



Haydon
Motion Solutions



TM

Precision Linear Motion Products Catalog and Design Guide



Leadscrews



Anti-Backlash
Nuts



Custom Leadscrew
Assemblies



Can-Stack Linear Actuators



Hybrid Linear
Actuators



LRS™ Motorized
Linear
Rail Systems



ScrewRail®
Assemblies



RGS®
Rapid Guide
Screws



Spline Shafts,
Slides and
Linear Guides

Hybrid Linear Actuators

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

Double Stack Hybrid Linear Actuators

| Series | Size (square) | Configuration# | Stroke (mm) | | Max Force (N) | Travel/step (micron) |
|--------|----------------|----------------|-------------|-------------|------------------------|----------------------|
| | | | C# | NC / EL# | | |
| 28000 | 28 mm (1.1-in) | C / NC / EL | 12.7 - 63.5 | Up to ≈ 250 | 30 - 133 ^A | 3 - 50 |
| 35000 | 35 mm (1.4-in) | C / NC / EL | 12.7 - 63.5 | Up to ≈ 300 | 50 - 220 ^A | 15.8 - 127 |
| 43000 | 43 mm (1.7-in) | C / NC / EL | 12.7 - 63.5 | Up to ≈ 400 | 50 - 337 | 15.8 - 127 |
| 57000 | 57 mm (2.3-in) | C / NC / EL | 12.7 - 63.5 | Up to ≈ 500 | 150 - 890 ^A | 12.7 - 127 |

^A Maximum force limited by bearing capabilities.

Dual Action Actuators

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

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

Can-Stack Linear Actuators

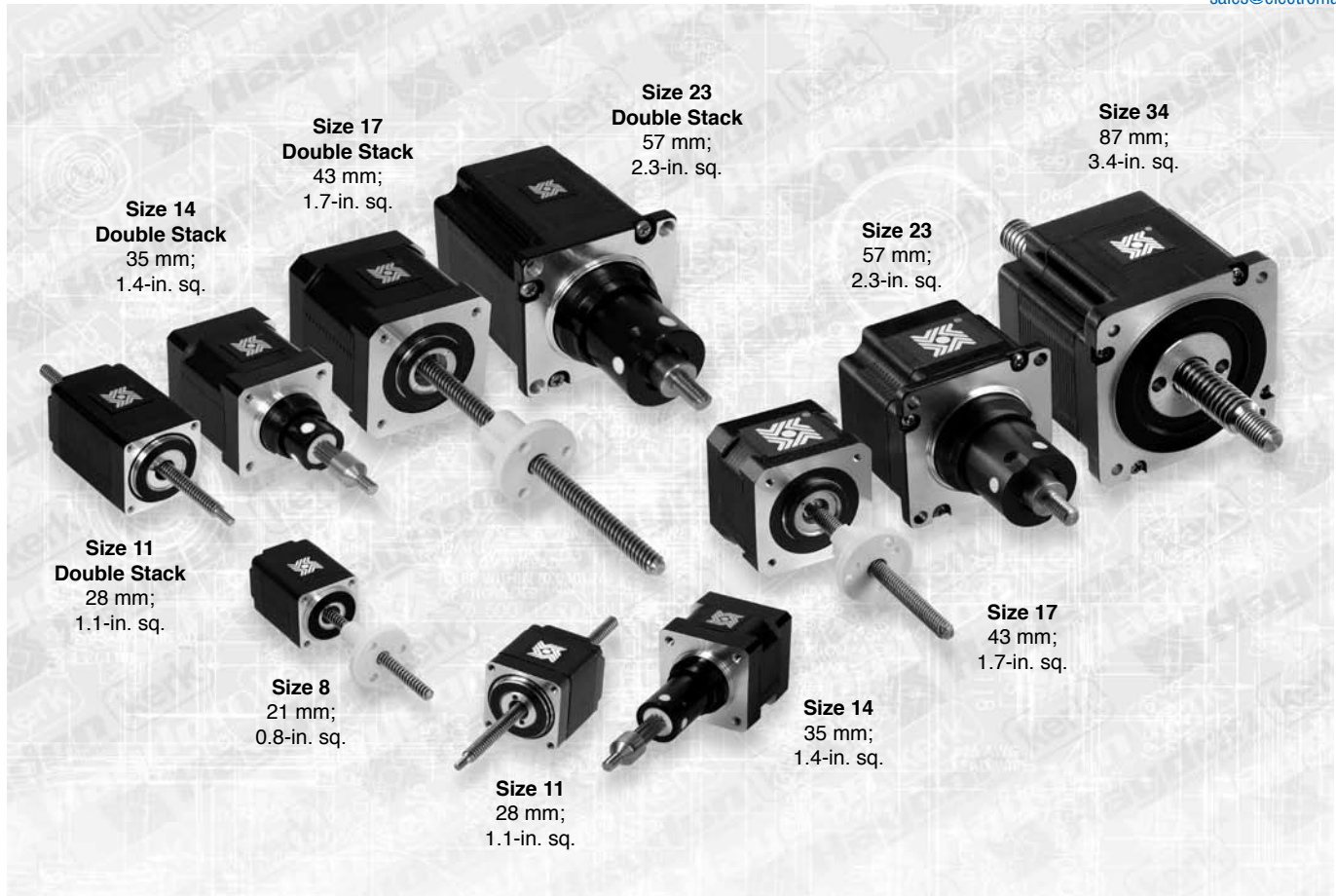
| Series | Ø Size | Configuration# | Stroke (mm) | | Max Force (N) | Travel/step (micron) |
|----------|----------------|----------------|-------------|-------------|---------------|----------------------|
| | | | C# | NC / EL# | | |
| LC15 | 15 mm (.59-in) | C | 12.7 | – | 7 | 20 |
| (Z)20000 | 20 mm (.79-in) | C / NC / EL | 12.7 | Up to ≈ 150 | 3 - 35 | 25 - 100 |
| (Z)26000 | 26 mm (1-in) | C / NC / EL | 12.7-31 | Up to ≈ 150 | 10 - 80 | 6 - 100 |
| 36000 | 36 mm (1.4-in) | C / NC / EL | 15.5 | Up to ≈ 150 | 15 - 160 | 3 - 100 |
| 46000 | 46 mm (1.8-in) | C / NC / EL | 23.1 | Up to ≈ 200 | 20 - 260 | 12.7 - 400 |

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

Drives

| | Type | Motor Leads | Input Voltage (VDC) | Current/Phase (I) | Number of Microsteps |
|---------|---------|-------------|---------------------|-------------------|----------------------|
| 40105 | Chopper | 4 | 20 - 40 | 2 | 2 |
| 44103 | Chopper | 4* | 24 - 28 | 1 | 8 |
| DCS4020 | Chopper | 4 | 24 - 40 | 2 | 2 |
| DCM8028 | Chopper | 4 / 6 / 8 | 20 - 80 E | 2.8 | 256 |
| DCM8055 | Chopper | 4 / 6 / 8 | 20 - 80 E | 5.5 | 256 |

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



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

The hybrid actuators come in six sizes, from 21 mm square to 87 mm square. Each size has three designs available – captive, non-captive and an external linear version. Haydon also offers a series of Double Stack enhanced performance hybrid linear actuators available in four sizes, from 28 mm to 57 mm square.

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

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

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

Identifying the part number codes when ordering

| E | 43 | H | 4 | N | 05 | 910 |
|---|---|--|--|---|--|---|
| <p>Prefix (only when using the following)</p> <p>E = External P = Proximity Sensor S = Home Switch T = High Temp</p> | <p>Series number designation: 43 = 43000</p> <p>Available Hybrids: 21000 28000 35000 43000 57000 87000</p> | <p>Style</p> <p>F = 1.8° Non captive H = 1.8° Captive H = 1.8° Captive (Use "E" prefix for "External") J = 0.9° Non-captive K = 0.9° Captive K = 0.9° Captive (Use "E" prefix for "External") L = 1.8° Double Stack, Non-captive M = 1.8° Double Stack, Captive M = 1.8° Double Stack, (Use "E" prefix for "External")</p> | <p>Coils</p> <p>4 = Bipolar (4 wire) 6 = Unipolar (6 wire)</p> | <p>Code ID Resolution Travel/Step</p> <p>(Example: <i>N</i> = travels .00012-in per step)</p> <p>(Refer to travel / step chart found on each Series product page.)</p> | <p>Voltage</p> <p>(Example: 05 = 5 VDC; 12 = 12 VDC) Custom V available</p> | <p>Suffix:</p> <p>Stroke Example: -910 = 1-in (Refer to Stroke chart on Captive motor series product page.)</p> <p>Suffix also represents:</p> <p>-900 = External Linear with grease and flanged nut</p> <p>-XXX = Special or custom (Special part numbers for custom screw lengths and design options will require an issued 3 digit suffix number. Please contact our sales or applications engineering department for assistance.)</p> |

EXAMPLES:

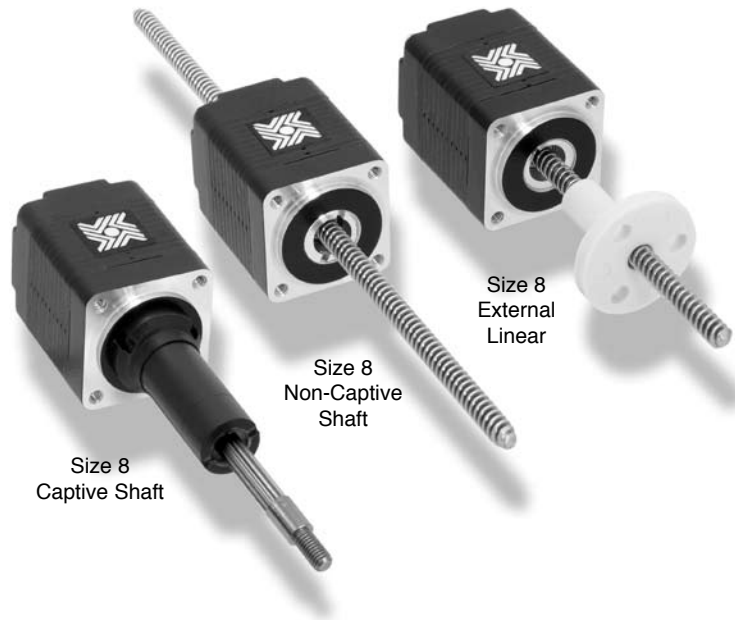
E43H4N-05 = External linear actuator, 43000 series, 1.8 degree, Bipolar coils, .00012-in travel per step, 5 volt DC.

43H4N-05-910 = 43000 series, 1.8 degree captive linear actuator, Bipolar, .00012-in travel per step, 5 volt DC, 1.0-in stroke.

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

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

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



Salient Characteristics

| Size 8: 21 mm (0.8-in) Hybrid Linear Actuator (1.8° Step Angle) | | | |
|---|------------------------|------------|---------|
| Part No. | Captive | 21H4(X)-V | |
| | Non-captive | 21F4(X)-V | |
| | External Lin. | E21H4(X)-V | |
| Wiring | | Bipolar | |
| Winding voltage | 2.5 VDC | 5 VDC | 7.5 VDC |
| Current/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 | | |
| Temperature rise | 135°F Rise (75°C Rise) | | |
| Weight | 1.5 oz (43 g) | | |
| Insulation resistance | 20 MΩ | | |

| Linear Travel / Step | | Order Code I.D. |
|-------------------------------|--------|-----------------|
| Screw Ø.138" (3.50 mm) 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

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.

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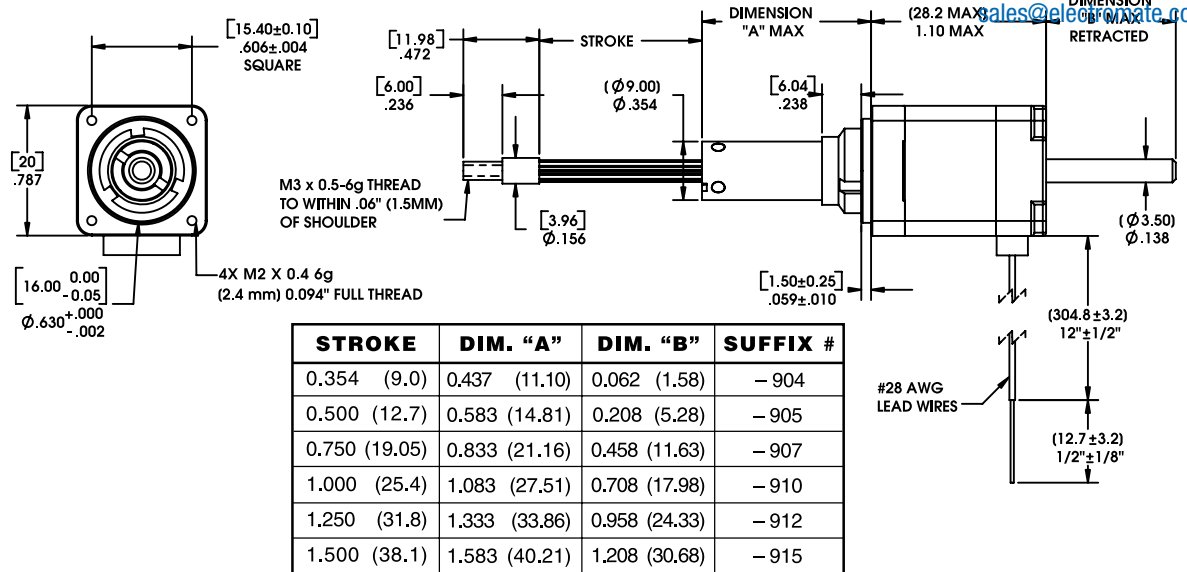
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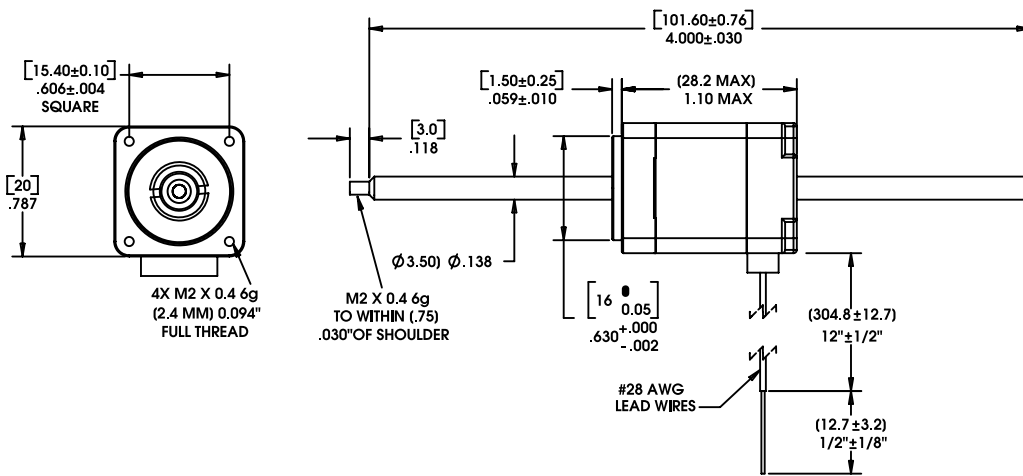
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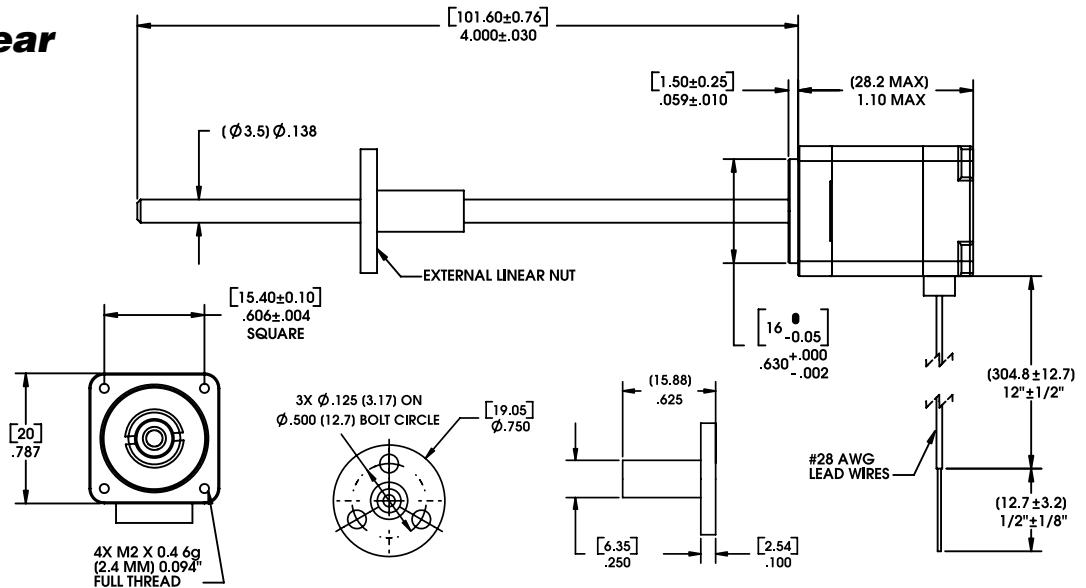
Captive Leadscrew



Non-Captive Leadscrew



External Linear



21000 Series: Size 8 Performance Curves



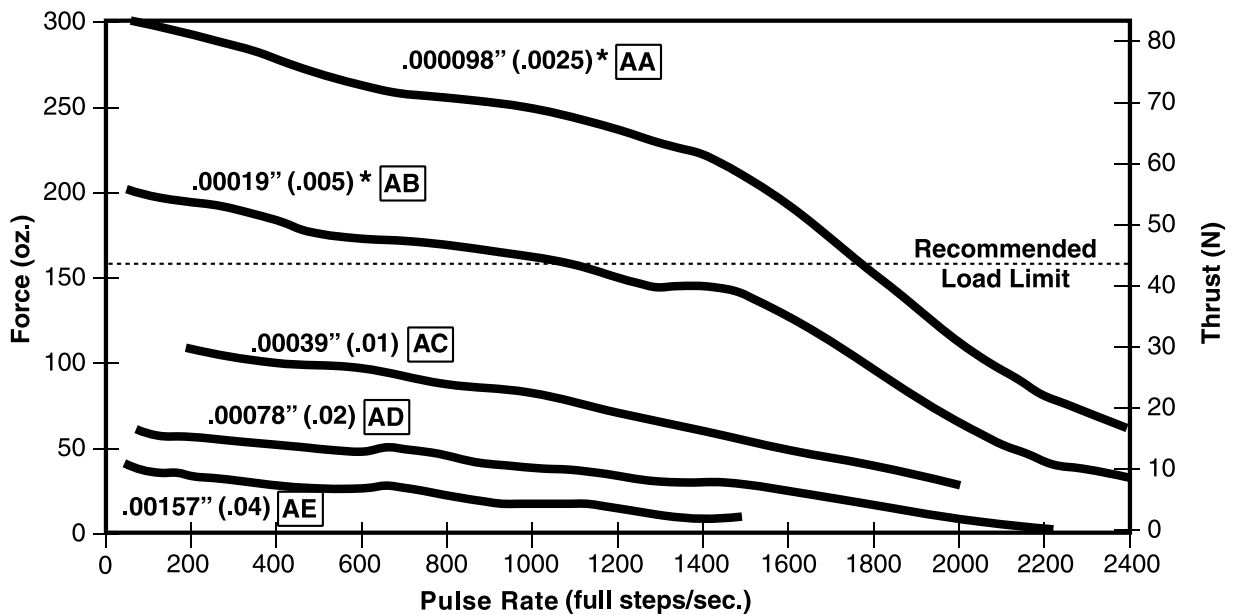
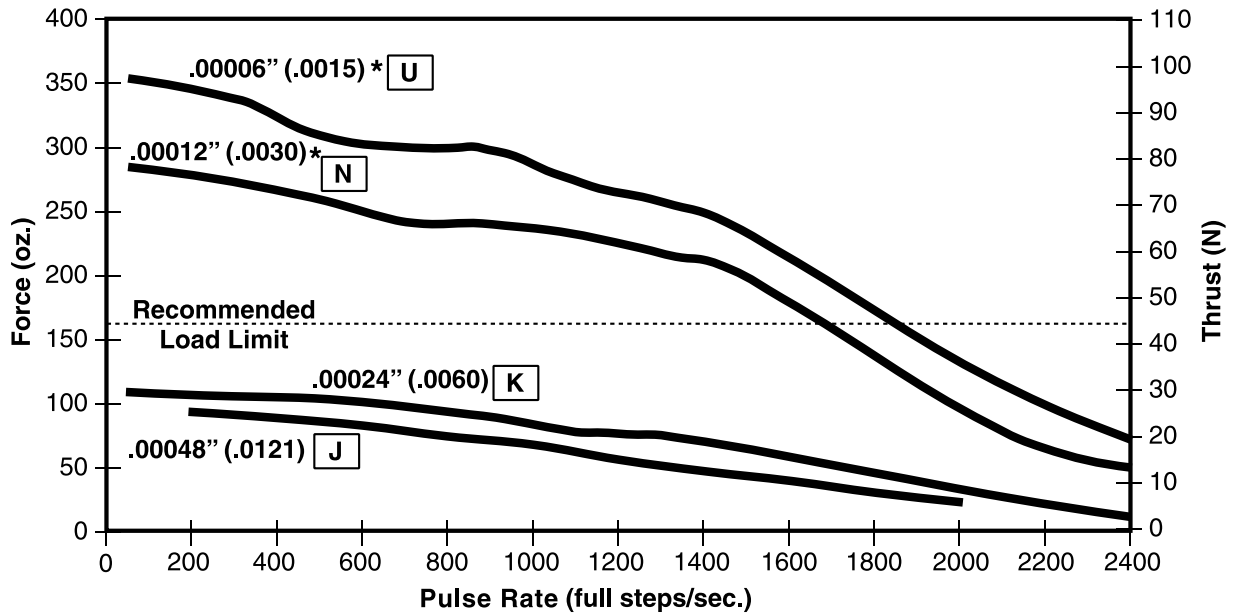
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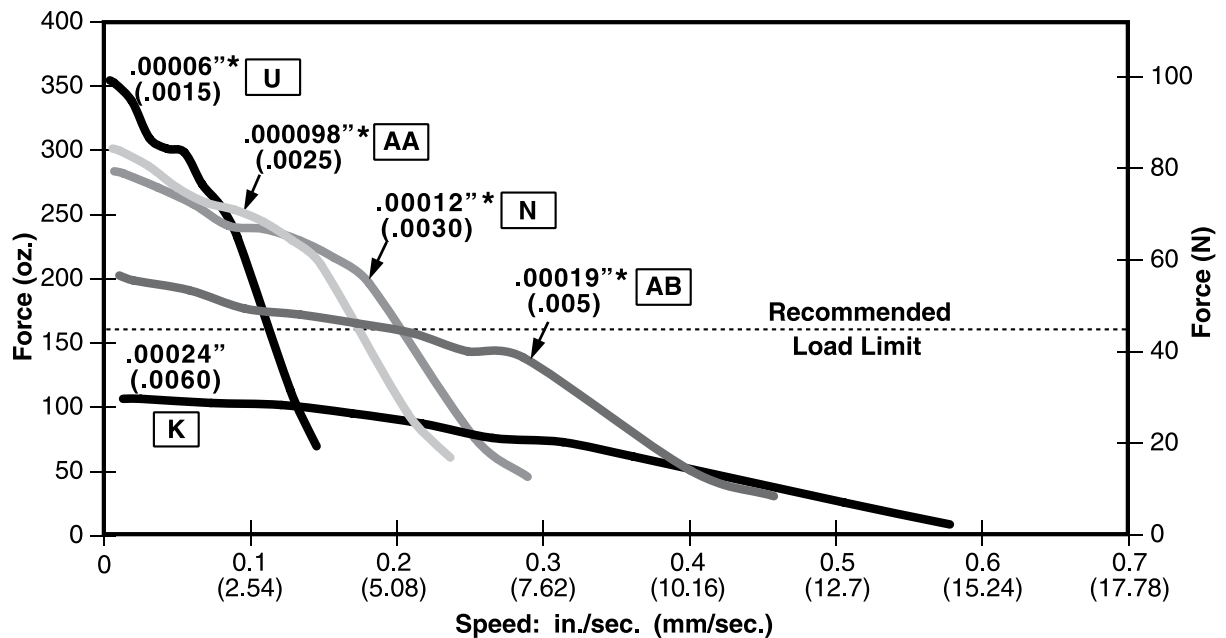
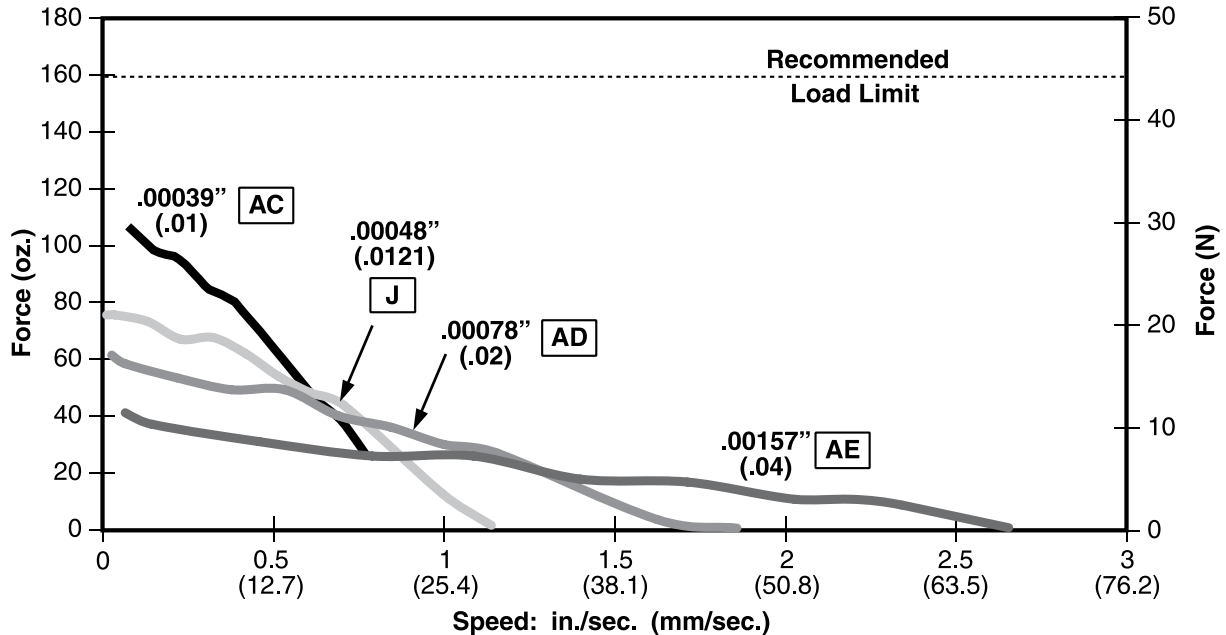
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FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle

Ø .138 (3.50) Leadscrew



FORCE vs. LINEAR VELOCITY Bipolar • Chopper • 100% Duty Cycle
Ø .138 (3.50) Leadscrew



*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.

