

BGS Linear Rails with Recirculating Ball Slide

A BGS Motorized Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capacity and is engineered for both normal and overhanging loads. High roll, pitch and yaw moment loading capability allows the system to maintain tight accuracy and repeatability, even in applications requiring significant cantilevered loading.

At the heart of the BGS Linear Rail system is a Haydon Kerk hybrid linear actuator with a precision 303 stainless steel lead screw. The lead screw drives a machined aluminum carriage mounted to a precision stainless steel ball slide resulting in a rigid, smooth operating motion system. The screw is coated with Black Ice® TFE coating providing a permanent wear-resistant dry lubrication.

Hybrid Linear Actuator Motor		BGS04	BGS06	BGS08
Size		Size 11 Double Stack Size 17 Single Stack*	Size 17 Single Stack* Size 23 Double Stack*	Size 23 Single Stack* Size 23 Double Stack*
Max. Stroke Length		18-in (460 mm)	24-in (610 mm)	30-in (760 mm)
Max. Load (Horizontal)**		22 lbs (100 N)	135 lbs (600 N)	225 lbs (1,000 N)
Roll Moment		5.72 lbs-ft (7.75 N-m)	11.62 lbs-ft (15.75 N-m)	22.50 lbs-ft (30.5 N-m)
Pitch Moment		4.88 lbs-ft (6.60 N-m)	7.93 lbs-ft (10.75 N-m)	19.36 lbs-ft (26.25 N-m)
Yaw Moment		5.68 lbs-ft (7.70 N-m)	9.15 lbs-ft (12.40 N-m)	22.27 lbs-ft (30.20 N-m)

Nominal Thread Lead	BGS04			BGS06			BGS08		
	inches	mm	Lead Code	inches	mm	Lead Code	inches	mm	Lead Code
0.025	0.635	0025	•						
0.039	1.00	0039	•						
0.050	1.27	0050	•			•			
0.0625	1.59	0063	•			•			
0.079	2.00	0079	•			•			
0.098	2.5	0098						•	
0.100	2.54	0100	•			•			•
0.118	3.00	0118	•						
0.125	3.18	0125				•			
0.157	4.00	0157				•			
0.197	5.00	0197						•	
0.200	5.08	0200				•			•
0.250	6.35	0250	•			•			
0.315	8.00	0315							
0.375	9.53	0375	•			•			
0.394	10.00	0394							
0.400	1.016	0400				•			
0.472	12.00	0472				•			
0.500	12.70	0500	•			•			•
0.630	16.00	0630							
0.750	19.05	0750	•			•			
0.984	25.00	0984				•			
1.000	25.40	1000	•			•			•
1.200	30.48	1200				•			

Size 11 = 28000 Series | Size 17 = 43000 Series | Size 23 = 57000 Series

*Size 17 (43000 Series) Single and Double Stack Hybrid Linear Actuator Stepper Motors (BGS06) are available with an optional programmable IDEA™ Drive. IDEA Drives are not available in the BGS08 Linear Rail.

**For vertical load information, see specifications for the Size 11 (28000 Series), Size 17 (43000 Series), and Size 23 (57000 Series) motors.

Ball Guided Rail Systems

The BGS Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capacity and is engineered for both normal and overhanging loads. High roll, pitch, and yaw moment loading capability allows the system to maintain tight accuracy and repeatability, even in applications requiring significant cantilevered loading. The lead screw drives a machined aluminum carriage mounted to a precision stainless steel ball rail resulting in a rigid, smooth-operating motion system. Offers an optional wear-compensating anti-backlash driven carriage. Black Ice® TFE coated screw provides a permanent wear-resistant dry lubrication.

When integrated with an IDEA Drive, the system combines Haydon Kerk hybrid linear actuator technology with a fully programmable, integrated stepper motor drive. By combining technologies into a single preassembled unit, Haydon Kerk Motion Solutions is able to improve system integration for the equipment OEM or end user. The overall cost for the customer is also lowered by offering a complete solution as it eliminates the need for rotary-to-linear conversion, and simplified product development.

