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

Haydon kerk® Motion Solutions

BGS™ Motorized Linear Rails: BGS08 Recirculating Ball Slide

BGS08™ Linear Rail with Hybrid 57000 Series Size 23 Single and Double Stacks

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.

Technical specifications for Size 23 Hybrid Linear Actuator Stepper Motors are on page 3.

BGS08 Size 23 Double Stack

BGS08 Specifications

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

Nominal Thread Lead inches	Nominal Thread Lead mm	Lead Code
0.098	2.50	**0098**
0.100	2.54	**0100**
0.197	5.00	**0197**
0.200	5.08	**0200**
0.500	12.70	**0500**
0.630	16.00	**0630**
1.000	25.40	**1000**

** To determine what is best for your application see the Linear Rail Applications Checklist on page 5.

Identifying the Motorized BGS part number codes when ordering

BG | **S** | **08** | **B** – **M** | **0197** – **XXX**

Prefix
BG = Ball Guide System

Frame Style
S = Standard

Frame Size Load*
08 = Max. static load 225 lbs (1,000 N)

Coating
B = TFE wear resist, dry lubricant Black Ice®

Drive / Mounting
M = Motorized

Nominal Thread Lead Code
0197 = .197-in (5.0)
(see Lead Code charts above)

Unique Identifier
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 (–) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.

Carriage holes available in Metric sizes
M5
M6

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

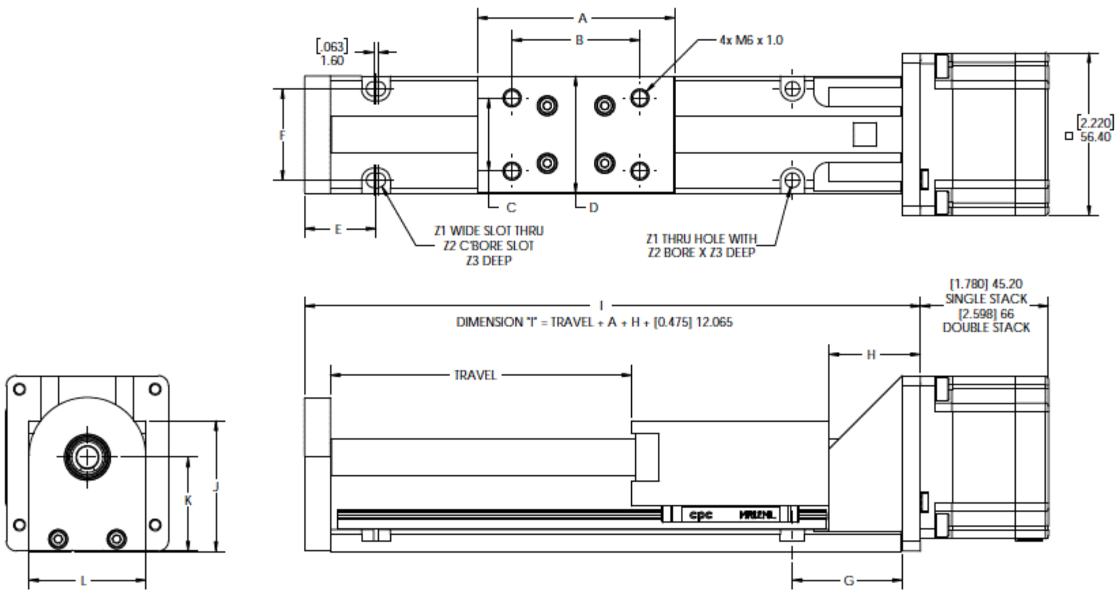
BGS™ Motorized Linear Rails: BGS08 Dimensional Drawings

BGS08™ Linear Rail with Hybrid 57000 Size 23 linear motors are recommended for horizontal loads up to 225 lbs (1,000 N)

	A	B	C	D	E	F	G	H	I	J	K	L	Z1	Z2	Z3
(inch)	(2.70)	(1.75)	(1.00)	(1.60)	(0.98)	(1.25)	(1.50)	(1.25)	*	(1.79)	(1.29)	(1.60)	(0.20)	(0.33)	(0.19)
mm	68.58	44.45	25.40	40.64	24.89	31.75	38.10	31.75	*	45.39	32.69	40.64	5.1	8.4	4.8

