	.003969	P
.00020833	.00529166	X
.00025	.00635	9
.0004167	.01058418	S
.0005	.0127	3
.001	.0254	1

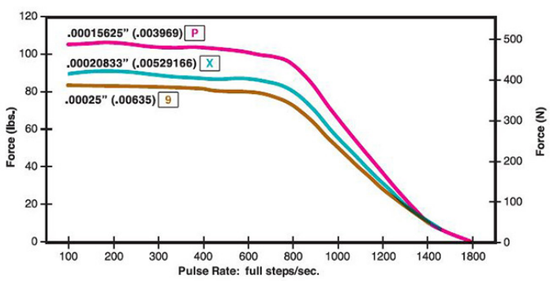
*Values truncated.

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

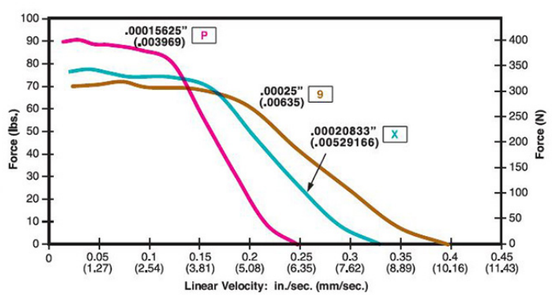
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

†Part numbering information on page 126. **Unipolar drive gives approximately 30% less thrust than bipolar drive.

FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle
with two available lead screw diameters



FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle
with two available lead screw diameters



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.

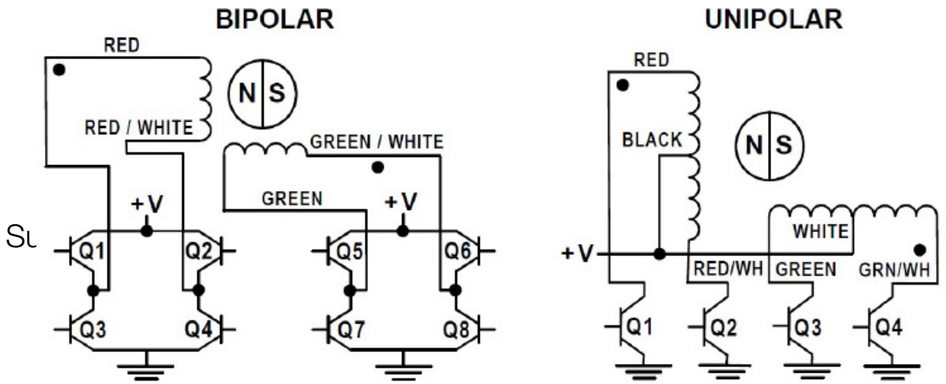
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Identifying the Hybrid Part Number Codes when Ordering

E	57	H	6	7	—	3.25	—	910
Prefix (include only when using the following) **A** = A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

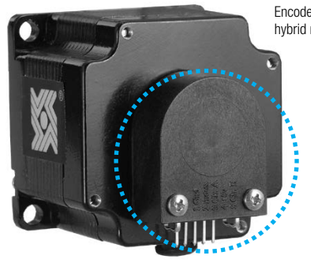
EXTEND CW ⟵ ⟶ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

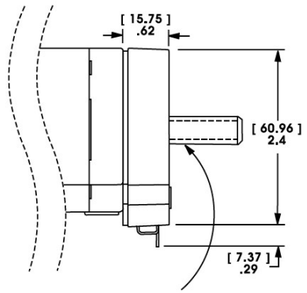
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 23 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.

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.



Encoder on Size 23 hybrid motor

57 mm 57000 Series Size 23



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

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		
	Minimum	**Maximum**
Size 23	- 40°C (- 40°F)	100°C (212°F)

Differential Ended Encoder - Pinout - Size 23	
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 +

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution					
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)					
Size 23	**CPR**	200	400*	1000	2000
	PPR	800	1600*	4000	8000

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 23			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

57000 Series
Size 23 Double Stack
Hybrid Linear Actuators

Size 23
Double Stack
Non-Captive Shaft

Size 23
Double Stack
External Linear

Size 23
Double Stack
Captive Shaft

Greater performance in a compact size

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

3 Available Designs

– Captive
– Non-Captive
– External Linear

The Size 23 actuator delivers thrust of up to 200 lbs. (890 N).

Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)				
Part No.	**Captive**	57M4 _ _ _ _ _ _ †		
	Non-Captive	57L4 _ _ _ _ _ _ †		
	External Linear	E57M4 _ _ _ _ _ _ †		
Wiring		Bipolar		
Winding Voltage		3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase		3.32 A	2.16 A	0.9 A
Resistance/phase		0.98 Ω	2.31 Ω	13.33 Ω
Inductance/phase		2.3 mH	7.6 mH	35.0 mH
Power Consumption		21.6 W Total		
Rotor Inertia		321 gcm^2		
Insulation Class		Class B (Class F available)		
Weight		32 oz (958 g)		
Insulation Resistance		20 MΩ		

†Part numbering information on page 131.

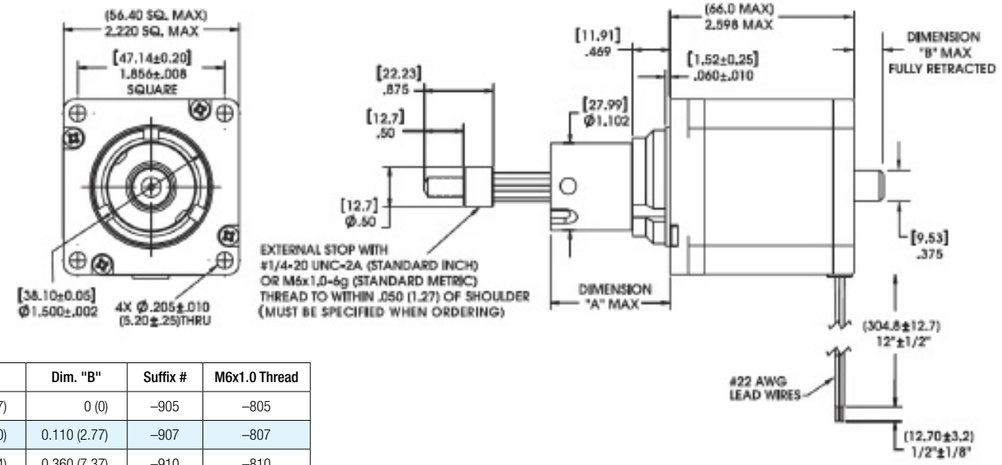
Linear Travel / Step Screw Ø.375" (9.53 mm)		Order Code I.D.
inches	mm	
.0005	.0127*	3
.001	.0254*	1
.002	.0508	2
.0025	.0635	Y
.005	.127	Z

*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.

Captive Lead Screw

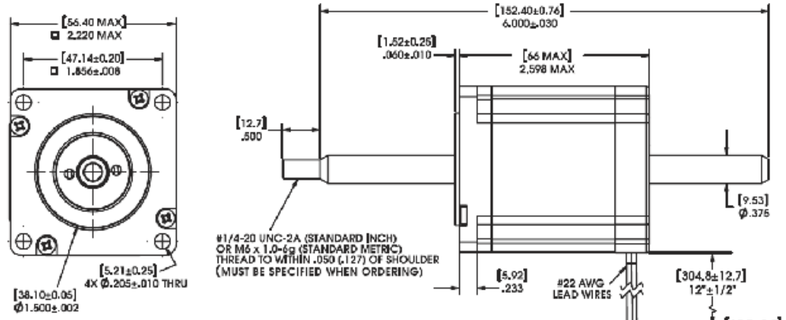


Stroke	Dim. "A"	Dim. "B"	Suffix #	M6x1.0 Thread
0.500 (12.7)	1.01 (25.7)	0 (0)	–905	–805
0.750 (19.05)	1.26 (32.0)	0.110 (2.77)	–907	–807
1.000 (25.4)	1.51 (38.4)	0.360 (7.37)	–910	–810
1.250 (31.8)	1.76 (44.7)	0.610 (15.47)	–912	–812
1.500 (38.1)	2.01 (51.1)	0.860 (21.83)	–915	–815
2.00 (50.8)	2.51 (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

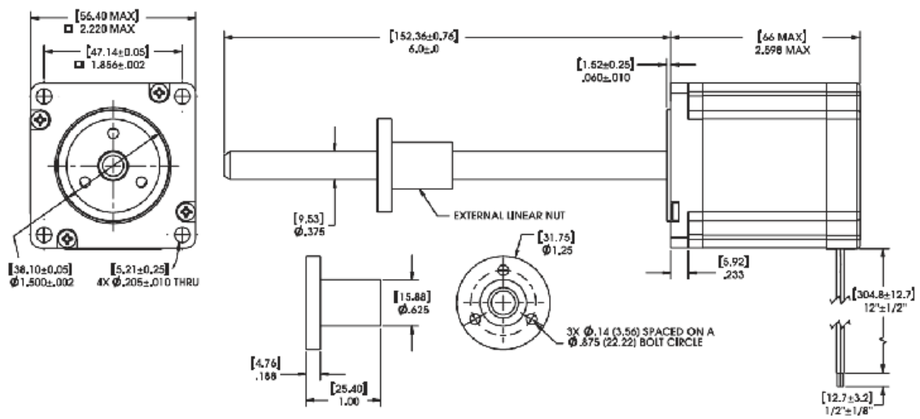
Up to 18-in (457 mm) standard screw lengths. Longer screw lengths are available.



External Linear

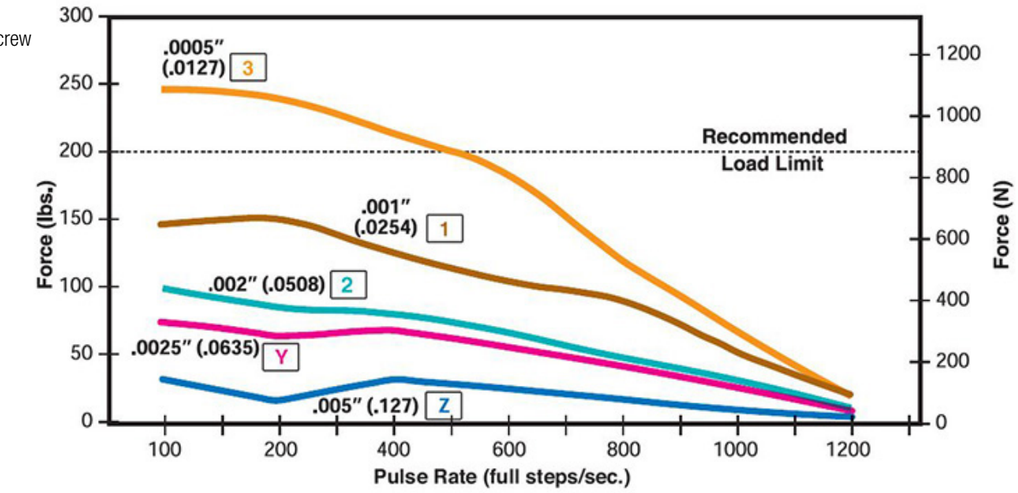
Dimensions = (mm) inches

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



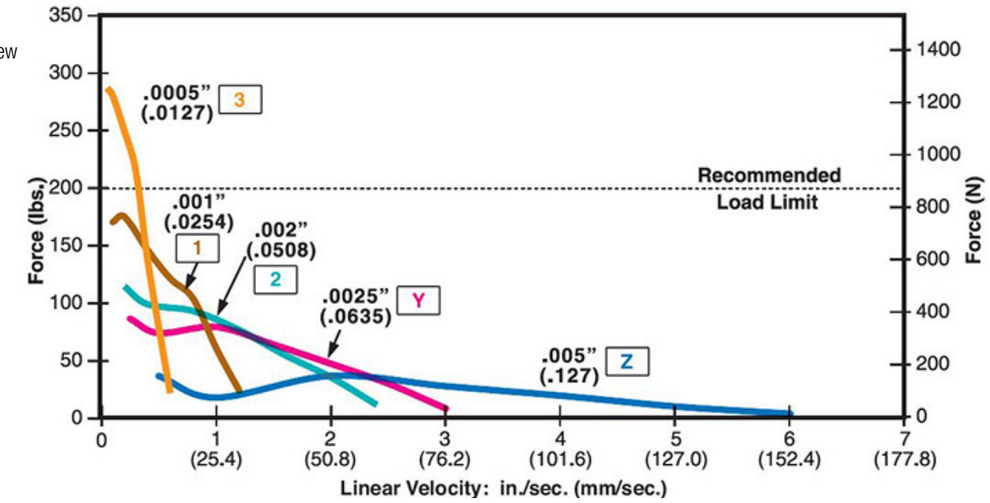
FORCE vs. PULSE RATE

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .375 (9.53) Lead Screw



FORCE vs. LINEAR VELOCITY

– Chopper
– Bipolar
– 100% Duty Cycle
– Ø .375 (9.53) Lead Screw

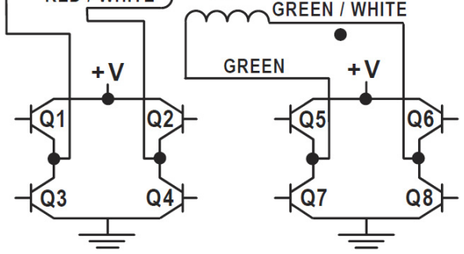


Identifying the Hybrid Part Number Codes when Ordering

E	57	M	4	3	—	3.25	—	910
Prefix (include only when using the following) **A =** A Coil (See AC Synchronous Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

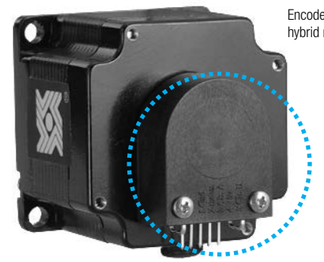
EXTEND CW ↓ ↑ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

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 23 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.

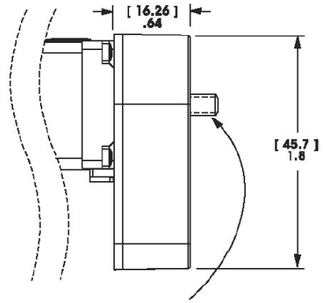
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder module incorporates a lensed LED light source and monolithic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



Encoder on Size 23 hybrid motor

57 mm 57000 Series Size 23

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



Differential Ended Encoder - Pinout - Size 23	
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 +

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		
	Minimum	**Maximum**
Size 23	- 40°C (- 40°F)	100°C (212°F)

Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution					
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)					
Size 23	**CPR**	200	400*	1000	2000
	PPR	800	1600*	4000	8000

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 23			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

87000 Series
Size 34 Hybrid Linear Actuators

Our largest, most powerful linear actuator

Size 34 incorporates the same precision, high performance and durable patented designs featured in our entire hybrid product line.

3 Available Designs

– Captive
– Non-Captive
– External Linear

The 87000 series delivers forces up to 500 lbs. (2224 N) in a compact, 3.4-in (87 mm) square package. 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, we can custom build this powerful motor to meet your specific motion requirements.

Size 34
Captive Shaft

Size 34
Non-Captive Shaft

Size 34
External Linear

Size 34: 87 mm (3.4-in) Hybrid Linear Actuator (1.8° Step Angle)							
Part No.	Captive	87H4 – – †				87H6 – – †	
	Non-Captive	87F4 – – †				87F4 – – †	
	External Linear	E87H4 – – †				E87H6 – – †	
Wiring		Bipolar				Unipolar**	
Winding Voltage		2.85 VDC	5 VDC	6 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		5.47 A	3.12 A	2.6 A	1.3 A	3.12 A	1.3 A
Resistance/phase		0.52 Ω	1.6 Ω	2.31 Ω	9.23 Ω	1.6 Ω	9.23 Ω
Inductance/phase		2.86 mH	8.8 mH	12.7 mH	51 mH	4.4 mH	25.5 mH
Power Consumption		31.2 W					
Rotor Inertia		1760 gcm²					
Insulation Class		Class B (Class F available)					
Weight		5.1 lbs. (2.3 Kg)					
Insulation Resistance		20 MΩ					

†Part numbering information on page 136. ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

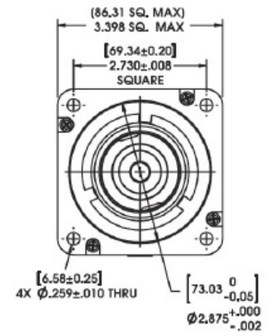
Linear Travel / Step Screw Ø .625"(15.88 mm)		Order Code I.D.
inches	mm	
.0005	.0127	3
.000625	.0158*	B
.00125	.0317*	C
.0025	.0635	Y
.005	.127	Z

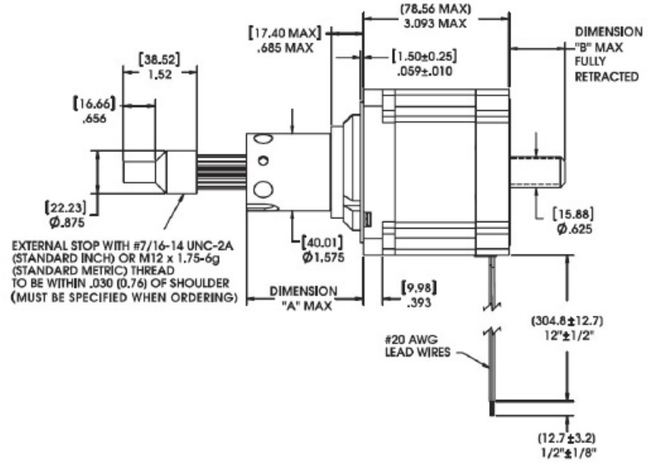
*Values truncated.
Standard motors are Class B rated for maximum temperature of 130°C.

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

Captive Lead Screw

Dimensions = (mm) inches



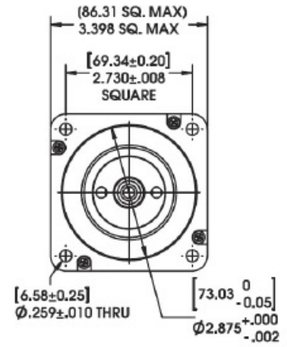


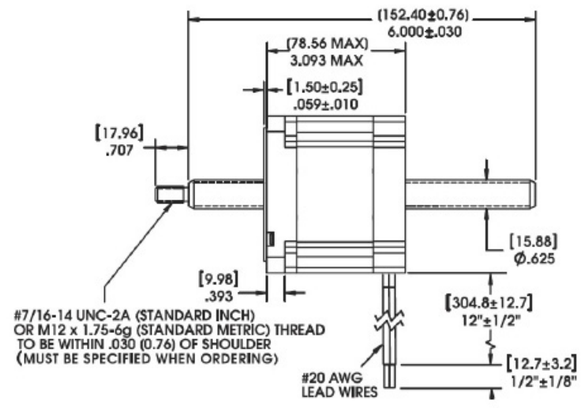
Stroke	Dim. "A"	Dim. "B"	Suffix #	M12x1.75 Thread
0.500 (12.7)	1.225 (31.12)	0 (0)	–905	–805
1.000 (25.4)	1.725 (43.82)	0.25 (6.35)	–910	–810
1.500 (38.1)	2.225 (56.52)	0.75 (19.05)	–915	–815
2.00 (50.8)	2.725 (69.22)	1.25 (31.75)	–920	–820
2.500 (63.5)	3.225 (81.92)	1.75 (44.45)	–925	–825

Non-Captive Lead Screw

Dimensions = (mm) inches

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

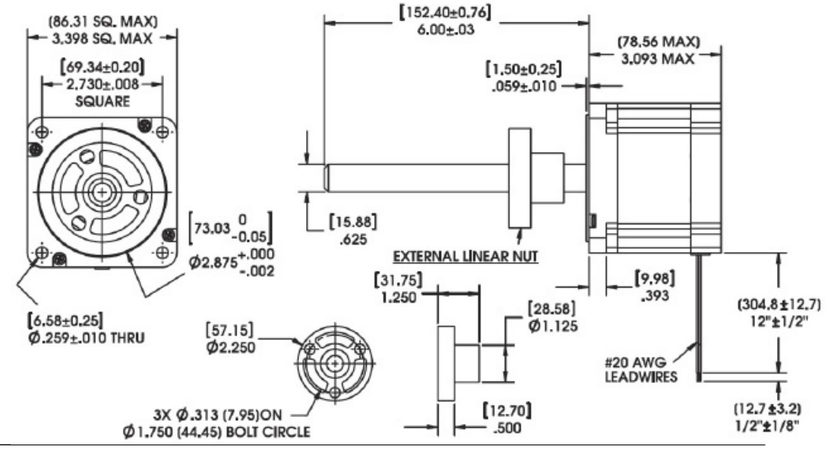




External Linear

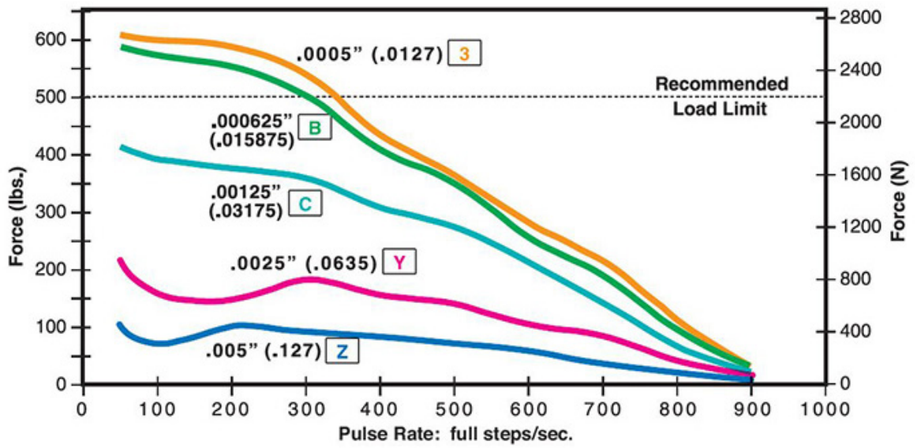
Dimensions = (mm) inches

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



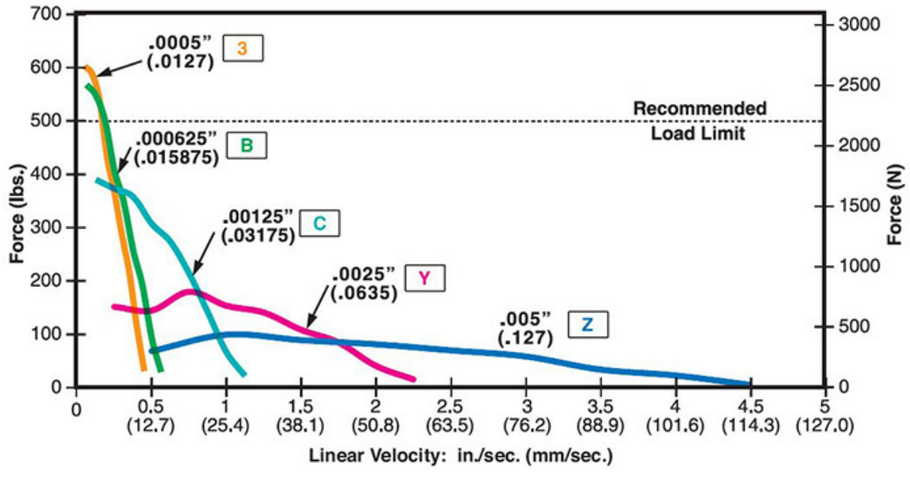
FORCE vs. PULSE RATE – Chopper – Bipolar – 100% Duty Cycle

– Ø .625 (15.88) Lead Screw



FORCE vs. LINEAR VELOCITY – Chopper – Bipolar – 100% Duty Cycle

– Ø .625 (15.88) 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.

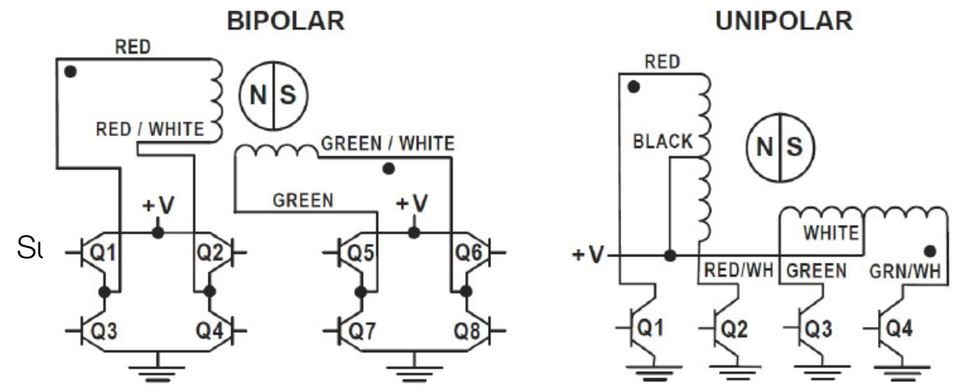
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

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 Data Sheet) **E** = External **K** = External with 40° thread form **P** = Proximity Sensor **S** = Home Position 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 **06** = 6 VDC **12** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page.) **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 call our Engineering Team at 203 756 7441.

Hybrids: **Wiring**



Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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

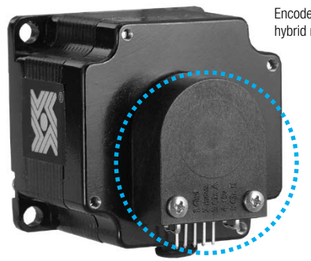
EXTEND CW ⟵ ⟶ RETRACT CCW

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

Encoders Designed for All Sizes of Hybrid Linear Actuators

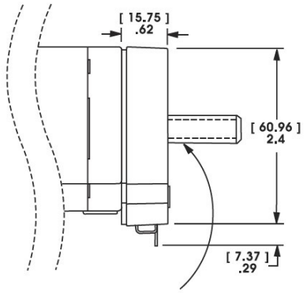
All Haydon Hybrid Linear Actuators are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder design is available with two channel quadrature TTL squarewave outputs. An optional index is also available as a 3rd channel. The Size 34 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.

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.



Encoder on Size 23 hybrid motor

87 mm 87000 Series Size 34



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

Differential Ended Encoder - Pinout - Size 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 +

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 34	**Minimum**	**Maximum**
	- 40°C (- 40°F)	100°C (212°F)

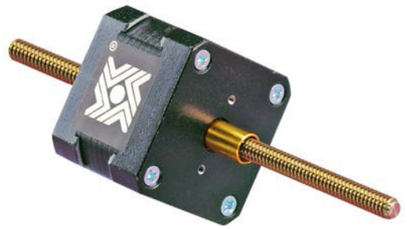
Mechanical Specifications	
	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution					
4 Standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)					
Size 34	**CPR**	200	400*	1000	2000
	PPR	800	1600*	4000	8000

*Index Pulse Channel not available.
Contact us for additional resolution options

Single Ended Encoder - Pinout - Size 34			
Connector Pin #	**Description**	**Connector Pin #**	**Description**
1	Ground	**4**	+5 VDC Power
2	Index (optional)	**5**	Channel B
3	Channel A		

Encoder Ready Option Shown 34000 Series Size 17



Extended Rotor Journal Shown 34000 Series Size 17

End of Stroke Proximity Sensor

TFE Coated Lead Screw

Integrated Anti-Backlash Nut

Encoder Ready Option for all Hybrid Sizes

Our Hybrid Linear Actuators can now be manufactured as an Encoder Ready Actuator. Encoder Ready Actuators can be used to install several popular hollow shaft encoders. Available with an extended rotor journal and a threaded rear housing. The motor uses 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.

Size 23 Mounting Face Plate for Size 17 Hybrids

Size 23 mounting pattern for our Hybrid Size 17 Linear Actuators.

Extended Rotor Journal for all Hybrid Sizes

Available with an extended rotor journal. The extended rotor journal can be used for encoder installation, manual adjustment, or flag installation for a positioning sensor.

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 positions.

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 Hybrid Sized

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 a 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*

TFE Coated Lead Screws for applications that require a *greaseless* screw and nut interface.

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 our brand captive, non-captive and external linear actuators. Not available for 0.00006-in (.0015 mm) and 0.000098-in (.0025 mm) resolutions.

*Certain conditions apply.

Integrated Anti-Backlash Nut for Hybrids*

Most sizes (except Size 34) of our 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.

Our actuators are designed for millions of cycles. However over time, additional backlash could increase and eventually double. Haydon Kerk Integrated Anti-Backlash Nut can eliminate all backlash. Designed specifically for our captive and non-captive hybrid motors, 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.

*Except Size 34.

Dual Motion Actuators

The Haydon Kerk line of dual motion hybrid actuators provide independent linear and rotary motion from a single compact actuator package. The actuators are based on unique, patented designs and incorporate Haydon Kerk proven linear and rotary motor technology. These units simplify product development by replacing what would otherwise be far more bulky and complex mechanisms.

Dual Motion
Size 14 Linear/Rotary Actuators

Axially move components to their insertion positions and then rotate them.

Based on unique, patented designs and incorporate proven motor technology. 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.

Encoders available. US Digital E5 for linear, E6 for rotary.

35000 Series Dual Motion with 47 mm NEMA

35000 Series: 1.8° Step Angle				
Linear Travel / Step		Load Limit		Order Code I.D.
inches	mm	lbs	N	
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. Standard motors are Class B rated for maximum temperature of 130°C.

35000 Series: 0.9° Step Angle				
Linear Travel / Step		Load Limit		Order Code I.D.
inches	mm	lbs	N	
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

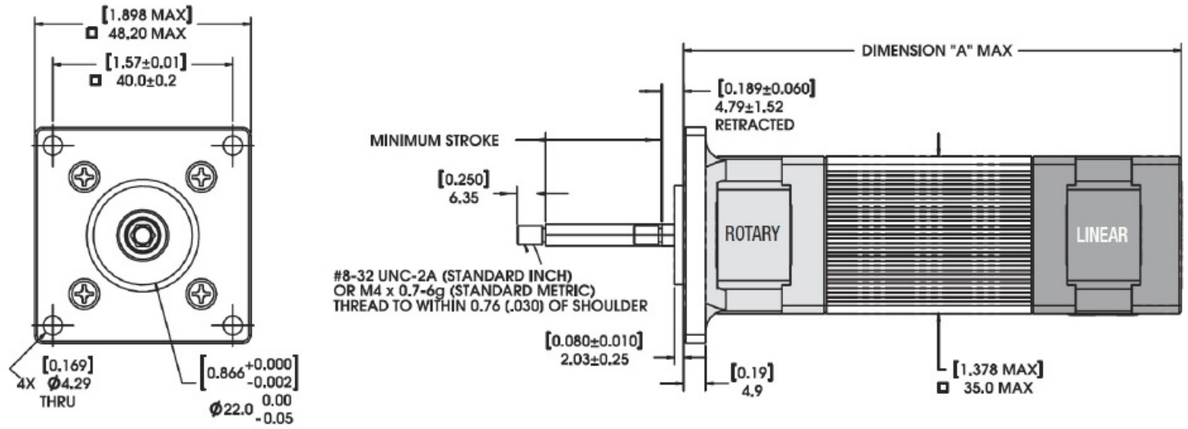
*Values truncated. Standard motors are Class B rated for maximum temperature of 130°C.

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)	**1.8° Step Angle Code ID Resolution Travel/Step** **U** = .00006-in (.0015) **AA** = .000098-in (.0025) **N** = .00012-in (.0030) **AB** = .00019-in (.005) **K** = .00024-in (.0061) **AC** = .00039-in (.01) **J** = .00048-in (.0121) **AD** = .00078-in (.02) **AE** = .00157-in (.04) **0.9° Step Angle Code ID Resolution Travel/Step** **BP** = .00003-in (.00076) **AY** = .00005-in (.00125) **U** = .00006-in (.0015) **AA** = .000098-in (.0025) **N** = .00012-in (.0030) **AB** = .00019-in (.005) **K** = .00024-in (.0061) **AC** = .00039-in (.01) **AD** = .00078-in (.02)		**Voltage** **05** = 5 VDC **12** = 12 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 call our Engineering Team at 203 756 7441.
See 35000 Series Hybrid Linear Data Sheet for More Detailed Motor Information.

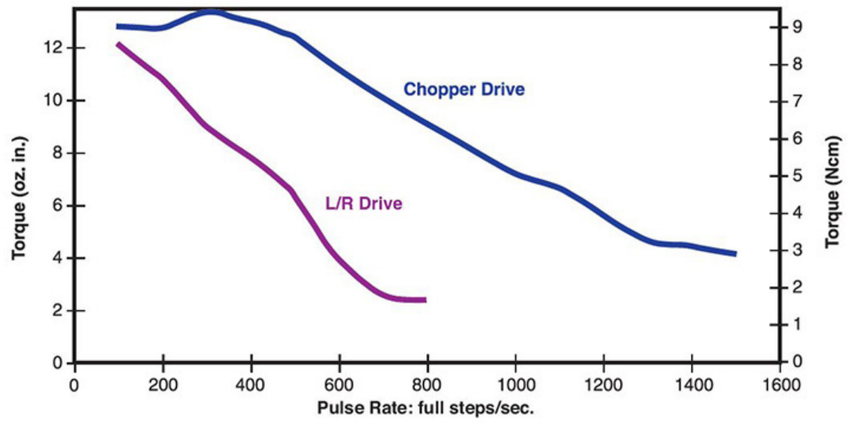
Dimensions = (mm) inches



Stroke	Dim. "A"	Suffix #	M4x0.7 Thread
0.500 (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)	–925	–825

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

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.

Dual Motion
Size 17 Linear/Rotary 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.

Encoders available. US Digital E5 for linear, E6 for rotary.

43000 Series Dual Motion with 57 mm NEMA

Identifying the Series 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)	**1.8° Step Angle Code ID Resolution Travel/Step** **N** = .00012-in (.003) **7** = .000125-in (.0031) **P** = .00015625-in (.0039) **AB** = .00019-in (.005) **K** = .00024-in (.006) **9** = .00025-in (.0063) **A** = .0003125-in (.0079) **AC** = .00039-in (.01) **J** = .00048-in (.0121) **3** = .0005-in (.0127) **B** = .000625-in (.0158) **AQ** = .00098-in (.025) **Q** = .00096-in (.0243) **C** = 0.00125-in (.0317) **BH** = .00196-in (.05) **R** = 0.00192-in (.0487) **Y** = .0025-in (.0635) **AG** = .00375-in (.0953) **Z** = .005-in (.127)	**0.9° Step Angle Code ID Resolution Travel/Step** **U** = .00006-in (.0015) **BB** = .0000625-in (.0016) **V** = .00007825-in (.00198) **AA** = .000098-in (.0025) **N** = .00012-in (.003) **7** = .000125-in (.0031) **P** = .00015625-in (.0039) **AB** = .00019-in (.005) **K** = .00024-in (.006) **9** = .00025-in (.0063) **A** = .0003125-in (.0079) **BG** = .00049-in (.0125) **J** = .00048-in (.0121) **B** = .000625-in (.0158) **AQ** = .00098-in (.025) **Q** = .00096-in (.0243) **C** = .00125-in (.0317) **AF** = .001875-in (.0476) **Y** = .0025-in (.0635)		**Voltage** **05** = 5 VDC **12** = 12 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 call our Engineering Team at 203 756 7441.
See 43000 Series Hybrid Linear Data Sheet for More Detailed Motor Information.

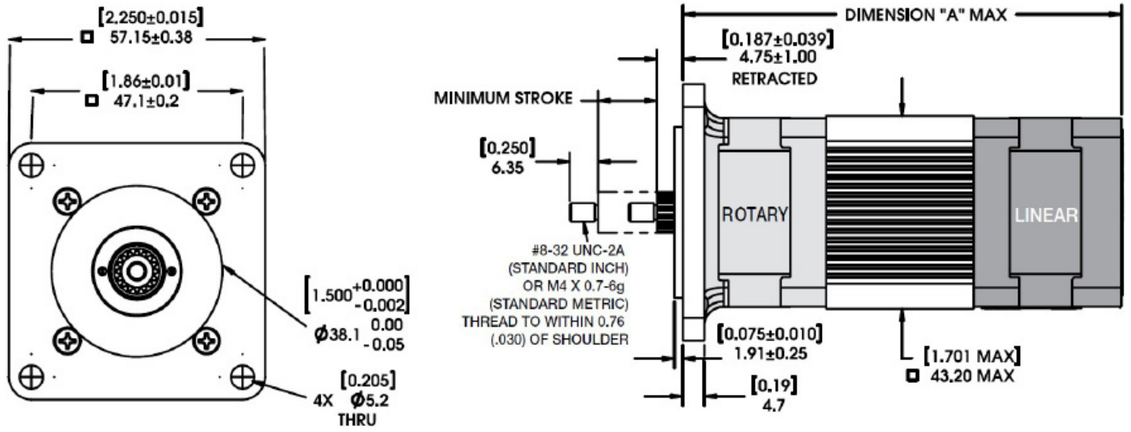
43000 Series: 1.8° Step Angle				
Linear Travel / Step		Load Limit		Order Code I.D.
inches	mm	lbs	N	
0.00012	0.003*	30	133	N
0.000125	0.0031*	30	133	7
0.00015625	0.0039*	30	133	P
0.00019*	0.005	30	133	AB
0.00024	0.0060*	30	133	K
0.00025	0.0063*	30	133	9
0.0003125	0.0079*	50	222	A
0.00039*	0.01	50	222	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. Standard motors are Class B rated for maximum temperature of 130°C.

43000 Series: 0.9° Step Angle				
Linear Travel / Step		Load Limit		Order Code I.D.
inches	mm	lbs	N	
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

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

Dimensions = (mm) inches

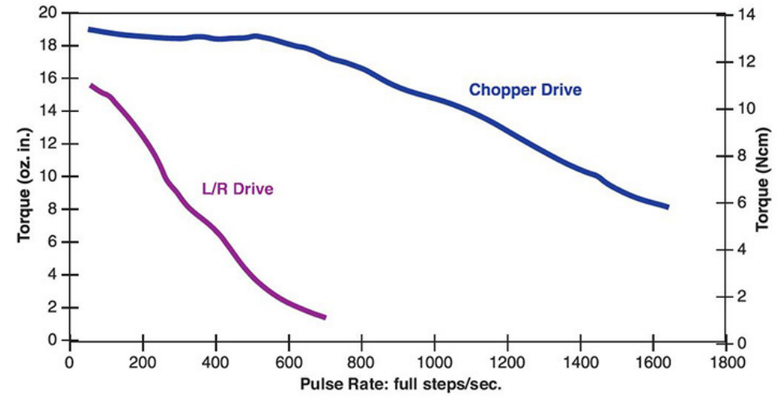


Stroke	Dim. "A"	Suffix #	M4x0.7 Thread
0.500 (12.7)	3.9 (99.3)	–905	–805
1.00 (25.4)	4.409 (112.0)	–910	–810
2.00 (50.8)	5.409 (137.4)	–920	–820
4.00 (101.6)	7.409 (188.2)	–925	–825

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

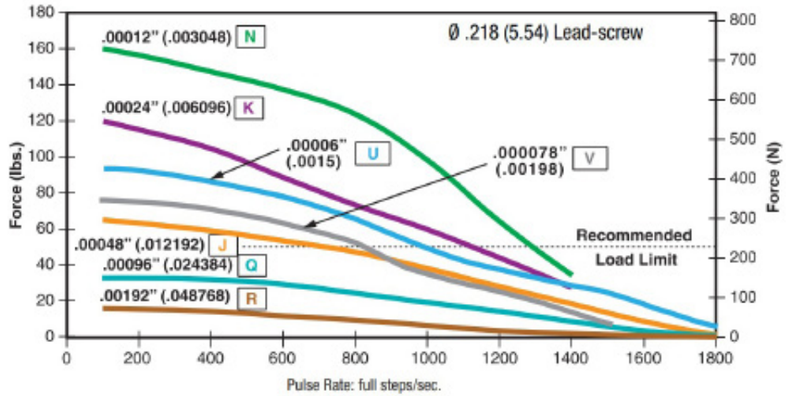
TORQUE vs. PULSE RATE: ROTARY FUNCTION

– Bipolar
– 100% Duty Cycle



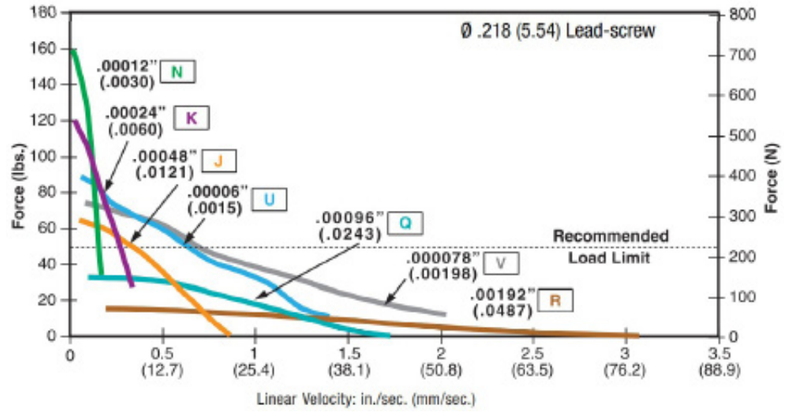
FORCE vs. PULSE RATE: LINEAR FUNCTION

– 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 Actuators

The Haydon™ brand of can-stack stepper motor linear actuators provides both a broader range and, for a given size, significantly higher thrust than previously available from mini-steppers. Haydon Kerk Motion Solutions patented design accepts a larger rotor than conventional units, improving efficiency and eliminating the need for massive heat sinks. Unique features impart ruggedness and reliability that assure long life and consistent performance. Rare earth magnets are available for even higher thrust. All units are built with dual ball bearings for greater motion control, precise step accuracy and long life.

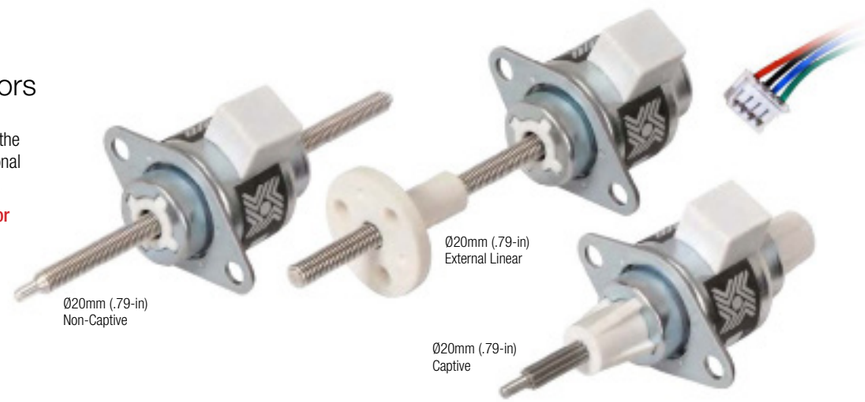
G4 19000 Series
Ø 20 mm (.79-in) Can-Stack Stepper Motor Linear Actuators

Utilizing high energy rare earth (neodymium) magnets,the G4 Series linear actuators consistently deliver exceptional performance. All units are built with dual ball bearings.

The highest force of any similar size linear actuator stepper motor

Multiple versions available

– Captive
– Non-Captive
– External Linear



Specifications

Ø 20 mm (.79-in) Motor					
Part No.	Captive	1944 – – – †		1954 – – – †	
	Non-Captive	1934 – – – †		1984 – – – †	
	External Linear*	E1944 – – – †		E1954 – – – †	
Wiring		Bipolar			
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
Power Consumption		3.38 W			
Insulation Class		Class B			
Weight		1.24 oz (35 g)			
Insulation Resistance		20 MΩ			

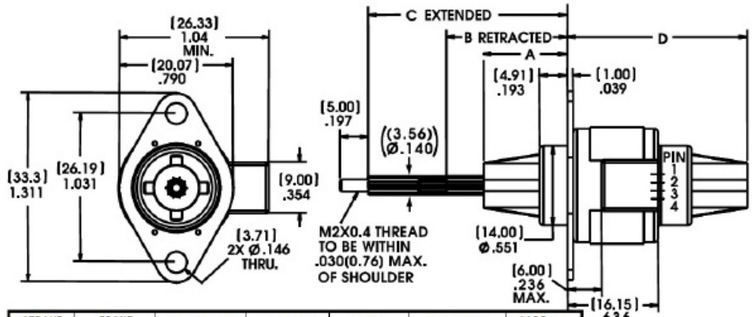
†Part numbering information on page 147.

Linear Travel / Step 15° Step Angle			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).

