HAYDON: 203 756 7441
KERK: 603 213 6290
www.haydonkerkpittman.com
AMETEK®
ADVANCED MOTION SOLUTIONS

Haydon kerk Motion Solutions®

87000 Series: Size 34 Stepper Motor Linear Actuator

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

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, Haydon Kerk Motion Solutions, Inc. can custom build this powerful motor to meet your specific motion requirements.

Specifications

Size 34: 87 mm (3.4-in) Hybrid Linear Actuator (1.8° Step Angle)						
Part No.	Captive	87H4 □–□□–□□□ †			87H6 □–□□–□□□ †	
	Non-captive	87F4 □–□□–□□□ †			87F6 □–□□–□□□ †	
	External Lin.	E87H4 □–□□–□□□ †			E87H6 □–□□–□□□ †	
Wiring		Bipolar			Unipolar**	
Winding Voltage		2.85 VDC	5 VDC	12 VDC	5 VDC	12 VDC
Current (RMS)/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				
Insulation Class		Class B (Class F available)				
Weight		5.1 lbs. (2.3 Kg)				
Insulation Resistance		20 MΩ				

Linear Travel / Step Screw Ø.625"(15.88 mm) inches	mm	Order Code I.D.
.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.

† Part numbering information on page 4

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

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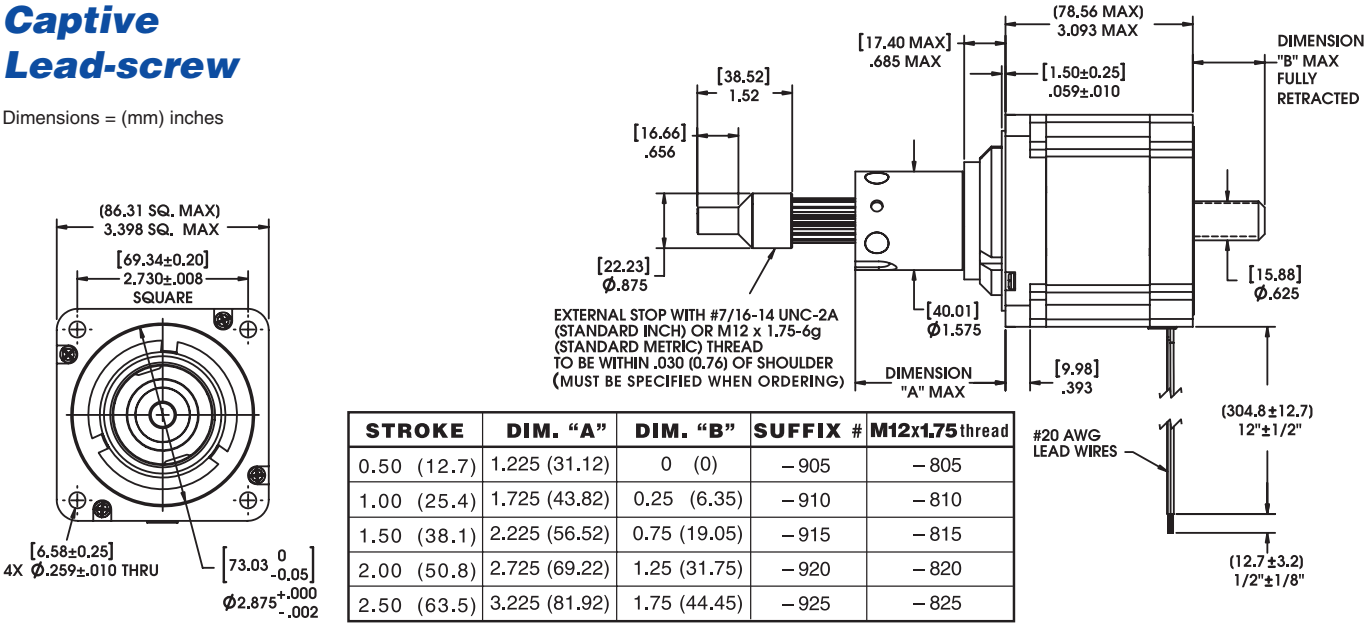
87000 Series: Size 34 Linear Actuator Dimensional Drawings