28000 Series: Size 11 Linear Actuator



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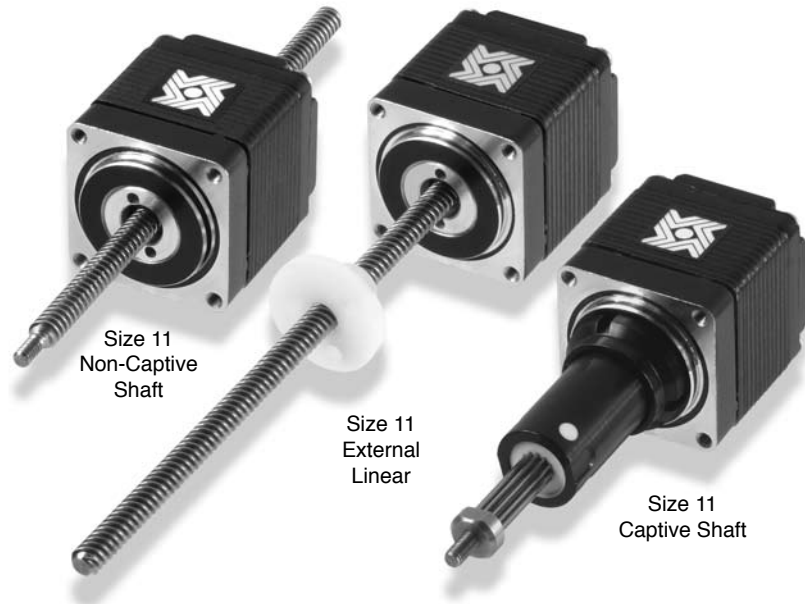
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HaydonKerk Motion Solutions™

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

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

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



Salient Characteristics

| Size 11: 28 mm (1.1-in) Hybrid Linear Actuator (1.8° Step Angle) | | | | | | |
|--|------------------------|------------|---------|--------|------------|--|
| Part No. | Captive | 28H4(X)-V | | | 28H6(X)-V | |
| | Non-captive | 28F4(X)-V | | | 28F6(X)-V | |
| | External Lin. | E28H4(X)-V | | | E28H6(X)-V | |
| Wiring | | Bipolar | | | Unipolar** | |
| Winding voltage | 2.1 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC | |
| Current/phase | 1.0 A | 0.42 A | 0.18 A | 0.42 A | 0.18 A | |
| Resistance/phase | 2.1 Ω | 11.9 Ω | 68.6 Ω | 11.9 Ω | 68.6 Ω | |
| Inductance/phase | 1.5 mH | 6.7 mH | 39.0 mH | 3.3 mH | 19.5 mH | |
| Power consumption | 4.2 W | | | | | |
| Rotor inertia | 9.0 gcm ² | | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | | |
| Weight | 4.2 oz (119 g) | | | | | |
| Insulation resistance | 20 MΩ | | | | | |

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

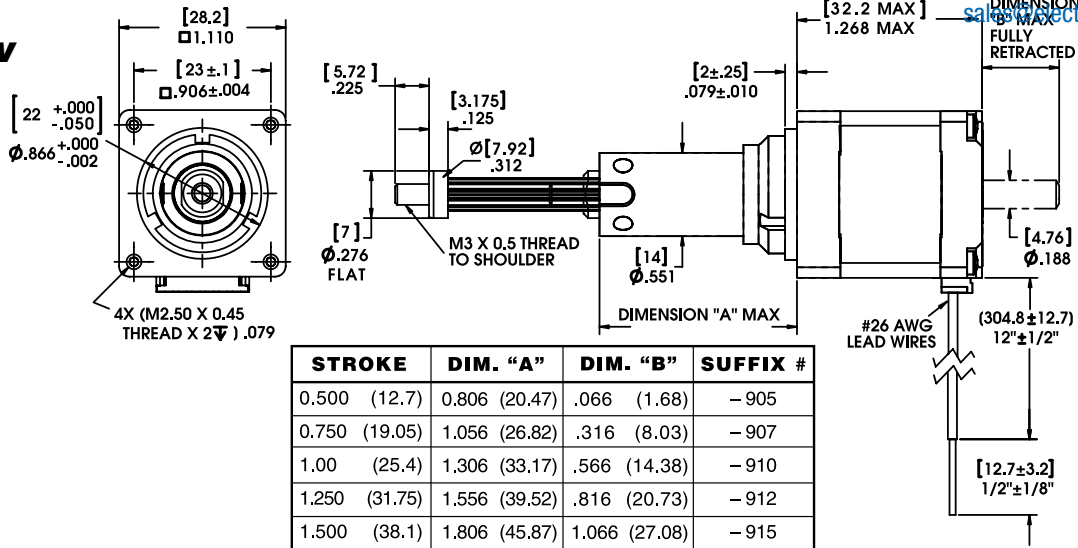
*Values truncated

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.

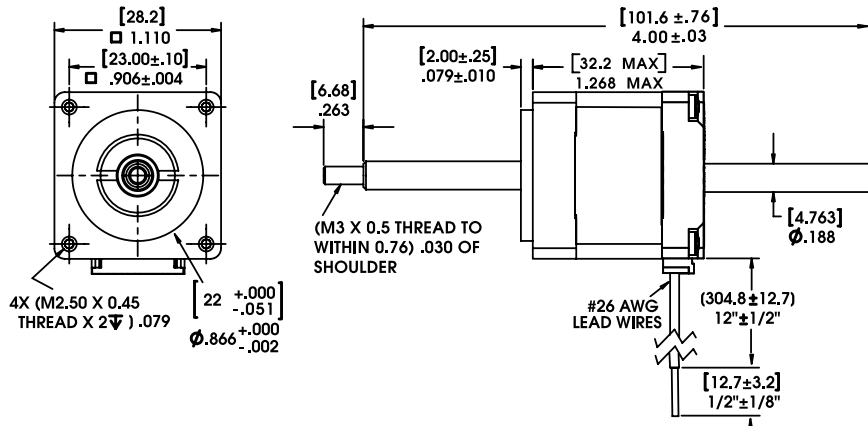
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Captive Leadscrew



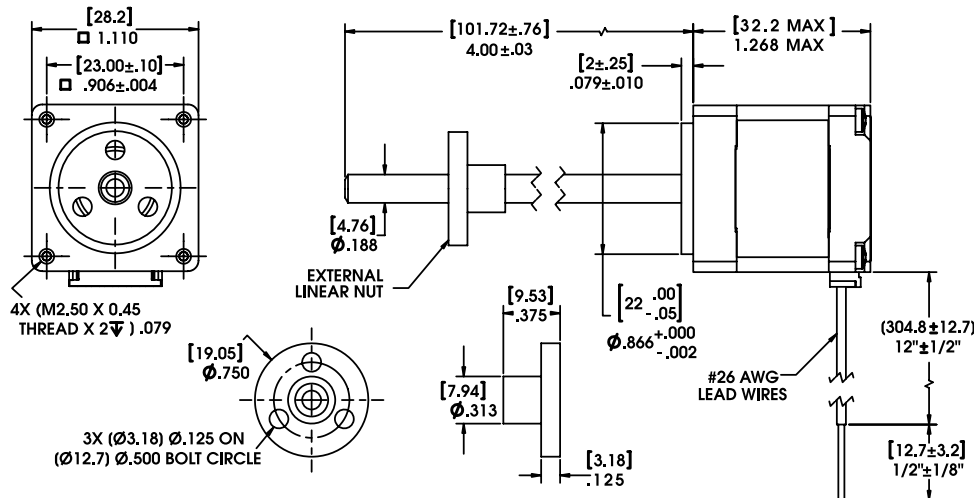
Integrated connector option, see page 95

Non-Captive Leadscrew



Integrated connector option, see page 95

External Linear



Integrated connector option, see page 95

28000 Series: Size 11 Performance Curves



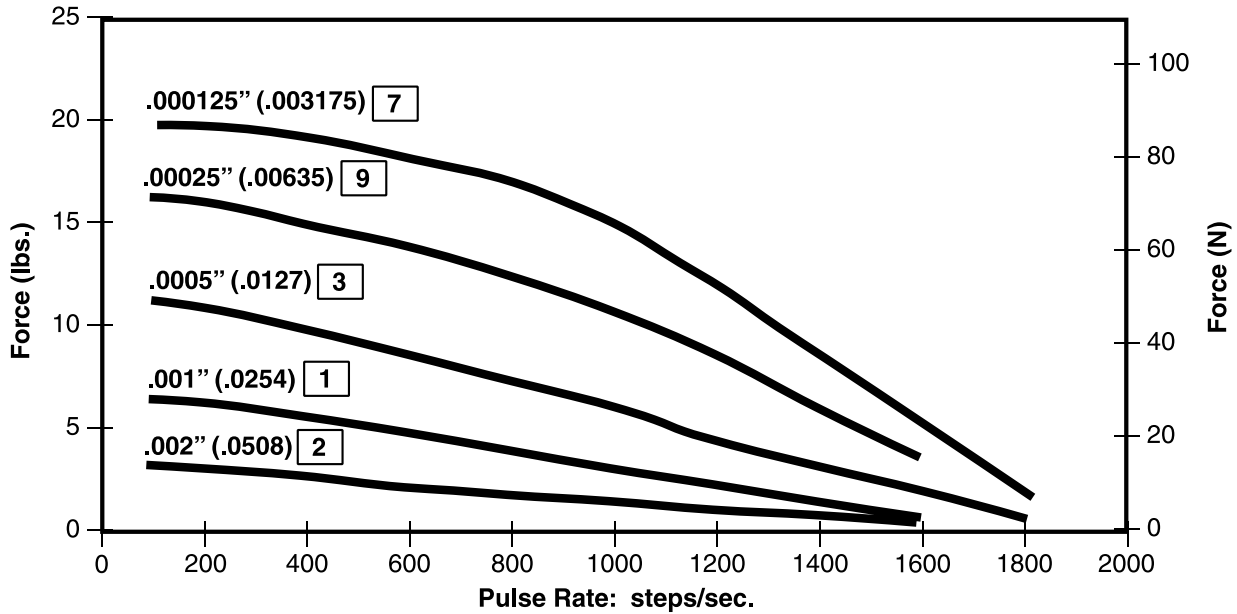
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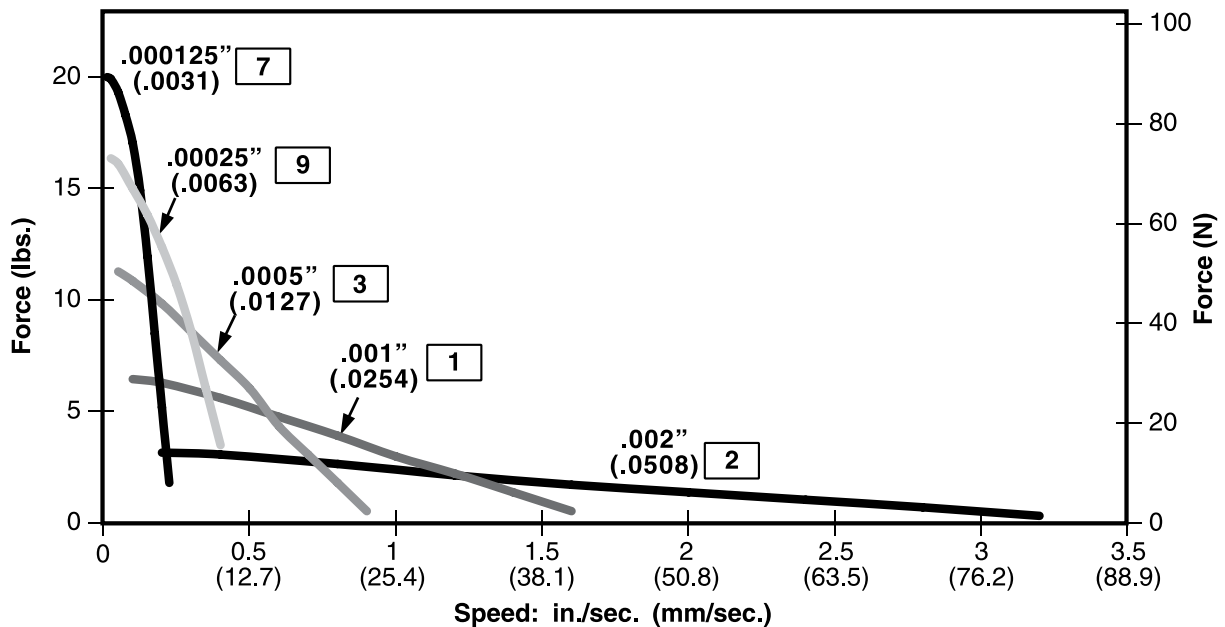
FORCE vs. PULSE RATE Bipolar · Chopper · 100% Duty Cycle

Ø .187 (4.75) Leadscrew



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

Ø .187 (4.75) Leadscrew



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

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

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

Haydon™ 28000 Series Size 11 Double Stack hybrid linear actuators for enhanced performance.

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



Salient Characteristics

| Size 11: 28 mm (1.1-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle) | | | |
|---|------------------------|------------|---------|
| Part No. | Captive | 28M4(X)-V | |
| | Non-captive | 28L4(X)-V | |
| | External Lin. | E28M4(X)-V | |
| Wiring | | Bipolar | |
| Winding voltage | 2.1 VDC | 5 VDC | 12 VDC |
| Current/phase | 1.9 A | 750 mA | 350 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 | | |
| Temperature rise | 135°F Rise (75°C Rise) | | |
| Weight | 5.8 oz (180 g) | | |
| Insulation resistance | 20 MΩ | | |
| Max. Load Limit | 30 lbs (133 N) | | |

| Linear Travel / Step | | Order Code I.D. |
|------------------------------|--------|-----------------|
| Screw Ø.1875"(4.76mm) 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.

28000 Series: Size 11 Double Stack Dimensional Drawings



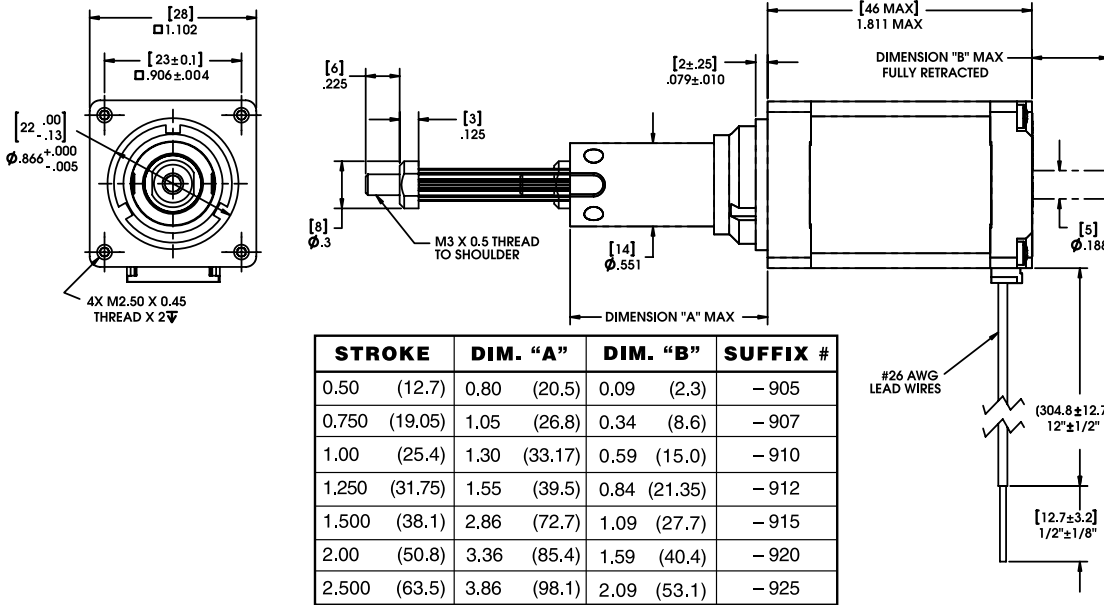
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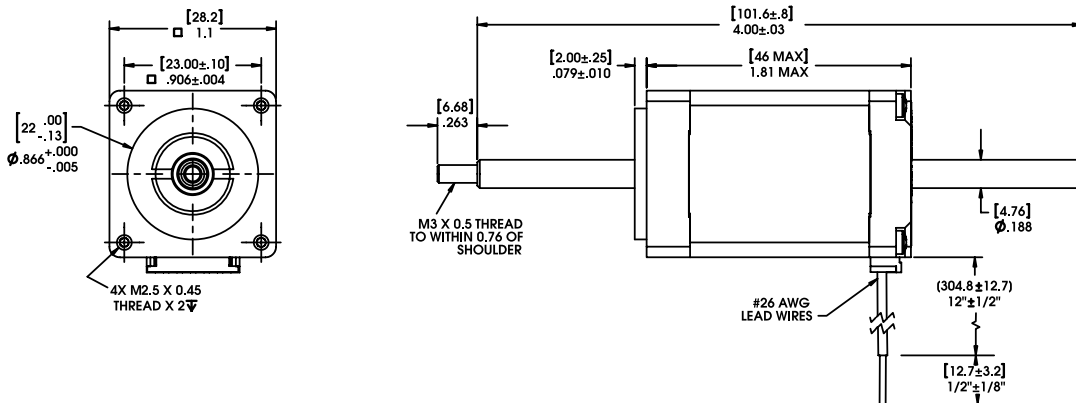
HaydonKerk Motion Solutions™

Captive Leadscrew



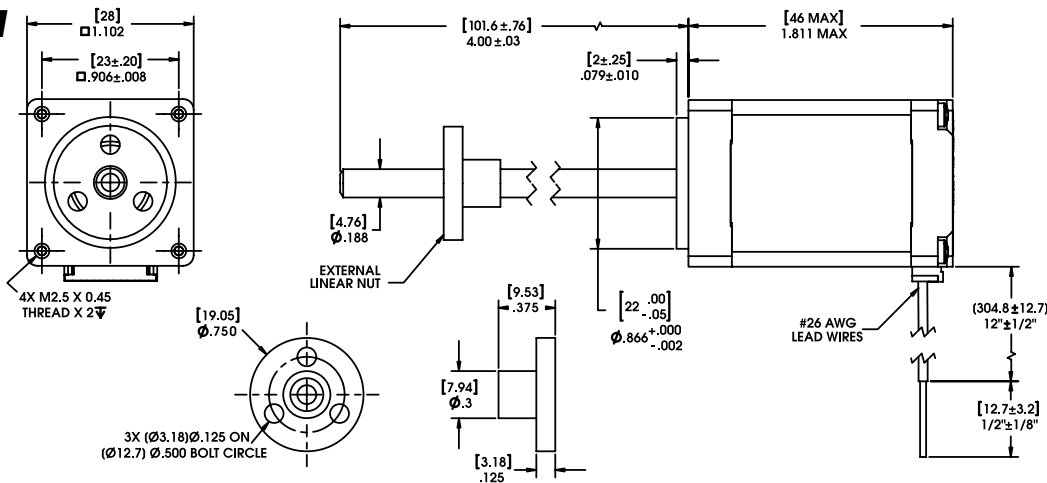
Integrated connector option, see page 95

Non-Captive Leadscrew



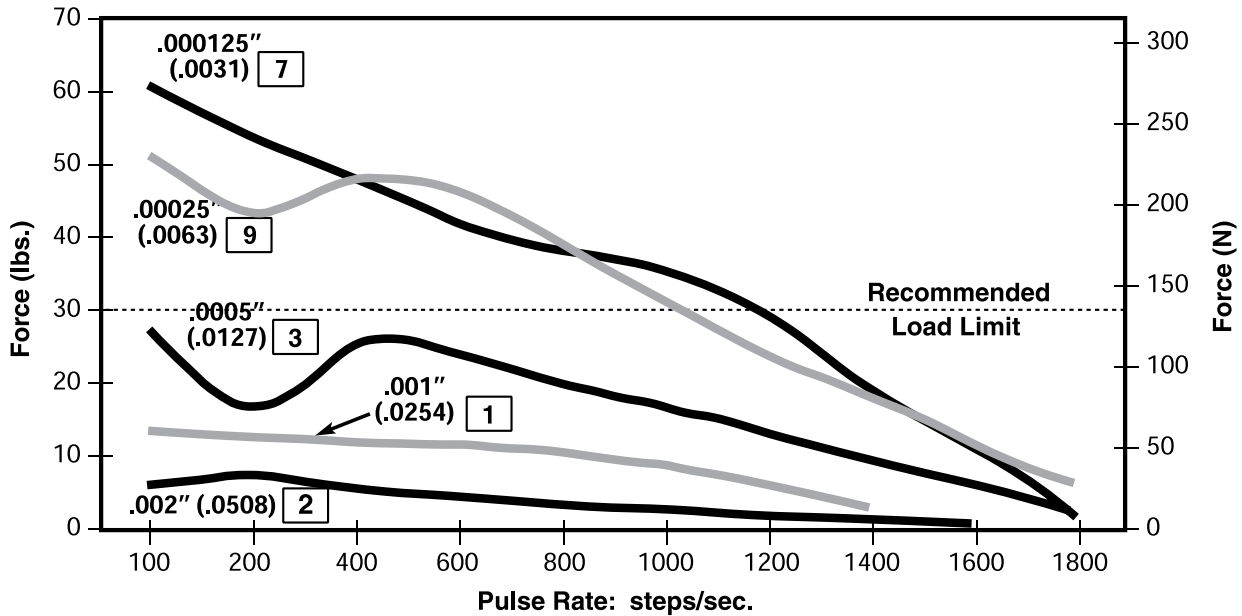
Integrated connector option, see page 95

