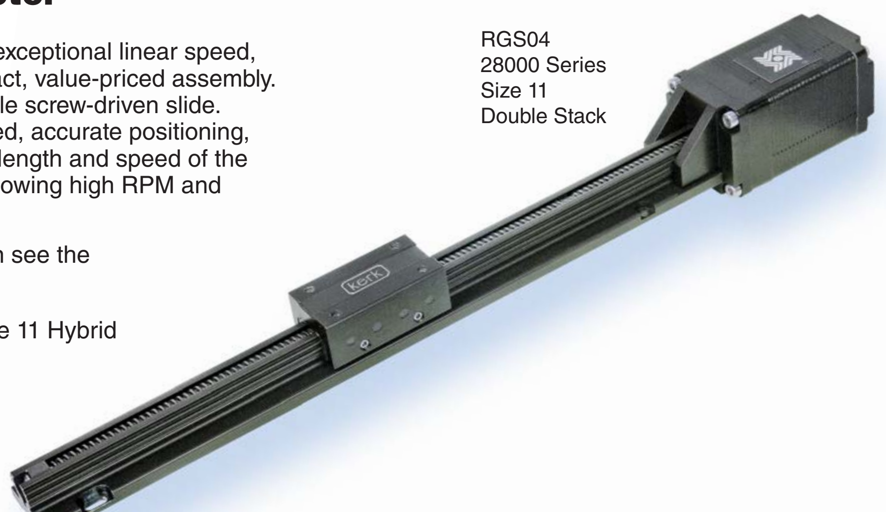
RGS04® Linear Rail for Hybird 28000 Series Size 11 Double Stacks and RGS04® for 43000 Series Size 17 Single and Double Stacks (See Page 4)

RGS04® Linear Rail with a 28000 Series Size 11 Double Stack Linear Actuator Stepper Motor

The RGS04 is a screw-driven rail that offers exceptional linear speed, accurate positioning, and long life in a compact, value-priced assembly. The RGS04 28000 Series is smallest available screw-driven slide. It offers a compact profile, reliable linear speed, accurate positioning, and long life in a high quality assembly. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans.

To determine what is best for your application see the Linear Rail Applications Checklist on page 9.

Technical specifications for 28000 Series Size 11 Hybrid Linear Actuators are on page 2.



RGS04
28000 Series
Size 11
Double Stack

Identifying the Motorized RGS part number codes when ordering

RG	S	04	K	–	M	0100	–	XXX

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard

Frame Size Load*

04 = 15 lbs (67 N) (Maximum static load)

Coating

K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting

M = Motorized (Double Stack only)

Nominal Thread Lead Code

0025 = .025-in (.635)
0039 = .039-in (1.00)
0050 = .050-in (1.27)
0063 = .0625-in (1.59)
0079 = .079-in (2.00)
0100 = .100-in (2.54)
0118 = .118-in (3.00)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0394 = .394-in (10.00)
0500 = .500-in (12.70)
0750 = .750-in (19.05)

Unique Identifier

Suffix used to identify specific motors (28000 Double Stack)

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

Carriage holes available in Metric sizes
M3
M4

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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RGS04® Linear Rails: RGS04 28000 Series Size 11 DS Dimensional Drawings

Specifications: Haydon® 28000 Series Size 11 Double Stack

Size 11: 28 mm (1.1-in) Double Stack External Linear Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Winding Voltage	2.1 VDC	5 VDC	12 VDC
Current (RMS)/phase	1.9 A	750 mA	313 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		
Rotor Inertia	13.5 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	5.8 oz (180 g)		
Insulation Resistance	20 MΩ		

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

Size 11
Double Stack External Linear

RGS04® Linear Rail with Hybrid 28000 Size 11 Double Stack linear motors

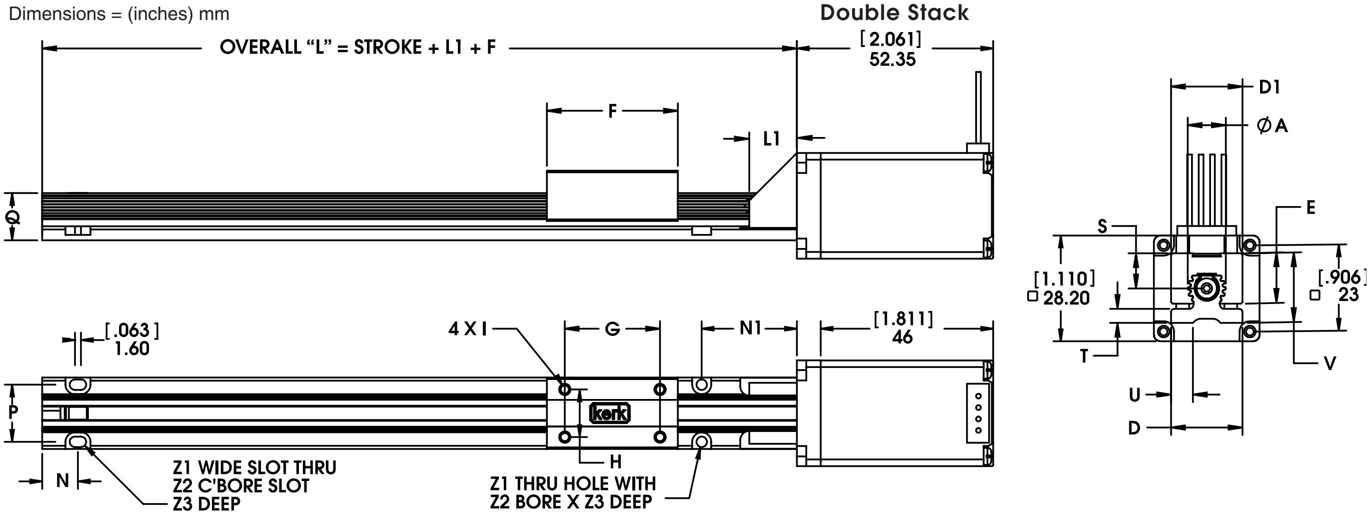
Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.7)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	18	5.1	2.3