Captive Lead-screw

Dimensions = (mm) inches

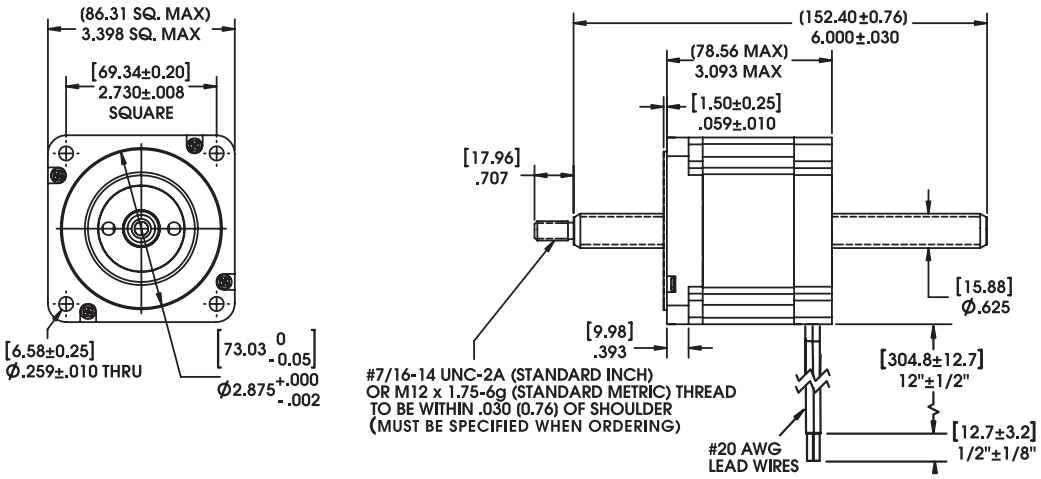


STROKE	DIM. "A"	DIM. "B"	SUFFIX #	M12x1.75 thread
0.50 (12.7)	1.225 (31.12)	0 (0)	–905	–805
1.00 (25.4)	1.725 (43.82)	0.25 (6.35)	–910	–810
1.50 (38.1)	2.225 (56.52)	0.75 (19.05)	–915	–815
2.00 (50.8)	2.725 (69.22)	1.25 (31.75)	–920	–820
2.50 (63.5)	3.225 (81.92)	1.75 (44.45)	–925	–825

Non-Captive Lead-screw

Dimensions = (mm) inches

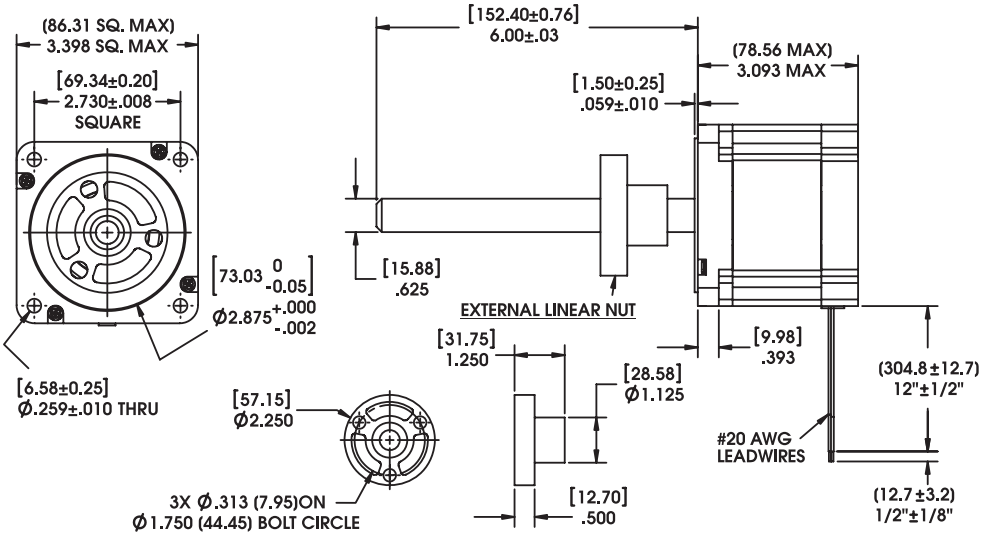
Up to 18-in (457 mm) standard screw lengths. Longer screw lengths are available.



