

**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.

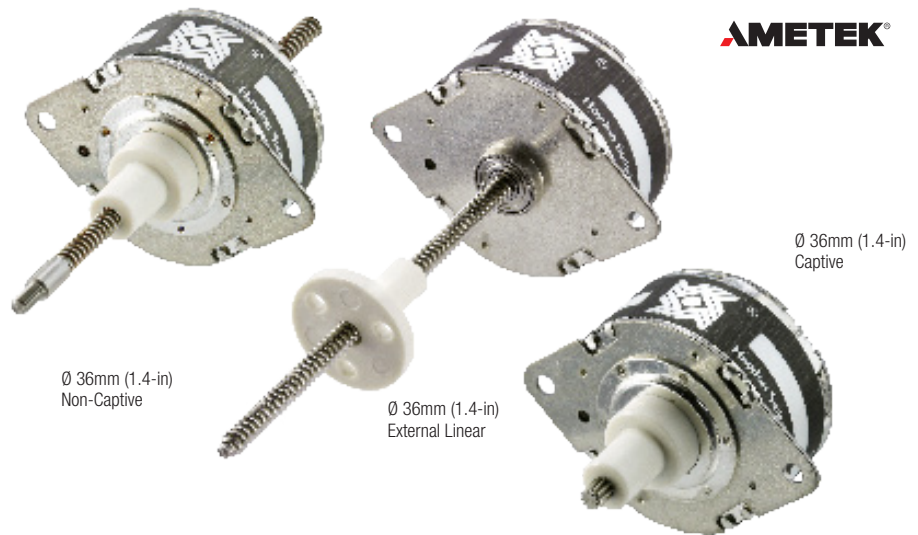
## 36000 Series Ø 36 mm (1.4-in) Can-Stack Stepper Motor Linear Actuators

**Powerful, versatile and robust**

### Multiple versions available

- Captive
- Non-Captive
- External Linear

### Specifications



Ø 36 mm (1.4-in) Z-Series Motor									
Part No.	Captive	3644 ■ - ■ - ■ ■ †		3654 ■ - ■ - ■ ■ †		3646 ■ - ■ - ■ ■ †		3656 ■ - ■ - ■ ■ †	
	Non-Captive	3634 ■ - ■ - ■ ■ †		3684 ■ - ■ - ■ ■ †		3636 ■ - ■ - ■ ■ †		3686 ■ - ■ - ■ ■ †	
	External Linear*	E3644 ■ - ■ - ■ ■ †		E3654 ■ - ■ - ■ ■ †		E3646 ■ - ■ - ■ ■ †		E3656 ■ - ■ - ■ ■ †	
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		460 mA	190 mA	460 mA	190 mA	460 mA	190 mA	460 mA	190 mA
Resistance/phase		11 Ω	63 Ω	11 Ω	63 Ω	11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase		7.2 mH	45 mH	5.5 mH	35 mH	3.8 mH	19 mH	3 mH	15 mH
Power Consumption		4.6 W							
Rotor Inertia		10.5 gcm <sup>2</sup>							
Insulation Class		Class B							
Weight		3 oz (86 g)							
Insulation Resistance		20 MΩ							

\*Part numbering information on page 5. \*\* 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
15° Angle	0.002	0.051	2
	0.004	0.102	4

**High resolution steppers for applications requiring fine step increments** down to 0.000125-in (0.0032 mm). See page 2.

Motors can also be electronically micro-stepped.

Other 36000 Series styles available:

- TFE lead screw
- High temperature option

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).







