



## UG Series SIMO® Linear Motion Platform



### Linear Motion Solutions

Synchronized Cutters Eliminate  
Built-In Extrusion Variances

Flexibility: Consistent Geometry  
Creates an Interchangeable Platform

Versatility: Self-Lubricating,  
High Speed, and Rigid Precision



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[pbclinear.com](http://pbclinear.com)

1-800-962-8979



PBC Linear has revolutionized traditional machining with the patented SIMO® (Simultaneous Integral Milling Operation). The SIMO process uses synchronized cutters, eliminating built-in extrusion variances by machining all critical edges concurrently in one pass. This ensures tight tolerances, limited variance and a remarkably straight and repeatable surface at negligible additional cost!

### Patented Machining Process

#### Machined Precision at Extrusion Prices

- Rigid, accurate, repeatable
- Machined rail edges can be used as a reference when mounting
- Low cost



[Link to the SIMO process video](#)

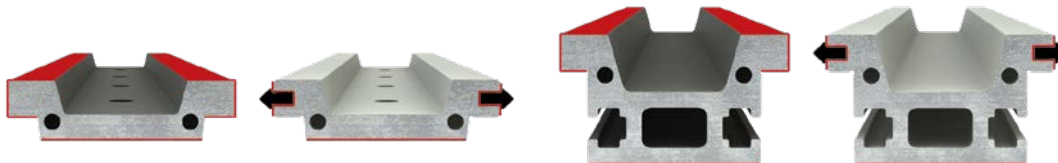
Synchronized Cutters  
Eliminate Built-In  
Extrusion Variances



#### Standard Aluminum Extrusion

#### SIMO

|                       |                          |                           |                             |
|-----------------------|--------------------------|---------------------------|-----------------------------|
| Straightness (Camber) | 0.0125 in/ft (1 mm/m)    | ⇒ <b>6 TIMES BETTER</b> ⇒ | ± 0.002 in/ft (0.166 mm/m)  |
| Twist                 | 1/2° per ft (1.5° per m) | ⇒ <b>2 TIMES BETTER</b> ⇒ | < 1/4° per ft (0.82° per m) |
| Flatness              | 0.004 in (.10 mm)        | ⇒ <b>2 TIMES BETTER</b> ⇒ | 0.002 in (0.0508 mm)        |



All Critical Surfaces Qualified

## UG Series Linear Motion Platform

### Bearing System Options

#### UGA – Low Profile Rail

- Surface mounted
- Ideal for small geometrics



#### UGT – Tall Rail

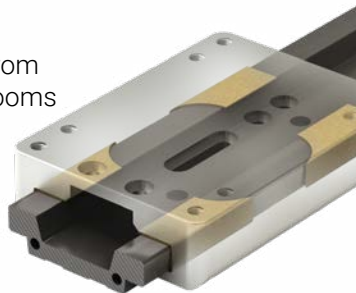
- Can be end supported
- Rigid structural component
- T-Slots for mounting clamps and other accessories



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Online

#### Gliding Surface Technology Plain Bearing (with FrelonGold)

- LOW COST
- Excels in environments from contamination to clean rooms
- Self-lubricating and maintenance free
- Vibration damping
- Suitable for extremely short stroke



#### Cam Roller Technology V-Guide Roller Bearings

- HIGH SPEED
- Increased cantilevered loads
- Stainless steel raceways resist corrosion
- Sealed V-wheel bearings handle contamination

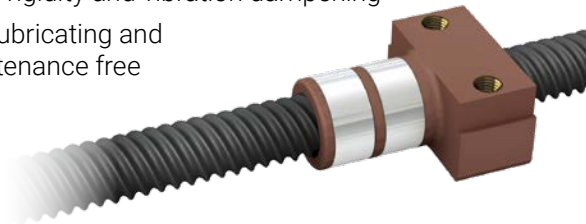


**NOTE:** Profile rail bearing & rail with ball screw option, Consult factory (see page 00)

### Drive System Options

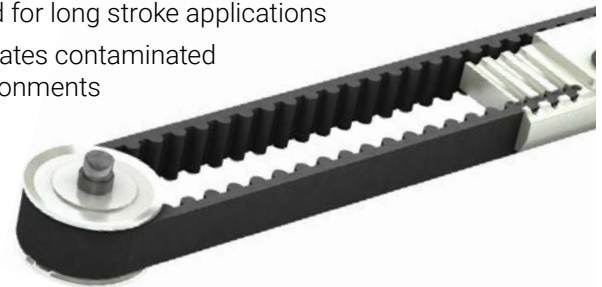
#### Lead Screw – Low Cost

- Standard fixed or Constant Force anti-backlash nut
- Good rigidity and vibration dampening
- Self-lubricating and maintenance free



#### Belt Drive – High Speed

- Good for long stroke applications
- Tolerates contaminated environments



### Motor System Options

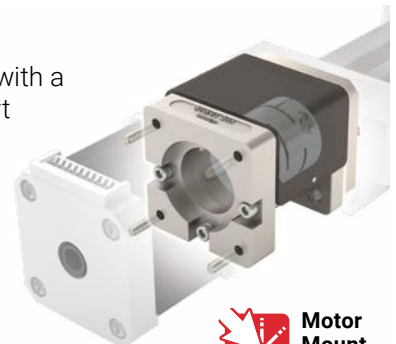
#### Integrated Screw and Motor

- Lead screw aligned and fixed directly with motor
- Less components means greater accuracy, increased rigidity, and less cost
- Motor is not field replaceable



#### Motor Mount

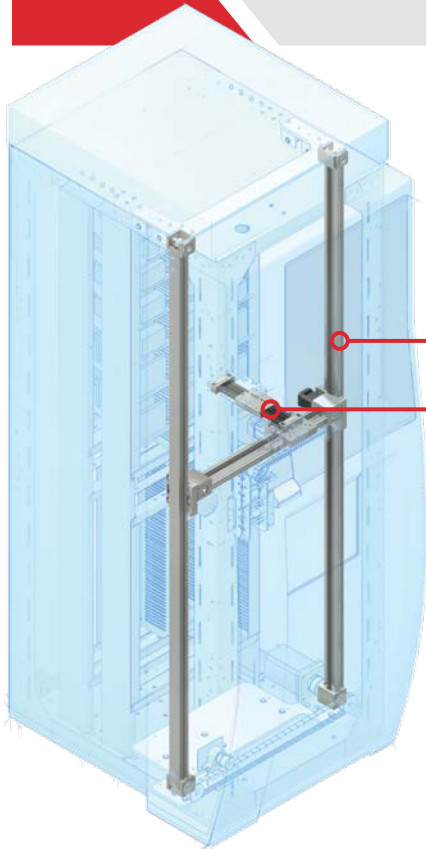
- Drive the SIMO Series with a stepper, servo, or smart motor, etc.
- One-piece main frame holds shaft-to-shaft centerline
- Allows for field replacement of motor



Motor  
Mount  
Info



## Applications



### Kiosk and Automated Retail

The SIMO Series tall rail (UGT) works well as a structural support – shown here in the X and Y axes in an automated dispensing application. The low profile (UGA) SIMO Series – shown in the Z axis – is ideal for fitting into tight spaces.

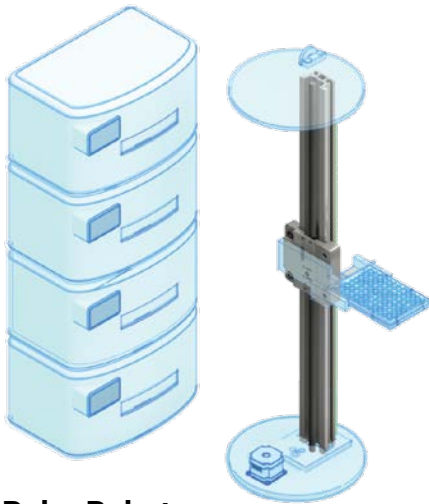
The tall rail (UGT) can be used as a structural support  
The low profile rail (UGA) fits into small spaces



### Cartesian robotics

SIMO Series' single- and multi-axis solutions provide the accuracy and consistency that pick and place applications require.

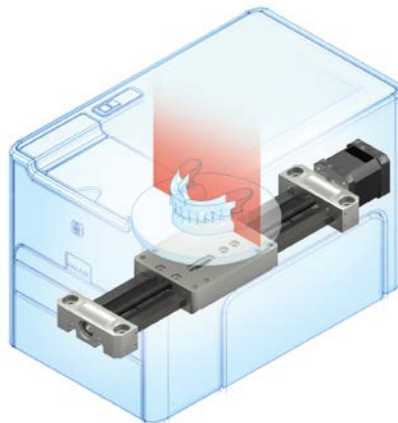
V-Guide bearings provide high speed performance and quick change of direction capabilities



### Polar Robot

The SIMO Series can be used in vertically or horizontally oriented applications. The polar robot shown here provides repeatable motion and high accuracy.

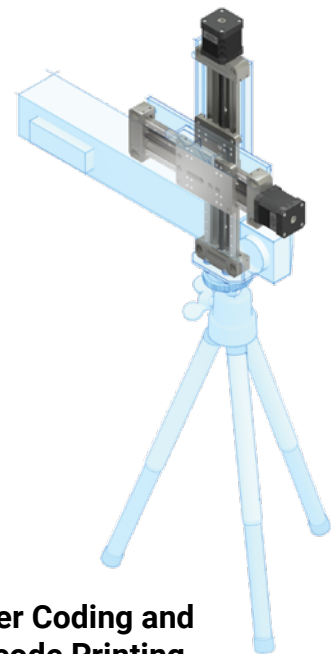
V-Guide bearings provide smooth travel and the tall rail (UGT) provides structural support



### Scanning Equipment

High precision and smooth operation are required when designing linear motion for laboratory scanning equipment. The plain bearing system utilizes FrelonGOLD® – a self-lubricating, maintenance free surface

Lead screws utilize an engineered high strength polymer, plain style nut that is self-lubricating and maintenance free – providing consistent torque over the length of the stroke that does not require oil.



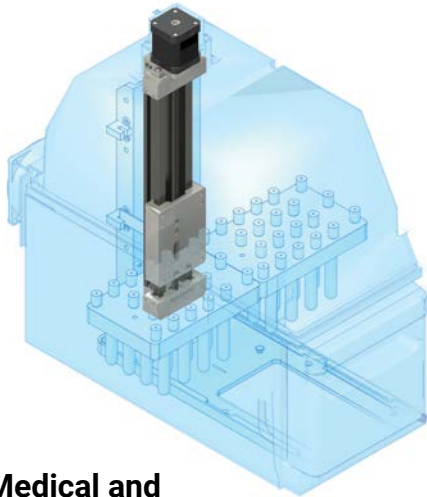
### Laser Coding and Barcode Printing

Inline barcode printers & scanners help industrial automation manufacturers reduce costs and improve quality. The SIMO Series' versatility provides dependable linear motion for even the most demanding coding applications.



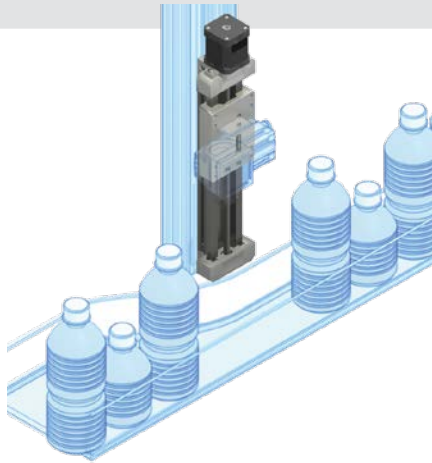
Email an  
Application Engineer





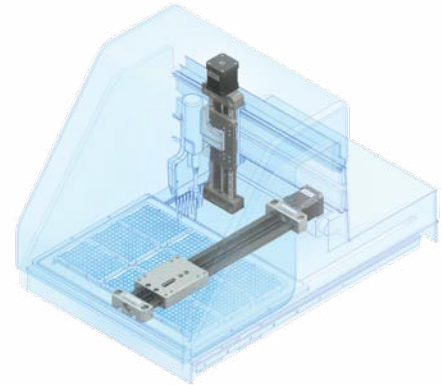
## Medical and Laboratory Equipment

Analyzers that are used in medical testing applications often require high accuracy in a small space. SIMO Series can be designed for these specific application requirements with the benefits of available rail, bearing type, and drive options.