External Linear

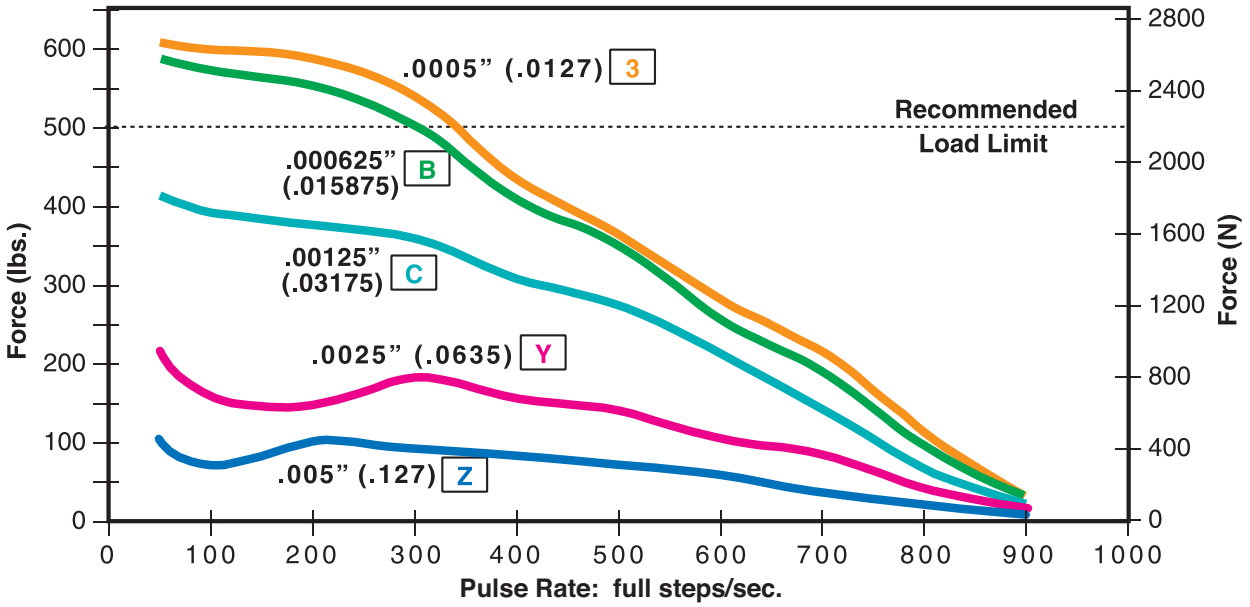
Dimensions = (mm) inches

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



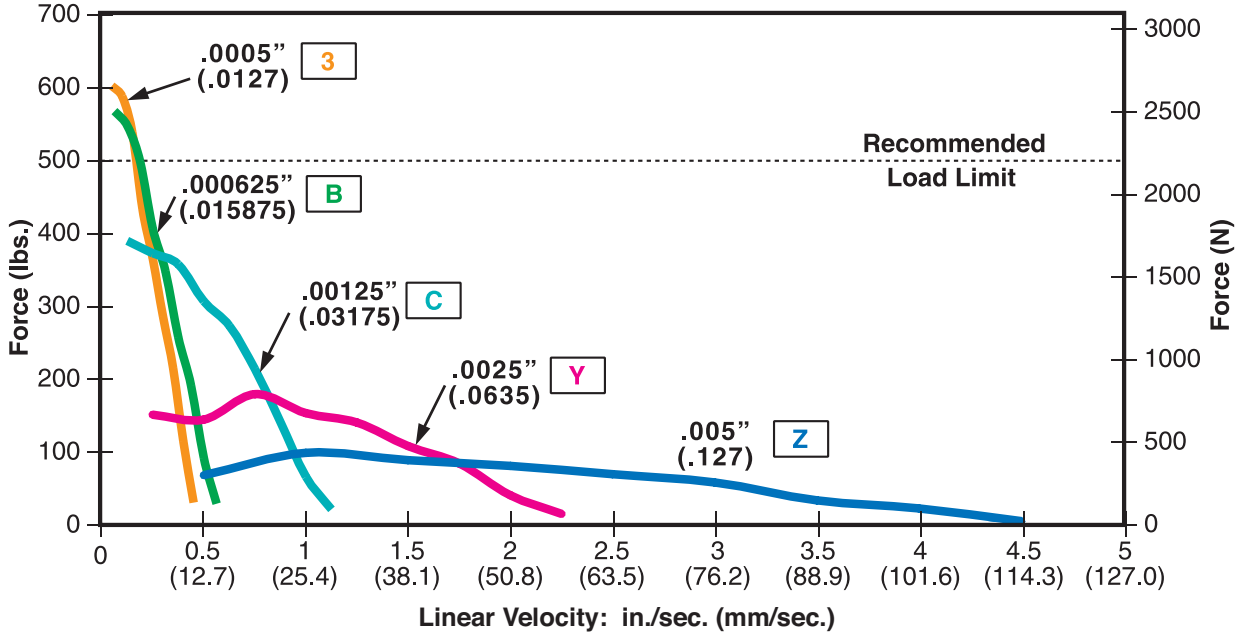
FORCE vs. PULSE RATE

Chopper • **Bipolar** • **100% Duty Cycle** • **Ø .625 (15.88) Lead-screw**



FORCE vs. LINEAR VELOCITY

Chopper • **Bipolar** • **100% Duty Cycle** • **Ø .625 (15.88) Lead-screw**



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

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

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

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Identifying the Hybrid part number codes when ordering

E	87	H	4	C	–	2.85	–	910

Prefix
(include only when using the following)

A = A Coil (See AC Synchronous Data Sheet)
E = External
K = External with 40° thread form
P = Proximity Sensor
S = Home Switch

Series number designation

87 = 87000

(Series numbers represent approximate width of motor body)

Style

F = 1.8° Non-captive
H = 1.8° Captive or External (use "E" or "K" Prefix for External version)

Coils

4 = Bipolar (4 wire)
6 = Unipolar (6 wire)

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 203 756 7441.

Code ID Resolution Travel/Step

3 = .0005-in (.0127)
B = .000625-in (.0158)
C = .00125-in (.0317)
Y = .0025-in (.0635)
Z = .005-in (.127)

Voltage

2.85 = 3.25 VDC
05 = 5 VDC
12 = 7.5 VDC