# 36000 Series High Resolution

Big motor with more precise control with resolutions down to .00025 inches (.0064 mm) and 0.000125-in (.0032 mm)

### Multiple versions available

- Captive
- Non-Captive
- External Linear

### Specifications

Ø 36 mm (1.4-in) Motor					
Part No.	Captive	3624  †		3626  †	
	Non-Captive	3614  †		3616  †	
	External Linear*	E3624  †		E3626  †	
Wiring		Bipolar		Unipolar**	
Step angle		3.75°			
Winding Voltage		5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/phase		460 mA	190 mA	460 mA	190 mA
Resistance/phase		11 Ω	63 Ω	11 Ω	63 Ω
Inductance/phase		9.2 mH	53 mH	4.6 mH	26 mH
Power Consumption		4.6 W			
Rotor Inertia		10.5 gcm <sup>2</sup>			
Insulation Class		Class B			
Weight		3 oz (86 g)			
Insulation Resistance		20 MΩ			

Linear Travel / Step 15° Step Angle			Order Code I.D.
step	inches	mm	
3.75° Angle	0.000125	0.0032	7
	0.00025	0.0064	9

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

High Resolution 36000 Series features a choice of two extremely small step increments, 0.000125-in (0.0032 mm) and 0.00025-in (0.0064 mm). Motors can also be electronically micro-stepped.

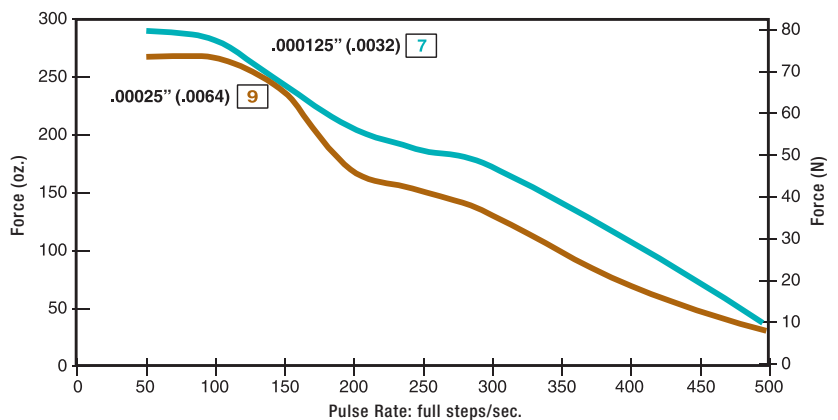
\*Part numbering information on page 5. \*\* Unipolar drive gives approximately 30% less thrust than bipolar drive.

