

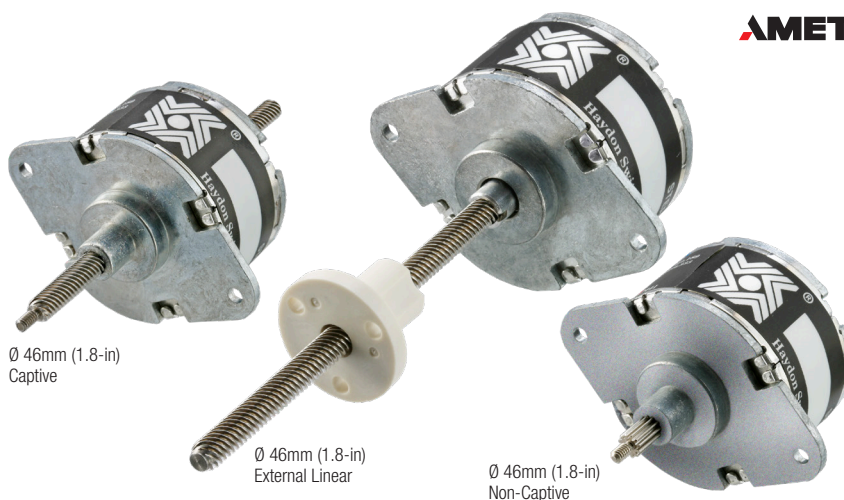
**PLEASE NOTE:** This is a legacy product, meant to provide reference data and is not intended for new machine designs. Please consider alternative HKP product for new machine designs.

## 46000 Series Ø 46 mm (1.8-in) Can-Stack Stepper Motor Linear Actuators

**Heavy-duty power, versatility and high output force**

### Multiple versions available

- Captive
- Non-Captive
- External Linear



### Specifications

Ø 46 mm (1.8-in) Motor									
Part No.	Captive	4644 - - - - †		4654 - - - - †		4646 - - - - †		4656 - - - - †	
	Non-Captive	4634 - - - - †		4684 - - - - †		4636 - - - - †		4686 - - - - †	
	External Linear	E4644 - - - - †		E4654 - - - - †		E4646 - - - - †		E4656 - - - - †	
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		1.0 A	.41 A	1.0 A	.41 A	1.0 A	.41 A	1.0 A	.41 A
Resistance/phase		5 Ω	29 Ω	5 Ω	29 Ω	5 Ω	29 Ω	5 Ω	29 Ω
Inductance/phase		9 mH	52 mH	7.1 mH	39 mH	4.5 mH	26 mH	3.5 mH	20 mH
Power Consumption		10 W							
Rotor Inertia		25.0 gcm <sup>2</sup>							
Insulation Class		Class B							
Weight		9.0 oz (255 g)							
Insulation Resistance		20 MΩ							

†Part numbering information on page 4. \*Unipolar drive gives approximately 30% less thrust than bipolar drive.

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
	0.004	0.102	4
	0.008	0.203	8
15° Angle	0.004	0.102	4
	0.008	0.203	8
	0.016	0.406	G

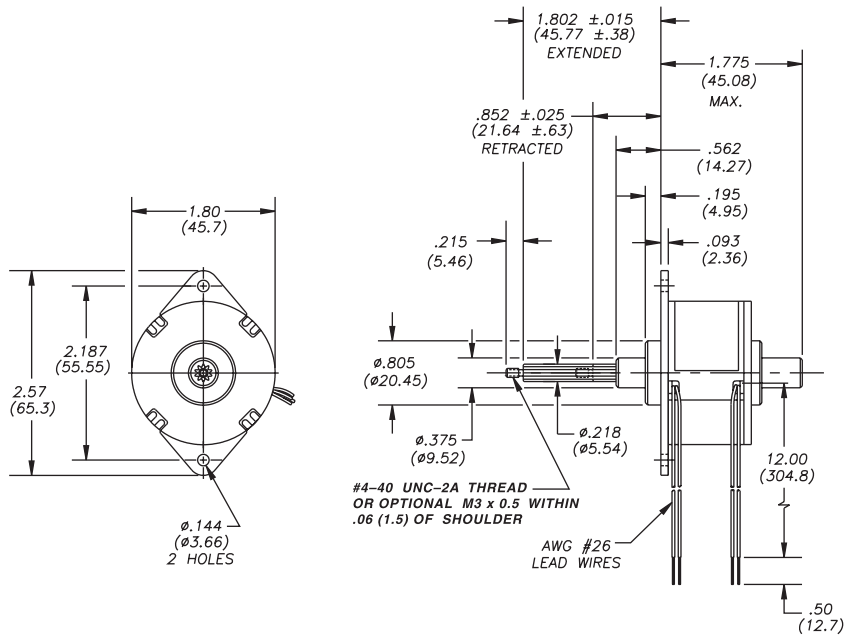
Special drive considerations may be necessary when leaving shaft fully extended or fully retracted. Standard motors are Class B rated for maximum temperature of 130° C (266° F).