BGS04™ Linear Rail

with Hybrid 28000 Series Size 11 Double Stack or 43000 Series Size 17 Single Stack Linear Actuator

The BGS™ Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capability and is engineered for both normal and overhanging loads.



BGS04 Size 11 Double Stack

Specifications: BGS04

BGS04 with Hybrid Linear Actuator Motor...	Size 11 Double Stack	Size 17 Single Stack*
Max. Stroke Length	18-in (460 mm)	
Max. Load (Horizontal)**	22 lbs (100 N)	
Roll Moment	5.72 lbs-ft (775 Nm)	
Pitch Moment	4.88 lbs-ft (660 Nm)	
Yaw Moment	5.68 lbs-ft (770 Nm)	

Nominal Thread Lead inches	Lead Code	Nominal Thread Lead mm	Lead Code
0.025	0025	0.250	0250
0.039	100	0.394	094
0.050	127	0.500	1270
0.0625	159	0.750	1905
0.079	200	1.000	2540
0.100	0100		1000
0.118	300		0118
0.200	0200		0200

* Size 17 is available with an optional programmable IDEATM Drive.

To determine what is best for your application see the Linear Rail Applications Checklist

Linear Rail Check List

Identifying the BGS Part Number Codes when Ordering

BG	S	04	B	M	0025	XXX
Prefix	Frame Style	Frame Size Load*	Lubrication	Drive / Mounting	Nominal Thread Lead Code	Unique Identifier
BG = Ball Guide System	S = Standard	04 = Maximum load 22 lbs (100 N)	B = TFE wear resist, dry lubricant Black Ice®	M = Motorized For 43000 Series Size 17 Only G = IDEATM integrated programmable drive - USB communications J = IDEATM integrated programmable drive - RS485 communications	0025 = .025-in (635) (see Lead Code charts above)	Suffix used to identify Size 11 or Size 17 motor - or a 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 (P) as shown above. For assistance call our Engineering team at 603 213 6290.

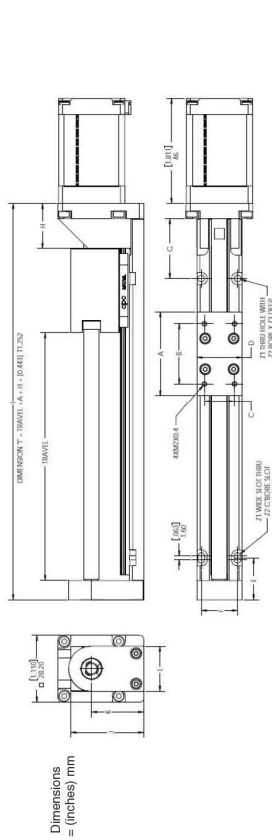
Double Stack

BGS04 Linear Rail with 28000 Series Size 11 Linear Actuator

Recommended for horizontal loads up to 22 lbs (100 N)

Carriage holes available in Metric sizes M2, M2.5, M3, M4															
A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3	
(inch)	1.40	1.0	0.50	0.75	0.69	0.60	1.00	0.75	*	1.22	0.87	0.75	0.11	0.20	0.09
mm	35.56	25.40	12.70	19.05	17.53	15.24	25.40	19.05	*	30.86	22.10	19.05	2.8	5.1	2.3

* Dimension "I" is a function of required travel distance.

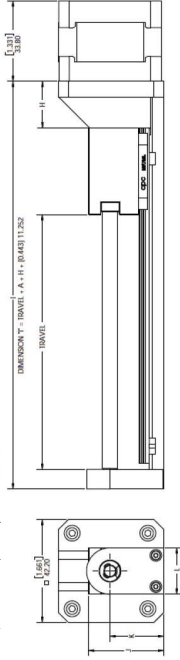


Dimensions = (inches) mm

Single Stack

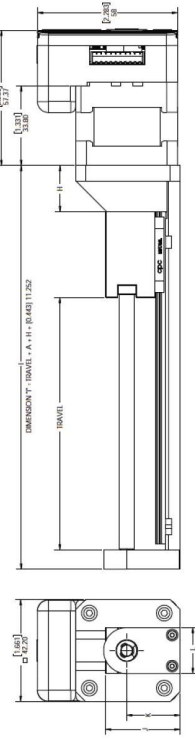
BGS04 Linear Rail with 43000 Series Size 17 Linear Actuator