### FORCE vs. PULSE RATE

for the Can-Stack 36000 High Resolution Motor

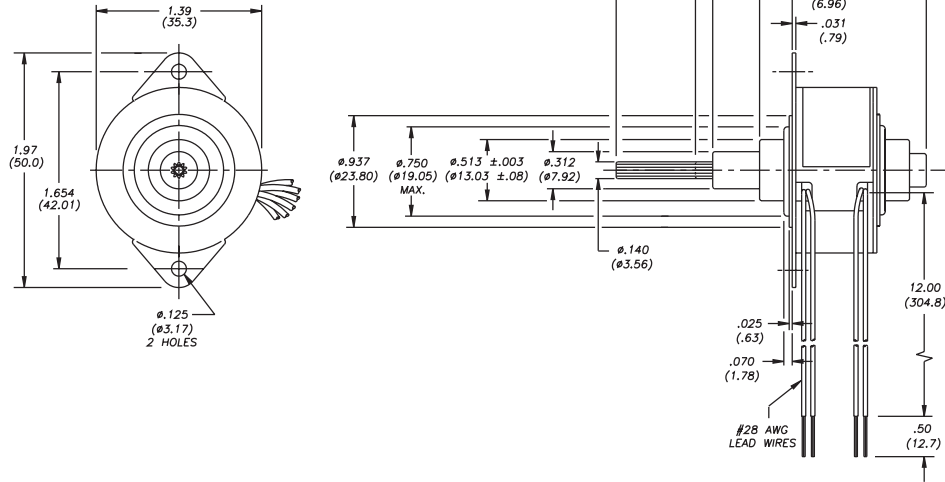
- L/R Drive
- Bipolar
- 100% Duty Cycle

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



### Captive Lead Screw

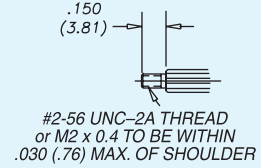
Dimensions = (mm) inches



### Spline Options

Dimensions = (mm) inches

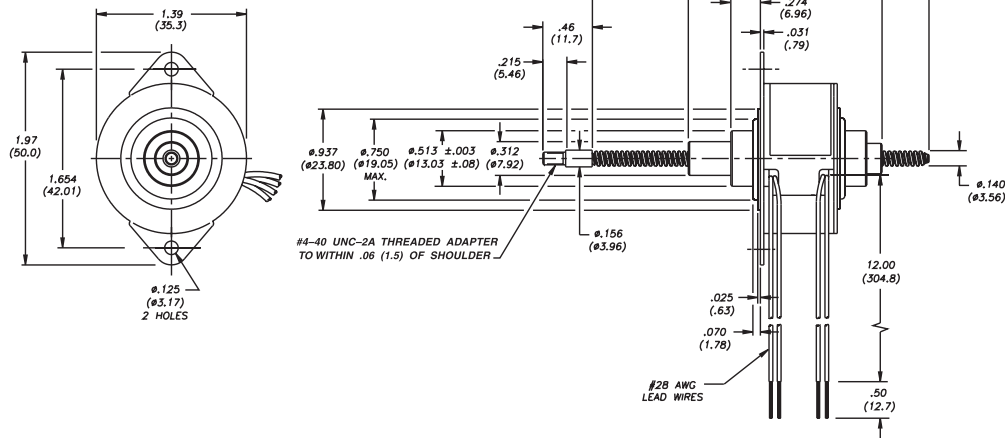
Spline is also available with optional #4-40 UNC-2A or M3 x 0.5 threaded adapter as shown in non-captive drawing.