Captive Lead Screw

Dimensions = (mm) inches

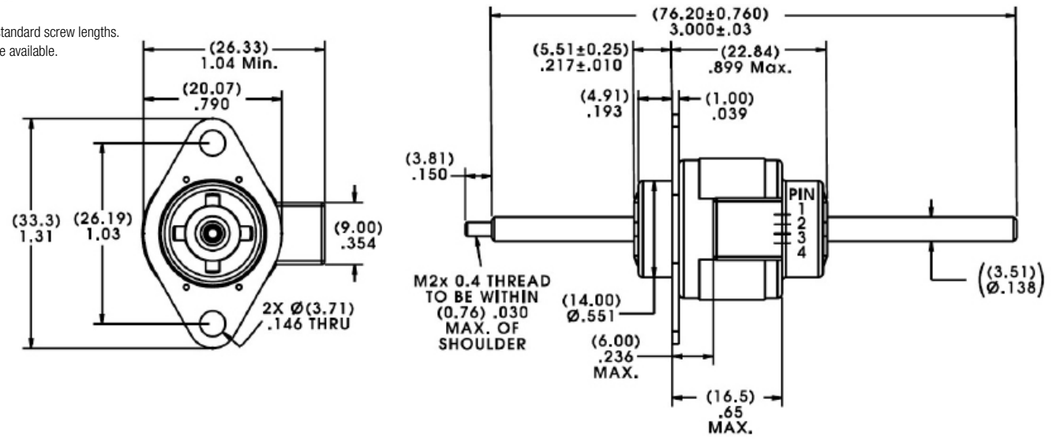


STROKE (Minimum)	FRONT SLEEVE A	RETRACTED B	EXTENDED C	REAR SLEEVE D	CODE with CONNECTOR	CODE with LEADS
(13 mm) .512	(14.75±0.25) .581±.010	(21.37±0.64) .841±.025	(35.17±0.38) 1.385±.015	(32.08 Max.) 1.263 Max.	– 905	– 1005
(18 mm) .708	(20.05±0.25) .789±.010	(26.67±0.64) 1.050±.025	(45.77±0.38) 1.802±.015	(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	(50.78 Max.) 2.000 Max.	– 912	– 1012

Non-Captive Lead Screw

Dimensions = (mm) inches

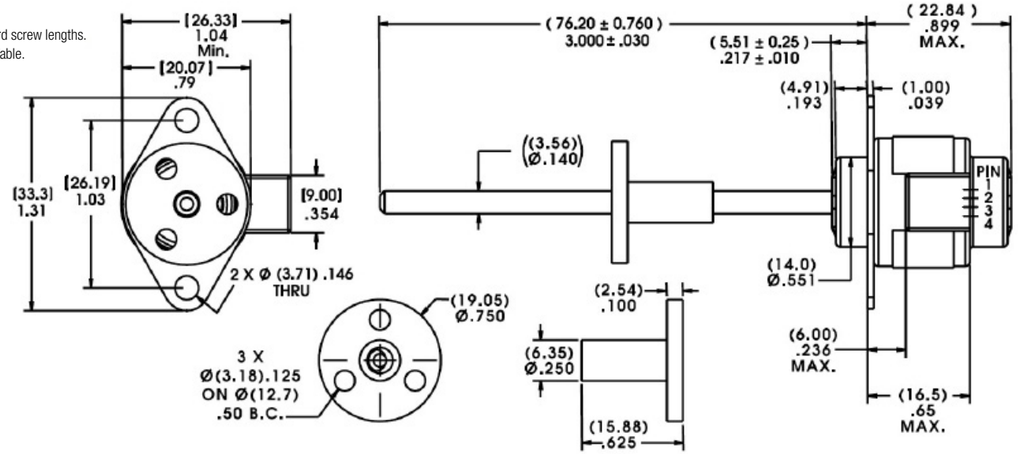
Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



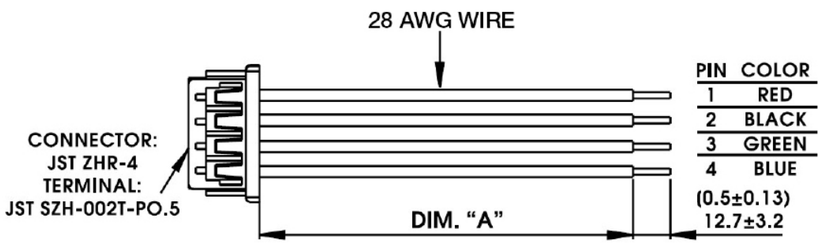
External Linear

Dimensions = (mm) inches

Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



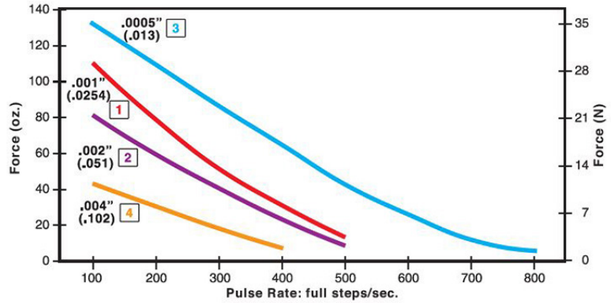
Connector



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

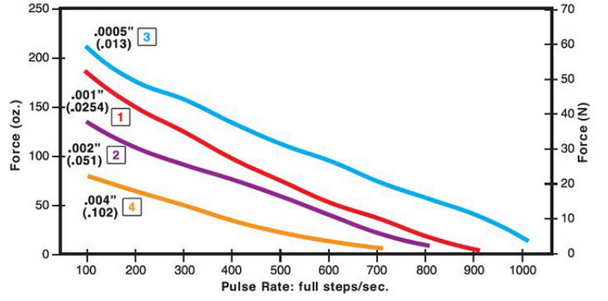
– L/R Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

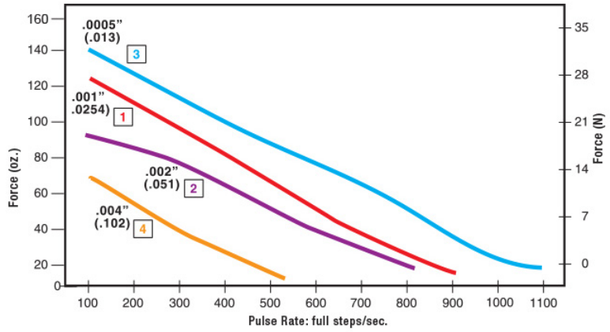
– L/R Drive
– Bipolar
– 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



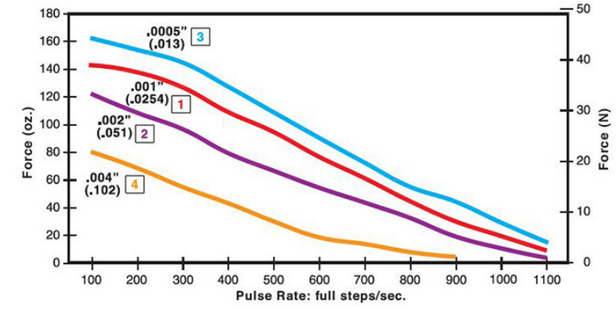
FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 25% Duty Cycle



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

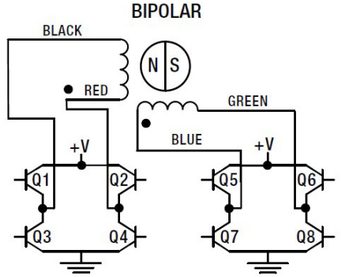
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack Number Codes when Ordering

E	19	5	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** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –1005 = captive 13mm stroke with leads –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 call our Engineering Team at 203 756 7441.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

■ Can-Stack Stepper Motor Linear Actuators Options

TFE Coated Lead Screws for applications that require a permanent, dry lubricant

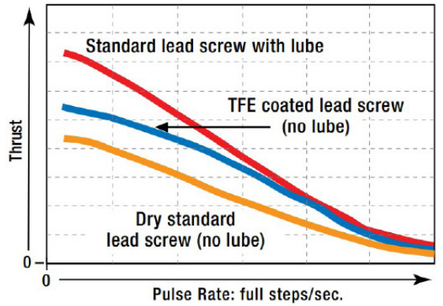
Ideal for applications where conventional oils and greases cannot be used for lead screw lubrication.

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. Available captive, non-captive and external linear.

Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.

Lead Screw Comparison: FORCE vs. PULSE RATE

– L/R Drive – 100% Duty Cycle



G4 19000 Series
External LInear

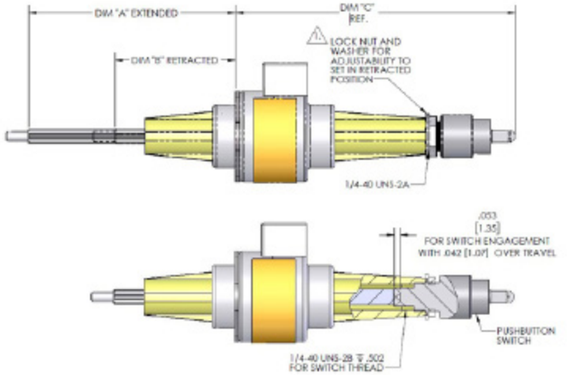
Home Position Switch monitors movements more precisely for greater control and improved quality control

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 positions. 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.

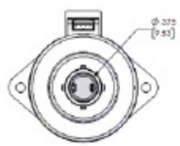
Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

When ordering motors with the home position switch, the part number should be preceded by an "S".

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)
Electrical Life	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA Tested to 60,000 make-and-break cycles at full load
Schematic	1 3 Multiple contact options available.



NOTE:
1. ADJUST LOCATION OF LOCK NUT TO ENSURE THE RETRACTED DIMENSION



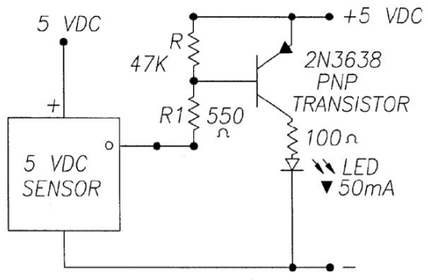
Stroke inches (mm)	Dim "A" Extended inches (mm)	Dim "B" Retracted inches (mm)	Dim "C" Ref. inches (mm)
.512 (13)	1.385 +/- .015 (35.17 +/- 0.38)	.841 +/- .025 (21.37 +/- 0.64)	2.230 +/- .025 (56.63 +/- 0.64)
.708 (18)	1.802 +/- .015 (45.77 +/- 0.38)	1.050 +/- .025 (26.67 +/- 0.64)	2.438 +/- .025 (61.93 +/- 0.64)
.984 (25)	2.353 +/- .015 (59.77 +/- 0.38)	1.325 +/- .025 (33.67 +/- 0.64)	2.714 +/- .025 (68.93 +/- 0.64)
1.22 (31)	*N/A Contact Customer Service*		

Can-Stack Stepper Motor Linear Actuators Options

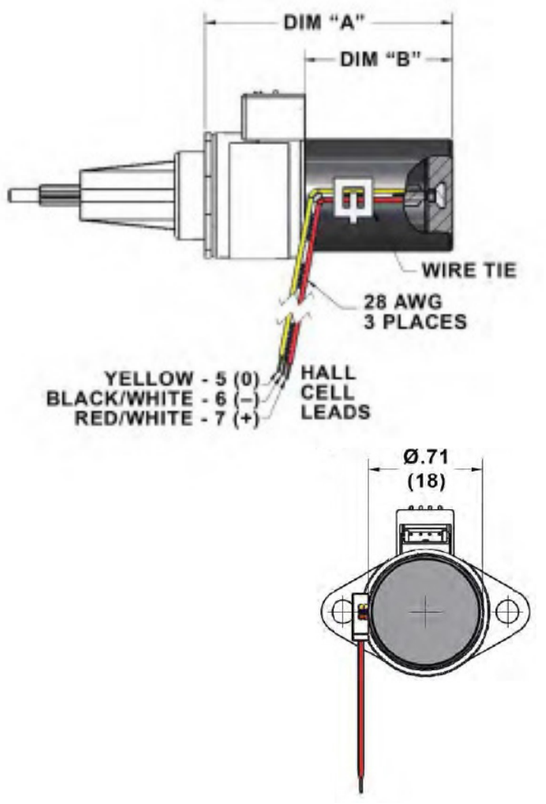
End of Stroke Proximity Sensor incorporates a hall effect device, activated by a rare earth magnet embedded in the end of the internal screw

Compact profile of the sensor allows for installation in limited space applications. Virtually unlimited cycle life. Special cabling and connectors available.

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.



Stroke inches (mm)	Dim "A" Extended inches (mm)	Dim "B" Retracted inches (mm)
.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.

G4 25000 Series
Ø 25 mm (1.0-in) Can-Stack Stepper Motor Linear Actuators

High durability and exceptional performance.
All units are built with dual ball bearings.

Generates higher force than other competitors

Multiple versions available

– Captive
– Non-Captive
– External Linear

Specifications

Ø 25 mm (1.0-in) Motor					
Part No.	Captive	2544 – – – †		2554 – – – †	
	Non-Captive	2534 – – – †		2584 – – – †	
	External Linear*	E2544 – – – †		E2554 – – – †	
Wiring		Bipolar			
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
Power Consumption		3.85 W			
Rotor Inertia		1.07 gcm²			
Insulation Class		Class B			
Weight		1.74 oz (49 g)			
Insulation Resistance		20 MΩ			

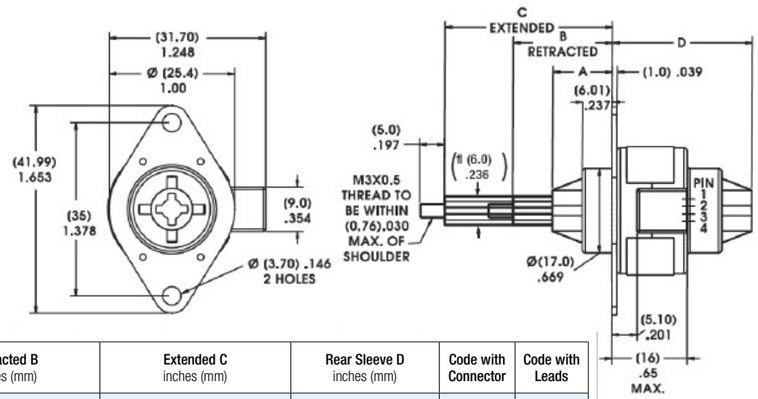
†Part numbering information on page 153.

Linear Travel / Step 15° Step Angle			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).

Captive Lead Screw

Dimensions = (mm) inches

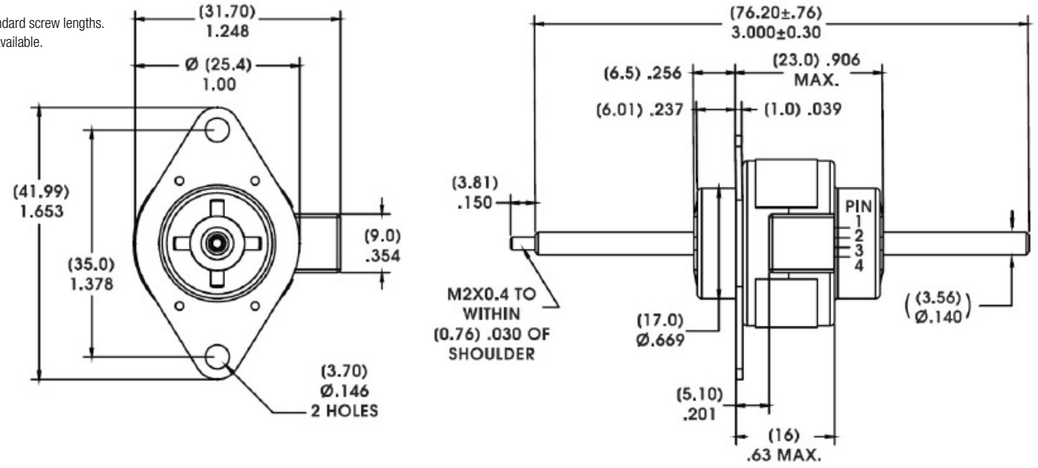


Stroke (Minimum) inches (mm)	Front Sleeve A inches (mm)	Retracted B inches (mm)	Extended C inches (mm)	Rear Sleeve D inches (mm)	Code with Connector	Code with Leads
.512 (13 mm)	.472 +/- .010 (11.99 +/- 0.25)	.787 +/- .025 (19.99 +/- 0.64)	1.329 +/- .015 (33.76 +/- 0.38)	1.128 Max. (28.65 Max.)	– 905	– 1005
.708 (18 mm)	.680 +/- .010 (17.28 +/- 0.25)	.994 +/- .025 (25.25 +/- 0.64)	1.743 +/- .015 (44.27 +/- 0.38)	1.336 Max. (33.94 Max.)	– 907	– 1007
.984 (25 mm)	.955 +/- .010 (24.26 +/- 0.25)	1.269 +/- .025 (32.23 +/- 0.64)	2.293 +/- .015 (58.24 +/- 0.38)	1.611 Max. (40.92 Max.)	– 910	– 1010
1.22 (31 mm)	1.191 +/- .010 (30.25 +/- 0.25)	1.505 +/- .025 (38.23 +/- 0.64)	2.765 +/- .015 (70.23 +/- 0.38)	1.847 Max. (46.91 Max.)	– 912	– 1012

Non-Captive Lead Screw

Dimensions = (mm) inches

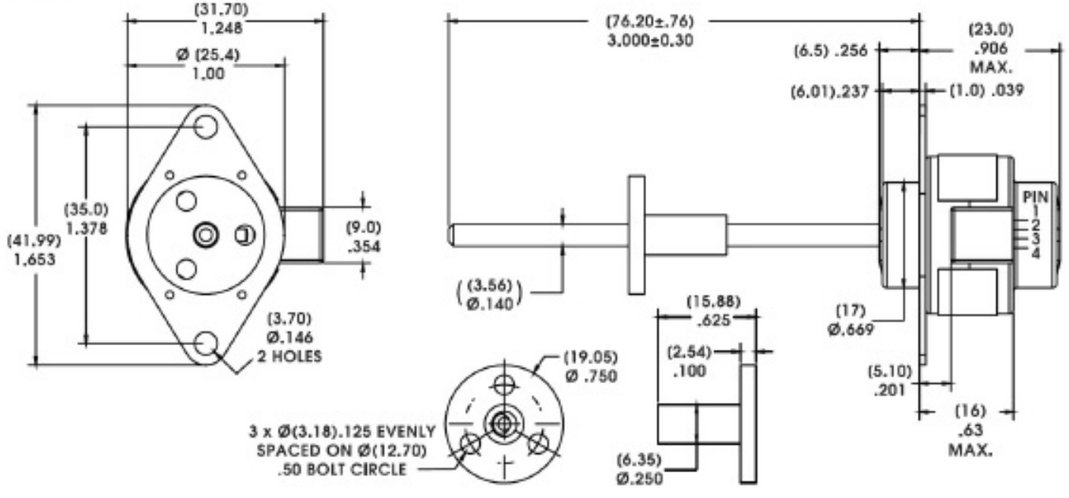
Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



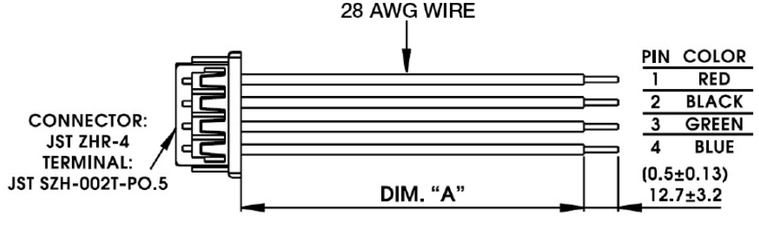
External Linear

Dimensions = (mm) inches

Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



Connector

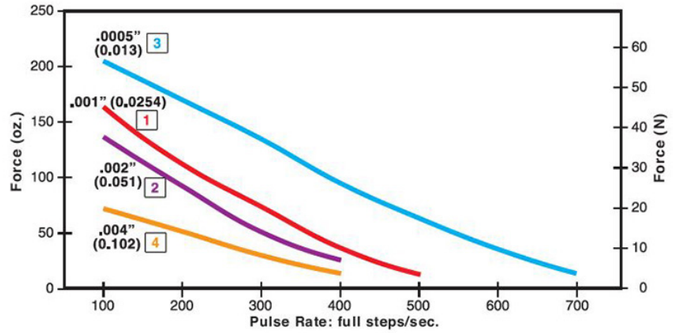


PIN	COLOR
1	RED
2	BLACK
3	GREEN
4	BLUE

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

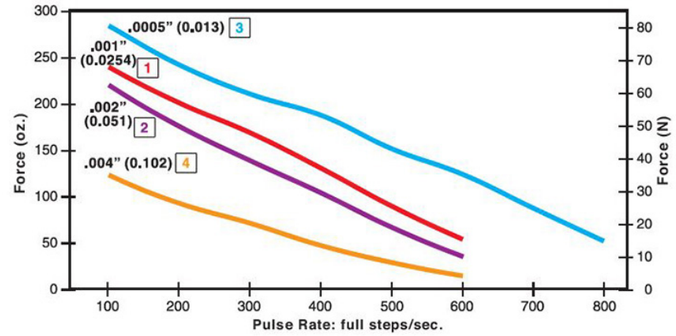
– L/R Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

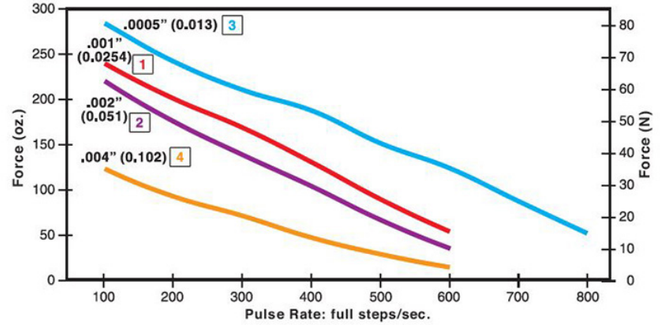
– L/R Drive
– Bipolar
– 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



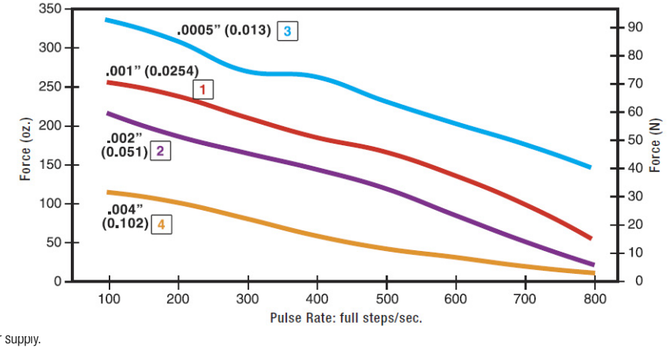
FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 25% Duty Cycle



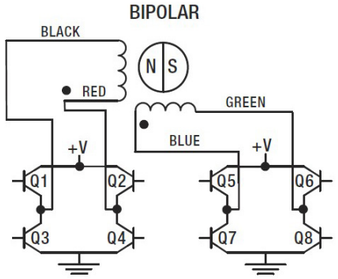
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply.
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack 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** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –1010 = captive 25mm stroke with leads –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 call our Engineering Team at 203 756 7441.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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 COW ↑

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

■ Can-Stack Stepper Motor Linear Actuators Options

TFE Coated Lead Screws for applications that require a permanent, dry lubricant

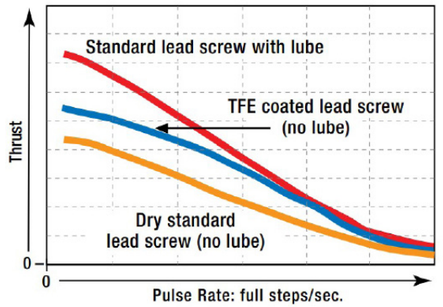
Ideal for applications where conventional oils and greases cannot be used for lead screw lubrication.

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. Available captive, non-captive and external linear.

Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.

Lead Screw Comparison: FORCE vs. PULSE RATE

– L/R Drive – 100% Duty Cycle



G4 25000 Series
External Linear

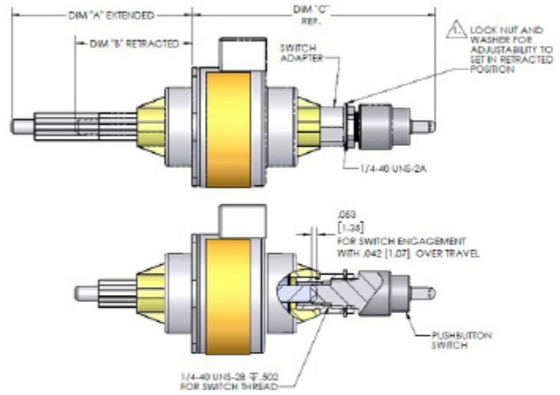
Home Position Switch monitors movements more precisely for greater control and improved quality control

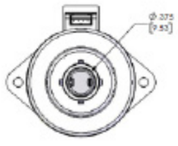
Miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home positions. Depending on your preference, contacts can be normally open or normally 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.

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

When ordering motors with the home position switch, the part number should be preceded by an "S".

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)
Electrical Life	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA Tested to 60,000 make-and-break cycles at full load
Schematic	1 3 Multiple contact options available.





NOTE:
⚠ ADJUST LOCATION OF LOCK NUT TO ENSURE THE RETRACTED DIMENSION

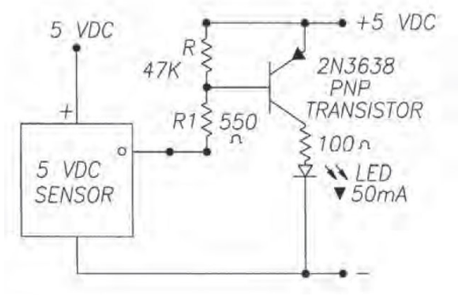
Stroke inches (mm)	Dim "A" Extended inches (mm)	Dim "B" Retracted inches (mm)	Dim "C" Ref. inches (mm)
.512 (13)	1.329 +/- .025 (33.76 +/- 0.64)	.787 +/- .025 (19.99 +/- 0.64)	2.051 +/- .025 (52.09 +/- 0.64)
.708 (18)	1.743 +/- .025 (44.27 +/- 0.64	.994 +/- .025 (25.25 +/- 0.64)	2.258 +/- .025 (57.35 +/- 0.64)
.984 (25)	2.293 +/- .025 (58.24 +/- 0.64)	1.269 +/- .025 (32.23 +/- 0.64)	2.534 +/- .025 (64.37 +/- 0.64)
1.22 (31)	2.765 +/- .025 (70.23 +/- 0.64)	1.505 +/- .025 (38.23 +/- 0.64)	2.770 +/- .025 (70.37 +/- 0.64)

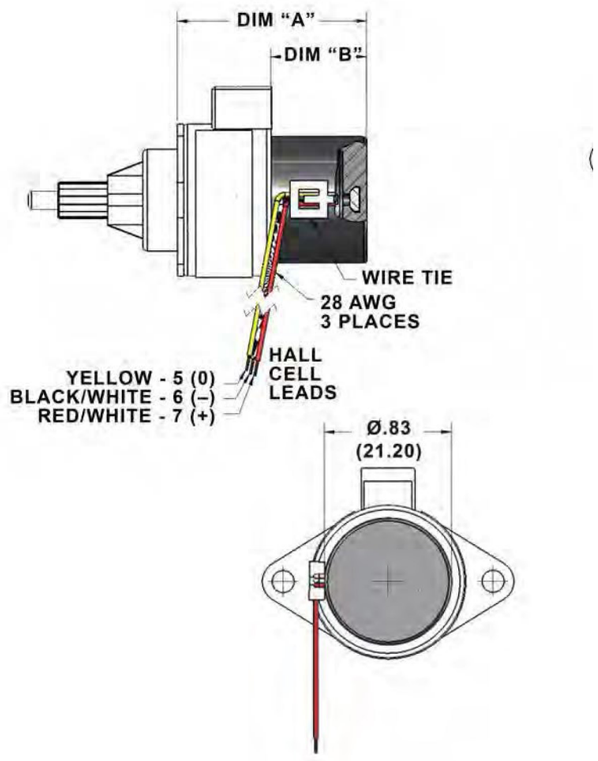
Can-Stack Stepper Motor Linear Actuators Options

End of Stroke Proximity Sensor incorporates a hall effect device, activated by a rare earth magnet embedded in the end of the internal screw

Compact profile of the sensor allows for installation in limited space applications. Virtually unlimited cycle life. Special cabling and connectors available.

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





Stroke inches (mm)	Dim "A" Extended inches (mm)	Dim "B" Retracted inches (mm)
.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)

The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

G4 25000 Series E8T Encoder

G4 25000 Series E8T Transmissive Optical Encoder is designed to provide the digital quadrature encoder feedback for high volume, compact space applications.

- Resolutions from 180 to 720
- Frequency response to 100 kHz
- High retention polarized connector
- Single-ended / Differential
- Low power consumption, 5 V @ 30 mA max

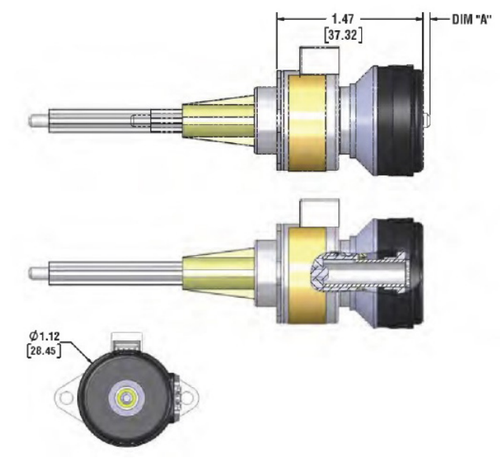
Assembly Options:

– Differential line driver with complementary outputs

– Detachable cable

– Through-hole cover

Stroke inches (mm)	Dim "A" Extended inches (mm)
.512 (13)	N/A
.708 (18)	N/A
.984 (25)	.071 (1.80)
1.22 (31)	.307 (7.80)



G4 37000 Series Ø 36 mm (1.4-in) Can-Stack Stepper Motor Linear Actuators

Outstanding durability and high performance.
The G4 Series features high energy neodymium magnets and dual ball bearings.

Exceptionally high linear force-to-size ratio, ideal for precision motion

Multiple versions available

– Captive
– Non-Captive
– External Linear

Specifications

Ø 36 mm (1.4-in) Motor					
Part No.	Captive	3744 – – – †		3754 – – – †	
	Non-Captive	3734 – – – †		3784 – – – †	
	External Linear	E3744 – – – †		E3754 – – – †	
Wiring		Bipolar			
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
Power Consumption		5.6 W			
Rotor Inertia		8.5 gcm²			
Insulation Class		Class B			
Weight		4.2 oz (120 g)			
Insulation Resistance		20 MΩ			

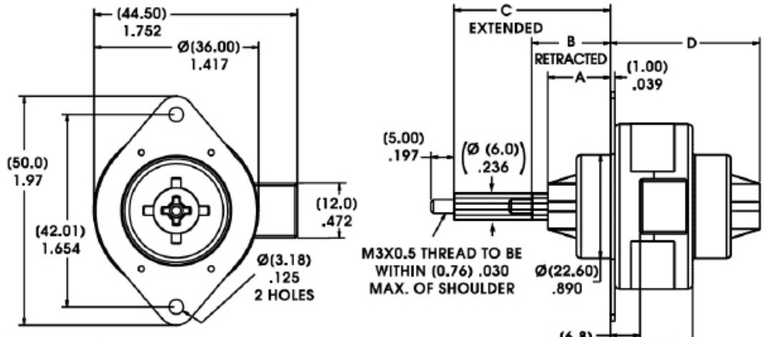
†Part numbering information on page 159.

Linear Travel / Step 15° Step Angle			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).

Captive Lead Screw

Dimensions = (mm) inches

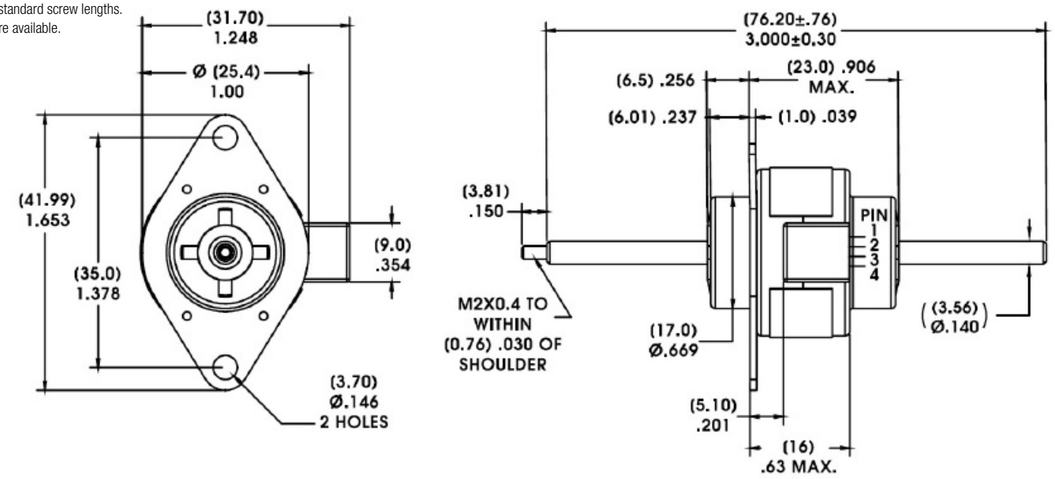


STROKE (Minimum)	FRONT SLEEVE A	RETRACTED B	EXTENDED C	REAR SLEEVE D	Suffix Code
(16.0 mm) 0.631	(13.67±0.25) .538±.010	(17.19±0.64) .677±.025	(34.24±0.38) 1.348±.015	(33.85 Max.) 1.333 Max.	– 905
(25.4 mm) 1.00	(26.37±0.25) 1.038±.010	(29.89±0.64) 1.177±.025	(56.94±0.38) 2.348±.015	(46.55 Max.) 1.833 Max.	– 910
(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

Non-Captive Lead Screw

Dimensions = (mm) inches

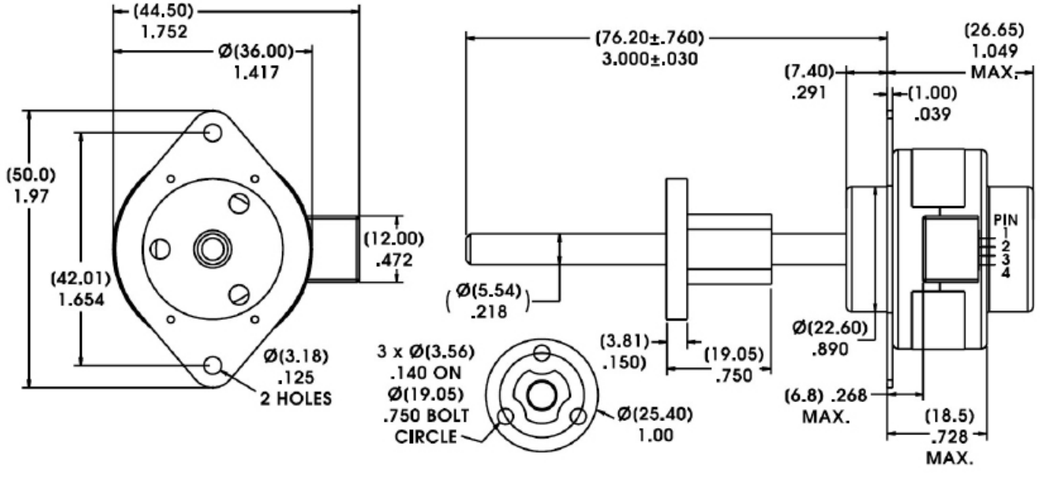
Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



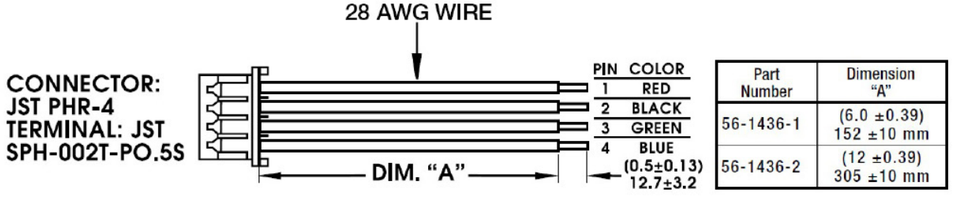
External Linear

Dimensions = (mm) inches

Up to 6.3-in (160 mm) standard screw lengths.
Longer screw lengths are available.



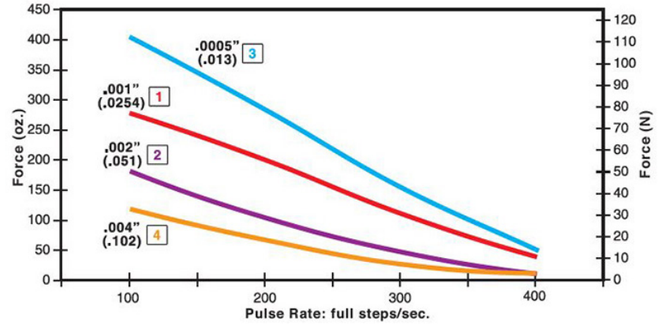
Connector



Part Number	Dimension "A"
56-1436-1	(6.0 ±0.39) 152 ±10 mm
56-1436-2	(12 ±0.39) 305 ±10 mm

FORCE vs. PULSE RATE

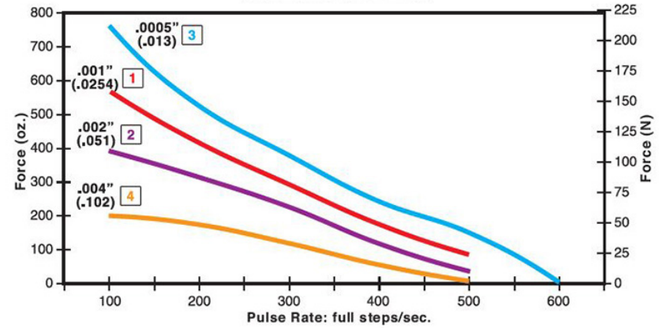
– L/R Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

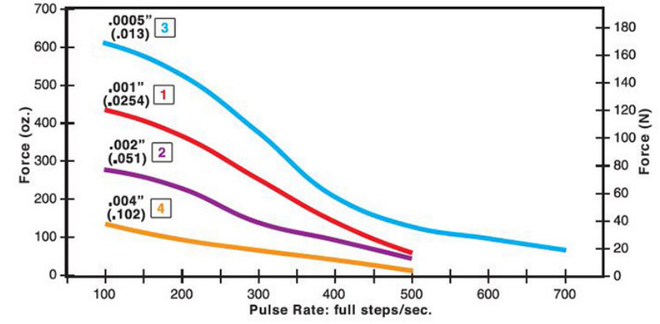
– L/R Drive
– Bipolar
– 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



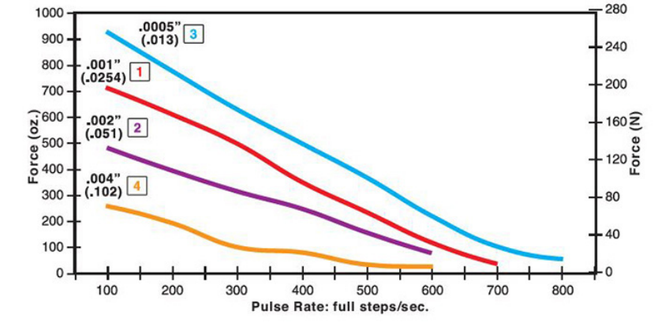
FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 25% Duty Cycle



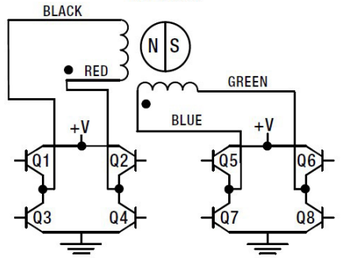
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply. Actuator bearings are rated for 75 lbs.
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack Number Codes when Ordering

E	37	4	4	2	—	05	—	1015
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** **37 = 37000** (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** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –1015 = captive 38.1mm stroke with leads –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 call our Engineering Team at 203 756 7441.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

■ Can-Stack Stepper Motor Linear Actuators Options

TFE Coated Lead Screws for applications that require a permanent, dry lubricant

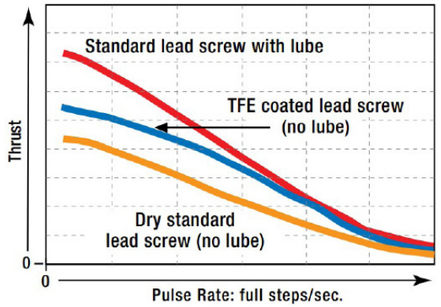
Ideal for applications where conventional oils and greases cannot be used for lead screw lubrication.

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. Available captive, non-captive and external linear.

Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.

Lead Screw Comparison: FORCE vs. PULSE RATE

– L/R Drive – 100% Duty Cycle



G4 37000 Series, External Linear

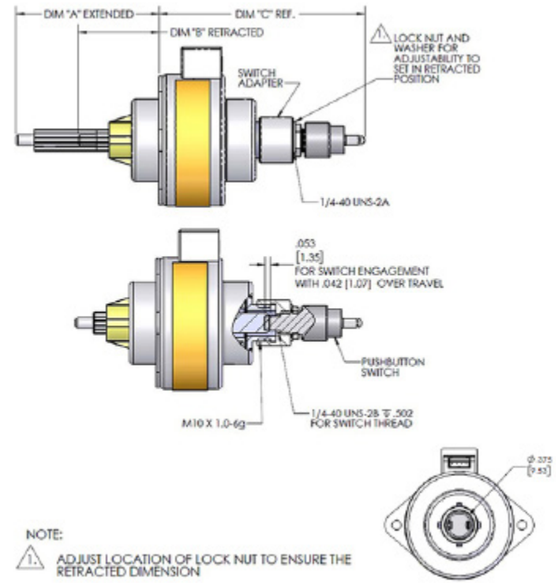
Home Position Switch monitors movements more precisely for greater control and improved quality control

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 positions. 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.

Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

When ordering motors with the home position switch, the part number should be preceded by an "S".

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)
Electrical Life	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA Tested to 60,000 make-and-break cycles at full load
Schematic	1 3 Multiple contact options available.



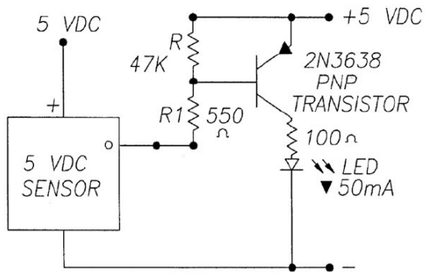
Stroke inches (mm)	Dim "A" Extended inches (mm)	Dim "B" Retracted inches (mm)	Dim "C" Ref. inches (mm)
.631 (16)	1.348 +/- .025 (34.24 +/- 0.64)	.677 +/- .025 (17.19 +/- 0.64)	2.218 +/- .025 (56.33 +/- 0.64)
1.00 (25.4)	2.348 +/- .025 (56.94 +/- 0.64)	1.177 +/- .025 (29.89 +/- 0.64)	2.718 +/- .025 (69.03 +/- 0.64)
1.50 (38.1)	3.348 +/- .025 (85.04 +/- 0.64)	1.677 +/- .025 (42.59 +/- 0.64)	3.218 +/- .025 (81.73 +/- 0.64)

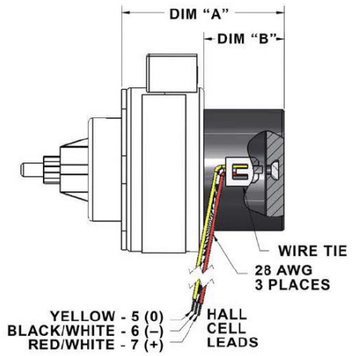
Can-Stack Stepper Motor Linear Actuators Options

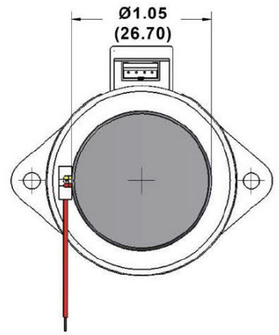
End of Stroke Proximity Sensor incorporates a hall effect device, activated by a rare earth magnet embedded in the end of the internal screw

Compact profile of the sensor allows for installation in limited space applications. Virtually unlimited cycle life. Special cabling and connectors available.

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







Stroke inches (mm)	Dim "A" inches (mm)	Dim "B" inches (mm)
.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

The sensor has virtually unlimited cycle life. Special cabling and connectors can also be provided.

G4 37000 Series E8T Encoder

G4 37000 Series E8T Transmissive Optical Encoder is designed to provide the digital quadrature encoder feedback for high volume, compact space applications.

- Resolutions from 180 to 720
- Frequency response to 100 kHz
- High retention polarized connector
- Single-ended / Differential
- Low power consumption, 5 V @ 30 mA max

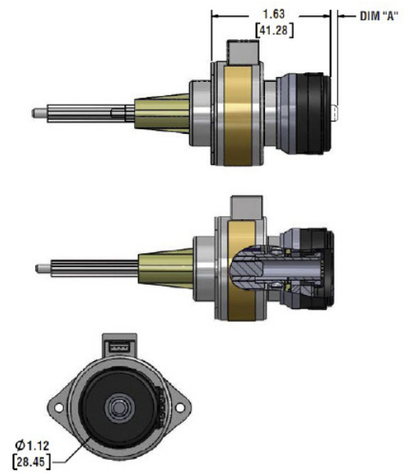
Assembly Options:

– Differential line driver with complementary outputs

– Detachable cable

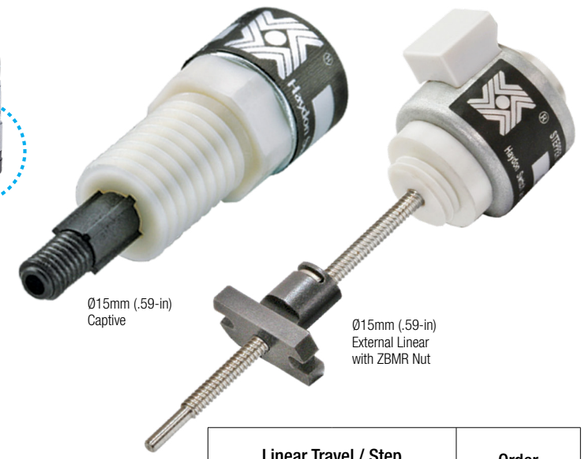
– Through-hole cover

Stroke inches (mm)	Dim "A" Extended inches (mm)
.631 (16)	N/A
1.00 (25.4)	.098 (2.50)
1.50 (38.1)	.598 (15.20)



15000 Series Ø 15 mm (.59-in) Can-Stack Stepper Motor Linear Actuators

New encoder option available! See page 182.



Delivering force of up to 8 lbs (35N) without compromising long life or cost. Lightweight models can also be micro- stepped for even finer resolution. Bi-directional travel motor. Available as connector stator or "space saving" flying leads type motor bodies.

The world's smallest commercial linear stepper motor

Multiple versions available

– Captive
– External Linear with free-wheeling BFW nut
– External Linear with ZBM anti-backlash nut*

*May not be available in all leads

Linear Travel / Step		Order Code I.D.
inches	mm	
.00059*	.015	BZ**
.00079*	.02	W**
.00098*	.025	AQ**
.00197*	.05	BH
.00394*	.10	DC

*Values truncated
**Black Ice not available

Specifications

Ø 15 mm (.59-in) Motor			
Part No.	Captive	LC1574 – – – †	
	External Linear	LE1574 – – – †	
Wiring	Bipolar		
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 gcm²		
Insulation Class	Class B (Class F available)		
Weight	LC15 0.49 oz (14 g) LE15 0.39 oz (11 g)		
Insulation Resistance	20 MΩ		
Stroke	Captive	0.5-in. (12.7 mm)	
	External Linear	up to 1.79-in. (45.4 mm)	

†Part numbering information below.

Available Standard Connectors for Series 15000				
Connector	PIN			
	1	2	3	4
JST PHR-4	Red	White	Green	Black
Molex 51021-0400	Black	Green	White	Red

Available Flying Leads	
Length	Order Code I.D. Suffix (add to end on I.D.)
12 inches (304.8 mm)	–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).

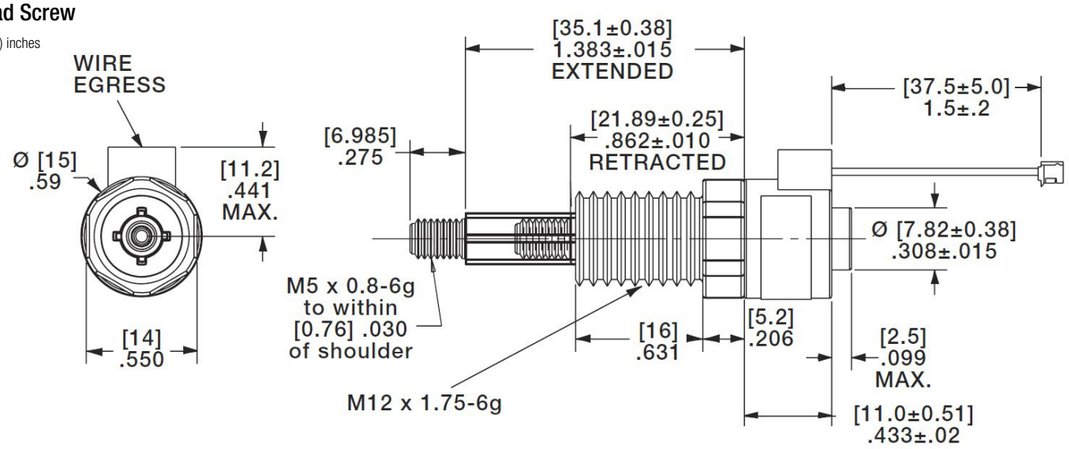
Identifying the Can-Stack Number Codes when Ordering

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)	**Step Angle** **7** = 18°	**Coils** **4** = Bipolar (4 wire)	**Code ID Resolution Travel/Step** **BZ** = .00059-in (.015) **W** = .00079-in (.02) **AQ** = .00098-in (.025) **BH** = .00197-in (.05) **DC** = .00394-in (.10)		**Voltage** **04** = 4 VDC **05** = 5 VDC **12** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –999 = 12-in leads –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 call our Engineering Team at 203 756 7441.

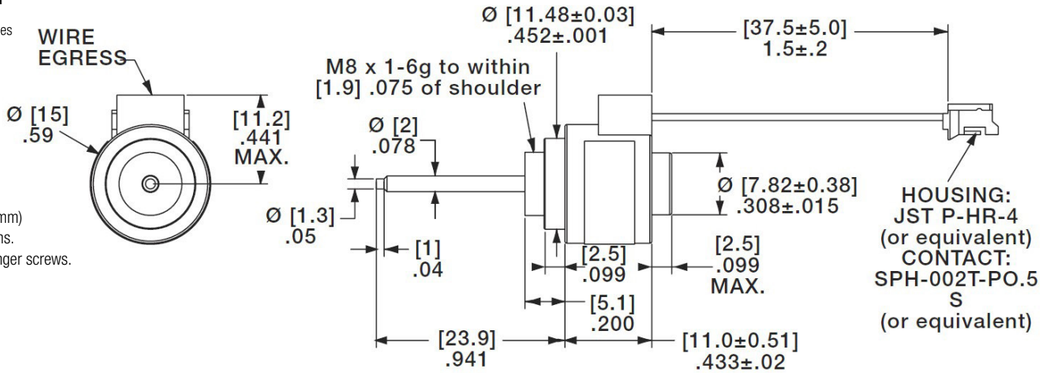
Captive Lead Screw

Dimensions = (mm) inches



External Linear

Dimensions = (mm) inches



Up to 2.36-in (59.9 mm) standard screw lengths. Consult factory for longer screws.