Recommended for horizontal loads up to 22 lbs (100 N)

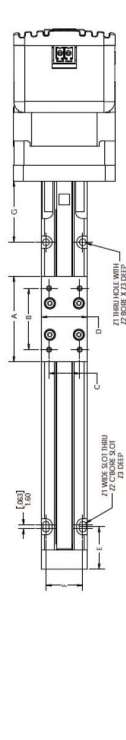


Dimensions = (inches) mm

...with IDEATM Drive



Dimensions = (inches) mm



Double Stack

28000 Series Size 11 Linear Actuator

Size 11: 28 mm (1.1-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)	
Wiring	Bipolar
Winding Voltage	2.1 VDC
Current (RMS)/phase	1.9 A
Resistance/phase	1.1 Ω
Inductance/phase	1.1 mH
Power Consumption	75 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

Single Stack

43000 Series Size 17 Linear Actuator

Size 17: 43 mm (1.7-in) Hybrid Linear Actuator (1.8° Step Angle)	
Wiring	Bipolar
Programmable Drive	IDEA™ Drive Option Available
Winding Voltage	2.33 VDC*
Current (RMS)/phase	1.5 A
Resistance/phase	1.56 Ω
Inductance/phase	1.9 mH
Power Consumption	7 W
Rotor Inertia	37 gcm ²
Insulation Class	Class B (Class F available)
Weight	8.5 oz (241 g)
Insulation Resistance	20 MΩ

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

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

Size 11

Double Stack External Linear

Size 17 External Linear



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

- Fully Programmable
- RFS 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

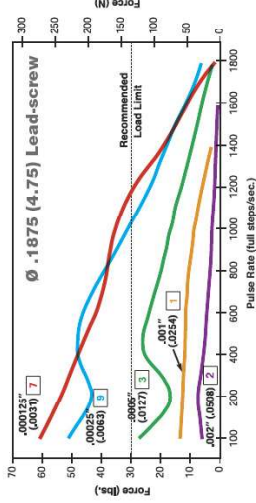
For more information see the [IDEA™ Drive Data Sheet](#)

Size 17 External Linear with programmable IDEA Drive

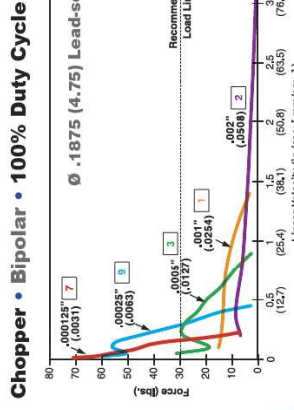
Double Stack

28000 Series Size 11 Linear Actuator

FORCE vs. PULSE RATE
— Chopper — Bipolar — 100% Duty Cycle



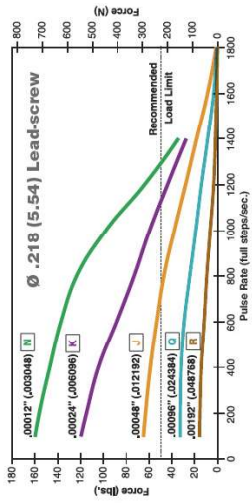
FORCE vs. LINEAR VELOCITY
— Chopper — Bipolar — 100% Duty Cycle