### Non-Captive Lead Screw

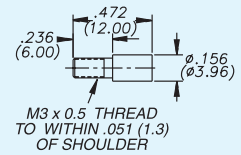
Dimensions = (mm) inches

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



### Optional Adapters

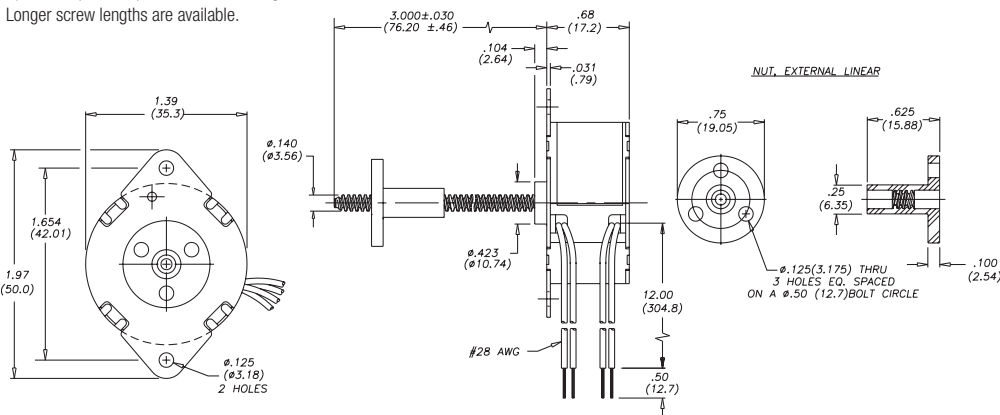
Dimensions = (mm) inches



### External Linear

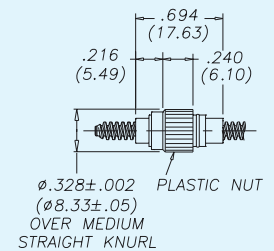
Dimensions = (mm) inches

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



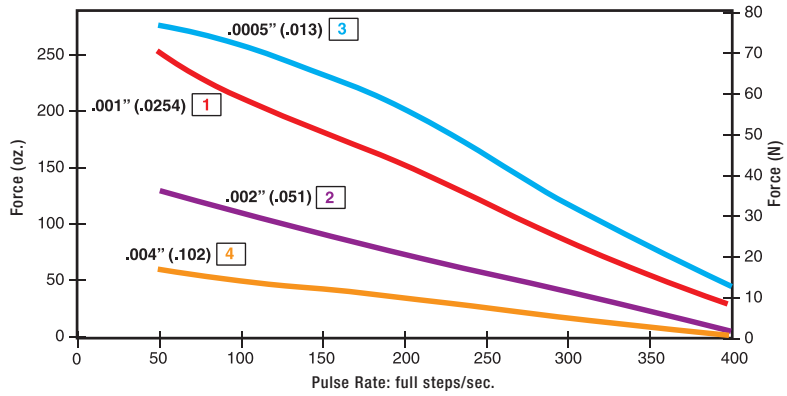
### Linear Series 36000 Nut Option

Dimensions = (mm) inches



**FORCE vs. PULSE RATE**

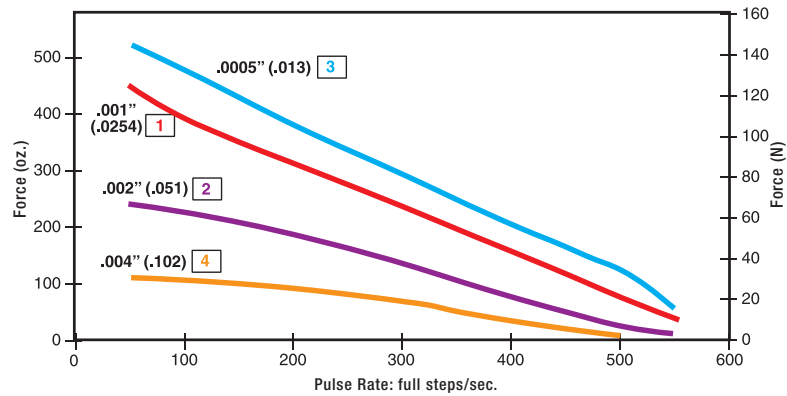
- L/R Drive
- Bipolar
- 100% Duty Cycle



**FORCE vs. PULSE RATE**

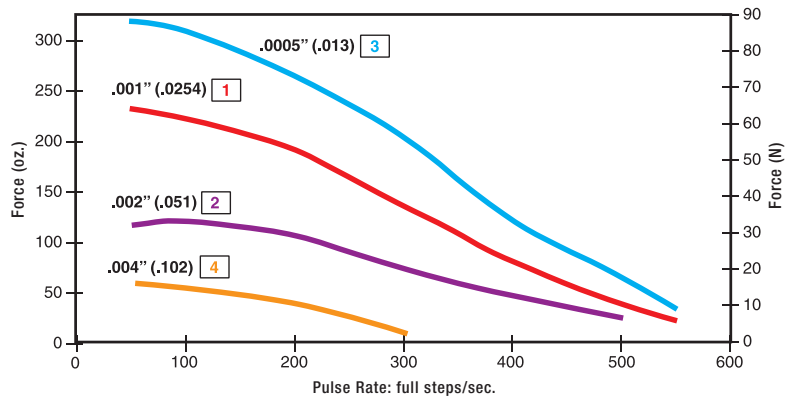
- L/R Drive
- Bipolar
- 25% Duty Cycle

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



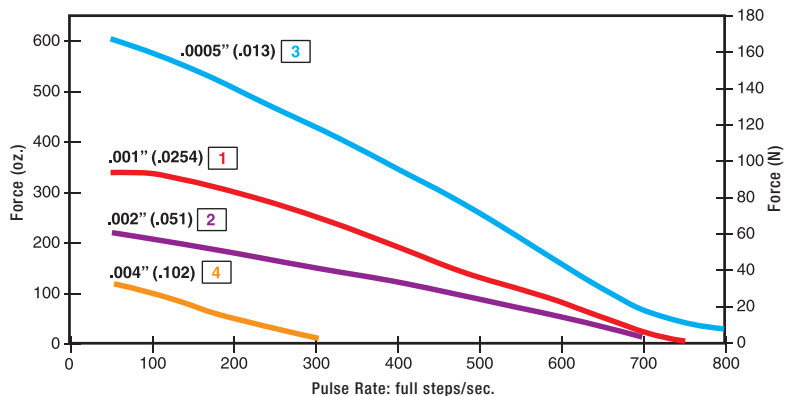
**FORCE vs. PULSE RATE**

- 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.

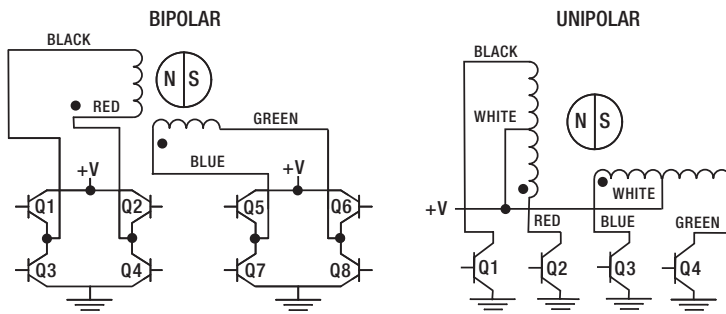
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