Stroke as shown: 0.37" (9.4mm)

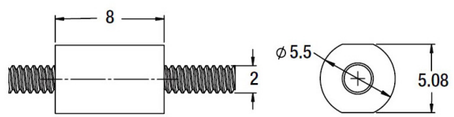
MICRO Series

Dimensions = (mm) inches

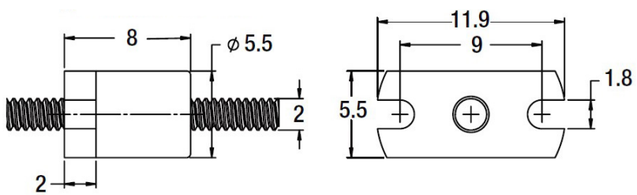
Standard nut styles. Consult the factory for custom solutions.

MICRO Series Nut Styles			
Part No.	**BFW Nut Style**	**Dynamic Load lbs (Kg)**	**Drag Torque oz-in (NM)**
BFWB	Barrel Mount	10 (4.5)	Free Wheeling
BFWR	Rectangular Flange		

Barrel Nut Style

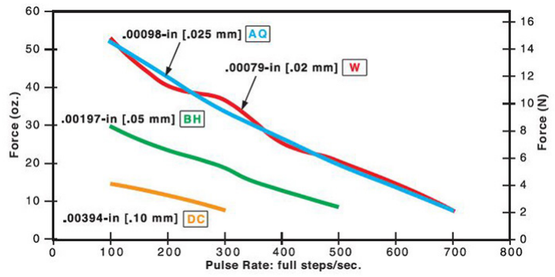


Rectangular Nut Style



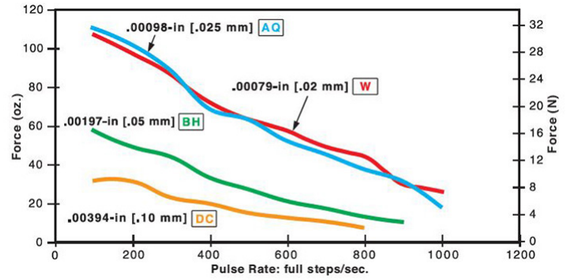
FORCE vs. PULSE RATE

– L/R Drive – Bipolar – 100% Duty Cycle



FORCE vs. PULSE RATE

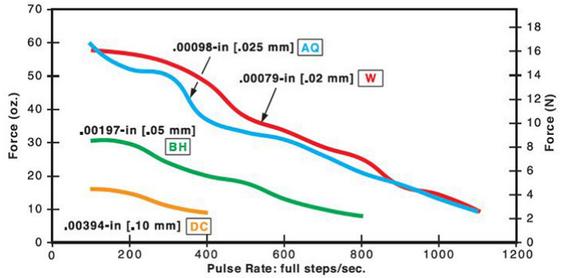
– L/R Drive – Bipolar – 25% Duty Cycle



Obtained by a special winding or by running a standard motor at double the rated current.

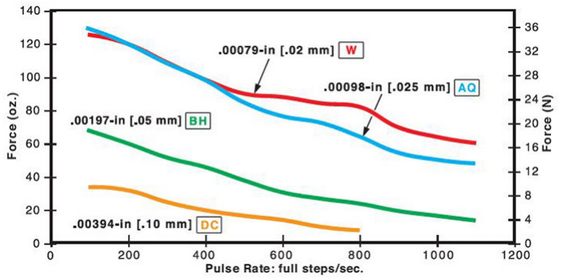
FORCE vs. PULSE RATE

– Chopper Drive – Bipolar – 100% Duty Cycle



FORCE vs. PULSE RATE

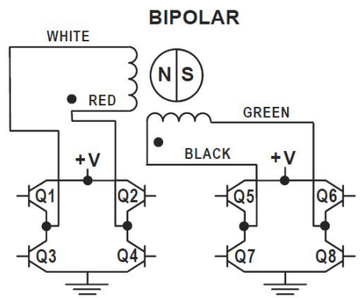
– Chopper Drive – Bipolar – 25% Duty Cycle



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.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

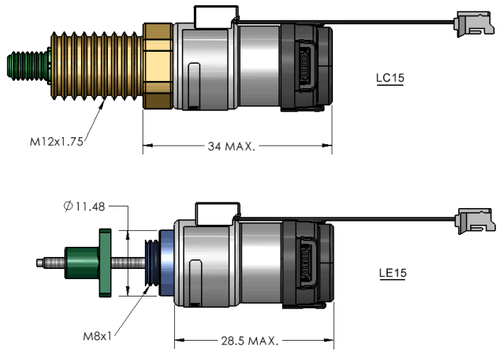
NEW! 15000 Series E16 Encoder

15000 Series E16 optical encoder is designed to provide A, B and Index digital quadrature signals for high volume, restricted space applications.

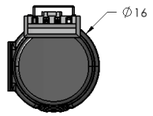
- Resolutions from 250/256 to 4000/4096
- Single-ended only
- Low power consumption, 5V @ 26mA max

Assembly Options:

– Detachable cable



Pin #	Description
1	Ground
2	Index
3	A channel
4	+5VDC power
5	B channel



Ø15mm (.59-in)
External Linear

Custom Free-Wheeling Nuts

Modified and custom free-wheeling nuts are available for the LE external linear versions. Custom geometries and materials can be combined for a wide variety of product application requirements, to help eliminate additional adjacent components as well as to deliver cost and space-saving benefits.

Z20000 Series
Ø 20 mm (.79-in) Can-Stack Stepper Motor Linear Actuators

Utilizing rare earth (neodymium) magnets, the 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.

Economical motors for high volume applications

Multiple versions available

– Captive
– Non-Captive
– External Linear

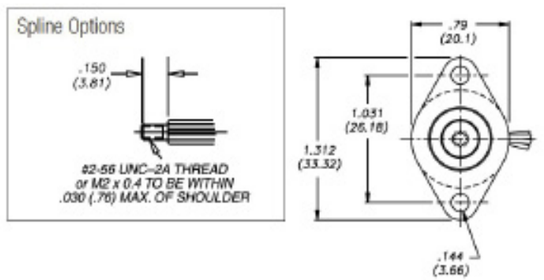
Specifications

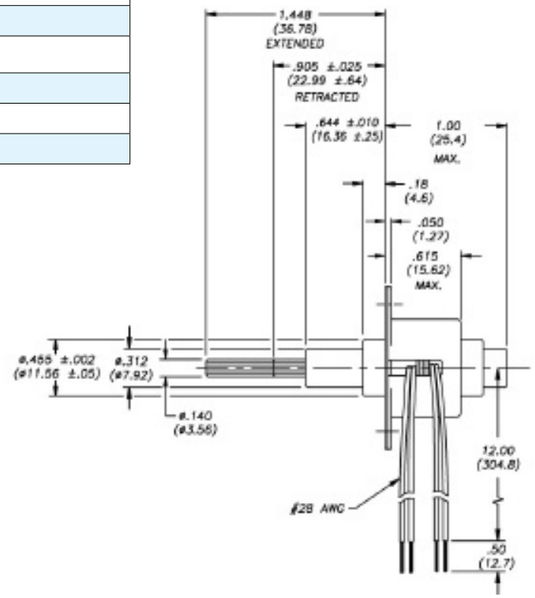
Ø 20 mm (.79-in) Z-Series Motor		
Part No.	**Captive**	Z2054 ☐ – ☐☐ – ☐☐☐ †
	Non-Captive	Z2084 ☐ – ☐☐ – ☐☐☐ †
	External Linear*	Z2054 ☐ – ☐☐ – 9 ☐☐ †*
Wiring	Bipolar	
Step angle	15°	
Winding Voltage	5 VDC	12 VDC
Current (RMS)/phase	250 mA	100 mA
Resistance/phase	20 Ω	118 Ω
Inductance/phase	5.4 mH	27 mH
Power Consumption	2.5 W	
Rotor Inertia	1.13 gcm²	
Insulation Class	Class B	
Weight	.85 oz. (24.1 g)	
Insulation Resistance	20 MΩ	

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).

†Part numbering information on page 168.
*When ordering Z-Series External Linear motors, add -900 to end of the Part Number.

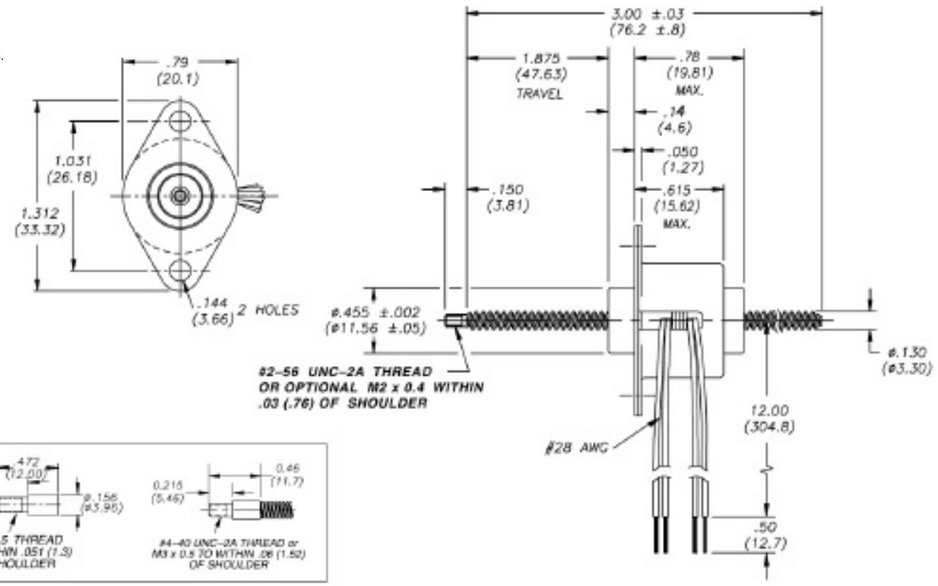




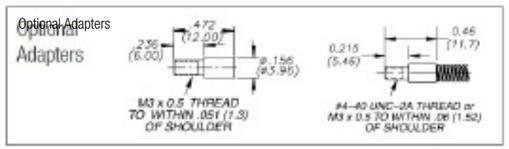
Non-Captive Lead Screw

Dimensions = (mm) inches

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



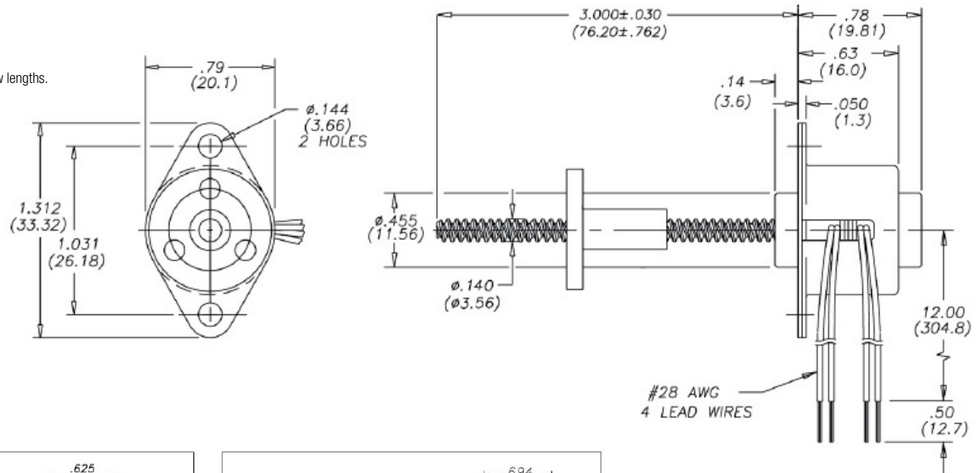
Optional Adapters

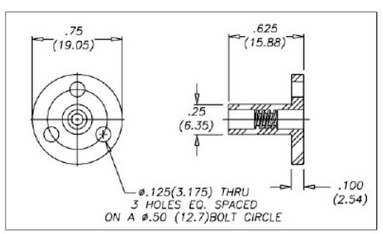


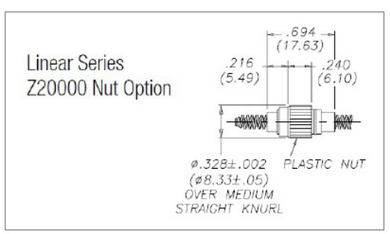
External Linear

Dimensions = (mm) inches

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

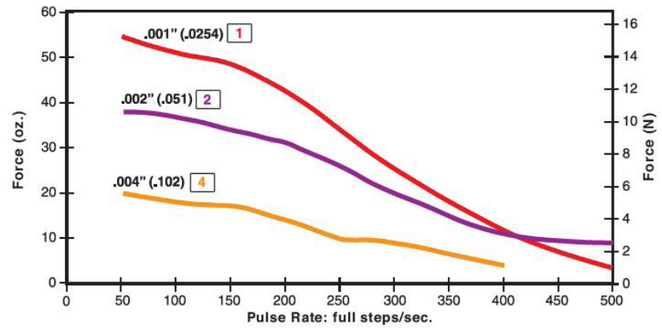






FORCE vs. PULSE RATE

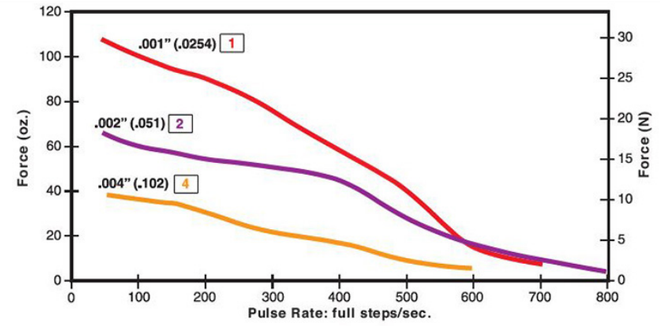
– L/R Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

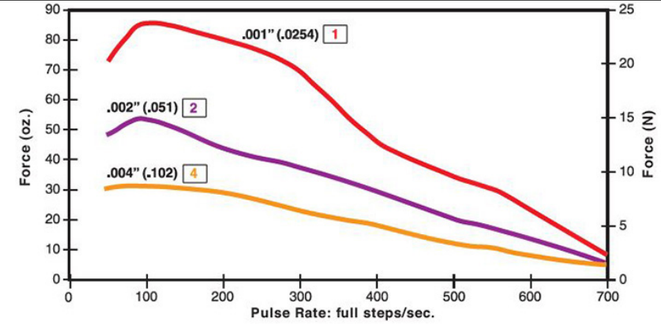
– L/R Drive
– Bipolar
– 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



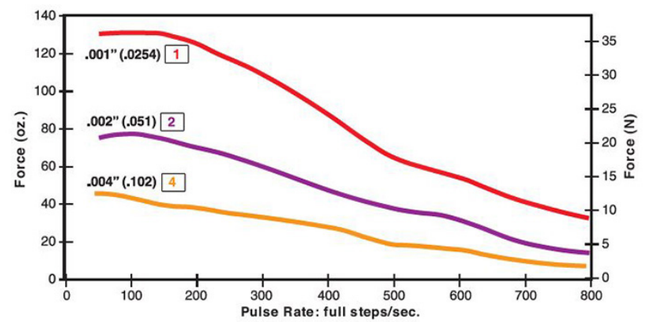
FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 25% Duty Cycle



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

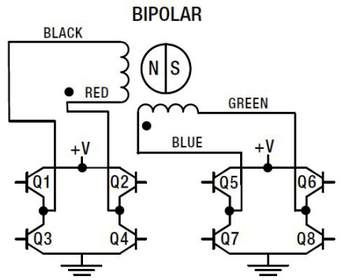
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack Number Codes when Ordering

Z	20	5	4	2	—	05	—	900
Prefix **Z** = Series Code	**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** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –900 used to code Z-Series external linear –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 call our Engineering Team at 203 756 7441.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

■ **Can-Stack Stepper Motor Linear Actuators Options**

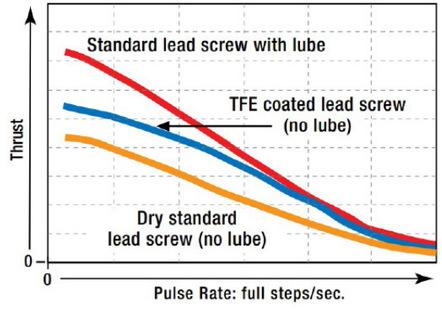
TFE Coated Lead Screws for applications that require a permanent, dry lubricant

Ideal for applications where conventional oils and greases cannot be used for lead screw lubrication.

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. Available captive, non-captive and external linear.

Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.

Lead Screw Comparison: FORCE vs. PULSE RATE – L/R Drive – 100% Duty Cycle



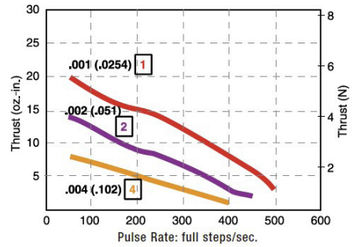
Z20000 Series
Non-Captive

■ **Can-Stack Stepper Motor Linear Actuators Options**

Specially Engineered Can-Stack Linear Actuators for high temperature applications

Stepping motors specially designed for high temperature environments.

Materials meeting class F temperature ratings are used in construction. Specialized components include high temperature bobbins, coils, lead wires, lubricant and adhesives.



Home Position Switch monitors movements more precisely for greater control and improved quality control

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 positions. 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.

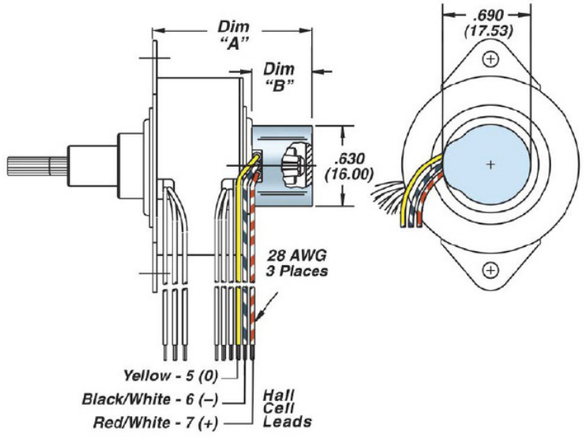
Activation force of 10 oz (2.78 N) required therefore may not be appropriate for smaller can-stack actuators.

When ordering motors with the home position switch, the part number should be preceded by an "S".

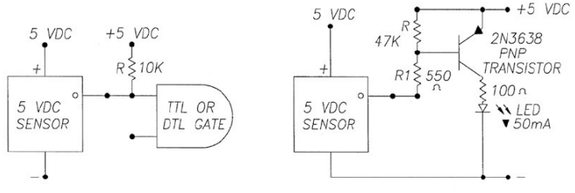
Specifications	
Contact Ratings (Standard)	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature	-30°C to +55°C (-22°F to 131°F)
Electrical Life	< 20 milliohms typ. initial at 2 - 4 V DC, 100 mA Tested to 60,000 make-and-break cycles at full load
Schematic	1 3 Multiple contact options available.

End of Stroke Proximity Sensor incorporates a hall effect device, activated by a rare earth magnet embedded in the end of the internal screw

Compact profile of the sensor allows for installation in limited space applications. Virtually unlimited cycle life. Special cabling and connectors available.

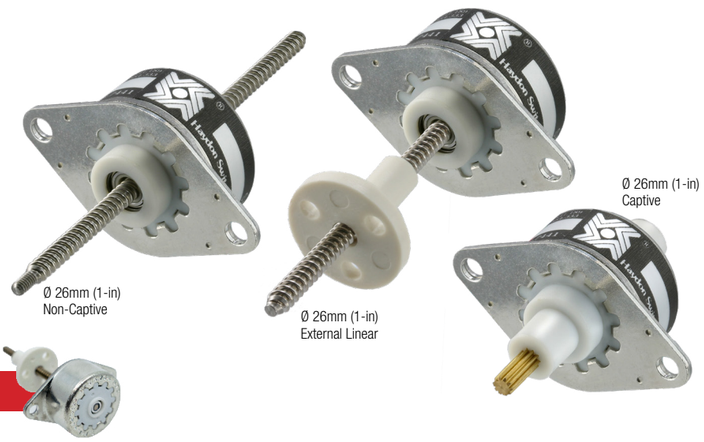


Specifications		
Supply Voltage (VDC)		3.8 min. to 24 max.
Current Consumption		10 mA max.
Output Voltage (operated)		0.15 typ., 0.40 max. Sinking 20 mA max.
Output Current		20 mA max.
Output Leakage Current (released)		10µA max. @ Vout = 24 VDC; Vcc = 24 VDC
Output Switching Time	Rise, 10 to 90%	.05 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.

Z26000 Series
Ø 26 mm (1-in) Can-Stack Stepper Motor Linear Actuators



Designed to accommodate high volume applications

Z26000 Series motors utilize rare earth (neodymium) magnets. Also, available in a special "earless" configuration without a mounting flange. All units are built with durable dual ball bearings.

Multiple versions available

– Captive – Non-Captive – External Linear

NOW AVAILABLE! Shorter motor body option available (see page 174)

Specifications

Ø 26 mm (1-in) Z-Series Motor								
Part No.	Captive	Z2644 – – – †		Z2654 – – – †		Z2646 – – – †		Z2656 – – – †	
	Non-Captive	Z2634 – – – †		Z2684 – – – †		Z2636 – – – †		Z2686 – – – †	
	External Linear*	Z2644 – – – 9 †**		Z2654 – – – 9 †**		Z2646 – – – 9 †**		Z2656 – – – 9 †**	
Wiring		Bipolar				Unipolar*			
Step angle		7.5°		15°		7.5°		15°	
Winding Voltage		5 VDC	12 VDC	5 VDC	12 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		340 mA	140 mA	340 mA	140 mA	340 mA	140 mA	340 mA	140 mA
Resistance/phase		14.7 Ω	84 Ω	14.7 Ω	84 Ω	14.7 Ω	84 Ω	14.7 Ω	84 Ω
Inductance/phase		8.5 mH	55 mH	6.7 mH	44 mH	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 4. *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.

Linear Travel / Step 15° Step Angle			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

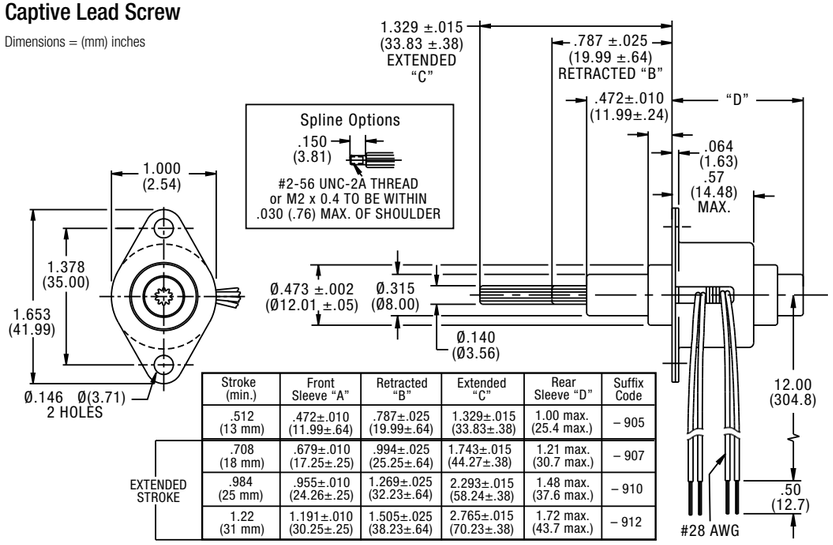
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted. Standard motors are Class B rated for maximum temperature of 130° C (266° F).

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).

18 mm (.708-in) Captive Extended
25 mm (.984-in) Captive Extended
31mm (1.22-in) Captive Extended

Captive Lead Screw

Dimensions = (mm) inches

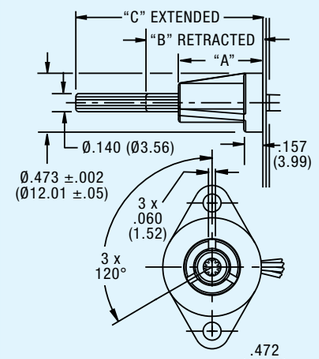


Stroke (min.)	Front Sleeve "A"	Retracted "B"	Extended "C"	Rear Sleeve "D"	Suffix Code
.512 (13 mm)	.472±.010 (11.99±.64)	.787±.025 (19.99±.64)	1.329±.015 (33.83±.38)	1.00 max. (25.4 max.)	– 905
.708 (18 mm)	.679±.010 (17.25±.25)	.994±.025 (25.25±.64)	1.743±.015 (44.27±.38)	1.21 max. (30.7 max.)	– 907
.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

EXTENDED STROKE

Extended Stroke Sleeve

Dimensions = (mm) inches



Optional Adapter: Spline is also available with optional #4-40-UNC-2A or M3 x 0.5 threaded adapter

Non-Captive Lead Screw

Dimensions = (mm) inches

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

Extended Stroke Sleeve

Dimensions = (mm) inches

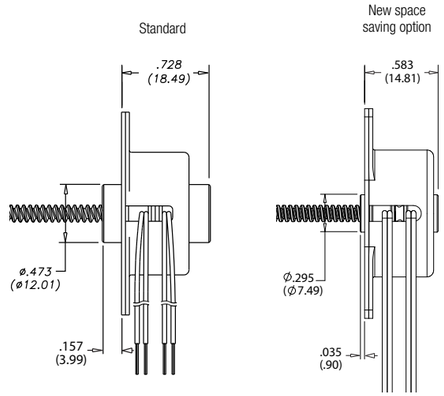
External Linear See new motor body option available on next page.

Dimensions = (mm) inches

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

Linear Series Z26000 Nut Option

Dimensions = (mm) inches



NOW AVAILABLE! Shorter External Linear Option

Designed to accommodate applications with space limitations

The Z26000 series now offers both the .728 and .583 motor body lengths with all existing Z26 motor advantages, including cost competitiveness and availability of customizations like rare earth magnets and earless options.

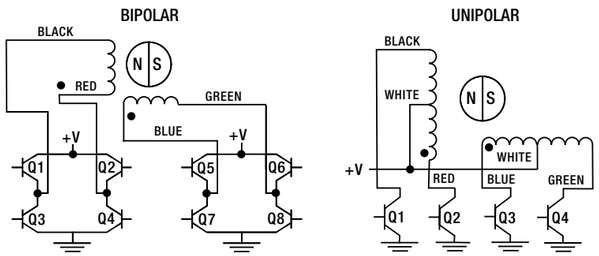
When ordering, the shorter motor option can be referenced using the last three suffix digits (-XXX).

Identifying the Can-Stack Number Codes when Ordering

Z	26	4	4	2	—	05	—	900
Prefix **Z** = Series Code	**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** = 12 VDC Custom V available		**Suffix** **Stroke** Example: –900 used to code Z-Series external linear –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 call our Engineering Team at 203 756 7441.

Can-Stacks: **Wiring**



Can-Stacks: **Stepping Sequence**

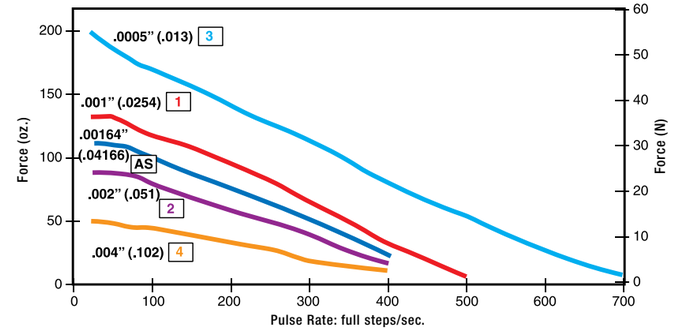
Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

EXTEND CW ⟵ ⟶ RETRACT CCW

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

FORCE vs. PULSE RATE

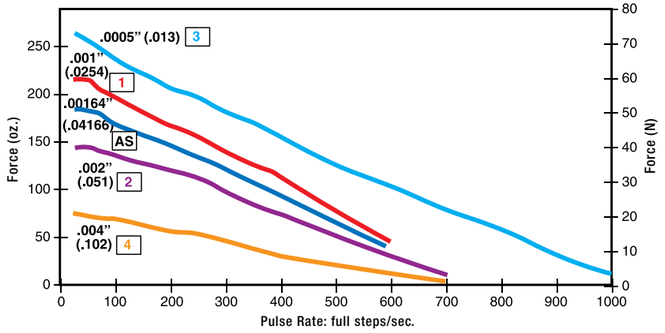
– L/R Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

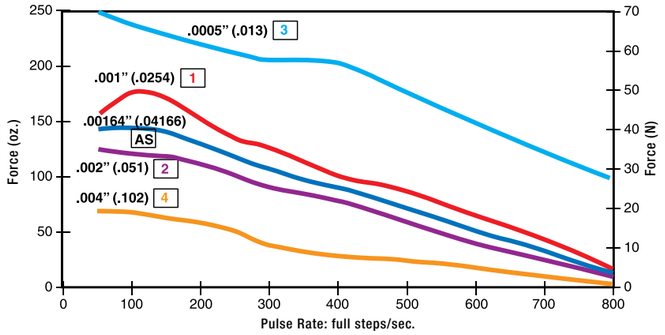
– L/R Drive
– Bipolar
– 25% Duty Cycle

Obtained by a special winding or by running a standard motor at double the rated current.



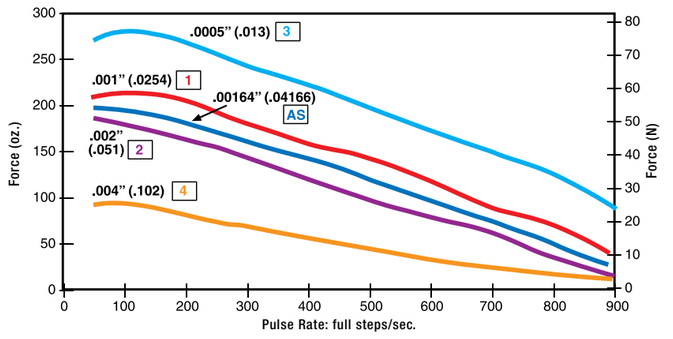
FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 100% Duty Cycle



FORCE vs. PULSE RATE

– Chopper Drive
– Bipolar
– 25% 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.

AC (Alternating Current) Synchronous 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.

Alternating Current (AC) Hybrid Linear Actuators

Stepping motors can also be run on Alternating Current (AC). 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 our stepping motors are available as 300 or 600 RPM AC synchronous motors.

Diagram 3

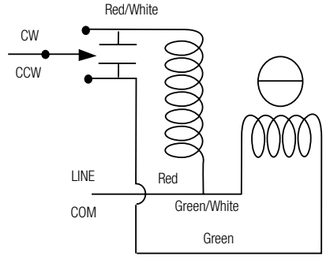
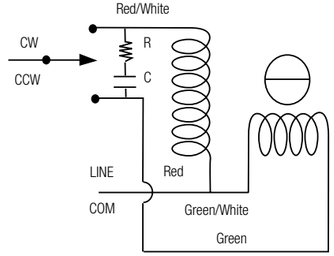


Diagram 4



Electrical Data

Series	Size	Watts	Amps	Capacitor (Mfd) @ 60 Hz	Capacitor (Mfd) @ 50 Hz	Coil Resistance (Ohms)		Connection Diagram
						Main Wind.	Cap. Wind.	
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	**Series Number Designation**	**Style**	**Coils**	**35000 and 43000 Series Code ID Resolution Travel/Step**	**57000 Series Code ID Resolution Travel/Step**	**87000 Series Code ID Resolution Travel/Step**		**Voltage**		**Suffix**
A = A Coil)	**35** = 35000 (Size 14) **43** = 43000 (Size 17) **57** = 57000 (Size 23) **87** = 87000 (Size 34)	**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)	**4** = Bipolar (4 wire)	**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)	**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)	**3** = .0005-in (.0127) **B** = .000625-in (.0158) **C** = .00125-in (.0317) **Y** = .0025-in (.0635) **Z** = .005-in (.127)		**24** = 24 VDC		–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 call our Engineering Team at 203 756 7441.

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: A35H4N-24 with a non-captive shaft becomes A35F4N-24.

Exception: A43K4U-24 (high resolution) and A43K4V-24 (High resolution), for a non-captive shaft substitute "J" in place of the "K". Example 2: A43K4U-24 with a non-captive shaft becomes A43J4U-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.

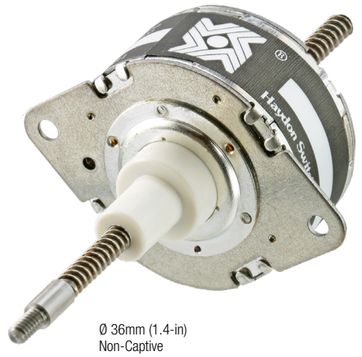
AC Can-Stack Linear Actuators

Stepping motors can also be run on Alternating Current (AC). 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 our stepping motors are available as 300 or 600 RPM AC synchronous motors.

$$\frac{\text{240 Steps per Revolution x 60 Seconds}}{\text{24 Steps per Revolution}} = \text{600 RPM}$$



Ø 36mm (1.4-in)
Non-Captive

Identifying the AC Can-Stack Part Number Codes when Ordering

A	35	5	4	2			—	24	—	800
Prefix	**Series Number Designation**	**Style**	**Coils**	**20000 and Z20000 Series Code ID Resolution Travel/Step**	**26000 Series Code ID Resolution Travel/Step**	**36000 Series Code ID Resolution Travel/Step**		**Voltage**		**Suffix**
A = A Coil **Z** = Economy Series (For 20000 and 26000 Series only)	**20 = 20000** (Ø20mm, .79-in) **26 = 26000** (Ø26mm, 1-in) **36 = 36000** (Ø36mm, 1.4-in) **46 = 46000** (Ø46mm, 1.8-in)	**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** = Bipolar (4 wire)	**1** = .001-in (.0254) **2** = .002-in (.051) **3** = .0005-in (.013) **4** = .004-in (.102) **9** = .00025-in (.00635) **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)	**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)	**1** = .001-in (.0254) **2** = .002-in (.051) **3** = .0005-in (.013) **4** = .004-in (.102)		**24** = 24 VDC		–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 call our Engineering Team at 203 756 7441.

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: A26441-24 with a non-captive shaft becomes A26341-24. Exception: When the third digit is "5" for a non-captive shaft substitute "8". Example 2: A26544-24 with a non-captive shaft becomes A26844-24.

For an external linear shaft, add the three digit suffix – 800 to the captive shaft part number. Example 3: A26441-24 with an external linear shaft becomes A26441-24 – 800. All standard motors operate at 24 Volts, represented in the part number by the suffix - 24 (A36443-24).

Specifications						
Motor Part No.	Linear Speed @ 60 Hz		Linear Speed @ 50 Hz		Maximum Force	
	(inches/sec.)	(cm/sec.)	(inches/sec.)	(cm/sec.)	(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
A26443-24	0.12	0.305	0.10	0.254	7.4	33
A26441-24	0.24	0.610	0.20	0.508	4.4	20
A26542-24	0.48	1.219	0.40	1.016	3.5	16
A26544-24	0.96	2.438	0.80	2.032	2.0	9
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).

Diagram 1

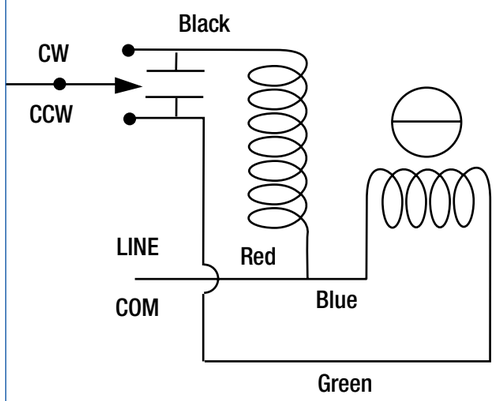
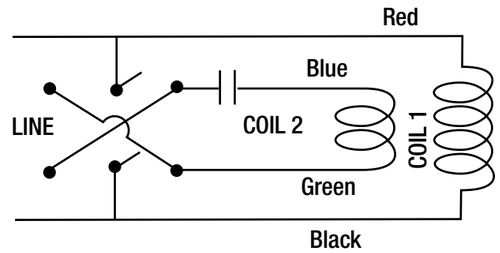


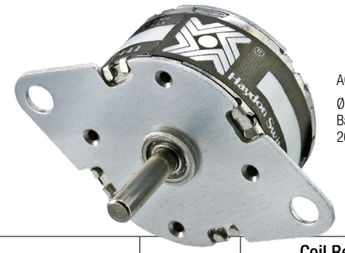
Diagram 2



NOTE: Capacitors not furnished with production units.

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.

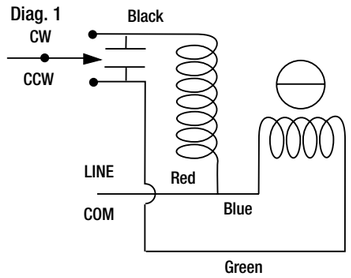


AC Synchronous
Ø 26 mm (1-in)
Ball Bearing
26000 Series

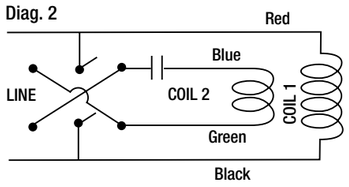
Specifications

Motor Part No.	Rotary Speed (RPMs) @		Torque		Watts	Amps	Capacitor @		Connection Diagram	Coil Resistance (Ohms)	
	60 Hz	50 Hz	oz-in	N-cm			60 Hz	50 Hz		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
A265540-24	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	600	6.5	4.6	10.0	.08	0.8	1.0	1	1450	1450

Diag. 1



Diag. 2



Capacitors not furnished (with production units).

Identifying the AC Rotary Motor Number Codes when Ordering

Z	26	5	4	0	—	24	—	700
Prefix **A** = A Coil **Z** = Economy (For 20000 and 26000 Series, only use –700 suffix to identify AC motor)	**Series Number Designation** **20 = 20000** (Ø 20 mm .79-in) **26 = 26000** (Ø 26 mm 1-in) **36 = 36000** (Ø 36 mm 1.4-in) **46 = 46000** (Ø 46 mm 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** = 120VDC Custom V for select 36000 and 46000 Series		**Suffix** –700 = indicates AC for Z Series motors –999 = Ball bearings –001 = Ball bearings for Z Series motors –000 = Sleeve bearings –XXX = Proprietary suffix assigned to a specific customer application. Identifier can apply to either a standard or custom part.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 203 756 7441.

AMETEK Haydon Kerk Pittman **Stepper Motor Linear Actuator Customization**

Haydon Kerk Pittman takes great pride in designing and developing customized solutions for your application needs.

Our Design and Development Engineers begin with our standard catalog products and build ideal solutions for your motion needs. Our factories bring your solutions into production.

Multi-axis Motion Systems

Haydon Kerk offers pre-engineered and customizable solutions for multi-axis positioning requirements, leveraging our core actuator and linear rail technologies to deliver optimized system performance. Our integrated solutions solve the motion application challenges for technology driven original equipment manufacturers (OEMs) around the globe.

Z-Theta

Designed for easy integration in OEM assemblies, the Haydon Kerk Z-Theta™ offers linear + rotary point to point motion in an compact footprint. Unlike in-house component-up designs requiring engineering, multiple vendors and complex assembly integration, Z-Theta is a modular “bolt-in” package.

ZT04 Multi-Axis System

Performance in an Ultra-Compact 2-Axis Design

Designed for easy integration in OEM assemblies, the Haydon Kerk Z-Theta™ offers linear + rotary point to point motion in a compact footprint. Unlike in-house component-up designs requiring engineering, multiple vendors and complex assembly integration, Z-Theta is a modular "bolt-in" package.

At the core of Z-Theta is the patented ScrewRail™, which combines guidance and linear transmission in a slender co-axial profile. Haydon Kerk's unique dual-motion integration with a pair of stepper motors adds rotary (theta) motion in manner that reduces motion system size by 50-80% as compared to alternative approaches, and less expensively than the equivalent components purchased separately.

The highly configurable Z-Theta provides flexibility, value, durability and performance suited for a host of lab automation, semiconductor and light factory automation applications. Performance is customized through a variety of leadscrew resolutions, available free-wheeling and anti-backlash nut selections, stepper motor configuration options, and optical encoder line counts.

Z-Theta
Mutli-Axis System

Benefits

- Compact co-axial design enables small footprint
- Easy integration into system design
- Pre-engineered modular design reduces supply chain and time to market
- Configuration options optimize performance for specific applications
- Compatible with a wide range of drive and controllers

Identifying the Z-Theta Part Number Codes when Ordering

ZT	04	A	K	—	B	A	J	A	A	—	E1	—	FY06
Prefix **ZT** = Z-Theta	**Nominal Rail Size** **04** = 1/2 in (13mm)	**Nut Style** **A** = Free-wheeling **B** = Anti-backlash	**Coating** **S** = Uncoated **K** = Kerkote®		**Motors Frame Size** **B** = Steppers, Size 23 Rotary, Size 17 Linear	**Rotary Motor** **A** = 1.8°, 3.25VDC, Bipolar coils (4 wire) **B** = 1.8°, 5VDC, Bipolar coils (4 wire)	**Rotary Motor Encoder** **J** = 12000 CPR **X** = No Encoder	**Linear Motor** **A** = 1.8°, 2.33VDC, Bipolar coils (4 wire) **B** = 1.8°, 5VDC, Bipolar coils (4 wire)	**Linear Motor Encoder** **A** = 500 CPR **C** = 1000 CPR **E** = 2000 CPR **X** = No Encoder		**Nominal Leadscrew Thread** **E1** = .050-in (1.27mm **E2** = .100-in (2.54mm) **E4**= .250-in (6.35mm) **E6**= .500-in (12.7mm) **E7**= 1.00-in (25.4mm)		**Stroke / Unique Identifier** **Xxx** = Unique identifier

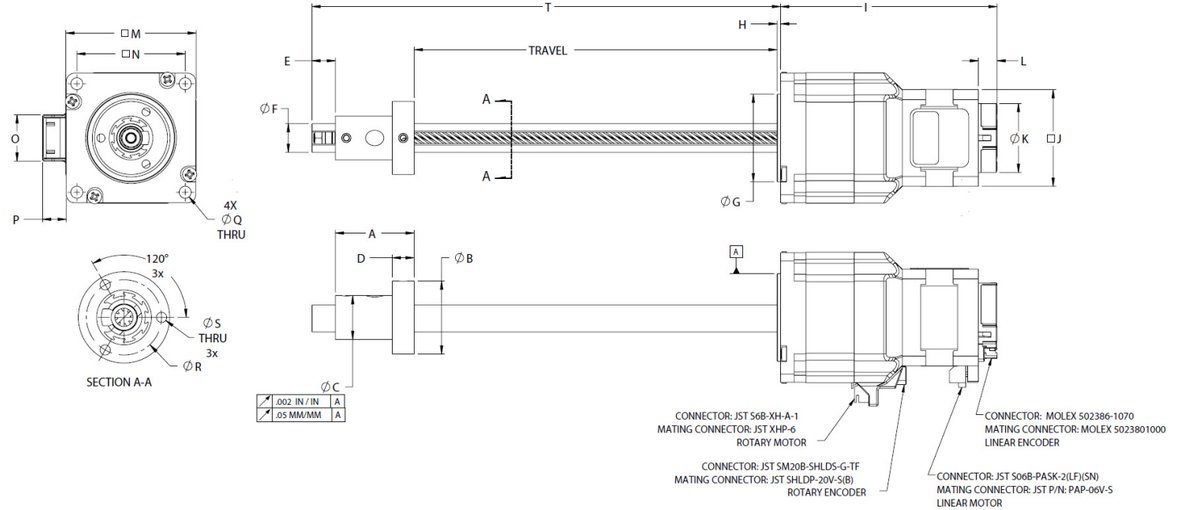
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 203 756 7441.

Mechanical Specifications

ZT04: Size 23 Rotary Motor, Size 17 Linear Motor		
Stroke Length Limit	**in [mm]**	12 [305]
Speed Limit	**in/sec [mm/s]**	6 [152]
Axial Force Limit	**lb-f [N]**	15 [67]
Load Limit (mass)	**lb [kg]**	5 [2.3]
Moment Load	**in-lb [NM]**	15 [1.7]
Torque, Theta Axis Motor	**in-lb [NM]**	3 [0.34]
Nut Length	**in [mm]**	1.4 [36]
Unit Height	**in [mm]**	Travel + 5.5 [140]
Width, Mounting Flange	**in [mm]**	2.23 [57]
Rail Material		Steel
Rail Runout	**in/in [mm/25mm]**	0.002 [0.05]
Rotary Repeatability (Open Loop)	**in [mm]**	+/-0.005 [0.13]
Rotary Resolution (@6" Radius)	**in [mm]**	+/-0.0031 [0.08]
Duty Cycle		100%

ZT04 Linear Specifications						
Lead Code		**E1**	**E2**	**E4**	**E6**	**E7**
Lead	in	0.050	0.100	0.250	0.500	1.00
	[mm]	[1.27]	[2.54]	[6.35]	[12.7]	[25.4]
Nominal Screw Diameter	in	0.25				
	[mm]	[6]				
Max Drag Torque	oz-in	2.0	TBD	3.0	4.0	5.0
	[NM]	[0.014]		[0.021]	[0.028]	[0.035]
Torque to Move Load	oz-in/lb	0.5	TBD	1.5	2.5	4.5
	[NM/Kg]	[0.004]		[0.011]	[0.018]	[0.32]
Resolution (Open Loop)	in	0.00025	0.0005	0.00125	0.0025	0.005
	[mm]	[0.00625]	[0.0127]	[0.03175]	[0.0635]	[0.127]

Dimensional Drawings



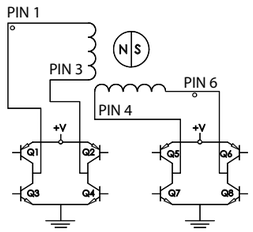
Units	A	B	C	D	E	F	G	H	I	J
in	1.35 ± .01	1.250 ± .005	.750 ± .005	.375 ± .005	.40 ± .01	.489 - .492	1.498 - 1.500	.06 ± .01	3.7 ± .1	1.65 ± .01
mm	34.29 ± 0.25	31.75 ± 0.13	19.05 ± 0.13	9.53 ± 0.13	10.16 ± 0.25	12.42 - 12.50	38.05 - 38.1	1.52 ± 0.25	93.98 ± 2.54	41.91 ± 0.25

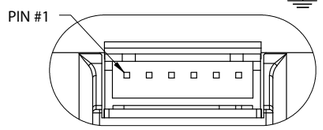
Units	K	L	M	N	O	P	Q**	R	S**	T
in	1.18 ± .02	.32 ± .02	2.23 ± .02	1.856 ± .005	.79 - .81	.41 - .43	.205 ± .005	1.030 ± .005	.140 ± .005	= Travel + E +A+H (± .040)
mm	29.97 ± 0.51	8.13 ± 0.51	56.64 ± 0.51	47.14 ± 0.13	20.07 - 20.57	10.41 - 10.92	5.21 ± 0.13	26.16 ± 0.13	3.56 ± 0.13	= Travel + E +A+H (± 1)

** Tapped holes also available

Connector Pinouts: Rotary

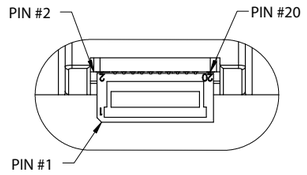
Pin #	Rotary Motor Connector Pinout
1	Phase 1 Start
2	
3	Phase 1 Finish
4	Phase 2 Finish
5	
6	Phase 2 Start





ROTARY MOTOR CONNECTOR
DETAIL VIEW

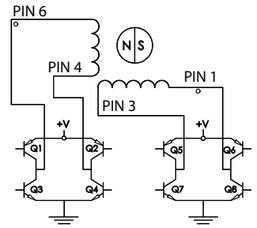
Pin #	Rotary Encoder Connector Pinout
1 - 8	Not used
9	DCOM**
10	Not used
11	VDD**
12	Chan. A+
13	Not used
14	Chan. B-
15	DGND
16	Chan. B+
17	+5V
18	Index-
19	Chan. A-
20	Index+

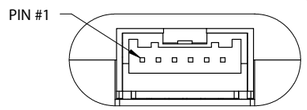


**Connects to EMI Filter Circuit

Connector Pinouts: Linear

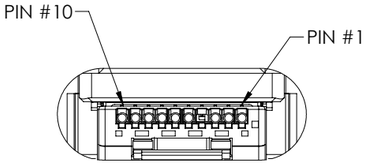
Pin #	Linear Motor Connector Pinout
1	Phase 2 Start
2	
3	Phase 2 Finish
4	Phase 1 Finish
5	
6	Phase 1 Start





LINEAR MOTOR CONNECTOR
DETAIL VIEW

Pin #	Linear Encoder Connector Pinout
1	GND
2	Vcc +5VDC
3	Index-
4	Not used
5	Chan. A-
6	Chan. A+
7	Chan. B+
8	Chan. B-
9	Index+
10	Motor Ground



Motor Specifications: Rotary

Size 23: 57 mm (2.3 inch) Hybrid Rotary Stepper Motor (1.8° Step Angle)			
Motor Ordering Code	**A**	**B**	**C**
Stack Length	Single		
Wiring	Bipolar		
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current/phase	2.0 Arms	1.3 Arms	540 mArms
Resistance/phase	1.63 Ω	3.85 Ω	22.2 Ω
Inductance/phase	3.5 mH	10.5 mH	58 mH
Holding Torque	8.5 kg-cm		
Power Consumption	13 W Total		
Insulation Class	Class B		
Insulation Resistance	20 MΩ		

†Part numbering information on page 192

Motor Specifications: Linear

Size 17: 43 mm (1.7 inch) Hybrid Rotary Stepper Motor (1.8° Step Angle)			
Motor Ordering Code	**A**	**B**	**C**
Stack Length	Single		
Wiring	Bipolar		
Winding Voltage	2.33 VDC	5 VDC	12 VDC
Current/phase	1.5 A	700 mA	290 mA
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω
Inductance/phase	1.9 mH	8.7 mH	54.0 mH
Power Consumption	7 W		
Rotor Inertia	37 gcm2		
Insulation Class	Class B (Class F available)		
Insulation Resistance	20 MΩ		

†Part numbering information on page 192

Performance Curves

SPEED vs. LINEAR FORCE (LINEAR MOTION)

– Chopper
– Bipolar
– 100% Duty Cycle

*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.