## Bottling

The SIMO Series is ideal in bottling and food service applications that require repeatable motion and involve various load capacities. Plain bearings utilize the bonded FrelonGold® self-lubricating maintenance-free surface



## Lab Automation Petri Camera Operation

Combine the SIMO Series bearing options to create the ideal multi-axis solution designed to fit the application.

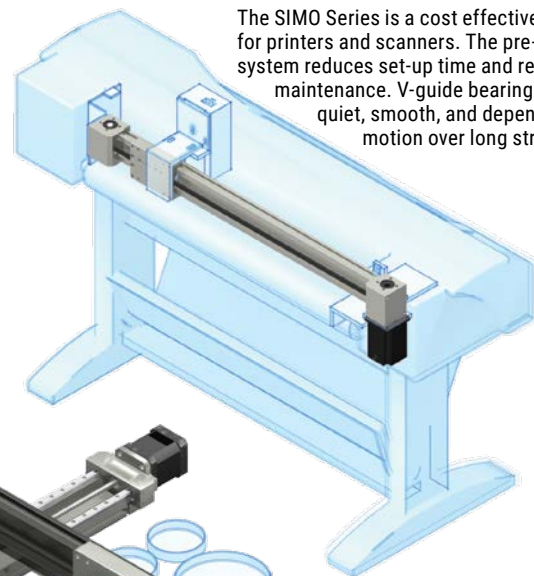
Shown here:

- X-axis: PRT with ball screw for precision, rigidity, and moment load capabilities
- Y-axis: GST with lead screw for repeatability and smooth motion.



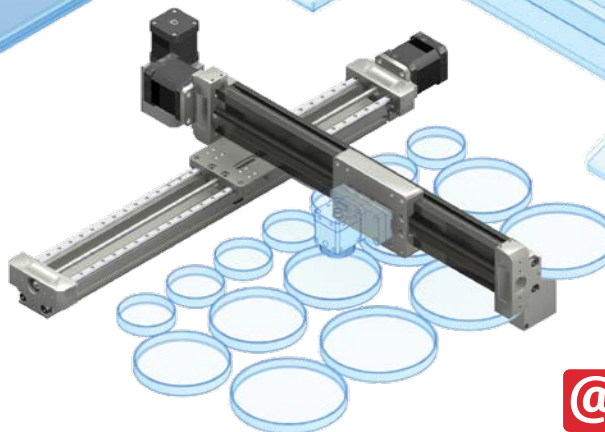
## Water Jet Plasma Cutter XYZ

The SIMO Series is easily integrated into water jet and plasma cutter assemblies. This type of machining requires rigid and precise linear motion and is often located in contaminated, wet, and dirty environments.



## Commercial Printing

The SIMO Series is a cost effective solution for printers and scanners. The pre-assembled system reduces set-up time and requires little maintenance. V-guide bearings provide quiet, smooth, and dependable motion over long strokes.



## Well Plate Handling

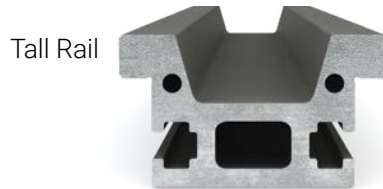
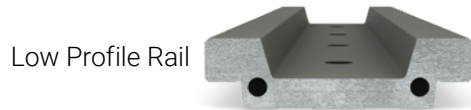
SIMO Series installed in an intricate well plate handler, providing accurate and reliable linear motion.



Email an  
Application Engineer

### Step 1: Rail

Page 6



**Do I need a low-profile rail or a structural support rail?**

### Step 2: Bearing Type

Page 8

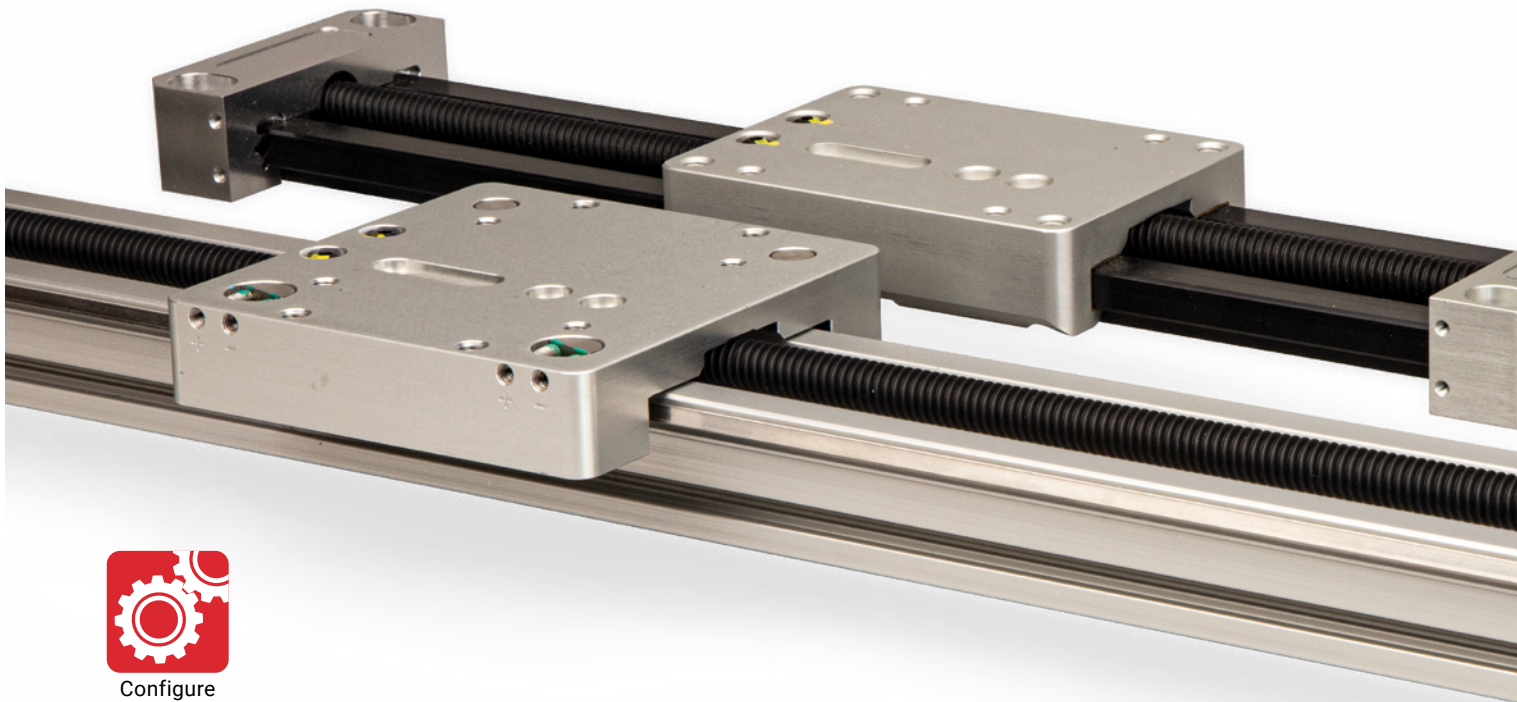
Gliding Surface Technology  
Plain Bearings



Cam Roller Technology  
V-Guide Bearings



**What performance do I expect from the bearing system?**



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If you are utilizing our digital SIMO Series catalog, you can click these icons, throughout the publication, to get more information. Note: Hyperlinks go to English language website.



**Link to Product  
Information**



**Link to Product  
Related Video**



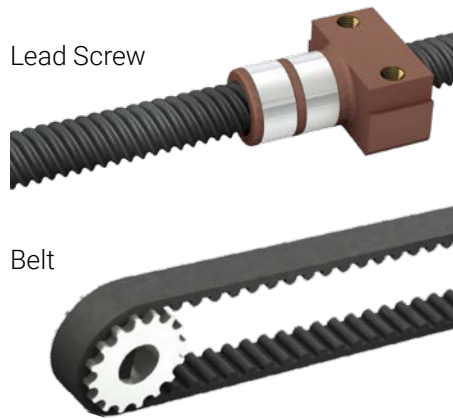
**Email an  
Application Engineer**



**Link to SIMO®  
Process**

## Step 3: Drive

Page 10



**How will  
I drive it?**

## Step 4: Motor

Page 12

42 mm (NEMA 17)  
56 mm (NEMA 23)

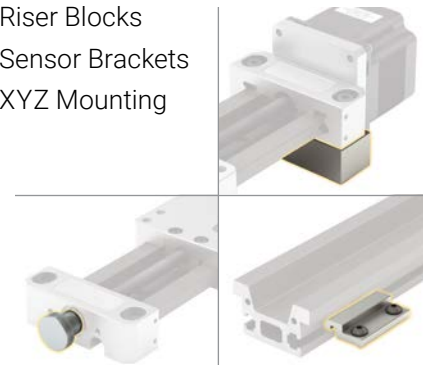


**Which motor suits  
my needs?**

## Step 5: Accessories

Page 13

Toe Clamps  
Hand Knobs & Brakes  
Riser Blocks  
Sensor Brackets  
XYZ Mounting



**How will  
I mount it?**



### Components

|   |    |
|---|----|
| Gliding Surface Technology: Plain Bearing | 12 |
| Cam Roller Technology: V-Guide Bearings   | 14 |

### Driven Sub-Systems

|  |       |
|--|-------|
| Lead Screw System                          | 16    |
| Belt Drive System (Horizontal Motor Mount) | 20    |
| Belt Drive System (Vertical Motor Mount)   | 24    |
| Motors                                     | 28    |
| Application Data Sheet & Calculations      | 29    |
| Load Calculations                          | 30    |
| Accessories                                | 31    |
| Multi-Axis Mounting                        | 34    |
| Motor Mounts                               | 38-47 |
| User Manual                                | 48    |



## Step 1 Rail Selection



### UGA – Low Profile Rail

- 24 mm overall height
- Reduced height is ideal for small geometrics
- Best mounted to a base plate or other support
- Can incorporate drive options: lead screw, ball screw, vertical belt



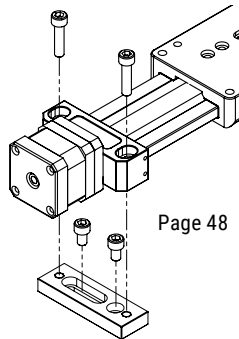
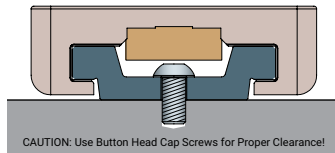
### UGT – Tall Rail

- 40 mm overall height
- Increased rigidity for unsupported mounting
  - Can be used as a structural member  
See Maximum Load chart on page 9
  - Saves on the cost of mounting onto another element (extrusion frame, base plate, etc.)
- Can incorporate drive options: lead screw, ball screw, vertical belt, horizontal belt

## Rail Mounting

### UGA – Low Profile Rail

- $\varnothing 6.6$  mm holes through rail for mounting with M6 SBHCS
- 60 mm TYP spacing between mounting holes
- Customer specifies first hole distance from end of rail
- End block mounting with lead screw driven systems

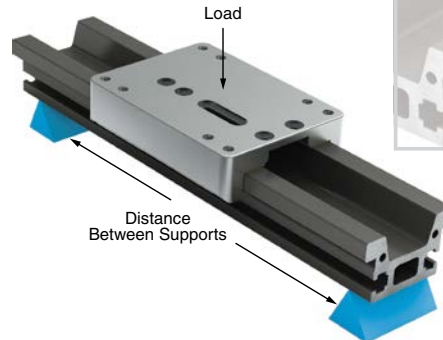
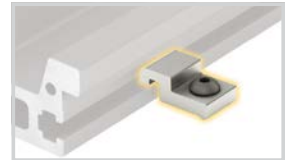


 **Detailed mounting information on page 49**

 **Detailed information on accessories on page 31 and t-nuts on page 32**

### UGT – Tall Rail

- Secure toe clamp mounting
- Other options, such as t-nuts, are available when rail is used as a structural element



## Rail Material

All rails are SIMO® qualified aluminum

## Reference Edge

- Critical rail edges are machined with the patent pending SIMO® Process
  - Reduce bow, twist, and warp
  - Holds tolerances to  $\pm 0.0254$  mm (0.001")
- Qualified edges can be used for reference when mounting

