



**RGW06** 

(30.48)

43000 Series Size 17

Double Stack with

programmable IDEA™ Drive

## RGS06<sup>®</sup> Linear Rail for Hybird 43000 Series Size 17 Single and Double Stacks and RGS06<sup>®</sup> for 57000 Series Size 23 Single and Double Stacks (See Page 6)

### **RGS Series Linear Rail** with Hybrid 43000 Series Size 17 Linear Actuator Stepper Motors

Combines many Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. The Motorized RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite<sup>®</sup> engineered polymers running on Kerkote<sup>®</sup> TFE coating, providing a strong, stable platform for a variety of linear motion applications. When integrated with an IDEA Drive, the system combines Haydon<sup>®</sup> hybrid linear actuator technology with a fully programmable, integrated stepper motor drive.

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Technical specifications for 43000 Series Size 17 Hybrid Linear Actuator Stepper Motors are on page 3.

To determine what is best for your application see the Linear Rail Applications Checklist on page 11.

### Identifying the Motorized RGS part number codes when ordering

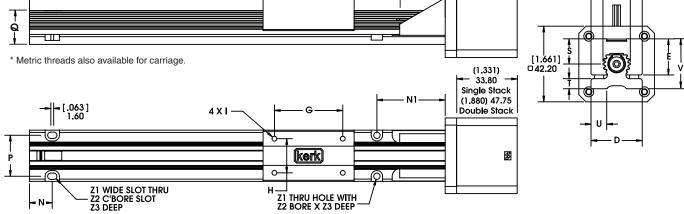
Prefix       Frame       Style       Frame       Coating         Style       S = Standard       06 = 35 lbs       K = TFE       Mounting       M = Motorized       Lead Code       Suffix         S = Standard       06 = 35 lbs       (156 N)       X = Special       (example:       Kerkote®       M = Motorized +       0050 = .050-in       identitie         mount       static       (Maximum       Kerkote       W = Wide       Static       Kerkote       0079 = .079-in       (4300)         grease       Carriage holes available in Metric sizes       M3       M4       J = Motorized +       0100 = .100-in       0100 = .100-in       0100 = .100-in       0100 = .100-in       0107 = .157-in       proprin       (4.00)       0117 = .157-in       proprin       (4.00)       0117 = .157-in       proprin       (4.00)       0117 = .157-in       0200 = .200-in       (5.00)       custor       0197 = .197-in       to a stick       (5.00)       0200 = .200-in       (5.08)       The id         M5       M6       M5       M6       0250 = .250-in       (6.35)       either         0375 = .375-in       standd       (9.53)       02400 = .400-in       02400 = .400-in       02400 = .400-in
0400 = .400-in (10.16) 0472 = .472-in (12.00) 0500 = .500-in (12.70) <b>NOTE</b> must





#### **RGS06<sup>®</sup>** with 43000 Series Size 17 Single and Double Stack linear motors Recommended for horizontal loads up to 35 lbs (156 N)

	Α	D	D1	Е	F	G	Н	∎*	L1	Ν	N1	Ρ	Q	S	Т	U	V	<b>Z1</b>	<b>Z</b> 2	<b>Z</b> 3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0	UNC	25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.8	3.6	6.3	3.3
Metric threads also available for carriage. (1.581) 40.15																				
Dimensions = (inches) mm     F     F     Image: Constraint of the second seco													1							
								_					1						ØA	-



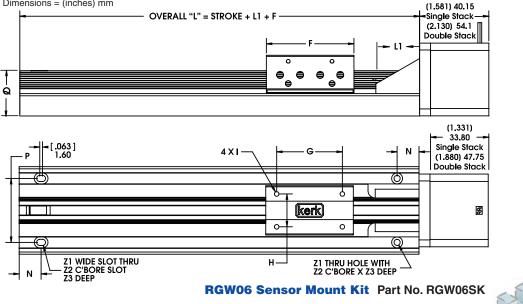
#### **RGW06<sup>®</sup>** with 43000 Series Size 17 Single and Double Stack linear motors Recommended for horizontal loads up to 35 lbs (156 N)

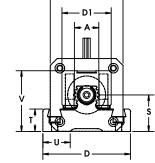
Z2 BORE X Z3 DEEP

	A	D	<b>D1</b>	F	G	н	<b>I</b> *	L1	Ν	Р	Q	S	т	U	V	<b>Z1</b>	<b>Z</b> 2	<b>Z</b> 3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0	UNC	25.4	12.7	37.1	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

\* Metric threads also available for carriage. Dimensions = (inches) mm

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[1.661] □ 42.20

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufcturer.