External Linear

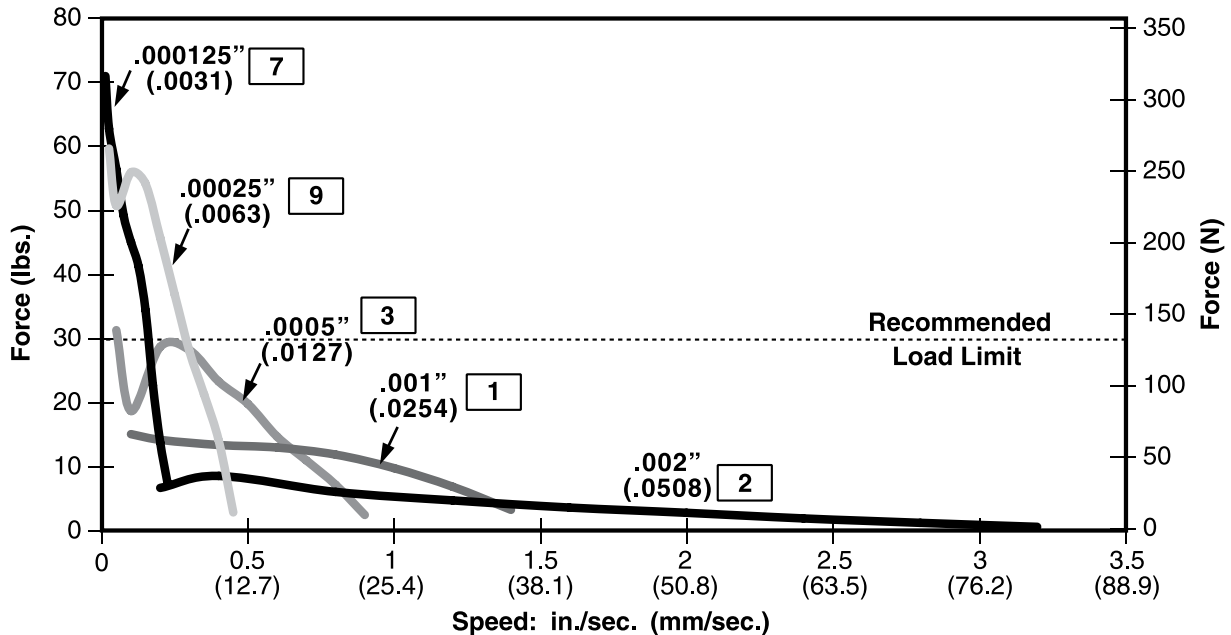


Integrated connector option, see page 95

FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle
Ø .187 (4.75) Leadscrew



FORCE vs. LINEAR VELOCITY Bipolar • Chopper • 100% Duty Cycle
Ø .187 (4.75) Leadscrew



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 Linear Actuator



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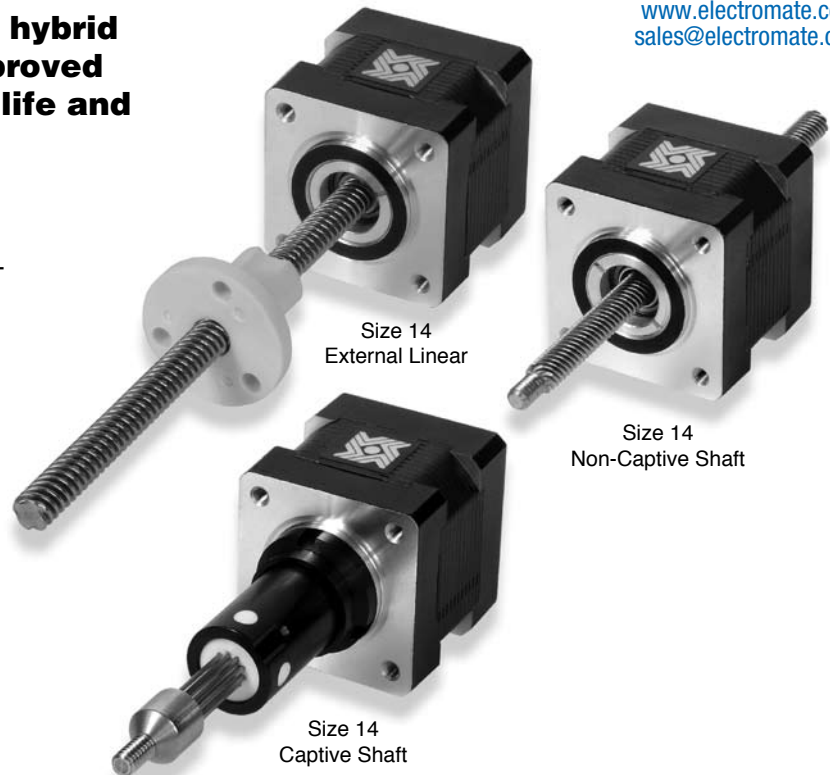


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Haydon™ 35000 Series Size 14 hybrid linear actuators have been improved to provide higher force, longer life and improved performance.

The various patented designs deliver exceptional performance and new linear motion design opportunities. Three designs are available, captive, non-captive and external linear versions. The 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).



Salient Characteristics

| Size 14: 35 mm (1.4-in) Hybrid Linear Actuator (1.8° Step Angle) | | | | | | Linear Travel / Step | | | | | |
|--|---------------|------------------------|--------|------------|------------|---|--------------------|---|--------------------|--|--|
| Part No. | Captive | 35H4(X)-V | | 35H6(X)-V | | Screw Ø .218" (5.54 mm) inches mm | Order Code I.D. | Screw Ø .250" (6.35 mm) inches mm | Order Code I.D. | | |
| | | 35F4(X)-V | | 35F6(X)-V | | | | | | | |
| | Non-captive | E35H4(X)-V | | E35H6(X)-V | | | | | | | |
| | External Lin. | | | | | | | | | | |
| Wiring | | Bipolar | | | Unipolar** | | | | | | |
| Winding voltage | | 2.33 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC | | | | | |
| Current/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 | | 27.0 gcm ² | | | | | | | | | |
| Temperature rise | | 135°F Rise (75°C Rise) | | | | | | | | | |
| Weight | | 5.7 oz (162 g) | | | | | | | | | |
| Insulation resistance | | 20 MΩ | | | | | | | | | |

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

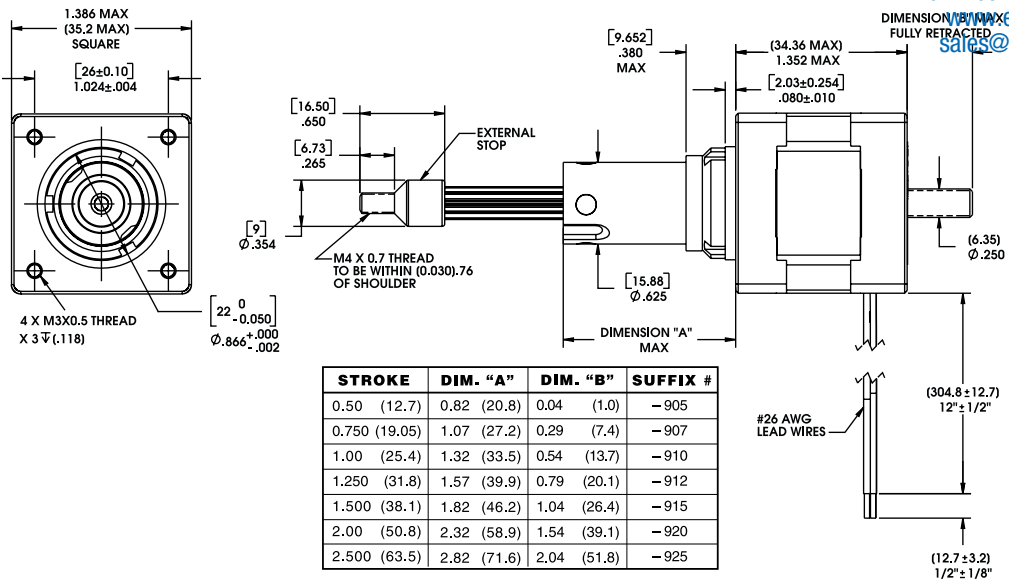
*Values truncated

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

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

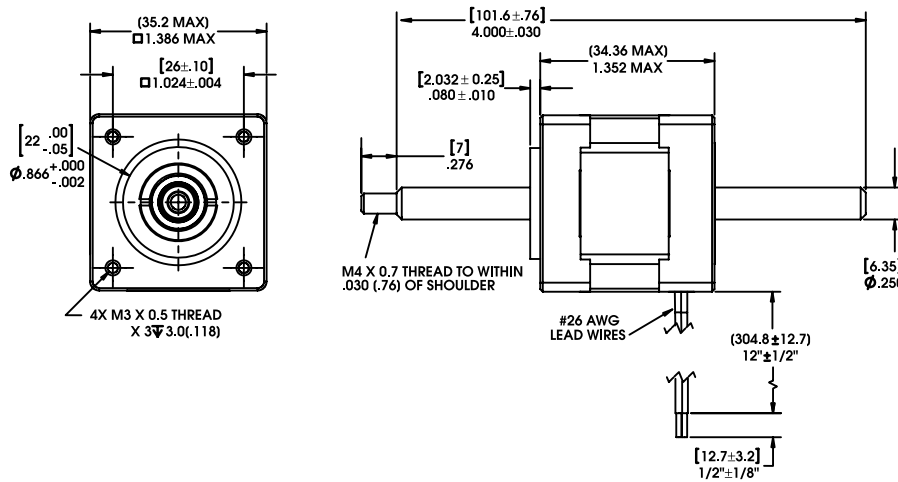
** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Captive Leadscrew



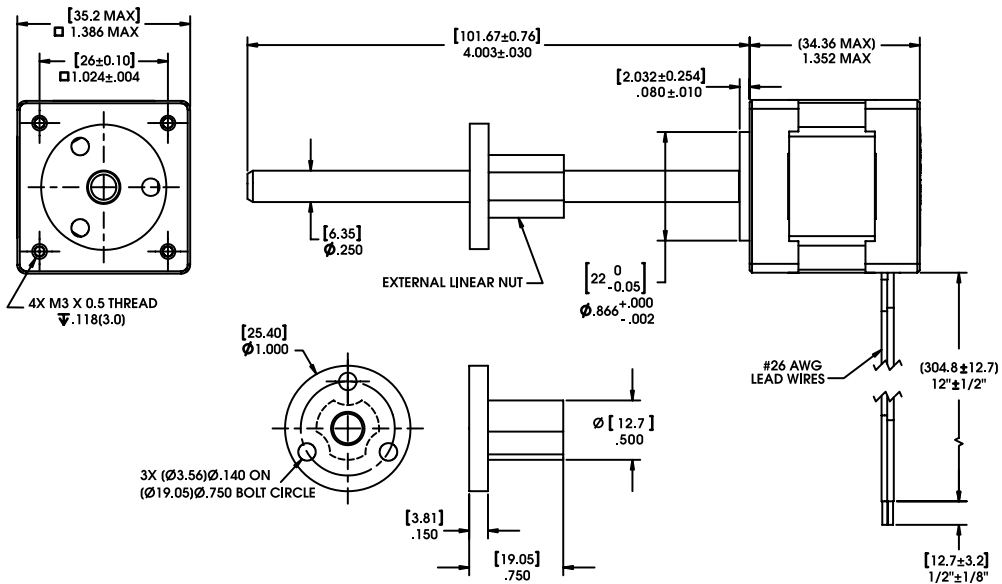
Integrated connector option, see page 95

Non-Captive Leadscrew



Integrated connector option, see page 95

External Linear



Integrated connector option, see page 95

35000 Series: Size 14 Performance Curves



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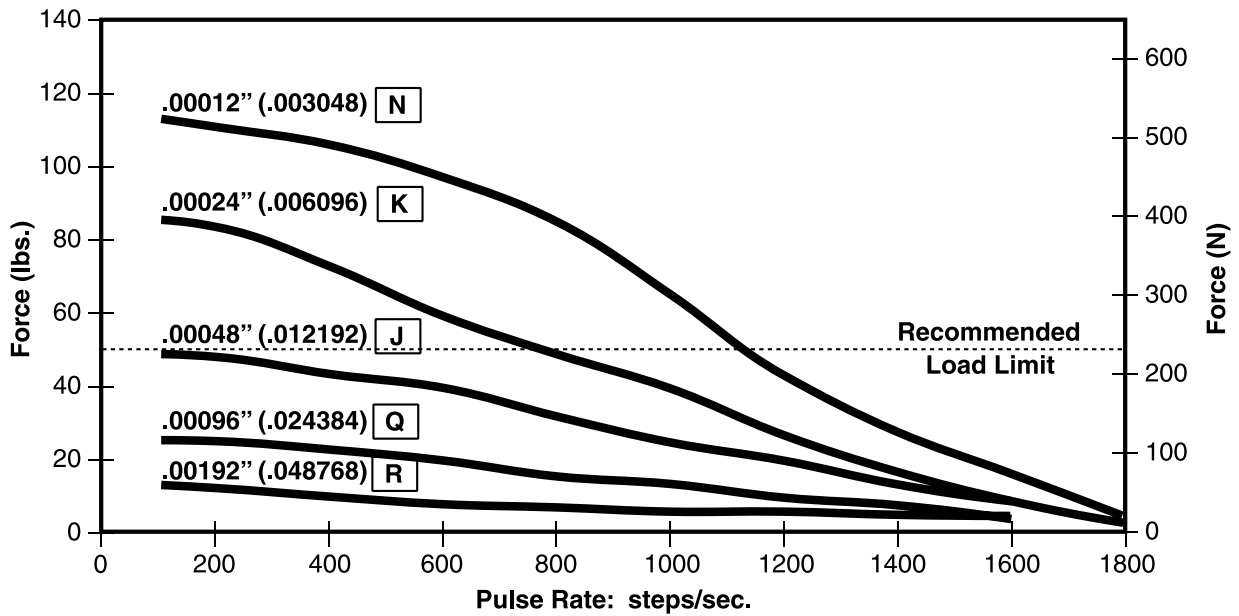


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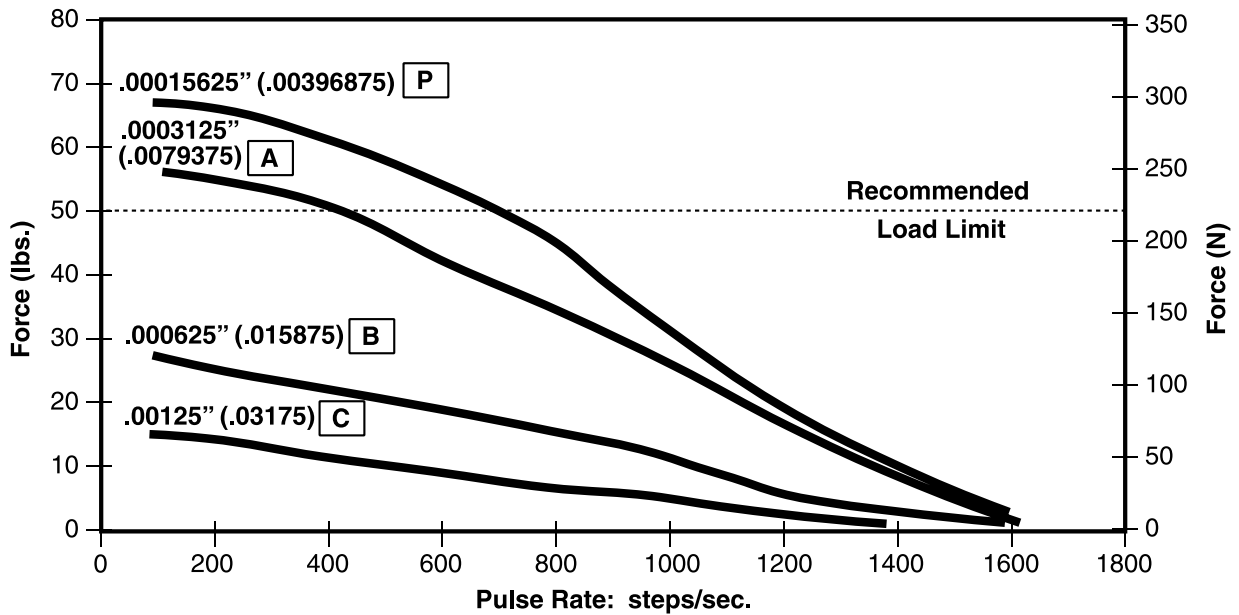
HaydonKerk Motion Solutions™

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

Ø .218 (5.54) Leadscrew

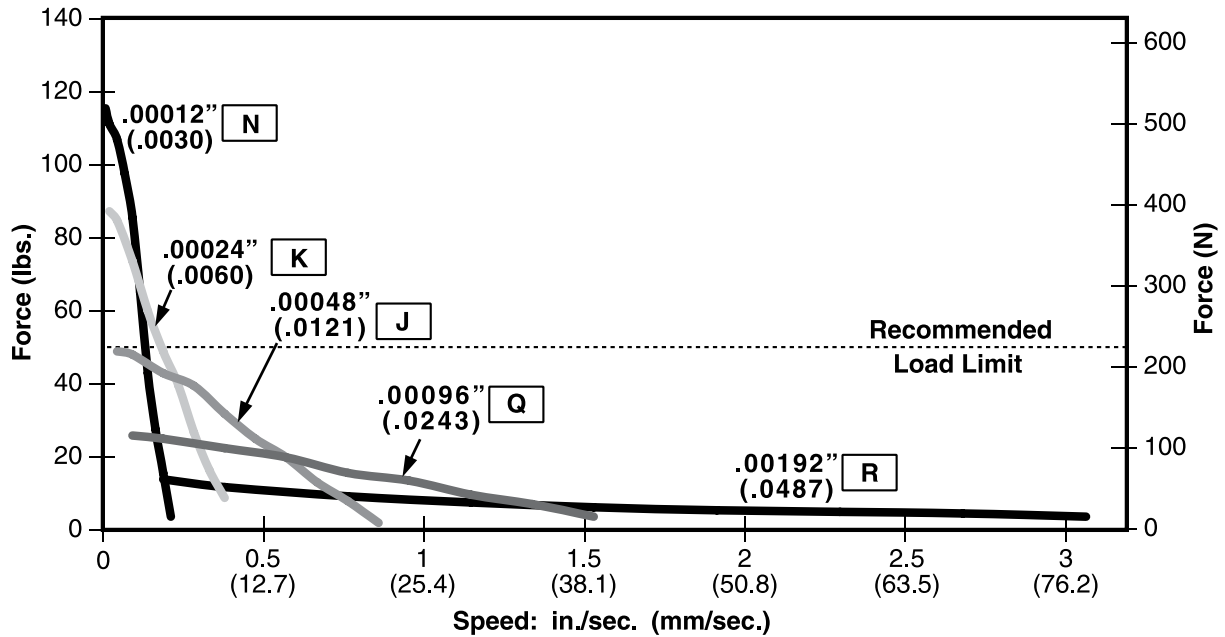


Ø .250 (6.35) Leadscrew

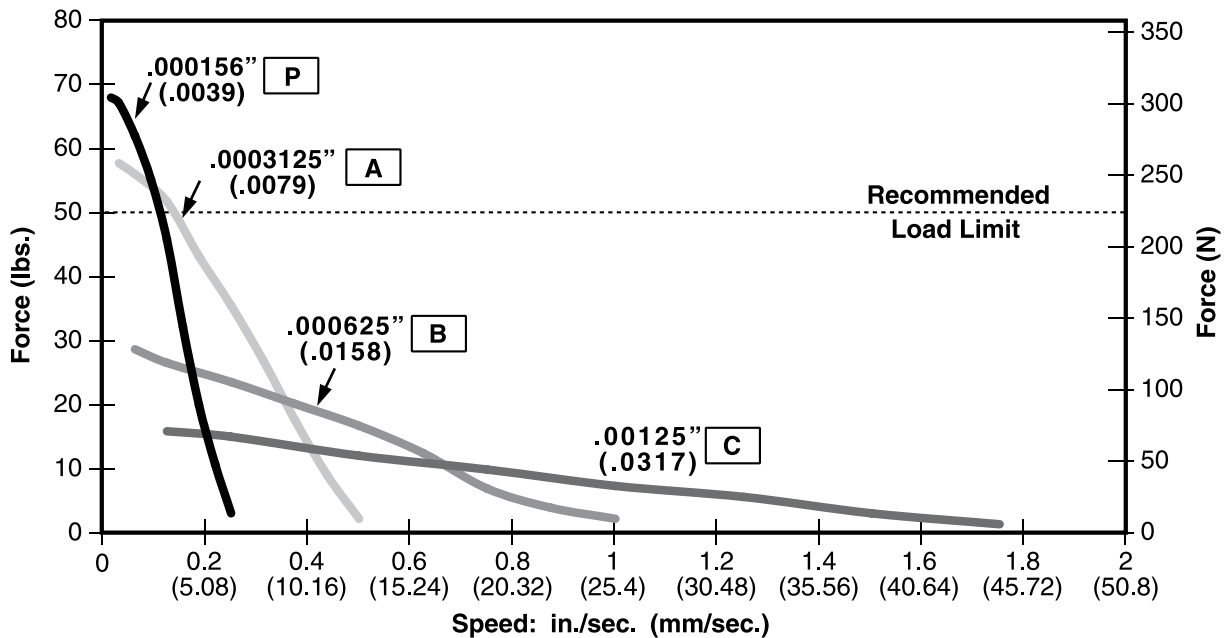


FORCE vs. LINEAR VELOCITY Bipolar • Chopper • 100% Duty Cycle

Ø .218 (5.54) Leadscrew



Ø .250 (6.35) Leadscrew



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 High Resolution Linear Actuator

HaydonKerk Motion Solutions™



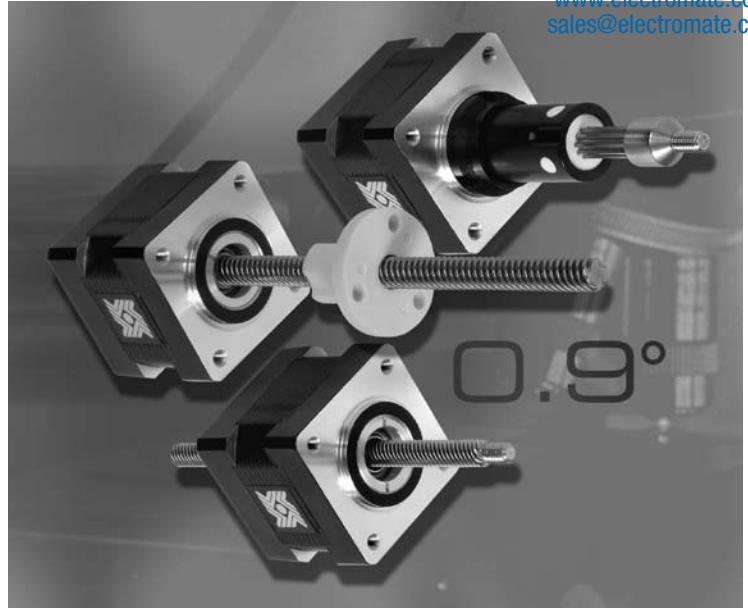
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Precision step movement down to 1.5 micron with up to 50 lbs (222 N) force.

The Haydon™ 35000 Series Size 14, 0.9° high resolution (standard resolution = 1.8°) 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. These compact units provide a cost effective solution for engineers requiring positional accuracy and high speed linear travel. Haydon can custom design this motor for virtually any customer specific application.