Other 46000 Series styles available:

- TFE lead screw
- High temperature option

### Captive Lead Screw

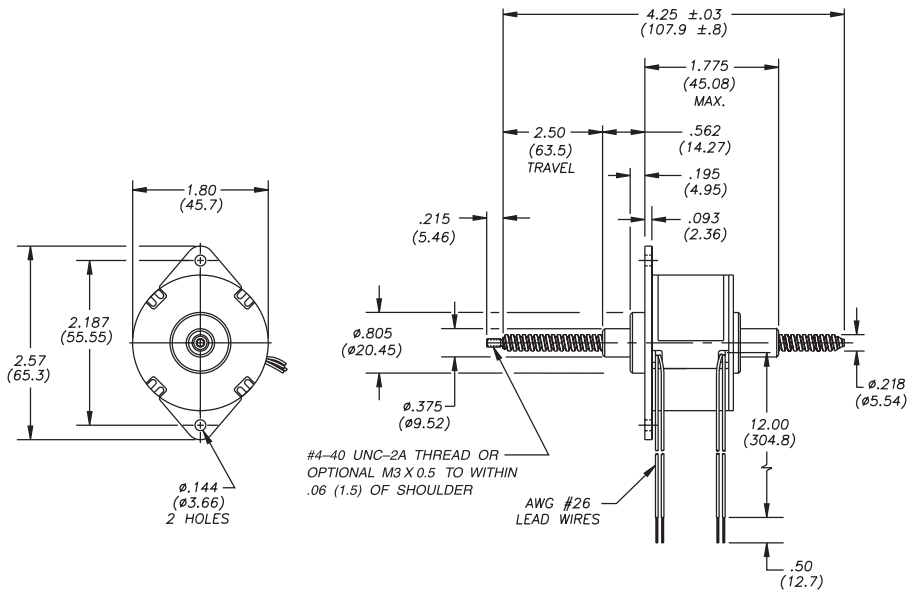
Dimensions = (mm) inches



### Non-Captive Lead Screw

Dimensions = (mm) inches

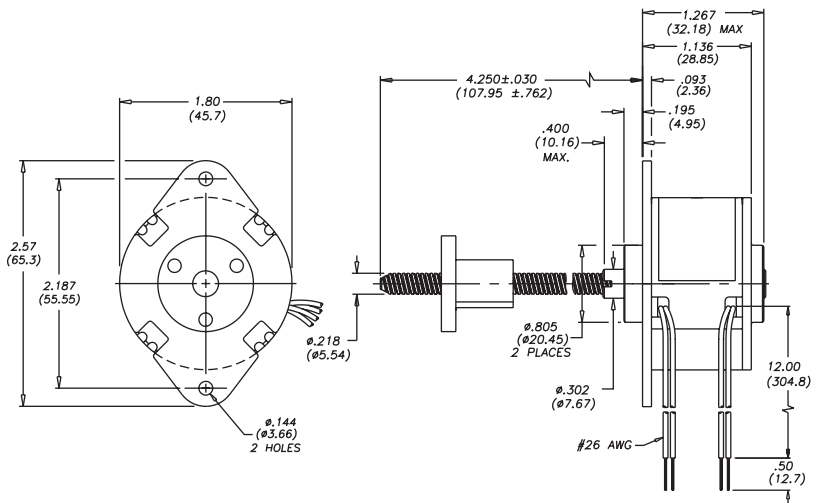
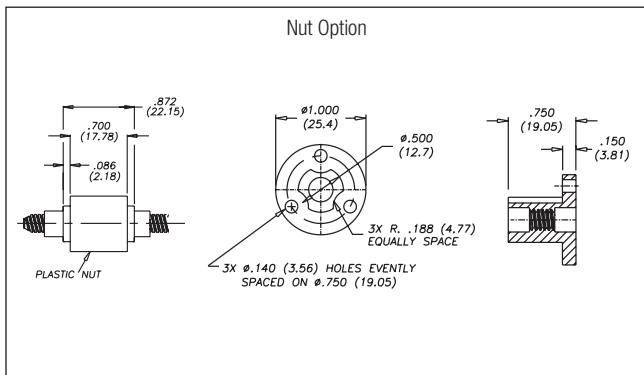
Up to 10-in (254 mm) standard screw lengths.  
Longer screw lengths are available.