FLAG mounts to side of carriage SENSOR MOUNT inserts into slot of RGW base



#### **RGS06<sup>®</sup> Linear Rails:** RGS06 43000 Series Size 17 **Motor Specifications**

# Specifications: Haydon<sup>®</sup> 43000 Series Size 17 Single Stack

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Size 17: 43 mm (1.7-in) Hybrid External Linear Actuator (1.8° Step Angle)									
Wiring		Bipolar		Unipo	olar**				
Programmable Drive	IDEA <sup>™</sup> Dri	IDEA <sup>™</sup> 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 <sup>2</sup>						
Insulation Class	Class B (Class F available)								
Weight	8.5 oz (241 g)								
Insulation Resistance	20 MΩ								

. . . .

43000 Series Size 17 Double Stack External Linear

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

## Specifications: Haydon® 43000 Series Size 17 Double Stack

.....

Size 17: 43 mm External Linear			
Wiring		Bipolar	
Programmable Drive	IDEA™ D	rive Option A	vailable
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 <sup>2</sup>	
Insulation Class	Class B	(Class F av	ailable)
Weight	12	2.5 oz (352 g	J)
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.

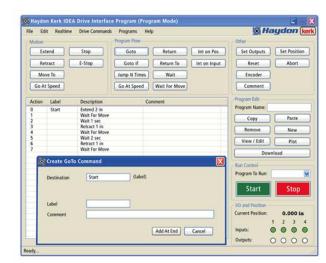
\*

**IDEA™** Drive software is simple to use with on-screen buttons and easy-tounderstand 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

43000 Series Size 17 Single Stack External Linear

- Graphic User Interface
- Auto-population of Drive Parameters
- For more information see the Haydon Kerk **IDEA™** Drive **Data Sheet**
- Programmable Acceleration/Deceleration and Current Control





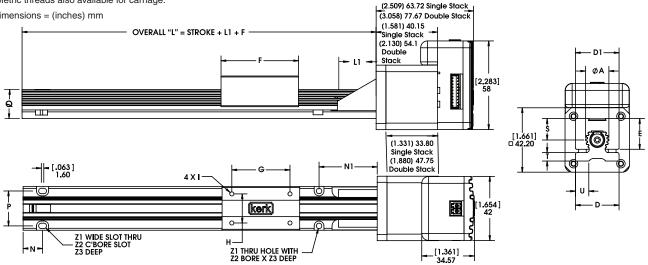
#### **RGS06<sup>®</sup> with 43000 Series Size 17 Single and Double Stack** linear motors with IDEA Drive Recommended for horizontal loads up to 35 lbs (156 N)

**Haydon kerk** 

	A	D	<b>D1</b>	Е	F	G	н	<b>I</b> *	L1	N	N1	Р	Q	S	Т	U	V	<b>Z1</b>	<b>Z</b> 2	<b>Z</b> 3
(inch)	(0.6)	(1.13)	(1.13)	(0.79)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.5)	(0.9)	(0.74)	(0.55)	(0.22)	(0.35)	(1.1)	(0.14)	(0.25)	(0.13)
mm	15.2	28.7	28.7	20.1	50.8	38.1	19.0	UNC	25.4	12.7	38.1	22.9	18.8	13.9	5.6	8.9	27.9	3.6	6.3	3.3

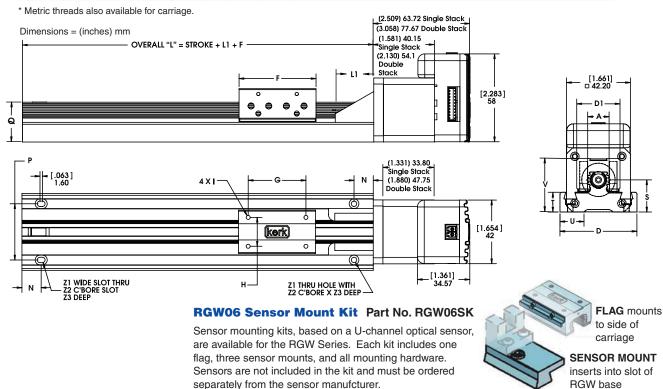
\* Metric threads also available for carriage.