Salient Characteristics

| Size 14: 35 mm (1.4-in) Hybrid Linear Actuator (0.9° Step Angle) | | | | | |
|--|------------------------|------------|--------|------------|------------|
| Part No. | Captive | 35K4(X)-V | | 35K6(X)-V | |
| | Non-captive | 35J4(X)-V | | 35J6(X)-V | |
| | External Lin. | E35K4(X)-V | | E35K6(X)-V | |
| Wiring | | Bipolar | | | Unipolar** |
| Winding voltage | 2.33 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC |
| Current/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 | 27 gcm ² | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | |
| Weight | 5.7 oz (162 g) | | | | |
| Insulation resistance | 20 MΩ | | | | |

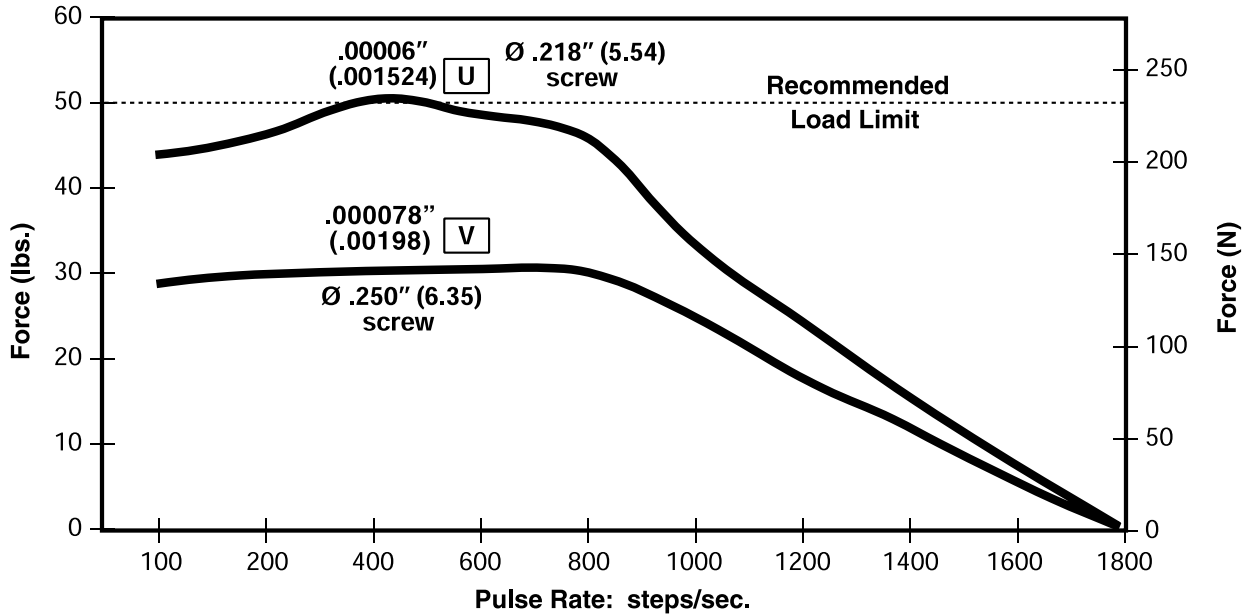
| Linear Travel / Step | | | | | |
|----------------------|--------|-----------|-----------------|---------|-----------|
| Screw Ø | | Order | Screw Ø | | Order |
| .218" (5.54 mm) | inches | Code I.D. | .250" (6.35 mm) | inches | Code I.D. |
| .00006 | .0015* | U | .000078* | .00198* | V |
| .00012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

*Values truncated

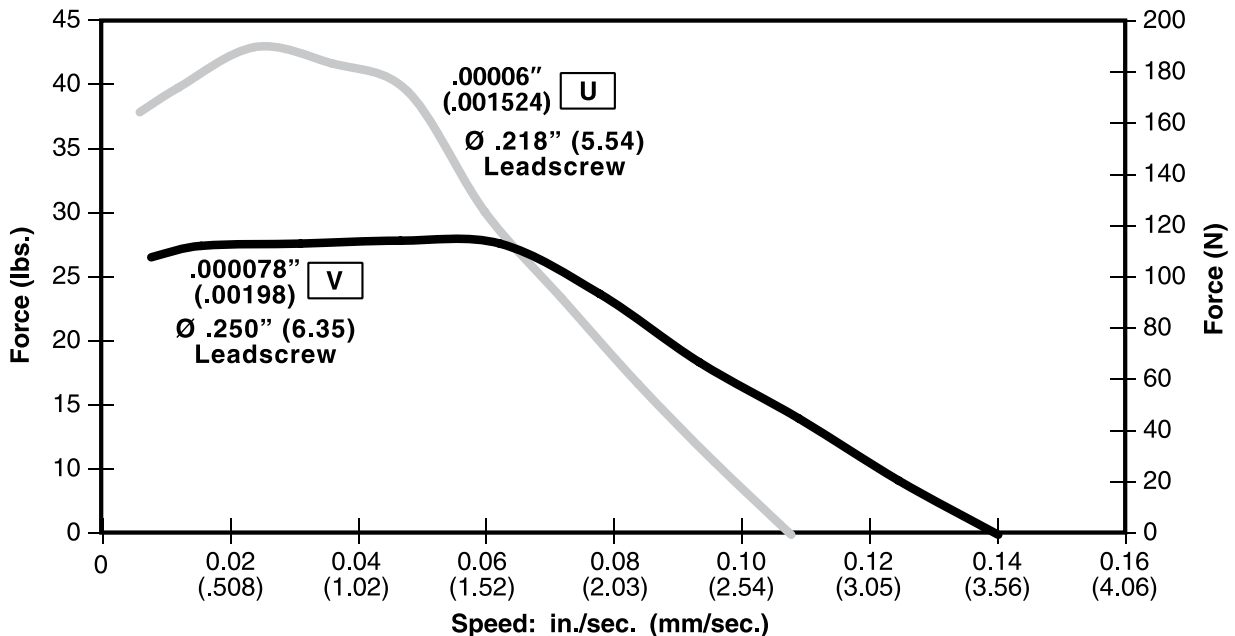
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

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

FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle
Ø .218 (5.54) and Ø .250 (6.35) Leadscrews



FORCE vs. LINEAR VELOCITY Bipolar • Chopper • 100% Duty Cycle
Ø .218 (5.54) and Ø .250 (6.35) Leadscrews



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 Double Stack Linear Actuator

HaydonKerk Motion Solutions™



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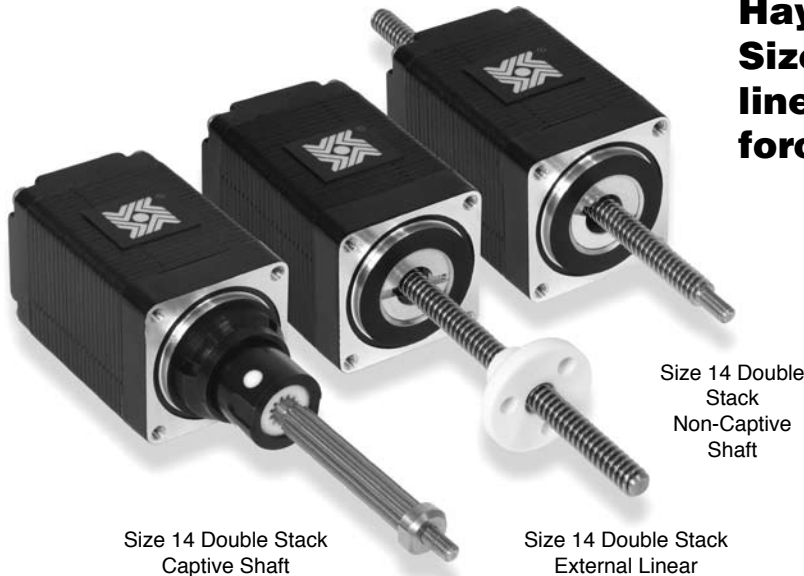
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**Haydon™ 35000 Series
Size 14 Double Stack hybrid
linear actuators have improve
force and performance.**



Size 14 Double Stack
Captive Shaft

Size 14 Double
Stack
Non-Captive
Shaft

Size 14 Double Stack
External Linear

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

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

Salient Characteristics

| Size 14: 3 mm (1.4-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle) | | | |
|--|------------------------|------------|---------|
| Part No. | Captive | 35M4(X)-V | |
| | Non-captive | 35L4(X)-V | |
| | External Lin. | E35M4(X)-V | |
| Wiring | | Bipolar | |
| Winding voltage | 2.33 VDC | 5 VDC | 12 VDC |
| Current/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 | | |
| Temperature rise | 135°F Rise (75°C Rise) | | |
| Weight | 8.5 oz (240 g) | | |
| Insulation resistance | 20 MΩ | | |
| Max. Load Limit | 50 lbs (222 N) | | |

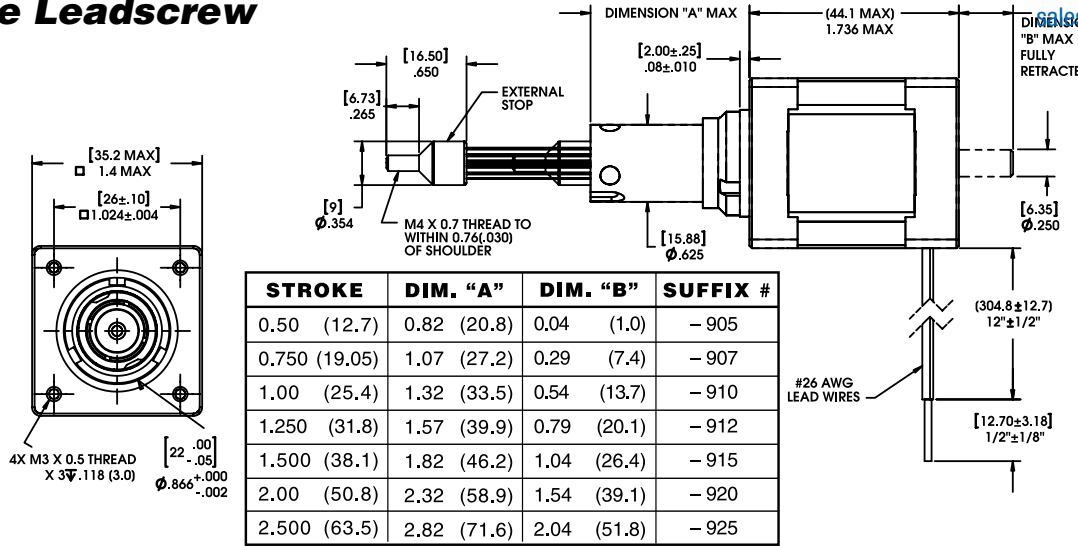
| Linear Travel / Step | | Order Code I.D. |
|-------------------------------|--------|-----------------|
| Screw Ø.250" (6.35 mm) inches | mm | |
| .000625 | .0158* | B |
| .00125 | .0317* | C |
| .0025 | .0635 | Y |
| .00375 | .0953 | AG |
| .005 | .127 | Z |

*Values truncated

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

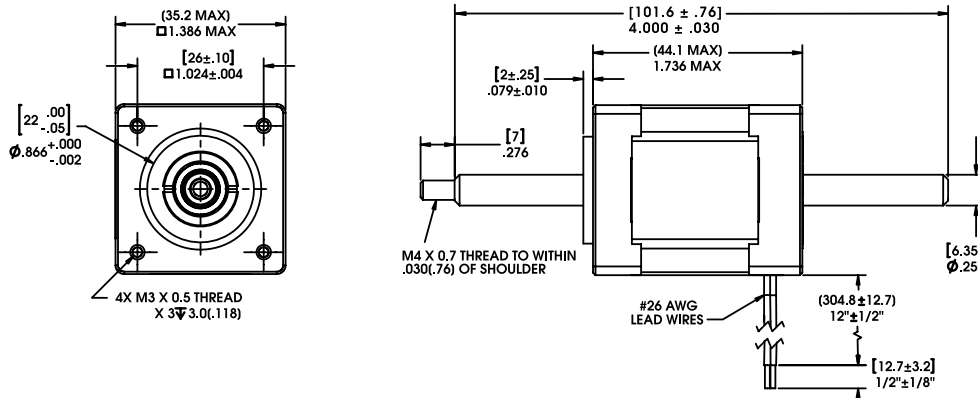
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

Captive Leadscrew



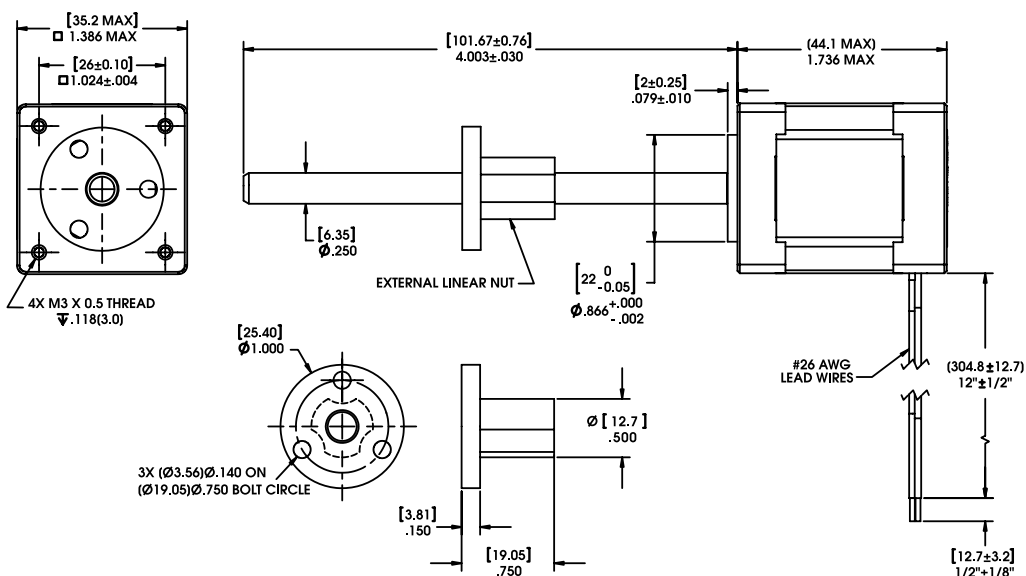
Integrated connector option, see page 95

Non-Captive Leadscrew



Integrated connector option, see page 95

External Linear



Integrated connector option, see page 95

35000 Series: Size 14 Double Stack Performance Curves

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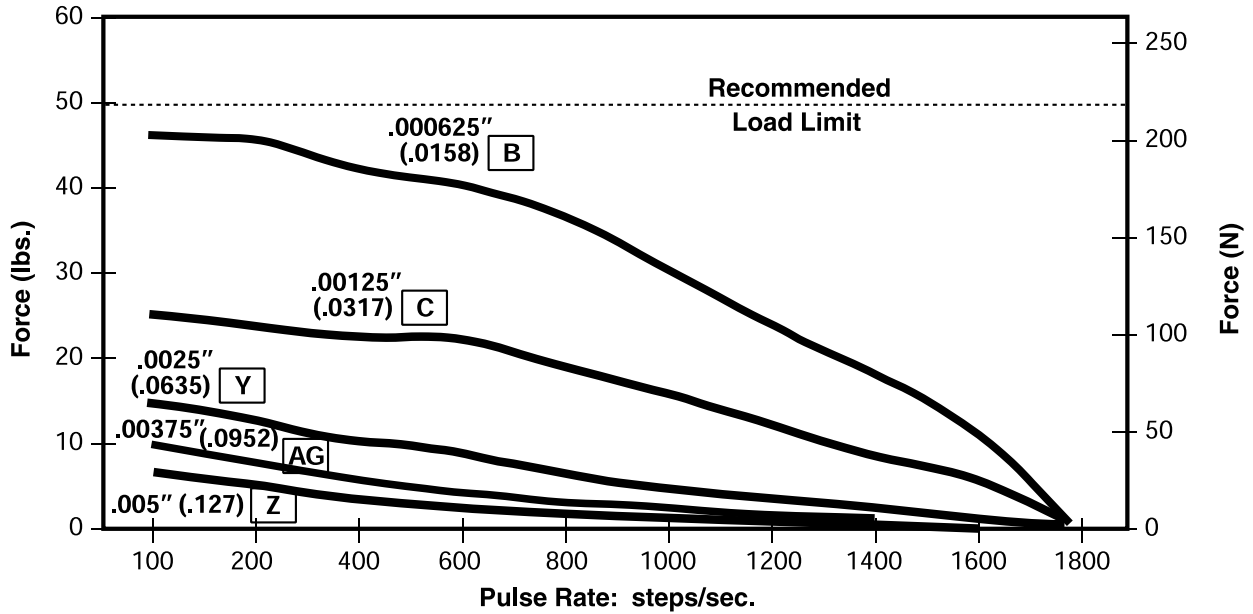
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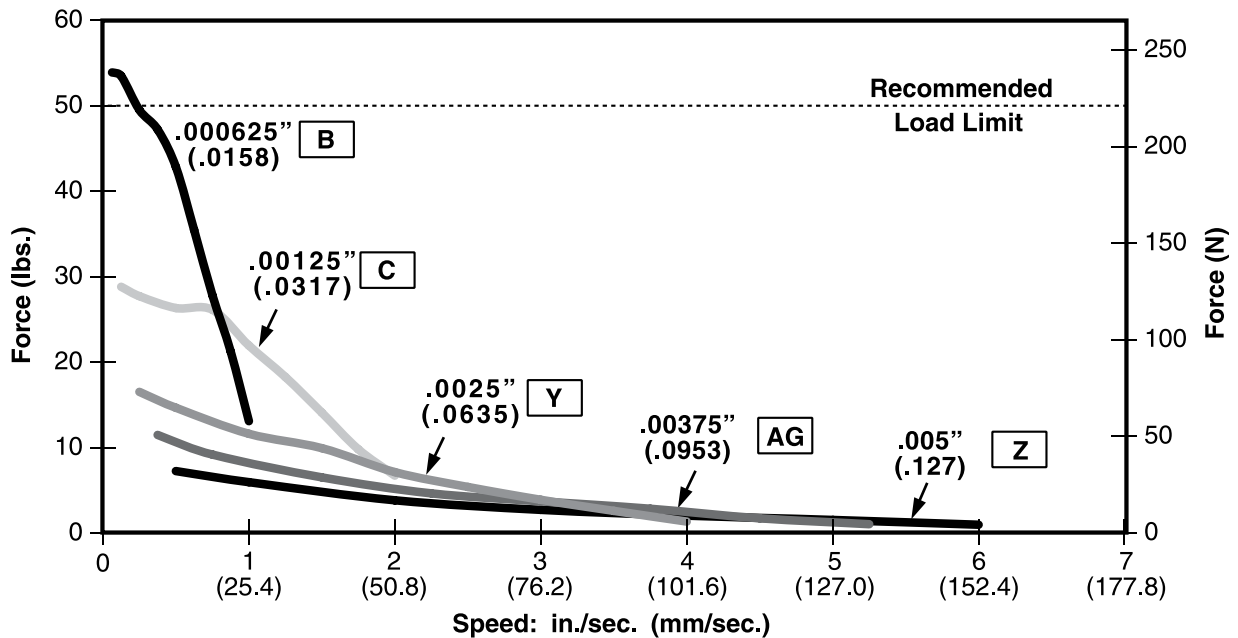
FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle

Ø .250 (6.35) Leadscrew



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

Ø .250 (6.35) Leadscrew



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

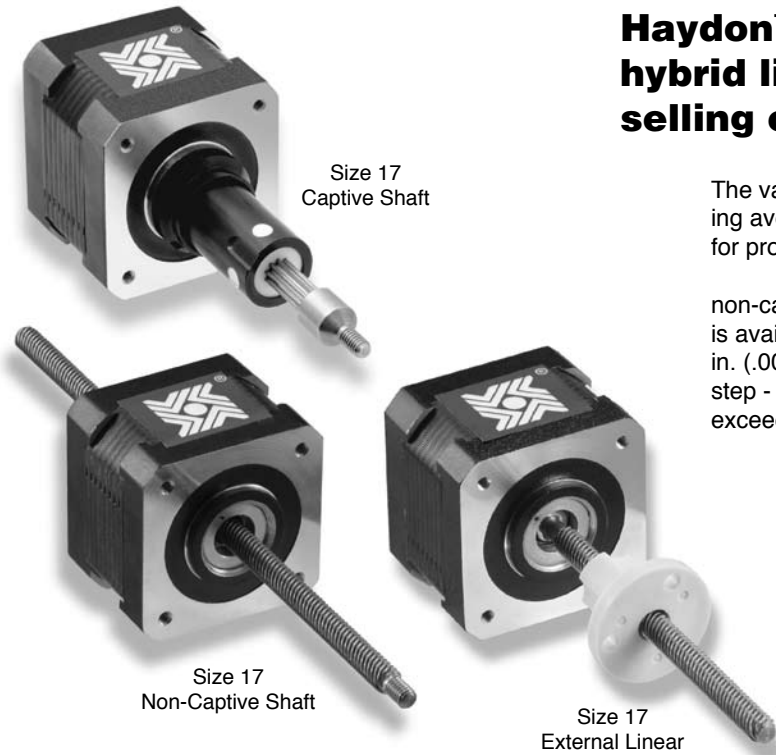
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

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

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

The various patented designs deliver high performance, opening avenues for equipment designers who previously settled for products with inferior performance and endurance.

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



Salient Characteristics

| Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle) | | | | | |
|--|------------------------|------------|---------|------------|------------|
| Part No. | Captive | 43H4(X)-V | | 43H6(X)-V | |
| | Non-captive | 43F4(X)-V | | 43F6(X)-V | |
| | External Lin. | E43H4(X)-V | | E43H6(X)-V | |
| Wiring | | Bipolar | | | Unipolar** |
| Winding voltage | 2.33 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC |
| Current/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 | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | |
| Weight | 8.5 oz (241 g) | | | | |
| Insulation resistance | 20 MΩ | | | | |

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

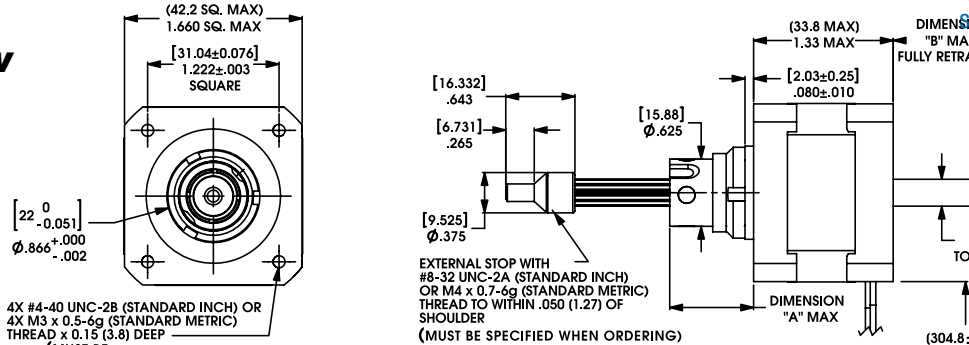
*Values truncated

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

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

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

Captive Leadscrew

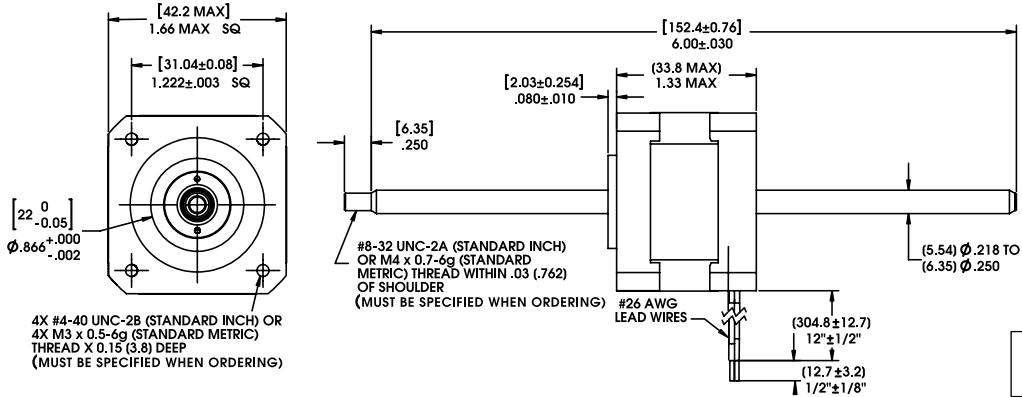


4X #4-40 UNC-2B (STANDARD INCH) OR 4X M3 x 0.5-6g (STANDARD METRIC) THREAD X 0.15 (3.8) DEEP (MUST BE SPECIFIED WHEN ORDERING)
 M3 MOUNTING HOLES AVAILABLE ON REQUEST.