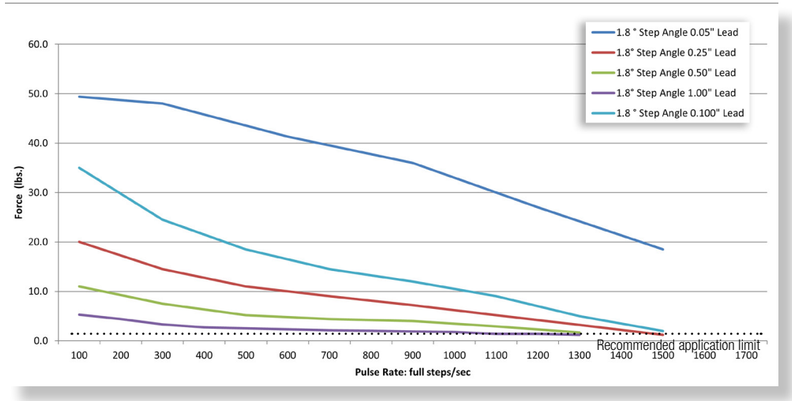
NOTE: 5 volt motor and 40 Vdc power supply (8:1 voltage ratio), X axis is Speed (Full-steps/sec), Y axis is Force (lbs)

The maximum step rate shown for each type of motor is the highest no-load start speed.

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.

Loading is on axis with nut.

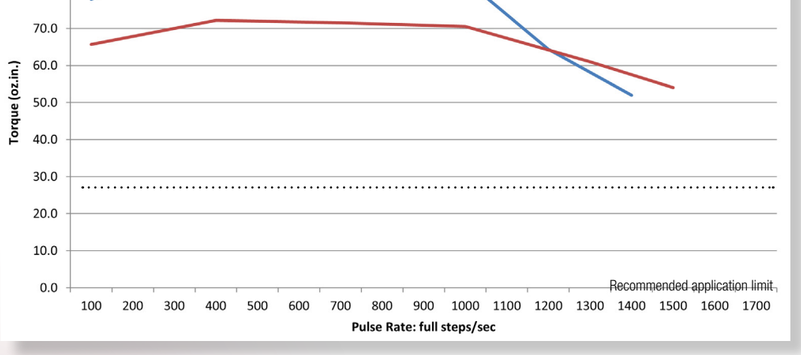


SPEED vs. PULL-OUT TORQUE (ROTARY MOTION)

– Chopper
– Bipolar
– 100% Duty Cycle

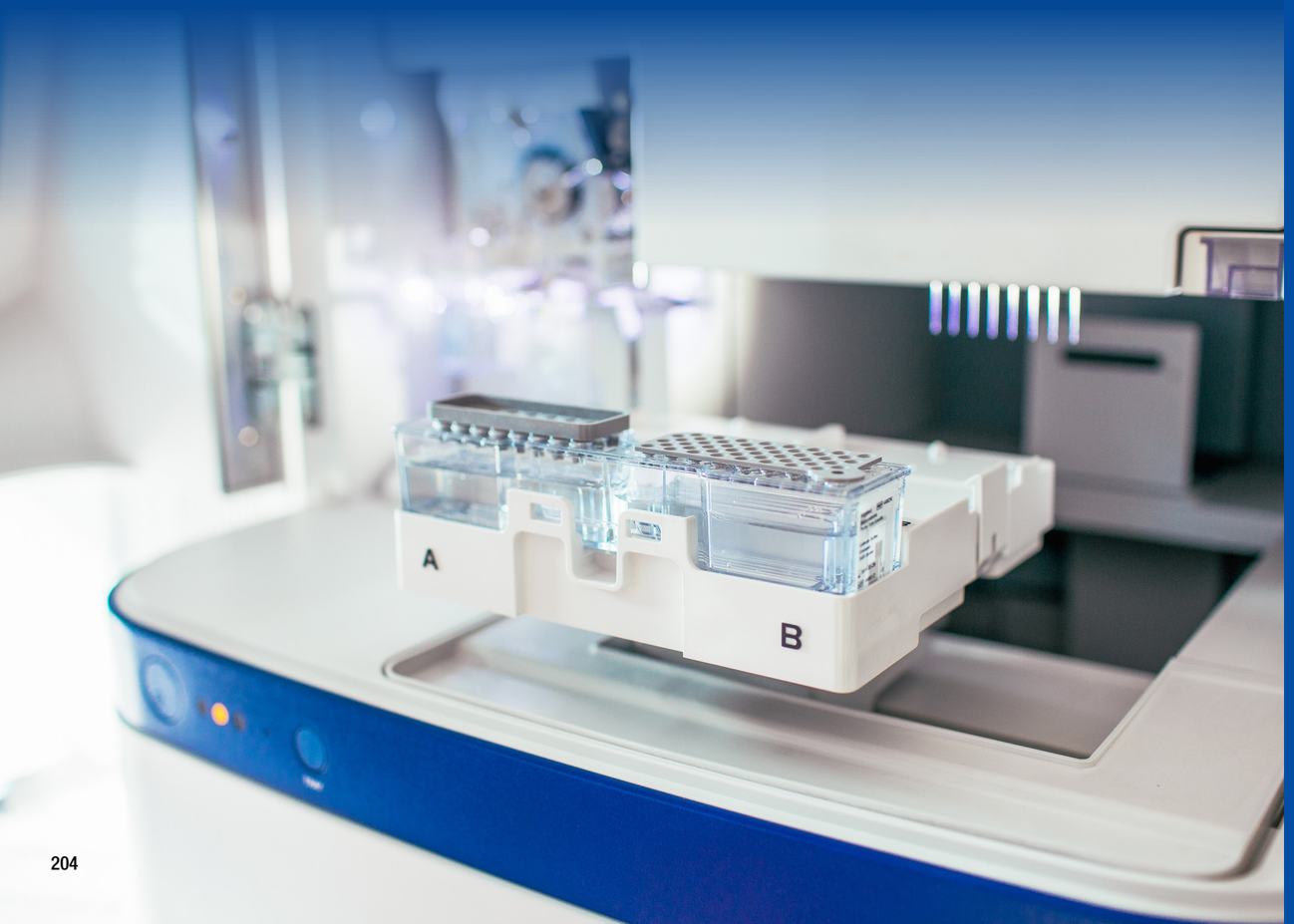
NOTE: 5 volt motor and 40 Vdc power supply (8:1 voltage ratio), X axis is Speed (Full-steps/sec), Y axis is Torque (oz-in).

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



Linear Rail Systems

Haydon Kerk offers both motorized and non-motorized linear rails, guides and splines that deliver enhanced system stability, high positional accuracy, low friction and long life for a variety of linear motion applications.



Mini Motorized Slides

The compact, low profile MiniSlide™ saves engineering time. Perfect for small lab, medical equipment and optical stage applications. Highly configurable mini slide assemblies offer 2 motor options, 9 different lead screw options, 4 different lubrication options, as well as English or Metric standards.

new

MiniSlide™
motorized with Hybrid Stepper Actuator

small size, big power

Exceedingly configurable, simple to integrate MiniSlide™ assembly is ideally suited for small lab and automation equipment.

Compact, low profile

Super efficient motor

Small step resolution with 1.8° step angle

High power density and force

Encoder or encoder-ready options

Size 8 Hybrid Stepper Linear Actuator: 21 mm (0.8-in) (1.8° Step Angle)			
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		
Rotor Inertia	1.4 gcm²		
Insulation Class	Class B (Class F available)		
Weight	1.5 oz (43 g)		
Insulation Resistance	20 MΩ		

MiniSlide is also available with 20mm Can-Stack Motor.

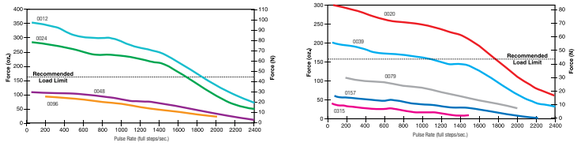
MiniSlide Load Specifications	
Design Payload (mass)	2.3kg [5 lbs]
Axial Force	45N [10 lbf]
Roll Moment*	1.13N-m [10 lbf-in]
Pitch Moment*	1.13N-m [10 lbf-in]
Yaw Moment*	0.56N-m [5 lbf-in]
Repeatability	+/-25µm [0.001 in]

*** Moment data based on 0.5° deflection**

Performance Curves

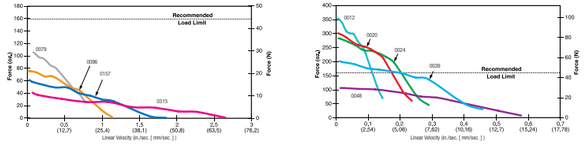
Force vs. Pulse Rate

– Chopper – 100% Duty Cycle – Bipolar – Ø.14 (3.56) Lead Screw



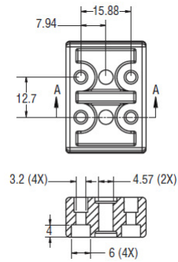
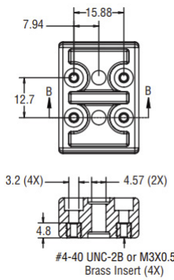
Force vs. Linear Velocity

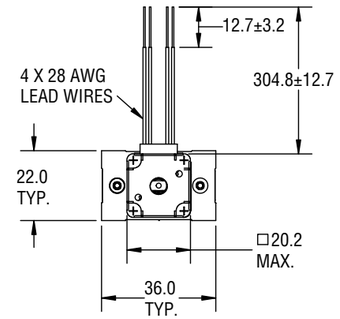
– Chopper – 100% Duty Cycle – Bipolar – Ø.14 (3.56) Lead Screw

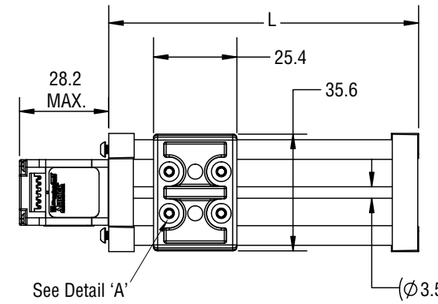


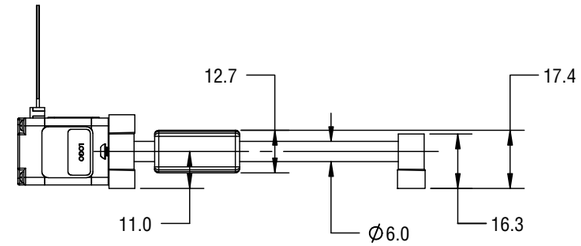
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply. Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot. With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Detail A: Carriage Mounting Options

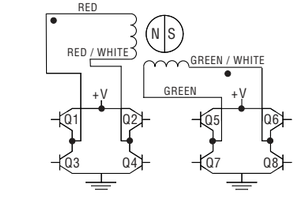
Counterbore Option	Threaded Insert Option
	







Wiring: Bipolar

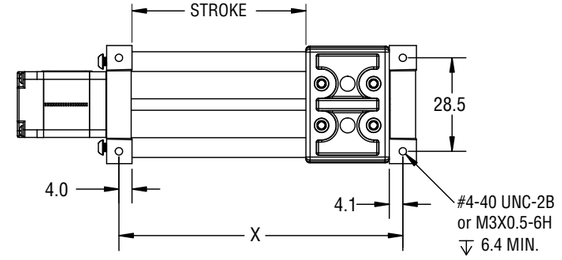


Can-Stack Motor Stepping Sequence

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.



Dimensions		
Stroke	**Rail Length "L"**	**Mounting Holes "X"**
25 mm	69.4 mm	61.5 mm
50 mm	94.4 mm	86.5 mm
75 mm	119.4 mm	111.5 mm
100 mm	144.4 mm	136.5 mm

Ordering Part Numbers for MiniSlide™ motorized with Size 8 Hybrid Stepper Actuator

MSA	02	K	—	H	0020	—	XXX
Prefix	**Frame Size**	**Coating**		**Motor**	**Nominal Thread Lead Code**		**Suffix**
MSA = Mini Slide Actuator	**02** = 1/8" Screws	**K** = TFE Kerkote **B** = TFE Black Ice **G** = Grease **S** = No Lubricant		**H** = Size 8 Hybrid Stepper Linear Actuator	0020 = 1/2mm lead 0039 = 1mm lead 0079 = 2mm lead 0157 = 4mm lead 0315 = 8mm lead 0012 = 0.012" lead 0024 = 0.024" lead 0048 = 0.048" lead 0096 = 0.096" lead		805 = 50mm stroke M3 mounting 810 = 100mm stroke M3 mounting 905 = 50mm stroke #4-40 mounting 910 = 100mm stroke #4-40 mounting XXX = Unique identifier *

NOTE: Dashes must be included in the Part Number (–) as shown above. For assistance call our Engineering Team at 203 756 7441.
* Unique Identifier can be used to indicate additional options and/or product modifications.

new

MiniSlide™ motorized with Can-Stack Stepper

small size, big power

Exceedingly configurable, simple to integrate MiniSlide™ assembly is ideally suited for small lab and automation equipment.

Compact, low profile

Economically priced

Ø 20mm (.79-in) 19000 Series Motor		
Step Angle	7.5°	
Wiring	Bipolar	
Winding Voltage	5 VDC	12 VDC
Current (RMS)/phase	350 mA	160 mA
Resistance/phase	14.0 Ω	74.5 Ω
Inductance/phase	6.24 mH	31.2 mH
Power Consumption	3.38 W	
Insulation Class	Class B	
Weight	1.24 oz (35 g)	
Insulation Resistance	20 Ω	

MiniSlide is also available with Size 8 Hybrid Stepper Linear Actuator.

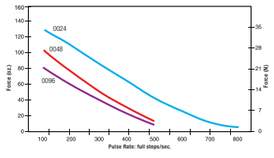
MiniSlide Load Specifications	
Design Payload (mass)	2.3kg [5 lbs]
Axial Force	45N [10 lbf]
Roll Moment*	1.13N-m [10 lbf-in]
Pitch Moment*	1.13N-m [10 lbf-in]
Yaw Moment*	0.56N-m [5 lbf-in]
Repeatability	+/-25µm [0.001 in]

*** Moment data based on 0.5° deflection**

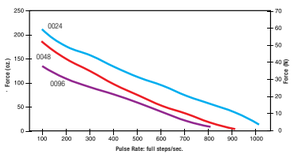
Performance Curves

Force vs. Pulse Rate – L/R Drive – Bipolar

100% Duty Cycle

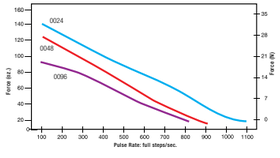


25% Duty Cycle

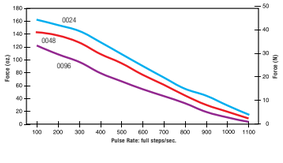


Force vs. Pulse Rate – Chopper Drive – Bipolar

100% Duty Cycle



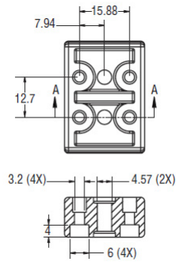
25% Duty Cycle



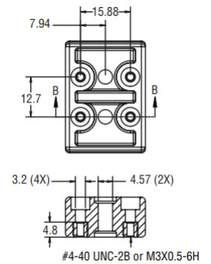
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply. Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot. With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

Detail A: Carriage Mounting Options

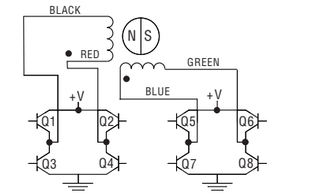
Counterbore Option



Threaded Insert Option



Wiring: Bipolar

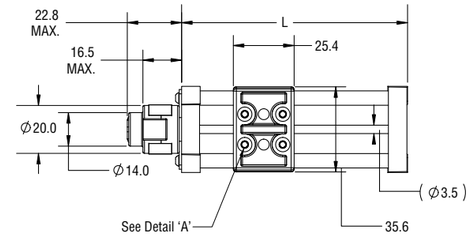


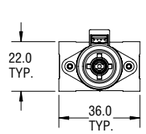
Can-Stack Motor Stepping Sequence

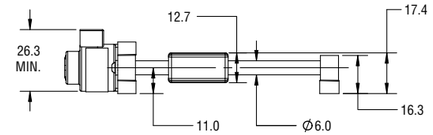
	Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
EXTEND CW	Step				
	1	ON	OFF	ON	OFF
	2	OFF	ON	ON	OFF
	3	OFF	ON	OFF	ON
	4	ON	OFF	OFF	ON
	1	ON	OFF	ON	OFF

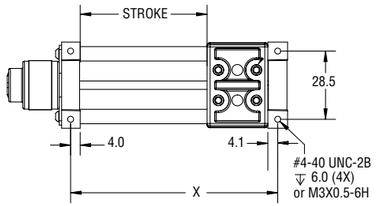
RETRACT CCW

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



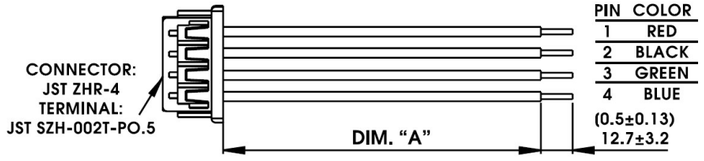






Dimensions		
Stroke	**Rail Length "L"**	**Mounting Holes "X"**
25 mm	69.4 mm	61.5 mm
50 mm	94.4 mm	86.5 mm
75 mm	119.4 mm	111.5 mm
100 mm	144.4 mm	136.5 mm

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

Ordering Part Numbers for MiniSlide™ motorized with 19000 Series Can-Stack Motor

MSA	02	K	—	C	0020	—	XXX
Prefix	Frame Size	Coating		Motor	Nominal Thread Lead Code		Suffix
MSA = Mini Slide Actuator	**02** = 1/8" Screws	**K** = TFE Kerkote **B** = TFE Black Ice **G** = Grease **S** = No Lubricant		**C** = 20mm G4 19000 Can-Stack Stepper Motor	0020 = 1/2mm lead 0039 = 1mm lead 0079 = 2mm lead 0157 = 4mm lead 0315 = 8mm lead	0012 = 0.012" lead 0024 = 0.024" lead 0048 = 0.048" lead 0096 = 0.096" lead	805 = 50mm stroke M3 mounting 810 = 100mm stroke M3 mounting 905 = 50mm stroke #4-40 mounting 910 = 100mm stroke #4-40 mounting XXX = Unique identifier *

NOTE: Dashes must be included in the Part Number (–) as shown above. For assistance call our Engineering Team at 203 756 7441.
* Unique Identifier can be used to indicate additional options and/or product modifications.

Ball Guided Rail Systems

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. The lead screw drives a machined aluminum carriage mounted to a precision stainless steel ball rail resulting in a rigid, smooth-operating motion system. Offers an optional wear-compensating anti-backlash driven carriage. Black Ice® TFE coated screw provides a permanent wear-resistant dry lubrication.

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, and simplified product development.

BGS Linear Rails with Recirculating Ball Slide

A BGS Motorized Linear Rail combines multiple technologies into a single integrated linear motion platform. The system provides excellent load capacity and is engineered for both normal and overhanding 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.

Hybrid Linear Actuator Motor	BGS04	BGS06	BGS08
	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 (600 N)	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		Lead Code	BGS04	BGS06	BGS08
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	●	●	
0.098	2.5	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	1.016	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		●	

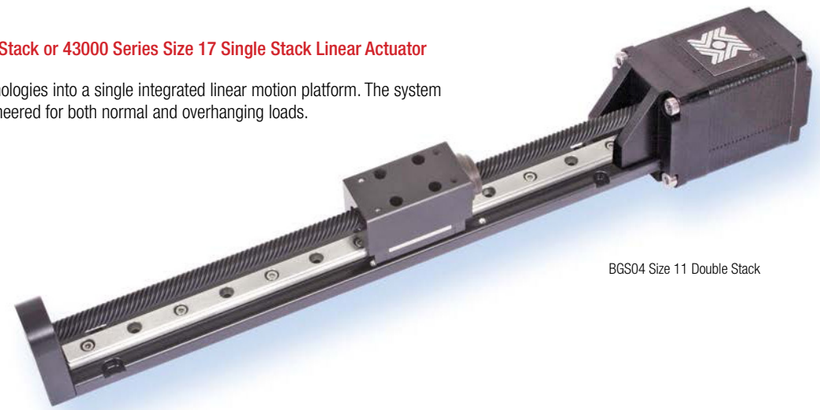
Size 11 = 28000 Series | Size 17 = 43000 Series | Size 23 = 57000 Series

*Size 17 (43000 Series) Single and Double Stack Hybrid Linear Actuator Stepper Motors (BGS06) are available with an optional programmable IDEA™ Drive. IDEA Drives are not available in the BGS08 Linear Rail.
**For vertical load information, see specifications for the Size 11(28000 Series), Size 17 (43000 Series), and Size 23 (57000 Series) motors.

BGS04™ Linear Rail

with Hybrid 28000 Series Size 11 Double Stack or 43000 Series Size 17 Single Stack Linear Actuator

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

Specifications: BGS04

BGS 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 Nm)
Pitch Moment	4.88 lbs-ft (6.60 Nm)
Yaw Moment	5.68 lbs-ft (7.70 Nm)

* Size 17 is available with an optional programmable IDEA™ Drive.

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	0400
0.394	10.00	0472
0.500	12.70	0500
0.750	19.05	0750
1.000	25.40	1000

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the BGS Part Number Codes when Ordering

BG	S	04	B	—	M	—	0025	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
BG = Ball Guide System	**S** = Standard	**04** = Max.static load 22 lbs (100 N)	**B** = TFE wear resist, dry lubricant Black Ice®		**M = Motorized** **For 43000 Series Size 17 Only** **G** = IDEA™ integrated programmable drive – USB communications **J** = IDEA™ integrated programmable drive – RS485 communications		**0025** = .025-in (.635) (see Lead Code charts above)		Suffix used to identify Size 11 or Size 17 motor – or a proprietary suffix assigned to a specifi 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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M2, M2.5, M3, M4

Double Stack

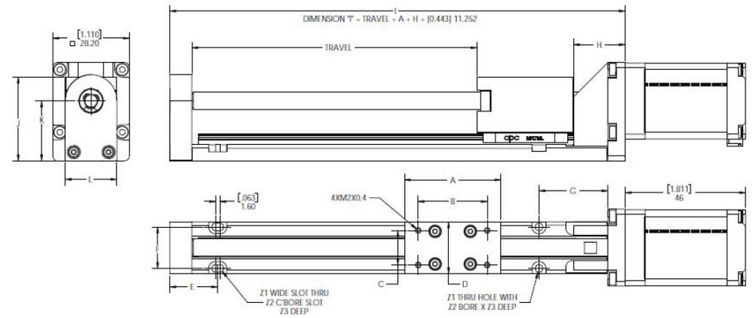
BGS04 Linear Rail with 28000 Series Size 11 Linear Actuator

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)	(1.00)	(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	35.56	25.40	12.70	19.05	17.53	15.24	25.4	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

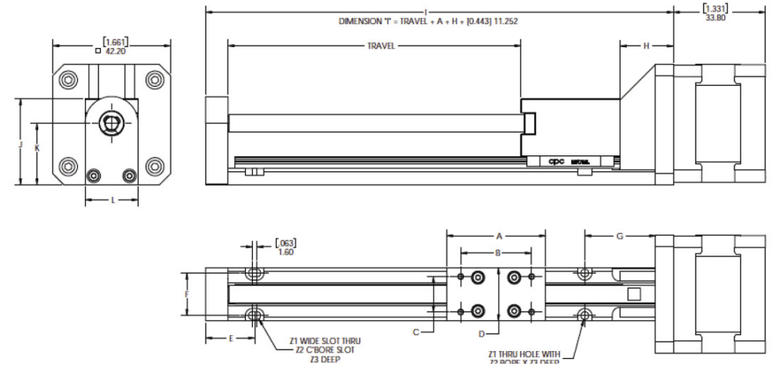


Single Stack

BGS04 Linear Rail with 43000 Series Size 17 Linear Actuator

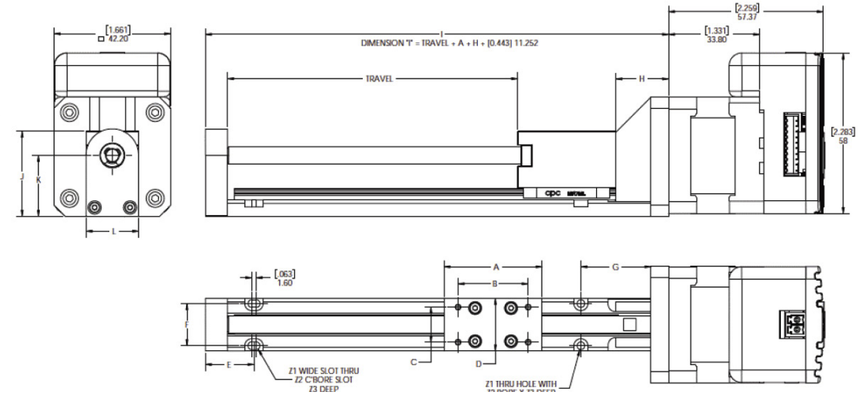
Recommended for horizontal loads up to 22 lbs (100 N)

Dimensions = (inches) mm



...with IDEA™ Drive

Dimensions = (inches) mm



Double Stack

28000 Series Size 11 Linear Actuator

Size 11 Double Stack: 28 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle)			
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 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	5.8 oz (180 g)		
Insulation Resistance	20 MΩ		

Size 11
Double Stack External Linear

Single Stack

43000 Series Size 17 Linear Actuator

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Programmable Drive	IDEA™ Drive Option Available			Not Applicable	
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				

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Size 17 External Linear

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

Size 17 External Linear
with programmable IDEA Drive

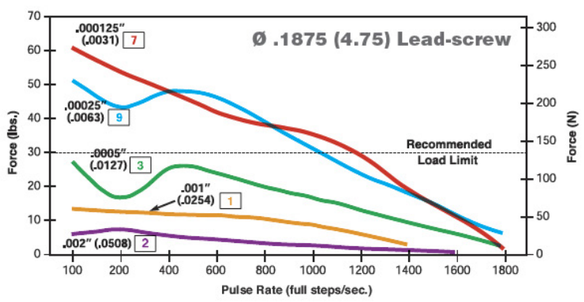
- Fully Programmable
- RoHS Compliant
- USB or RS-485 Communication
- Microstepping Capability – Full, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64
- Graphic User Interface
- Auto-population of Drive Parameters
- Programmable Acceleration/Deceleration and Current Control

For more information see the IDEA™ Drive Data Sheet

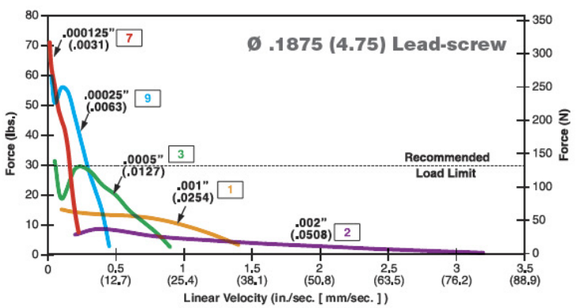
Double Stack

28000 Series Size 11 Linear Actuator

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



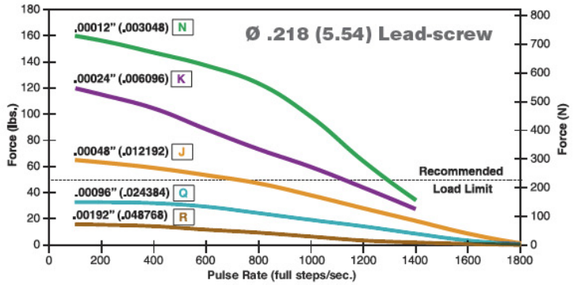
FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle

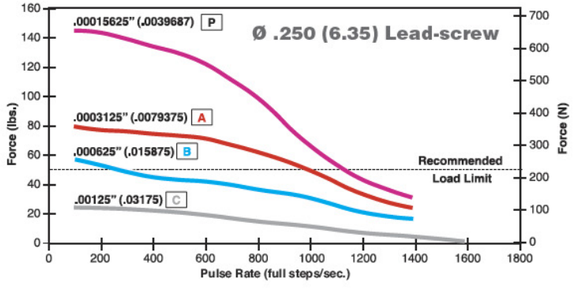


Double Stack

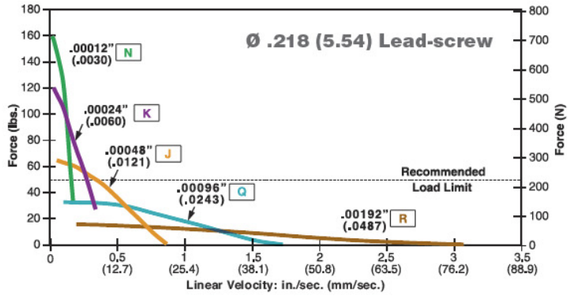
43000 Series Size 17 Linear Actuator

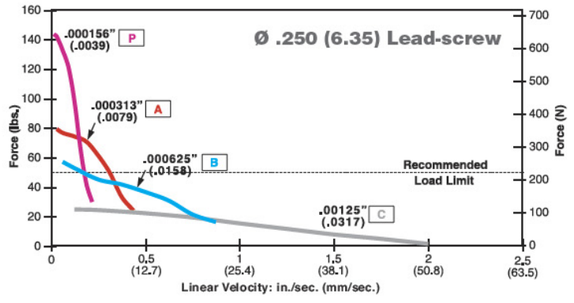
FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle





FORCE vs. LINEAR VELOCITY
– Chopper – 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.

28000 Series Size 11 and 43000 Series Size 17 Linear Actuators

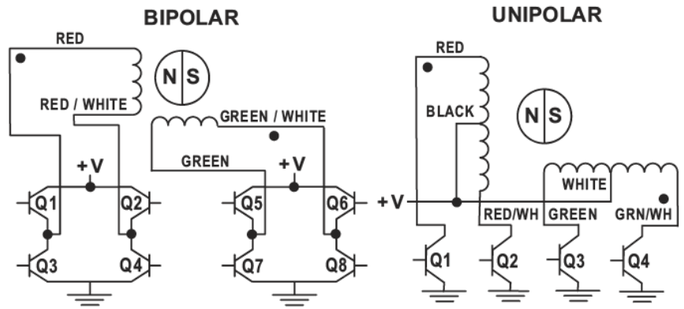
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



Size 11 28000 Series abd Size 17 43000 Series • Integrated Connectors

Hybrid Size 11 Double Stack and Size 17 Single Stack 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. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

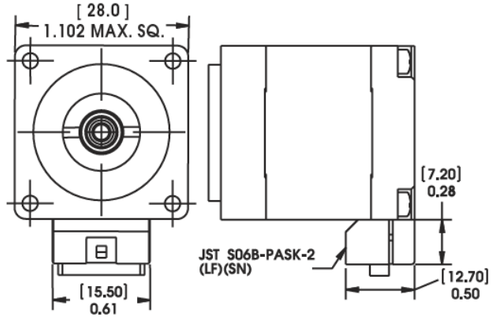
Motor Connector: JST part # S06B-PASK-2
Mating Connector: JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)
Wire to Board Connector:
JST part number SPHD-001T-P0.5

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

Dimensional Drawings

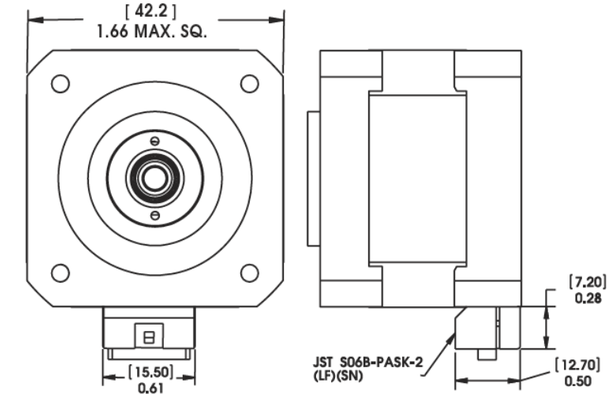
Integrated Connector with 28000 Series Size 11 Linear Actuator

Dimensions = (mm) inches



Integrated Connector with 43000 Series Size 17

Dimensions = (mm) inches

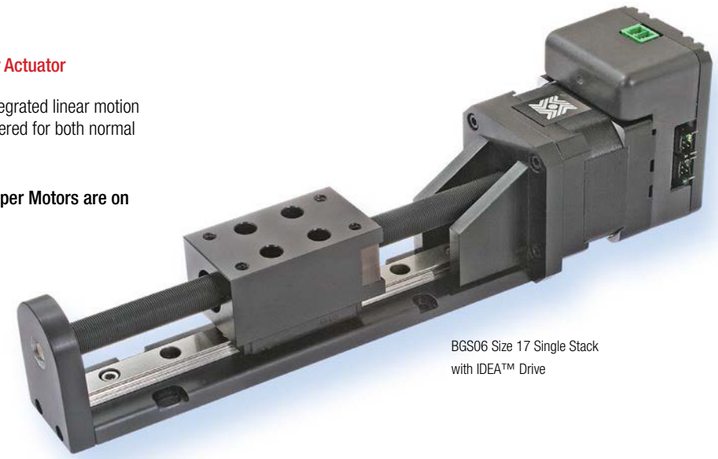


BGS06 Linear Rail

with Hybrid 43000 Series Size 17 Single or Double Stack Linear Actuator

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.

Technical specifications for Size 17 Hybrid Linear Actuator Stepper Motors are on page 3.



BGS06 Size 17 Single Stack with IDEA™ Drive

Specifications: BGS06

BGS with Hybrid Linear Actuator Motor	Size 17 Single and Double Stack*
Max. Stroke Length	24 in (610 mm)
Max. Load (horizontal)	135 lbs (600 N)
Roll Moment	11.62 lbs-ft (15.75 Nm)
Pitch Moment	7.93 lbs-ft (10.75 Nm)
Yaw Moment	9.15 lbs-ft (12.4 Nm)

* Available with an optional programmable IDEA™ Drive.

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

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the BGS Part Number Codes when Ordering

BG	S	06	B	—	G	—	0079	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
BG = Ball Guide System	**S** = Standard	**06** = Max.static load 135 lbs (600 N)	**B** = TFE wear resist, dry lubricant Black Ice®		**M** = Motorized **G** = IDEA™ integrated programmable drive – USB communications **J** = IDEA™ integrated programmable drive – RS485 communications		**0079** = .079-in (2.0) (see Lead Code charts above)		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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M3.5, M4

Single Stack

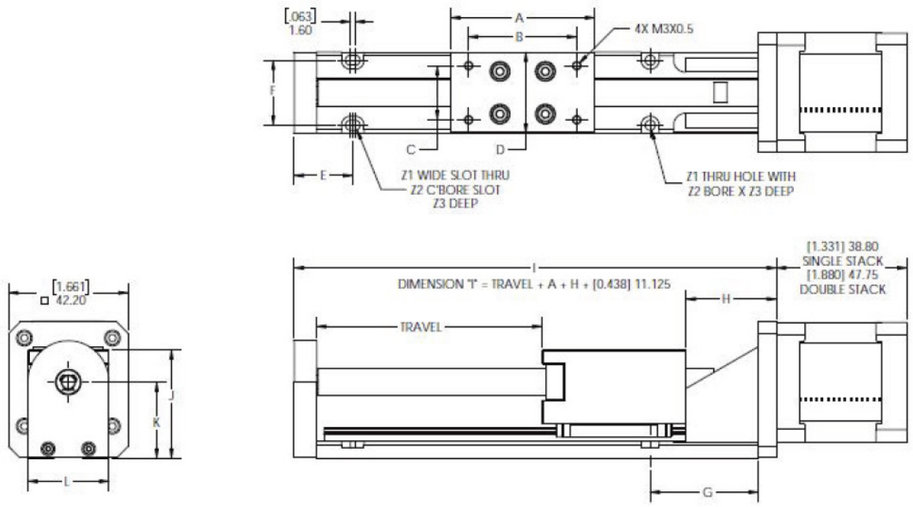
BGS06 Linear Rail with 43000 Series Size 17 Linear Actuator

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)	*	(1.5)	(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	6.3	3.3

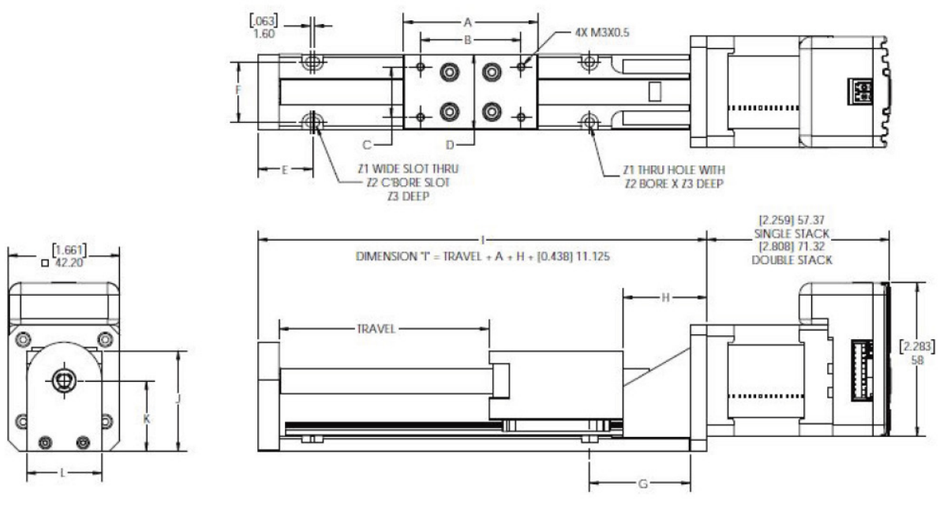
* Dimension "I" is a function of required travel distance.

Dimensions = (inches) mm



...with IDEA™ Drive

Dimensions = (inches) mm



Single Stack

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Programmable Drive	IDEA™ Drive Option Available			Not Applicable	
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				

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Size 17 External Linear

Size 17 External Linear
with programmable IDEA Drive

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

- 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

For more information see the IDEA™ Drive Data Sheet

Double Stack

Size 17 Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Programmable Drive	IDEA™ Drive Option Available		
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	13.2 W		
Rotor Inertia	78 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	12.5 oz (352 g)		
Insulation Resistance	20 MΩ		

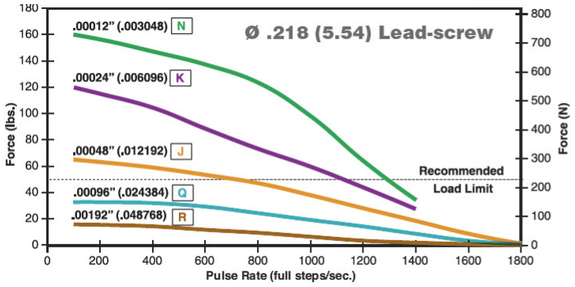
* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

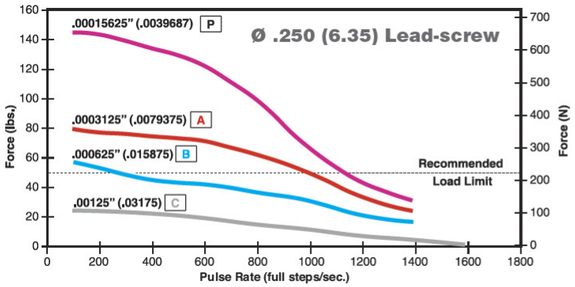
Size 17 Double Stack
External Linear

Double Stack

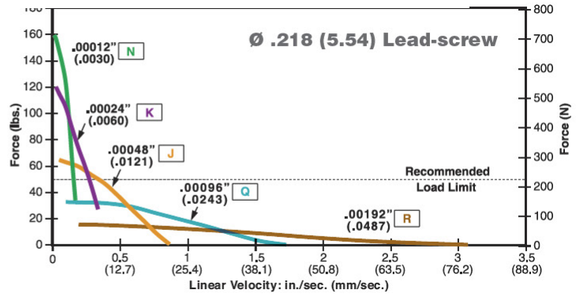
43000 Series Size 17 Linear Actuator

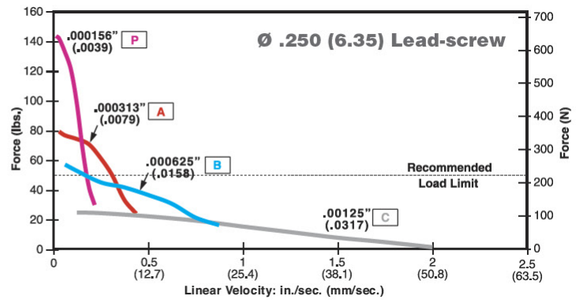
FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle





FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle

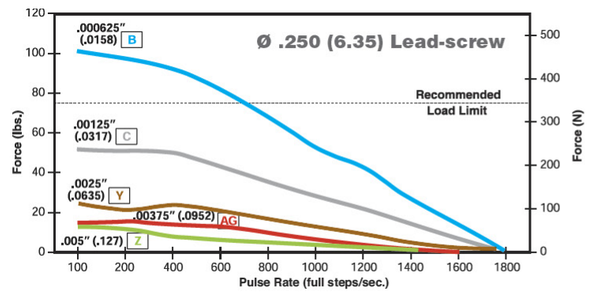




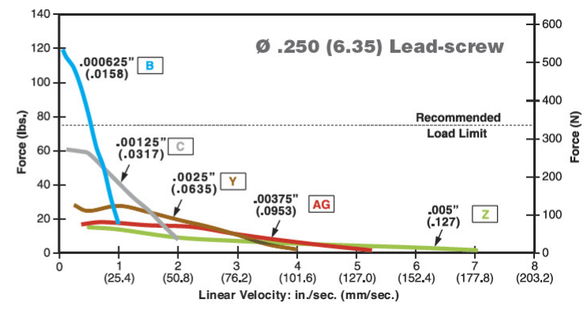
Double Stack

43000 Series Size 17 Linear Actuator

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper – 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.

28000 Series Size 11 and 43000 Series Size 17 Linear Actuators

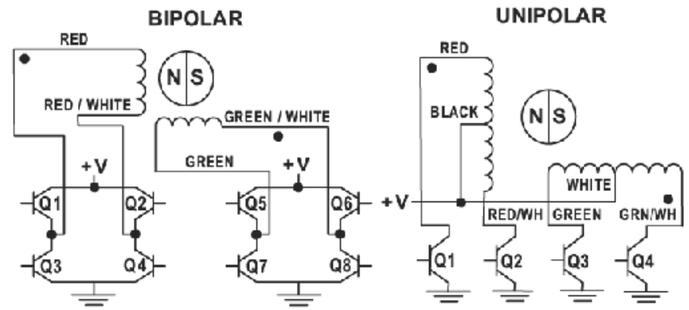
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



Size 17 43000 Series • Integrated Connectors

Hybrid Size 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. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

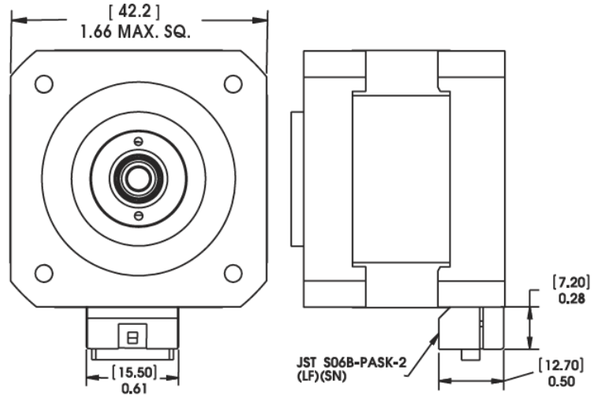
Motor Connector:	JST part # S06B-PASK-2
Mating Connector:	JST part # PAP-06V-S Haydon Kerk Part #56-1210-5 (12 in. Leads)
Wire to Board Connector:	JST part number SPHD-001T-P0.5

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

Dimensional Drawing

43000 Series Size 17 Linear Actuator with Integrated Connector

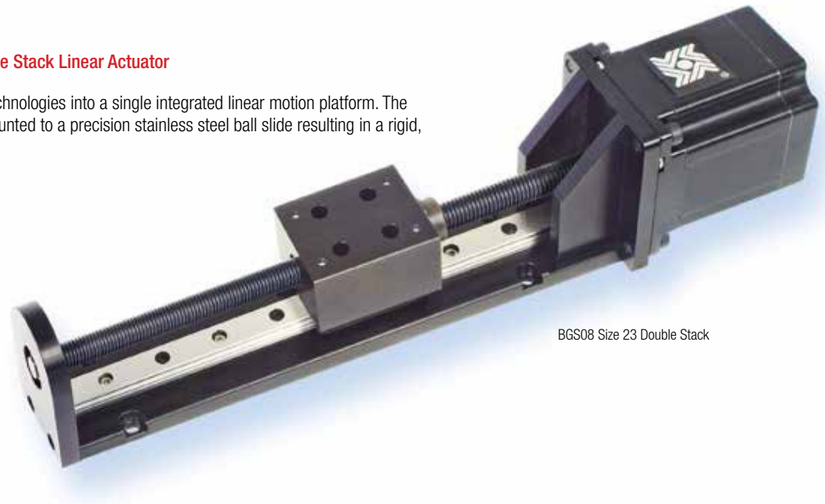
Dimensions = (mm) inches



BGS08™ Linear Rail

with Hybrid 57000 Series Size 23 Single or Double Stack Linear Actuator

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.