### External Linear

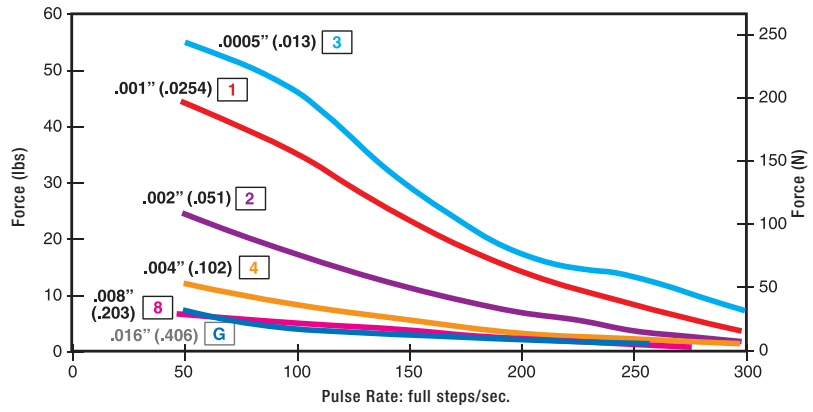
Dimensions = (mm) inches

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



**FORCE vs. PULSE RATE**

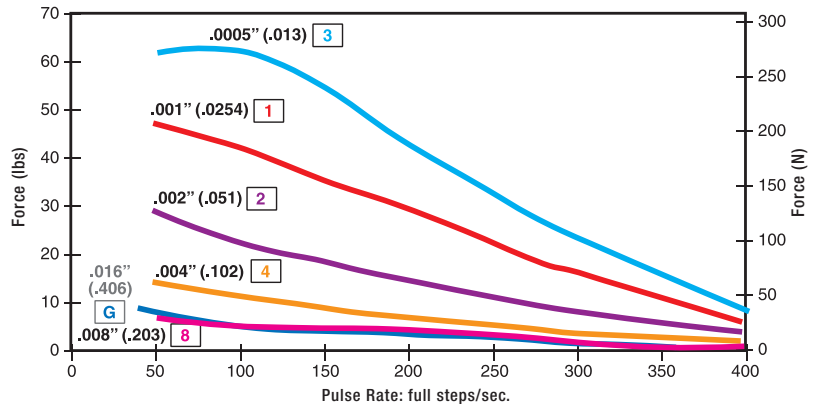
- L/R Drive
- Bipolar
- 100% Duty Cycle



**FORCE vs. PULSE RATE**

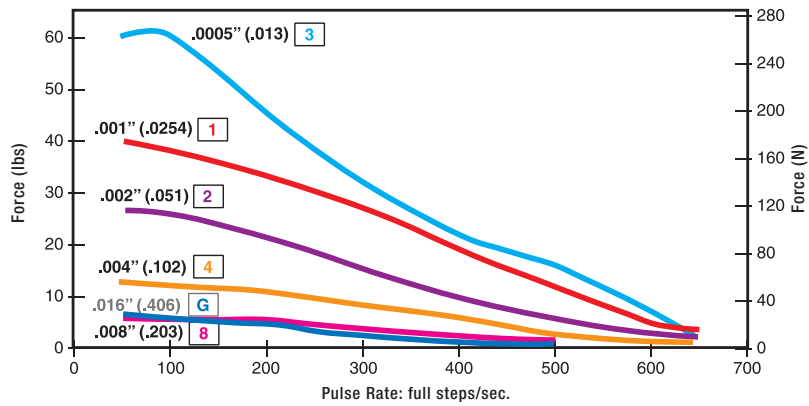
- L/R Drive
- Bipolar
- 25% Duty Cycle

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



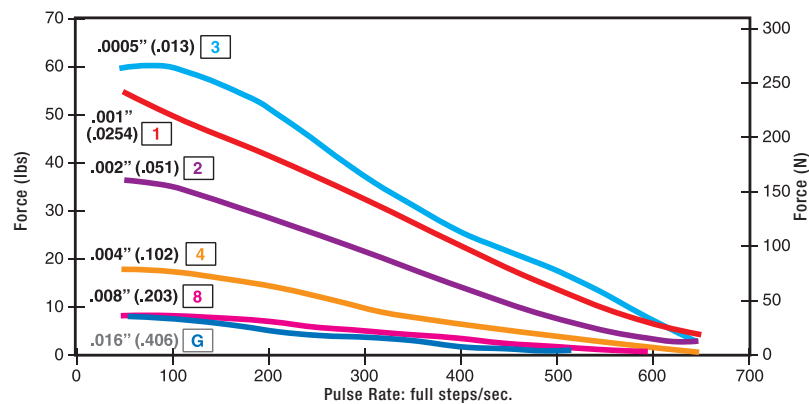
**FORCE vs. PULSE RATE**

- 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.