Dimensions = (inches) mm



#### **RGW06<sup>®</sup> Wide Rail with 43000 Series Size 17 Single and Double Stack** linear motors with IDEA Drive Recommended for horizontal loads up to 35 lbs (156 N)

	A	D	<b>D1</b>	F	G	н	<b>I</b> *	L1	Ν	Ρ	Q	s	Т	U	V	<b>Z1</b>	<b>Z</b> 2	<b>Z</b> 3
(inch)	(0.6)	(2.0)	(1.13)	(2.0)	(1.5)	(0.75)	6-32	(1.0)	(0.5)	(1.46)	(1.04)	(0.83)	(0.51)	(0.63)	(1.39)	(0.14)	(0.25)	(0.14)
mm	15.2	50.8	28.7	50.8	38.1	19.0	UNC	25.4	12.7	37.1	26.4	21.1	13.0	16.0	35.3	3.6	6.3	3.6

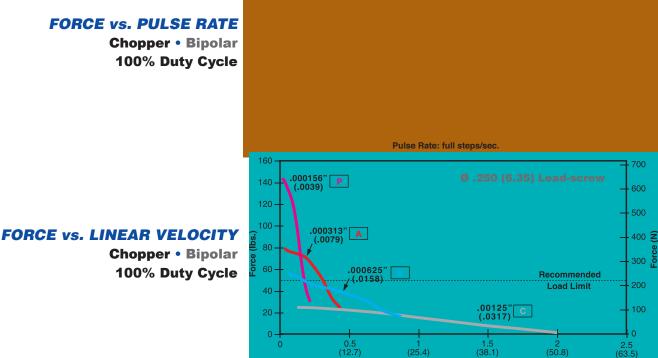


HAYDON: 203 756 7441 KERK: 603 213 6290 www.haydonkerkpittman.com



**RGS06<sup>®</sup> Linear Rails: RGS06 Motorized 43000 Series** Performance Curves

**Performance Curves:** Haydon<sup>®</sup> 43000 Series Size 17 Single Stack



(25.4)

Linear Velocity: in./sec. (mm/sec.)

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**Performance Curves:** Havdon<sup>®</sup> 43000 Series Size 17 Double Stack

> **FORCE vs. PULSE RATE Chopper • Bipolar**

**100% Duty Cycle** 

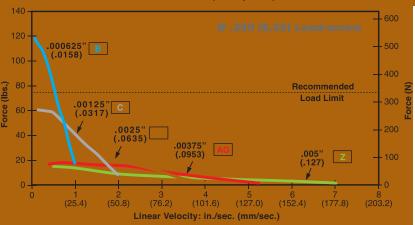


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000625" <mark>В</mark> FORCE vs. LINEAR VELOCITY **Chopper • Bipolar** 80 **100% Duty Cycle** (Ibs.) .00125"C Force ( NOTE: All chopper drive curves were created with a 5 volt .0025" 40 motor and a 40 volt power supply.

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.



Pulse Rate (full steps/sec.)



### **RGS Series Linear Rail** with Hybrid 57000 Series Size 23 Linear Actuator Stepper Motors

RG Series linear rails are available:

- RGS06 Motorized with 57000 Series Size 23 Single and Double Stack hybrid motors
- RGW06 Wide frame motorized with 57000 Series Size 23 Single and Double Stack hybrid motors

A combination of Haydon Kerk Motion Solutions patented motion technologies into a single integrated, linear motion control system. RGS linear rails feature standard wear-compensating, anti-backlash driven carriages to insure repeatable and accurate positioning. All moving surfaces include Kerkite<sup>®</sup> engineered polymers running on Kerkote<sup>®</sup> TFE coating, providing a strong, stable platform for a variety of linear motion applications.

Technical specifications for 57000 Series Size 23 Hybrid Linear Actuator Stepper Motors are on page 8.

To determine what is best for your application see the Linear Rail Applications Checklist on page 11.

RGW06 57000 Series Size 23 Double Stack

team at

603 213 6290.