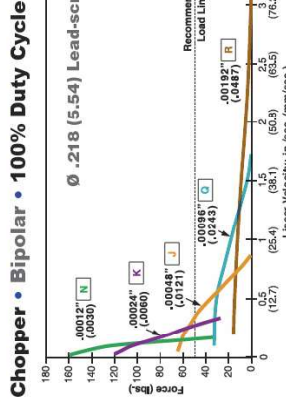
Double Stack

43000 Series Size 17 Linear Actuator

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

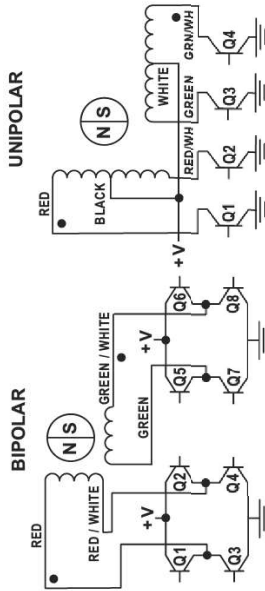
28000 Series Size 11 and 43000 Series Size 17 Linear Actuators

Hybrids: Stepping Sequence

Hybrids: Wiring

	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.



Size 11 28000 Series and Size 17 43000 Series • Integrated Connectors



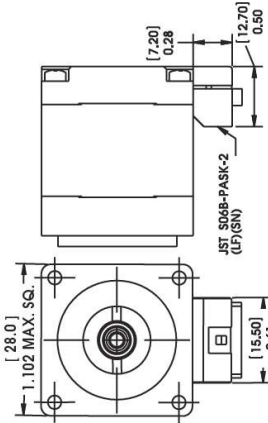
Motor Connector: JST part # S06B-PASK-2
Mating Connector: JST part # PAP-06V-S
Haydon Kerk Part # 96-121D-3 (12 in. Leads)
Wire to Board Connector:
JST part number 3PHD-001T-P0.5

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 Drawings

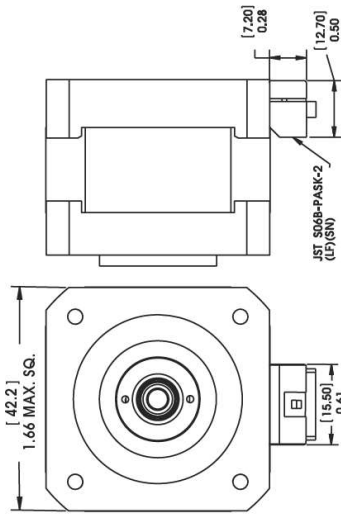
Integrated Connector with 28000 Series Size 11 Linear Actuator

Dimensions = (mm) inches



Integrated Connector with 43000 Series Size 17

Dimensions = (mm) inches



BGS06 Linear Rail

with Hybrid 43000 Series Size 17 Single or Double Stack Linear Actuator

The BGS™ Linear Rail combines many technologies into a single integrated linear motion platform. The system provides excellent load capability and is engineered for both normal and overhauling loads.

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



BGS06 Size 17 Single Stack with IDEA™ Drive

Specifications: BGS06

BGS06 with Hybrid Linear Actuator Motor...	Size 17 Single Stack* Size 17 Double Stack*	Nominal Thread Lead Inches	Nominal Thread Lead mm	Lead Code
Max. Stroke Length	24-in (610 mm)	0.400	10.16	0400
Max. Load (Horizontal)**	135 lbs (600N)	0.472	12.00	0472
Roll Moment	11.62 lbs-ft (15.75 Nm)	0.500	12.70	0500
Pitch Moment	7.93 lbs-ft (10.75 Nm)	0.750	19.05	0750
Yaw Moment	9.15 lbs-ft (12.40 Nm)	1.000	25.40	1000
		1.200	30.48	1200
		0.375	9.53	0375

* Available with an optional programmable IDEA™ Drive.

**To determine what is best for your application see the Linear Rail Applications Checklist

Linear Rail Check List

Identifying the BGS Part Number Codes when Ordering

BG	S	06	B	G	0079	XXX
Prefix	Frame Style	Frame Size Load*	Lubrication	Drive / Mounting	Nominal Thread Lead Code	Unique Identifier
BG = Ball Guide System	S = Standard	06 = Max static load 135 lbs (600 N)	B = TFE wear resist, dry lubricant Black Grease	M = Motorized G = IDEA™ integrated programmable drive J = IDEA™ integrated programmable drive RS = RS485 communications	0079 = .079-in (2.0) (see Lead Code charts above)	Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Characters must be included in Part Number (P) as shown above. For assistance call our Engineering Team at 603.213.6290.