BGS08 Size 23 Double Stack

Specifications: BGS08

BGS with Hybrid Linear Actuator Motor	Size 23 Single and Double Stack
Max. Stroke Length	30 in (760 mm)
Max. Load (horizontal)	225 lbs (1,000 N)
Roll Moment	22.5 lbs-ft (30.5 Nm)
Pitch Moment	19.36 lbs-ft (26.25 Nm)
Yaw Moment	22.27 lbs-ft (30.20 Nm)

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

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the BGS Part Number Codes when Ordering

BG	S	08	B	—	M	—	0025	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
BG = Ball Guide System	**S** = Standard	**08** = Max.static load 225 lbs (1,000 N)	**B** = TFE wear resist, dry lubricant Black Ice®		**M = Motorized**		**0197** = .197-in (5.0) (see Lead Code charts above)		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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M5 and M6

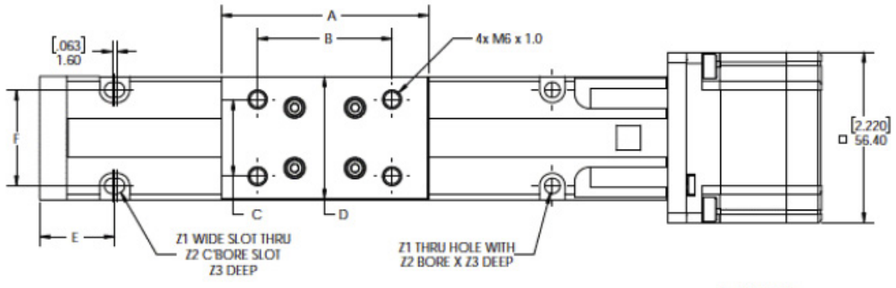
BGS08 Linear Rail with Hybrid 57000 Size 23 Linear Motors

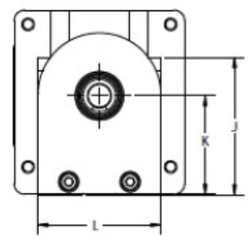
Recommended for horizontal loads up to 225 lbs (1,000 N)

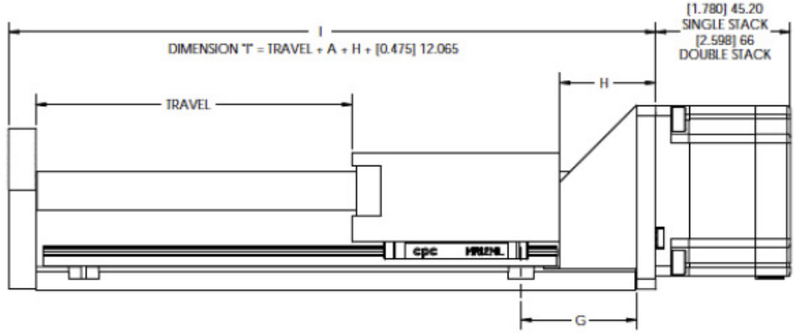
	A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(2.70)	(1.75)	(1.00)	1.60	(0.98)	(1.25)	(1.50)	(1.25)	*	(1.79)	(1.29)	(1.60)	(0.20)	(0.33)	(0.19)
mm	68.58	44.45	25.40	40.64	24.89	31.75	38.10	31.85	*	45.39	32.69	40.64	5.1	8.4	4.8

* Dimension "I" is a function of required travel distance.

Dimensions = (inches) mm



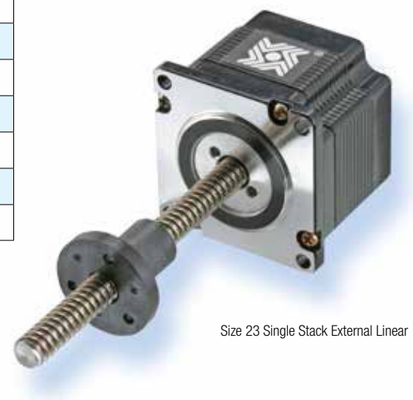




Single Stack

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
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				

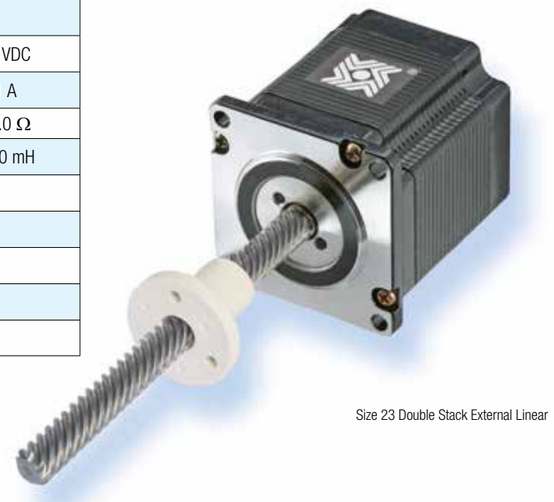
** Unipolar drive gives approximately 30% less thrust than bipolar drive.



Size 23 Single Stack External Linear

Double Stack

Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
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	321 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

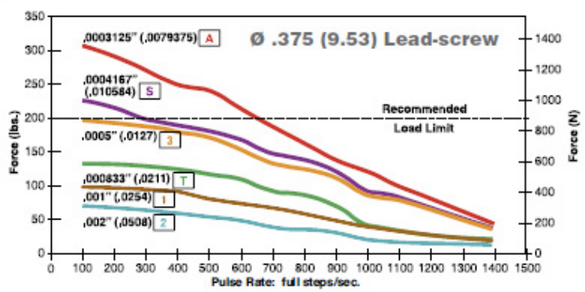


Size 23 Double Stack External Linear

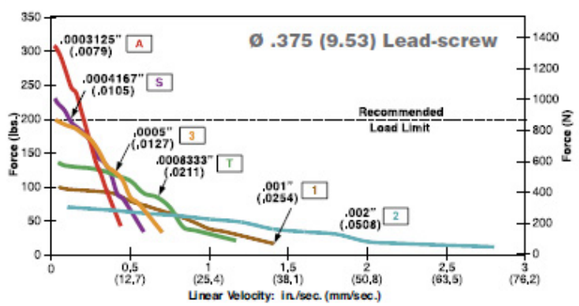
Single Stack

57000 Series Size 23 Linear Actuator

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



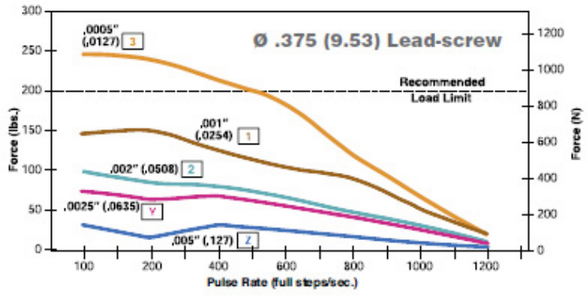
FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle



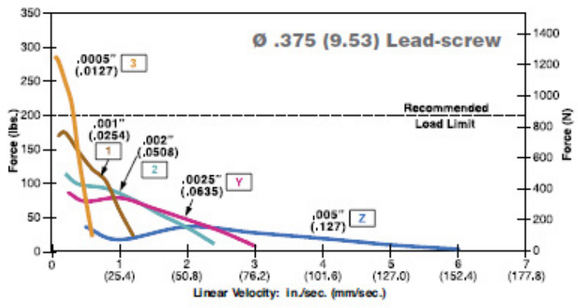
Double Stack

57000 Series Size 23 Linear Actuator

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper – 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.

Size 23 57000 Series • Stepping Sequence & Wiring

57000 Series Size 23 Linear Actuator

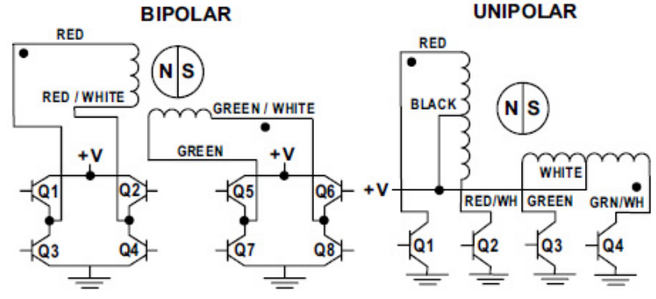
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



New!

EGS04 Motorized with 28000 Series

Linear Rail with Size 11 Double Stack Hybrid Stepper

Designed for Lab Automation and Electronic Assembly customers who need high-speed and highly-efficient point-to-point motion. This low-profile stage combines our patented screw support system, which allows for extended travel stroke without the normal reduction in screw RPM, with a ball bearing profile rail. The motorized EGS04 Linear Rail is available with either size 11 or size 17 hybrid stepper motors (see page 3). Standard carriage option is designed for horizontal loads up to 67 N (15 lbs.), and a long carriage option is available for higher loads.

- Low-profile
- High speed capability
- Efficient, stiff load support

EGS04 Motorized
Size 11 28000 Series

Specifications			
Design Payload (mass)	6.8kg [15 lbs]	**Pitch Moment***	5.25 N-m [46 lbf-in]
Axial Force	133N [30 lbf]	**Yaw Moment***	3 N-m [26 lbf-in]
Roll Moment*	3.1 N-m [27 lbf-in]	**Repeatability**	+/-25µm [0.001 in]

* Moment data based on 0.25° deflection

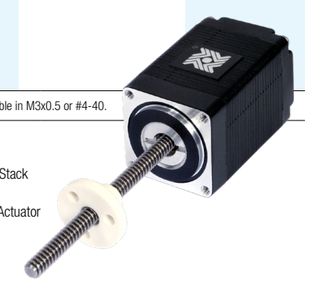
Identifying the Motorized EGS Part Numbers when Ordering

EGS	04	K	—	M	0100	—	E	S	M	—	Axx
Prefix **EGS** = EGS Series	**Nominal Rail Size** **04** = .25 in (6.35mm) diameter screw	**Screw Coating / Grease** **K** = Kerkote (standard) **S** = Uncoated		**Drive Type** **M** = Motorized, stepper	**Lead Code** **0025** = 0.025" lead **0039** = 1mm lead **0050** = 0.050" lead **0063** = 0.0625" lead **0079** = 2mm lead **0100** = 0.100" lead **0118** = 3mm lead **0200** = 0.200" lead **0250** = 0.250" lead **0394** = 10mm lead **0500** = 0.500" lead **0750** = 0.750" lead **1000** = 1.00" lead		**Encoder / Feedback** **E** = Rotary encoder **X** = No encoder	**Carriage(s)** **S** = Standard **L** = Long **M** = Multiple (std or long)	**Carriage Mounting** **E** = Imperial **M** = Metric		**Stroke / Unique Identifier** **Axx** = Unique identifier (e.g. A01)

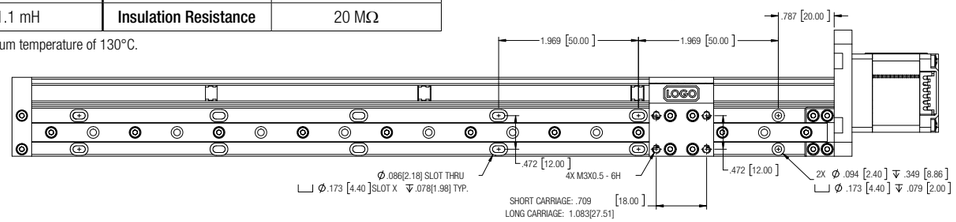
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290. Carriage holes available in M3x0.5 or #4-40.

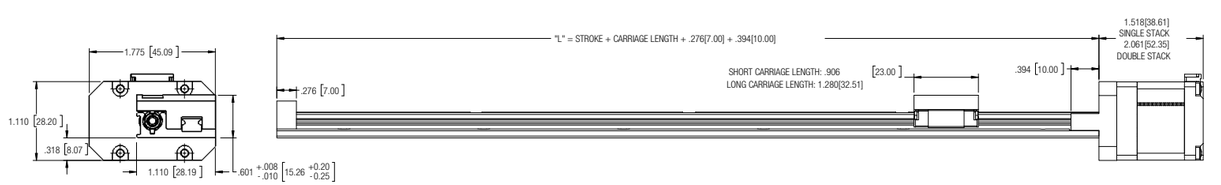
Size 11 Double Stack: 28 mm (1.1-in) Hybrid External Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar	**Power Consumption**	7.5 W Total
Winding Voltage	2.1 VDC	**Rotor Inertia**	13.5 gcm²
Current (RMS)/phase	1.9 A	**Insulation Class**	Class B (Class F available)
Resistance/phase	1.1 Ω	**Weight**	5.8 oz (180 g)
Inductance/phase	1.1 mH	**Insulation Resistance**	20 MΩ

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



Size 11 Double Stack
28000 Series
External Linear Actuator

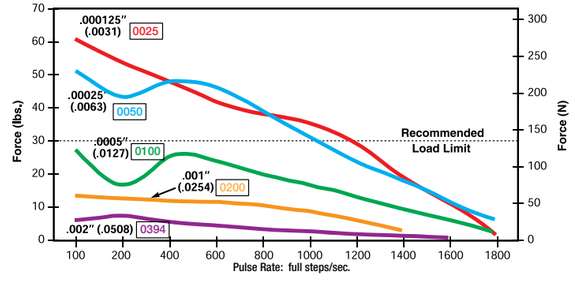




Double Stack

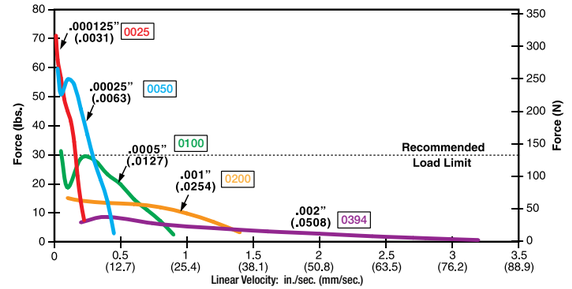
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

– Chopper – 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.

Size 11 28000 Series • Stepping Sequence & Wiring

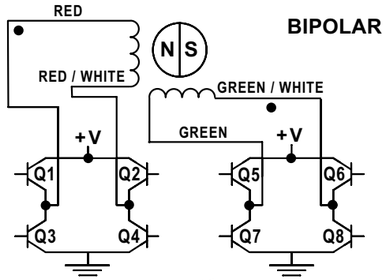
Hybrids: **Stepping Sequence**

Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
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.

Hybrids: **Wiring**



Size 11 28000 Series • Integrated Connector

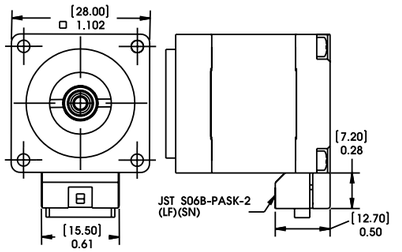
Offered alone or with a harness assembly, the integrated connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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 # 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



EGS04 Motorized with 43000 Series

EGS04 Motorized
Size 17 43000 Series

Linear Rail with Size 17 Single or Double Stack Hybrid Stepper

This low-profile stage combines our patented screw support system, which allows for extended travel stroke without the normal reduction in screw RPM, with a ball bearing profile rail. The motorized EGS04 Linear Rail is available with size 17 hybrid stepper motors. Standard carriage option is designed for horizontal loads up to 67 N (15 lbs.), and a long carriage option is available for higher loads.

- Low-profile
- High speed capability
- Efficient, stiff load support

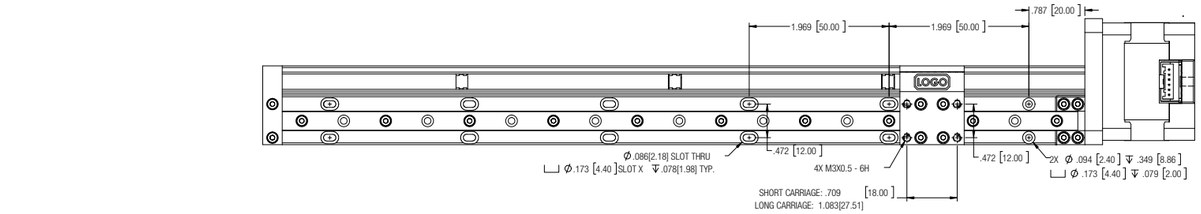
Identifying the Motorized EGS Part Numbers when Ordering

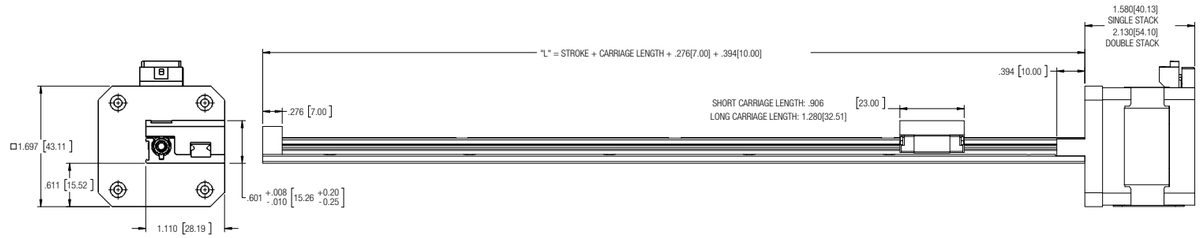
EGS	04	K	—	M	0100	—	E	S	M	—	Axx
Prefix	**Nominal Rail Size**	**Screw Coating / Grease**		**Drive Type**	**Lead Code**		**Encoder / Feedback**	**Carriage(s)**	**Carriage Mounting**		**Stroke / Unique Identifier**
EGS = EGS Series	**04** = .25 in (6.35mm) diameter screw	**K** = Kerkote (standard) **S** = Uncoated		**M** = Motorized, stepper	**0025** = 0.025" lead **0039** = 1mm lead **0050** = 0.050" lead **0063** = 0.0625" lead **0079** = 2mm lead **0100** = 0.100" lead **0118** = 3mm lead **0200** = 0.200" lead **0250** = 0.250" lead **0394** = 10mm lead **0500** = 0.500" lead **0750** = 0.750" lead **1000** = 1.00" lead		**E** = Rotary encoder **X** = No encoder	**S** = Standard **L** = Long **M** = Multiple (std or long)	**E** = Imperial **M** = Metric		**Axx** = Unique identifier (e.g. A01)

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290. Carriage holes available in M3x0.5 or #4-40.

Size 17: 43 mm (1.7-in) External Linear Actuator (1.8° Step Angle)								
	Single Stack					Double Stack		
Wiring	Bipolar			Unipolar**		Bipolar		
Winding Voltage	2.33 VDC[†]	5 VDC	12 VDC	5 VDC	12 VDC	2.33 VDC[†]	5 VDC	12 VDC
Current (RMS)/phase	1.5 A	700 mA	290 mA	700 mA	290 mA	2.6 A	1.3 A	550 mA
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω	7.2 Ω	41.5 Ω	0.9 Ω	3.8 Ω	21.9 Ω
Inductance/phase	1.9 mH	8.7 mH	54.0 mH	4.4 mH	27.0 mH	1.33 mH	8.21 mH	45.1 mH
Power Consumption	7 W					13.2 W		
Rotor Inertia	37 gcm^2					78 gcm^2		
Insulation Class	Class B (Class F available)					Class B (Class F available)		
Weight	8.5 oz (241 g)					12.5 oz (352 g)		
Insulation Resistance	20 MΩ					20 MΩ		

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





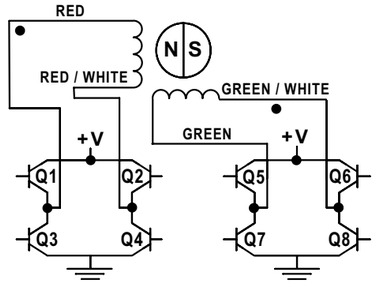
Size 17 43000 Series • Stepping Sequence & Wiring

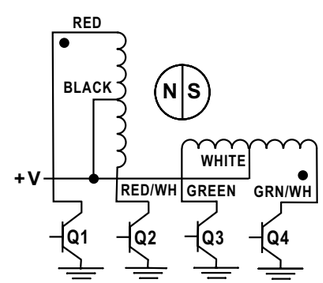
Hybrids: **Stepping Sequence**

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

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

Hybrids: **Wiring**

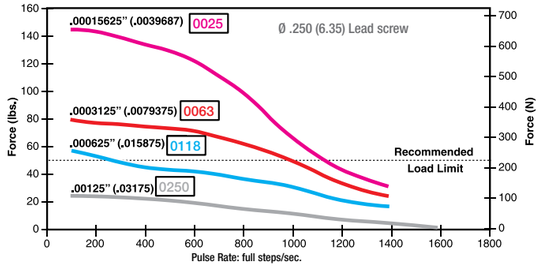




Single Stack

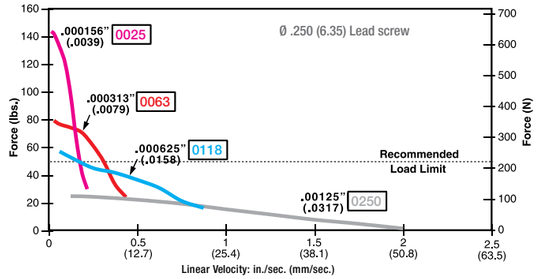
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

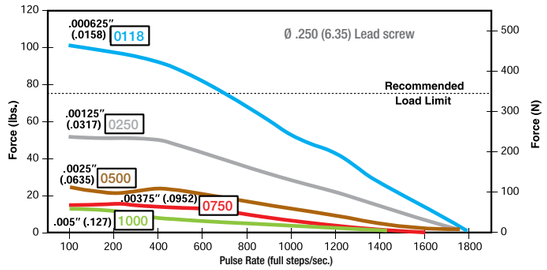
– Chopper – Bipolar – 100% Duty Cycle



Double Stack

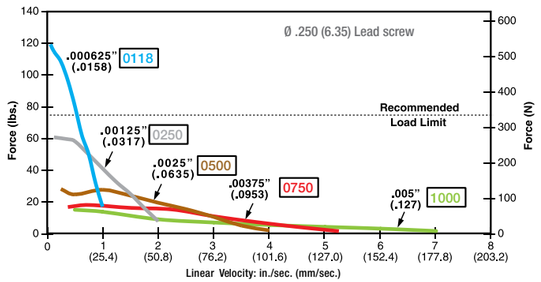
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

– Chopper – 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.

Size 17 47000 Series • Integrated Connector

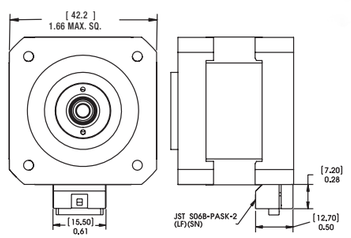
Offered alone or with a harness assembly, the integrated connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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 # SPHD-001T-P0.5

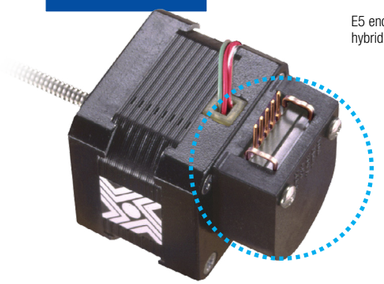
Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	–
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	–
6	Phase 1 Start	Phase 1 Start	Red



Encoders Designed for All EGS Rails

EGS Series rails are available with specifically designed encoders for applications that require feedback. The compact optical incremental encoder designs are available with two channel quadrature TTL squarewave outputs. Version with Index channel are also available. Various resolutions are available, up to 5000 CPR.

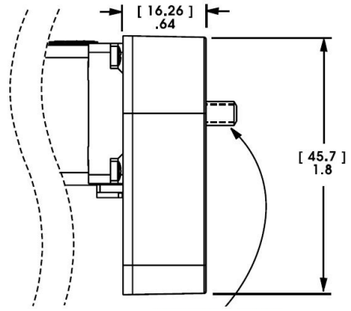
Simplicity and low cost make the encoders ideal for both high and low volume motion control applications. The internal monolithic electronic module converts the real-time shaft angle, speed, and direction into TTL compatible outputs. The encoder modules incorporate a lensed LED light source and monolithic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



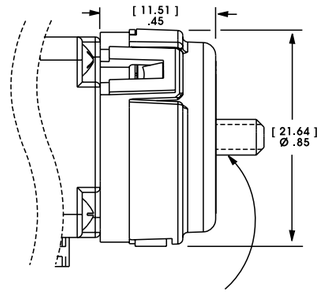
E5 encoder on Size 17 hybrid motor

E5 Encoder Dimensions

Dimensions = [mm] inches



E4T Encoder Dimensions



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.
Index available on E4T.

Operating Temperature

	Minimum	Maximum
E4T	- 20°C (- 28°F)	100°C (212°F)
E5	- 20°C (- 40°F)	100°C (212°F)

Mechanical Specifications

	Maximum
Acceleration	250,000 rad/sec2
Vibration (5 Hz to 2 kHz)	20 g

Resolution

	Standard Resolutions (CPR)			Maximum (CPR)
E4T	200	400	1000	1000
E5	200	400	1000	5000

*Other Resolutions Available - Contact Factory

Pinouts

E4T Single-Ended		E4T Differential		E5 Single-Ended		E5 Differential	
Connector Pin#	Description	Connector Pin#	Description	Connector Pin#	Description	Connector Pin #	Description
1	+5VDC power	1	Ground	1	Ground	1	Ground
2	A channel	2	A channel	2	Index	2	Ground
3	Ground	3	A- channel	3	A channel	3	Index-
4	B channel	4	+5VDC power	4	+5VDC power	4	Index+
		5	B channel	5	B channel	5	A- channel
		6	B- channel			6	A+ channel
						7	+5 VDC Power
						8	+5 VDC Power
						9	B- channel
						10	B+ channel

EGS04 Motorized with BLDC

Linear Rail with BLDC Motor

This low-profile stage features screw support with a ball bearing profile rail. The motorized EGS04 Linear Rail is available with a 42mm brushless DC (BLDC) servo motor for high speed applications. Standard configuration is a single stack EC042B with 1000cpr E30D encoder included. Recommended for horizontal loads up to 15 lbs (67N).

- Low-profile
- High speed capability
- Efficient, stiff load support

EGS04 Motorized BLDC Motor

Refer to EC042B data sheet for complete motor specifications.

Identifying the Motorized EGS Part Numbers when Ordering

EGS	04	K	—	P	0100	—	E	S	M	—	Axx
Prefix **EGS** = EGS Series	**Nominal Rail Size** **04** = .25 in (6.35mm) diameter screw	**Screw Coating / Grease** **K** = Kerkote (standard) **S** = Uncoated		**Drive Type** **P** = Motorized BLDC **Q** = Integrated drive, BLDC	**Lead Code*** 0025, 0039, 0050, 0063, 0079, 0100, 0118, 0200, 0250, 0394, 0500, 0750, 1000		**Encoder / Feedback** **E** = Rotary encoder **X** = No encoder	**Carriage(s)** **S** = Standard **L** = Long **M** = Multiple (std or long)	**Carriage Mounting** **E** = Imperial **M** = Metric		**Stroke / Unique Identifier** **Axx** = Unique identifier (e.g. A01)

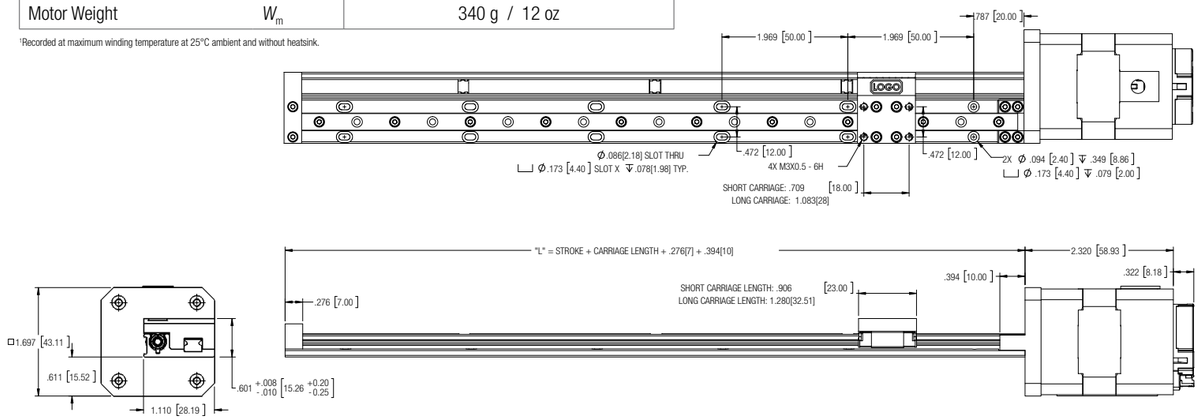
* Refer to page 1 or 3 for coordinating lead resolutions.

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290. Carriage holes available in M3x0.5 or #4-40.

Motor Data		EC042B-1
Max DC Terminal Voltage	V_T	96 V
Max Speed (Mechanical)	ω_{MAX}	9000 rpm
Continuous Stall Torque[1]	T_{CS}	0.064 Nm / 9.0 oz-in
Peak Torque (Maximum)[1]	T_{pk}	0.38 Nm / 54 oz-in
Coulomb Friction Torque	T_f	0.0014 Nm / 0.20 oz-in
Viscous Damping Factor	D	3.4E-06 V/(rad/s) / 0.050 oz-in/krpm
Thermal Time Constant	τ_{th}	5.1 min
Thermal Resistance	R_{th}	9.1 °C/W
Max. Winding Temperature	Θ_{MAX}	105 °C
Rotor Inertia	J_r	1.4E-05 kg-m^2 / 0.0021 oz-in-s^2
Motor Weight	W_m	340 g / 12 oz

[1]Recorded at maximum winding temperature at 25°C ambient and without heatsink.

EC042B motor



Slide Guided Rail Systems

Haydon Kerk Slide Guided Rails are available in many styles and sizes to meet your application needs. Many rails are offered with integrated drive, motorized, non-motorized or guide only versions without lead screw. Rails are available with wear-compensating, anti-backlash driven carriages to insure repeatability and accurate positioning. All moving surfaces include engineered polymers that provide a precise, strong and stable platform for a variety of linear motion applications.

Performance Atributes

Series	Description	Sizes	Max Stroke m	Max Load N	Motorized	Rail Only	Guide Only	Stiffness	Major Attributes
RGS	Aluminum rail w/ wear compensation	4, 6, 8, 10	2.5	67-445	•	•	•	*	High speed
RGW	Aluminum rail w/ wear compensation	6, 10	2.5	156-445	•	•	•	**	Wide base
WGS	Aluminum rail w/ wear compensation	6	2.5	156	•	•		****	Low profile
LRS	Aluminum rail w/ wear compensation	4		222	•	•		****	Higher thrust
SRA	Steel tube, no wear compensation	3, 4, 6, 8	1.6	45-440		•			Compact
SRZ	Steel tube, no wear compensation	3, 4, 6, 8	1.6	45-440		•			Compact

RGS04 Motorized with 28000 Series

Linear Rail with Size 11 Double Stack Hybrid Stepper

The RGS04 28000 Series is our smallest screw driven slide 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. Recommended for horizontal loads up to 15 lbs (67N).

RGS04 Motorized
Size 11 28000 Series Double Stack

To determine what is best for your application see the Linear Rail Applications Checklist.

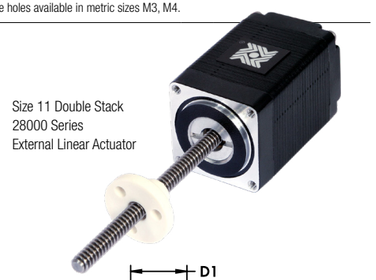
Identifying the Motorized RGS Part Numbers when Ordering

RG	S	04	K	—	M	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard	**04** = 15 lbs (67 N) (Maximum static load)	**K** = TFE Kerkote		**M** = Motorized	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)		Suffix used to identify specific motors or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part

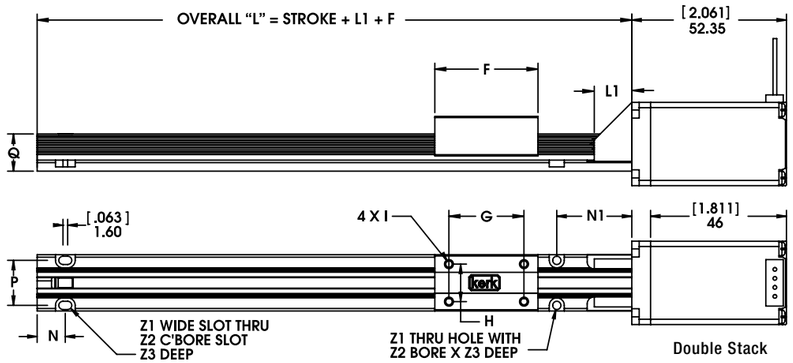
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290. Carriage holes available in metric sizes M3, M4.

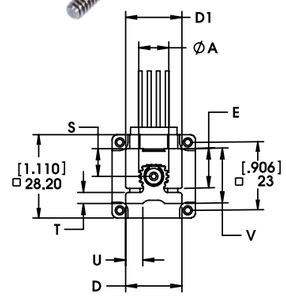
Size 11 Double Stack: 28 mm (1.1-in) Hybrid External Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar	**Power Consumption**	7.5 W Total
Winding Voltage	2.1 VDC	**Rotor Inertia**	13.5 gcm²
Current (RMS)/phase	1.9 A	**Insulation Class**	Class B (Class F available)
Resistance/phase	1.1 Ω	**Weight**	5.8 oz (180 g)
Inductance/phase	1.1 mH	**Insulation Resistance**	20 MΩ

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



Size 11 Double Stack
28000 Series
External Linear Actuator





Dimensions = (inches) mm

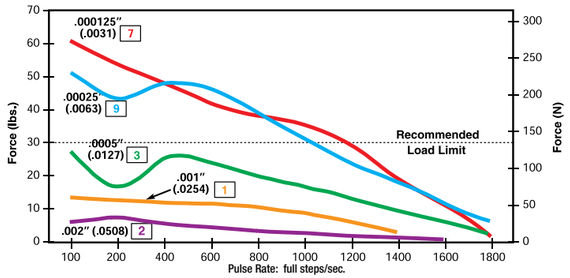
	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.40)	(0.75)	(0.75)	(0.53)	(1.40)	(1.00)	(0.50)	4-40	(0.50)	(0.38)	(1.00)	(0.60)	(0.5)	(0.37)	(0.15)	(0.23)	(0.7)	(0.11)	(0.2)	(0.09)
mm	10.2	19	19	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.0	2.8	5.1	2.3

*Metric threads also available for carriage.

Double Stack

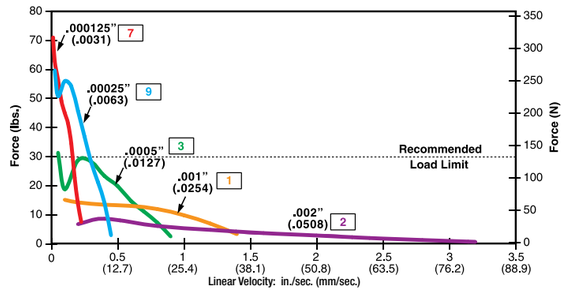
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

– Chopper – 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.

Size 11 28000 Series • Stepping Sequence & Wiring

Hybrids: **Stepping Sequence**

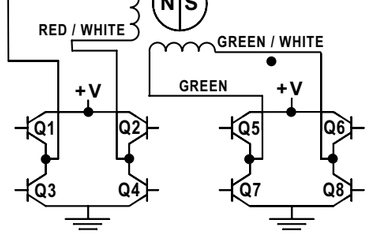
Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

EXTEND CW ↓ ↑ RETRACT CCW

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

Hybrids: **Wiring**

BIPOLAR



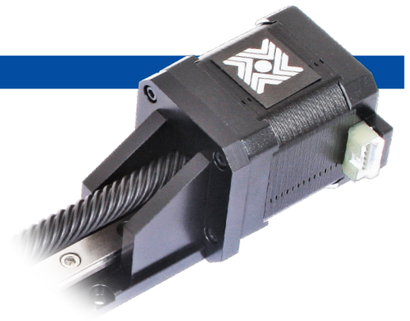
Size 11 28000 Series • Integrated Connector

Offered alone or with a harness assembly, the integrated 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. Ideal for those that want to plug in directly to pre-existing harnesses.

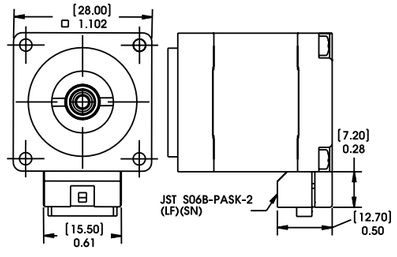
Motor Connector: JST part # S06B-PASK-2

Mating Connector: JST part # PAP-06V-S
Haydon Kerk part # 56-1210-5 (12 in. Leads)

Wire to Board Connector: JST part # SPHD-001T-P0.5



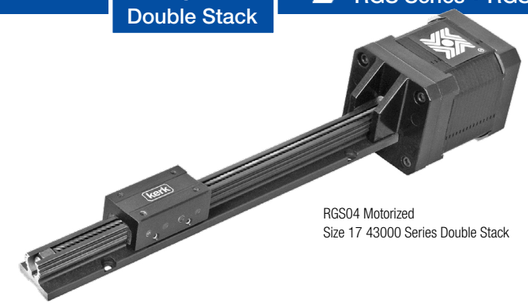
Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	–
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	–
6	Phase 1 Start	Phase 1 Start	Red



RGS04 Motorized with 43000 Series

Linear Rail with Size 17 Single or Double Stack Hybrid Stepper with *or* without an integrated programmable IDEA™ Drive

The RGS04 is a screw driven rail that offers exceptional linear speed, accurate positioning and long life in a compact 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. Recommended for horizontal loads up to 15 lbs (67N).



RGS04 Motorized
Size 17 43000 Series Double Stack

Identifying the Motorized RGS Part Numbers when Ordering

RG	S	04	K	—	M	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard	**04** = 15 lbs (67 N) (Maximum static load)	**K** = TFE Kerkote		**M** = Motorized **G** = IDEA Integrated programmable drive, USB communications **J** = IDEA integrated programmable drive, RS485 communications	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)		Suffix used to identify specific motors or a proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part

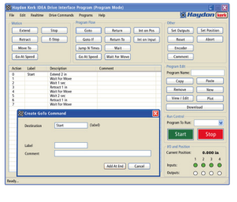
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290. Carriage holes available in metric sizes M3, M4, M5, M6.

Size 17: 43 mm (1.7-in) External Linear Actuator (1.8° Step Angle)								
	Single Stack					Double Stack		
Wiring	Bipolar			Unipolar**		Bipolar		
Programmable Drive	IDEA™ Drive Available			N/A		IDEA™ Drive Available		
Winding Voltage	2.33 VDC†	5 VDC	12 VDC	5 VDC	12 VDC	2.33 VDC†	5 VDC	12 VDC
Current (RMS)/phase	1.5 A	700 mA	290 mA	700 mA	290 mA	2.6 A	1.3 A	550 mA
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω	7.2 Ω	41.5 Ω	0.9 Ω	3.8 Ω	21.9 Ω
Inductance/phase	1.9 mH	8.7 mH	54.0 mH	4.4 mH	27.0 mH	1.33 mH	8.21 mH	45.1 mH
Power Consumption	7 W					13.2 W		
Rotor Inertia	37 gcm²					78 gcm²		
Insulation Class	Class B (Class F available)					Class B (Class F available)		
Weight	8.5 oz (241 g)					12.5 oz (352 g)		
Insulation Resistance	20 MΩ					20 MΩ		

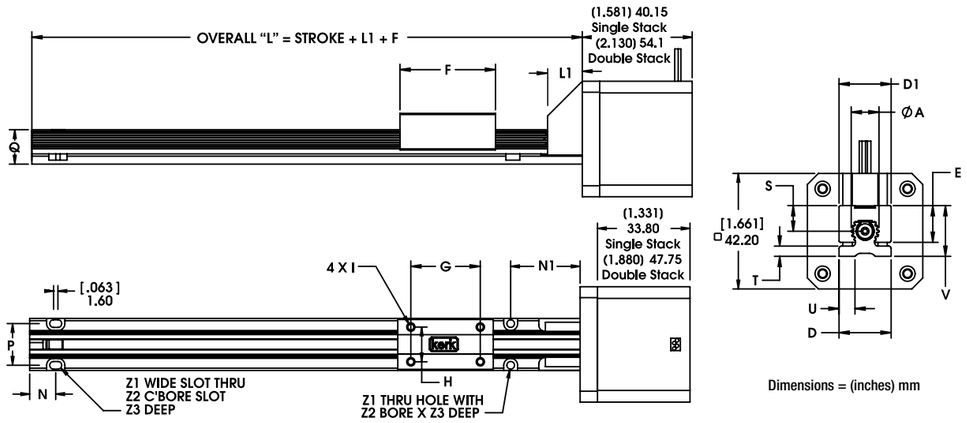
†43000 Series with IDEA™ Drive. Contact us if higher voltage motor is desired.
**Unipolar drive gives approximately 30% less thrust than bipolar drive.

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

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.



NOTE: For more information see the Haydon Kerk IDEA Drive webpages.

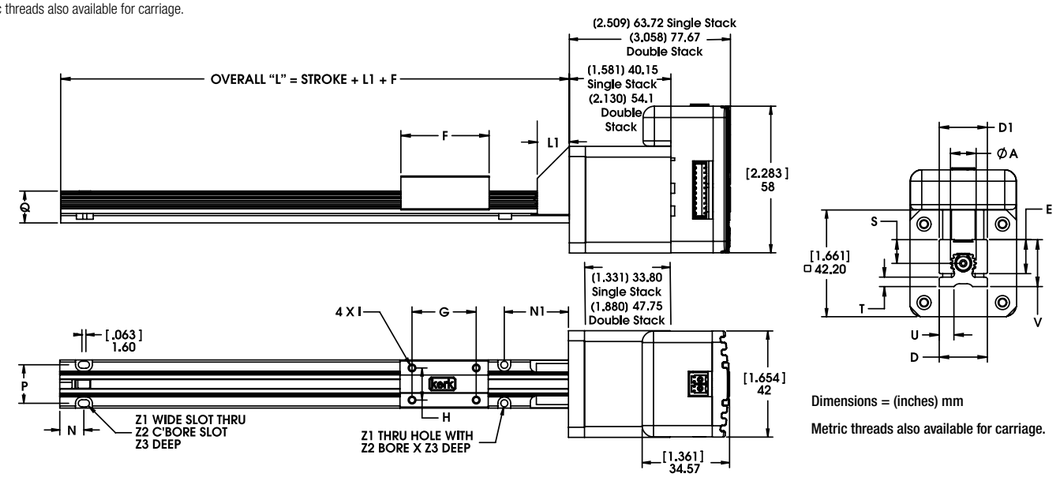


Dimensions = (inches) mm

RGS04 with 43000 Series Size 17 Single or Double Stack Linear Actuator (drawing above) or Double Stack Linear Actuator with integrated programmable IDEA™ Drive (drawing below)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.40)	(0.75)	(0.75)	(0.53)	(1.40)	(1.00)	(0.50)	4-40	(0.50)	(0.38)	(1.00)	(0.60)	(0.5)	(0.37)	(0.15)	(0.23)	(0.73)	(0.11)	(0.2)	(0.09)
mm	10.2	19	19	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	18.0	2.8	5.1	2.3

*Metric threads also available for carriage.



Dimensions = (inches) mm

Metric threads also available for carriage.

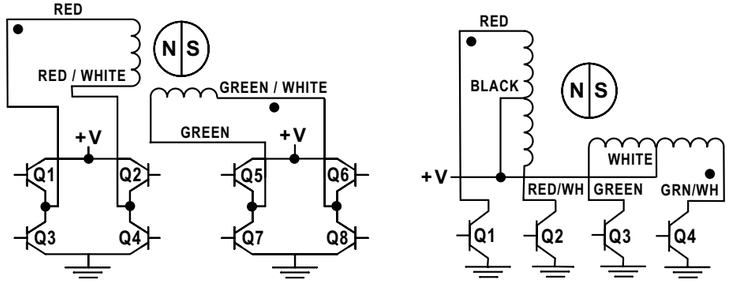
Size 17 43000 Series • Stepping Sequence & Wiring

Hybrids: **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

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

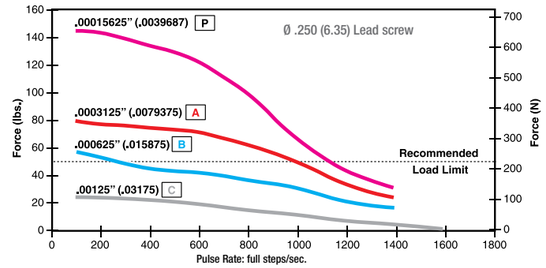
Hybrids: **Wiring**



Single Stack

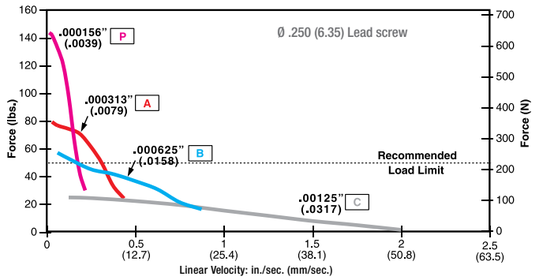
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

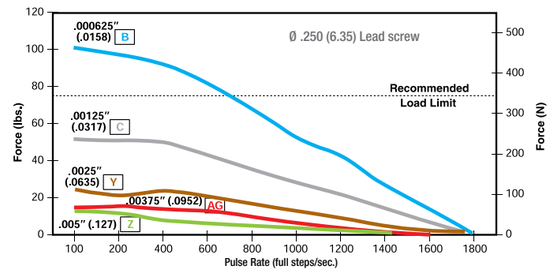
– Chopper – Bipolar – 100% Duty Cycle



Double Stack

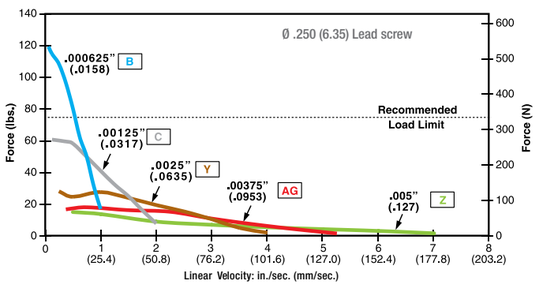
FORCE vs. PULSE RATE

– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

– Chopper – 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.

Size 17 47000 Series • Integrated Connector

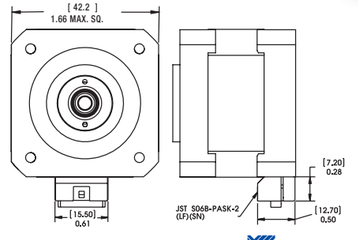
Offered alone or with a harness assembly, the integrated connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 22 to 28. Ideal for those that want to plug in directly to pre-existing harnesses.

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 # 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



RGS04 Non-Motorized Linear Rails

Screw driven linear rail or linear rail without screw

The non-motorized RGS Series features standard wear compensating, anti-backlash driven carriages to ensure 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.

RGS04 Non-Motorized
Screw Driven Linear Rail

Identifying the Non-Motorized RGS Part Numbers when Ordering

RG	S	04	K	—	A	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard	**04** = 15 lbs (67 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None	0000 = No Screw 0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290. Carriage holes available in metric sizes M3, M4.