Custom V available

Suffix

Stroke
Example: –910 = 1-in (Refer to Stroke chart on Captive motor series product page.)

Suffix also represents:

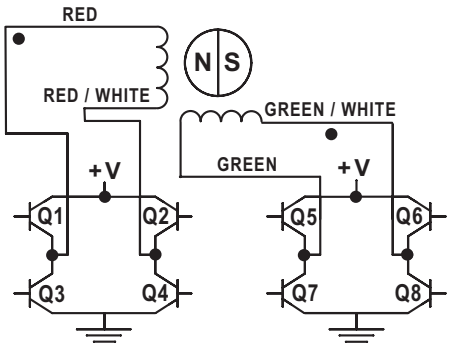
–800 = Metric

–900 = External Linear with grease and flanged nut

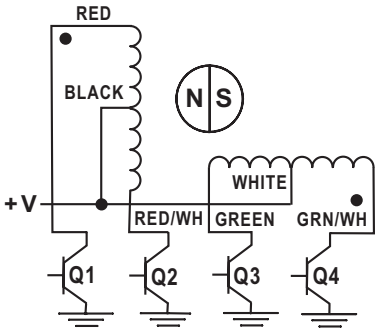
–XXX = Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

Hybrids: Wiring

BIPOLAR



UNIPOLAR



Hybrid Stepper Motor Linear Actuators: OPTIONS

- **ENCODERS** for all Hybrid Linear Actuator Motors
- **OPTIONAL ASSEMBLIES** for Hybrid Linear Actuator Motors

Haydon kerk Express℠
Standard products available 24-hrs. at
www.haydonkerkexpress.com

Hybrids: Stepping Sequence

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

EXTEND CW ↓ RETRACT CCW ↑

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

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Encoders designed for all sizes of hybrid linear actuators

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

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

Electrical Specifications

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

- 2 channel quadrature TTL squarewave outputs.
- Channel B leads A for a clockwise rotation of the rotor viewed from the encoder cover.
- Tracks at speeds of 0 to 100,000 cycles/sec.
- Optional index available as a 3rd channel (one pulse per revolution).