Single Stack

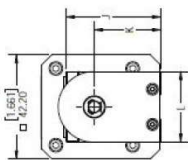
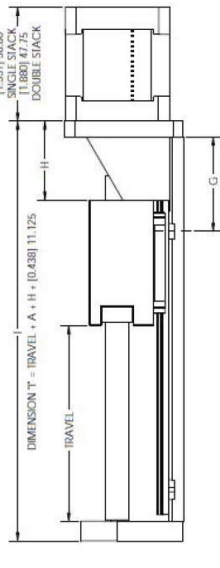
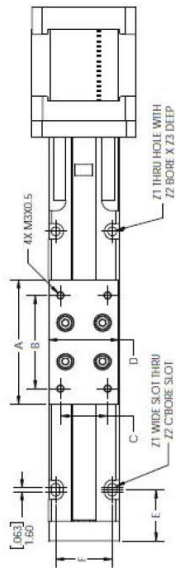
■ BGS06 Linear Rail with 43000 Series Size 17 Linear Actuator

Recommended for horizontal loads up to 135 lbs (600 N)

Carriage holes available in Metric sizes M3, M3.5, M4														
A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(2.00)	(1.50)	(0.75)	(1.13)	(0.81)	(0.90)	(1.50)	(1.25)	* (1.50)	(1.05)	(1.13)	(0.47)	(0.25)	(0.19)
mm	50.80	38.10	19.05	28.58	20.57	22.86	38.10	31.75	*	38.15	28.77	12.00	6.4	3.3

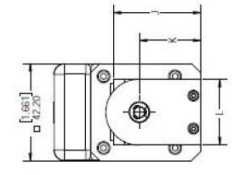
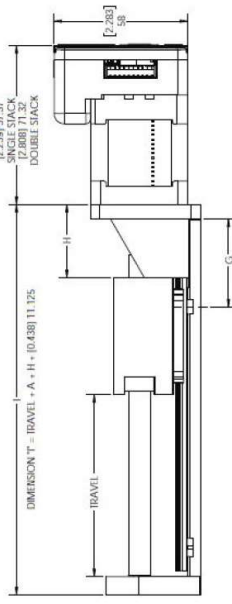
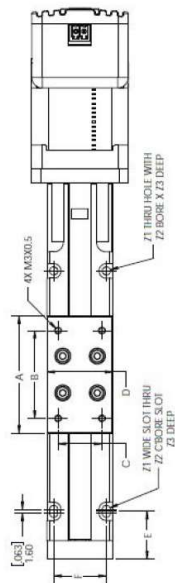
* Dimension "I" is a function of required travel distance.

Dimensions = (inches) mm



...with IDEA™ Drive

Dimensions = (inches) mm



Double Stack

■ 43000 Series Size 17 Linear Actuator

Size 17: 43 mm (1.7-in) Hybrid 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
Current (RMS)/phase	1.5 A	700 mA	290 mA
Resistance/phase	1.56 Ω	7.2 Ω	41.5 Ω
Inductance/phase	1.9 mH	8.7 mH	54.0 mH
Power Consumption	7 W		
Rotor Inertia	37 gcm ²		
Insulation Class	Class B (Class F available)		
Weight	8.5 oz (241 g)		
Insulation Resistance	20 MΩ		

* 43000 Series Single Stack with IDEA programmable drive. Contact Haydon Kerk if higher voltage motor is desired.
 ** Unipolar drive gives approximately 30% less thrust than bipolar drive.

Single Stack

■ 43000 Series Size 17 Linear Actuator

Size 17: 43 mm (1.7-in) Double Stack Hybrid 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
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.