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

Integrated connector option, see page 95

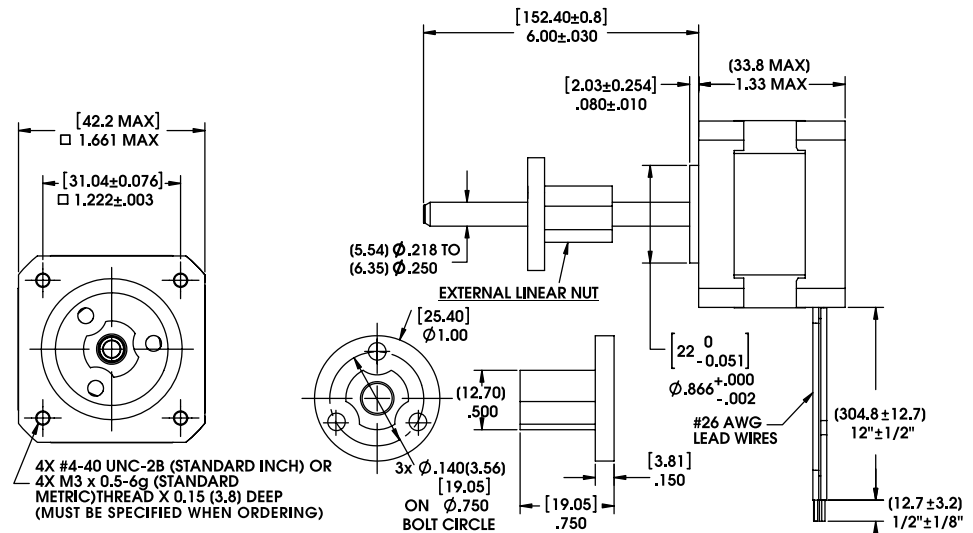
Non-Captive Leadscrew



4X #4-40 UNC-2B (STANDARD INCH) OR 4X M3 x 0.5-6g (STANDARD METRIC) THREAD X 0.15 (3.8) DEEP (MUST BE SPECIFIED WHEN ORDERING)

Integrated connector option, see page 95

External Linear

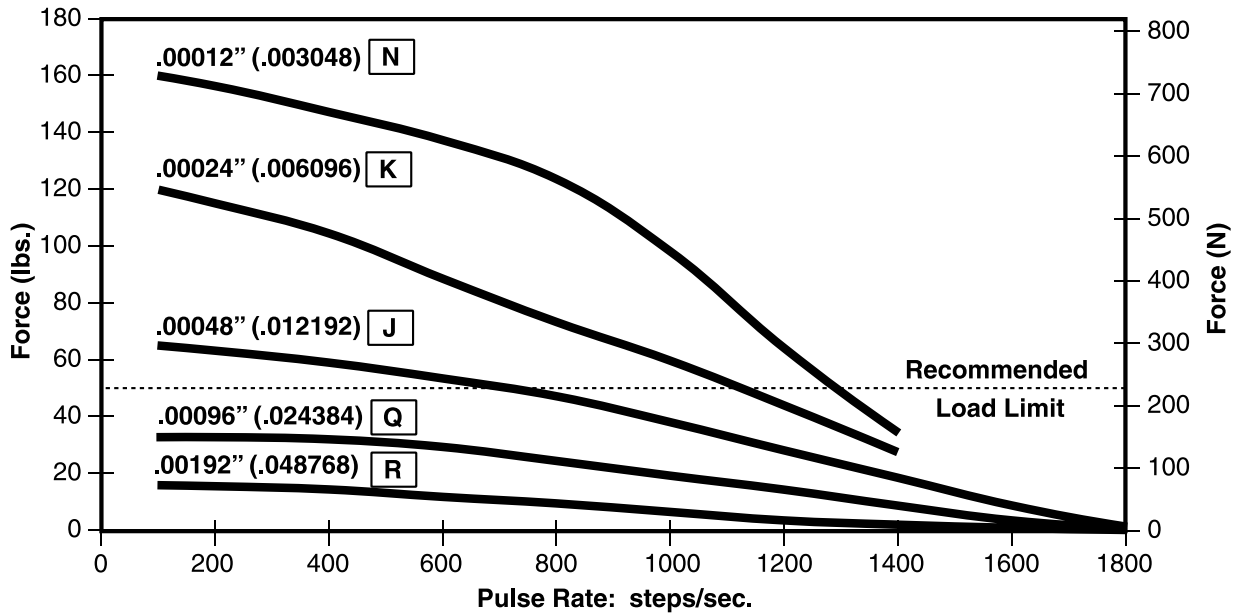


4X #4-40 UNC-2B (STANDARD INCH) OR 4X M3 x 0.5-6g (STANDARD METRIC) THREAD X 0.15 (3.8) DEEP (MUST BE SPECIFIED WHEN ORDERING)

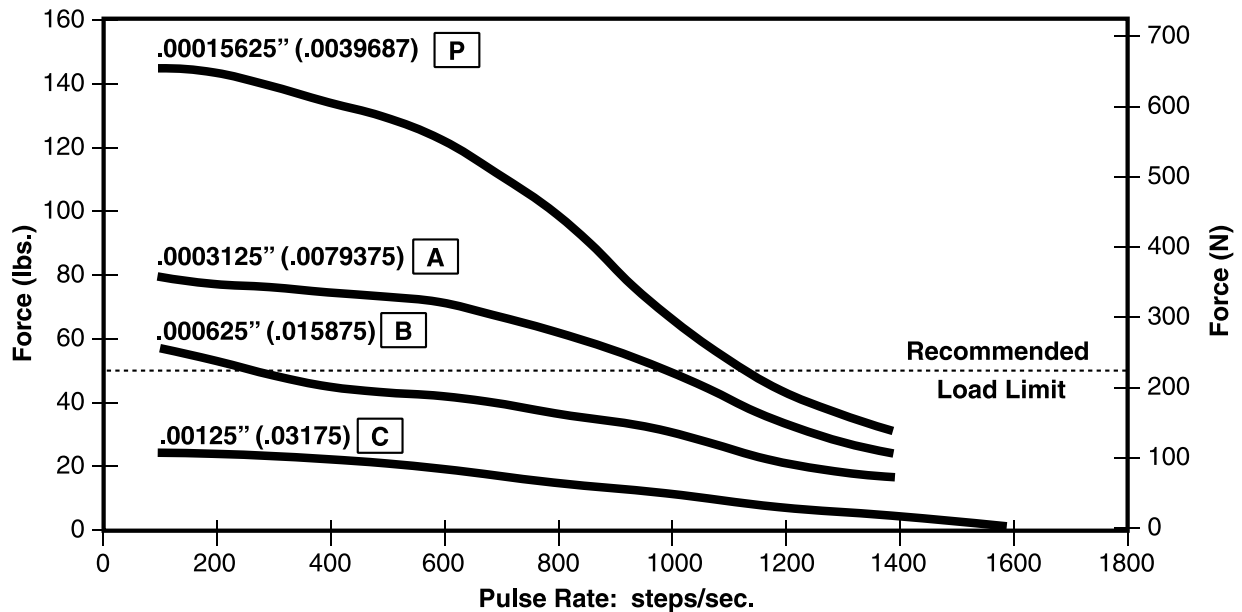
Integrated connector option, see page 95

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

Ø .218 (5.54) Leadscrew



Ø .250 (6.35) Leadscrew



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 Performance Curves



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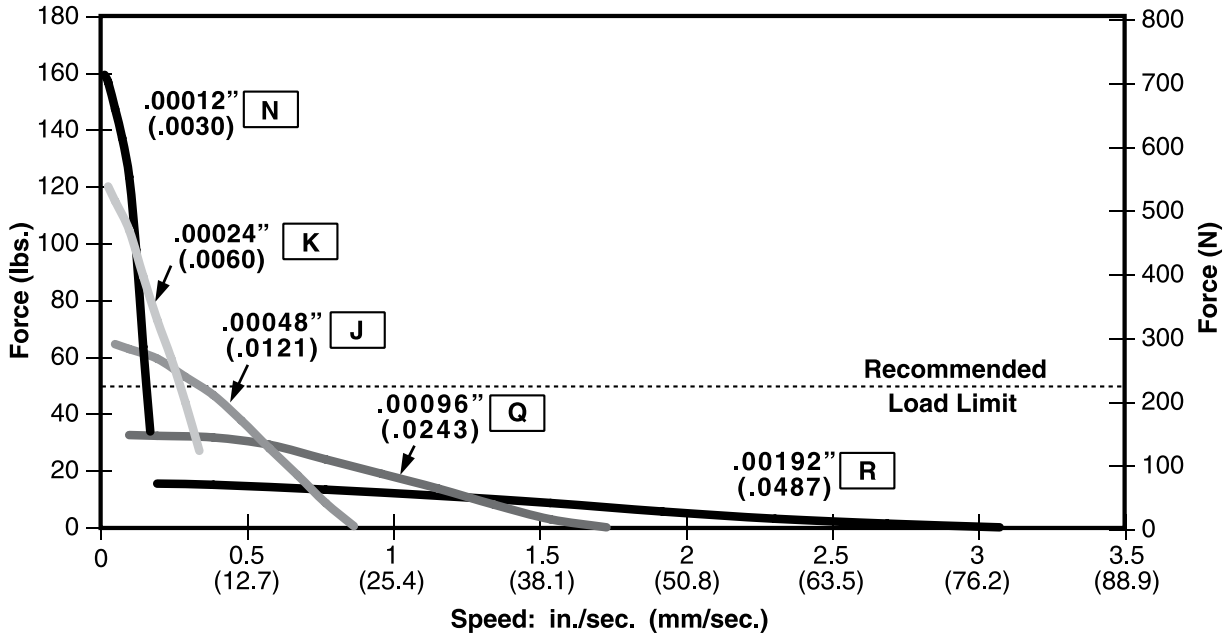


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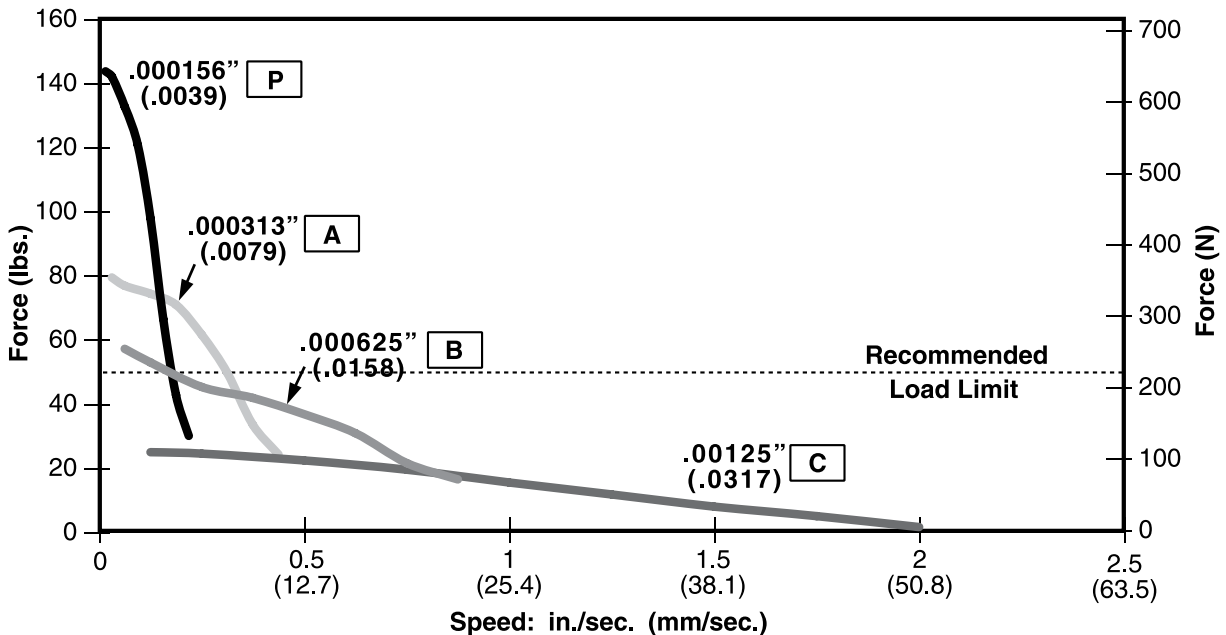
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FORCE vs. LINEAR VELOCITY **Bipolar · Chopper · 100% Duty Cycle**

Ø .218 (5.54) Leadscrew



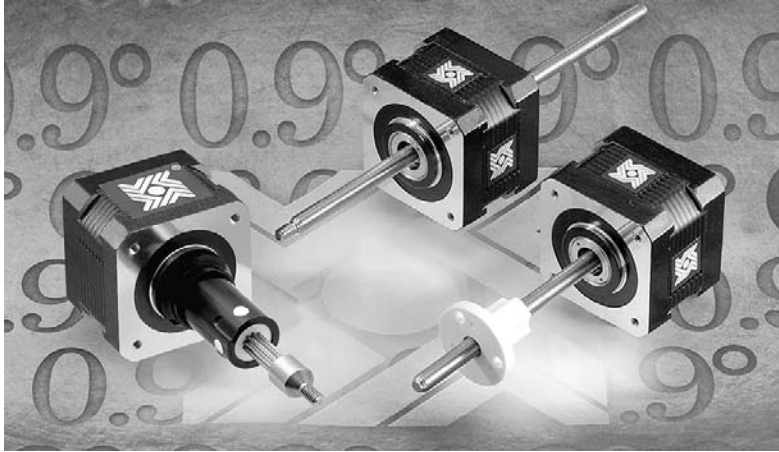
Ø .250 (6.35) Leadscrew



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

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

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



Haydon™ 43000 Series
Size 17, 0.9° high resolution hybrid motor has been specially engineered to deliver high speed, force and endurance.

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

Combined with a stainless steel lead-screw, the motor delivers an extremely smooth, precise motion.

Designed for applications that require long-life reliability, precise positioning and rapid motion.

Salient Characteristics

| Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (0.9° Step Angle) | | | | | |
|--|------------------------|------------|---------|------------|---------|
| Part No. | Captive | 43K4(X)-V | | 43K6(X)-V | |
| | Non-captive | 43J4(X)-V | | 43J6(X)-V | |
| | External Lin. | E43K4(X)-V | | E43K6(X)-V | |
| Wiring | | Bipolar | | Unipolar** | |
| Winding voltage | 2.33 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC |
| Current/phase RMS | 1.5 A | 700 mA | 290 mA | 700 mA | 290 mA |
| Resistance/phase | 1.56 Ω | 7.2 Ω | 41.5 Ω | 7.2 Ω | 41.5 Ω |
| Inductance/phase | 2.6 mH | 12.0 mH | 70.0 mH | 6.0 mH | 35.0 mH |
| Power consumption | 7 W | | | | |
| Rotor inertia | 37 gcm ² | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | |
| Weight | 8.5 oz (241 g) | | | | |
| Insulation resistance | 20 MΩ | | | | |

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

*Values truncated

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

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

43000 Series: Size 17 High Resolution Linear Actuator Performance Curves

HaydonKerk Motion Solutions™

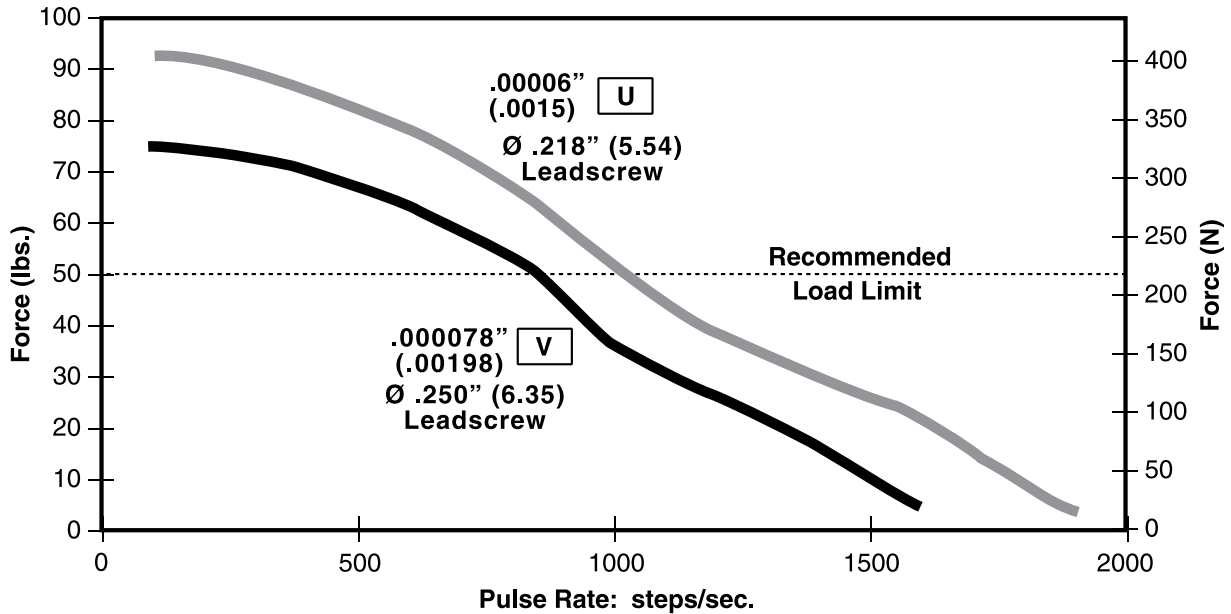


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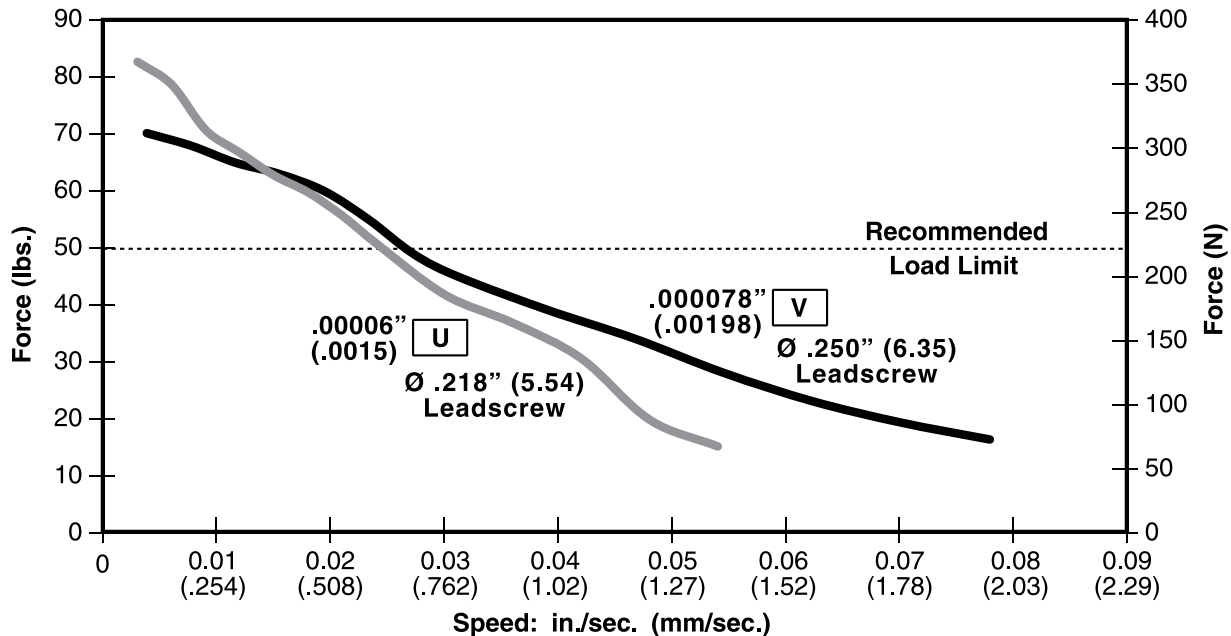


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FORCE vs. LINEAR VELOCITY Bipolar • Chopper • 100% Duty Cycle Ø .218 (5.54) and Ø .250 (6.35) Leadscrews



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 Double Stack Captive Shaft

Size 17 Double Stack External Linear

Size 17 Double Stack Non-Captive Shaft

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

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

Three designs are available, captive, non-captive and external linear versions. The 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).

Salient Characteristics

| Size 17: 43 mm (1.7-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle) | | | | |
|---|------------------------|------------|---------|--|
| Part No. | Captive | 43M4(X)-V | | |
| | Non-captive | 43L4(X)-V | | |
| | External Lin. | E43M4(X)-V | | |
| Wiring | | Bipolar | | |
| Winding voltage | 2.33 VDC | 5 VDC | 12 VDC | |
| Current/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 | 14 W Total | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | |
| Weight | 12.5 oz (352 g) | | | |
| Insulation resistance | 20 MΩ | | | |
| Max. Load Limit | 75 lbs (337 N) | | | |

| Linear Travel / Step | | Order Code I.D. |
|-------------------------------|--------|-----------------|
| Screw Ø.250" (6.35 mm) 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.