1200 = 1.200-in

(30.48)

# Identifying the Motorized RGS part number codes when ordering

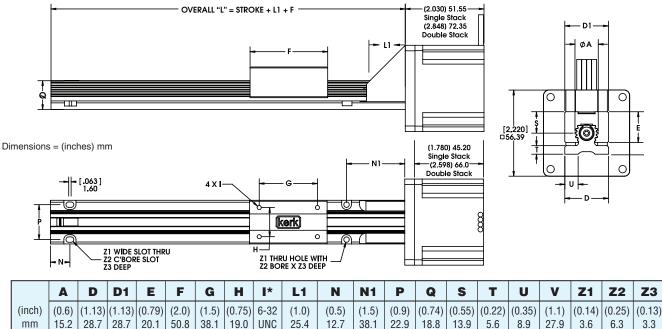
RG	S	06	К -	M	0100 -	XXX
<b>Prefix</b> <b>RG</b> = Rapid Guide Screw	Frame Style S = Standard W = Wide sensor mount capability	Frame Size Load 06 = 35 lbs (156 N) (Maximu static load)	Coating K = TFE Kerkote® X = Special (example: Kerkote with grease	Drive / Mounting M = Motorized	Nominal Thread Lead Code 0050 = .050-in (1.27) 0079 = .079-in (2.00) 0100 = .100-in (2.54)	Unique Identifier Suffix used to identify specifi motors (57000 Single, Double Stack) – or a
		in Me	oles available tric sizes M3 M4 M5 M6		$\begin{array}{l} \textbf{0157} = .157\text{-in} \\ (4.00) \\ \textbf{0197} = .197\text{-in} \\ (5.00) \\ \textbf{0200} = .200\text{-in} \\ (5.08) \\ \textbf{0250} = .250\text{-in} \\ (6.35) \\ \textbf{0375} = .375\text{-in} \\ (9.53) \\ \textbf{0400} = .400\text{-in} \\ (10.16) \\ \textbf{0472} = .472\text{-in} \end{array}$	proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.
					(12.00) <b>0500</b> = .500-in (12.70) <b>0750</b> = .750-in (19.05) <b>0984</b> = .984-in (25.00) <b>1000</b> = 1.000-in	<b>NOTE:</b> Dashess must be includ in Part Numbe (-) as shown above. For assistance or order entry, ca our engineerin



#### RGS06<sup>®</sup> Linear Rails: RGS06 & RGW06 Motorized Dimensional Drawings

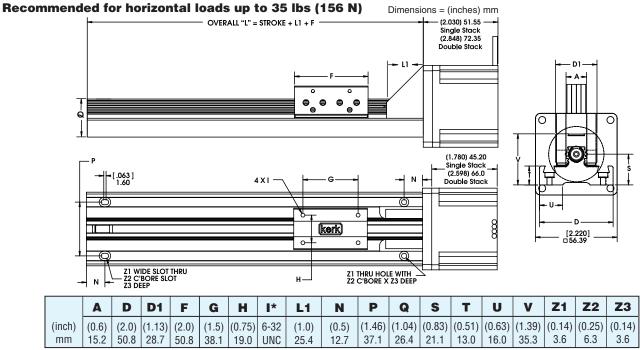
### **RGS06°** with 57000 Series Size 23 Single and Double Stack linear motors

Recommended for horizontal loads up to 35 lbs (156 N)



\* Metric threads also available for carriage.

### **RGW06®** with 57000 Series Size 23 Single and Double Stack linear motors



\* Metric threads also available for carriage.

#### RGW06 Sensor Mount Kit Part No. RGW06SK

Sensor mounting kits, based on a U-channel optical sensor, are available for the RGW Series. Each kit includes one flag, three sensor mounts, and all mounting hardware. Sensors are not included in the kit and must be ordered separately from the sensor manufcturer. SENS inserts

FLAG mounts to side of carriage

SENSOR MOUNT inserts into slot of RGW base



# Specifications: Haydon<sup>®</sup> 57000 Series Size 23 Single Stack

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Size 23: 57 mm (2	2.3-in) Hybrid	External Li	near Actuato	or (1.8° Step /	Angle)		
Wiring		Bipolar		Unip	olar**		
Winding Voltage	3.25 VDC	5 VDC	12 VDC	5 VDC	12 VDC		
Current (RMS)/phase	2.0 A	1.3 A	.54 A	1.3 A	.54 A		
Resistance/phase	1.63 Ω	3.85 Ω	22.2 Ω	3.85 Ω	22.2 Ω		
Inductance/phase	3.5 mH	10.5 mH	58 mH	5.3 mH	23.6 mH		
Power Consumption			13 W				
Rotor Inertia			166 gcm <sup>2</sup>				
Insulation Class		Class E	3 (Class F ava	ailable)			
Weight			18 oz (511 g)				
Insulation Resistance	20 MΩ						

\*\* Unipolar drive gives approximately 30% less thrust than bipolar drive. Standard motors are Class B rated for maximum temperature of 130°C.