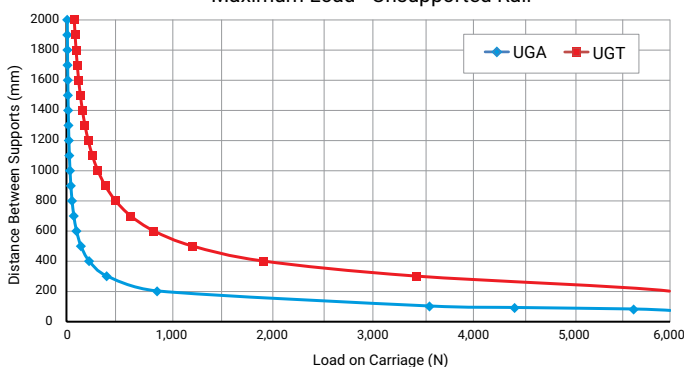
### Plain Bearing

- Hard anodized
- Best material for FrelonGOLD

### V-Guide Bearings

- Clear anodized
- 420 stainless steel race hardened to RC60 swaged in

Maximum Load - Unsupported Rail



## Step 2 Bearing System Options

Bearing System Options for SIMO Series Actuators: **Plain Bearing** or **V-Guide Bearings**

Choose the bearing system that best supports the application requirements

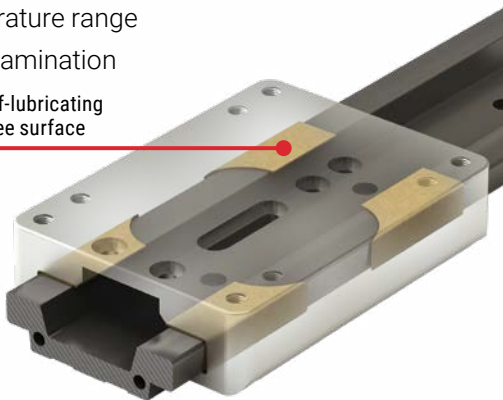
### Gliding Surface Technology Plain Bearing

- Low cost
- Utilizes bonded FrelonGOLD® bearing surfaces
- Self-lubricating and maintenance free
- No catastrophic failure
- No metal-to-metal contact, vibration damping
- MAX speed: 1.53 m/s (300 ft/min) (dry running)
- Precision or compensated running clearance
- Wide temperature range
- Resists contamination

FrelonGold® self-lubricating maintenance-free surface



**Note:** Plain bearings should comply with the 2:1 ratio rule. See page 12



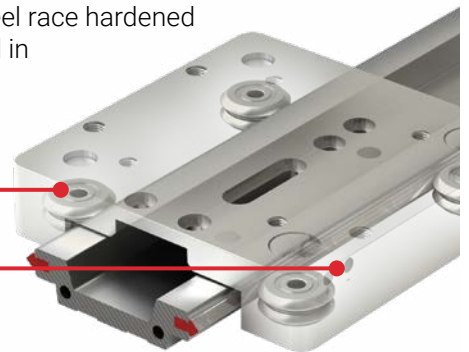
### Cam Roller Technology V-Guide Bearings

- High speeds up to 5 m/s (984 ft/min)
- Sealed bearings
- Handles contamination
- Quick change of direction
- Good for cantilevered loads
- Built in lubricators standard
- Patented side-adjust preload feature
- 420 stainless steel race hardened to RC60, swaged in



Double row V-Guide bearings on a hardened steel raceway

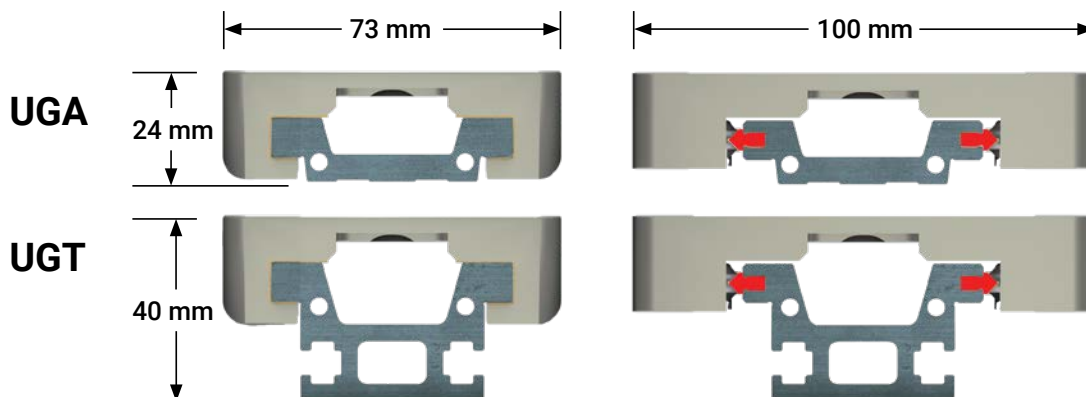
Patent pending side adjustment feature



### SIMO Series Base Combinations

A choice of bearing systems within the same base linear motion platform

All Critical Surfaces Qualified



Full specifications on page 12



Full specifications on page 14



Link to 2:1 Ratio Whitepaper



Video Link: Cam Screw Adjustable Carriages

## Step 3 Drive Type Selection

Drive Type Options for SIMO Series Actuators: **Lead Screw** or **Belt Drive**

Choose the drive type that best supports the application requirements

### Lead Screw

- Self-lubricating PTFE coated screw and polymer nut
- Fixed nut or Constant Force™ anti-backlash nut available
- 1, 2, 5, 10, 16 mm leads most common
- Other leads available • consult factory



Specifications on page 16

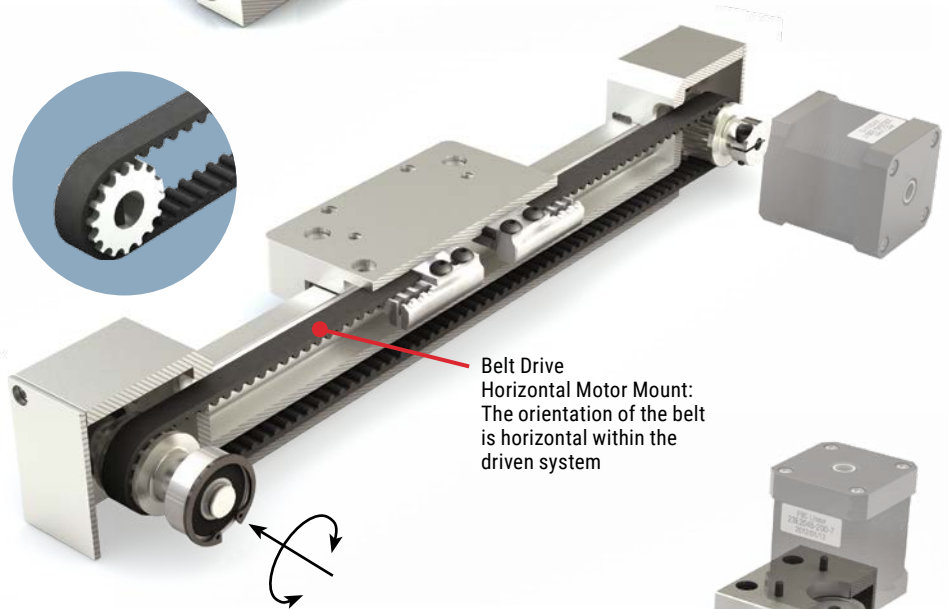


### Belt Drive Horizontal Motor Mount

- Ideal for high speed applications
- Horizontal motor mount is available only with (UGT) tall rail



Specifications on page 20



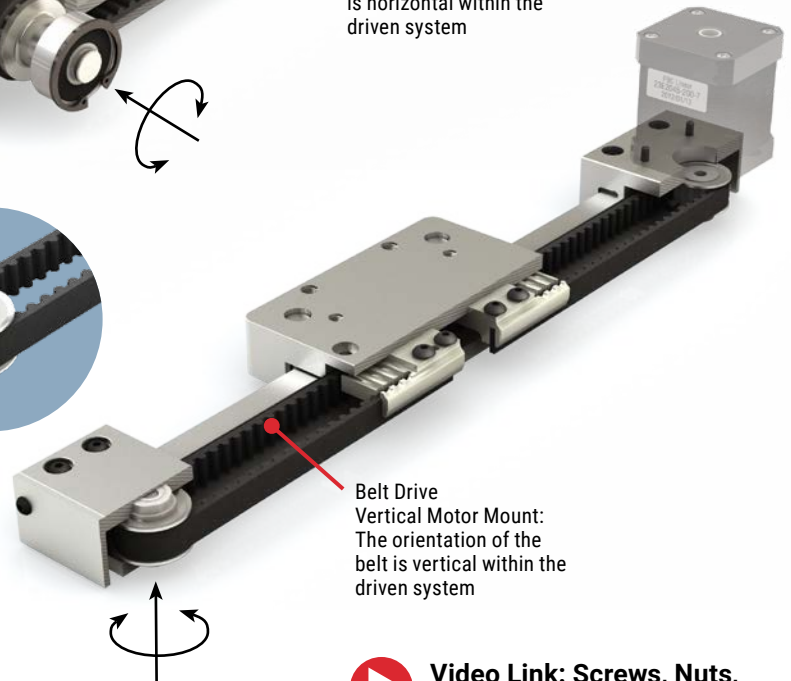
Belt Drive Horizontal Motor Mount:  
The orientation of the belt is horizontal within the driven system

### Belt Drive Vertical Motor Mount

- Ideal for high speed applications
- Vertical motor mount is designed only for (UGA) low profile rail



Specifications on page 24



Belt Drive Vertical Motor Mount:  
The orientation of the belt is vertical within the driven system



Video Link: Screws, Nuts, and Hybrid Linear Actuators



## Step 4 Motor Selection

### Integrated Stepper Motor

The driven SIMO Series systems are optimized for use with integrated stepper motors.

- 42 mm (NEMA 17)
- 56 mm (NEMA 23)
- Single, double, triple stack
- Performance specifications for each drive type:
  - Lead screw
  - Belt drive with horizontal motor mount
  - Belt drive with vertical motor mount
  - Ball screw – consult factory
- Standard wire connection is onboard plug
- Optional connections – consult factory
- Third party motor mount also available



**Detailed information  
on motors on page 30**



**Link to Motor  
Specifications Document**

### Integrated And Traditional Screw Motor Setup

**Integrated lead screw aligned with  
and fixed directly to motor**

- Fewer components
- High accuracy and reliability
- High rigidity
- Space Saving
- Great value
- Motor not field replaceable

**Traditional screw motor setup optional**

- Motor field replaceable
- Requires motor mount option
- Consult factory

Integrated Screw Motor

Traditional Screw Motor



**Video Link: Constant Force  
Lead Screw Technology**

**Used with lead screw  
driven systems**

## Step 5 Select Accessories

Choose the accessories to complete your fully optimized SIMO Series system. See page 38 for more information.



### Hand Knob

Hand adjustment knobs are used for manually adjusting screw driven systems



### Hand Brake

Hand brakes are used to manually lock position in the GST screw driven systems



### Sensor Brackets

Sensor brackets accommodate a variety of sensor types

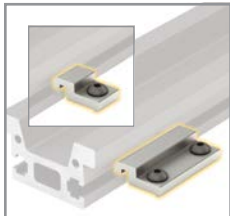


### Motor Mount

Motor mount option for attaching a stepper, servo, or smart motor, etc.

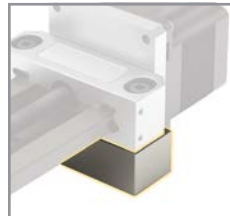


**Specifications on page 38**



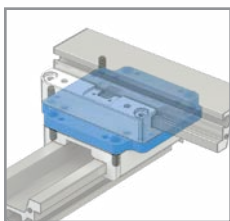
### Toe Clamps

Large and small toe clamps are available to secure the (UGT) tall rail to the mounting surface



### Riser Block

Riser blocks provide clearance for the motor when using the (UGA) low profile rail



### Multi-Axis Mounting Plates

Mounting plates are available to easily configure multi-axis systems

### Replacement Lubrication Kits

Replacement lubrication kits are available for GST plain bearing systems and CRT v-wheel bearing systems.

### T-Nuts

Roll in t-nut for 5 mm slot with M5 tap PBC Linear part number 6100443.