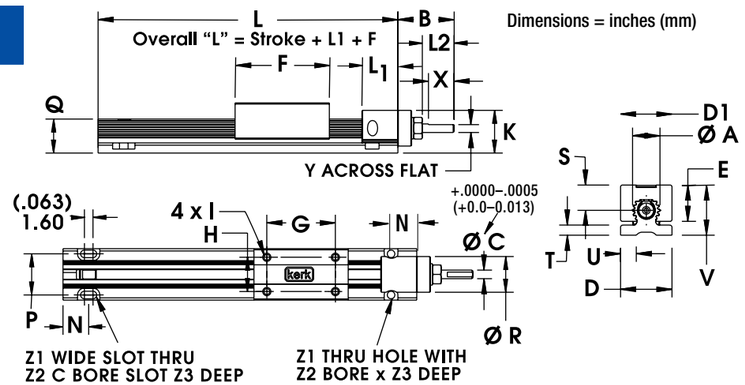
Specifications

	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load	Screw Inertia
RGS04 Non-Motorized with Guide Screw	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**	0.4 (10.2)	1/4 (6.4)	3.0 (0.2)	100,000,000 (254,000,000)	1.0 (.016)	15 (67)	.3 x 10^{-5} (6.5 x 10^{-6})
	.200 (5.08)	**0200**			4.0 (.03)		1.5 (.023)		
	.500 (12.70)	**0500**			5.0 (.04)		2.5 (.039)		
	1.000 (25.40)	**1000**			6.0 (.04)		4.5 (.070)		

NOTE: RGS 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.

Non-Motorized with Lead Screw Dimensional Drawings

Dimensions = inches (mm)



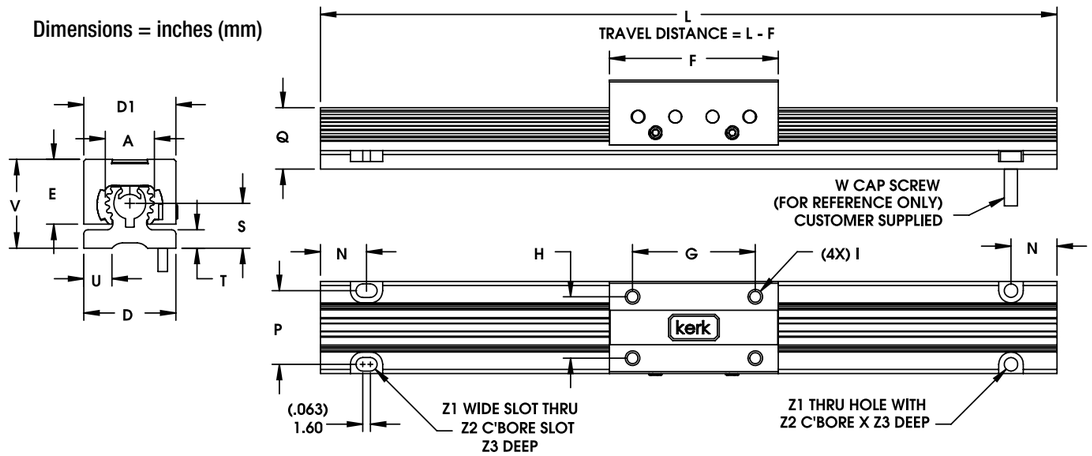
	A	B	C	D	D1	E	F	G	H	I*	K	L1	L2	N	P	Q	R	S	T	U	V	X	Z1	Z2	Z3
inch	0.40	.83	.1250	0.75	0.75	0.53	1.38	1.00	0.50	4-40	0.6	.53	.47	.375	.60	.50	.52	0.37	0.15	0.23	0.7	.38	0.115	0.20	0.09
mm	10.2	21.1	3.175	19.1	19.1	13.5	35.1	25.4	12.7	UNC	15	13.5	11.9	9.53	15.24	12.7	13.2	9.4	3.8	5.8	18.0	9.7	2.92	5.1	2.3

*Metric carriage hole sizes available M3, M4.

Non-Motorized without Lead Screw Dimensional Drawings

RGS04 Non-Motorized
Linear Rail without Screw

Dimensions = inches (mm)



	A	D	D1	E	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	0.40	0.75	0.75	0.53	1.4	1.00	0.50	4-40	.375	.60	.50	0.37	0.15	0.23	0.7	0.11	0.20	0.09
mm	10.2	19.1	19.1	13.5	36	25.4	12.7	UNC	9.53	15.24	12.7	9.4	3.8	5.8	18.0	2.8	5.1	2.3

*Metric carriage hole sizes available M3, M4.

To determine what is best for your application see the Linear Rail Applications Checklist.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers, Kerkite Polymers are formulated to provide optimum performance in its target conditions and applications.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris. Kerkote differs from conventional plating and coating because it is soft, more evenly distributed than other lubricants, and decreases erratic drag torques and unpredictable wear.

- Reduces friction
- Cost effective
- Long term and maintenance free

Kerkote provides the maximum level of self-lubrication, requiring no additional external lubrication or maintenance.

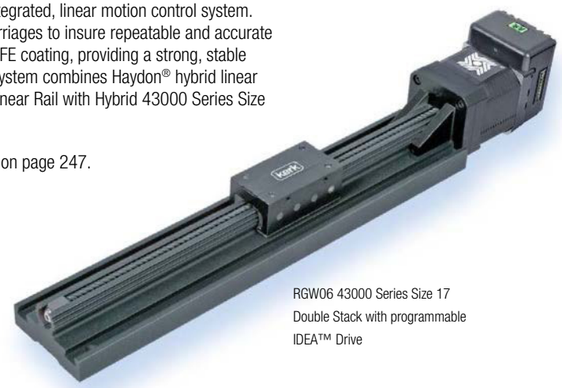
RGS06 and RGW06 Wide Linear Rails with 43000 Series Hybrid Motor

**Also available with 57000 Series Hybrid Motor (see pages 247-251)*

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. RGS Series Linear Rail with Hybrid 43000 Series Size 17 Linear Actuator Stepper Motors.

Technical specifications for 43000 Series Size 17 Hybrid Linear Actuator Stepper Motors are on page 247.

To determine what is best for your application see the Linear Rail Applications Checklist.



RGW06 43000 Series Size 17
Double Stack with programmable
IDEA™ Drive

Identifying the RGS06 Part Number Codes when Ordering

RG	S	06	K	—	M	—	0100	—	XXX
Prefix	Frame Style	Frame Size Load*	Lubrication		Drive / Mounting		Nominal Thread Lead Code		Unique Identifier
RG = Rapid Guide Screw	**S** = Standard **W** = Wide sensor mount capability	**06** = 35 lbs (156 N) (Maximum static load)	**K** = TFE Kerkote®		**M** = Motorized **G** = Motorized + IDEA™ integrated programmable drive – USB communi-cations **J** = Motorized + IDEA™ integrated programmable drive – RS485 communications		**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)		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 call our Engineering Team at 603 213 6290.

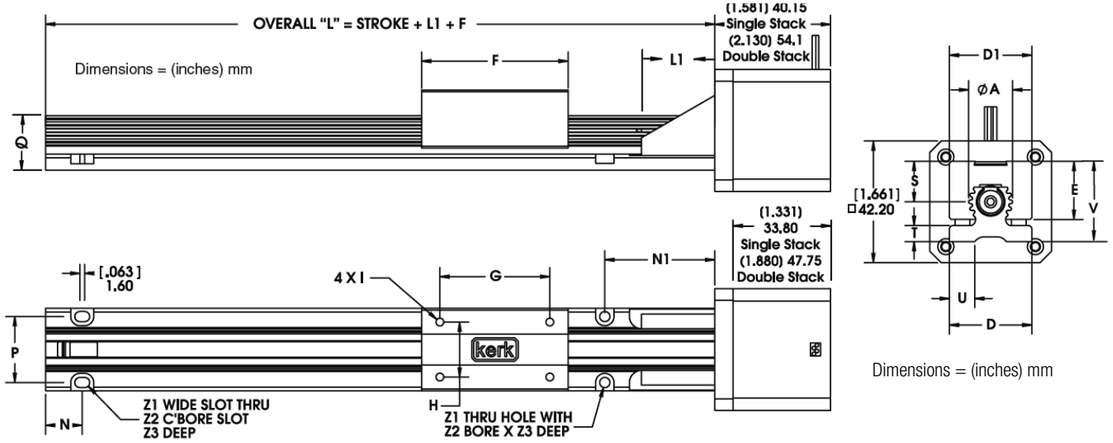
Carriage holes available in Metric sizes M2, M4, M5, M6

RGS06 Linear Rail with 43000 Series Size 17 Single and Double Stack Linear Actuators

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 UNC	(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		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.



Dimensions = (inches) mm

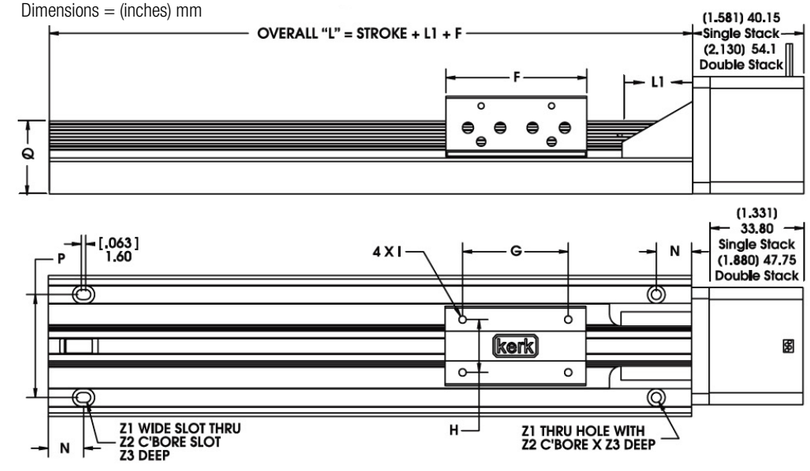
RGW06 Wide Linear Rail with 43000 Series Size 17 Single and Double Stack Linear Actuators

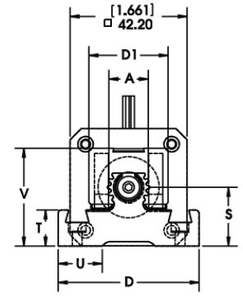
Recommended for horizontal loads up to 22 lbs (100 N)

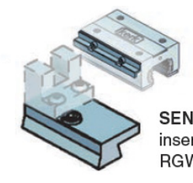
	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32 UNC	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0		25.4	12.7	22.9	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

* Metric threads also available for carriage.

Dimensions = (inches) mm







FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base

RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mount 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.

Single Stack

43000 Series Size 17

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)					
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				

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

43000 Series Size 17
Double Stack External Linear

43000 Series Size 17
Single Stack External Linear

Double Stack

43000 Series Size 17

Size 17 Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)			
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	13.2 W		
Rotor Inertia	78 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	12.5 oz (352 g)		
Insulation Resistance	20 MΩ		

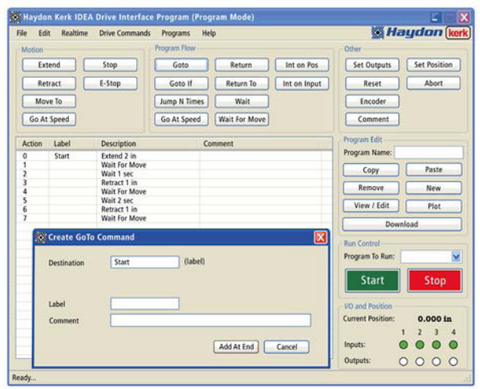
* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired. Standard motors are Class B rated for maximum temperature of 130°C.

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

- 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

For more information see the IDEA™ Drive Data Sheet

Size 17 External Linear
with programmable IDEA Drive

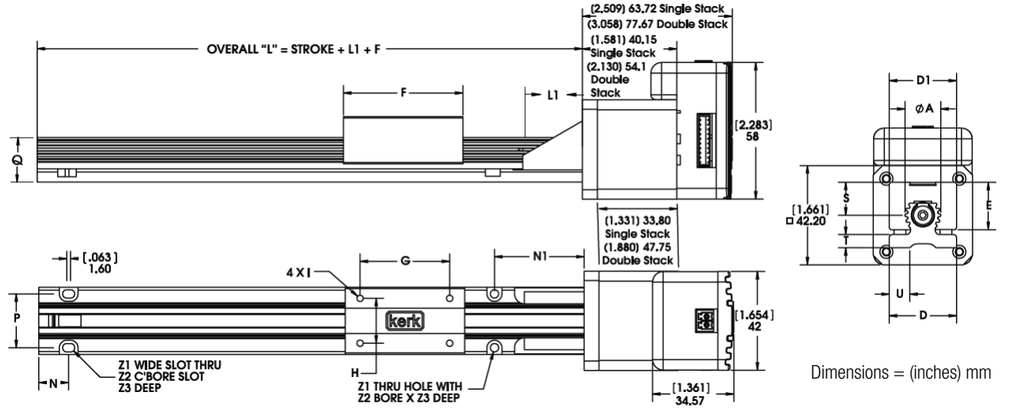


RGS06 with 43000 Series Size 17 Single and Double Stack linear motors with IDEA Drive

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 UNC	(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		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.



Dimensions = (inches) mm

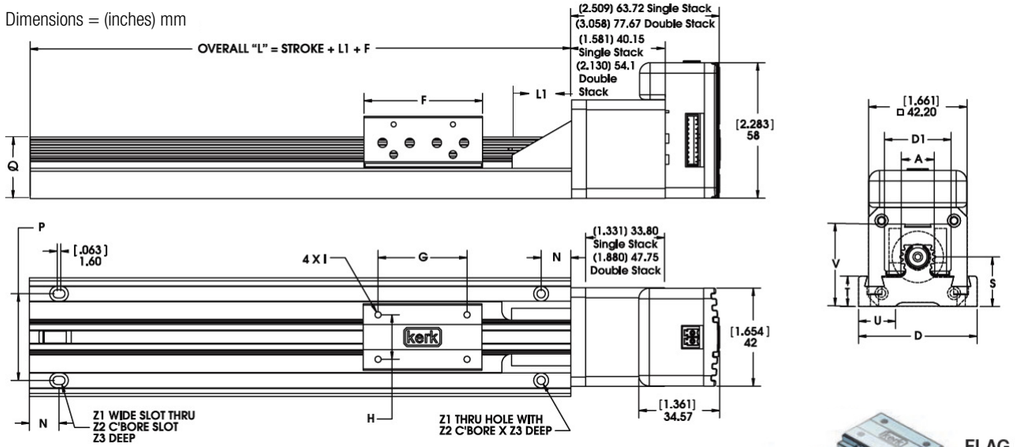
RGW06 Wide Rail with 43000 Series Size 17 Single Stack and Double Stack linear motors with IDEA Drive

Recommended for horizontal loads up to 35 lbs (156 N)

	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32 UNC	(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		25.4	12.7	22.9	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

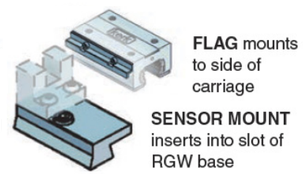
* Metric threads also available for carriage.

Dimensions = (inches) mm



RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mount 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.

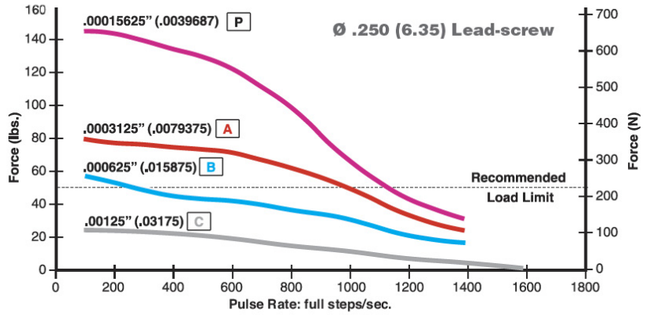


FLAG mounts to side of carriage

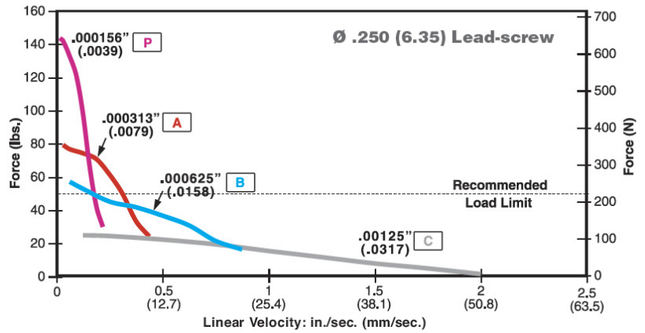
SENSOR MOUNT inserts into slot of RGW base

Single Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle

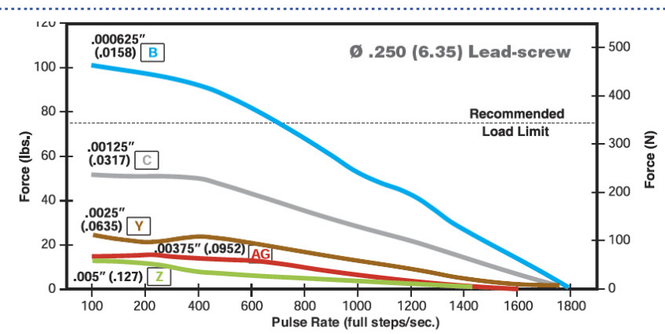


FORCE vs. LINEAR VELOCITY
– Chopper
– Bipolar
– 100% Duty Cycle

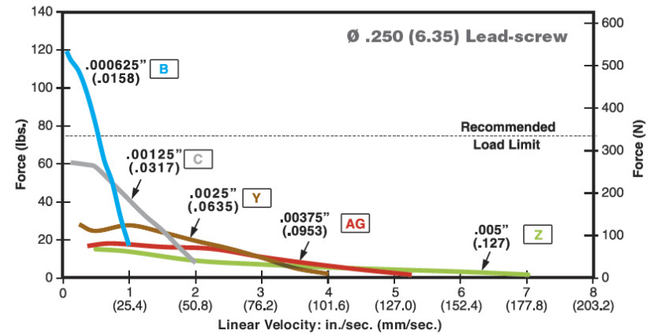


Double Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper
– 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.

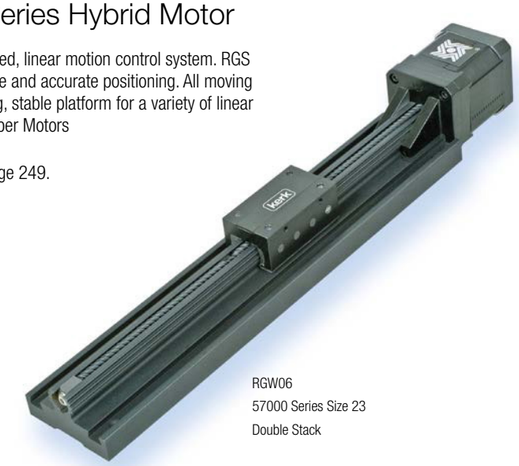
With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction

RGS06 and RGW06 Wide Linear Rails with 57000 Series Hybrid Motor

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. RGS Series Linear Rail with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors

Technical specifications for 57000 Series Size 23 Hybrid Linear Actuator Stepper Motors are on page 249.

To determine what is best for your application see the Linear Rail Applications Checklist.



RGW06
57000 Series Size 23
Double Stack

Identifying the BGS Part Number Codes when Ordering

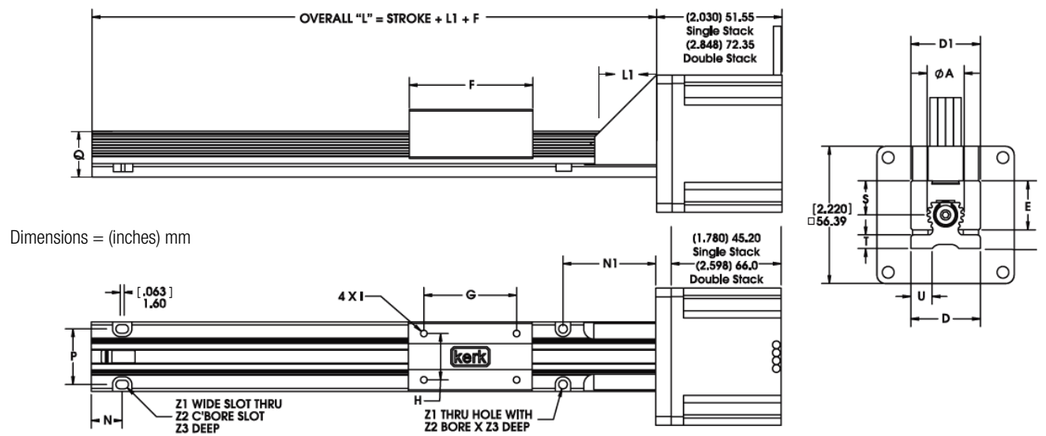
RG	S	06	K	—	M	—	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard **W** = Wide sensor mount capability	**06** = 35 lbs (156 N) (Maximum static load)	**K** = TFE Kerkote®		**M** = Motorized		**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)		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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M4, M5, M6

RGS06 with 57000 Series Size 23 Single and Double Stack linear motors

Recommended for horizontal loads up to 35 lbs (156 N)



Dimensions = (inches) mm

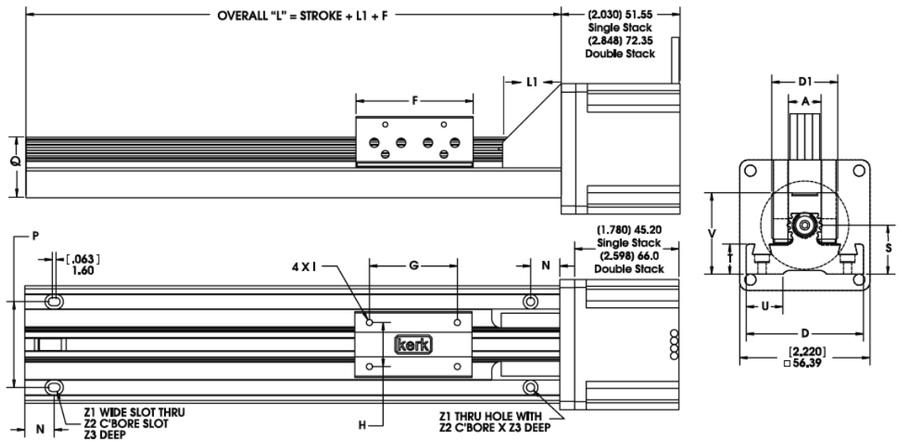
	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32 UNC	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0		25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.9	3.6	6.3	3.3

* Metric threads also available for carriage.

RGW06 Wide 57000 Series Size 23 Single Stack and Double Stack linear motors

Recommended for horizontal loads up to 35 lbs (156 N)

Dimensions = (inches) mm

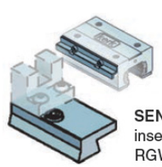


	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32 UNC	(1.0)	(0.5)	(1.46)	(0.74)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0		25.4	12.7	22.9	37.1	21.1	13.0	16.0	35.3	3.6	6.3	3.6

* Metric threads also available for carriage.

RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mount 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

Single Stack

57000 Series Size 23

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
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				

** Unipolar drive gives approximately 30% less thrust than bipolar drive.
Standard motors are Class B rated for maximum temperature of 130°C.

Double Stack

57000 Series Size 23

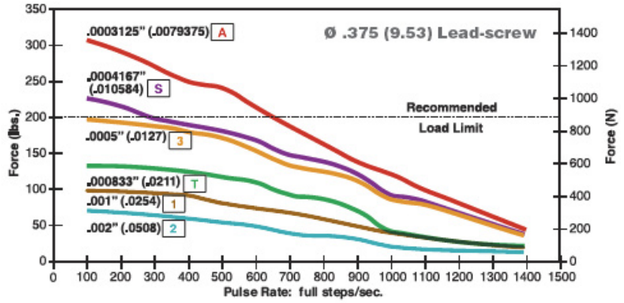
Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase	3.85 A	2.5 A	1 A
Resistance/phase	0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase	2.3 mH	7.6 mH	35.0 mH
Power Consumption	25 W Total		
Rotor Inertia	321 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

57000 Series
Size 23
Single Stack
External Linear

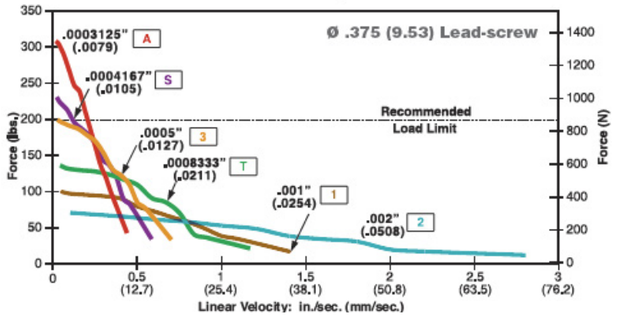
57000 Series
Size 23
Double Stack
External Linear

Single Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle

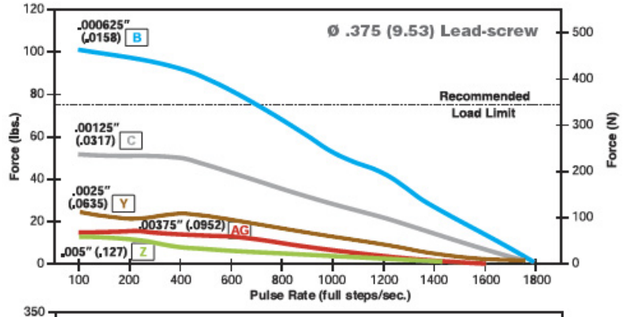


FORCE vs. LINEAR VELOCITY
– Chopper
– Bipolar
– 100% Duty Cycle

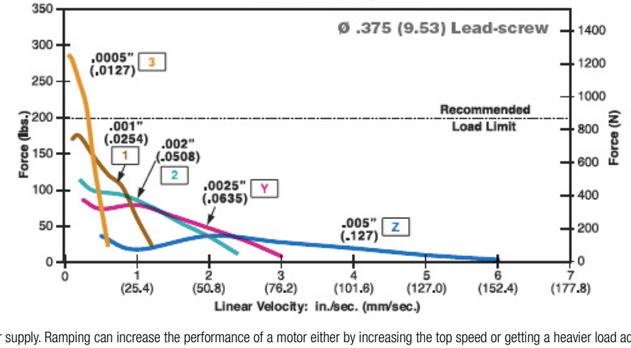


Double Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper
– 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

43000 Series Size 17 and 57000 Series Size 23

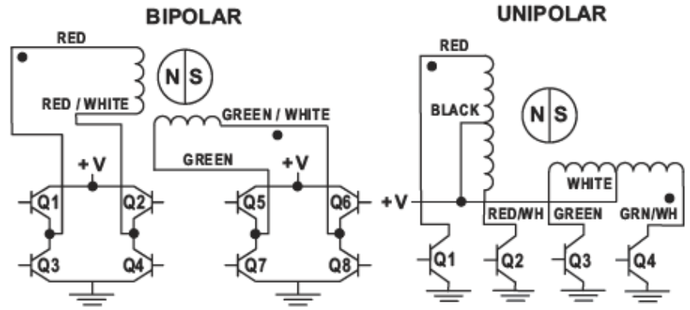
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



Size 17 43000 Series • Integrated Connectors

Haydon Kerk Hybrid Size 17 Single and Double Stack 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. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

Motor Connector: JST part # S06B-PASK-2

Mating Connector: JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)

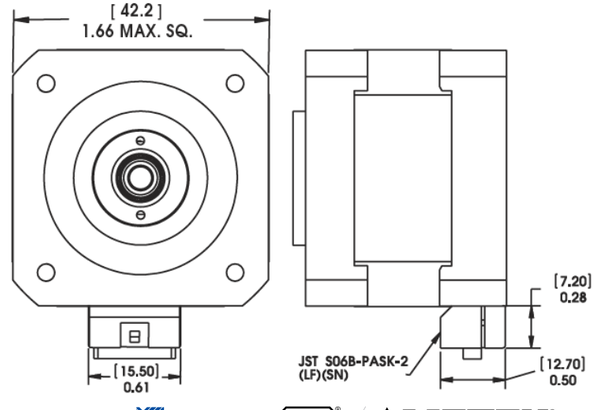
Wire to Board Connector: JST part number SPHD-001T-P0.5

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

Dimensional Drawings

Integrated Connector with 43000 Series Size 17

Dimensions = (mm) inches



RGS06 Non-Motorized Linear Rails

- Screw driven linear rails in standard or wide format
- Linear rails without screw in standard or wide format

The non-motorized RGS Series features standard wear compensating, anti-backlash driven carriages to ensure 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.
Recommended for horizontal loads up to 35 lbs (156 N).

RGW06 Wide Series,
Non-Motorized
Screw Driven Linear Rail

Identifying the Non-Motorized RGS Part Numbers 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		**Drive / Mounting** **A** = None **B** = Inline 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 (2.54)		**Unique Identifier** Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

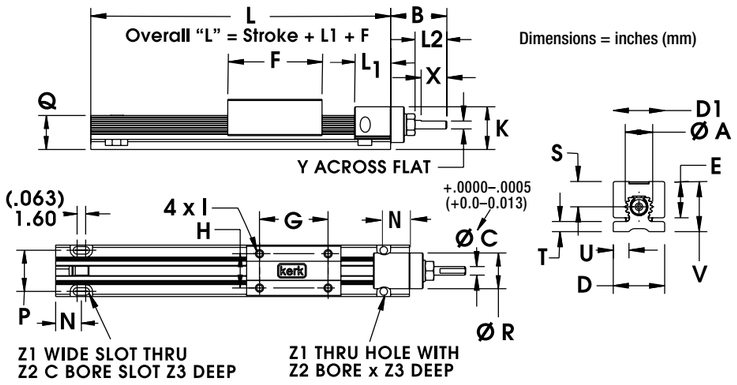
Specifications

	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
RGS06 Non-Motorized with Guide Screw	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**	0.6 (15.2)	3/8 (9.5)	4.0 (0.3)	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**			5.0 (.04)		1.5 (.023)		
	.500 (12.70)	**0500**			6.0 (.04)		2.5 (.039)		
	1.000 (25.40)	**1000**			7.0 (.05)		4.5 (.070)		

NOTE: RGS 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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Standard Frame



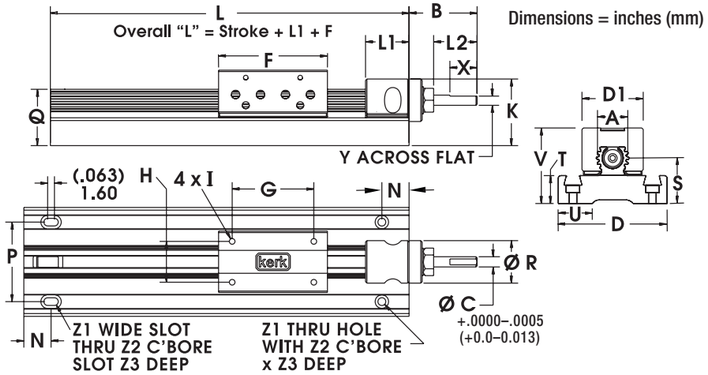
RGS06 Non-Motorized, Screw Driven

	A	B	C	D	D1	E	F	G	H	I*	K	L1	L2	N	P	Q	R	S	T	U	V	X	Z1	Z2	Z3
inch	0.60	1.25	.1875	1.13	1.13	0.79	2.0	1.50	0.750	6-32 UNC	0.9	.80	.80	.50	.90	.74	.80	.55	.22	.35	1.1	.50	.14	.25	.13
mm	15.2	31.8	4.762	28.6	28.6	20.1	51	38.1	19.1		23	20.3	20.3	12.7	22.8	18.8	20.3	14.0	5.6	8.9	28	12.7	3.6	6.4	3.3

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Wide Frame



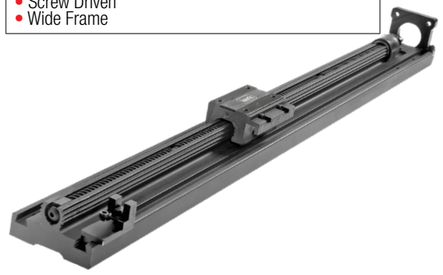
RGW06 Wide Series, Non-Motorized, Screw Driven

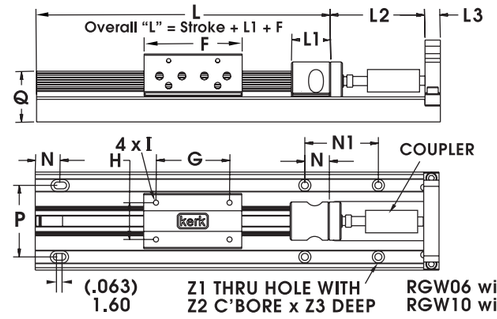
	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

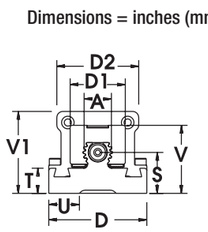
*Metric carriage hole sizes available M3, M4, M5, M6.

Motor Mount for Non-Motorized with Lead Screw Dimensional Drawings

- Motor Mount
- Screw Driven
- Wide Frame







NOTE: The coupling shown in the dimensional drawing is not included.

RGW06 Motor Mount, Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

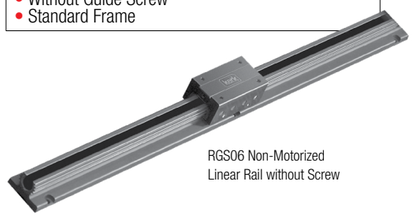
*Metric carriage hole sizes available M3, M4, M5, M6.

RGW06 Sensor Mount Kits

Sensor mounting kits based on U-channel optical sensor. 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 sensor manufacturer.
Part # RGW06SK

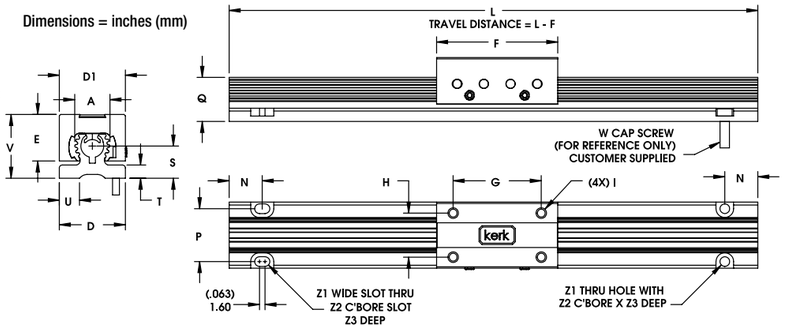
Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Standard Frame



RGS06 Non-Motorized
Linear Rail without Screw

Dimensions = inches (mm)



RGS06 Non-Motorized, Without Screw Driven

	A	D	D1	E	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	0.60	1.13	1.13	.79	2.0	1.50	.75	6-32	.50	.90	.74	.55	.22	.35	1.1	.14	.25	.13
mm	15.2	28.6	28.6	20.1	51	38.1	19	UNC	12.7	22.8	18.8	14	5.6	8.9	28	3.6	6.4	3.3

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Wide Frame

Dimensions = inches (mm)

RGS06 Wide Series, Non-Motorized, Without Screw Driven

	A	D	D1	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	0.60	1.13	1.13	2.0	1.50	.75	6-32	.50	1.46	1.04	.83	.51	.63	1.4	.14	.25	.14
mm	15.2	28.6	28.6	51	38.1	19	UNC	12.7	37	26.4	21.2	13	16	36	3.6	6.4	3.6

*Metric carriage hole sizes available M3, M4, M5, M6.

To determine what is best for your application see the Linear Rail Applications Checklist.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers, Kerkite Polymers are formulated to provide optimum performance in its target conditions and applications.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris. Kerkote differs from conventional plating and coating because it is soft, more evenly distributed than other lubricants, and decreases erratic drag torques and unpredictable wear.

- Reduces friction
- Cost effective
- Long term and maintenance free

Kerkote provides the maximum level of self-lubrication, requiring no additional external lubrication or maintenance.

RGW06 Non-Motorized Linear Rails

- Screw driven linear rails in wide format
- Linear rails without screw in wide format

The non-motorized RGW Series features standard wear compensating, anti-backlash driven carriages to ensure 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. Recommended for horizontal loads up to 35 lbs (156 N).

RGW06 Wide Series,
Non-Motorized
Screw Driven Linear Rail

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the Non-Motorized RGW Part Numbers when Ordering

RG	W	06	K	—	A	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**W** = Wide Sensor Mount Capability	**06** = 35 lbs (156 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None **B** = Inline Screw Motor Mount	0000 = No Screw 0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

Specifications

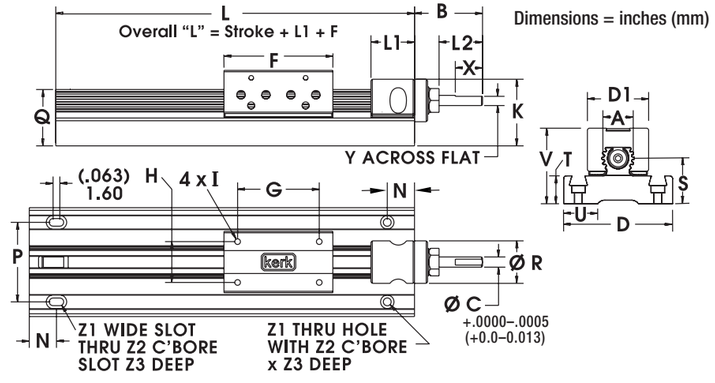
RGW06 Non-Motorized with Lead Screw	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec²/in (kg-m-sec²/m)
	.100 (2.54)	**0100**	0.6 (15.2)	3/8 (9.5)	4.0 (0.3)	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**			5.0 (.04)		1.5 (.023)		
	.500 (12.70)	**0500**			6.0 (.04)		2.5 (.039)		
	1.000 (25.40)	**1000**			7.0 (.05)		4.5 (.070)		

NOTE: RGW 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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Wide Frame

Dimensions = inches (mm)



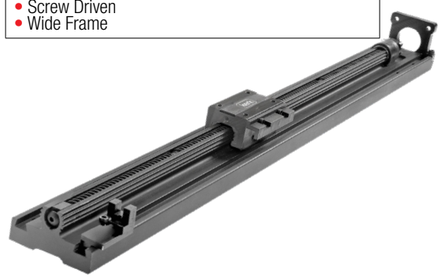
RGW06 Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

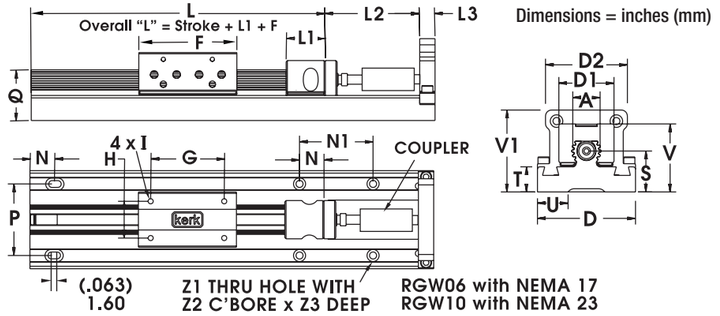
*Metric carriage hole sizes available M3, M4, M5, M6.

Motor Mount for Non-Motorized with Lead Screw Dimensional Drawings

- Motor Mount
- Screw Driven
- Wide Frame



Dimensions = inches (mm)



NOTE: The coupling shown in the dimensional drawing is not included.

RGW06 Motor Mount, Wide Series, Non-Motorized, Screw Driven

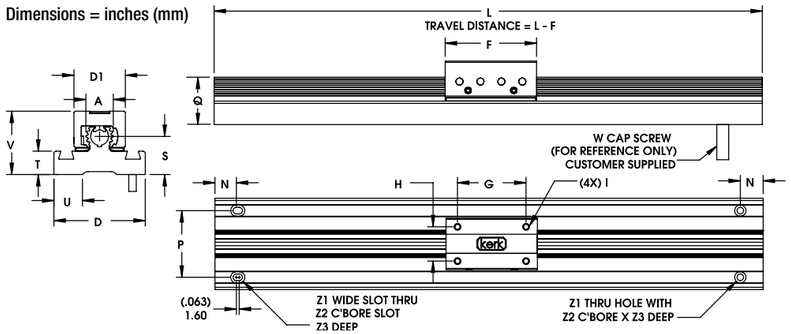
	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Wide Frame

Dimensions = inches (mm)



RGW06 Wide Series, Non-Motorized, Without Screw Driven

	A	D	D1	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	0.60	1.13	1.13	2.0	1.50	.75	6-32 UNC	.50	1.46	1.04	.83	.51	.63	1.4	.14	.25	.14
mm	15.2	28.6	28.6	51	38.1	19		12.7	37	26.4	21.2	13	16	36	3.6	6.4	3.6

*Metric carriage hole sizes available M3, M4, M5, M6.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris.

- Reduces friction
- Cost effective
- Requires no additional external lubrication or maintenance

Accessory

RGW06 Sensor Mount Kits

Sensor mounting kits based on U-channel optical sensor. 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 sensor manufacturer. Part # RGW06SK

RGS08 Linear Rail for Heavier Weight Applications

with 57000 Series Size 23 Single and Double Stack Hybrid Linear Actuators

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.

Technical specifications for 57000 Series Size 23 Hybrid Linear Actuator Stepper Motors are on page 3.

To determine what is best for your application see the Linear Rail Applications Checklist.

RGS08
57000 Series Size 23
Double Stack

Identifying the RGS08 Part Number Codes when Ordering

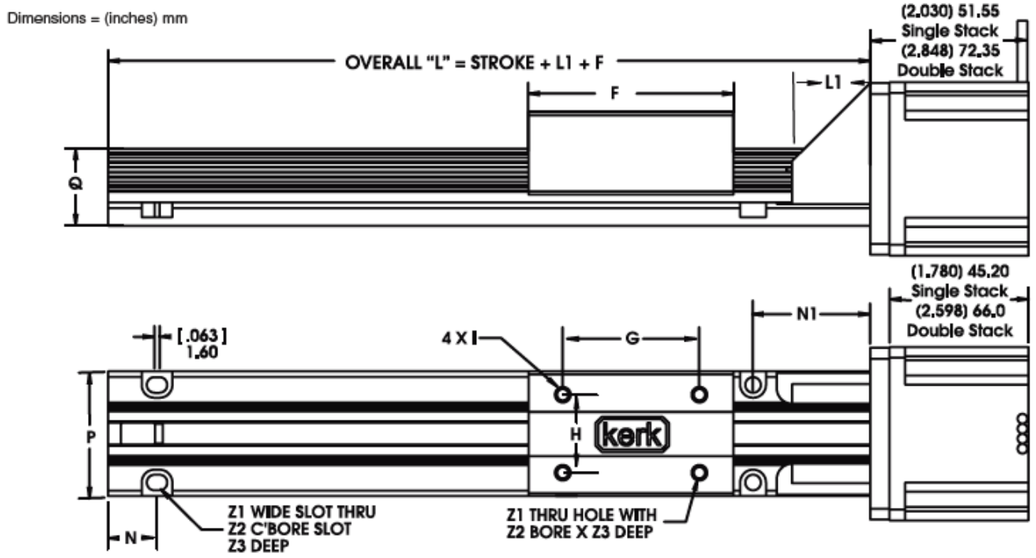
RG	S	08	K	—	M	—	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard	**08** = 50 lbs (222 N) (Maximum static load)	**K = TFE Kerkote®** **X = Special (example: Kerkote with grease)**		**M** = Motorized		**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)**		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.

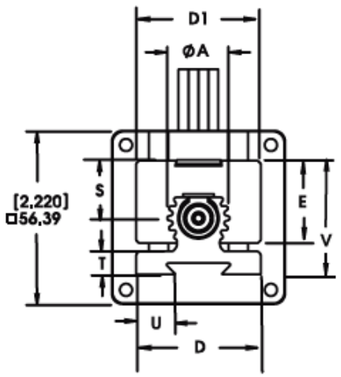
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M4, M5, M6

RGS08 with 57000 Series Size 23 Single and Double Stack Linear Actuators

Recommended for horizontal loads up to 50 lbs (222 N)





	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)	10-20 UNC	(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		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.

Single Stack

57000 Series Size 23

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
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				

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

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

Double Stack

57000 Series Size 23

Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
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	321 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

57000 Series Size 23
Single Stack
External Linear

57000 Series Size 23
Double Stack
External Linear

Size 23 57000 Series • Stepping Sequence & Wiring

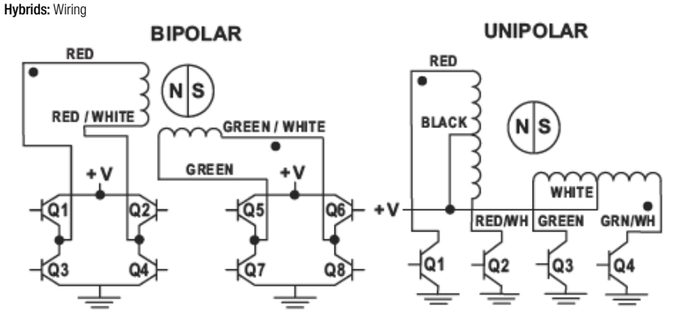
Hybrids: Stepping Sequence

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

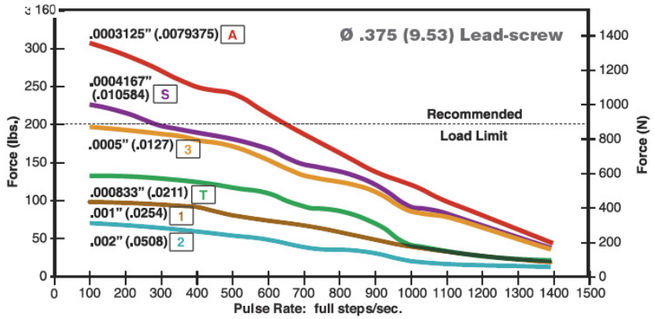
Note: Half stepping is accomplished by inserting an off state between transitioning phases.

Hybrids: Wiring

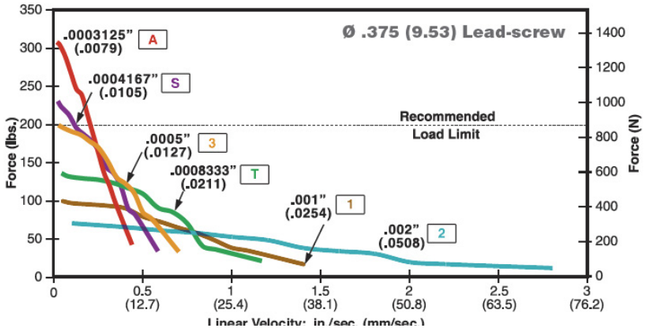


Single Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle

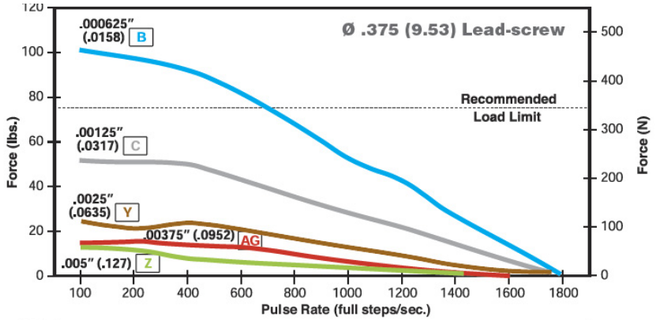


FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle

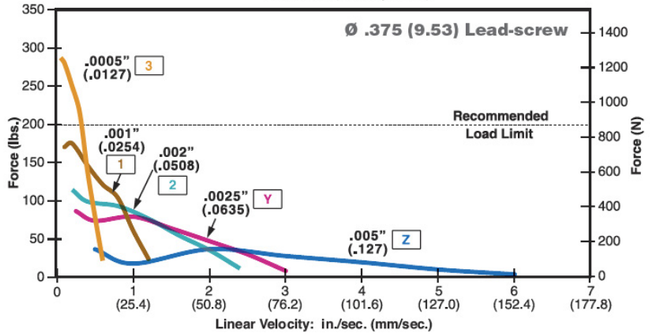


Double Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper – 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

RGS08 Non-Motorized Linear Rails

Screw driven linear rail or linear rail without screw

The non-motorized RGS Series features standard wear compensating, anti-backlash driven carriages to ensure 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.
Recommended for horizontal loads up to 50 lbs (222 N).