# **Specifications:** Haydon<sup>®</sup> 57000 Series Size 23 Double Stack

Size 23: 57 mm ( External Linear	• •	-	
Wiring		Bipolar	
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase	3.85 A	2.5 A	1 A
Resistance/phase	0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase	2.3 mH	7.6 mH	35.0 mH
Power Consumption		25 W Total	
Rotor Inertia		332 gcm <sup>2</sup>	
Insulation Class	Class B	(Class F av	ailable)
Weight	3	82 oz (958 g)	)
Insulation Resistance		20 MΩ	



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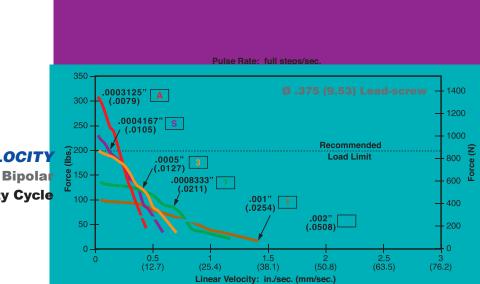
**RGS06<sup>®</sup> Linear Rails:** RGS06 Motorized 57000 Series Performance Curves

Performance Curves: Haydon<sup>®</sup> 57000 Series Size 23 Single Stack

## FORCE vs. PULSE RATE

Chopper • Bipolar 100% Duty Cycle

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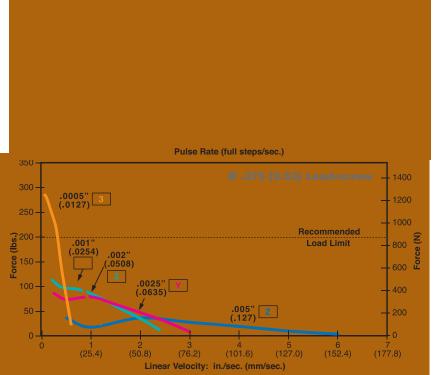


FORCE vs. LINEAR VELOCITY Chopper • Bipola

100% Duty Cycle

### Performance Curves: Haydon<sup>®</sup> 57000 Series Size 23 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.



## Haydon® 43000 Series Size 17 and 57000 Series Size 23 Stepper Motors

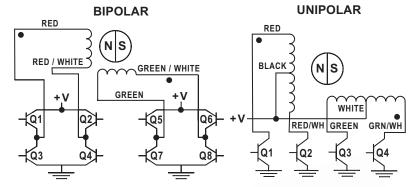
**Haydon** (kerk

#### **Hybrids: Stepping Sequence**

	Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8	
Π	Unipolar	Q1	Q2	Q3	Q4	1
EXTEND	Step					CCW
D	1	ON	OFF	ON	OFF	
Q	2	OFF	ON	ON	OFF	CT
CW →	3	OFF	ON	OFF	ON	TRACT
÷	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



### **Integrated Connectors**

Haydon Kerk 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.

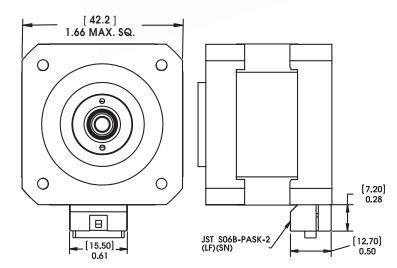


#### Motor Connector: JST part # S06B-PASK-2 <u>Mating Connector:</u> JST part # PAP-06V-S Haydon Kerk Part #56-1210-5 (12 in. Leads) <u>Wire to Board Connector:</u> JST part number SPHD-001T-P0.5