Operating Temperature Size 34

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

Mechanical Specifications

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

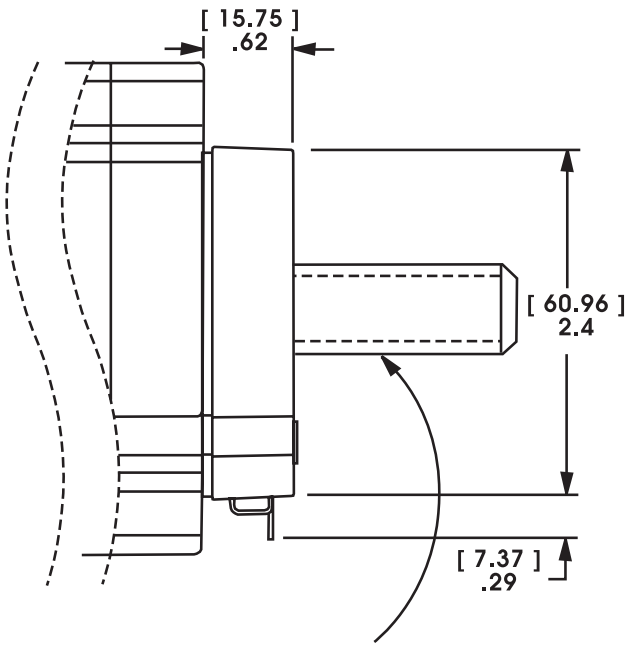
Resolution

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

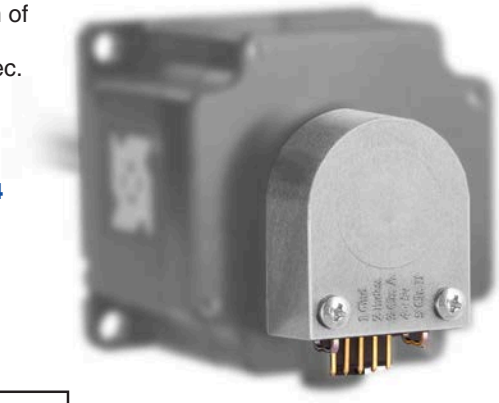
Size 34 Encoder

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

57 mm 87000 Series Size 34



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



Encoder mounted on Size 23 motor

Single Ended Encoder Pinout Size 34

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

Differential Ended Encoder Pinout Size 34

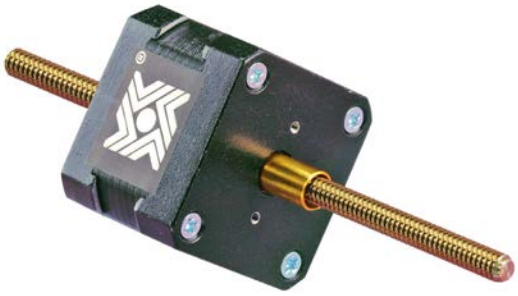
Connector Pin #	Description
1	Ground
2	Ground
3	– Index
4	+ Index
5	Channel A –
6	Channel A +
7	+5 VDC Power
8	+5 VDC Power
9	Channel B –
10	Channel B +

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 lead-screw 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.



Home Position Switch for Hybrids

A miniature electronic home position switch capable of monitoring the home positions of linear actuators. The switch mounts on the rear sleeve of captive linear motors and allows the user to identify start, stop or home postions. 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® and Kerkote® TFE Coated Lead-screws
(certain conditions apply)

Where applications require the use of a "greaseless" screw and nut interface Haydon Kerk Motion Solutions offers TFE coated lead-screws.

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