* Metric threads also available for carriage.

Dimensions = (inches) mm

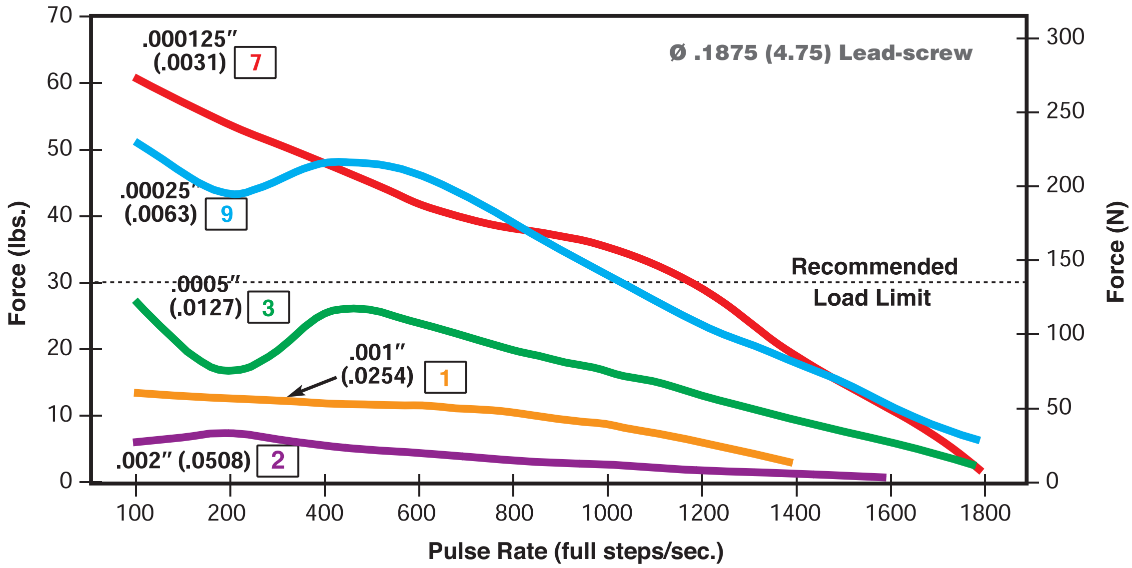
Double Stack



Performance Curves: Haydon® 28000 Series Size 11 Double Stack

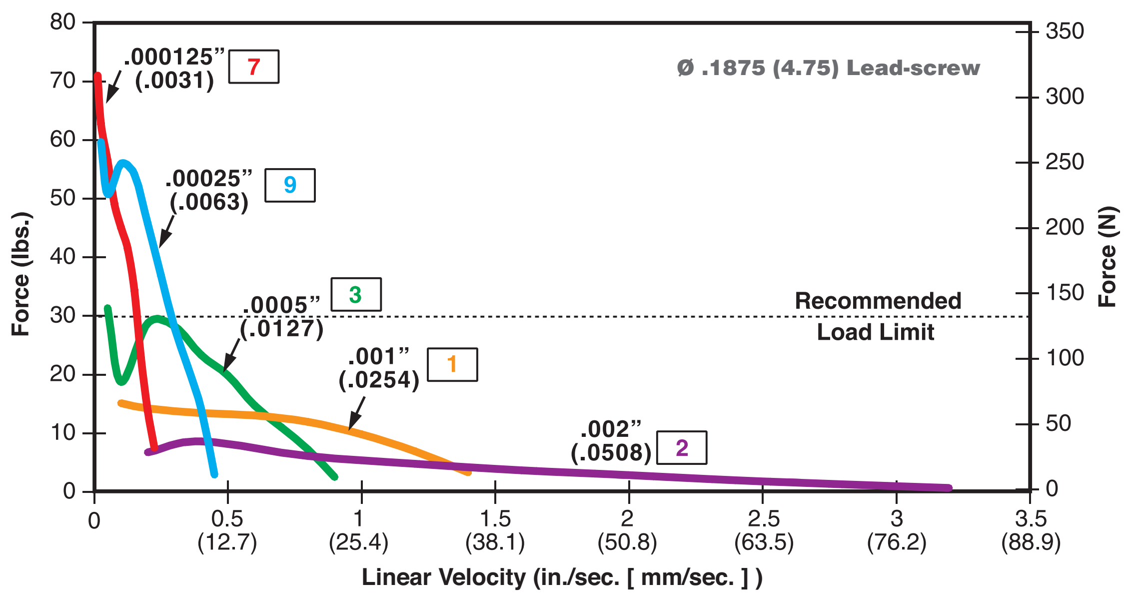
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar • 100% 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.