**Detailed information on accessories on page 31**



**Consult Factory**  
800-962-8979

## Custom Option Profile Rail & Ball Screw

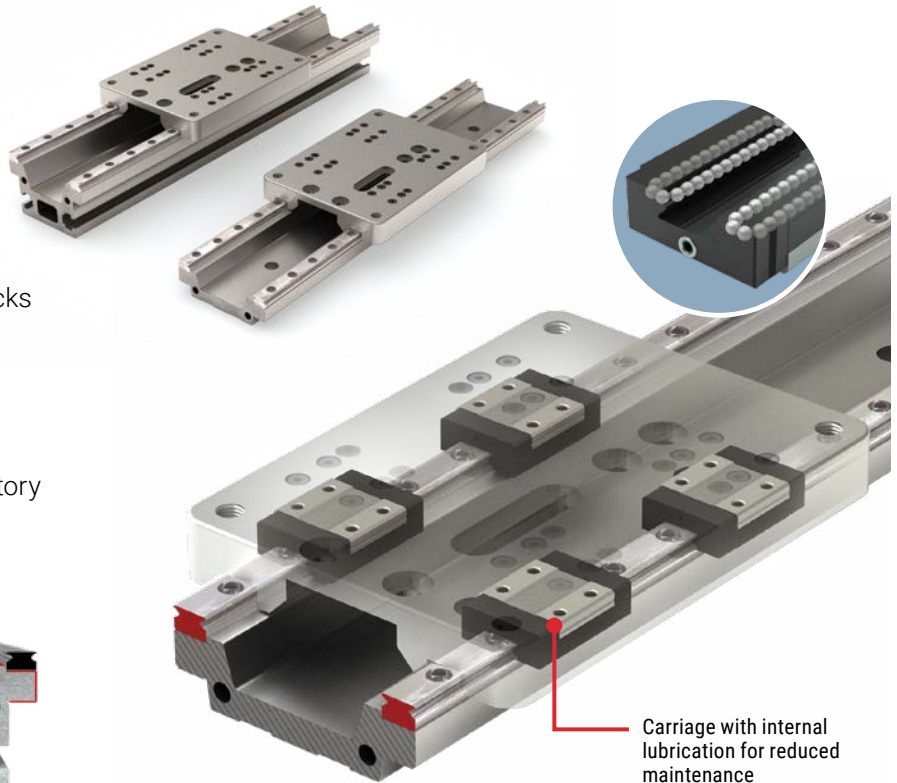
High Rigidity • High Precision • High Speeds



**Consult Factory**  
800-962-8979

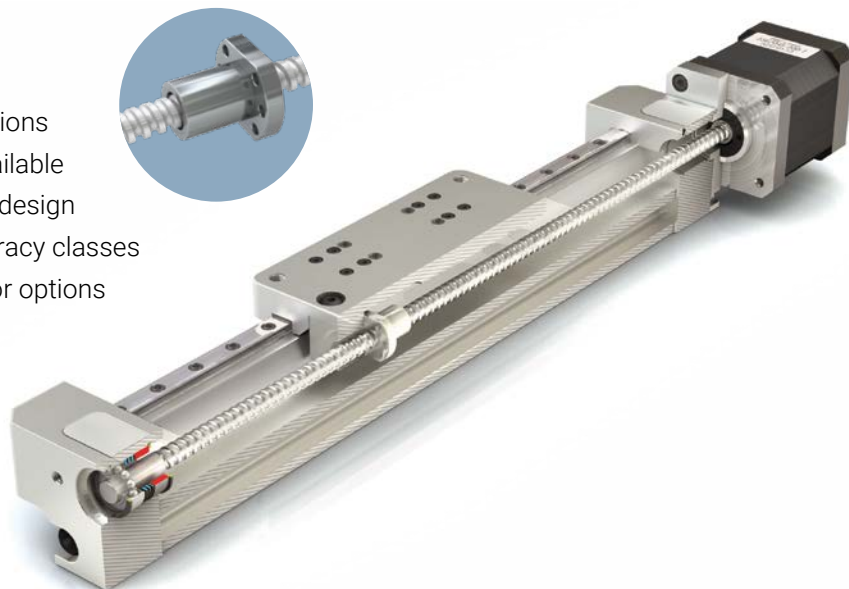
### Profile Rail Technology Profile Rail Guideways

- High precision and high speeds  
– to 3 m/s (590 ft/min)
- Size: 7 mm recirculating ball bearing blocks
- Increased stiffness and preloaded bearing performance
- Supports cantilevered loads
- Extra long blocks for increased load capacity are available – consult factory
- Uniform Rail Dimensions



### Ball Screw

- Precise positional accuracy applications
- Multiple leads available
- Rigid preload nut design
- Selection of accuracy classes
- Consult factory for options

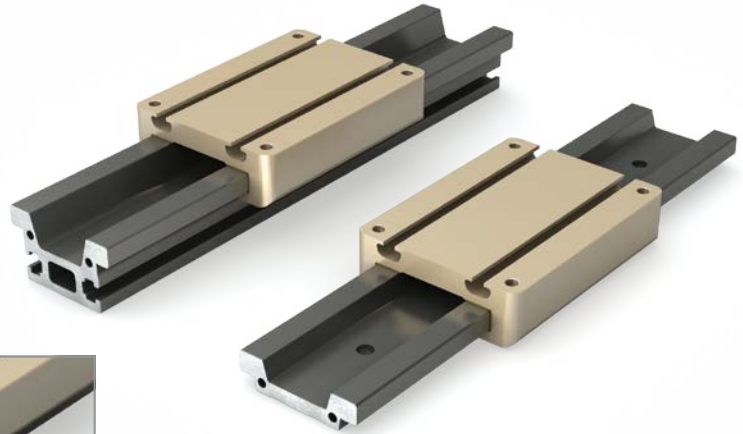




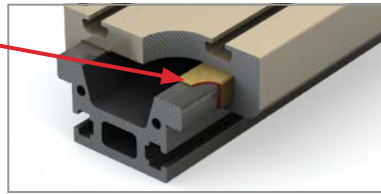
## Plain Bearing Rail & Carriage

### Gliding Surface Technology Plain Bearing

- Low cost
- Utilizes the bonded FrelonGOLD® self-lubricating maintenance-free bearing surfaces
- Ideal for contaminated environments & clean rooms
- Smooth and quiet operation
- Vibration damping and shock resistant

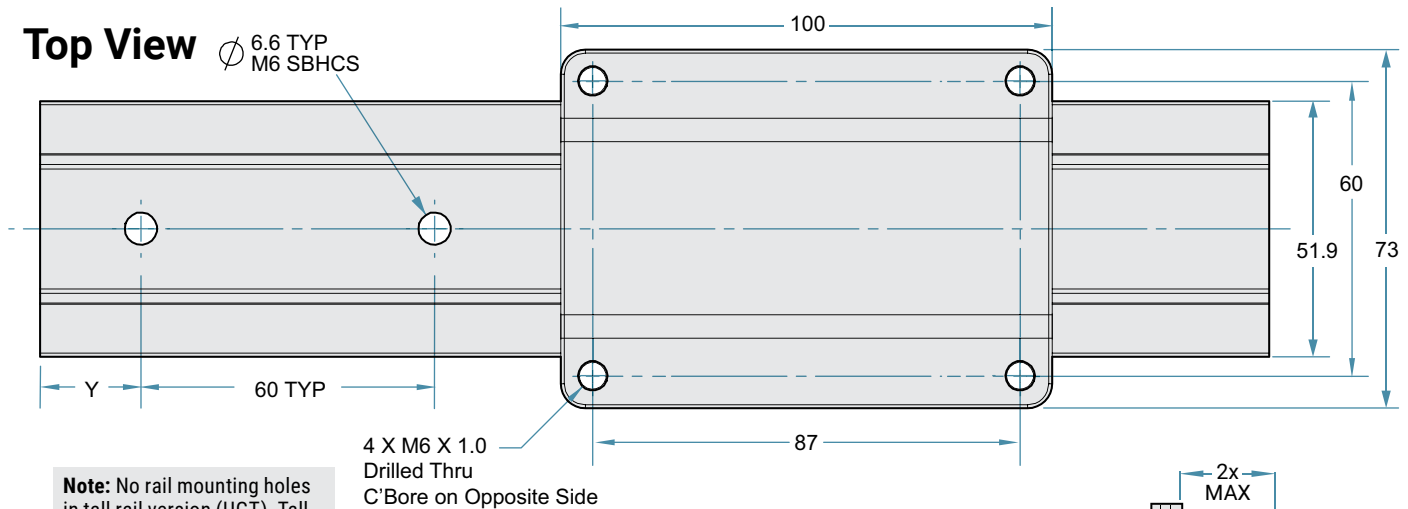


Plain Bearing with FrelonGOLD®  
Subject to 2:1 cantilevered  
load rule, see below



See page 36 for riser blocks  
and other accessories

### Top View

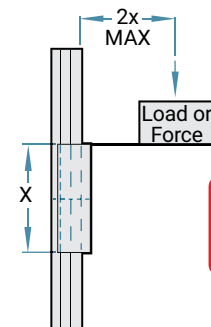


**Note:** No rail mounting holes  
in tall rail version (UGT). Tall  
rail version is mounted with  
toe clamps. For low profile rail  
(UGA), specify Y dimension  
(hole to end) at time of order.



See page 34 for multi-axis  
mounting brackets

**Note:** Binding of the carriage will occur if the 2:1 ratio  
for cantilevered loads and drive forces is exceeded. This  
principle is not load or force dependent. It is a product of  
the coefficient of frictions associated with plain bearings.  
Contact factory or website for additional information.



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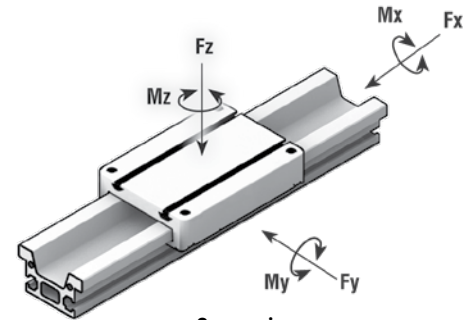
### Rail Ordering Information

| UG          | X                               | 040        | R          | - | XXXX        | - | 0                            | X   | 0             |
|-------------|---------------------------------|------------|------------|---|-------------|---|------------------------------|---|---------------|
| Series      | Rail Type                       | Rail Width | Order Type |   | Rail Length |   | Rail Finish                  | Hole Pattern  | Other Options |
| SIMO Series | A Low Profile<br>T Tall Profile | 40 mm      | R Rail     |   | 2750 mm max |   | 0 GST Hard Anodized Standard | 0 60 mm (UGA only – specify Y dimension)<br>1 No Holes (UGT only) | 0 Standard    |

Ordering example: UGA040R-0280-000; Y = 20 mm. For low profile rail (UGA), specify Y dimension (hole to end) at time of order.  
This is a SIMO Series, plain bearing – GST gliding surface technology, low profile rail, 280 mm length.

## Plain Bearing Rail & Carriage

| GST – Plain Bearing  |               |                  | Low Profile   | Tall Profile  |
|--|---------------|------------------|---------------|---------------|
| Size   |               | mm               | 24 x 73       | 40 x 73       |
| MAX Static Load*   | Fy            |                  | 3150          | 3150          |
|  | Fz (Normal)   | N                | 6000          | 4710          |
|  | Fz (Inverted) |                  | 2220          | 1640          |
| MAX Dynamic Load   | Fy            |                  | 3150          | 3150          |
|  | Fz (Normal)   | N                | 6000          | 4710          |
|  | Fz (Inverted) |                  | 2220          | 1640          |
| Max Moments*   | Mx            |                  | 100           | 100           |
|  | My            | Nm               | 130           | 130           |
|  | Mz            |                  | 120           | 120           |
| Carriage Bending Moment of Inertia (second moment of area) | Ly            | cm <sup>4</sup>  | 48.9          | 48.9          |
|  | Lz            |                  | 51.4          | 51.4          |
| Inertia of Carriage  | Ly            | Kgm <sup>2</sup> | 0.000 000 259 | 0.000 000 259 |
|  | Lz            |                  | 0.000 000 348 | 0.000 000 348 |
| Coefficient of Friction** $\mu$                            |               |                  | 0.125         | 0.125         |
| MAX Velocity, no lube, continuous motion                   |               | m/s              | 1.53          | 1.53          |
| MAX Velocity, intermittent motion or with lube             |               | m/s              | 4.2           | 4.2           |
| Normal Operating Temperatures - Minimum                    |               | °C               | 0             | 0             |
| Normal Operating Temperatures - Maximum                    |               | °C               | +150***       | +150***       |
| MAX Rail Length  |               | mm               | 2,000         |               |
| Carriage Weight  |               | Kg               | 0.235         | 0.235         |
| Rail Weight  |               | Kg/m             | 1.067         | 1.727         |



### Conversions

newton (N) x 0.2248 = lb.  
newton - meter (N-m) x 8.851 = in.-lb.

