

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

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



**Specifications**

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

Linear Travel / Step					
Screw Ø	Order Code	Screw Ø	Order Code	Screw Ø	Order Code
.218" (5.54 mm)	I.D.	.250" (6.35 mm)	I.D.		I.D.
inches		inches			
.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.

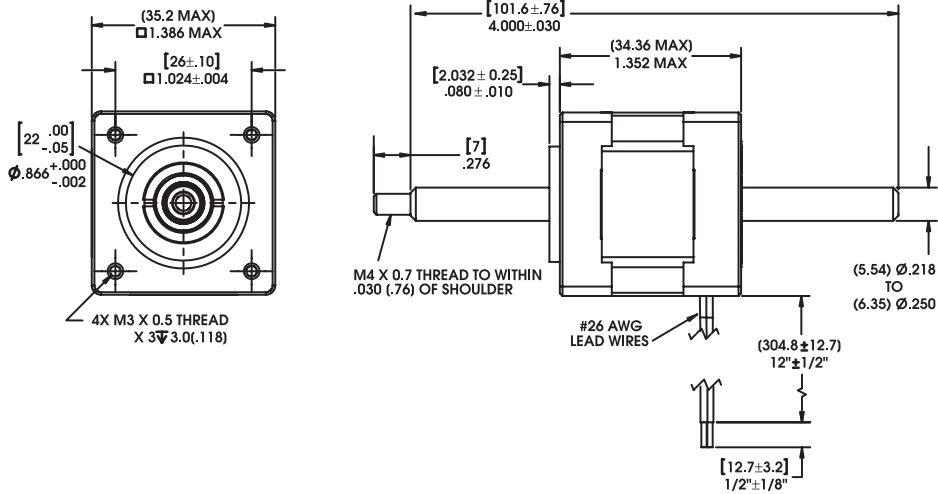
† Part numbering information on page 3

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

**Non-Captive  
 Lead-screw**

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

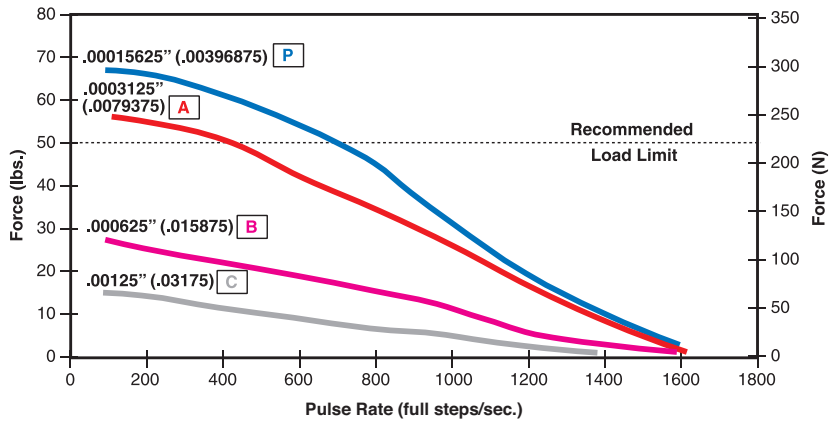
Integrated  
 connector  
 option  
 available