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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RGS04® Linear Rail with 43000 Series Size 17 Single Stack or Double Stack Linear Actuator Stepper Motors

RGS04 linear rails are available with the following **Haydon Hybrid Linear Actuator Stepper Motors**:

- **Motorized with 43000 Series Size 17 Single and Double Stack without or with an integrated programmable IDEA™ Drive**

The RGS04 is a screw-driven rail that offers exceptional linear speed, accurate positioning, and long life in a compact, value-priced assembly. It offers a compact profile, reliable linear speed, accurate positioning, and long life in a high quality assembly. The length and speed of the RGS is not limited by critical screw speed, allowing high RPM and linear speeds, even over long spans.

To determine what is best for your application see the Linear Rail Applications Checklist on page 9.

Technical specifications for 43000 Series Size 17 Hybrid Linear Actuators are on page 6. 43000 Series Size 17 is available with an optional programmable **IDEA™ Drive** (see page 6).

RGS04 Size 43000 Series Size 17 Double Stack

Identifying the Motorized RGS part number codes when ordering

RG | **S** | **04** | **K** – **M** | **0100** – **XXX**

Prefix

RG = Rapid Guide Screw

Frame Style

S = Standard

Frame Size Load*

04 = 15 lbs (67 N) (Maximum static load)

Coating

K = TFE Kerkote®
X = Special (example: Kerkote with grease

Drive / Mounting

M = Motorized

G = IDEA™ integrated programmable drive
– USB communications

J = IDEA™ integrated programmable drive
– RS485 communications

Nominal Thread Lead Code

0025 = .025-in (.635)
0039 = .039-in (1.00)
0050 = .050-in (1.27)
0063 = .0625-in (1.59)
0079 = .079-in (2.00)
0100 = .100-in (2.54)
0118 = .118-in (3.00)
0200 = .200-in (5.08)
0250 = .250-in (6.35)
0394 = .394-in (10.00)
0500 = .500-in (12.70)
0750 = .750-in (19.05)

Unique Identifier

Suffix used to identify specific motors (43000 Single/ Double Stack)

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

Carriage holes available in Metric sizes
M3
M4
M5
M6

NOTE: Dashes must be included in Part Number (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

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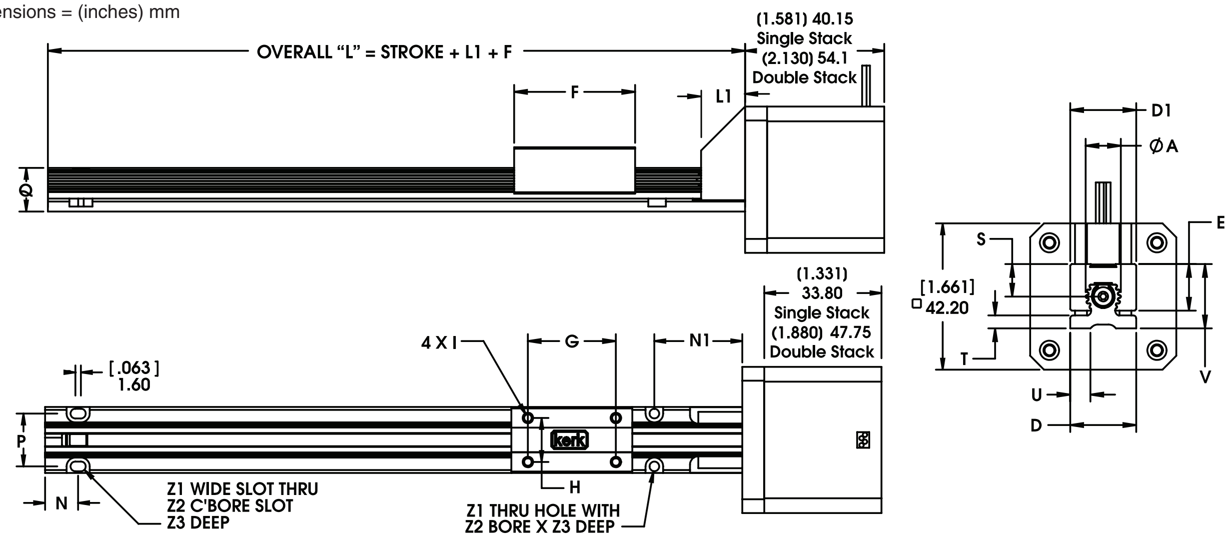
RGS04® with 43000 Series Size 17 Single Stack and Double Stack linear actuator stepper motors

Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.73)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	2.8	5.1	2.3

* Metric threads also available for carriage.