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

Size 17 External Linear



Size 17 External Linear with programmable IDEA Drive

IDEA™ Drive software is simple to use with on-screen menus and touch-sensitive 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 [IDEA™ Drive Data Sheet](#)

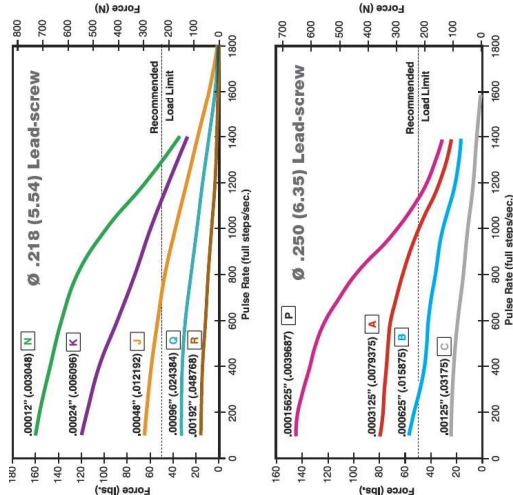
Size 17 Double Stack External Linear



Double Stack

43000 Series Size 17 Linear Actuator

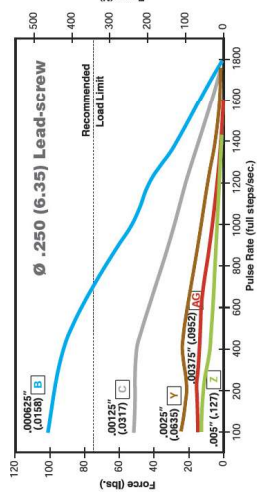
FORCE vs. PULSE RATE
 - Chopper - Bipolar - 100% Duty Cycle



Double Stack

43000 Series Size 17 Linear Actuator

FORCE vs. PULSE RATE
 - Chopper - Bipolar - 100% Duty Cycle



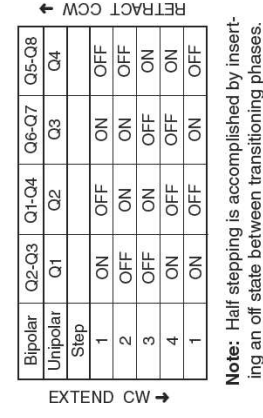
NOTE: All chopper drive curves were created with a 5 volt motor and a 40 volt power supply. Ramping can increase the performance of a motor either by increasing the top speed or getting a heavier load accelerated up to speed faster. Also, deceleration can be used to stop the motor without overshoot. With L/R drives peak force and speeds are reduced, using a unipolar drive will yield a further 30% force reduction.

43000 Series Size 17 Linear Actuators

Hybrids: Stepping Sequence

Hybrids: Wiring

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



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

Size 17 43000 Series • Integrated Connectors

Hybrid Size 17 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 to high connection integrity. The connector is rated up to 3 amps and the mating connector will handle a range of wire gauges from 18 to 24 AWG. The 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:
 Mating Connector:

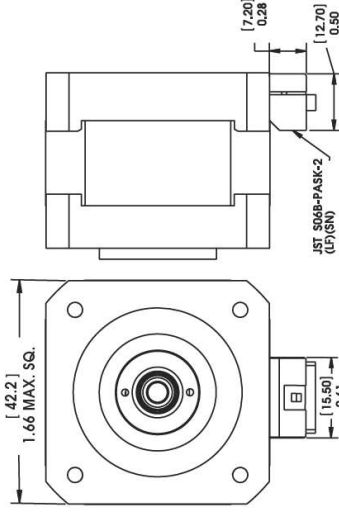
Wire to Board Connector:

JST part # S06B-PASK-2
 JST part # PAP-06V-S
 Haydon Kerk Part # 430-1210-5, (12 in. Leads)
 JST part number SPHD-001-1P-03

Dimensional Drawing

43000 Series Size 17 Linear Actuator with Integrated Connector

Dimensions = (mm) inches



BGS08™ Linear Rail

with Hybrid 57000 Series Size 23 Single or Double Stack Linear Actuator

This BGS™ heavy-duty linear rail combines many technologies into a single integrated linear motion platform. The lead screw drives a machined aluminum carriage mounted to a precision stainless steel ball slide resulting in a rigid, smooth-operating motion system.