Fz = Axial capacity  
Fy = Radial capacity  
Mx, My, Mz = Moment capacities

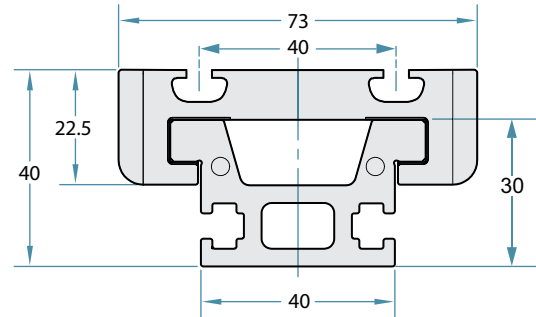
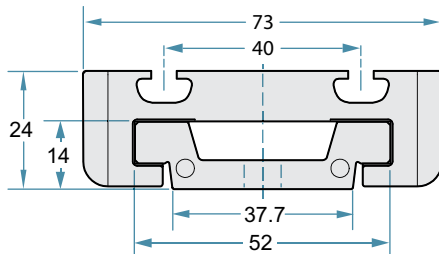
\* The shown moments and loads are MAX values, please consult our technical department for further information.

\*\* Listed values are for dry application. Adding lubrication can decrease values by up to 50%.

\*\*\* Compensated fit carriage

\*\*\* Refer to page 29–30 for calculations..

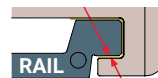
## Carriage



See page 31 for accessories, t-nuts, and replacement lubrication kits

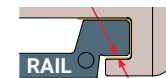
### Precision Series

0.025–0.051 mm Running Clearance  
(Ceramic Coated)



### Compensated Series

0.064–0.089 mm Running Clearance  
(Ceramic Coated)



Configure Online

## Carriage Ordering Information

| UG          | A  | 040        | C          | - | 0                     | X  | 1                                | G                     | X   | 0             |
|-------------|--|------------|------------|---|-----------------------|--|----------------------------------|-----------------------|---|---------------|
| Series      | Rail Type  | Rail Width | Order Type |   | Carriage Length       | Running Clearance  | Height                           | Bearing Material      | Options   | Other Options |
| SIMO Series | A Standard<br>(Used with both low profile & tall rail) | 40 mm      | C Carriage |   | 0 GST 100 mm Standard | P Precision<br>0.025–0.051 mm<br>C Compensated<br>0.064–0.089 mm | 1 Standard carriage with t-slots | G FrelonGOLD Standard | 0 None<br>1 Hand Brake<br>2 Lube Option<br>3 Both | 0 Standard    |

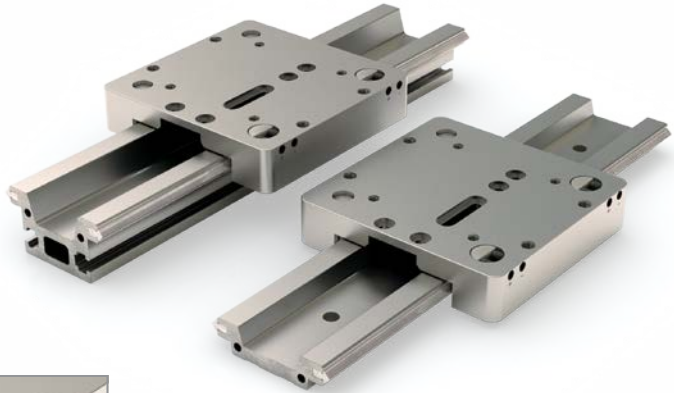
Ordering example: UGA040C-0P1G30. This is a SIMO Series carriage, plain bearing – GST gliding surface technology, precision running clearance, with standard FrelonGOLD, hand brake, and lube option.

Note: Driven systems use precision series carriages only

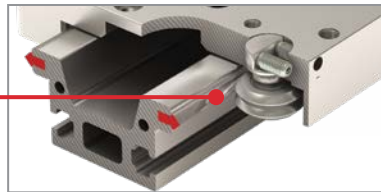
# V-Guide Bearings Rail & Carriage

## Cam Roller Technology V-Guide Bearings

- Double row V-Guide roller bearings ride on a hardened stainless steel raceway
- Sealed rollers provide high speed performance and quick change of direction capabilities
- Greater capacity for cantilevered and moment loads
- Patented side-adjustable preload

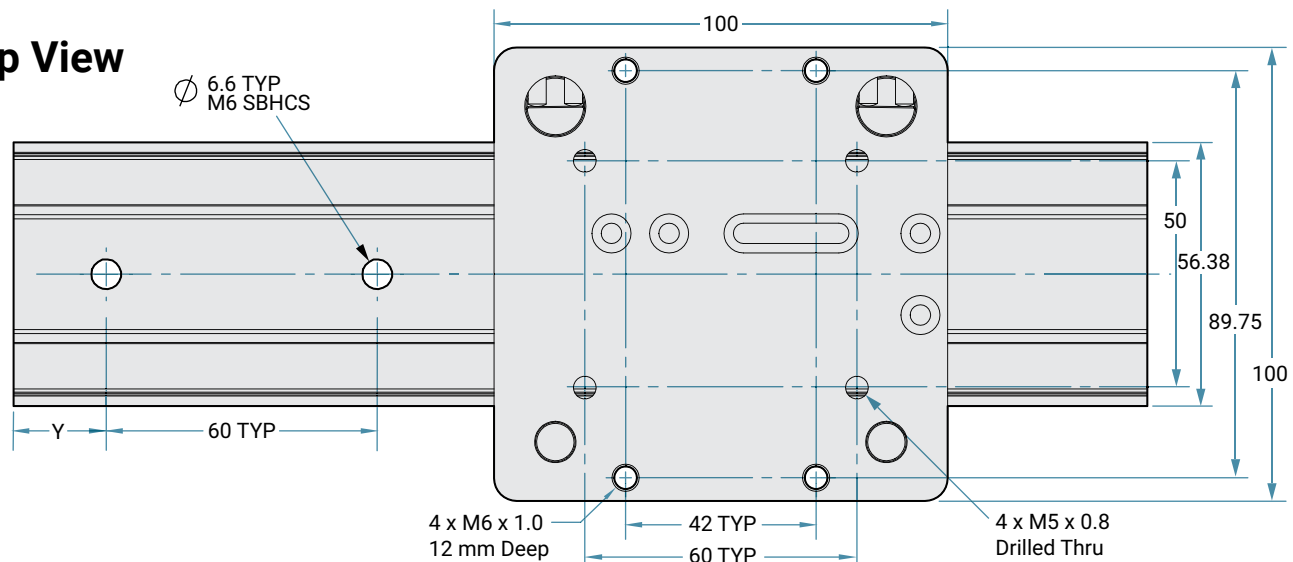


## Double Row V-Guide Bearings on a Hardened Stainless Steel Raceway



**See page 35 for riser blocks and other accessories.**

## Top View



**See page 34 for multi-axis mounting brackets**

**Note:** No rail mounting holes in tall rail version (UGT). Tall rail version is mounted with toe clamps. For low profile rail (UGA), specify Y dimension (hole to end) at time of order.



Configure  
Online

## Rail Ordering Information

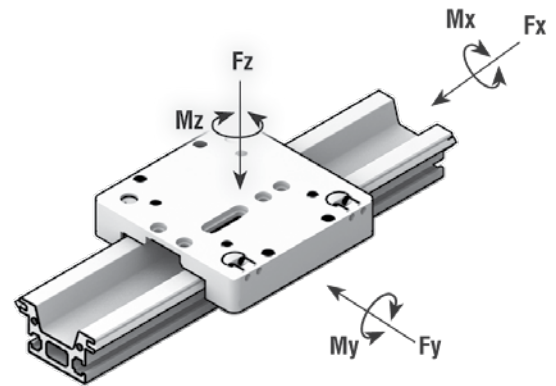
| UG          | X                               | 040        | R          | - | XXXX        | - | 2                            | X   | 0             |
|-------------|---------------------------------|------------|------------|---|-------------|---|------------------------------|---|---------------|
| Series      | Rail Type                       | Rail Width | Order Type |   | Rail Length |   | Rail Finish                  | Hole Pattern  | Other Options |
| SIMO Series | A Low Profile<br>T Tall Profile | 40 mm      | R Rail     |   | 3600 mm max |   | 2 CRT Clear Anodize Standard | 0 60 mm (UGA only – specify Y dimension)<br>1 No Holes (UGT only) | 0 Standard    |

Ordering example: UGA040R-0280-200; Y = 20 mm. For low profile rail (UGA), specify Y dimension (hole to end) at time of order. This is a SIMO Series, V-Guide bearing- CRT cam roller technology, low profile rail, 280 mm length, with a hole-to-end (Y) dimension of 20 mm.



## V-Guide Bearings Rail & Carriage

| CRT – V-Guide Bearings                                     |               |                  | Low Profile              | Tall Profile  |
|--|---------------|------------------|--------------------------|---------------|
| Size   |               | mm               | 24 x 100                 | 40 x 100      |
| MAX Static Load*   | Fy            |                  | 740                      | 740           |
|  | Fz (Normal)   | N                | 880                      | 880           |
|  | Fz (Inverted) |                  | 880                      | 880           |
| MAX Dynamic Load   | Fy            |                  | 740                      | 740           |
|  | Fz (Normal)   | N                | 880                      | 880           |
|  | Fz (Inverted) |                  | 880                      | 880           |
| MAX Moments*   | Mx            |                  | 15                       | 15            |
|  | My            | Nm               | 25                       | 25            |
|  | Mz            |                  | 35                       | 35            |
| Carriage Bending Moment of Inertia (second moment of area) | Ly            | cm <sup>4</sup>  | 102.6                    | 102.6         |
|  | Lz            |                  | 104.4                    | 104.4         |
| Inertia of Carriage  | Ly            | Kgm <sup>2</sup> | 0.000 000 242            | 0.000 000 242 |
|  | Lz            |                  | 0.000 000 788            | 0.000 000 788 |
| Coefficient of Friction** $\mu$                            |               |                  | 0.02                     |               |
| MAX Velocity, continuous motion                            |               | m/s              | 5 (requires lubrication) |               |
| MAX Velocity, intermittent motion                          |               | m/s              | 5.5                      | 5.5           |
| MAX Acceleration   |               | m/s <sup>2</sup> | 50                       | 50            |
| Normal Operating Temperatures - Minimum                    |               | °C               | 0                        | 0             |
| Normal Operating Temperatures - Maximum                    |               | °C               | +80                      | +80           |
| MAX Rail Length  |               | mm               | 2,000                    |               |
| Carriage Weight  |               | Kg               | 0.355                    | 0.355         |
| Rail Weight  |               | Kg/m             | 1.305                    | 1.979         |



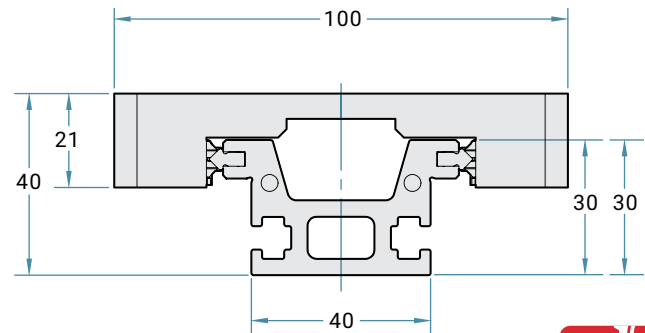
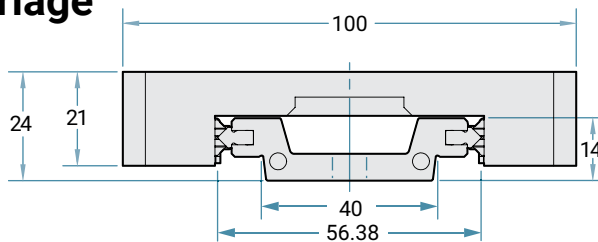
### Conversions

newton (N) x 0.2248 = lb.  
newton - meter (N-m) x 8.851 = in.-lb.