Dimensions = (inches) mm



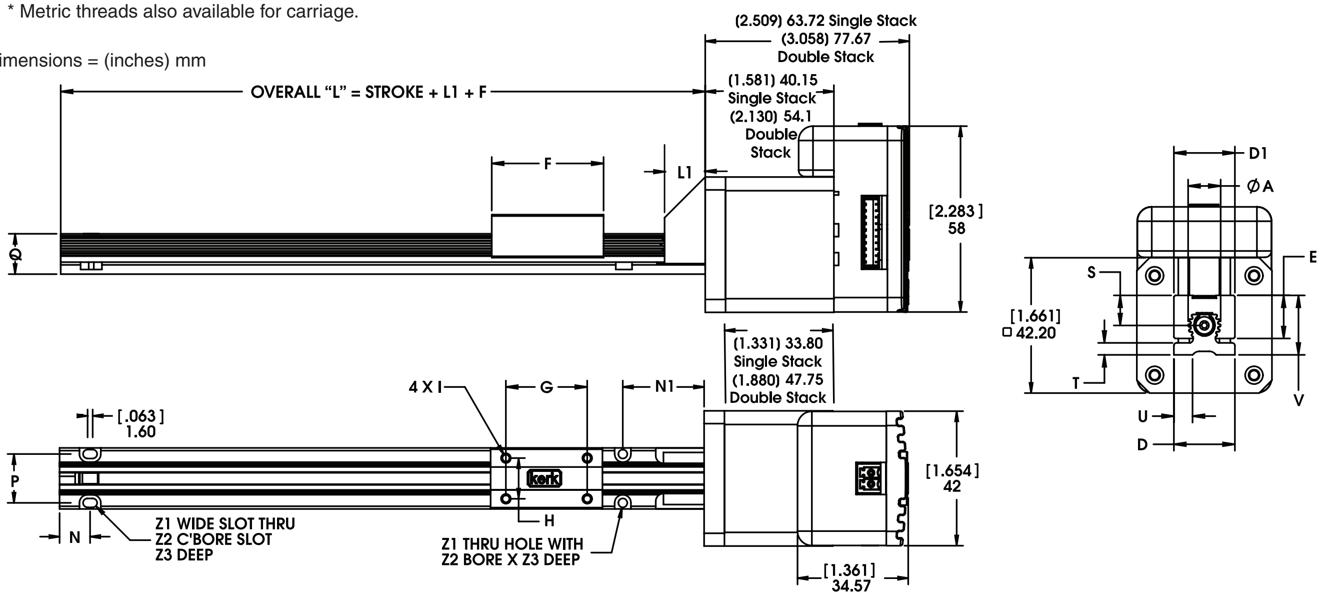
RGS04® with 43000 Series Size 17 Single Stack and Double Stack linear actuator stepper motors with an integrated programmable IDEA™ Drive

Recommended for horizontal loads up to 15 lbs (67 N)

	A	D	D1	E	F	G	H	I*	L1	N	N1	P	Q	S	T	U	V	Z1	Z2	Z3
(inch)	(0.4)	(0.75)	(0.75)	(0.53)	(1.4)	(1.0)	(0.5)	4-40	(0.5)	(0.375)	(1.0)	(0.6)	(0.5)	(0.37)	(0.15)	(0.23)	(0.73)	(0.11)	(0.2)	(0.09)
mm	10.2	19.0	19.0	13.5	35.6	25.4	12.7	UNC	12.7	9.52	25.4	15.2	12.7	9.4	3.8	5.8	18.5	2.8	5.1	2.3

* Metric threads also available for carriage.

Dimensions = (inches) mm



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Specifications: Haydon® 43000 Series Size 17 Single Stack

Size 17: 43 mm (1.7-in) Hybrid External Linear Actuator (1.8° Step Angle)					
Wiring	Bipolar			Unipolar**	
Programmable Drive	IDEA™ Drive Option Available			Not Applicable	
Winding Voltage	2.33 VDC*	5 VDC	12 VDC	5 VDC	
Current (RMS)/phase	1.5 A	700 mA	290 mA	700 mA	12 VDC
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω	7.2 Ω	290 mA
Inductance/phase	1.9 mH	8.7 mH	54.0 mH	4.4 mH	41.5 Ω
Power Consumption	7 W				27.0 mH
Rotor Inertia	37 gcm^2				
Insulation Class	Class B (Class F available)				
Weight	8.5 oz (241 g)				
Insulation Resistance	20 MΩ				

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

43000 Series
Size 17
Double Stack
External Linear

43000 Series
Size 17
Single Stack
External Linear

Specifications: Haydon® 43000 Series Size 17 Double Stack

Size 17: 43 mm (1.7-in) Double Stack Hybrid External Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Programmable Drive	IDEA™ Drive Option Available		
Winding Voltage	2.33 VDC*	5 VDC	12 VDC
Current (RMS)/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	10.4 W Total		
Rotor Inertia	78 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	12.5 oz (352 g)		
Insulation Resistance	20 MΩ		

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.

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

IDEA™ Drive software is simple to use with on-screen buttons and easy-to-understand programming guides.