RGS08 Non-Motorized
Screw Driven Linear Rail

Identifying the Non-Motorized RGS Part Numbers when Ordering

RG	S	08	K	—	A	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard	**08** = 50 lbs (222 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None	0000 = No Screw 0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

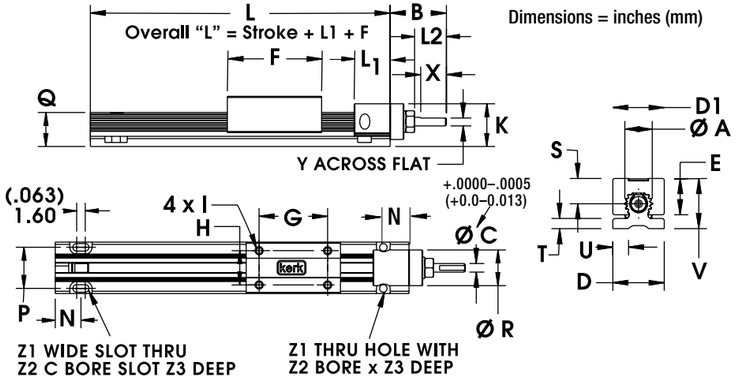
Specifications

	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
RGS08 Non-Motorized with Lead Screw	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**	0.8 (20.3)	1/2 (12.7)	5.0 (0.4)	100,000,000 (254,000,000)	1.1 (.018)	50 (222)	5.2×10^{-5} (20.0×10^{-6})
	.200 (5.08)	**0200**			6.0 (.04)		1.7 (.027)		
	.500 (12.70)	**0500**			7.0 (.05)		3.0 (.047)		
	1.000 (25.40)	**1000**			8.0 (.06)		6.0 (.096)		

NOTE: RGS 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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Standard Frame



RGS08 Non-Motorized, Screw Driven

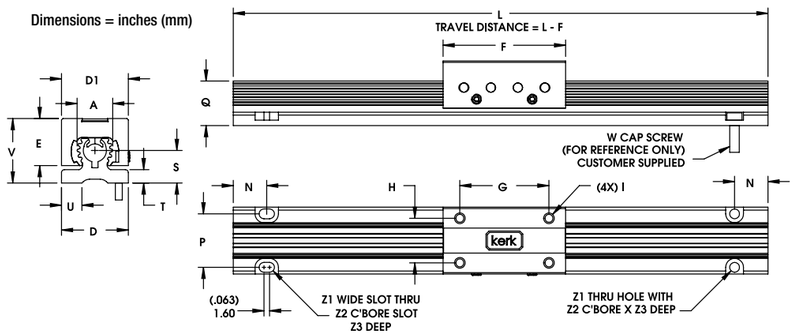
	A	B	C	D	D1	E	F	G	H	I*	K	L1	L2	N	P	Q	R	S	T	U	V	X	Z1	Z2	Z3
inch	0.80	1.50	.250	1.60	1.60	1.06	2.7	1.75	1.00	10-24 UNC	1.3	1.09	.77	.625	1.25	1.0	1.04	.74	.30	.51	1.47	.70	.22	.33	.19
mm	20.3	38.1	6.35	40.6	40.6	26.9	69	44.4	25.4		33	27.7	19.6	15.8	31.75	25.4	26.4	18.8	7.6	13	37.3	17.8	5.5	8.4	4.8

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Standard Frame

Dimensions = inches (mm)



RGS08 Non-Motorized, Without Screw Driven

	A	D	D1	E	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	0.80	1.60	1.60	1.06	2.7	1.75	1.00	10-24	.625	1.25	1.00	.74	.30	.51	1.47	.20	.33	.19
mm	20.3	40.6	40.6	26.9	69	44.4	25.4	UNC	15.8	31.7	25.4	18.8	7.6	13	37.3	5.1	8.3	4.8

*Metric carriage hole sizes available M3, M4, M5, M6.

To determine what is best for your application see the Linear Rail Applications Checklist.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers, Kerkite Polymers are formulated to provide optimum performance in its target conditions and applications.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris. Kerkote differs from conventional plating and coating because it is soft, more evenly distributed than other lubricants, and decreases erratic drag torques and unpredictable wear.

- Reduces friction
- Cost effective
- Long term and maintenance free

Kerkote provides the maximum level of self-lubrication, requiring no additional external lubrication or maintenance.

RGS10 and RGW10 Wide Linear Rails

with 57000 Series Size 23 Hybrid Linear Actuators

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. RGS Series Linear Rail with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors

Technical specifications for 57000 Series Size 23 Hybrid Linear Actuator Stepper Motors are on page 3.

To determine what is best for your application see the Linear Rail Applications Checklist.

RGS08
57000 Series Size 23
Double Stack

Identifying the RGS10 and RGW10 Part Number Codes when Ordering

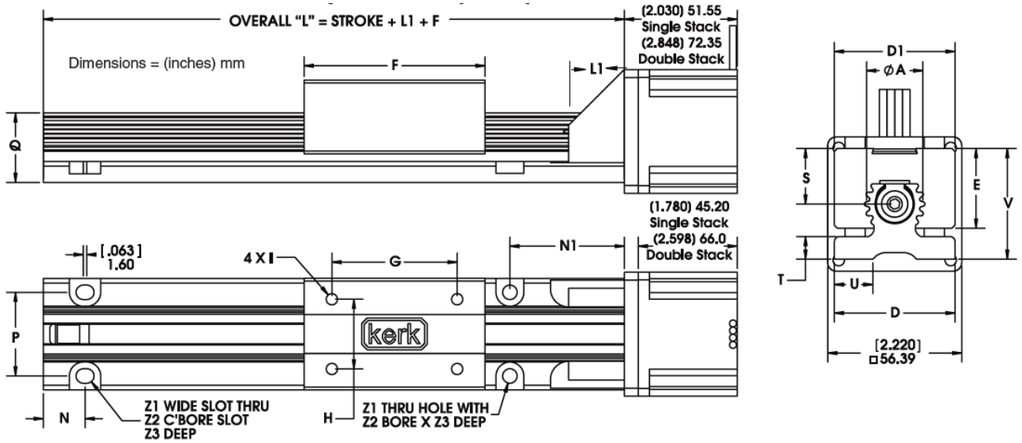
RG	S	10	K	—	M	—	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard **W** = Wide sensor mount capability	**10** = 100 lbs (445 N) (Maximum static load)	**K** = TFE Kerkote®		**M** = Motorized		**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)		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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M4, M5, M6

RGS10 with 57000 Series Size 23 Single and Double Stack Linear Actuators

Recommended for horizontal loads up to 100 lbs (445 N)

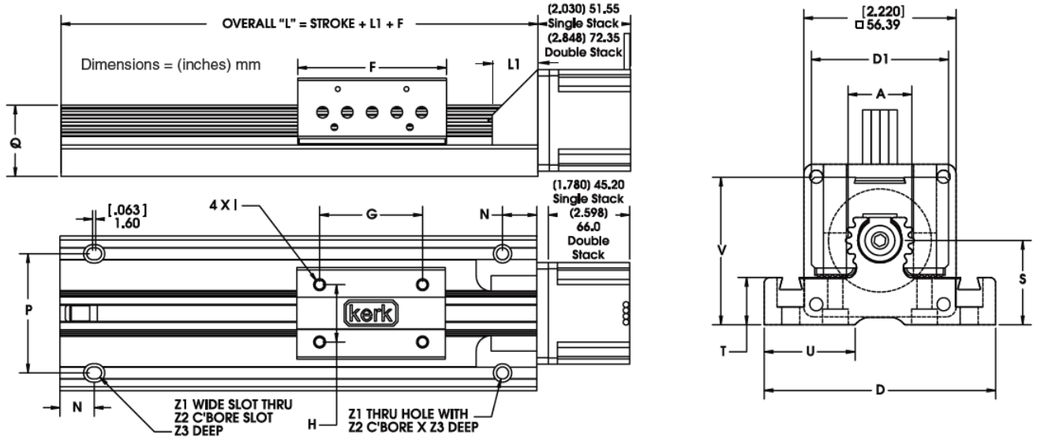


	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(1.0)	(2.0)	(2.0)	(1.32)	(3.3)	(2.25)	(1.25)	1/4-20 UNC	(1.0)	(0.75)	(2.045)	(1.5)	(1.25)	(0.92)	(0.375)	(0.64)	(1.83)	(0.26)	(0.5)	(0.22)
mm	25.4	50.8	50.8	33.5	83.8	57.1	31.7		25.4	19.0	52.2	38.1	37.1	23.4	9.53	16.3	46.5	6.6	12.7	5.6

* Metric threads also available for carriage.

RGW10 Wide with 57000 Series Size 23 Single and Double Stack Linear Actuators

Recommended for horizontal loads up to 100 lbs (445 N)

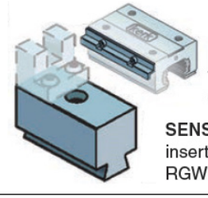


	A	D	D1	F	G	H	I*	L1	N	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(1.0)	(3.38)	(2.0)	(3.3)	(2.25)	(1.25)	1/4-20 UNC	(1.0)	(0.75)	(2.6)	(1.56)	(1.22)	(0.69)	(1.33)	(2.15)	(0.26)	(0.4)	(0.43)
mm	25.4	85.9	50.8	83.8	57.1	31.7		25.4	19.0	66.0	39.6	31.0	17.5	33.8	54.6	6.6	10.2	10.9

* Metric threads also available for carriage.

RGW10 Sensor Mount Kit Part No. RGW10SK

Sensor mount 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

Single Stack

57000 Series Size 23

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
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 gcm²				
Insulation Class	Class B (Class F available)				
Weight	18 oz (511 g)				
Insulation Resistance	20 MΩ				

** Unipolar drive gives approximately 30% less thrust than bipolar drive.
Standard motors are Class B rated for maximum temperature of 130°C.

Double Stack

57000 Series Size 23

Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
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	321 gcm²		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

57000 Series Size 23
Single Stack
External Linear

57000 Series Size 23
Double Stack
External Linear

Size 23 57000 Series • Stepping Sequence & Wiring

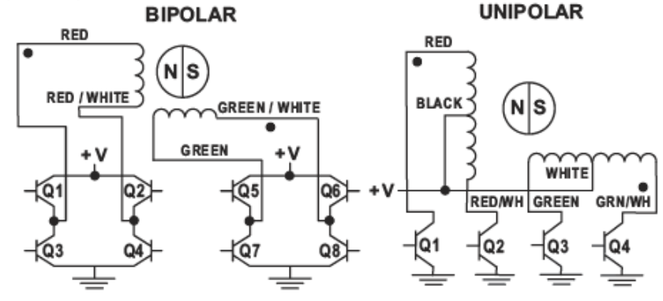
Hybrids: Stepping Sequence

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

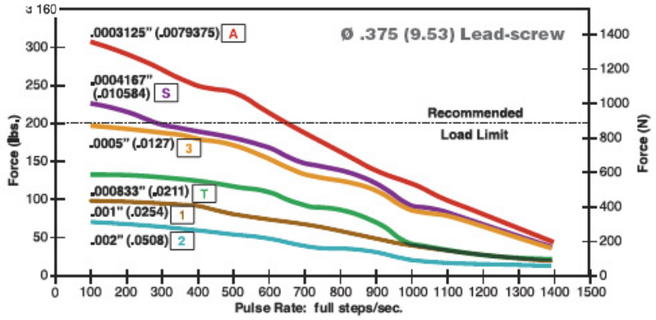
Note: Half stepping is accomplished by inserting an off state between transitioning phases.

Hybrids: Wiring

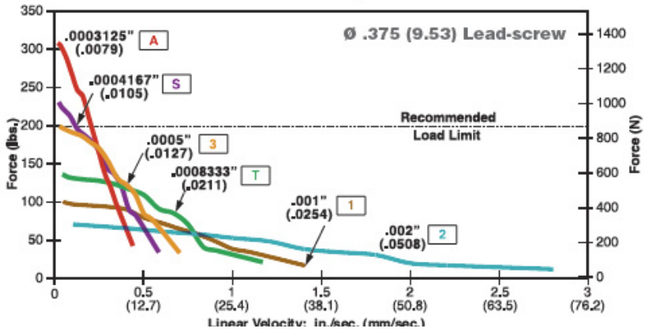


Single Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle

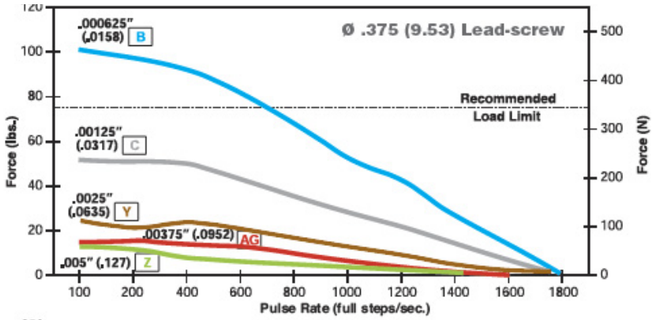


FORCE vs. LINEAR VELOCITY
– Chopper
– Bipolar
– 100% Duty Cycle

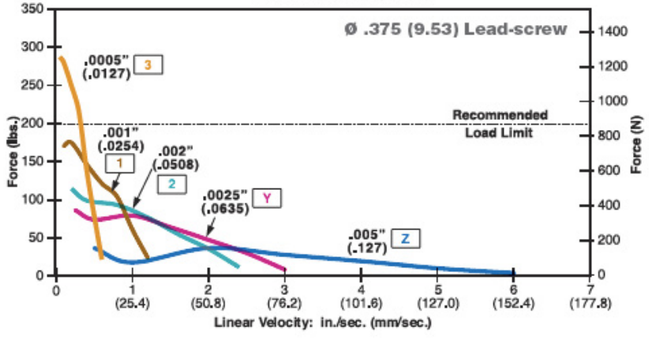


Double Stack

FORCE vs. PULSE RATE
– Chopper
– Bipolar
– 100% Duty Cycle



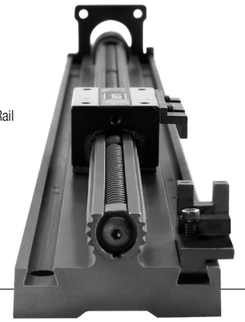
FORCE vs. LINEAR VELOCITY
– Chopper
– Bipolar
– 100% Duty Cycle



RGS10 Non-Motorized Linear Rails

- Screw driven linear rails in standard or wide format
- Linear rails without screw in standard or wide format

The non-motorized RGS Series features standard wear compensating, anti-backlash driven carriages to ensure 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.
Recommended for horizontal loads up to 100 lbs (445 N).



RGW10 Wide Series,
Non-Motorized
Screw Driven Linear Rail

Identifying the Non-Motorized RGS Part Numbers when Ordering

RG	S	10	K	—	A	0500	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**S** = Standard **W** = Wide Sensor Mount Capability	**10** = 100 lbs (445 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None **B** = Inline Screw Motor Mount	0000 = No Screw 0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

Specifications

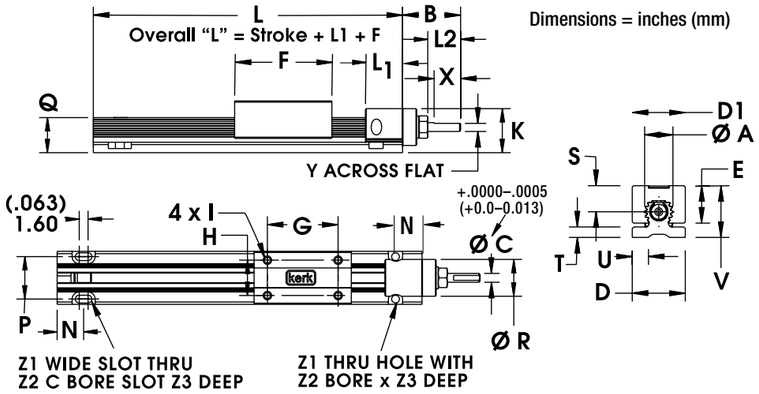
RGS10 Non-Motorized with Lead Screw	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**	1.0 (25.4)	5/8 (15.9)	5.0 (0.4)	100,000,000 (254,000,000)	1.3 (.020)	100 (445)	14.2×10^{-5} (3.9×10^{-6})
	.200 (5.08)	**0200**			6.5 (.05)		2.0 (.031)		
	.500 (12.70)	**0500**			7.0 (.05)		3.0 (.047)		
	1.000 (25.40)	**1000**			8.5 (.06)		6.5 (.101)		

NOTE: RGS 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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Standard Frame

Dimensions = inches (mm)



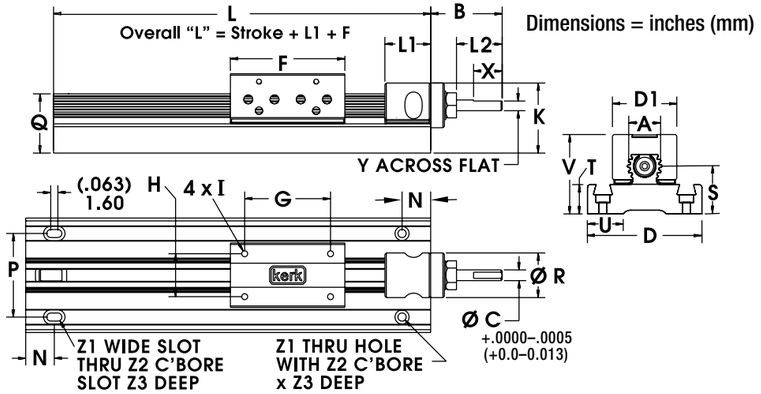
RGS10 Non-Motorized, Screw Driven

	A	B	C	D	D1	E	F	G	H	I*	K	L1	L2	N	P	Q	R	S	T	U	V	X	Y	Z1	Z2	Z3
inch	1.0	1.75	.312	2.0	2.0	1.32	3.3	2.25	1.25	1/4-20 UNC	1.6	1.3	.30	.75	1.5	1.25	1.3	.92	.375	.64	1.83	.88	.28	.26	.50	.22
mm	25.4	44.5	7.93	50.8	50.8	33.5	83	57.1	31.8		41	33	33	19	38.1	31.8	33	23.4	9.5	16.3	46.5	22.4	7.1	6.6	12.7	5.6

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Wide Frame



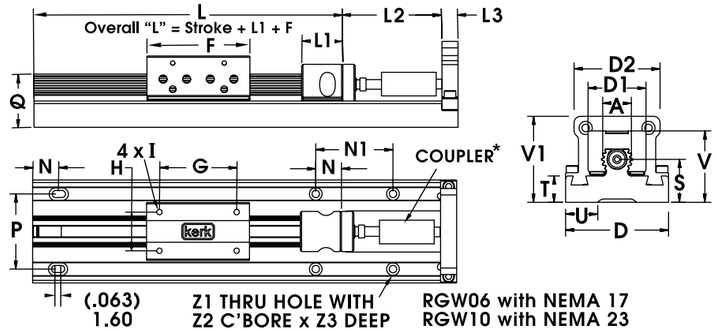
RGW10 Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	S	T	U	V	X	Y	Z1	Z2	Z3
inch	1.0	1.75	.312	3.38	2.0	3.3	2.25	1.25	1/4-20 UNC	1.9	1.3	1.3	.75	2.6	1.5	1.2	.69	1.3	2.1	.88	.28	.14	.40	.43
mm	25.4	44.5	7.93	85.7	50.8	83	57.1	31.7		48	33	33	19	66	39.6	31	17.5	33.8	54.6	22.4	7.11	6.6	10.2	10.9

*Metric carriage hole sizes available M3, M4, M5, M6.

Motor Mount for Non-Motorized with Lead Screw Dimensional Drawings

- Motor Mount
- Screw Driven
- Wide Frame



Dimensions = inches (mm) *NOTE: The coupling shown in the dimensional drawing is not included.

RGW10 Motor Mount, Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

*Metric carriage hole sizes available M3, M4, M5, M6.

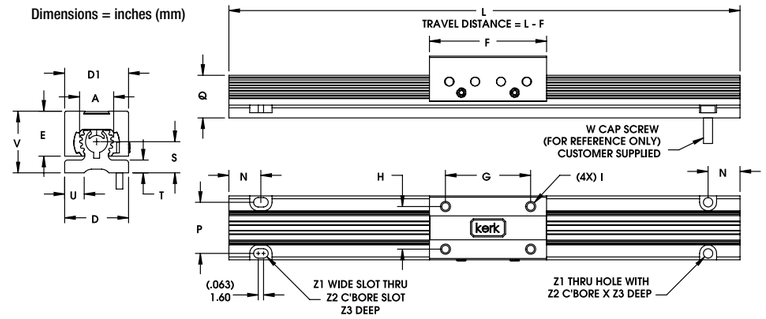
RGW10 Sensor Mount Kits

Sensor mounting kits based on U-channel optical sensor. 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 sensor manufacturer.
Part # RGW10SK

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Standard Frame

Dimensions = inches (mm)



RGS10 Non-Motorized, Without Screw Driven

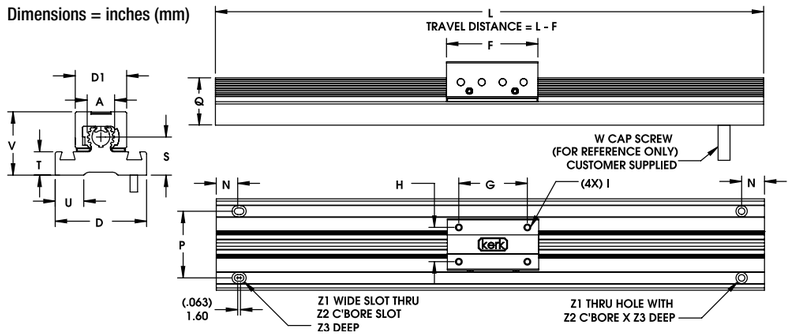
	A	D	D1	E	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	1.0	2.0	2.0	1.32	3.3	2.25	1.25	1/4-200 UNC	.75	1.5	1.25	.92	.375	.64	1.83	.26	.50	.22
mm	25.4	50.8	50.8	33.5	83	57.1	31.7		19	38.1	31.8	14	9.5	16.3	46.5	6.6	12.7	5.6

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Wide Frame

Dimensions = inches (mm)



RGW10 Wide Series, Non-Motorized, Without Screw Driven

	A	D	D1	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	1.0	3.38	2.0	3.3	2.25	1.25	1/4-200 UNC	.75	2.6	1.5	1.2	.69	1.3	2.15	.26	.40	.43
mm	25.4	85.7	50.8	83	57.1	31.7		19	66	39.6	31	17.5	33.8	54.6	6.6	10.2	10.9

*Metric carriage hole sizes available M3, M4, M5, M6.

To determine what is best for your application see the Linear Rail Applications Checklist.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers, Kerkite Polymers are formulated to provide optimum performance in its target conditions and applications.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris. Kerkote differs from conventional plating and coating because it is soft, more evenly distributed than other lubricants, and decreases erratic drag torques and unpredictable wear.

- Reduces friction
- Cost effective
- Long term and maintenance free

Kerkote provides the maximum level of self-lubrication, requiring no additional external lubrication or maintenance.

RGW10 Non-Motorized Linear Rails

- Screw driven linear rails in wide format
- Linear rails without screw in wide format

The non-motorized RGW Series features standard wear compensating, anti-backlash driven carriages to ensure 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. Recommended for horizontal loads up to 100 lbs (445 N).

RGW10 Wide Series, Non-Motorized Screw Driven Linear Rail

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the Non-Motorized RGW Part Numbers when Ordering

RG	W	10	K	—	A	—	0500	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
RG = Rapid Guide Screw	**W** = Wide Sensor Mount Capability	**10** = 100 lbs (445 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None **B** = Inline Screw Motor Mount		0000 = No Screw 0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

Specifications

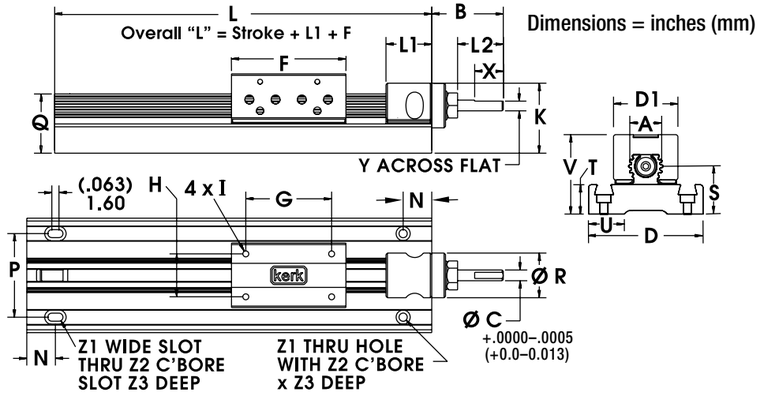
	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
RGW10 Non-Motorized with Lead Screw	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**	1.0 (25.4)	5/8 (15.9)	5.0 (0.4)	100,000,000 (254,000,000)	1.3 (.020)	100 (445)	14.2 x 10^{-5} (3.9 x 10^{-6})
	.200 (5.08)	**0200**			6.5 (.05)		2.0 (.031)		
	.500 (12.70)	**0500**			7.0 (.05)		3.0 (.047)		
	1.000 (25.40)	**1000**			8.5 (.06)		6.5 (.101)		

NOTE: RGW 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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Wide Frame

Dimensions = inches (mm)



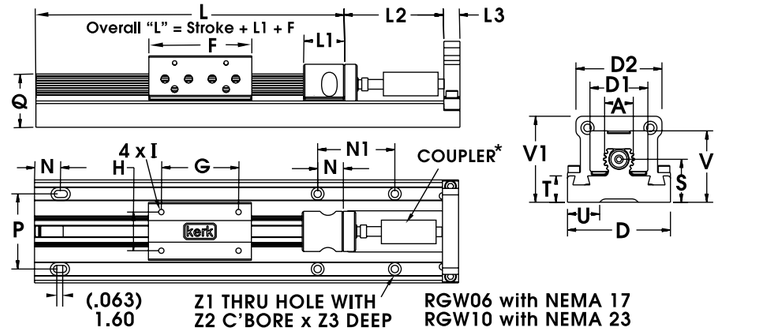
RGW10 Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	S	T	U	V	X	Y	Z1	Z2	Z3
inch	1.0	1.75	.312	3.38	2.0	3.3	2.25	1.25	1/4-20 UNC	1.9	1.3	1.3	.75	2.6	1.5	1.2	.69	1.3	2.1	.88	.28	.14	.40	.43
mm	25.4	44.5	7.93	85.7	50.8	83	57.1	31.7		48	33	33	19	66	39.6	31	17.5	33.8	54.6	22.4	7.11	6.6	10.2	10.9

*Metric carriage hole sizes available M3, M4, M5, M6.

Motor Mount for Non-Motorized with Lead Screw Dimensional Drawings

- Motor Mount
- Screw Driven
- Wide Frame



Dimensions = inches (mm)

*NOTE: The coupling shown in the dimensional drawing is not included.

RGW10 Motor Mount, Wide Series, Non-Motorized, Screw Driven

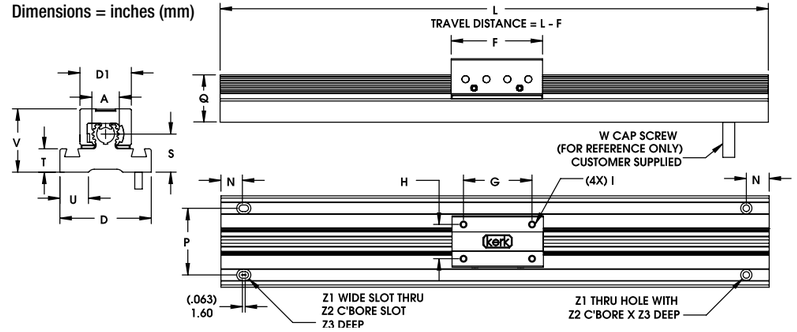
	A	B	C	D	D1	F	G	H	I*	K	L1	L2	N	P	Q	R	S1	T	U	V	X	Y	Z1	Z2	Z3
inch	0.60	1.25	.1875	2.0	1.13	2.0	1.50	0.750	6-32 UNC	1.2	.80	.80	.50	1.46	1.04	.80	.83	.51	.63	1.4	.50	.170	.14	.25	.14
mm	15.2	31.8	4.762	50.8	28.6	50.8	38.1	19.1		30	20.3	20.3	12.7	37.0	26.4	20.3	21.2	13.0	16.0	36	12.7	4.32	3.6	6.4	3.6

*Metric carriage hole sizes available M3, M4, M5, M6.

Non-Motorized without Lead Screw Dimensional Drawings

- Without Guide Screw
- Wide Frame

Dimensions = inches (mm)



RGW10 Wide Series, Non-Motorized, Without Screw Driven

	A	D	D1	F	G	H	I*	N	P	Q	S	T	U	V	Z1	Z2	Z3
inch	1.0	3.38	2.0	3.3	2.25	1.25	1/4-200 UNC	.75	2.6	1.5	1.2	.69	1.3	2.15	.26	.40	.43
mm	25.4	85.7	50.8	83	57.1	31.7		19	66	39.6	31	17.5	33.8	54.6	6.6	10.2	10.9

*Metric carriage hole sizes available M3, M4, M5, M6.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris.

- Reduces friction
- Cost effective
- Requires no additional external lubrication or maintenance

Accessory

RGW10 Sensor Mount Kits

Sensor mounting kits based on U-channel optical sensor. 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 sensor manufacturer. Part # RGW10SK

WGS06 Linear Rails with 43000 Series Hybrid Motor

**Also available with 57000 Series Hybrid Motor (info available starting on page 5)*

The 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.

Technical specifications for 43000 Series Size 17 Hybrid Linear Actuator Stepper Motors and Haydon Kerk IDEA™ programmable drives are on page 3, 57000 Series Size 23 specifications are on page 5.

To determine what is best for your application see the Linear Rail Applications Checklist.

WGS06 with 43000 Series Size 17
hybrid linear stepper motor

WGS06 with 43000 Series Size 17
with an optional IDEA™ Drive
(not available for Size 23 motor)

Identifying the WGS06 Part Number Codes when Ordering

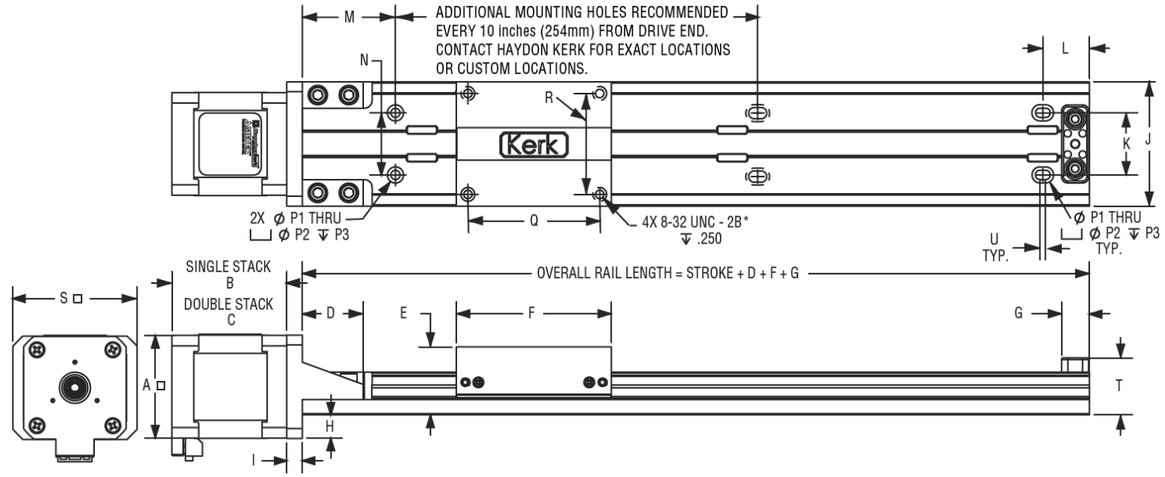
WG	S	06	K	—	G	—	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
WG = Wide Guide Screw	**S** = Standard	**06** = 35 lbs (156 N) (Maximum static load)	**K = TFE Kerkote®**		**M** = Motorized **G** = Motorized + IDEA™ integrated programmable drive – USB communi-cations **J** = Motorized + IDEA™ integrated programmable drive – RS485 communications		**0100 = .100-in (2.54)** **0200 = .200-in (5.08)** **0500 = .500-in (12.70)** **1000 = 1.000-in (25.4)**		**– M43 =** 43000 Series-Size 17 Motor **– G43 =** 43000 Series Size 17 Motor with IDEA Drive **– M57 =** 57000 Series-Size 23 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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M4, M5, M6

WGS06 Linear Slide with 43000 Series Size 17 Linear Actuator

Recommended for horizontal loads up to 35 lbs (156 N)



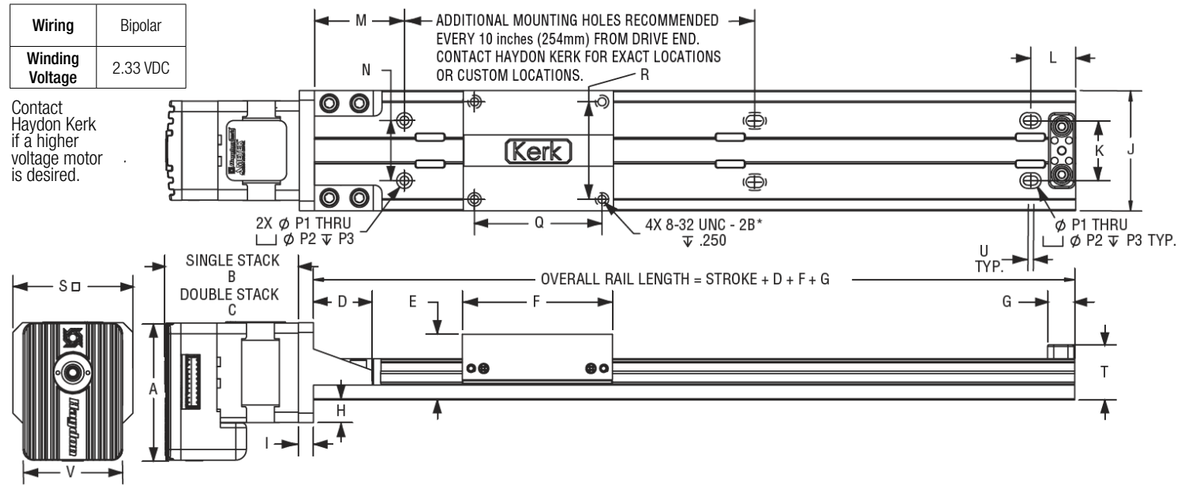
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U
(mm)	(42.2)	(33.8)	(47.75)	(24.9)	(27.9)	(63.5)	(11.2)	(9.7)	(6.4)	(50.8)	(25.4)	(19.1)	(38.1)	(25.4)	(3.81)	(6.60)	(6.50)	(53.95)	(41.25)	(50.8)	(23.3)	(2.3)
inch	1.660 MAX.	1.330 MAX.	1.880 MAX.	0.98	1.1	2.50	0.44	0.38	0.250	2.00	1.000	0.75	1.50	1.000	0.150	0.260	0.256	2.124	1.624	2.00	0.92	0.090

* Metric threads also available for carriage.

...with IDEA™ Drive

Wiring	Bipolar
Winding Voltage	2.33 VDC

Contact Haydon Kerk if a higher voltage motor is desired.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U	V
(mm)	(58.0)	(63.72)	(77.67)	(24.9)	(27.9)	(63.5)	(11.2)	(9.7)	(6.4)	(50.8)	(25.4)	(19.1)	(38.1)	(25.4)	(3.81)	(6.60)	(6.50)	(53.95)	(41.25)	(50.8)	(23.3)	(2.3)	(42.0)
inch	2.283 MAX.	2.509 MAX.	3.058 MAX.	0.98	1.1	2.50	0.44	0.38	0.250	2.00	1.000	0.75	1.50	1.000	0.150	0.260	0.256	2.124	1.624	2.00	0.92	0.090	1.66

* Metric threads also available for carriage.

Single Stack

■ **43000 Series Size 17**

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Programmable Drive	IDEA Drive option available			Not applicable	
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				

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

Nominal Thread Lead		Lead Code
inches	mm	
0.1	2.54	0100
0.2	5.08	0200
0.5	12.7	0500
1.0	25.4	1000

43000 Series Size 17
Single Stack External Linear

Double Stack

■ **43000 Series Size 17**

Size 17 Double Stack: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Programmable Drive	IDEA Drive option available		
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	13.2 W		

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.

Nominal Thread Lead		Lead Code
inches	mm	
0.1	2.54	0100
0.2	5.08	0200
0.5	12.7	0500
1.0	25.4	1000

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

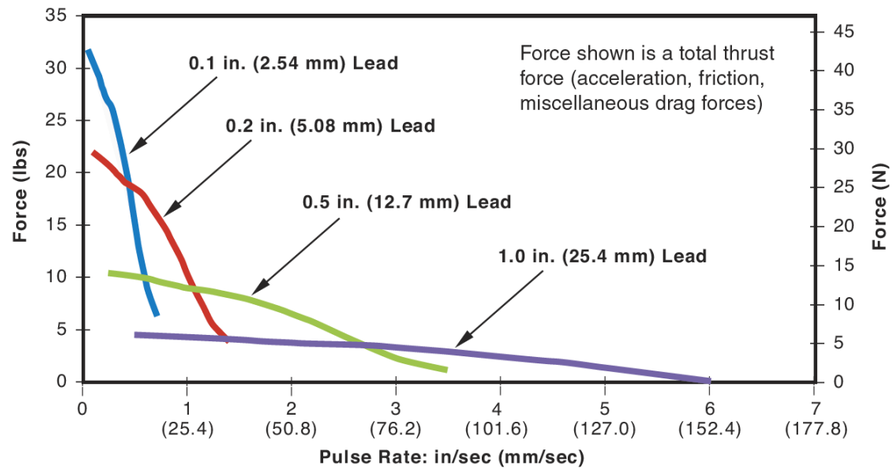
Size 17 External Linear
with programmable IDEA Drive

- 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

For more information see the IDEA™ Drive Data Sheet

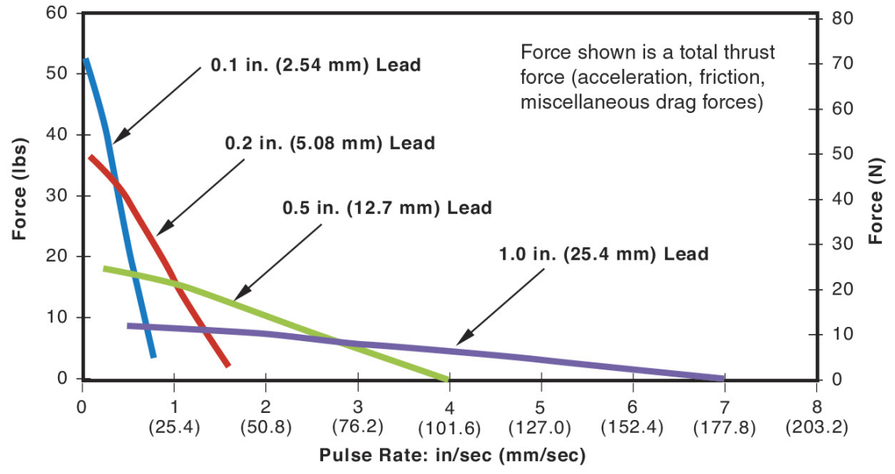
Single Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



Double Stack

FORCE vs. PULSE RATE
– Chopper – 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

Single Stack

■ **57000 Series Size 23**

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
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				

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

Nominal Thread Lead		Lead Code
inches	mm	
0.1	2.54	0100
0.2	5.08	0200
0.5	12.7	0500
1.0	25.4	1000

Size 23
Single Stack
External Linear

Double Stack

■ **57000 Series Size 23**

Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
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		

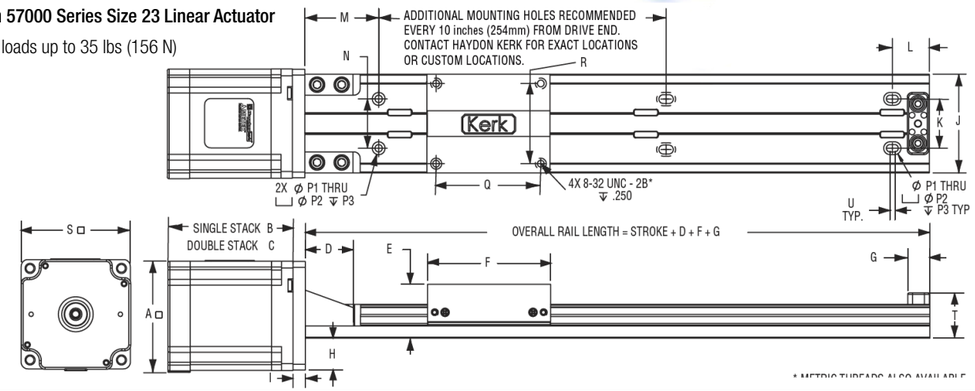
Nominal Thread Lead		Lead Code
inches	mm	
0.1	2.54	0100
0.2	5.08	0200
0.5	12.7	0500
1.0	25.4	1000

Size 23
Double Stack
External Linear

WGS Series • WGS06 Motorized • Size 23 57000 Series • Dimensional Drawings

■ **WGS06 Linear Slide with 57000 Series Size 23 Linear Actuator**

Recommended for horizontal loads up to 35 lbs (156 N)

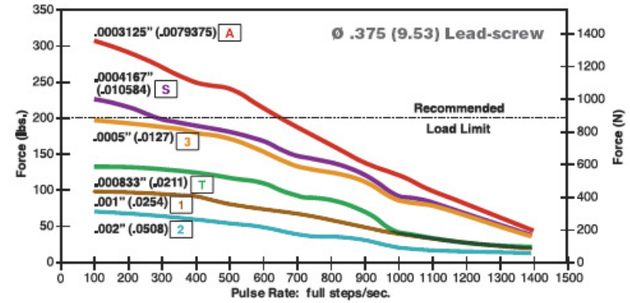


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P1	P2	P3	Q	R	S	T	U
(mm)	(56.4)	(45.2)	(66)	(24.9)	(27.9)	(63.5)	(11.2)	(16.5)	(6.4)	(50.8)	(25.4)	(19.1)	(38.1)	(25.4)	(3.81)	(6.60)	(6.50)	(53.95)	(41.25)	(56.4)	(23.3)	(2.3)
inch	2.220 MAX.	1.780 MAX.	2.598 MAX.	0.98	1.1	2.50	0.44	0.65	0.250	2.00	1.000	0.75	1.50	1.000	0.150	0.260	0.256	2.124	1.624	2.220 MAX.	0.92	0.090

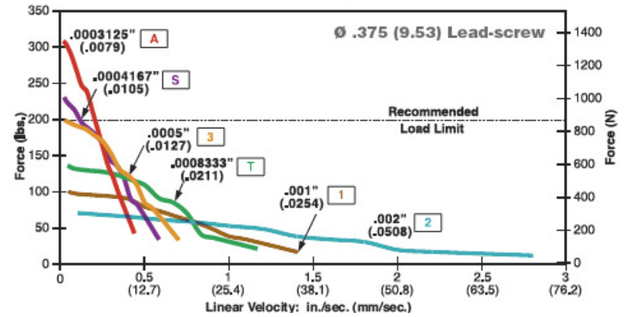
* Metric threads also available for carriage.

Single Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle

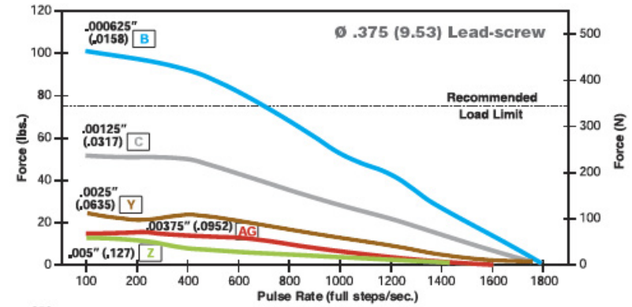


FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle

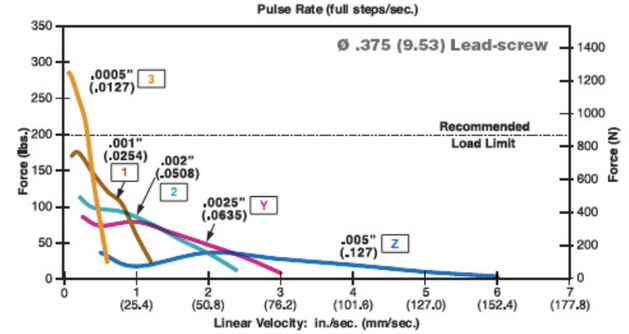


Double Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper – 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

43000 Series Size 17 and 57000 Series Size 23

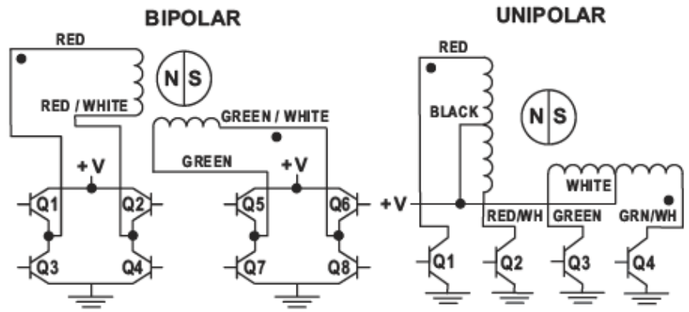
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



Size 17 43000 Series • Integrated Connectors

Haydon Kerk Hybrid Size 17 Single and Double Stack 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. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

Motor Connector: JST part # S06B-PASK-2

Mating Connector: JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)

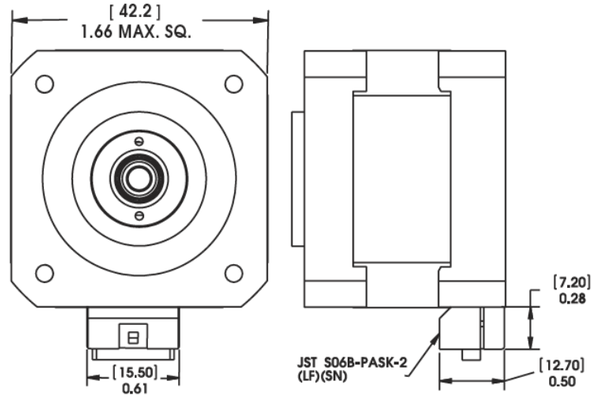
Wire to Board Connector: JST part number SPHD-001T-P0.5

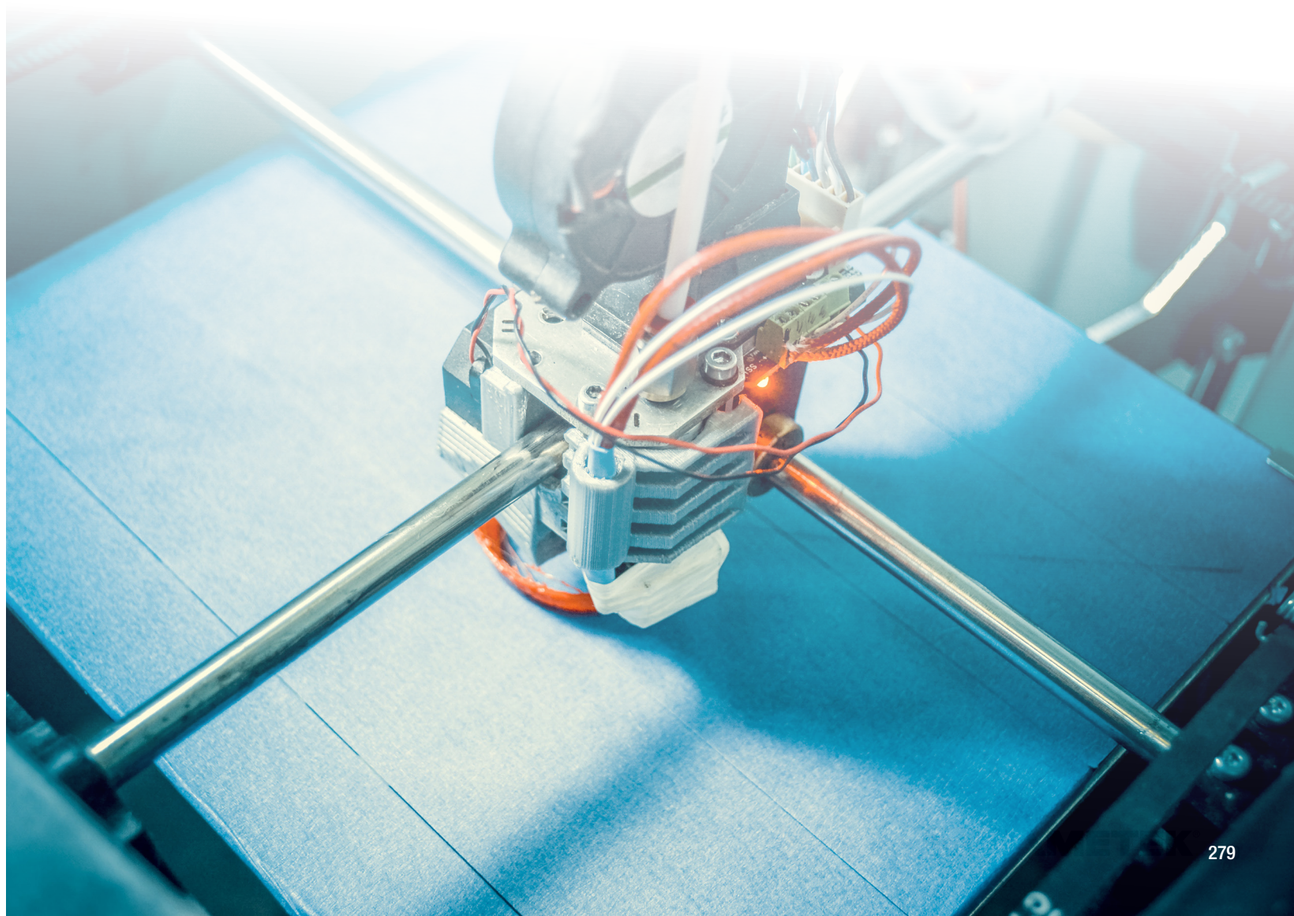
Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	-
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	-
6	Phase 1 Start	Phase 1 Start	Red

Dimensional Drawings

Integrated Connector with 43000 Series Size 17

Dimensions = (mm) inches



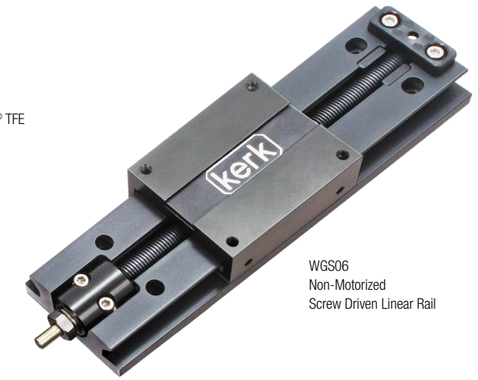


WGS06 Non-Motorized Linear Rails

• Wide, low profile screw driven linear rails

The non-motorized WGS Series features standard wear compensating, anti-backlash driven carriages to ensure 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.
Recommended for horizontal loads up to 35 lbs (156 N).