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 43000 Series Size 17

Dimensions = (mm) inches



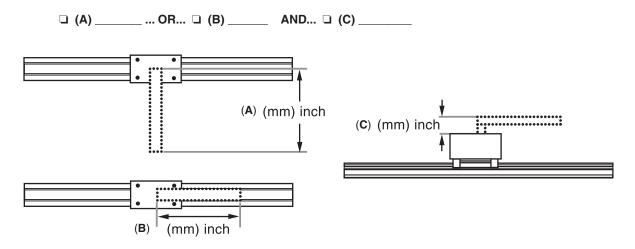


### Information needed to properly size a linear rail system

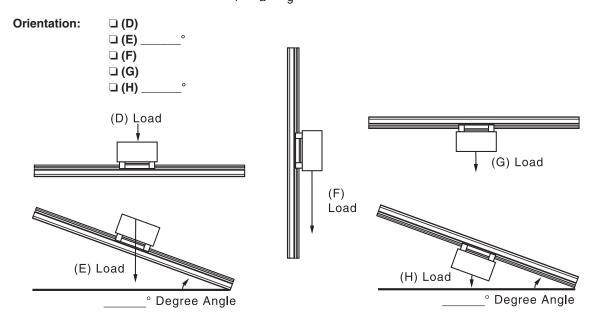
Haydon Kerk<sup>™</sup> Linear Rail Systems are designed to be **precision motion devices**. Many variables must be considered before applying a particular rail system in an application. The following is a basic checklist of information needed that will make it easier for the Haydon Kerk engineering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

# **Linear Rail Application Checklist**

- 1) D Maximum Load? \_\_\_\_\_ (N or lbs.)
- 2) Load Center of Gravity (cg) Distance and Height (mm or inches)? See illustrations (A) (B) (C) below. Dimensions (D mm / D inch):



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 ( $F_f + F_a + F_a$ ).







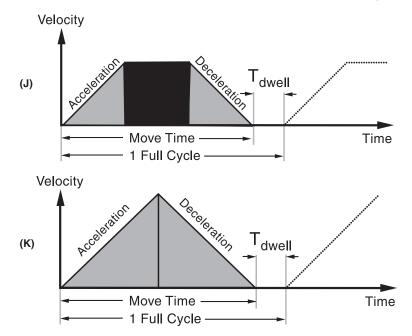
### Linear Rail Application Checklist (Continued)

#### 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).



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

a) Depint to point move distance \_\_\_\_\_ (mm or inches)

b) D Move time \_\_\_\_\_ (seconds) including time of acceleration and deceleration

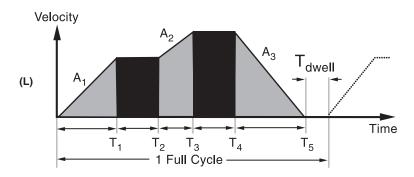
c) Dwell time between moves \_\_\_\_\_ (seconds)

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)  $\Box$  Time (in seconds) including: T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>...T<sub>n</sub> and T<sub>dwell</sub>
- b)  $\Box$  Acceleration / Deceleration (mm/sec.<sup>2</sup> or inches/sec.<sup>2</sup>) including: A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>...A<sub>n</sub>

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







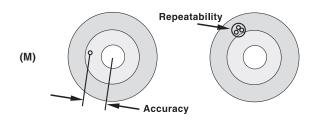
### Linear Rail Application Checklist (Continued)

#### 6) D 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) D 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.



8) D 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? C 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)  $\Box$  Number of Cycles \_\_\_\_

#### 11) Deperating Temperature Range (°C or °F)

- a) U Will the system operate in an environment in which the worst case temperature is above room temperature?
- b) b) Will the system be mounted in an enclosure with other equipment generating heat?

#### 12) **Controller / Drive Information?**

- a) □ Haydon Kerk IDEA<sup>™</sup> Drive (with Size 17 Stepper Motors only)
- b) □ Customer Supplied Drive...Type? □ Chopper Drive □ L / R Drive Model / Style of Drive: \_\_\_\_\_
- 13) Dever Supply Voltage? \_\_\_\_\_ (VDC)
- 14)\* 
  Step Resolution? a) 
  Full Step b) 
  Half-Step c) 
  Micro-Step

15)\* 
Drive Current? (A<sub>rms</sub> / Phase) and (A<sub>peak</sub> / Phase) (A<sub>peak</sub> / Phase)

16)\* 
Current Boost Capability? (%)

\* Disregard items 14, 15 and 16 if the RGS06 is assembled with a 43000 Series Size 17 Single or Double Stack motor with an integrated IDEA<sup>™</sup> Drive. IDEA Drive not available for 57000 Series Size 23 motors.