43000 Series: Size 17 Double Stack Dimensional Drawings



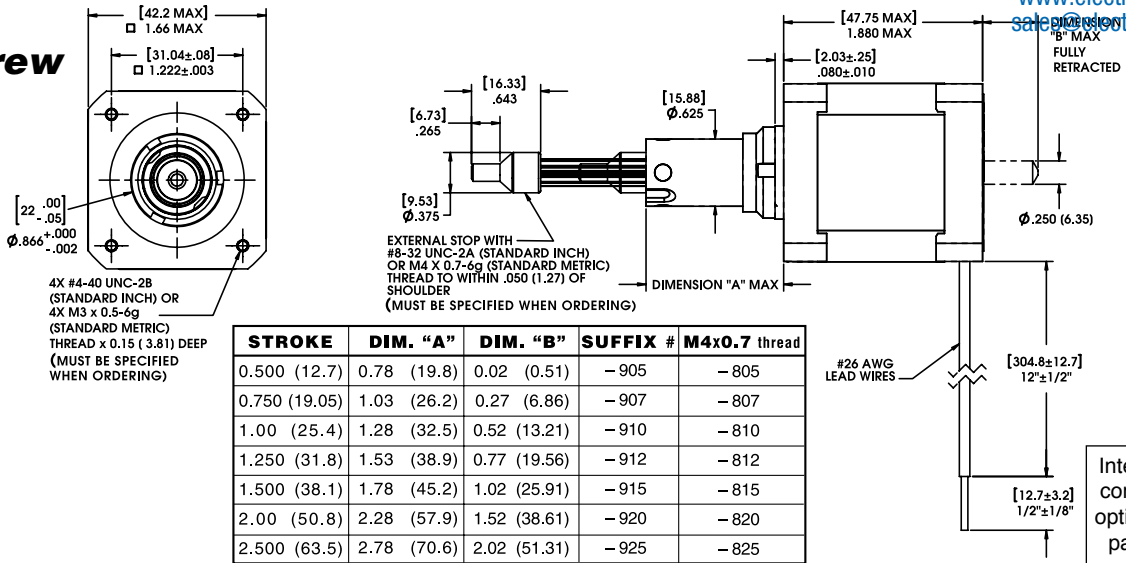
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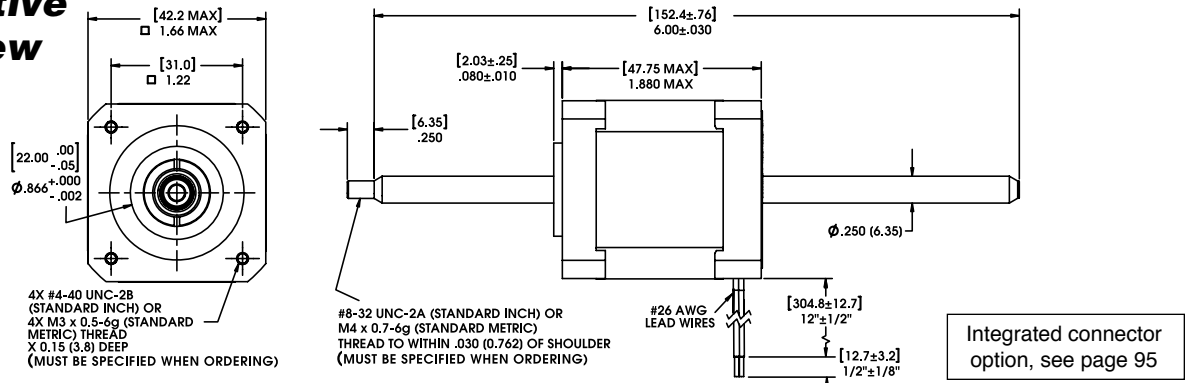
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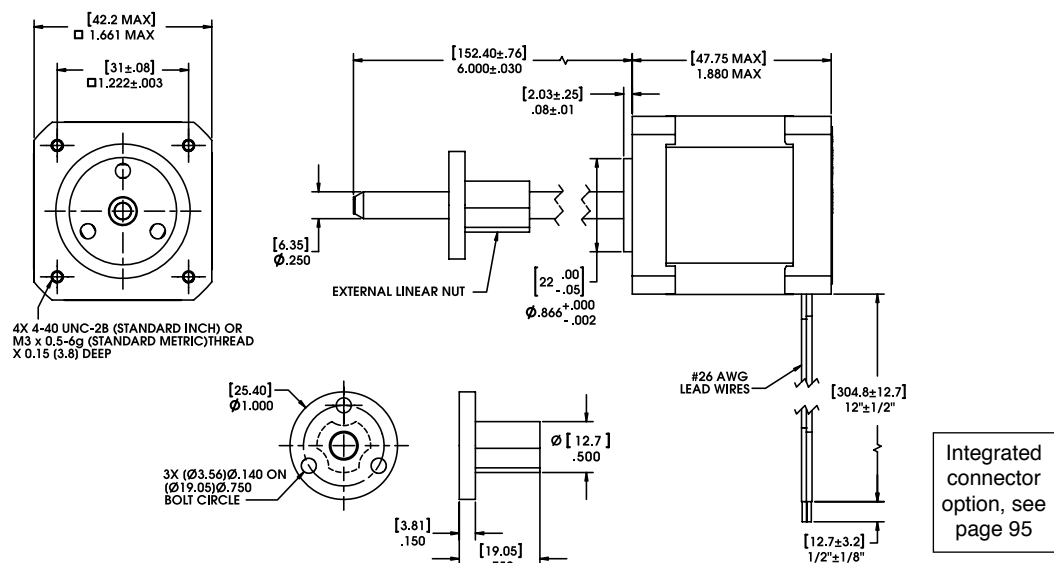
Captive Leadscrew



Non-Captive Leadscrew

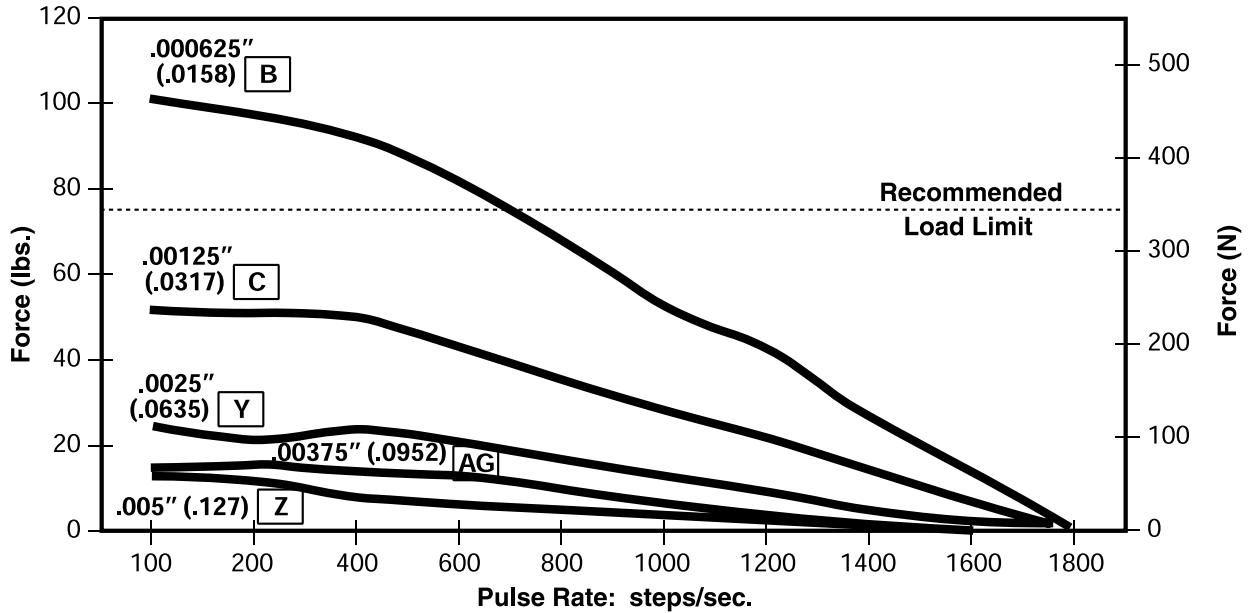


External Linear



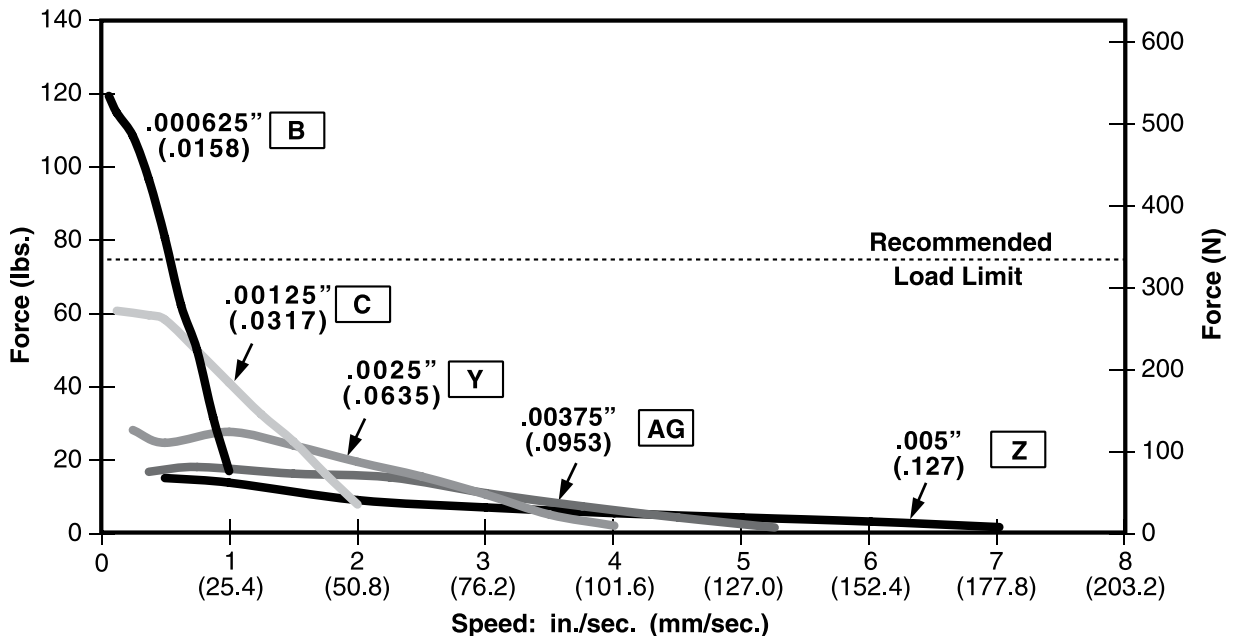
FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle

Ø .250 (6.35) Leadscrew



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

Ø .250 (6.35) Leadscrew



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

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

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

Haydon™ Size 23 hybrids... for applications that require forces up to 200 lbs. (890 N)



Size 23
External Linear



Size 23
Non-Captive
Shaft



Size 23 Captive
Shaft

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

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

Salient Characteristics

| Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle) | | | | | | |
|--|------------------------|------------|--------|--------|------------|--|
| Part No. | Captive | 57H4(X)-V | | | 57H6(X)-V | |
| | Non-captive | 57F4(X)-V | | | 57F6(X)-V | |
| | External Lin. | E57H4(X)-V | | | E57H6(X)-V | |
| Wiring | | Bipolar | | | Unipolar** | |
| Winding voltage | 3.25 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC | |
| Current/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 | | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | | |
| Weight | 18 oz (511 g) | | | | | |
| Insulation resistance | 20 MΩ | | | | | |

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

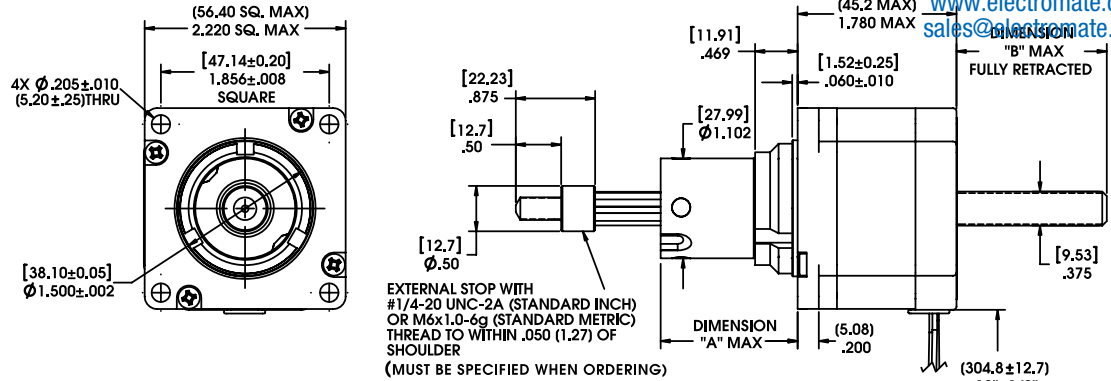
*Values truncated

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

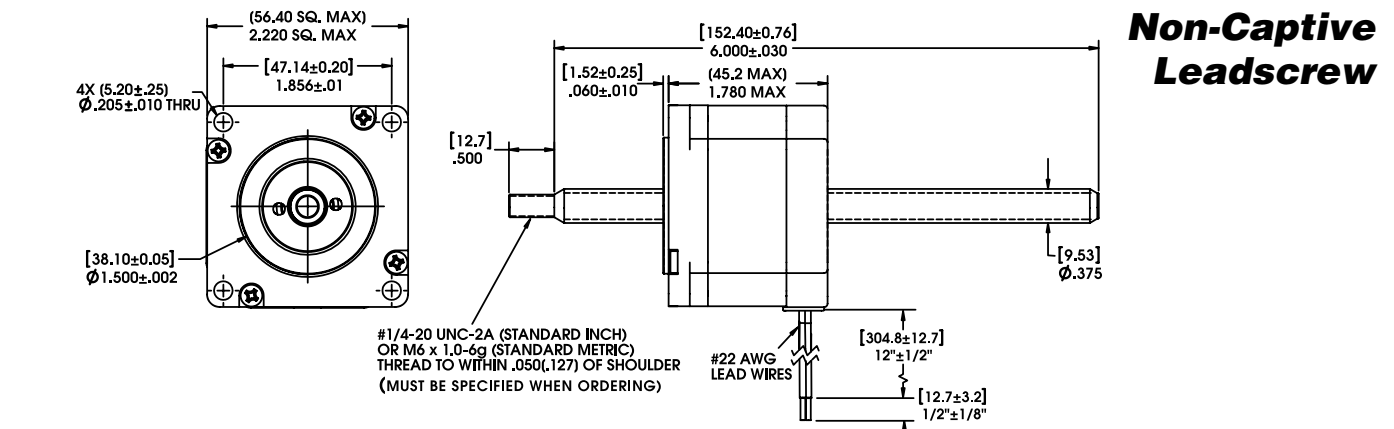
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

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

Captive Leadscrew

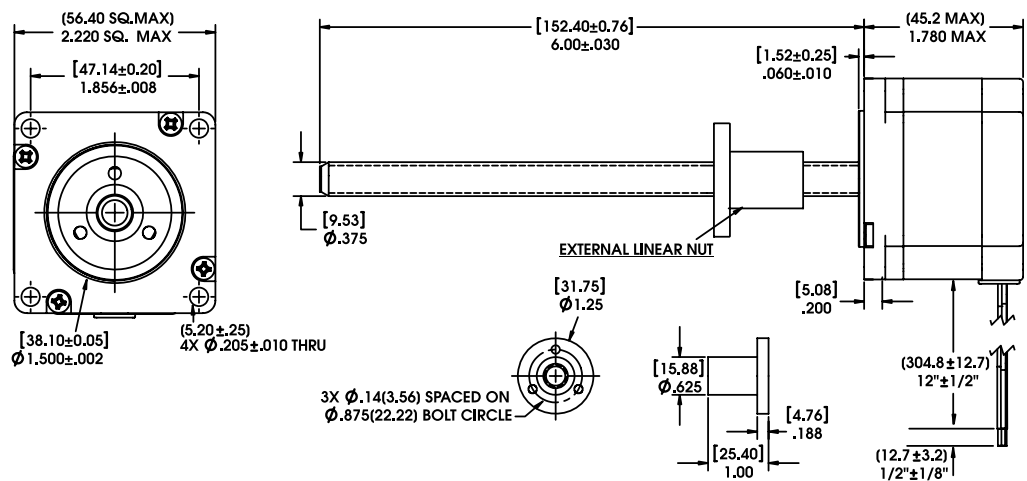


| STROKE | DIM. A | DIM. B | SUFFIX # | M4x0.7 thread |
|---------------|-------------|-------------|----------|---------------|
| 0.500 (12.7) | 1.01 (25.7) | 0.06 (1.5) | -905 | -805 |
| 0.750 (19.05) | 1.26 (32.0) | 0.31 (7.9) | -907 | -807 |
| 1.00 (25.4) | 1.51 (38.4) | 0.56 (14.2) | -910 | -810 |
| 1.250 (31.8) | 1.76 (44.7) | 0.81 (20.6) | -912 | -812 |
| 1.500 (38.1) | 2.01 (51.1) | 1.06 (26.9) | -915 | -815 |
| 2.00 (50.8) | 2.51 (63.8) | 1.56 (39.6) | -920 | -820 |
| 2.500 (63.5) | 3.01 (76.5) | 2.06 (52.3) | -925 | -825 |



Non-Captive Leadscrew

External Linear



57000 Series: Size 23 Performance Curves



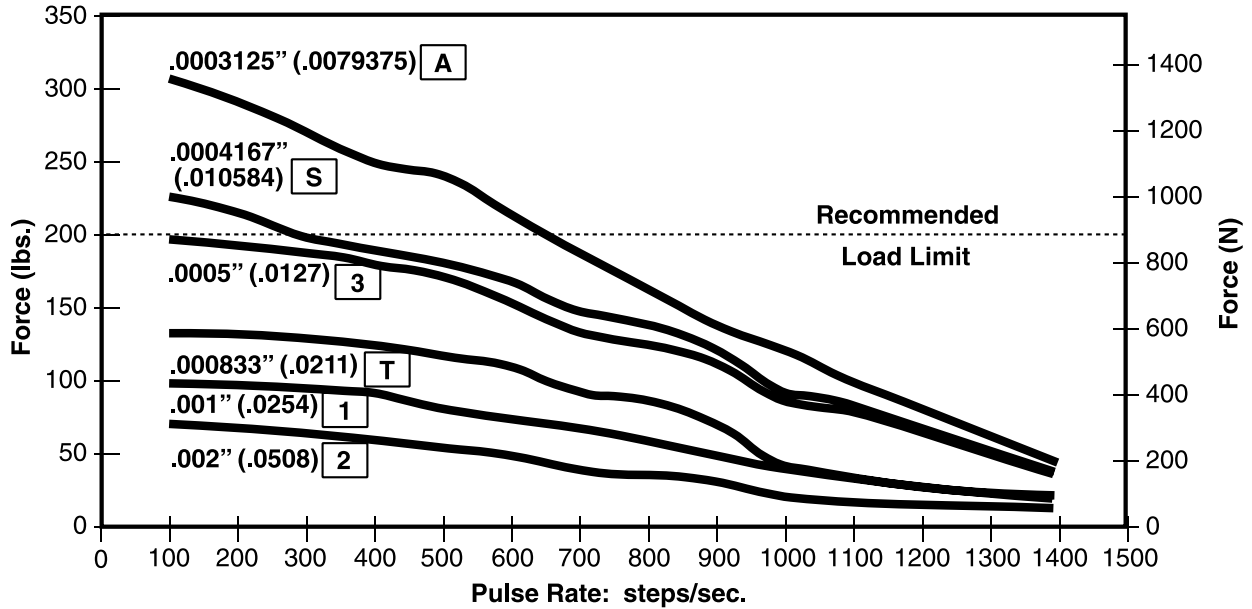
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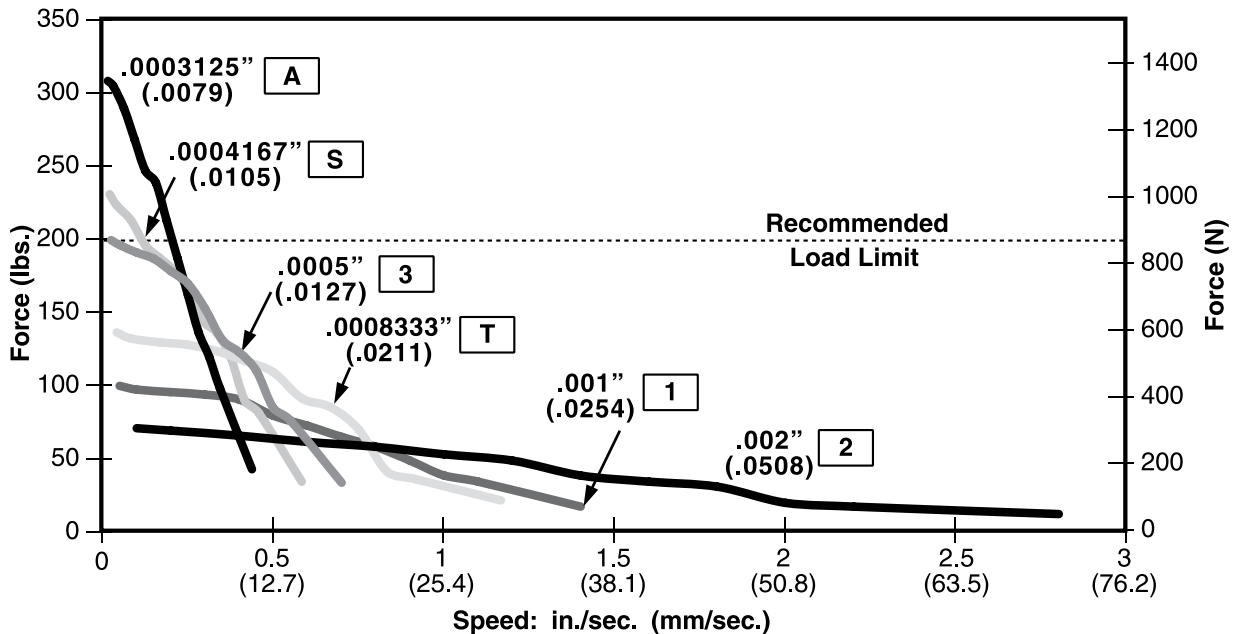
FORCE vs. PULSE RATE Bipolar · Chopper · 100% Duty Cycle

Ø .375 (9.53) Leadscrew



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

Ø .375 (9.53) Leadscrew



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.



A full linear step movement as low as 2 microns and a thrust capability up to 200 lbs (890 N)

The Haydon™ 57000 Series Size 23, 0.9° high resolution (standard resolution = 1.8°) hybrid offers precise motion with excellent motion control. Combined with a stainless steel leadscrew and a production-proven, patented rotor drive nut this motor is designed for trouble-free, long-term performance. Adaptable to customer specifications.

Salient Characteristics

| Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (0.9° Step Angle) | | | | | |
|--|------------------------|------------|--------|--------|------------|
| Part No. | Captive | 57K4(X)-V | | | 57K6(X)-V |
| | Non-captive | 57J4(X)-V | | | 57J6(X)-V |
| | External Lin. | E57K4(X)-V | | | E57K6(X)-V |
| Wiring | | Bipolar | | | Unipolar** |
| Winding voltage | 3.25 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC |
| Current/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 | 37 gcm ² | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | |
| Weight | 18 oz (511 g) | | | | |
| Insulation resistance | 20 MΩ | | | | |

| Linear Travel / Step | | Order Code I.D. |
|-------------------------------|-----------|-----------------|
| Screw Ø.375" (9.53 mm) 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

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

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

57000 Series: Size 23 High Resolution Linear Actuator Performance Curves

HaydonKerk Motion Solutions™



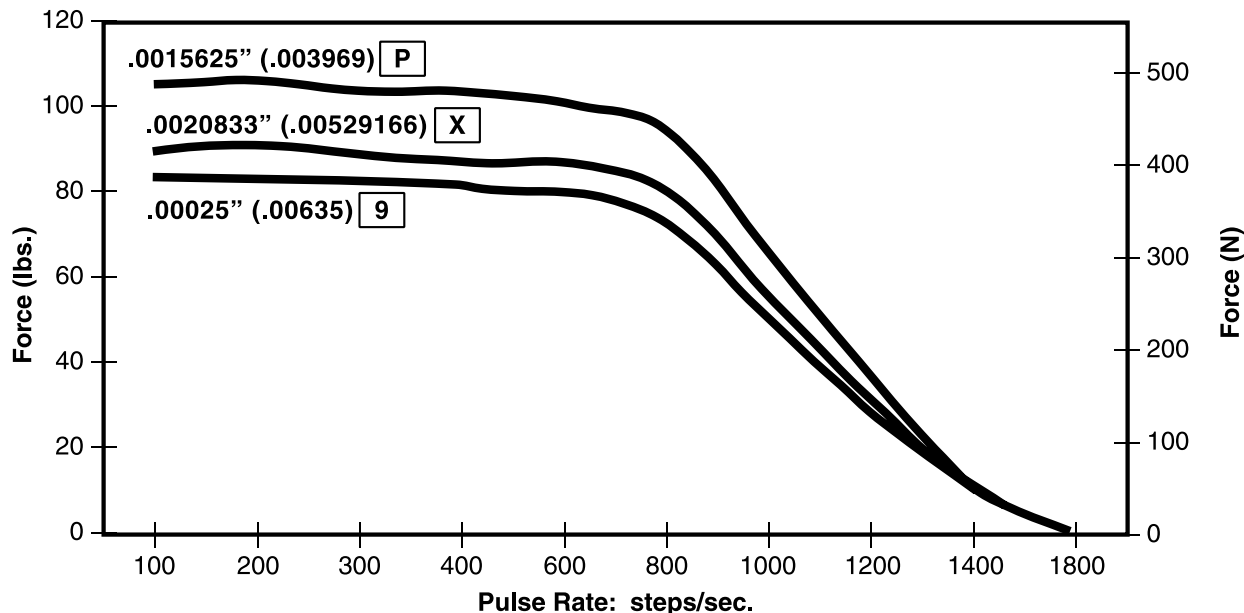
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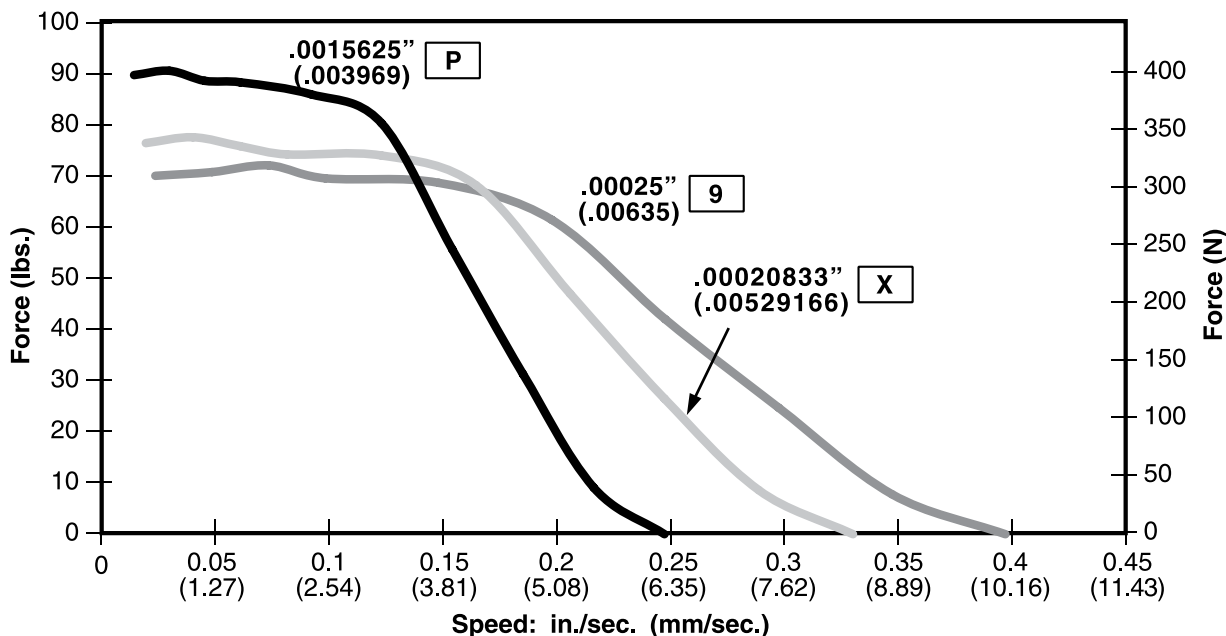
FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle

Ø .375 (9.53) Leadscrew



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

Ø .375 (9.53) Leadscrew



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

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

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

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

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



Salient Characteristics

| Size 23: 57 mm (2.3-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle) | | | |
|---|------------------------|------------|---------|
| Part No. | Captive | 57M4(X)-V | |
| | Non-captive | 57L4(X)-V | |
| | External Lin. | E57M4(X)-V | |
| Wiring | | Bipolar | |
| Winding voltage | 3.25 VDC | 5 VDC | 12 VDC |
| Current/phase | 3.85 A | 2.5 A | 1 A |
| Resistance/phase | 0.8 Ω | 2.0 Ω | 12.0 Ω |
| Inductance/phase | 2.3 mH | 7.6 mH | 35.0 mH |
| Power consumption | 25 W Total | | |
| Temperature rise | 135°F Rise (75°C Rise) | | |
| Weight | 32 oz (958 g) | | |
| Insulation resistance | 20 MΩ | | |
| Max. Load Limit | 200 lbs (890 N) | | |

| Linear Travel / Step | | Order Code I.D. |
|-------------------------------|-------|-----------------|
| Screw Ø.375" (9.53 mm) 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.