**FORCE vs. PULSE RATE**

**Chopper  
 Bipolar  
 100% Duty Cycle**

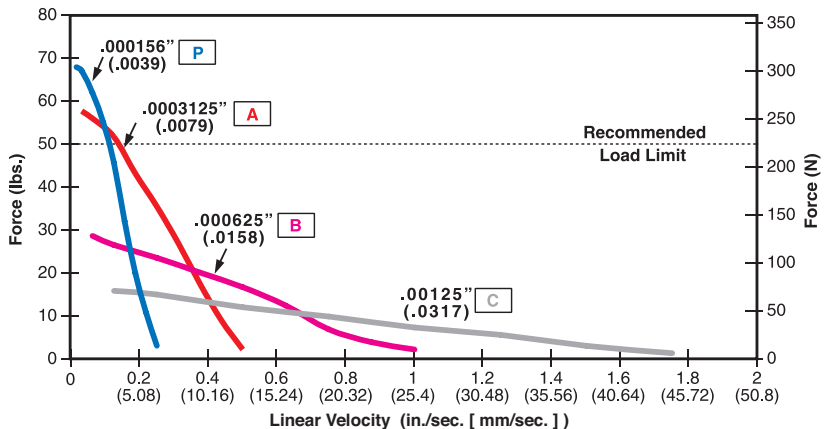
Ø .250 (6.35) Lead-screw >



**FORCE vs. LINEAR VELOCITY**

**Chopper Drive  
 Bipolar  
 100% Duty Cycle**

Ø .250 (6.35) Lead-screw >



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

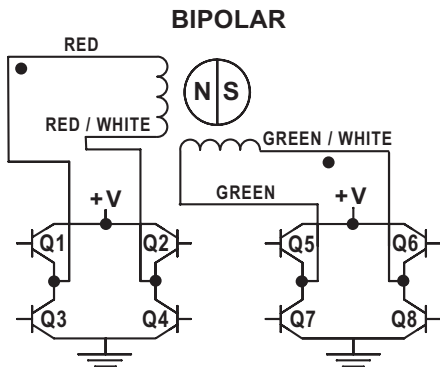
Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot.

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

**Identifying the Hybrid part number codes when ordering**

<b>E</b>	<b>35</b>	<b>F</b>	<b>4</b>	<b>P</b>	-	<b>05</b>	-	<b>XXX</b>
<b>Prefix</b> (include only when using the following)  <b>A</b> = A Coil (See AC Synchronous Data Sheet) <b>E</b> = External <b>K</b> = External with 40° thread form <b>P</b> = Proximity Sensor <b>S</b> = Home Switch	<b>Series number designation</b>  <b>35 = 35000</b>  (Series numbers represent approximate width of motor body)	<b>Style</b>  <b>F</b> = 1.8° Non-captive <b>H</b> = 1.8° Captive or External (use "E" or "K" Prefix for External version) <b>J</b> = 0.9° Non-captive <b>K</b> = 0.9° Captive or External (use "E" or "K" Prefix for External version)	<b>Coils</b>  <b>4</b> = Bipolar (4 wire) <b>6</b> = Unipolar (6 wire)	<b>Code ID Resolution Travel/Step</b>  <b>N</b> = .00012-in (.0030) <b>K</b> = .00024-in (.0060) <b>J</b> = .00048-in (.0121) <b>Q</b> = .00096-in (.0243) <b>P</b> = .0015625-in (.0039) <b>A</b> = .0003125-in (.0079) <b>B</b> = .000625-in (.0158) <b>C</b> = .00125-in (.0317) <b>R</b> = .00192-in (.0478)  <b>High Resolution</b> <b>U</b> = .00006-in (.0015) <b>V</b> = .000078-in (.00198)		<b>Voltage</b>  <b>2.33</b> = 2.33 VDC <b>05</b> = 5 VDC <b>12</b> = 7.5 VDC  <i>Custom V available</i>		<b>Suffix</b>  <b>Stroke</b> <i>Example: -910 = 1-in (Refer to Stroke chart on Captive motor series product page.)</i>  <b>Suffix also represents:</b> -800 = Metric -900 = External Linear with grease and flanged nut -XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

**Hybrids: Wiring**



**Hybrids: Stepping Sequence**

	Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8	
	Unipolar	Q1	Q2	Q3	Q4	
	Step					
EXTEND CW ↓	1	ON	OFF	ON	OFF	RETRACT CCW ↑
	2	OFF	ON	ON	OFF	
	3	OFF	ON	OFF	ON	
	4	ON	OFF	OFF	ON	
	1	ON	OFF	ON	OFF	

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

**Encoders for all sizes of hybrid linear actuators**

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

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



Encoder  
 (on Size 23  
 hybrid motor)

- 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).

**Electrical Specifications**

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

**Operating Temperature Size 14**

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

**Resolution**

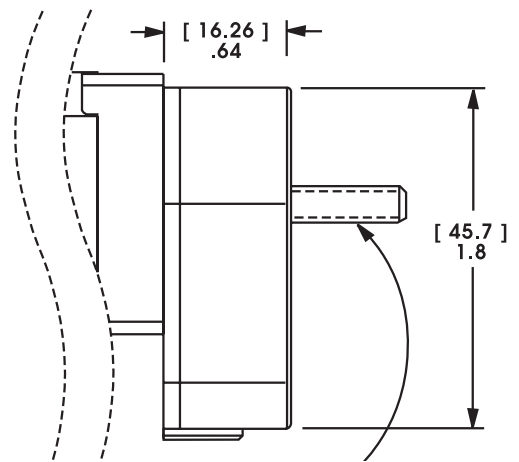
4 standard Cycles Per Revolution (CPR) or Pulses Per Revolution (PPR)

**Size 14 Encoder**

CPR	200	400	1000*
PPR	800	1600	4000*

\*Index Pulse Channel not available.

**30 mm 35000 Series Size 14**



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

**Single Ended Encoder Pinout  
 Size 14**

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

**Mechanical Specifications**

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