Identifying the Can-Stack Number Codes when Ordering

E	36	4	4	2	05	900
<b>Prefix</b> (include only when using the following) <b>E</b> = External <b>K</b> = External with 40° thread form <b>P</b> = Proximity Sensor <b>S</b> = Home Position Switch <b>R</b> = Rare Earth Magnet	<b>Series Number Designation</b> <b>36 = 36000</b> (Series numbers represent approximate diameters of motor body)	<b>Style</b> <b>1</b> = High Resolution 3.75° non-captive <b>2</b> = High Resolution 3.75° Captive or External (use "E" or "K" Prefix for External version) <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>High Resolution</b> <b>7</b> = .000125-in (.0032) <b>9</b> = .00025-in (.00635)	<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

↑ RETRACT CCW  
↓ EXTEND CW

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.

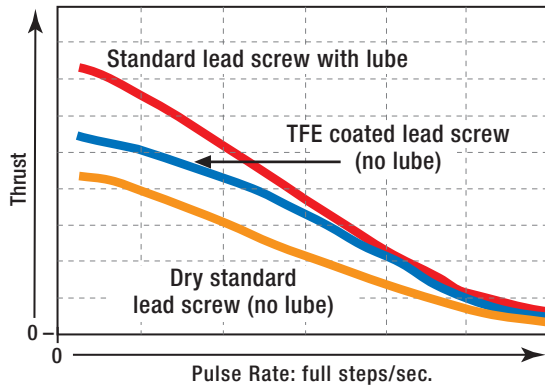
Typical applications: where contamination from grease or lubricants must be avoided; silicon wafer handling, clean rooms, medical equipment or laboratory instrumentation.