BGS08 Size 23 Double Stack

Specifications: BGS08

BGS08 with Hybrid Linear Actuator Motor...	Size 23 Single Stack	Size 23 Double Stack
Max. Stroke Length	30-in (760 mm)	30-in (760 mm)
Max. Load (Horizontal)**	225 lbs (1,000 N)	225 lbs (1,000 N)
Roll Moment	22.50 lbs-ft (30.5 Nm)	22.50 lbs-ft (30.5 Nm)
Pitch Moment	19.36 lbs-ft (26.25 Nm)	19.36 lbs-ft (26.25 Nm)
Yaw Moment	22.27 lbs-ft (30.20 Nm)	22.27 lbs-ft (30.20 Nm)

Nominal Thread	Lead Code
0.098 inches	2.50 0098
0.100 inches	2.54 0100
0.197 inches	5.00 0197
0.250 inches	6.06 0250
0.500 inches	12.70 0500
0.630 inches	16.00 0630
1.000 inches	25.40 1000

To determine what is best for your application see the Linear Rail Applications Checklist

Linear Rail Check List

Identifying the BGS Part Number Codes when Ordering

BG Prefix	S Frame Style	08 Frame Size Load*	B Lubrication	M Drive / Mounting	0025 Nominal Thread Lead Code	XXX Unique Identifier
BG = Ball Guide System	S = Standard	08 = Mexstatic load 225 lbs (1,000 N)	B = TFE wear resist. dry lubricant Black lube®	M = Motorized	0197 = .197-in (5.0) (see Lead Code charts above)	Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.

NOTE: Details must be included in Part Number P- as shown above. For assistance call our Engineering Team at 603.213.6299.

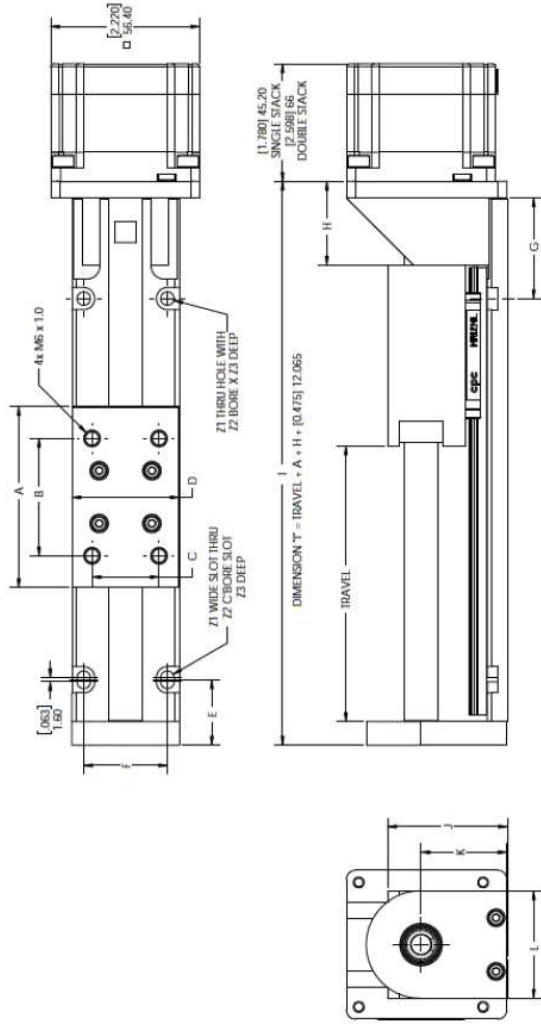
BGS08 Linear Rail with Hybrid 57000 Size 23 Linear Motors

Recommended for horizontal loads up to 225 lbs (1,000 N)

Carriage holes available in Metric sizes M6 and M8														
A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(in)	2.70	1.75	1.00	1.60	0.98	1.25	1.50	1.25	*	4.79	4.29	4.69	4.39	4.19
mm	68.58	44.45	25.40	40.64	24.89	31.75	38.10	31.75	*	121.25	109.14	119.14	111.43	106.68

* Dimension "I" is a function of required travel distance.