To determine what is best for your application see the Linear Rail Applications Checklist.



WGS06
Non-Motorized
Screw Driven Linear Rail

Identifying the Non-Motorized WGS Part Numbers when Ordering

WG	S	06	K	—	A	0100	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
WG = Wide Guide Screw	**S** = Standard	**06** = 35 lbs (156 N) (Maximum static load)	**K** = TFE Kerkote		**A** = None **B** = Inline Screw Motor Mount	0100 = .100-in (2.54) 0200 = .200-in (5.08) 0500 = .500-in (12.70) 1000 = 1.000-in (2.54)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

Specifications

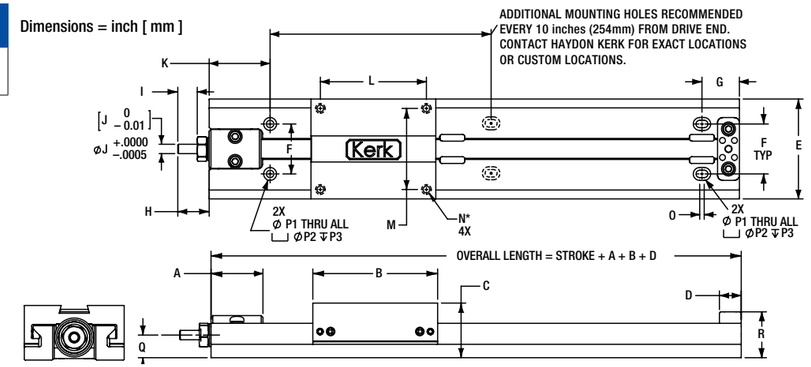
	Inch Lead	Thread Lead Code	Nominal Rail Diam.	Nominal Screw Diam.	Typical Drag Torque	Life @ 1/4 Design Load*	Torque-to-Move Load	Design Load*	Screw Inertia
WGS06 Non-Motorized with Lead Screw	inch (mm)		inch (mm)	inch (mm)	oz - in (N-m)	inch (cm)	oz-inc/lb (Nm/Kg)	lbs (N)	oz-in-sec^2/in (kg-m-sec^2/m)
	.100 (2.54)	**0100**			4.0 (0.3)		1.0 (.016)		
	.200 (5.08)	**0200**		3/8 (9.5)	5.0 (.04)	100,000,000	1.5 (.023)		
	.500 (12.70)	**0500**			6.0 (.04)	(254,000,000)	2.5 (.039)	35 (156)	1.5 x 10^{-5} (4.2 x 10^{-6})
	1.000 (25.40)	**1000**			7.0 (.05)		4.5 (.070)		

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.

Non-Motorized with Lead Screw Dimensional Drawings

- Screw Driven
- Wide Frame

Dimensions = inch [mm]



WSG06 Wide Series, Non-Motorized, Screw Driven

	A	B	C	D	E	F	G	H	I	J	K	L	M	N*	O	P1	P2	P3	Q	R
inch	1.0	2.5	1.1	.44	2.0	1.0	.75	.63	.39	.187	1.2	2.1	1.62	8-32 UNC-2B	.09	.15	.26	.256	.45	.92
mm	25.4	63.5	28	11.2	50.8	25.4	19.1	16	9.9	4.76	39.9	53.9	41.2		2.3	3.8	6.6	6.5	11.4	23.3

*Metric carriage hole sizes available M3, M4, M5, M6.

Material Coatings

Kerkite® Polymers

Compounded with lubricants, reinforcements and thermoplastic polymers, Kerkite Polymers are formulated to provide optimum performance in its target conditions and applications.

- Injection molded
- High performance
- Exceptional wear properties

Kerkote® TFE Coating

A dry lubricant, Kerkote will not become dry and paste-like, and does not attract dirt or debris. Kerkote differs from conventional plating and coating because it is soft, more evenly distributed than other lubricants, and decreases erratic drag torques and unpredictable wear.

- Reduces friction
- Cost effective
- Long term and maintenance free

Kerkote provides the maximum level of self-lubrication, requiring no additional external lubrication or maintenance.

LRS04 Motorized Linear Rails with 43000 Series

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.

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.

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

To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the LRS04 Part Number Codes when Ordering

LR	W	04	B	—	M	—	0025	—	XXX
Prefix	**Frame Style**	**Frame Size Load***	**Lubrication**		**Drive / Mounting**		**Nominal Thread Lead Code**		**Unique Identifier**
LR = Linear Rail System (LRS)	**B** = BFW nut **C** = CMP nut **W** = WDG nut **G** = Guide only	**04** = 50 lbs (222 N) (Maximum static load)	**S** = Uncoated **B** = Black Ice® TFE **N =** No screw		**A** = None **M** = Motorized 43000 Series Size 17 Hybrid **G** = Motor with IDEA™ integrated programmable drive - USB communi-cations **J** = Motor with IDEA™ integrated programmable drive - RS485 commu-nications		**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)		Proprietary suffix assigned to a specificcustomer 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 call our Engineering Team at 603 213 6290.

Carriage holes available in Metric sizes M3, M4, M5, M6

LRS04 Linear Rail with 43000 Series Size 17 Linear Actuator

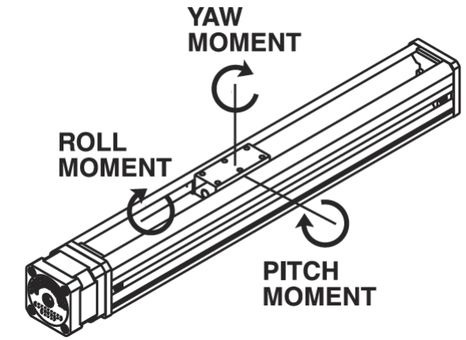
Recommended for horizontal loads up to 50 lbs (222 N)

Specifications

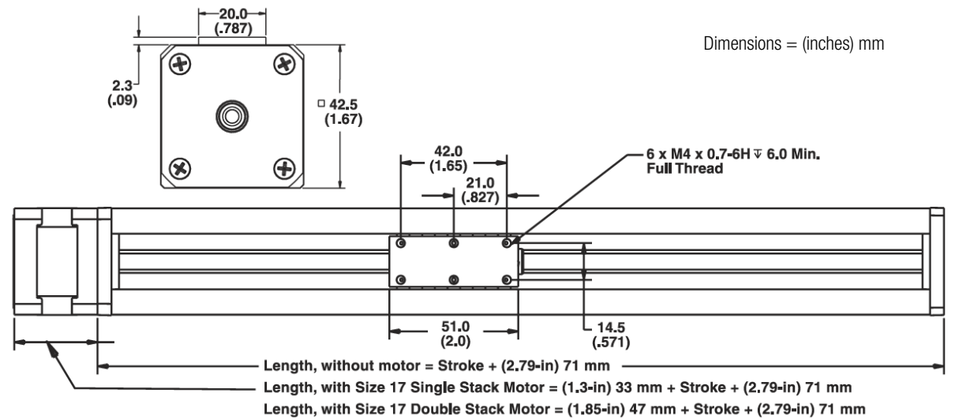
Width	Length of stroke (max)	Speed (max)	Straight line accuracy	Twist
1-5/8 in square (4.3 cm square)	40 in (1000 mm)	20 in/sec (0.5 M/sec)	+/- 0.012 in/ft (+/- 1.0 mm/M)	+/- 0.25° in/ft (+/- 0.75° /M)

Load Ratings (max)

Top load "Z" direction	Hanging / Gantry	Max. Pitch Moment	Max. Moment Roll	Max. Moment Yar
50 lbs. (225 N)	50 lbs. (225 N)	75 in – lbs (8.5 N – M)	75 in – lbs (8.5 N – M)	(8.5 N – M)

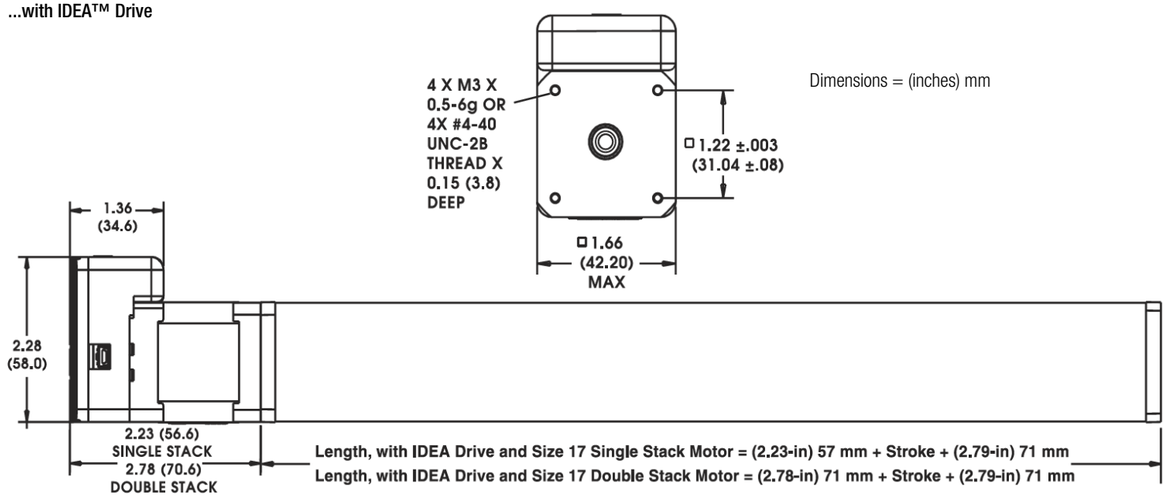


Dimensions = (inches) mm



...with IDEA™ Drive

Dimensions = (inches) mm



Single Stack

43000 Series Size 17

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Programmable Drive	IDEA Drive option available			Not applicable	
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				

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Size 17
Single Stack
External Linear
with IDEA Drive

Size 17
Single Stack
External Linear

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

- 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

For more information see the IDEA™ Drive Data Sheet

Double Stack

43000 Series Size 17

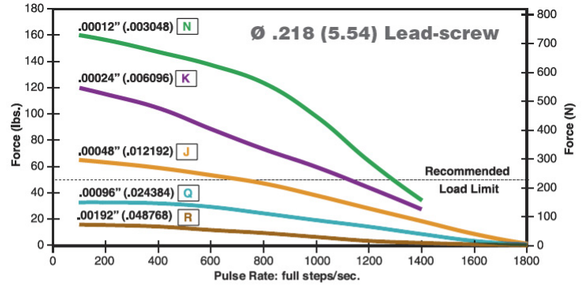
Size 23 Double Stack: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Programmable Drive	IDEA Drive option available		
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase	3.85 A	2.5 A	1 A
Resistance/phase	0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase	2.3 mH	7.6 mH	35.0 mH
Power Consumption	25 W Total		
Rotor Inertia	321 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		

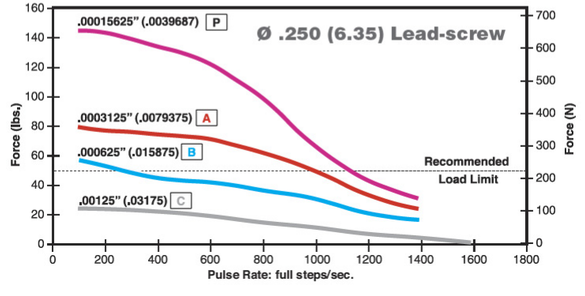
* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Size 17
Double Stack
External Linear

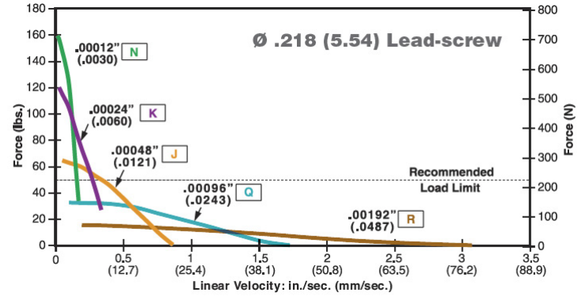
Single Stack

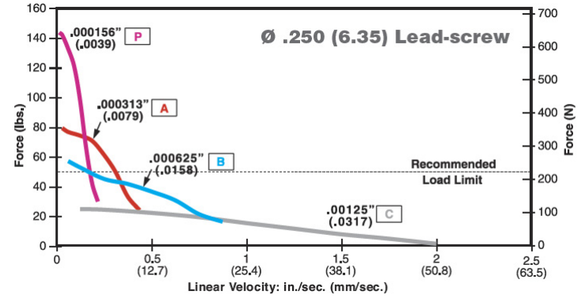
FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle





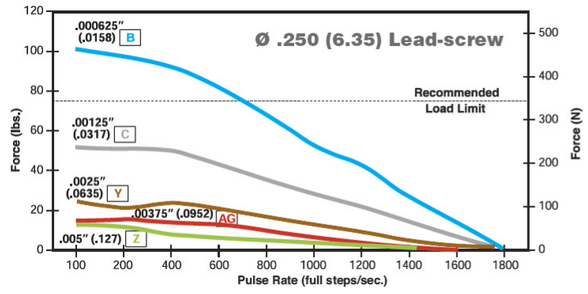
FORCE vs. LINEAR VELOCITY
– Chopper – Bipolar – 100% Duty Cycle



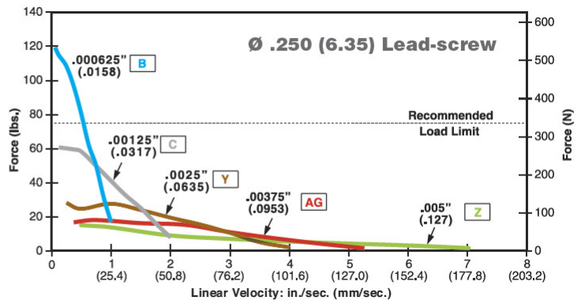


Double Stack

FORCE vs. PULSE RATE
– Chopper – Bipolar – 100% Duty Cycle



FORCE vs. LINEAR VELOCITY
– Chopper – 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

43000 Series Size 17

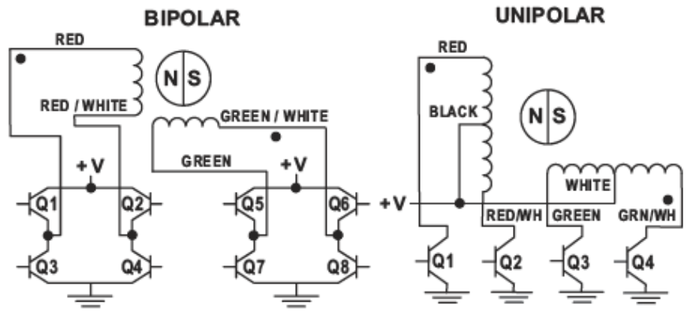
Hybrids: Stepping Sequence

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.

Hybrids: Wiring



Size 17 43000 Series • Integrated Connectors

Hybrid Size 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. In addition to standard configurations, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

Motor Connector: JST part # S06B-PASK-2

Mating Connector: JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)

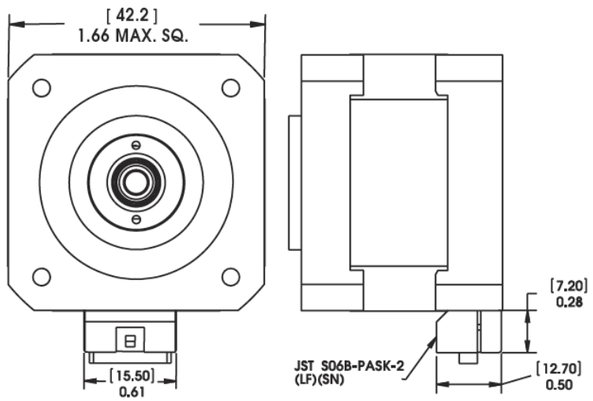
Wire to Board Connector: JST part number SPHD-001T-P0.5

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

Dimensional Drawings

■ Integrated Connector with 43000 Series Size 17

Dimensions = (mm) inches



LRS04 Non-Motorized Linear Rails

• T-slots integrated into exterior rail bottom and sides that accommodate full length support and various mounting options

The non-motorized LRS Linear Rail System consists of a stationary base and a load -bearing carriage that travels along a rigid extruded aluminum rail. Easily allows flexibility to integrate with a variety of motor types, belt and pulley configurations.

Also available with several inline motor options, including a single stack or double stack Size 17 stepper motor, with or without a programmable IDEA™ Drive.

For extreme loads, the LRS04 can be used with CMP or WDG high precision anti-backlash nuts, as well as a freewheeling general purpose nut.

LRS04
Non-Motorized
Shown with Black Ice™ TFE Coated Lead Screw

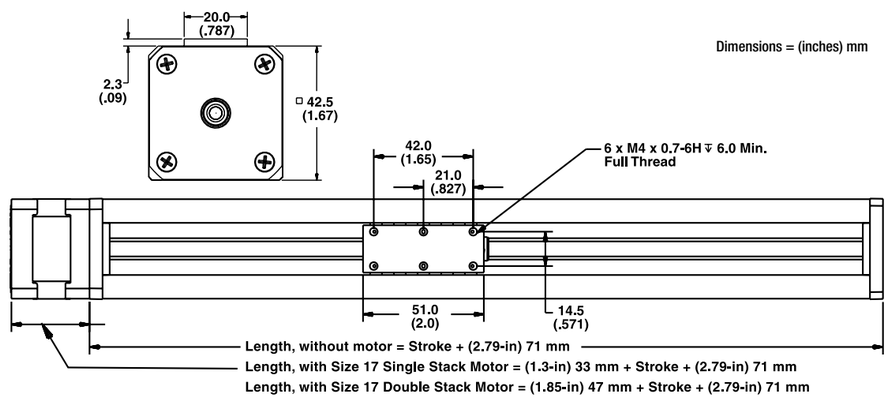
To determine what is best for your application see the Linear Rail Applications Checklist.

Identifying the Non-Motorized LRS Part Numbers when Ordering

LR	W	04	B	—	A	0025	—	XXX
Prefix	**Frame Style**	**Frame Size Load**	**Coating**		**Drive / Mounting**	**Nominal Thread Lead Code**		**Unique Identifier**
LR = Linear Rail System	**B** = BFW Nut **C** = CMP Nut **W** = WDG Nut **G** = Guide only	**04** = 50 lbs (222 N) (Maximum static load)	**S** = Uncoated **B** = Black Ice TFE **N** = No screw		**A** = None	0000 = No screw 0025 = 0.25-in (.635) 0031 = 0.3125-in (.794) 0039 = .0394-in (1.0) 0050 = .05-in (1.27) 0063 = .0625-in (1.588) 0079 = 0.079-in (2.0) 0100 = .100-in (2.54) 0125 = 0.125-in (3.175) 0197 = 0.197-in (5.0) 0250 = 0.250-in (6.35) 0394 = 0.3937-in (10.0) 0500 = .500-in (12.70) 0750 = 0.75-in (19.05) 1000 = 1.0-in (25.4)		Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290.

Dimensional Drawings



SRA Screw Rail® Linear Actuators

- Coaxial Screw and Rail Guides
- Recommended anywhere low drag and minimal free play is required

Traditionally, linear motion has required separate components to handle drive, support and guidance. The compact Screw Rail combines all functions in a single, coaxial component.

By eliminating the need for external rail-to-screw alignment, the Screw Rail simplifies the design, manufacture and assembly of motion systems. The 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. An added benefit is the ability to get three-dimensional motion from a single Screw Rail.

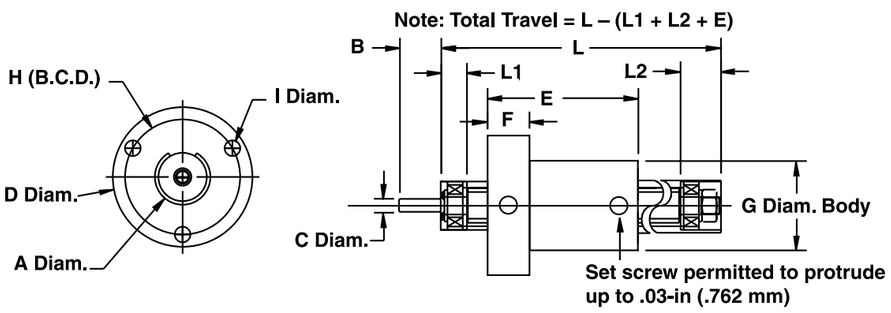
SRA Standard
Screw Rail Linear Actuator

Identifying SRA Screw Rail Part Numbers when Ordering

SR	A	03	K	—	A	0100	—	XXX
Prefix **SR** = Screw Rail	**Nut Style** **A** = Freewheeling	**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)	**Coating** **S** = Uncoated **K** = Kerkote®		**Drive / Mounting** **A** = None	**Nominal Thread Lead Code** 0050 = .05 -in (1.27) SRA03, SRA04 0100 = .100-in (2.54) SRA03, SRA06, SRA08 0200 = .200-in (5.08) SRA06, SRA08 0250 = .250-in (6.35) SRA03, SRA04 0375 = .375-in (9.53) SRA03 0500 = .500-in (12.70) SRA04, SRA06, SRA08 1000 = 1.00-in (25.4) SRA04, SRA06, SRA08		**Unique Identifier** Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290. Right-hand and left-hand assemblies available. *End supports available, see page 2.

Dimensional Drawings



Part No.		A Diam.	B	C Diam.	D Diam.	E	F	G Diam.	H (B, C, D)	I	L1	L2
SRA03	inch	.364/.367	.38	.1245/.1250	.98	1.0	.28	.562	.75	.094	.37	.38
	mm	9.24/9.32	9.56	3.16/3.18	24.9	25.4	7.2	14.3	19.1	2.39	9.4	9.66
SRA04	inch	.489/.492	0.62	.1870/.1875	1.25	1.4	.38	.750	1.03	0.140	0.26	0.36
	mm	12.42/12.5	15.75	4.75/4.76	31.8	36	9.5	19.1	26.2	3.56	6.6	9.1
SRA06	inch	.739/.742	0.75	.2490/.2495	1.75	2.0	.50	1.120	1.48	0.173	0.38	0.70
	mm	18.77/18.85	19.05	6.33/6.34	44.5	51	12.7	28.4	37.6	4.39	9.7	17.8
SRA08	inch	.989/.992	0.75	.2490/.2495	2.23	2.5	.63	1.495	1.92	0.200	0.48	0.77
	mm	25.12/25.2	19.05	6.33/6.34	56.6	64	15.9	38.0	48.8	5.08	12.2	19.6

Metric available as requested.

Assembly Option

When mounted vertically, the Screw Rail 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.

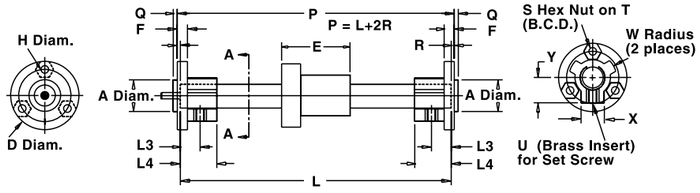
Part No.	Inch Lead**		Thread Lead Code	Nominal Rail Diam.		Nominal Screw Diam.		Max Drag Torque		Life @ 1/4 Design Load x 10^6 (Non Anti-Backlash)		Torque-to-Move Lead		Design Load		Screw inertia per Unit Length		Equivalent Diam*	
	inch	mm		inch	mm	inch	mm	oz-in	NM	inch	cm	oz-in/lb	NM/Kg	lbs	NM	oz-in sec^2/in	KgM^2/M	inch	mm
SRA03	.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
	.100	2.54	0100					2.0	0.018			1.0	0.016						
	.250	6.35	0250					2.5	0.020			1.25	0.019						
	.375	9.53	0375					3.0	0.025			2.0	0.030						
SRA04	.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
	.250	6.35	0250					3.0	0.020			1.5	0.023						
	.500	12.7	0500					4.0	0.030			2.5	0.039						
	1.00	25.40	1000					5.0	0.040			4.5	.0.70						
SRA06	.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
	.200	5.08	0200					4.0	0.030			1.5	0.023						
	.500	12.7	0500					5.0	0.040			2.5	0.039						
	1.00	25.40	1000					6.0	0.045			4.5	0.070						
SRA08	.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
	.200	5.08	0200					5.0	0.040			1.5	0.023						
	.500	12.7	0500					6.0	0.045			2.5	0.039						
	1.00	25.40	1000					8.0	0.060			4.5	0.070						

*Screw Rail stiffness may be modeled using Classical Beam Deflection Theory with equivalent stainless steel beam of diameter given.
**Other leads available as custom orders.

Screw Rail® End Supports

- Optional accessory providing convenience of simple and compact mounting
- End Supports slide over the outside diameter of each rail end and "key" off the slot in the Screw Rail

Kerkite® composite polymer End Supports come standard with three hex nuts that are captured in the flange for easy assembly. Also supplied with a brass threaded insert and a set screw to fasten to the outside diameter of the rail.



Dimensions E and L are referenced in the ScrewRail Dimensions VIEW AA
Note: Total Travel = L – (E + 2 [L4])

Identifying Screw Rail End Support Part Numbers when Ordering

SR	04	ES	—	Z00
Prefix **SR** = Screw Rail	**Nominal Size Diameter** **04** = 1/2-in (13 mm) **06** = 3/4-in (19 mm) **08** = 1-in (25 mm)	**Accessory** **ES** = End Support		**Identifier** Standard

NOTE: Dashes must be included in Part Number (–) as shown above.
For assistance call our Engineering Team at 603 213 6290.

	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	T inch (mm)	U inch	W Diam. Brass Insert Inch (mm)	X inch (mm)	Y inch (mm)
SRA04	.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)
SRA06	.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)
SRA08	.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 carriage hole sizes available M3, M4, M5, M6.

SRZ Screw Rail® Linear Actuators

- **Coaxial Screw and Rail Guides**
- **Continuous Self-Adjusting Anti-Backlash**

Traditionally, linear motion has required separate components to handle drive, support and guidance. The compact Screw Rail combines all functions in a single, coaxial component.

By eliminating the need for external rail-to-screw alignment, the Screw Rail simplifies the design, manufacture and assembly of motion systems. The 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. An added benefit is the ability to get three-dimensional motion from a single Screw Rail.

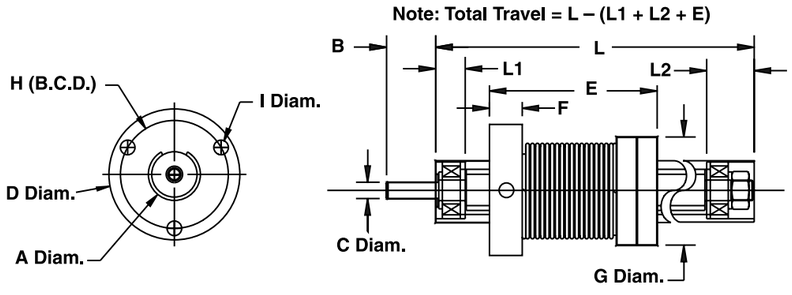
SRZ
Anti-Backlash
Screw Rail Linear Actuator

Identifying SRZ Screw Rail Part Numbers when Ordering

SR	Z	06	K	—	A	0100	—	XXX
Prefix **SR** = Screw Rail	**Nut Style** **A** = Anti-Backlash	**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)	**Coating** **S** = Uncoated **K** = Kerkote®		**Drive / Mounting** **A** = None	**Nominal Thread Lead Code** 0050 = .05 -in (1.27) SRZ03, SRZ04 0100 = .100-in (2.54) SRZ03, SRZ06, SRZ08 0200 = .200-in (5.08) SRZ06, SRZ08 0250 = .250-in (6.35) SRZ03, SRZ04 0375 = .375-in (9.53) SRZ03 0500 = .500-in (12.70) SRZ04, SRZ06, SRZ08 1000 = 1.00-in (25.4) SRZ04, SRZ06, SRZ08		**Unique Identifier** Suffix used to identify specific motors 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 call our Engineering Team at 603 213 6290. Right-hand and left-hand assemblies available.

Dimensional Drawings



Part No.		A Diam.	B	C Diam.	D Diam.	E	F	G Diam.	H (B, C, D)	I	L1	L2
SRZ03	inch	.364/.367	.38	.1245/.1250	.98	1.1	.28	.73	.75	.094	.37	.38
	mm	9.24/9.32	9.56	3.16/3.18	24.9	27.94	7.2	18.5	19.1	*	9.4	9.66
SRZ04	inch	.489/.492	0.62	.1870/.1875	1.31	1.4	.38	.97	1.03	0.140	0.26	0.36
	mm	12.42/12.5	15.75	4.75/4.76	33.3	36	9.5	24.7	26.2	*	6.6	9.1
SRZ06	inch	.739/.742	0.75	.2490/.2495	1.81	2.0	.50	1.38	1.48	0.173	0.38	0.70
	mm	18.77/18.85	19.05	6.33/6.34	46.0	51	12.7	35.1	37.6	*	9.7	17.8
SRZ08	inch	.989/.992	0.75	.2490/.2495	2.30	2.5	.63	1.72	1.92	0.200	0.48	0.77
	mm	25.12/25.2	19.05	6.33/6.34	58.4	64	15.9	43.7	48.8	*	12.2	19.6

*Metric available as requested.

Assembly Option

When mounted vertically, the Screw Rail 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.

Part No.	Inch Lead**		Thread Lead Code	Nominal Rail Diam.		Nominal Screw Diam.		Max Drag Torque		Life @ 1/4 Design Load x 10^6 (Non Anti-Backlash)		Torque-to-Move Lead		Design Load		Screw inertia per Unit Length		Equivalent Diam*	
	inch	mm		inch	mm	inch	mm	oz-in	NM	inch	cm	oz-in/lb	NM/Kg	lbs	NM	oz-in sec^2/in	KgM^2/M	inch	mm
SRZ03	.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	50	.1 x 10^{-5}	.4 x 10^{-6}	30	7.6
	.100	2.54	0100					2.5	0.018			1.0	0.016						
	.250	6.35	0250					3.0	0.020			1.25	0.019						
	.375	9.53	0375					3.5	0.025			2.0	0.030						
SRZ04	.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 x 10^{-5}	1.3 x 10^{-6}	.39	9.9
	.250	6.35	0250					4.0	0.030			1.5	0.023						
	.500	12.7	0500					5.0	0.040			2.5	0.039						
	1.00	25.40	1000					6.0	0.045			4.5	.0.70						
SRZ06	.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 x 10^{-5}	6.5 x 10^{-6}	.60	15.2
	.200	5.08	0200					6.5	0.047			1.5	0.023						
	.500	12.7	0500					7.0	0.050			2.5	0.039						
	1.00	25.40	1000					7.5	0.053			4.5	0.070						
SRZ08	.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 x 10^{-5}	20.0 x 10^{-6}	.81	20.5
	.200	5.08	0200					8.5	0.060			1.5	0.023						
	.500	12.7	0500					9.0	0.064			2.5	0.039						
	1.00	25.40	1000					9.5	0.067			4.5	0.070						

*Screw Rail stiffness may be modeled using Classical Beam Deflection Theory with equivalent stainless steel beam of diameter given.
**Other leads available as custom orders.

Linear Guide Elements

Spline Shafts and Guide Rails deliver low-cost, low friction and long life for a variety of linear motion control applications.

KERK® SS and SZ Spline shafts are available in stainless steel and can be coated with our proprietary Kerkote® TFE or Black Ice® coatings. Spline Shafts provide anti-rotation for one axis motion or a drive mechanism with rotation for two axes of motion. The bushing is supplied with an integral brass collar to facilitate various mounting configurations without nut distortion.

KERK GR Guide Rail is the perfect choice for light load applications requiring minimal frictional drag, low cost and long wear. It features a burnished, centerless ground stainless steel shaft (available either uncoated or with Kerkote® TFE for additional lubricity) and a graphite and PTFE-filled thermoplastic bushing.

SS and 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.

GR Series Linear Rails and Bushings

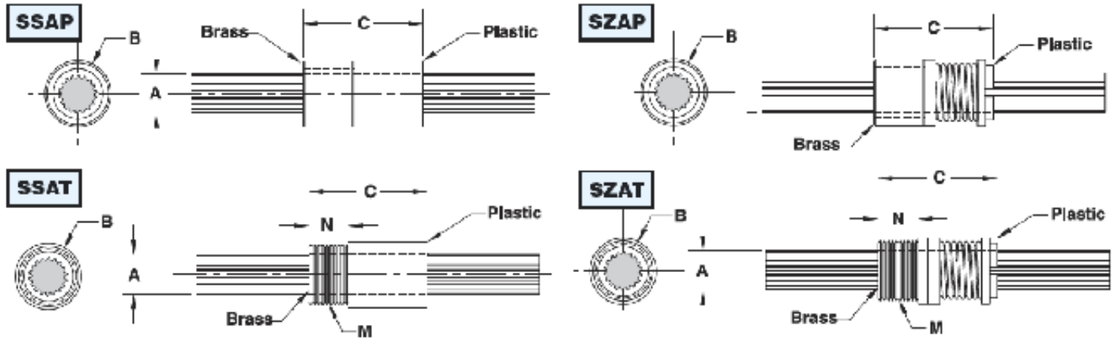
The GR Series linear rail system has been designed for light load applications where low cost, minimum frictional drag and long wear life are primary design considerations. The assembly consists of a centerless ground and burnished stainless steel shaft mated with a Kerkite® composite polymer bushing. 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.

Identifying the Spline Shafts and Guide Rails Part Number Codes when Ordering

SZ	A	P	04	1	K	—	08	—	XXX
Prefix	**Nut Style**	**Mounting**	**Rail Diameter**	**Number of Bushings per Rail**	**Lubrication**		**Length in Inches (Rounded up)**		**Unique Identifier**
SS = Spline Shaft **SZ** = Anti- Backlash Spline Shaft **GR** = Guide Rail	**A** = Assembly **B** = Bushing only **S** = Shaft only	**T** = Threaded (for Spline Shafts only) **G** = Snap ring groove (for Guide Rails only) **P** = Plain (no features) **S** = Shaft only **X** = Custom	**02** = 1/8-in **04** = 1/4-in **06** = 3/8-in **08** = 1/2-in **12** = 3/4-in	**0** **1** **2** **3** **4** **5** Use "0" for Shaft only and "1" if Bushing only	**S** = Uncoated **K** = Kerkote® **B** = Black Ice™ **N** = Bushing only		Example: **06** = 6-in **08** = 8-in **00** = Bushing only		Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

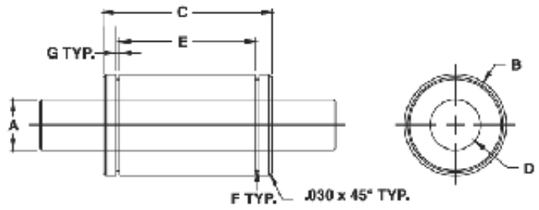
NOTE: Dashes must be included in Part Number (–) as shown above. For assistance call our Engineering Team at 603 213 6290.

SRA Series Standard ScrewRail Linear Actuators



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)
SS/SZ 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)
SS/SZ 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)
SS/SZ 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)
SS/SZ 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)

GR Series Linear Rails and Bushings



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)
GR 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)
GR 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)
GR 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)

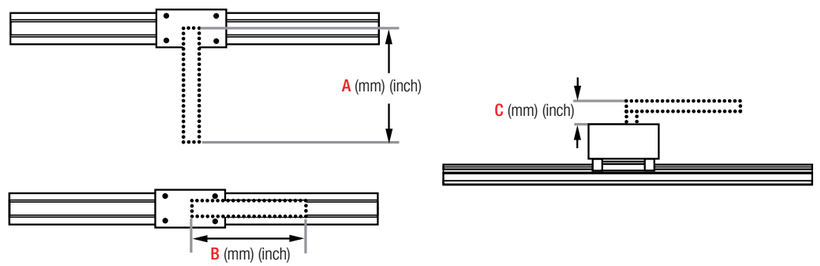
Linear Rail Checklist

Information needed to properly size a linear rail system

Our 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 Pittman Engineering Team to assist you in choosing the proper linear rail. See **order form** on page 4.

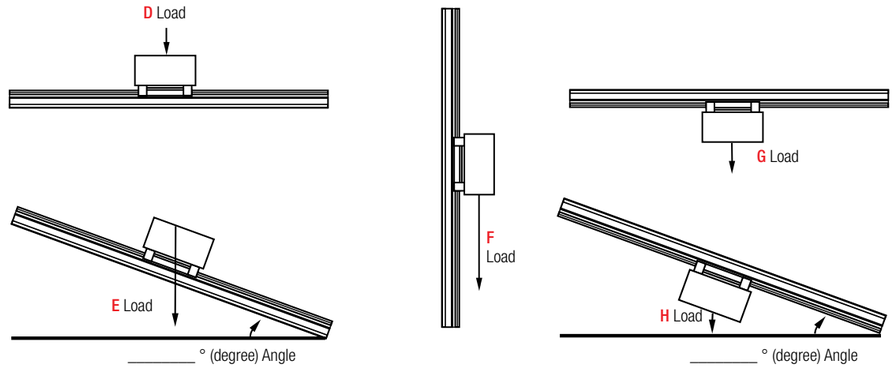
1. ☐ Maximum Load? _____ (N or lbs.)
2. ☐ Load Center of Gravity (cg) Distance and Height (mm or inches)? See illustrations (A) (B) (C) below.

   Dimensions: ☐ mm or ☐ 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 ($F_f + F_a + F_g$).

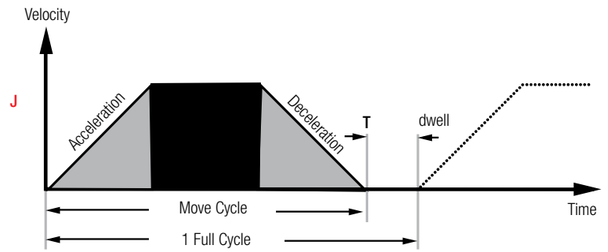
   Orientation: ☐ D _____ ☐ F _____ ☐ G _____
   ☐ E _____ ° ☐ H _____ °



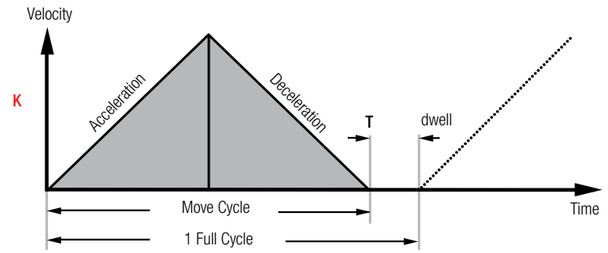
4. ☐ Stroke Length to Move Load? _____ (mm or inches)
   Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether or not an integrated stepper motor programmable drive system is added.

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).

J



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.

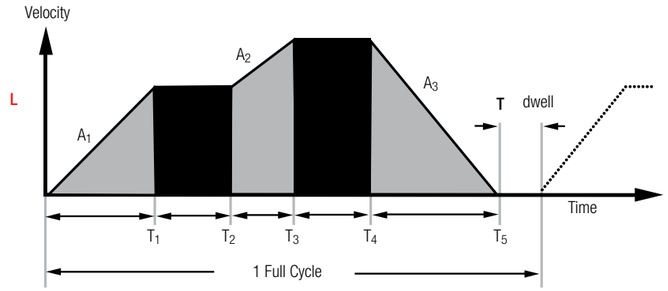
A *complex* move profile (L) requires more information.

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: $A_1, A_2, A_3 \ldots A_n$

6. ☐ Position Accuracy Required? _____ (mm or inches)

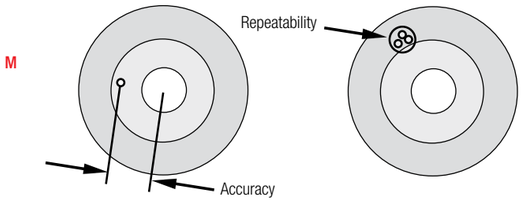
L



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 M.

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 M.

M



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?* _____ (%)

*NOTE: If the Haydon Kerk IDEA™ Drive is used with 43000 Series Size 17 linear actuator stepper motor disregard items 14, 15, and 16.

Linear Rail Application Checklist

Upon completion, email to: **info.haydonkerk@ametek.com**

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 or ☐ 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 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: $A_1, A_1, A_1 \ldots A_n$

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 **M**.

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 **M**.

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)

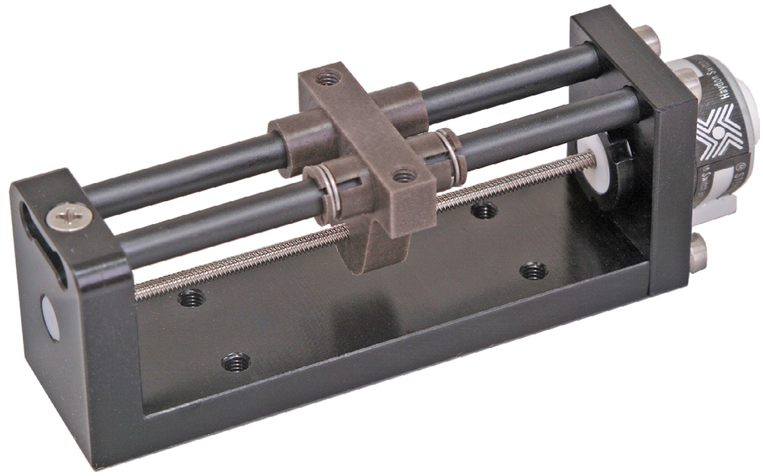
16*. Current Boost Capability?* _____ (%)

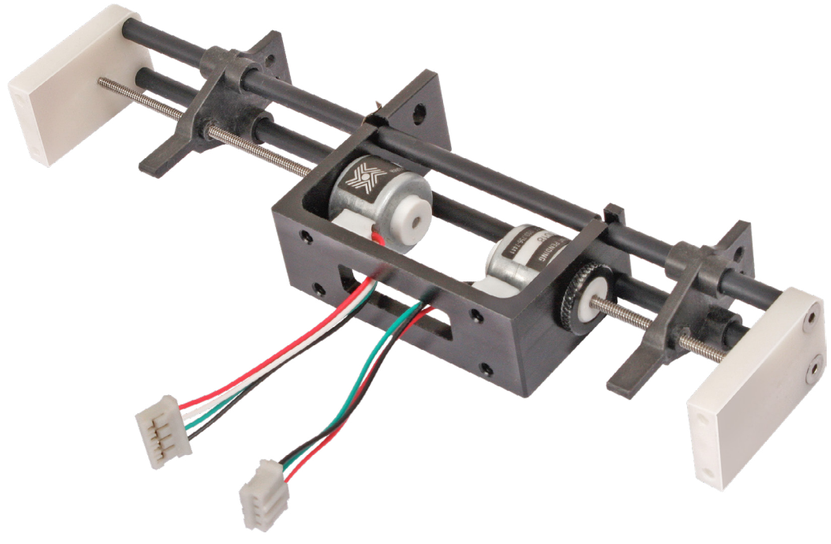
*NOTE: If the Haydon Kerk IDEA™ Drive is used with 43000 Series Size 17 linear actuator stepper motor disregard items 14, 15, and 16.

AMETEK Haydon Kerk Pittman **Linear Rails and Slides Customization**

Haydon Kerk Pittman takes great pride in designing and developing customized solutions for your application needs.

Our Design and Development Engineers begin with our standard catalog products and build ideal solutions for your motion needs. Our factories bring your solutions into production.





PITTMAN®

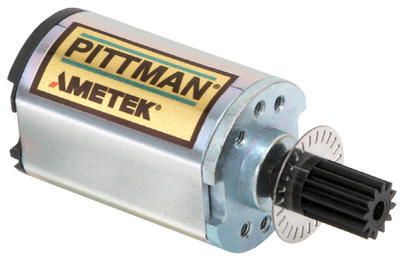
AMETEK®

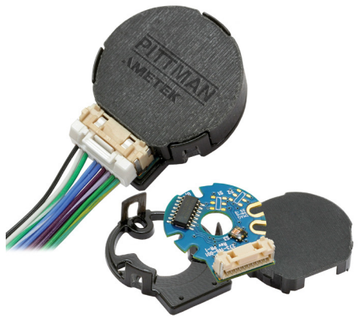
To complement the Haydon Kerk® brand of products AMETEK® Advanced Motion Solutions also offers the PITTMAN® brand of DC motor products. Our experienced team of sales engineers will work with you to help you determine the optimum motion solution.

PITTMAN offers a broad range of DC brush and brushless motors with various power ratings, sizes, lengths, and options to meet just about any motion application. In addition to a standard offering of optional components such as drives, encoders, brakes, and gearboxes, motors can be further customized to include unique motor windings, special wire harnesses, EMI/RFI suppression, shaft modifications, custom output devices such as pinions and worm gears, and just about any other value-added feature to help streamline and simplify your product design and manufacturing.

Explore the PITTMAN catalog >

www.haydonkerkpittman.com/learningzone/catalogs-and-product-guides





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