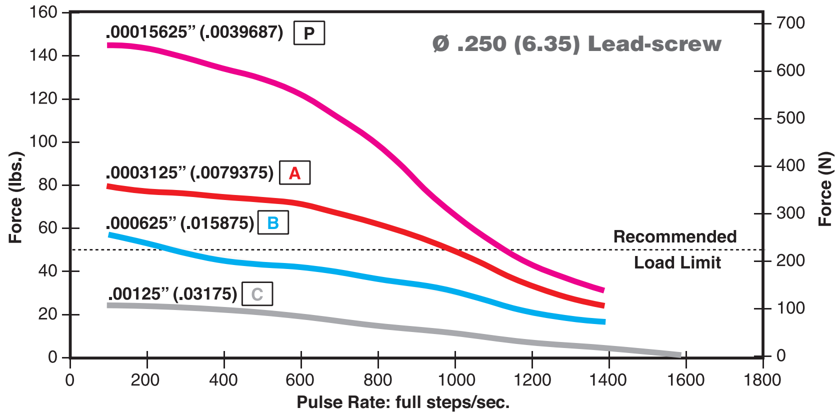
- Fully Programmable
- RoHS Compliant
- USB or RS-485 Communication
- Microstepping Capability – Full, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64
- Graphic User Interface
- Auto-population of Drive Parameters
- Programmable Acceleration/Deceleration and Current Control

For more information see the **Haydon Kerk IDEA™ Drive Data Sheet**

Performance Curves:
Haydon® 43000 Series Size 17 Single Stack

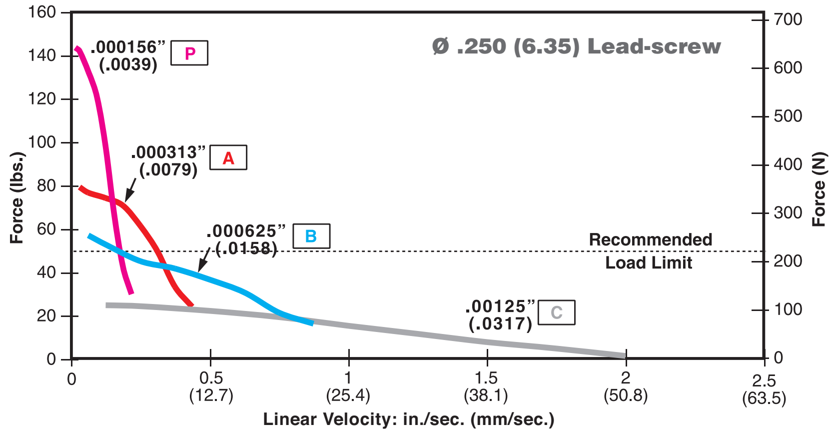
FORCE vs. PULSE RATE

Chopper • Bipolar
100% Duty Cycle



FORCE vs. LINEAR VELOCITY

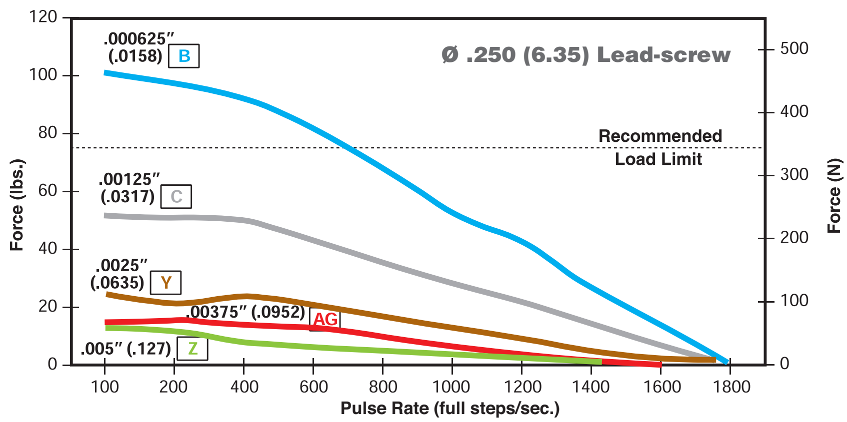
Chopper • Bipolar
100% Duty Cycle



Performance Curves:
Haydon® 43000 Series Size 17 Double Stack

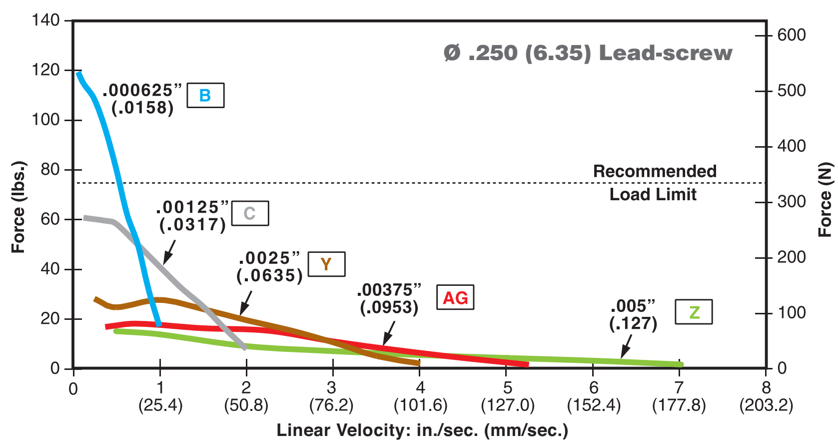
FORCE vs. PULSE RATE

Chopper • Bipolar
100% Duty Cycle



FORCE vs. LINEAR VELOCITY

Chopper • Bipolar
100% 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.