57000 Series: Size 23 Double Stack Dimensional Drawings



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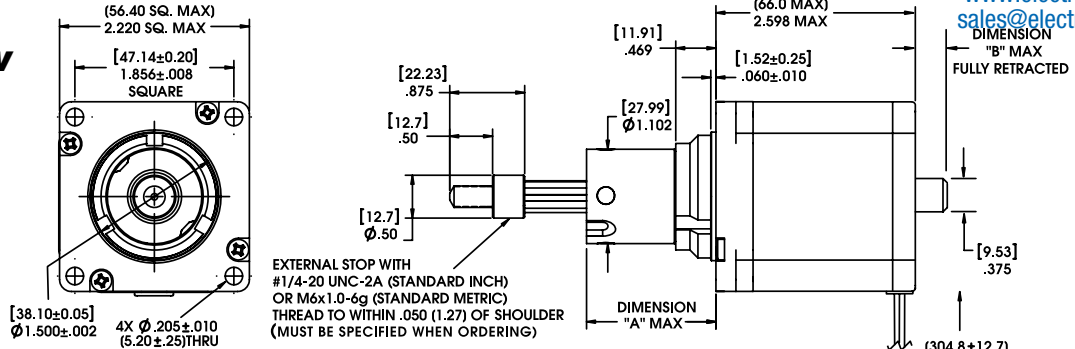
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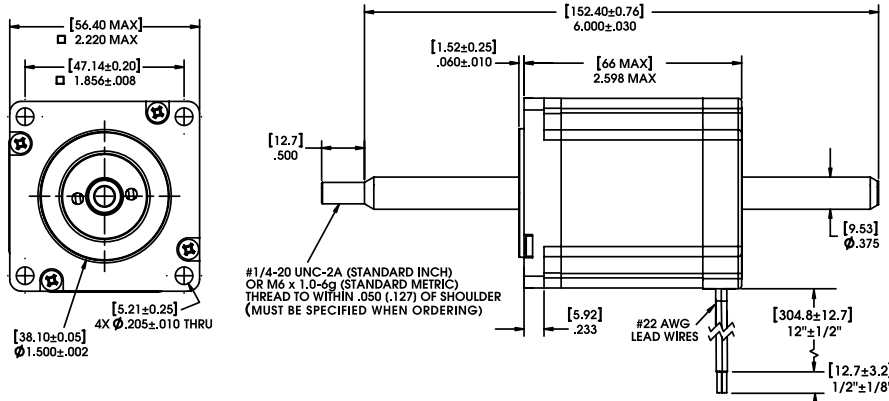
sales@electromate.com

HaydonKerk Motion Solutions™

Captive Leadscrew

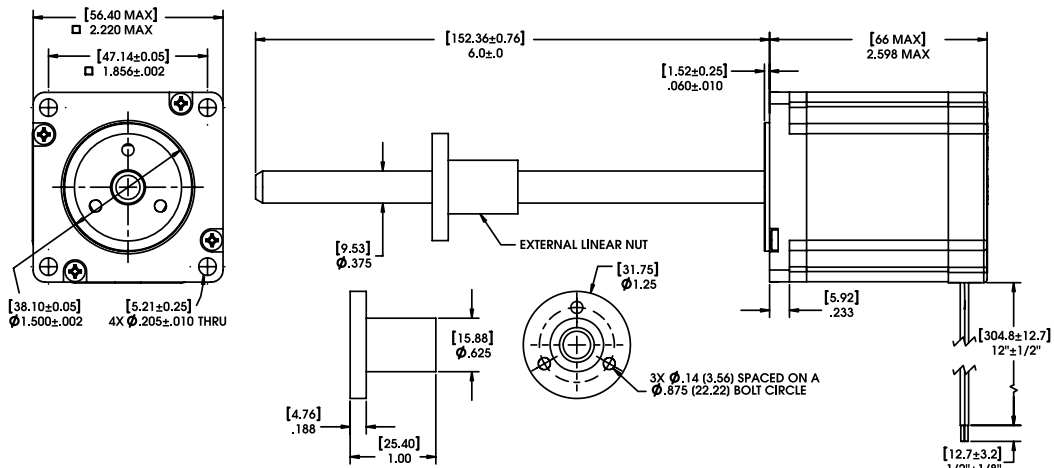


| STROKE | DIM. "A" | DIM. "B" | SUFFIX # | M6x1.0 thread |
|---------------|-------------|---------------|----------|---------------|
| 0.500 (12.7) | 1.01 (25.7) | 0 (0) | -905 | -805 |
| 0.750 (19.05) | 1.26 (32.0) | 0.110 (2.77) | -907 | -807 |
| 1.00 (25.4) | 1.51 (38.4) | 0.360 (7.37) | -910 |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



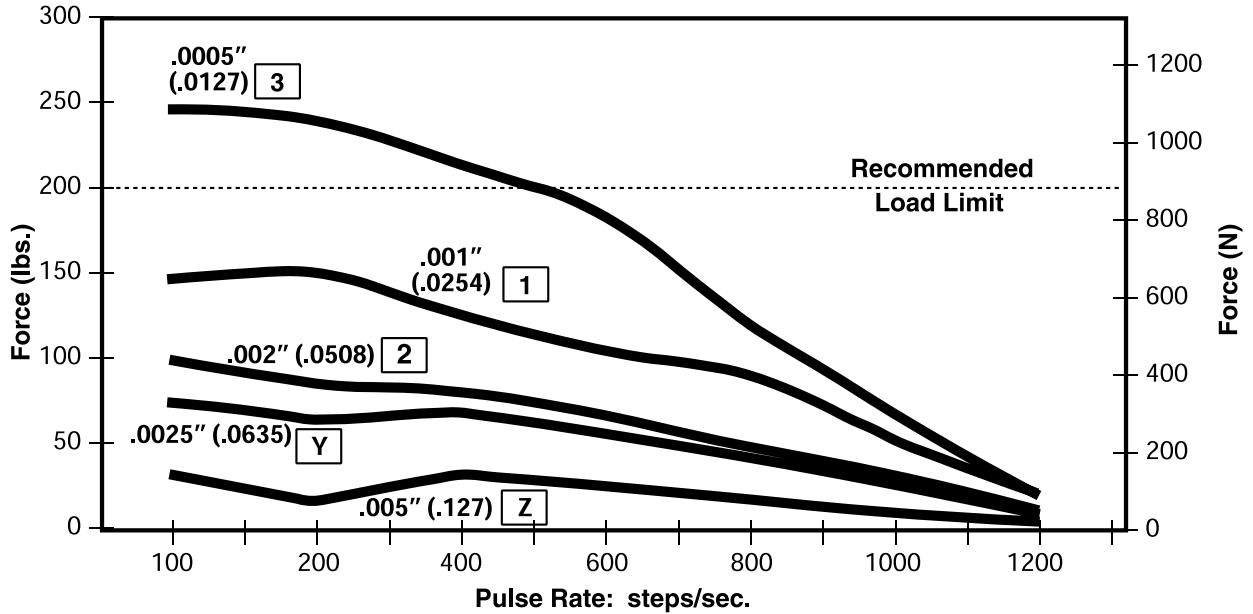
Non-Captive Leadscrew

External Linear



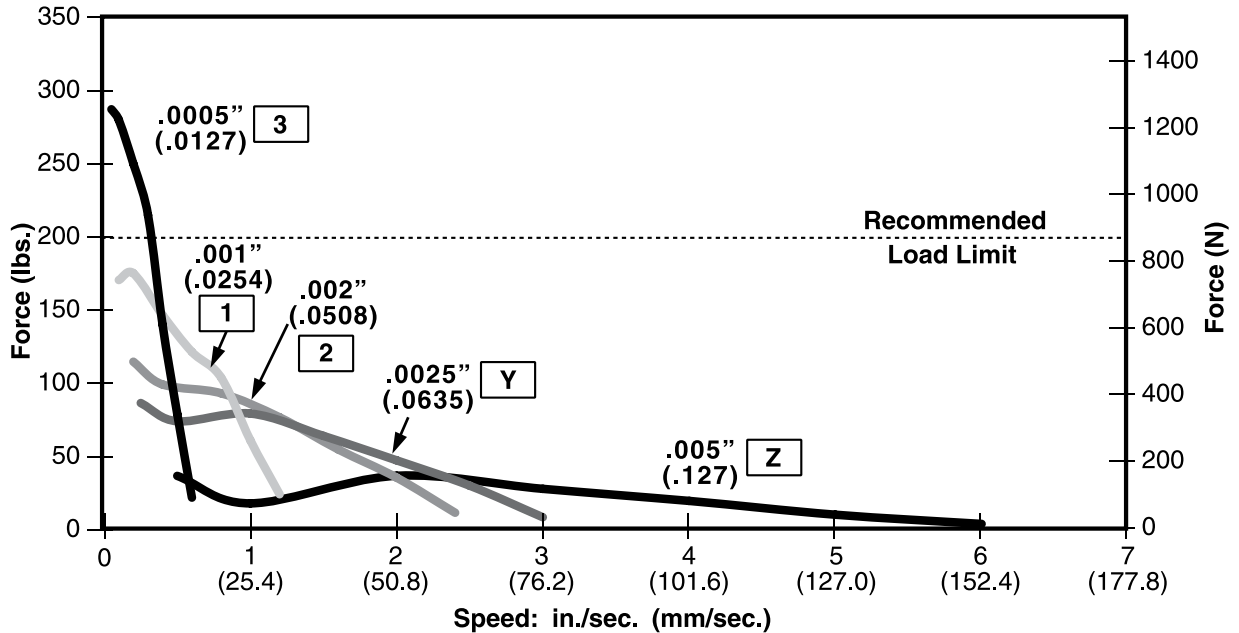
FORCE vs. PULSE RATE Bipolar • Chopper • 100% Duty Cycle

Ø .375 (9.53) Leadscrew



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

Ø .375 (9.53) Leadscrew



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.

87000 Series: Size 34 Linear Actuator



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HaydonKerk Motion Solutions™

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



Size 34
 Captive
 Shaft



Size 34
 Non-Captive
 Shaft



Size 34
 External Linear

Despite its large size and strength, this motor incorporates the same precision, high performance and durable patented designs featured in our entire hybrid product line.

The 87000 series delivers forces up to 500 lbs. (2224 N) in a compact, 3.4-in (87 mm) square package.

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

In addition to our standard configurations, HaydonKerk Motion Solutions™ can custom build this powerful motor to meet your specific motion requirements. The in-house design and engineering team is available to assist you with a solution to fit your needs and your budget.

Salient Characteristics

| Size 34: 87 mm (3.4-in) Hybrid Linear Actuator (1.8° Step Angle) | | | | | |
|--|------------------------|------------|--------|--------|------------|
| Part No. | Captive | 87H4(X)-V | | | 87H6(X)-V |
| | Non-captive | 87F4(X)-V | | | 87F6(X)-V |
| | External Lin. | E87H4(X)-V | | | E87H6(X)-V |
| Wiring | | Bipolar | | | Unipolar* |
| Winding voltage | 2.85 VDC | 5 VDC | 12 VDC | 5 VDC | 12 VDC |
| Current/phase | 5.47 A | 3.12 A | 1.3 A | 3.12 A | 1.3 A |
| Resistance/phase | 0.52 Ω | 1.6 Ω | 9.23 Ω | 1.6 Ω | 9.23 Ω |
| Inductance/phase | 2.86 mH | 8.8 mH | 51 mH | 4.4 mH | 25.5 mH |
| Power consumption | 31.2 W | | | | |
| Rotor inertia | 1760 gcm ² | | | | |
| Temperature rise | 135°F Rise (75°C Rise) | | | | |
| Weight | 5.1 lbs. (2.3 Kg) | | | | |
| Insulation resistance | 20 MΩ | | | | |

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

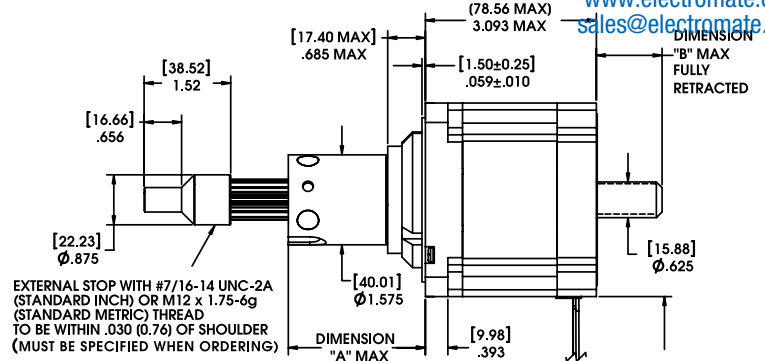
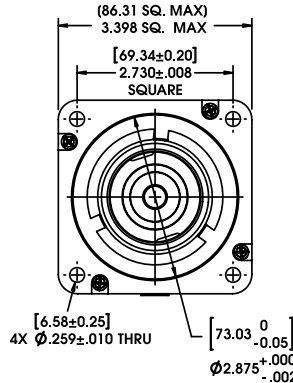
*Values truncated

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

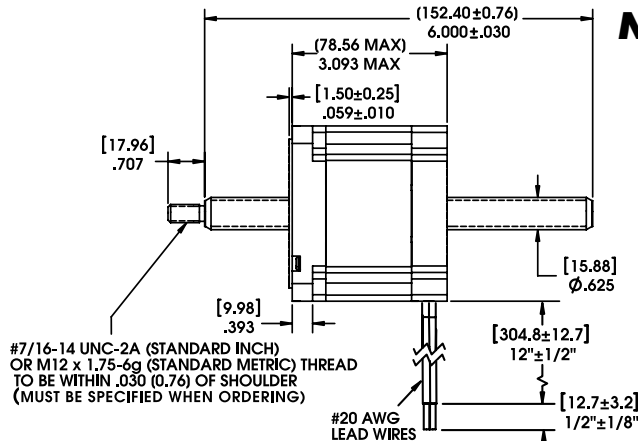
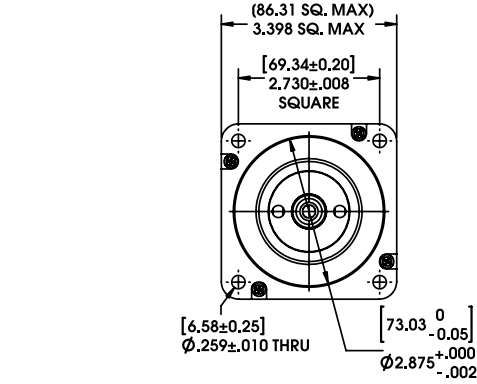
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted.

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

Captive Leadscrew

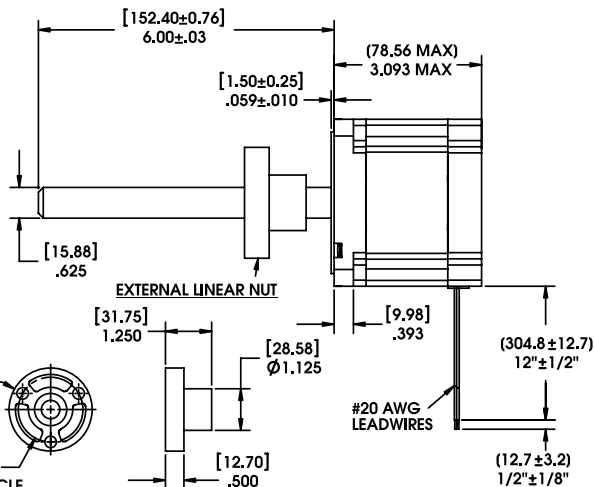
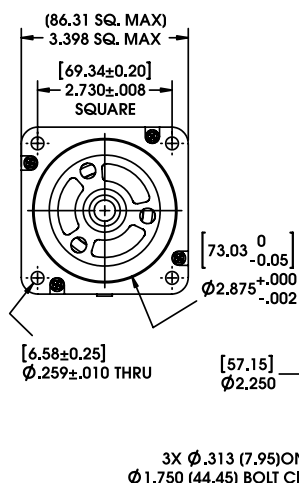


| STROKE | DIM. "A" | DIM. "B" | SUFFIX # | M12x1.75 thread |
|-------------|---------------|--------------|----------|-----------------|
| 0.50 (12.7) | 1.225 (31.12) | 0 (0) | -905 | -805 |
| 1.00 (25.4) | 1.725 (43.82) | 0.25 (6.35) | -910 | -810 |
| 1.50 (38.1) | 2.225 (56.52) | 0.75 (19.05) | -915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



Non-Captive Leadscrew

External Linear



87000 Series: Size 34 Performance Curves



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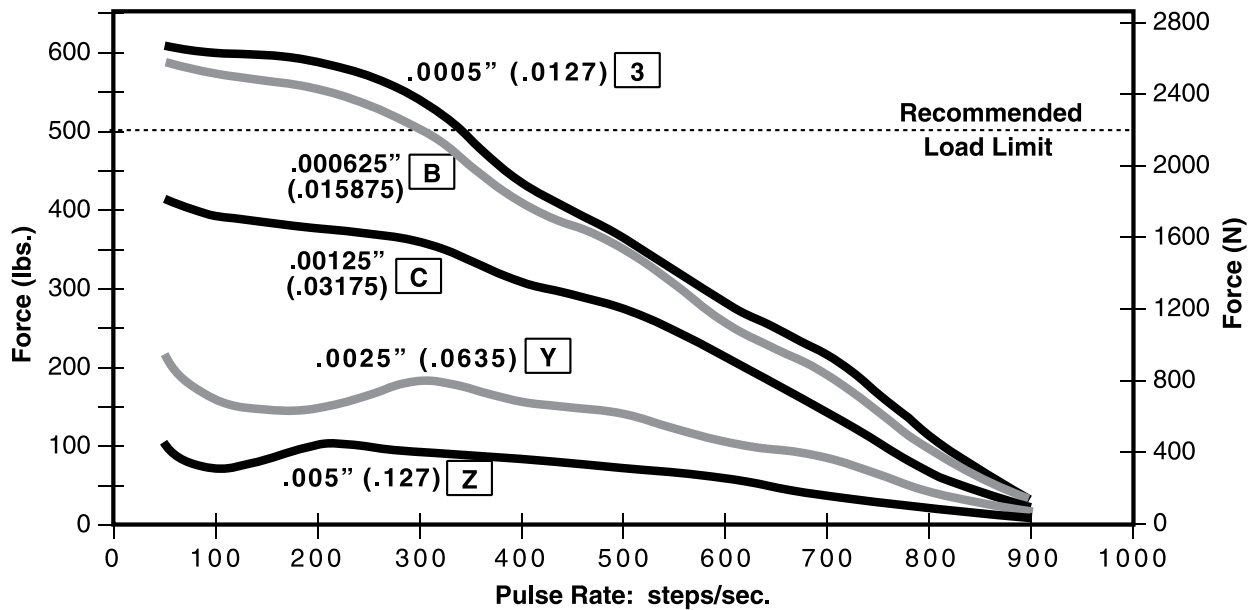


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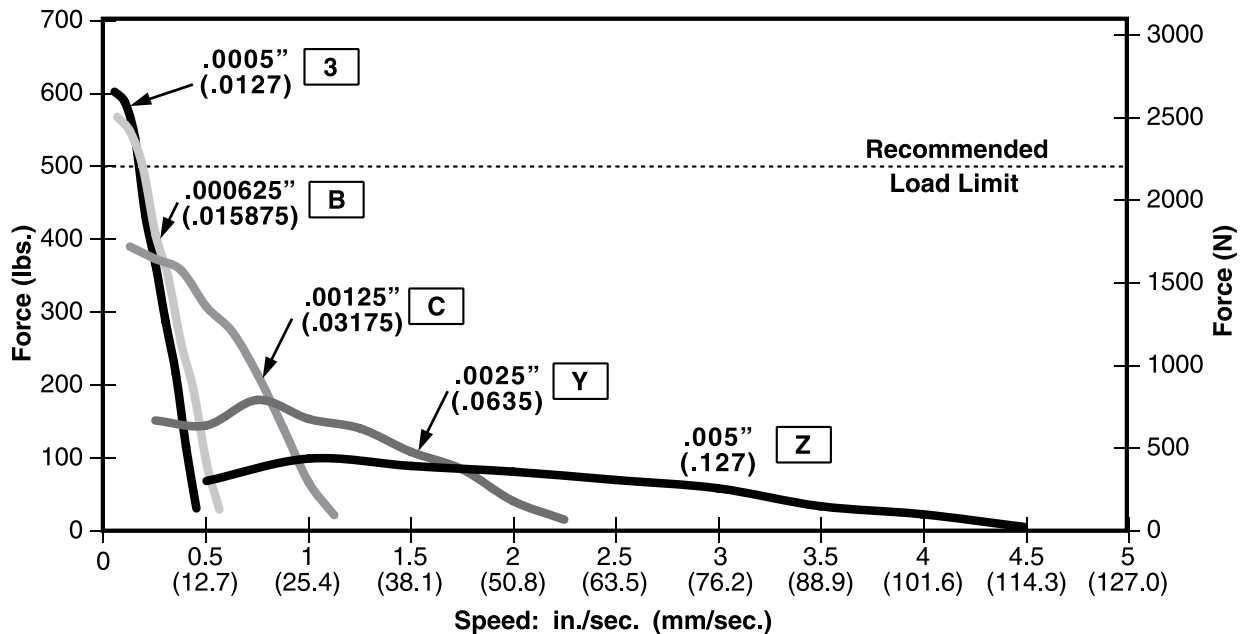
FORCE vs. PULSE RATE Bipolar · Chopper · 100% Duty Cycle

Ø .625 (15.88) Leadscrew



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

Ø .625 (15.88) Leadscrew



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.