Dimensions = (inches) / mm



Single Stack

Size 23: 57 mm (2.3-in) Hybrid Linear Actuator (1.8° Step Angle)		
Wiring	Bipolar	Unipolar**
Winding Voltage	3.25 VDC	5 VDC
Current (RMS)/phase	2.0 A	1.3 A
Resistance/phase	1.63 Ω	3.85 Ω
Inductance/phase	3.5 mH	10.5 mH
Power Consumption	13 W	
Rotor Inertia	166 gcm ²	
Insulation Class	Class B (Class F available)	
Weight	18 oz (511 g)	
Insulation Resistance	20 MΩ	

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



Size 23 Single Stack External Linear

Double Stack

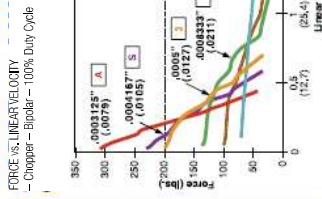
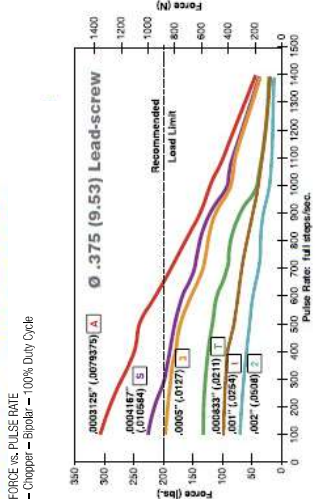
Size 23: 57 mm (2.3-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)		
Wiring	Bipolar	Unipolar**
Winding Voltage	3.25 VDC	5 VDC
Current (RMS)/phase	3.85 A	2.5 A
Resistance/phase	0.98 Ω	2.0 Ω
Inductance/phase	2.3 mH	7.6 mH
Power Consumption	25 W Total	
Rotor Inertia	332 gcm ²	
Insulation Class	Class B (Class F available)	
Weight	32 oz (955 g)	
Insulation Resistance	20 MΩ	



Size 23 Double Stack External Linear

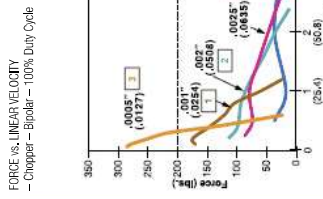
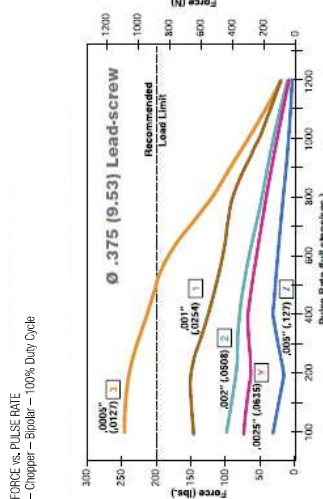
Single Stack

57000 Series Size 23 Linear Actuator



Double Stack

57000 Series Size 23 Linear Actuator



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.

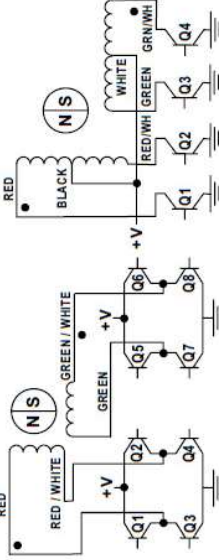
Size 23 57000 Series • Stepping Sequence & Wiring

57000 Series Size 23 Linear Actuator

Hybrids: Stepping Sequence

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

Hybrids: Wiring



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