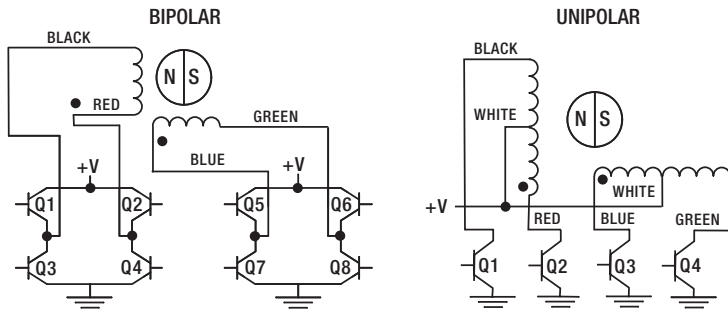
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack Number Codes when Ordering

E	46	4	4	3	05	900
<b>Prefix</b> (include only when using the following) <b>E</b> = External <b>K</b> = External with 40° thread form <b>S</b> = Home Position Switch <b>R</b> = Rare Earth Magnet	<b>Series Number Designation</b> <b>46 = 46000</b> (Series numbers represent approximate diameters of motor body)	<b>Style</b> <b>3</b> = 7.5° Non-Captive <b>4</b> = 7.5° Captive or External (use "E" or "K" Prefix for External version) <b>5</b> = 15° Captive or External (use "E" or "K" Prefix for External version) <b>8</b> = 15° Non-Captive	<b>Coils</b> <b>4</b> = Bipolar (4 wire) <b>6</b> = Unipolar (6 wire)	<b>Code ID Resolution Travel/Step</b> <b>1</b> = .001-in (.0254) <b>2</b> = .002-in (.051) <b>3</b> = .0005-in (.013) <b>4</b> = .004-in (.102) <b>8</b> = .0008-in (.203) <b>G</b> = .016-in (.406)	<b>Voltage</b> <b>05</b> = 5 VDC <b>12</b> = 12 VDC  Custom V available	<b>Suffix Stroke</b>  Example: -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.

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.

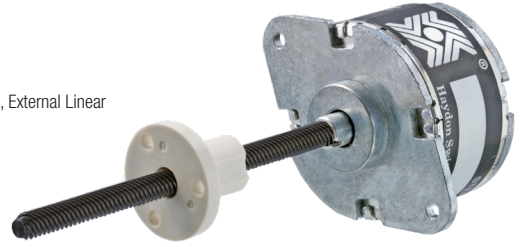
### TFE Coated Lead Screws for applications that require a permanent, dry lubricant

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.

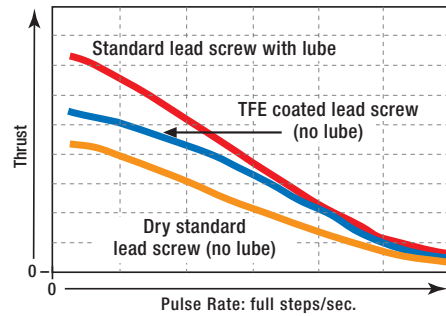
Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.

46000 Series, External Linear



#### Lead Screw Comparison: FORCE vs. PULSE RATE

- L/R Drive - 100% Duty Cycle

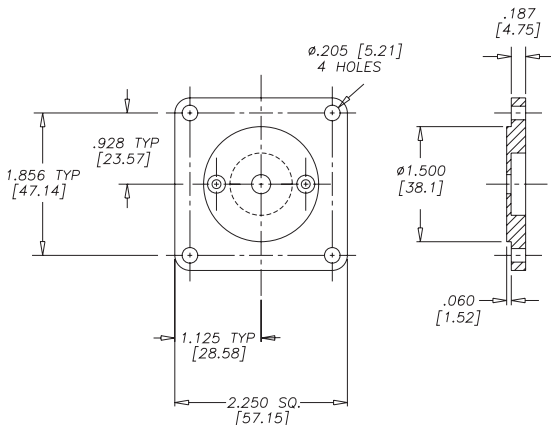


### Specially engineered can-stack linear actuators for high temperature applications

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

### NEMA Flange

Assembly option available for applications that require a Size 23 mount.



### 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	 Multiple contact options available.