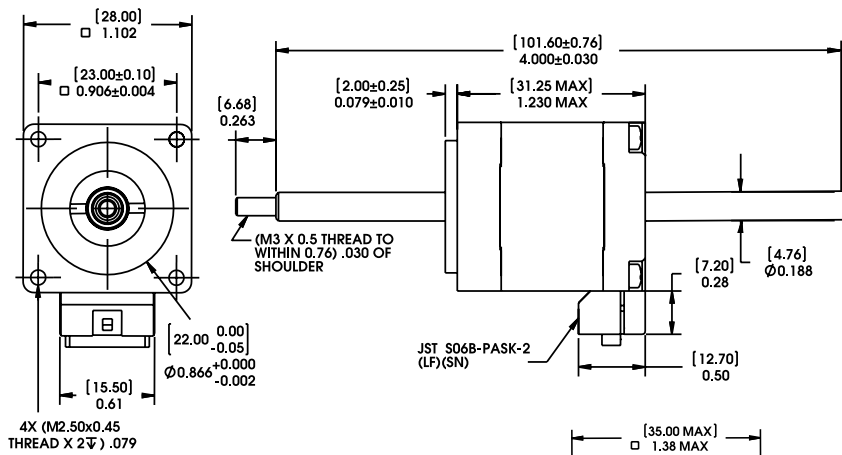


Size14 external,
non-captive and captive
with integrated connectors

Integrated Connectors for Size 11, Size 14 and Size 17 Hybrid Linear Actuators

Hybrid Size 11, Size 14 and 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, HaydonKerk Motion Solutions™ can custom design this motor to meet your specific application requirements.

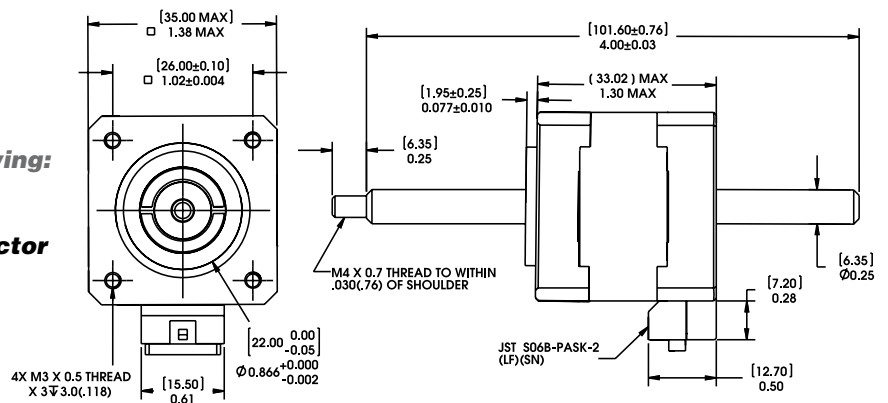
Dimensional Drawing: Series 28000 Size 11 with Integrated Connector



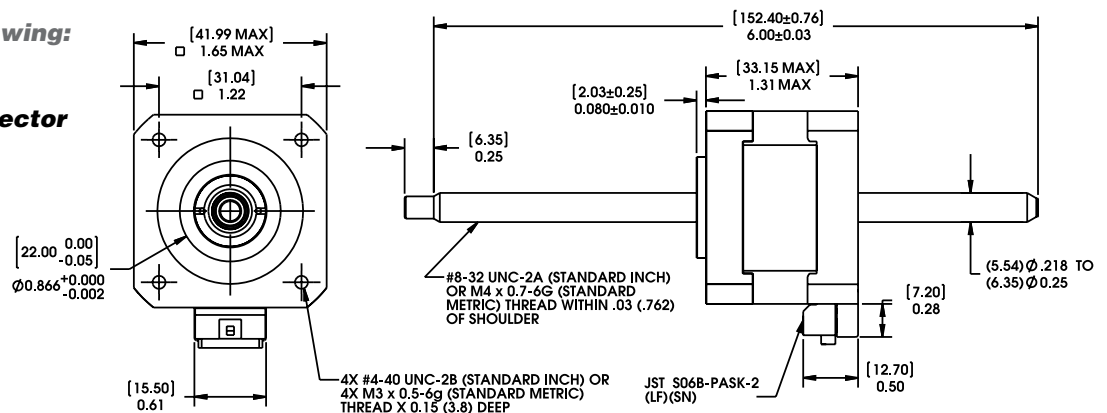
Mating Connector:
JST part number PAP-06V-S
Wire to Board Connector:
JST part number SPHD-001T-P0.5

| Pin # | Bipolar | Unipolar |
|-------|----------------|----------------|
| 1 | Phase 2 Start | Phase 2 Start |
| 2 | Open | Phase 2 Common |
| 3 | Phase 2 Finish | Phase 2 Finish |
| 4 | Phase 1 Finish | Phase 1 Finish |
| 5 | Open | Phase 1 Common |
| 6 | Phase 1 Start | Phase 1 Start |

Dimensional Drawing: 35000 Series Size 14 with Integrated Connector



Dimensional Drawing: 43000 Series Size 17 with Integrated Connector



Encoders designed for all sizes of hybrid linear actuators



Size 17 with encoder



Size 23 with encoder

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

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.

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).

Single Ended Encoder Pinout Size 8

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

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

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

Operating Temperature

| | Minimum | Maximum |
|-------------------------|-----------------|---------------|
| Size 8 | - 10°C (14°F) | 85°C (185°F) |
| Size 11, 14, 17, 23, 34 | - 40°C (- 40°F) | 100°C (212°F) |

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

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

Mechanical Specifications

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

Resolution

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

Size 8 Encoder

| | | |
|-----|------|------|
| CPR | 250 | 300 |
| PPR | 1000 | 1200 |

Size 11, 14 & 17 Encoders

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

Others are available.

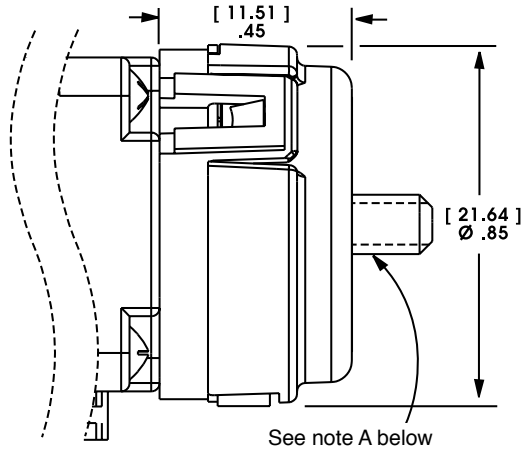
Size 23 and 34 Encoders

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

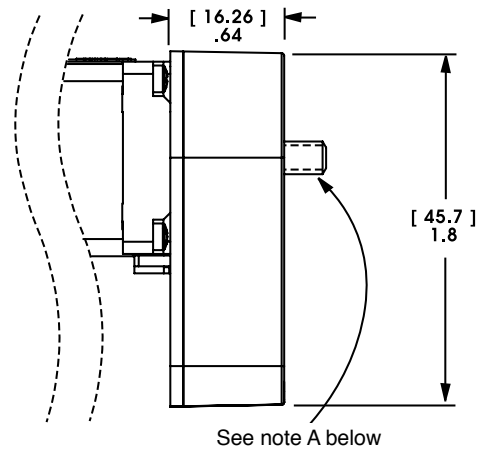
*Index Pulse Channel not available.

Encoder Dimensional Drawings

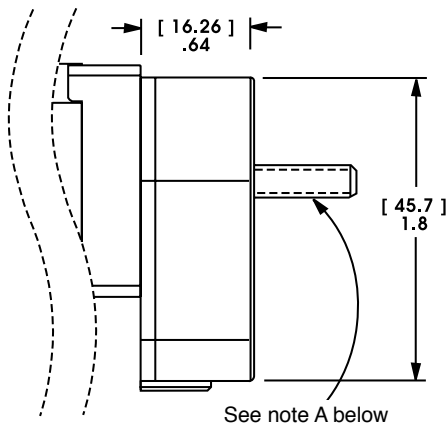
E4 21000 Series Size 8



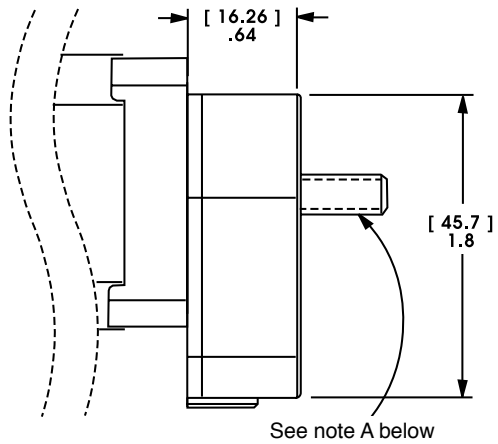
E5 28000 Series Size 11



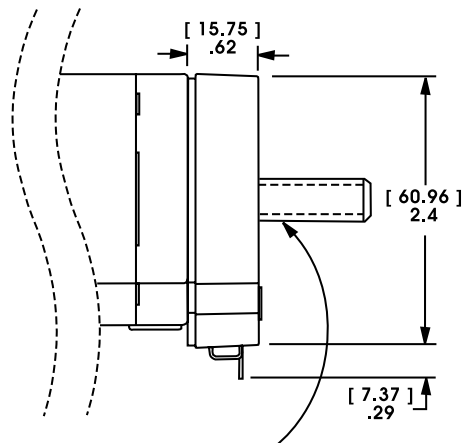
E5 35000 Series Size 14



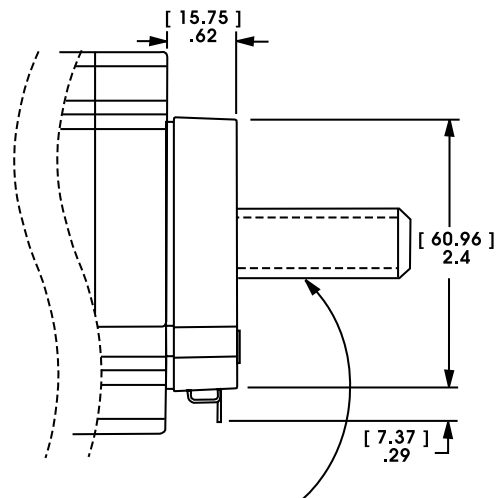
E5 43000 Series Size 17



E3 57000 Series Size 23



E3 87000 Series Size 34



Note A: Leadscrew extends beyond encoder on specific captive and non-captive motors. External linear shaft extension is available upon request.



Encoder Ready Option for all sizes of Hybrids

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



Extended Rotor Journal for all Hybrid sizes

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

Size 23 Mounting Face Plate for Size 17 Hybrids

HaydonKerk Motion Solutions™ offers a size 23 mounting pattern for its hybrid Size 17 linear actuators. The advantage of using this configuration is to replace existing costly, inefficient Size 23 linear actuators with a lower cost, high performance Size 17 motor.



Home Position Switch for all Hybrids (except Size 8)

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 sizes of Hybrids

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

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



Black Ice™ Teflon® Coated Leadscrews for all Hybrids (certain conditions apply)

Where applications require the use of a "greaseless" screw and nut interface HaydonKerk Motion Solutions™ offers Teflon® coated leadscrews.

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

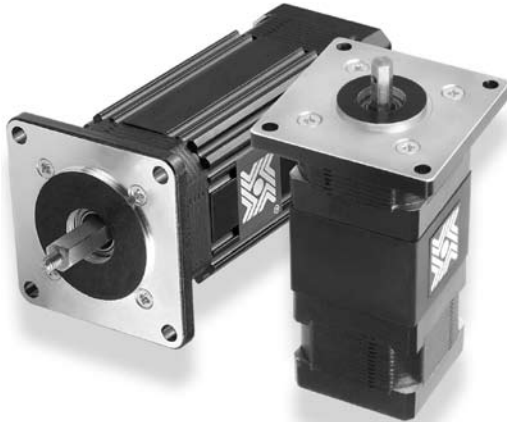


Integrated Anti-backlash Nut for all Hybrids (except Size 34)

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

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

HaydonKerk Motion Solutions™ application engineers can help you select the appropriate preload for your application.



A single unit that axially moves a component to an insertion position and then rotates it

In certain applications, it is required to have both rotary and linear motion. Such an application, for example, is in the robotic picking and placing of components where it may be required to axially move a component to an insertion position and then rotate the component to screw it in place. Another type of application requiring a shaft, which may selectively rotate and/or reciprocate, is in the precise control of laparoscopic and other such medical instruments.

In either type of application, it is frequently required that the linear motion be locked while rotary motion takes place. Conventional motor arrangements are often complicated and heavy, a substantial disadvantage for robotics applications. A problem with motors having linear motion is that the motors frequently provide inadequate output shaft support when heavy side loads are imposed on the output shafts.

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

A limitless number of operating parameters are offered allowing each device to be custom manufactured according to customer specific application requirements. 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.

For linear actuator data for the dual motion actuators please see the 35000 Series (Size 14) and 43000 Series (Size 17) hybrid linear actuators sections of this catalog. The curves for the rotary portion of the motors appear in the pages that follow.

Part Number Construction: Dual Motion Actuators

| LR | 35 | K | H | 4 | J | 05 | 910 |
|--------------------|--|--|--|---|--|--|---|
| Prefix | Series number designation | Rotary Step Angle | Linear Step Angle | Coils | Code ID Resolution Travel/Step | Voltage | Suffix: |
| LR = Linear/Rotary | 35 = 35000 Available Series: 35000 43000 (Series numbers represent width ² of motor body) | H = 1.8° K = 0.9° M = 1.8° P = 0.9° Double Stack | H = 1.8° K = 0.9° M = 1.8° P = 0.9° Double Stack | 4 = Bipolar (4 wire) 6 = Unipolar (6 wire) | (Example: J = travels .00048-in per step) (Refer to travel / step chart found on each Series product page.) | (Example: 05 = 5 VDC; 12 = 12 VDC) Custom V available | Stroke Example: -910 = 1-in (26 mm) -XXX = Special or custom (Special part numbers for custom screw lengths and design options will require an issued 3 digit suffix number. Please contact our sales or applications engineering department for assistance.) |

EXAMPLE:

LR35KH4AB-05-910 = Dual motion, 35000 Series (Size 14, 1.5-in, 35 mm sq.), 0.9° rotary, 1.8° linear, bipolar coils, .00048-in (0.0121 mm), 5 Volts DC, 1-in (26 mm) stroke

35000 Series (Size 14) Dual Motion Actuators



Sold & Serviced By:



Toll Free Phone (877) SERV098

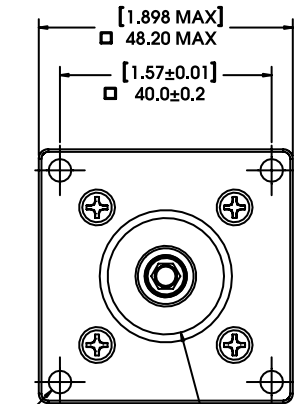
Toll Free Fax (877) SERV099

www.electromate.com

sales@electromate.com

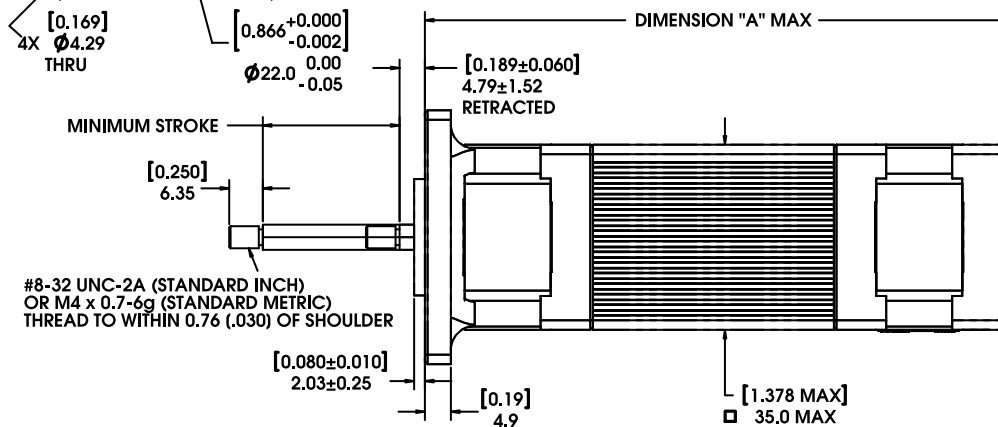
HaydonKerk Motion Solutions™

Dimensional Drawings



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

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



Technical Specification

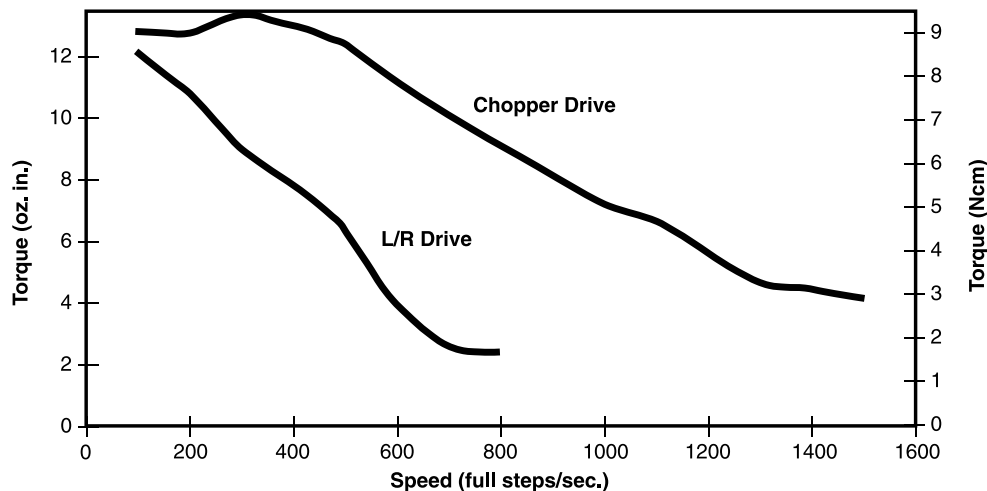
| Linear Travel / Step inches | mm | Order Code I.D. |
|-----------------------------|---------|-----------------|
| 0.000098* | 0.0025 | AA |
| 0.00012 | 0.0030* | N |
| 0.00019* | 0.005 | AB |
| 0.00024 | 0.0060* | K |
| 0.00039* | 0.01 | AC |
| 0.00048 | 0.0121* | J |
| 0.00078* | 0.02 | AD |
| 0.00157* | 0.04 | AE |

*Values truncated

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

35000 Series Size 14 • Rotary Function • Bipolar • 100% Duty Cycle

Torque curves for 35000 Series Linear Actuators. See FORCE/SPEED curves for 35000 Series Linear Actuator on pages 68 and 69.



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.

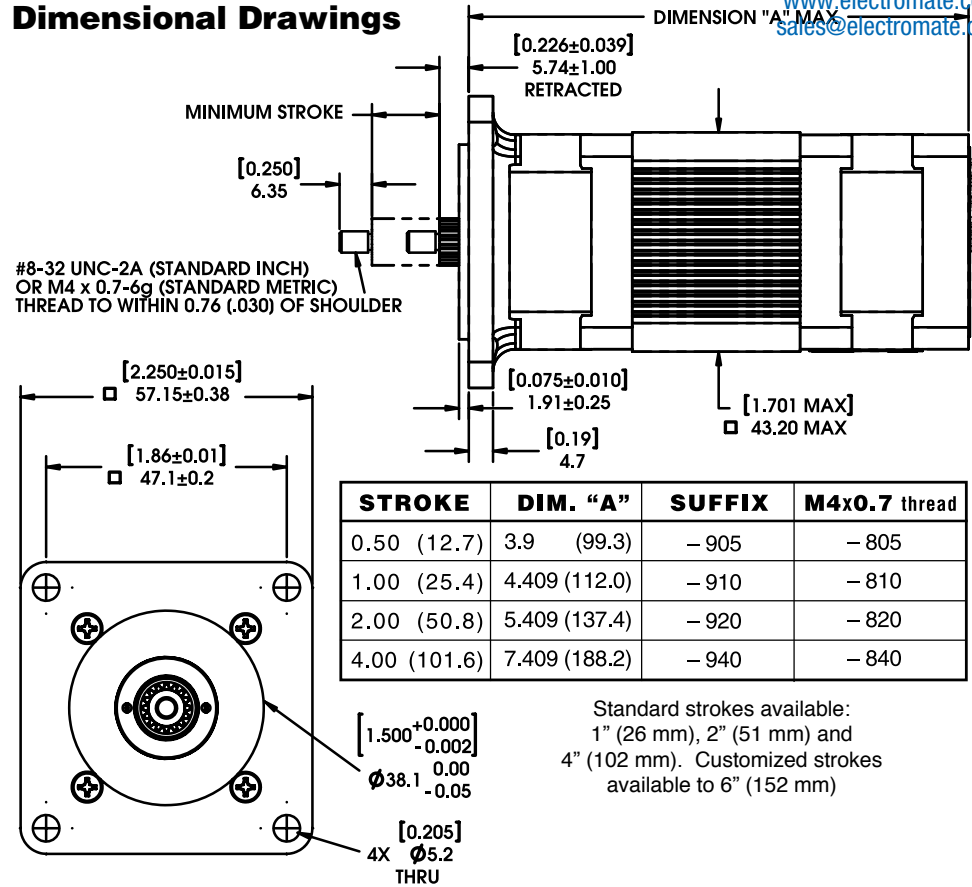
Technical Specification

| Linear Travel / Step | | Order Code I.D. |
|----------------------|----------|-----------------|
| inches | mm | |
| 0.000078* | 0.00198* | V |
| 0.00012 | 0.0030* | N |
| 0.000156259 | 0.0039* | P |
| 0.0003125 | 0.0079* | A |
| 0.0004167 | 0.0105* | S |
| 0.00048 | 0.0121* | J |
| 0.0005 | 0.0127 | 3 |
| 0.000625 | 0.0158* | B |
| 0.00078* | 0.02 | AD |
| 0.0008333 | 0.0211* | T |
| 0.00096 | 0.0243* | Q |
| 0.001 | 0.0245 | 1 |
| 0.00125 | 0.0317* | C |
| 0.00192 | 0.0487* | R |
| 0.002 | 0.0508 | 2 |

*Values truncated

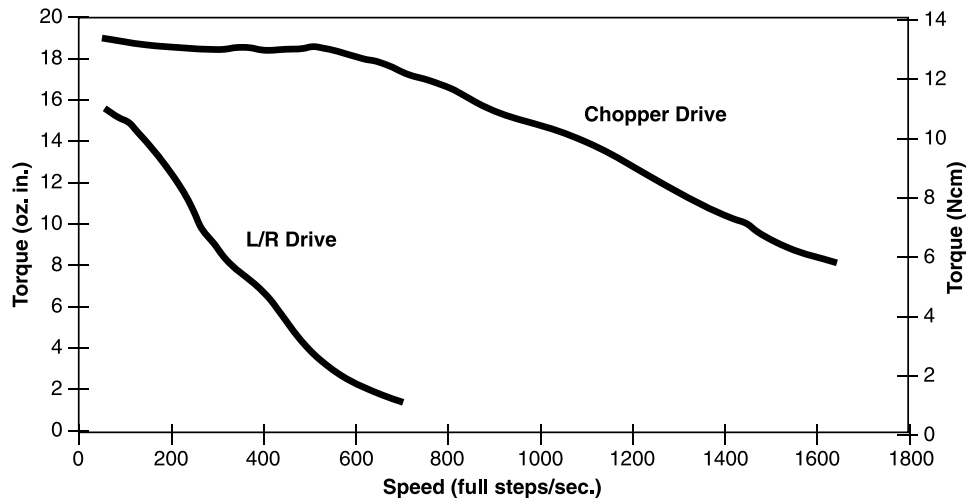
Standard motors are Class B rated for maximum temperature of 130°C.

Dimensional Drawings



43000 Series Size 17 • Rotary Function • Bipolar • 100% Duty Cycle

Torque curves for 43000 Series Linear Actuators. See FORCE/SPEED curves for 43000 Series Linear Actuator on pages 77 and 78.



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.