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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28000 Series Size 11 / 43000 Series Size 17 Linear Actuator Stepper Motors

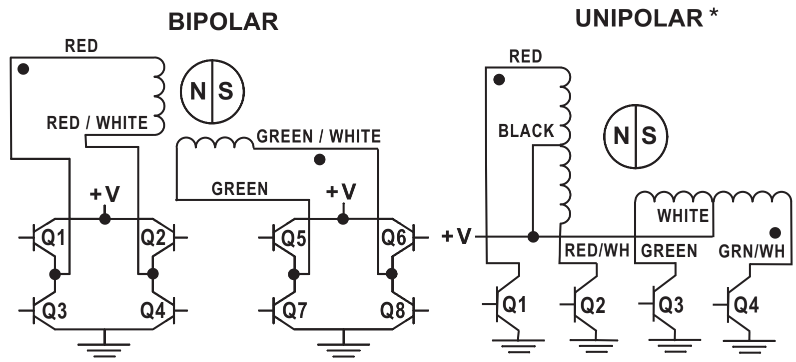
Hybrids: Stepping Sequence

EXTEND CW ↓ / RETRACT CCW ↑

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

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

Hybrids: Wiring



* Unipolar not available with 28000 Series

Integrated Connectors

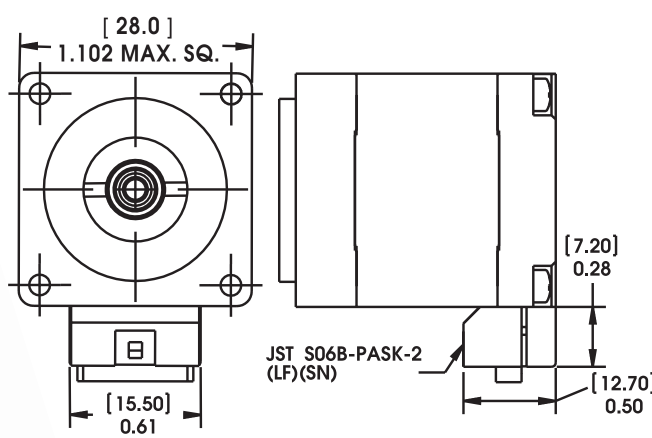
Hybrid Size 11 Double Stack and Hybrid Size 17 Single and Double Stack linear actuators are available with an integrated connector. Offered alone or with a harness assembly, this connector is RoHS compliant and features a positive latch in order for high connection integrity. The connector is rated up 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, Haydon Kerk Motion Solutions can custom design this motor to meet your specific application requirements.

Motor Connector:
JST part # S06B-PASK-2
Mating Connector:
JST part # PAP-06V-S
Haydon Kerk Part #56-1210-5 (12 in. Leads)
Wire to Board Connector:
JST part number SPHD-001T-P0.5

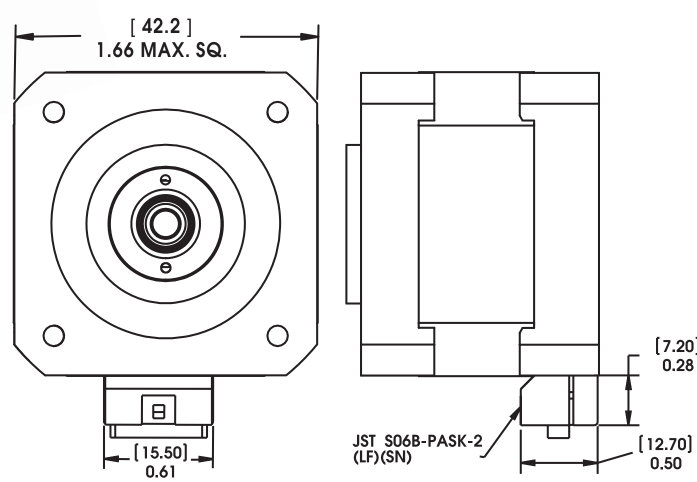
Pin #	Bipolar	Unipolar	Color
1	Phase 2 Start	Phase 2 Start	G/W
2	Open	Phase 2 Common	–
3	Phase 2 Finish	Phase 2 Finish	Green
4	Phase 1 Finish	Phase 1 Finish	R/W
5	Open	Phase 1 Common	–
6	Phase 1 Start	Phase 1 Start	Red

Dimensional Drawing: Integrated Connector with 28000 Series Size 11 Double Stack

Dimensions = (mm) inches



Dimensional Drawing: Integrated Connector with 43000 Series Size 17 Single and Double Stack



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Information needed to properly size a linear rail system