Fz = Axial capacity  
Fy = Radial capacity  
Mx, My, Mz = Moment capacities

- Lubricate rails with lithium based grease
- \* The shown moments and loads are MAX values, please consult our technical department for further information.

## Carriage



See page 31 for accessories, t-nuts, and replacement lubrication kits



Configure Online

## Carriage Ordering Information

| UG          | A   | 040        | C          | - | 3                     | A                 | 3          | T                        | X  | 0             |
|-------------|---|------------|------------|---|-----------------------|-------------------|------------|--------------------------|--|---------------|
| Series      | Rail Type   | Rail Width | Order Type |   | Carriage Length       | Running Clearance | Height     | Bearing Options          | Options  | Other Options |
| SIMO Series | A Standard (Used with both low profile & tall rail) | 40 mm      | C Carriage |   | 3 CRT 100 mm Standard | A Adjustable      | 3 Standard | T Stainless Steel Sealed | 1 Lube Option Standard<br>0 None (contact factory before ordering) | 0 Standard    |

Ordering example: UGA040C-3A3T10. This is a SIMO Series carriage, V-Guide – CRT cam roller technology, adjustable, with lube option.

## Lead Screw Driven System

### Overview

- Utilizes a self-lubricating and maintenance free nut
- Standard fixed nut or Constant Force anti-backlash nut available
- Lead screw material:
  - 10 mm diameter
  - 300 series stainless steel with PTFE coating
  - 1, 2, 5, 10, 16 mm leads most common
  - Other leads available – consult factory
- Ideal for a broad range of applications such as kiosks, assembly, automation, medical, and laboratory

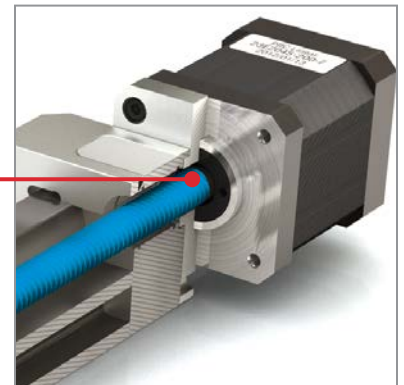


### Motor Options and Benefits

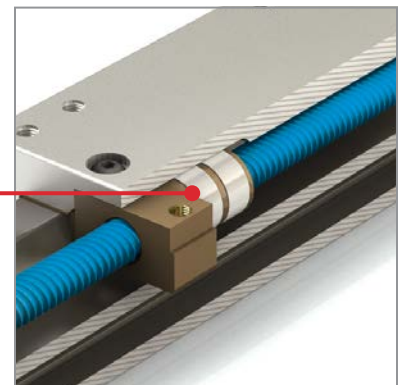
- Standard integrated screw stepper motors
  - 42 mm (NEMA 17)
  - 56 mm (NEMA 23)
- Integrated lead screw eliminates components and tolerance stack-ups
- Improves rigidity and performance
- Reduces system cost



**Detailed information on motors on page 30**



Drive end screw support bearings are integrated into the stepper motor



Patented Constant Force Technology nuts provide consistent anti-backlash operation

### Accessories

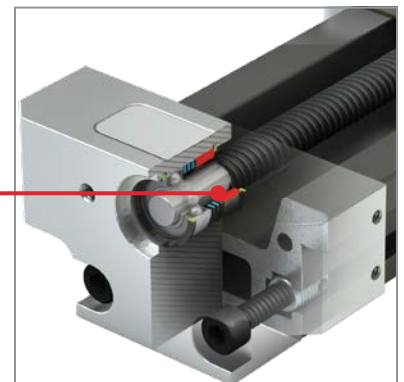
- Hand knobs – for manual positioning or applications that require precision adjustment
- Riser blocks
- Toe clamps and t-nuts
- Brake knobs
- Optional motor mounts



**Detailed information on accessories on page 31**



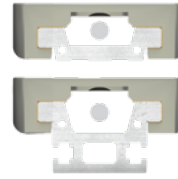
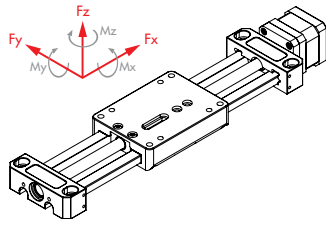
**Link to Motor Specifications Document**



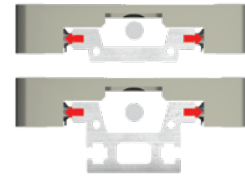
Ball bearings provide idle end screw support

# LDA Belgium

## Lead Screw Driven System



**GST: Plain Bearing**  
Low Profile Rail / Tall Rail



**CRT: V-Guide**  
Low Profile Rail / Tall Rail

### Basic System Properties

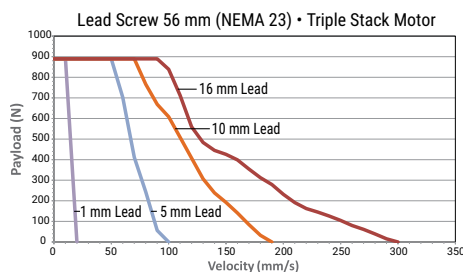
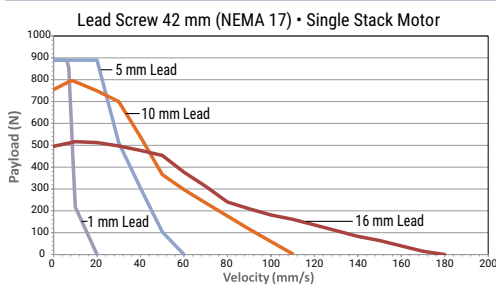
|   |                  |   |   |
|---|------------------|---|---|
| MAX Velocity, no lube, continuous motion  | m/s              | 1.5   | requires lubrication                              |
| MAX Velocity, intermittent motion         | m/s              | 4.2 (with lubrication)                          | 5.5 (requires lubrication)                        |
| MAX Acceleration***                       | m/s <sup>2</sup> | 50  | 50  |
| Stroke Length (MIN recommended – MAX)***  | mm               | 5 - 1400  | 5 - 1400  |
| Normal Operating Temperatures (MIN - MAX) | °C               | 0° - 80°  |   |
| MAX Drive (input) Speed                   | rpm              | 3000****  |   |
| Standard Lead Screw Accuracy              |                  | ISO CLASS 10 (± .0007 mm/mm)                    |   |
| Carriage Weight                           | Kg               | 0.235   | 0.355   |
| Rail + Screw Weight                       | Kg/m             | 1.690 / 2.356                                   | 1.909 / 2.578                                     |
| System Weight (excluding motor)           | Kg               | 0.41 + (1.69 * length) / 0.5 + (2.356 * length) | 0.53 + (1.909 * length) / 0.62 + (2.578 * length) |

### Static & Dynamic System Properties

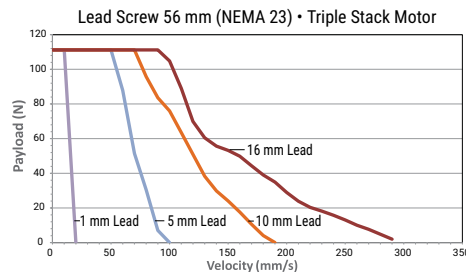
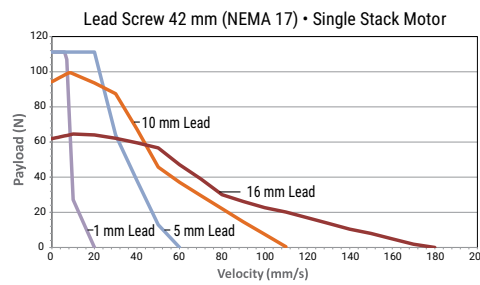
|   |                  |    |             |     |
|---|------------------|----|-------------|-----|
| MAX Static Load*  | Fx               | N  | 111.2       |     |
|   | Fy               |    | 3150        | 740 |
|   | Fz (Normal)      |    | 6000 / 4710 | 880 |
|   | Fz (Inverted)    |    | 2220 / 1640 | 880 |
| Nut Thrust Capacity (See PV derate chart)                                   | Fx Standard Nut  | N  | 445         |     |
|   | Fx Anti-Backlash |    | 400         |     |
| MAX Dynamic Load*<br>(For PBC Linear supplied motor, refer to charts below) | Fx               | N  | 111.2       |     |
|   | Fy               |    | 890         | 740 |
|   | Fz (Normal)      |    | 890         | 880 |
|   | Fz (Inverted)    |    | 890         | 880 |
| MAX Moments*  | Mx               | Nm | 100         | 15  |
|   | My               |    | 130         | 25  |
|   | Mz               |    | 120         | 35  |

\*The above moments and loads are MAX values, please consult our technical department for further information. \*\*Refer to pages 45 & 46 for combined load calculations. \*\*\*Increased acceleration may be possible in limited cases. Consult factory if exceeding limit. \*\*\*\* Reduced Fx dynamic nut load capacity in compliance with PV derate chart to the right here.

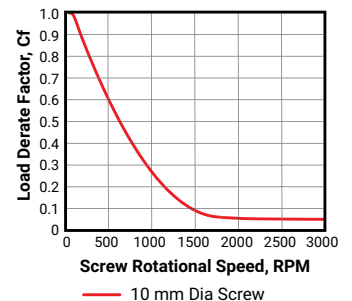
### Horizontal Applications



### Vertical Applications



### PBC Linear Load Derate Factor for Metric Lead Screw Nuts



### MAX Nut Load = Cf x Nut Dynamic Load Rating

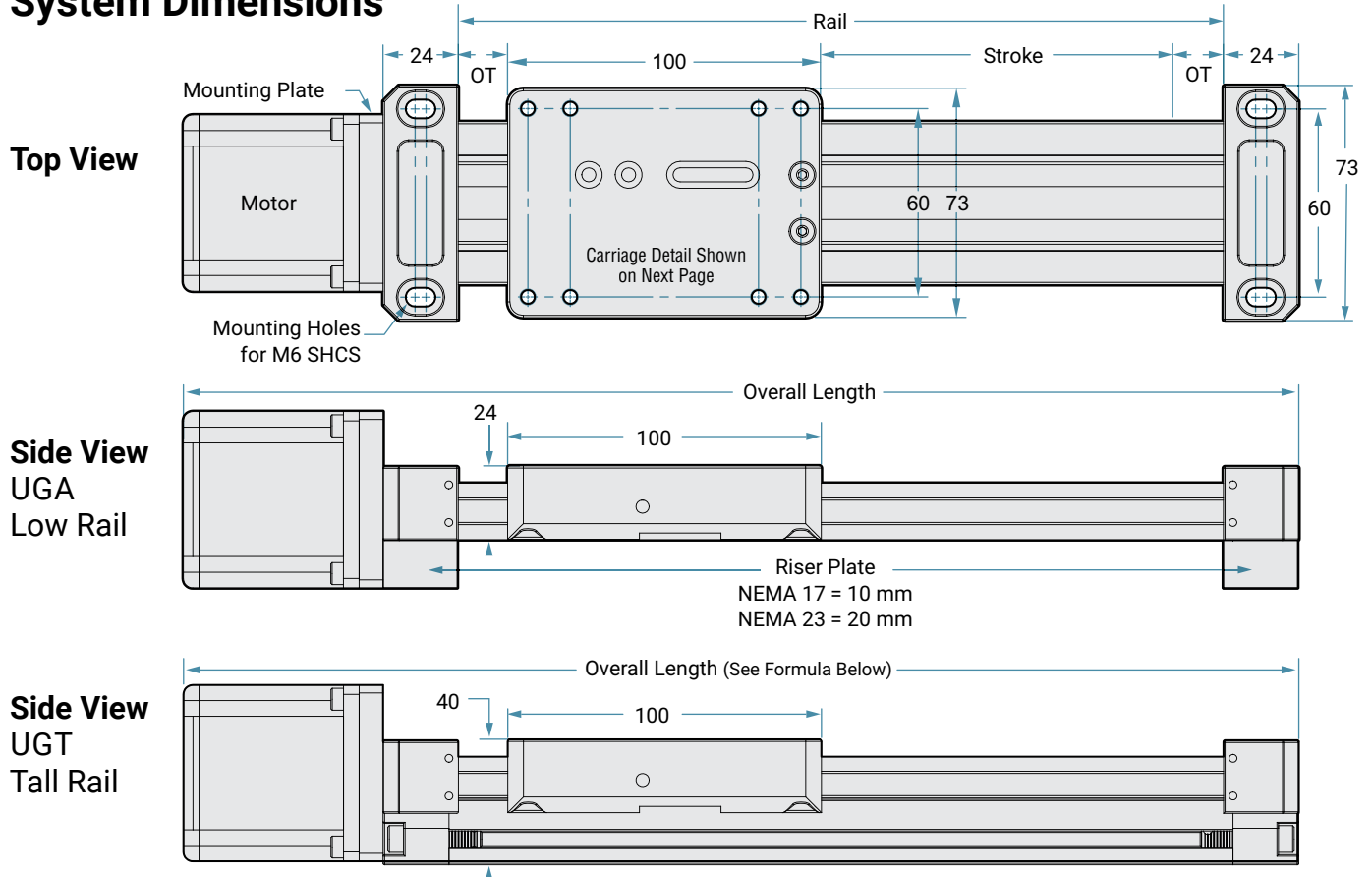
Please note that the PV limit of the nut is dependent on the duty of the application and other factors so these curves are a guideline. If your application will operate near or beyond the shown curves, please contact PBC Linear for support.