36000 Series, Non-Captive

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

- L/R Drive - 100% Duty Cycle

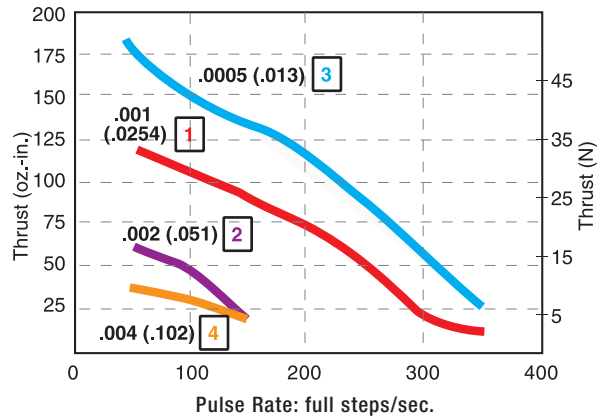


### Specially engineered can-stack linear actuators for high temperature applications

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

#### 36000 Series, High Temperature : FORCE vs. PULSE RATE

- L/R Drive - 100% Duty Cycle

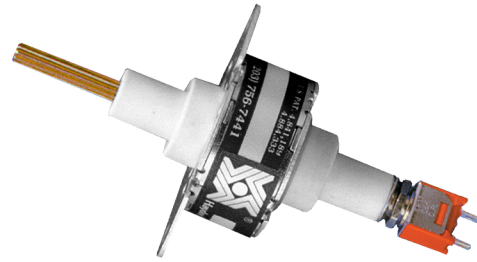


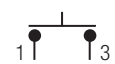
### Home Position Switch monitors movements more precisely for greater control and improved quality control

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".



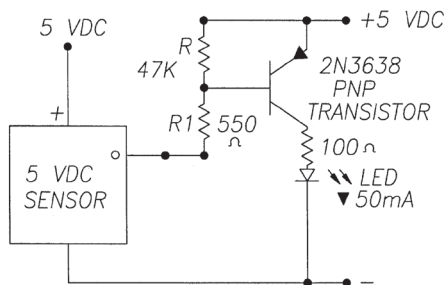
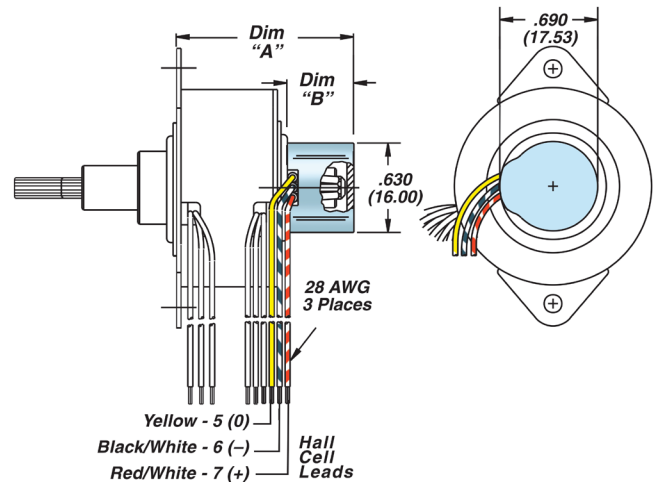
Specifications	
Contact Ratings (Standard)	1.00 AMP @ 120 VAC 1.00 AMP @ 28 VDC
Operating Temperature	-30°C to +55°C (-22°F to 131°F)
Electrical Life	< 20 millionths typ. initial at 2 - 4 V DC, 100 mA Tested to 60,000 make-and-break cycles at full load
Schematic	 Multiple contact options available.

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

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



Specifications		
Supply Voltage (VDC)	3.8 min. to 24 max.	
Current Consumption	10 mA max.	
Output Voltage (operated)	0.15 typ., 0.40 max. Sinking 20 mA max.	
Output Current	20 mA max.	
Output Leakage Current (released)	10µA max. @ Vout = 24 VDC; Vcc = 24 VDC	
Output Switching Time	Rise, 10 to 90%	.05 µs typ., 1.5 µs max. @ Vcc = 12 V, RL = 1.6 KOhm
	Fall, 90 to 10%	.15 µs typ., 1.5 µs max. @ CL = 20 pF
Temperature	- 40 to +150°C	



NOTE: Sensor is category 2 ESD sensitive per DOD-STD-1686A. Assembly operations should be performed at workstations with conductive tops and operators grounded.

Series	Dim "A"	Dim "B"
P36000	1.220 (31.0)	.470 (12.0)
P26000	0.950 (24.13)	.370 (9.4)
P20000	1.120 (28.45)	.470 (12.0)