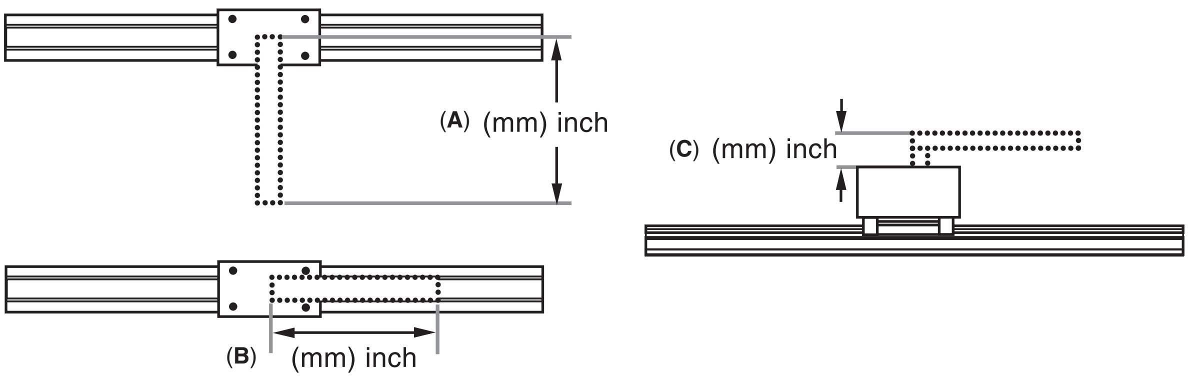
Haydon Kerk™ Linear Rail Systems are designed to be **precision motion devices**. Many variables must be considered before applying a particular rail system in an application. The following is a basic checklist of information needed that will make it easier for the Haydon Kerk engineering team to assist you in choosing the proper linear rail.

Linear Rail Application Checklist

1) ❏ **Maximum Load?** _______________ (N or lbs.)

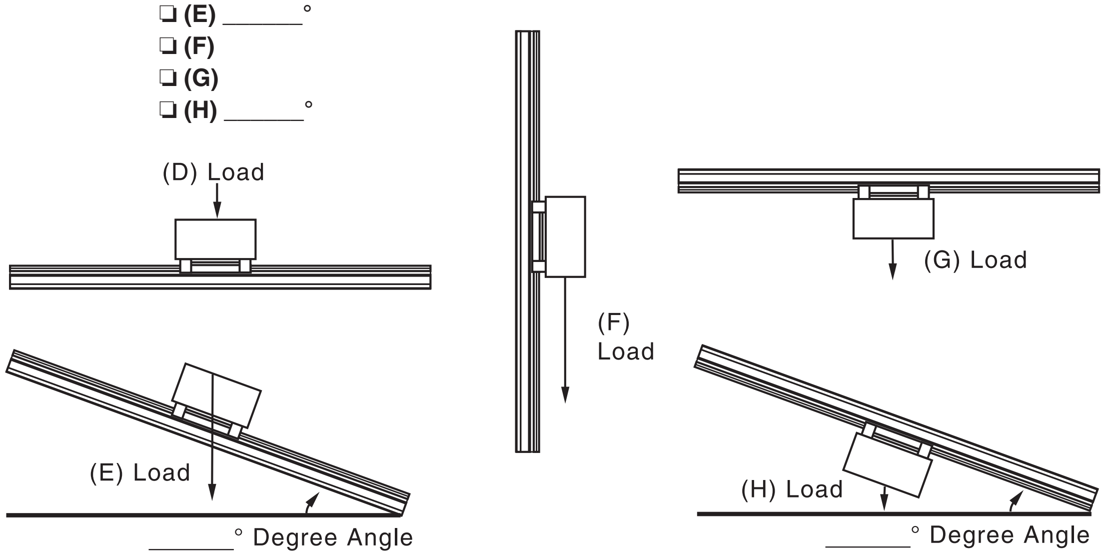
2) ❏ **Load Center of Gravity (cg) Distance and Height** (mm or inches)**?** See illustrations (A) (B) (C) below.
Dimensions (❏ **mm /** ❏ **inch)**:

❏ **(A)** _______ **... OR...** ❏ **(B)** ______ **AND...** ❏ **(C)** ________



3) ❏ **Rail Mount Orientation?** The force needed to move the load is dependent on the orientation of the load relative to the force of gravity. For example, total required force in the horizontal plane (D) is a function of friction and the force needed for load acceleration ($F_f + F_a$). Total force in the vertical plane is a function of friction, load acceleration, and gravity ($F_f + F_a + F_g$).

Orientation:
❏ **(D)**
❏ **(E)** ______°
❏ **(F)**
❏ **(G)**
❏ **(H)** ______°

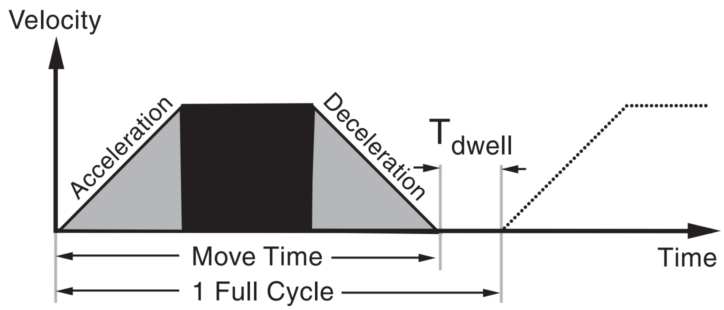


Linear Rail Application Checklist *(Continued)*

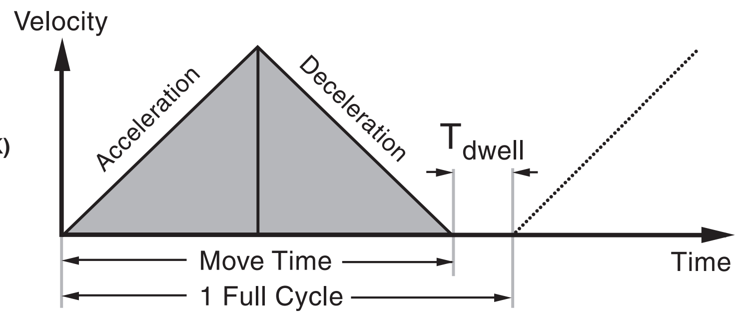
4) ❏ **Stroke Length to Move Load?** _______________ (mm or inches)
Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether or not an integrated stepper motor programmable drive system is added.