Note: Based on 500 mm stroke, GST version with 0.125 C.O.F. and 0.3G acceleration. Based on 24 volt, but higher voltage amplifiers may produce higher speeds.



## Lead Screw System

### System Dimensions



Note: GST bearing system shown.

### Motor Lengths (Plus Mounting Plate)

| Motor Size      | Single Stack | Double Stack | Triple Stack |
|-----------------|--------------|--------------|--------------|
| 42 mm (NEMA 17) | 40 mm        | 48 mm        | 61 mm        |
| 56 mm (NEMA 23) | 55 mm        | 77 mm        | 77 mm        |

Note: Sizes shown include 7.8 mm width for motor mounting plate.

#### Required for SIMO Series driven systems:

Minimum overtravel (OT)

- 10 mm for ≤ 300 mm stroke
- 25 mm for > 300 mm stroke

### Overall Length Calculation

$$\begin{aligned}
 &\text{Over-Travel Drive End} = \text{_____} \text{ mm} \\
 &+ \text{Carriage} = 100 \text{ mm} \\
 &+ \text{Stroke} = \text{_____} \text{ mm} \\
 &+ \text{Over-Travel Idle End} = \text{_____} \text{ mm} \\
 &= * \text{Rail} = \text{_____} \text{ mm} \\
 &+ \text{End Blocks} = \text{_____} \text{ mm} \\
 &+ \text{Motor \& Mounting Plate Length} = \text{_____} \text{ mm} \\
 &= \text{Overall Length} = \text{_____} \text{ mm}
 \end{aligned}$$

\* Rail dimension is specified at time of order

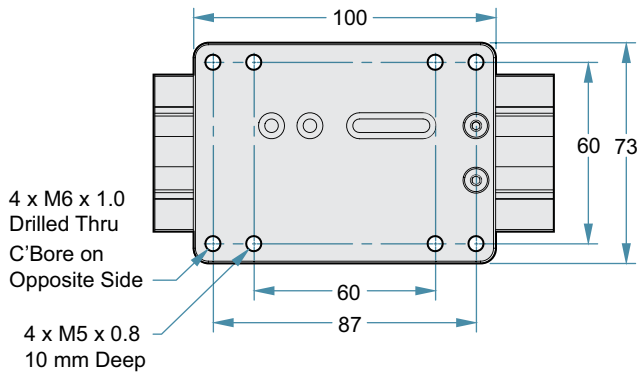


Visit [pbclinear.com](http://pbclinear.com) for complete specifications

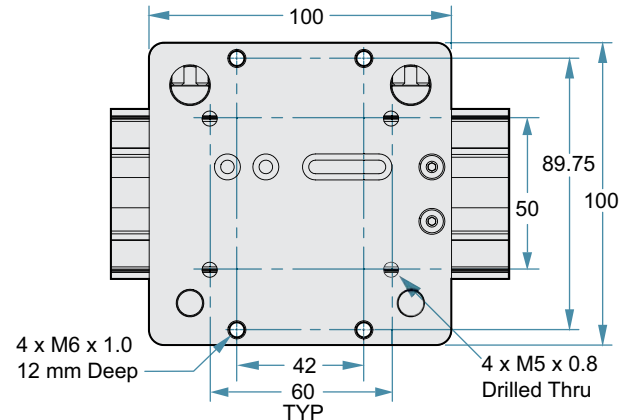
## Lead Screw System

### Carriage Dimensions Top View

#### Gliding Surface Technology – Plain Bearing



#### Cam Roller Technology – V-Guide Bearings



Uniform Dimensioning Provides Design Flexibility

### System Ordering Information

| UG          | X                               | 040        | D          | - | XX  | X   | - | XXXX  | - | LS            | X  | - | XX  | X   | 1                                 | -          | 0  |
|-------------|---------------------------------|------------|------------|---|---|---|---|---|---|---------------|--|---|---|---|-----------------------------------|------------|--|
| Series      | Rail Type                       | Rail Width | Order Type |   | Carriage Type   | Options   |   | Rail Length   |   | Drive Type    | Drive End Option   |   | Motor Option  | Lead (mm)   | Nut                               | Accuracy   | Other Options  |
| SIMO Series | A Low Profile<br>T Tall Profile | 40 mm      | D Driven   |   | A1 GST with Frelon GOLD<br><br>B2 V-Guide with Stainless Steel Sealed Rollers & Lubrication | 0 None<br>1 Hand Brake<br>2 Lube<br>3 Both<br><br>1 Lube (required) |   | 1500 mm MAX<br><br>Consult factory for longer lengths |   | LS Lead Screw | 1 Shaft or MTA MT<br>2 Knob<br><br>3 PBC Linear Integrated Motor Screw |   | 00 No Motor/Stub Shaft Only<br><br>A1 42 mm (N17) Single Stack<br>A2 42 mm (N17) Double Stack<br>B4 56 mm (N23) Single Stack<br>B5 56 mm (N23) Double Stack<br>B6 56 mm (N23) Triple Stack<br><br>Third Party MTR MT Options<br>ZE 40 mm<br>ZF 42 mm (N17)<br>ZG 56-58 mm (N23)<br>ZH 60 mm<br>ZO Blank Plate | AF - 16<br>AJ - 10<br>AX - 5<br>AG - 2<br>AH - 1<br>AW - 25<br>BD - 12<br>BH - 8<br>BG - 6<br>AR - 4<br><br>Consult factory for other leads | 1 Standard<br><br>2 Anti-Backlash | 1 Class 10 | 0 = 1/1<br>1 = 2/1<br>2 = 2/2<br>3 = 3/1<br>4 = 3/2<br>5 = 3/3<br>6 = 4/1<br>7 = 4/2<br>8 = 4/3<br>9 = 4/4<br><br># Carriages/<br>Master car<br>poition from<br>drive end. |



Configure  
Online



See page 31 for replacement  
lubrication kits



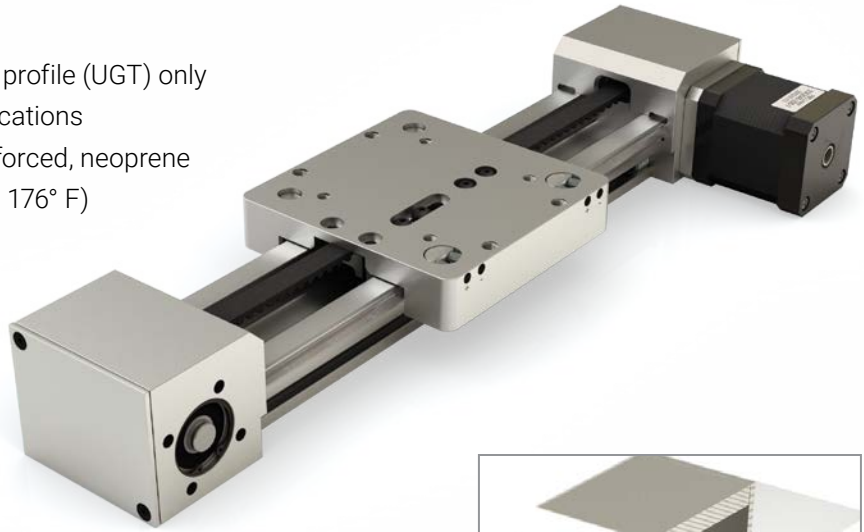
Email an  
Application Engineer

Ordering example: UGT040D-A10-0900-LS3A1-AF11-0. This is a SIMO Series, plain bearing – GST gliding surface technology, tall profile rail, 900 mm length, lead screw driven, PBC Linear integrated motor screw, 42 mm (NEMA 17) single stack motor, 16 mm lead, standard nut, accuracy class 10.

## Belt Drive System Horizontal Motor Mount

### Overview

- Horizontal motor mount available in the tall profile (UGT) only
- Ideal for higher speed, high duty cycle applications
- Belt material: nylon covered, fiberglass reinforced, neoprene
- Temperature range: 0° C to +80° C (32° F to 176° F)
- Rounded GT®2 tooth design creates better engagement with the pulley resulting in greater torque transfer, reduced vibration, and extended life

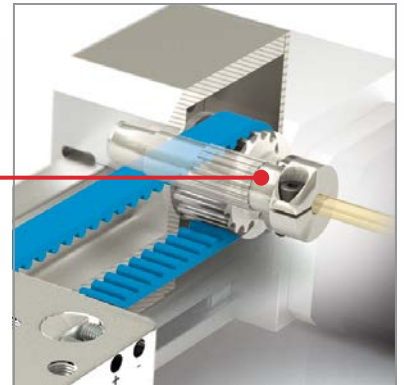


### Motor Options and Benefits

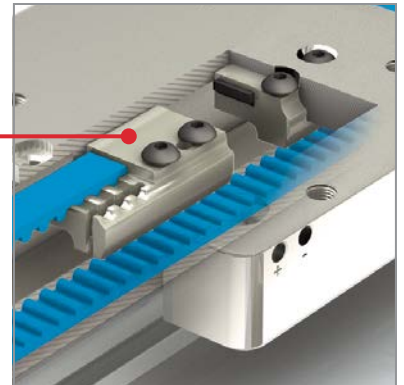
- Standard integrated stepper motors
  - 42 mm (NEMA 17)
  - 56 mm (NEMA 23)
- Split collar connection to integrated pulley
- Integrated shaft reduces pulley runout
- Reduces system cost
- Optional stub shaft and motor adapter plate – consult factory



Split collar drive shaft connects integrated pulley shaft and motor



Independent belt clamps allow for tensioning adjustments



**Detailed information on motors on page 30**

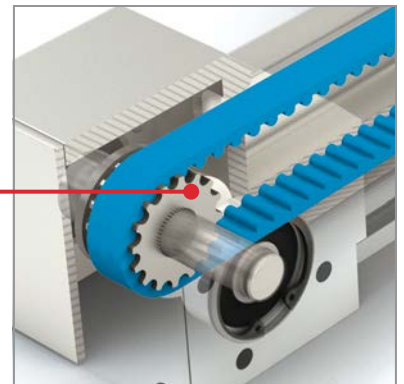
### Accessories

- Sensor brackets
- Toe clamps and t-nuts
- Covers
- Optional motor mounts



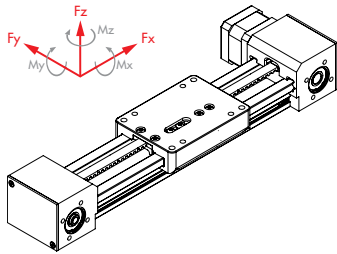
**Detailed information on accessories on page 31**