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

Dimensions = (inches) mm



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

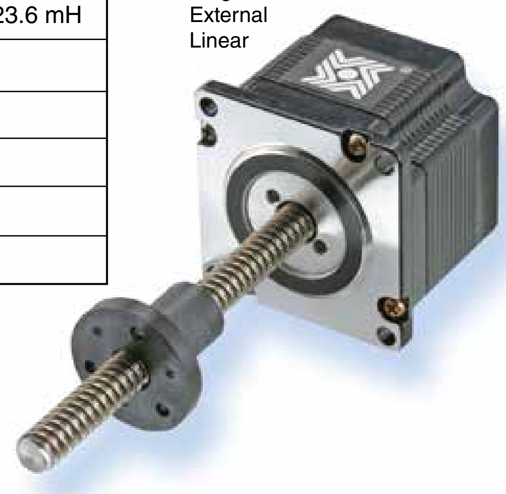
Haydon kerk® Motion Solutions

57000 Series: Size 23 Single & Double Stack Stepper Motor Linear Actuator

Specifications: Haydon® 57000 Series Size 23 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	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^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

Specifications: Haydon® 57000 Series Size 23 Double Stack

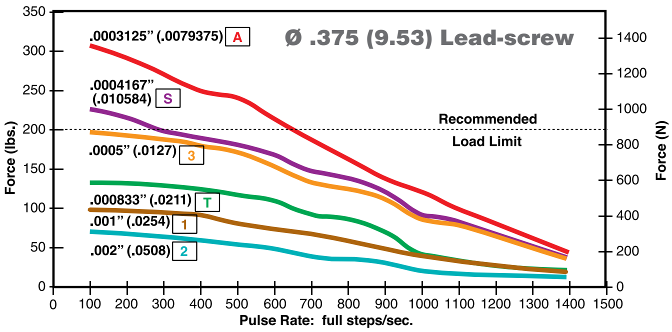
Size 23: 57 mm (2.3-in) Double Stack Hybrid Linear Actuator (1.8° Step Angle)			
Wiring	Bipolar		
Winding Voltage	3.25 VDC	5 VDC	12 VDC
Current (RMS)/phase	3.85 A	2.5 A	1 A
Resistance/phase	0.98 Ω	2.0 Ω	12.0 Ω
Inductance/phase	2.3 mH	7.6 mH	35.0 mH
Power Consumption	25 W Total		
Rotor Inertia	332 gcm^2		
Insulation Class	Class B (Class F available)		
Weight	32 oz (958 g)		
Insulation Resistance	20 MΩ		


Size 23
Double Stack
External
Linear

Performance Curves: Haydon® 57000 Series Size 23 Single Stack

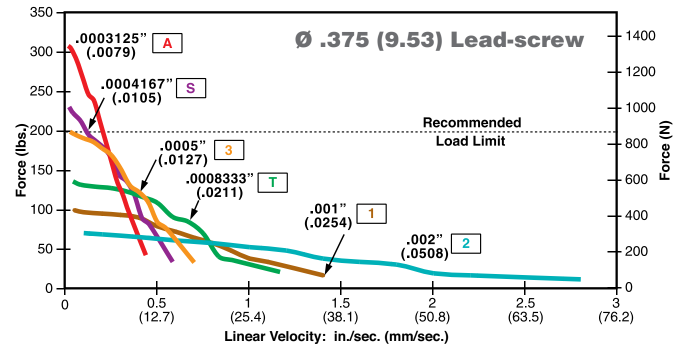
FORCE vs. PULSE RATE

Chopper • Bipolar • 100% Duty Cycle



FORCE vs. LINEAR VELOCITY

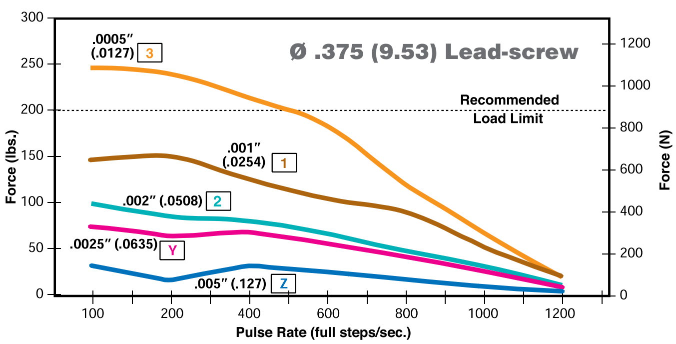
Chopper • Bipolar • 100% Duty Cycle



Performance Curves: Haydon® 57000 Series Size 23 Double Stack

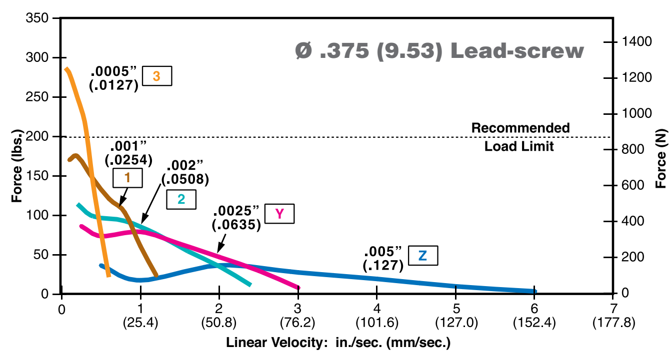
FORCE vs. PULSE RATE

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 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.