5) ❏ **Move Profile?**
A **trapezoidal** move profile divided into 3 equal segments (J) is a common move profile and easy to work with. Another common move profile is a **triangular** profile divided into 2 equal segments (K).

(J)



(K)



If using a **trapezoidal** (J) or **triangular** (K) move profile, the following is needed…

a) ❏ Point to point move distance __________ (mm or inches)
b) ❏ Move time __________ (seconds) including time of acceleration and deceleration
c) ❏ Dwell time between moves __________ (seconds)

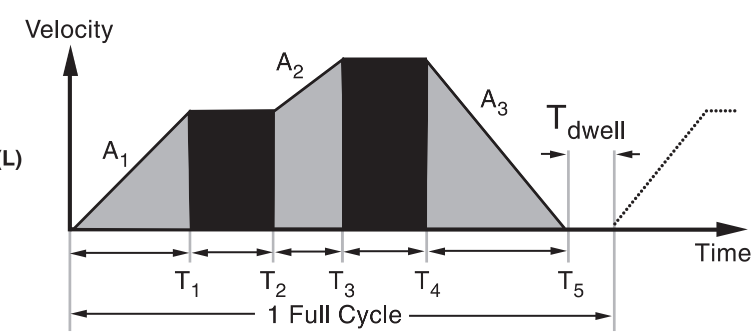
The trapezoidal move profile (J) is a good starting point in helping to size a system for prototype work.

A **complex** move profile (L) requires more information.

a) ❏ Time (in seconds) including: T_1, T_2, T_3, T_4, T_5…T_n and T_{dwell}
b) ❏ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: A_1, A_2, A_3…A_n

For more information call Haydon Kerk Motion Solutions Engineering at 203 756 7441.

(L)

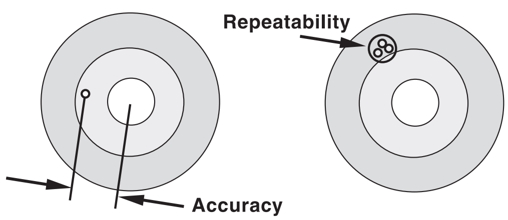


Linear Rail Application Checklist *(Continued)*

6) ❑ **Position Accuracy Required?** __________ (mm or inches)
Accuracy is defined as the difference between the theoretical position and actual position capability of the system. Due to manufacturing tolerances in components, actual travel will be slightly different than theoretical "commanded" position. See figure (M) below.

7) ❑ **Position Repeatability Required?** __________ (mm or inches)
Repeatability is defined as the range of positions attained when the rail is commanded to approach the same position multiple times under identical conditions. See figure (M) below.

(M)



8) ❑ **Positioning Resolution Required?** __________ (mm/step or inches/step)
Positioning resolution is the smallest move command that the system can generate. The resolution is a function of many factors including the drive electronics, lead screw pitch, and encoder (if required). The terms "resolution" and "accuracy" should never be used interchangeably.

9) ❑ **Closed-Loop Position Correction Required?** ❑ YES ❑ NO
In stepper motor-based linear rail systems, position correction is typically accomplished using a rotary incremental encoder (either optical or magnetic).

10) ❑ **Life Requirement?** (select the most important application parameter)
a) ❑ Total mm or inches _________
... or ... b) ❑ Number of Full Strokes _________
... or ... c) ❑ Number of Cycles _________

11) ❑ **Operating Temperature Range** ____________ (°C or °F)
a) ❑ Will the system operate in an environment in which the worst case temperature is above room temperature?
b) ❑ Will the system be mounted in an enclosure with other equipment generating heat?

12) ❑ **Controller / Drive Information?**
a) ❑ Haydon Kerk IDEA™ Drive (with Size 17 Stepper Motors only)
b) ❑ Customer Supplied Drive... Type? ❑ Chopper Drive ❑ L / R Drive
Model / Style of Drive: ____

13) ❑ **Power Supply Voltage?** ______________ (VDC)

14)* ❑ **Step Resolution?** a) ❑ Full Step b) ❑ Half-Step c) ❑ Micro-Step

15)* ❑ **Drive Current?** ____________ (A_{rms} / Phase) and ____________ (A_{peak} / Phase)

16)* ❑ **Current Boost Capability?** _________ (%)

** Disregard items 14, 15 and 16 if the RGS04 is assembled with a 43000 Series Size 17 motor with an integrated IDEA™ Drive. IDEA Drive not available for 28000 Series Size 11 motors.*