The Haydon® 57000 Series
Size 23
Hybrids: Stepping Sequence

EXTEND CW ↓

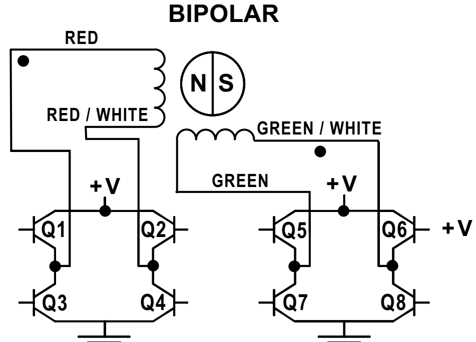
Bipolar	Q2-Q3	Q1-Q4	Q6-Q7	Q5-Q8
Unipolar	Q1	Q2	Q3	Q4
Step				
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON
4	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF

RETRACT CCW ↑

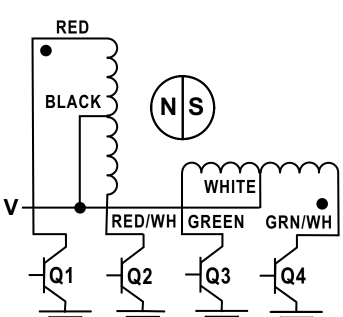
Note: Half stepping is accomplished by inserting an off state between transitioning phases.

Hybrids: Wiring

BIPOLAR



UNIPOLAR



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.

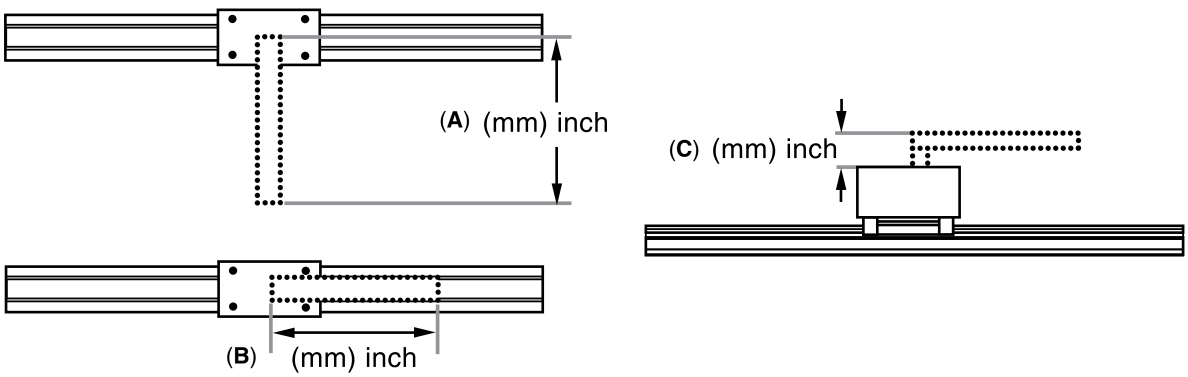
Linear Rail Application Checklist

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

2) ❑ **Load Center of Gravity (cg) Distance and Height** (mm or inches)**?** See illustrations (A) (B) (C) below.

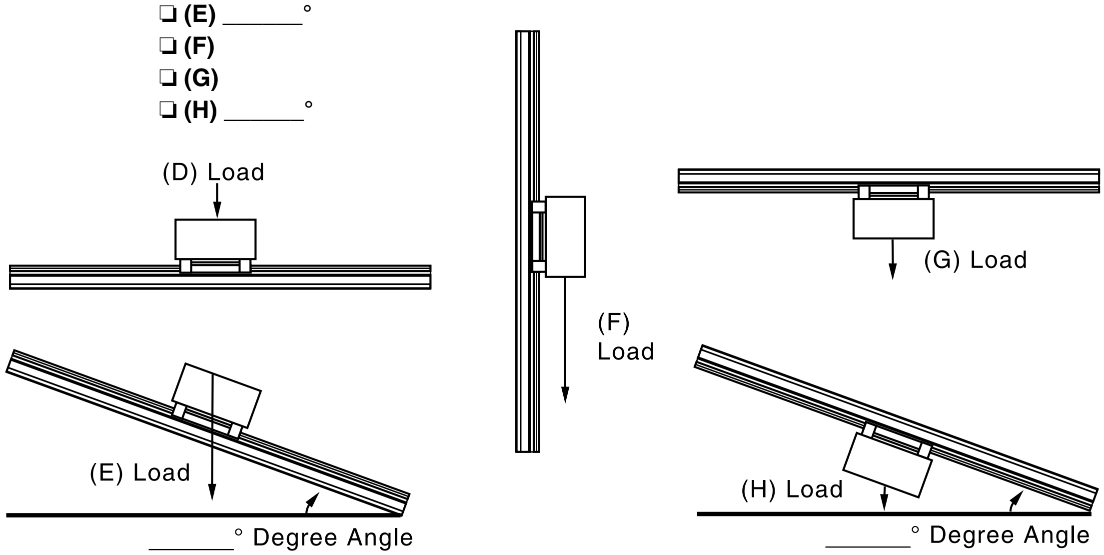
Dimensions (❑ **mm /** ❑ **inch)**:

❑ **(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)** ______°

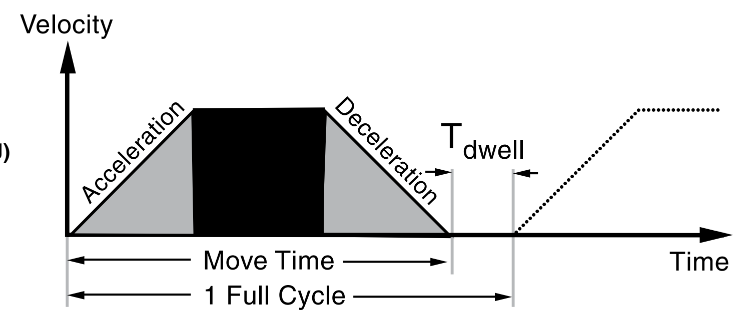


Linear Rail Application Checklist *(Continued)*

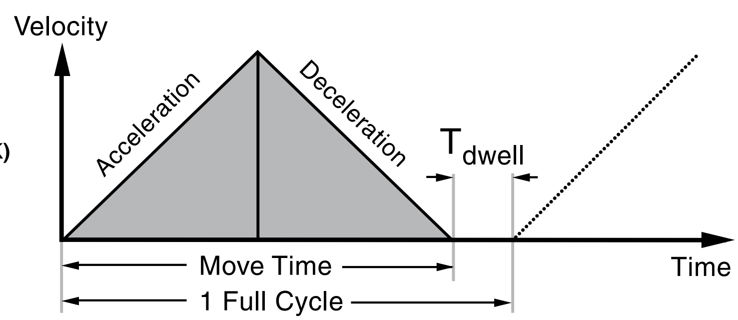
4) ❑ **Stroke Length to Move Load?** _______________ (mm or inches)
Overall rail size will be a function of stroke length needed to move the load, the rail frame size (load capability), the motor size, and whether or not an integrated stepper motor programmable drive system is added.

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.

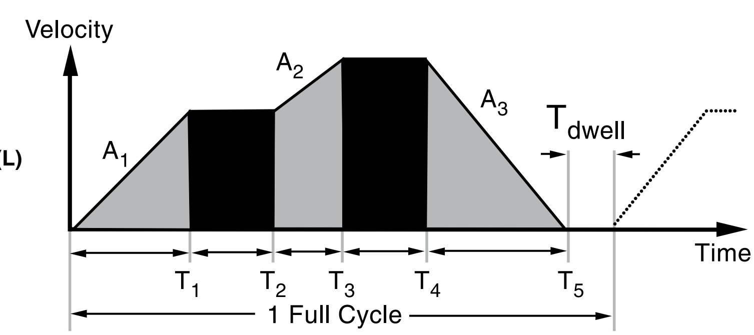
A **complex** move profile (L) requires more information.

a) ❑ Time (in seconds) including: $T_1, T_2, T_3, T_4, T_5 \ldots T_n$ and T_{dwell}

b) ❑ Acceleration / Deceleration (mm/sec.^{2} or inches/sec.^{2}) including: $A_1, A_2, A_3 \ldots A_n$

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

(L)

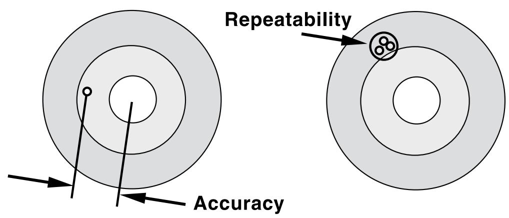


Linear Rail Application Checklist *(Continued)*

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?** _________ (%)

** If the Haydon Kerk IDEA™ Drive is used disregard items 14, 15, and 16.*