Idle end pulley incorporates integrated shaft design

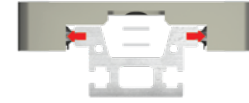




## Belt Drive System Horizontal Motor Mount



**GST**  
Plain Bearing  
Tall Rail Only

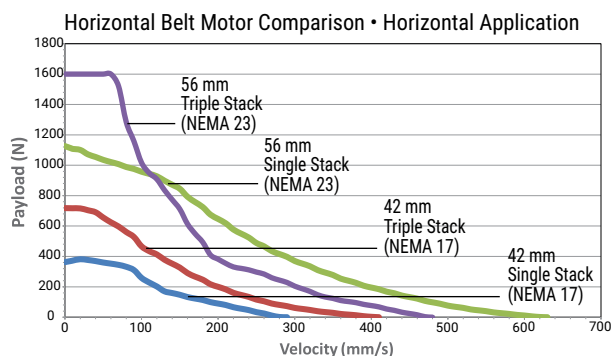


**CRT**  
V-Guide  
Tall Rail Only

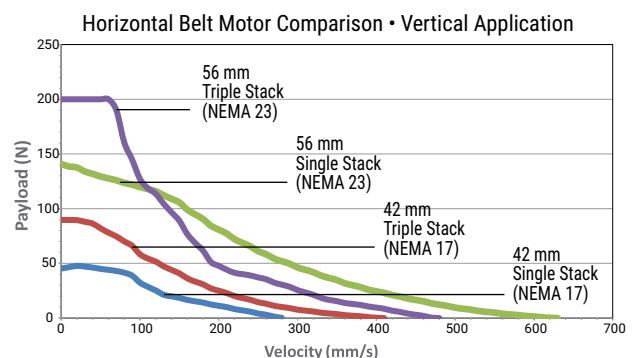
| Basic System Properties   |               |                       |                        |
|---|---------------|-----------------------|------------------------|
| MAX Velocity, no lube, continuous motion                                    | m/s           | 1.5                   | Requires Lubrication   |
| MAX Velocity, intermittent motion or with lube                              | m/s           | 4.2                   | 5.5                    |
| MAX Acceleration ***  | m/s2          | 50                    | 50                     |
| Stroke Length (MIN recommended)   | mm            | 5                     | 5                      |
| Stroke Length (Maximum)   | mm            | 1900                  | 1900                   |
| Belt Type & Size  |               | GT®2 - 5 mm           |                        |
| MAX Drive (input) Torque  | Nm            | 2.31                  |                        |
| Pulley Ratio  | mm/rev        | 80                    |                        |
| Pulley Pitch Diameter   | mm            | 25.5                  |                        |
| MAX Drive (input) Speed   | rpm           | 3000                  |                        |
| Normal Operating Temperatures - MIN – MAX                                   | °C            | 0° - 80°              |                        |
| Carriage Weight   | Kg            | 0.235                 | 0.355                  |
| Rail + Belt Weight  | Kg/m          | 1.73                  | 1.98                   |
| System Weight (excluding motor)   | Kg            | 0.5 + (1.73 * length) | 0.62 + (1.98 * length) |
| Static & Dynamic System Properties  |               |                       |                        |
| MAX Static Load*  | Fx            | N                     | 200                    |
|   | Fy            |                       | 740                    |
|   | Fz (Normal)   |                       | 880                    |
|   | Fz (Inverted) |                       | 880                    |
| MAX Dynamic Load*<br>(For PBC Linear supplied motor, refer to charts below) | Fx            | N                     | 200                    |
|   | Fy            |                       | 740                    |
|   | Fz(Normal)    |                       | 880                    |
|   | Fz (Inverted) |                       | 880                    |
| MAX Moments*  | Mx            | Nm                    | 15                     |
|   | My            |                       | 25                     |
|   | Mz            |                       | 35                     |
|   |               |                       | 120                    |
| Coefficient of Friction (linear guide)      μ                               |               |                       | 0.125                  |
|   |               |                       | 0.02                   |

\*The above moments and loads are MAX values, please consult or technical department for further information. \*\* Refer to pages 45 & 46 for combined load calculations. \*\*\*Increased acceleration may be possible in limited cases. Consult factory if exceeding limit.

### Horizontal Applications



### Vertical Applications



Note: Based on 2 m stroke, .125 C.O.F., and .3G acceleration.  
Use caution when applying a belt drive in a vertical application.  
Higher voltage amplifiers may produce higher speeds.

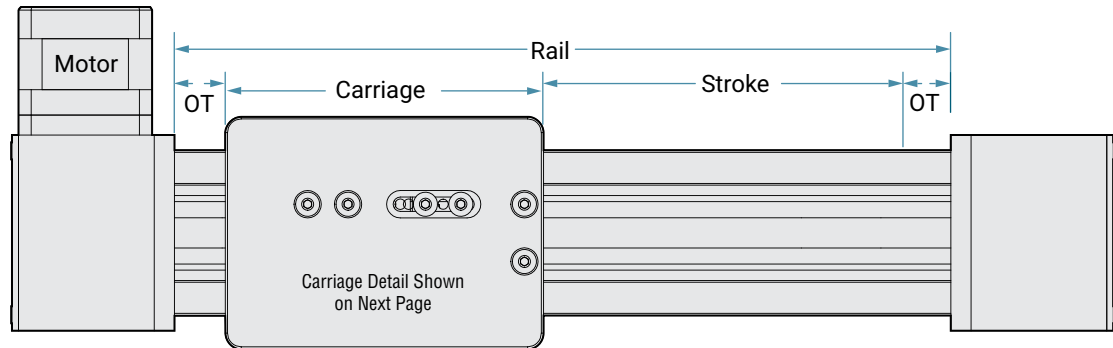


**Link to Motor  
Specifications Document**

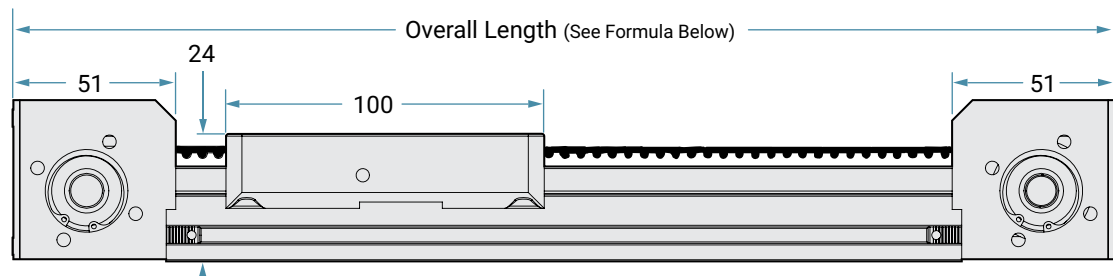
## Belt Drive System Horizontal Motor Mount

### System Dimensions

#### Top View



#### Side View UGT Tall Rail



Note: GST bearing system shown.

#### Required for SIMO Series driven systems:

Minimum overtravel (OT)

- 10 mm for  $\leq 300$  mm stroke
- 25 mm for  $> 300$  mm stroke

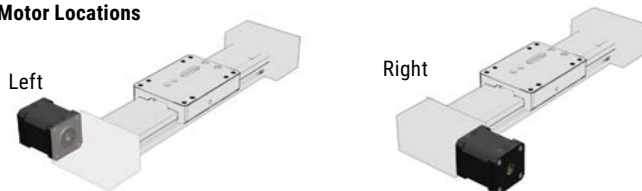
### Overall Length Calculation

$$\begin{aligned}
 &\text{Over-Travel Drive End} = \text{_____} \text{ mm} \\
 &+ \text{Carriage} = \text{100} \text{ mm} \\
 &+ \text{Stroke} = \text{_____} \text{ mm} \\
 &+ \text{Over-Travel Idle End} = \text{_____} \text{ mm} \\
 &= * \text{Rail} = \text{_____} \text{ mm} \\
 &+ \text{End Blocks} = \text{_____} \text{ mm} \\
 &= \text{Overall Length} = \text{_____} \text{ mm}
 \end{aligned}$$

### Motor Lengths (Plus Mounting Plate)

| Motor Size      | Single Stack | Double Stack | Triple Stack |
|-----------------|--------------|--------------|--------------|
| 42 mm (NEMA 17) | 40 mm        | 48 mm        | 61 mm        |
| 56 mm (NEMA 23) | 55 mm        | 77 mm        | 77 mm        |

#### Motor Locations



Note: Specify motor location (in part number) for PBC Linear integrated motors. Contact factory for stub shaft and optional motor mounting plates.

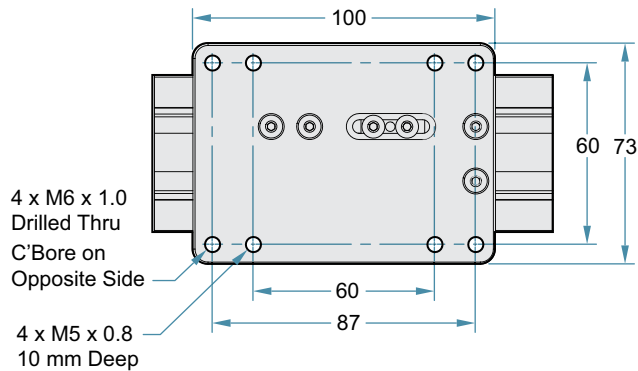
\* Rail dimension is specified at time of order

 **Email an  
Application Engineer**

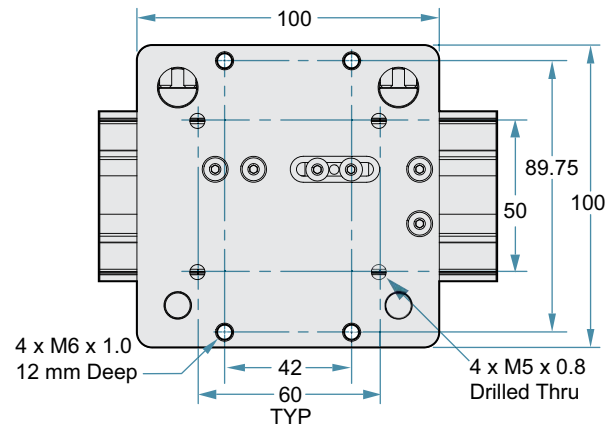
## Belt Drive System Horizontal Motor Mount

### Carriage Dimensions Top View

#### Gliding Surface Technology – Plain Bearing



#### Cam Roller Technology – V-Guide Bearings



Uniform Dimensioning Provides Design Flexibility

### System Ordering Information

| UG          | T              | 040        | D          | - | XX                      | X  | - | XXXX  | - | BD            | X                | XX   | - | 00          | X   | 0          | - | 0   |
|-------------|----------------|------------|------------|---|-------------------------|--|---|---|---|---------------|------------------|--|---|-------------|---|------------|---|---|
| Series      | Rail Type      | Rail Width | Order Type |   | Carriage Type           | Options                                    |   | Rail Length   |   | Drive Type    | Drive End Option | Motor Option   |   | Lead (mm)   | Motor Position  | Accuracy   |   | # * Carriages   |
| SIMO Series | T Tall Profile | 40 mm      | D Driven   |   | A1 GST with Frelon GOLD | 0 None<br>1 Hand Brake<br>2 Lube<br>3 Both |   | 2000 mm MAX<br><br>Consult factory for longer lengths |   | BD Belt Drive | 1 Standard       | 00 No Motor/Stub Shaft Only<br><br>Integrated Motor<br>B4 56 mm (N23) Single Stack<br>B5 56 mm (N23) Double Stack<br>B6 56 mm (N23) Triple Stack<br><br>3rd Party Motor Mount<br>1ZE 40 mm<br>1ZF 42 mm (N17)<br>1ZG 56-58 mm (N23)<br>1ZH 60 mm<br>1ZO Blank Plate<br><br>For custom options consult an application engineer at PBC Linear, 800-962-8979. |   | 00 Not Used | L Left<br>R Right<br>D Dual Stub Shaft<br>DL Dual Stub Shaft Left Mount<br>DR Dual Stub Shaft Right Mount | 0 Not Used |   | 0 = 1/1<br>1 = 2/1<br>2 = 2/2<br>3 = 3/1<br>4 = 3/2<br>5 = 3/3<br>6 = 4/1<br>7 = 4/2<br>8 = 4/3<br>9 = 4/4<br><br># Carriages/<br>Master car<br>position from<br>drive end. |



Configure  
Online



See page 31 for replacement  
lubrication kits



Email an  
Application Engineer

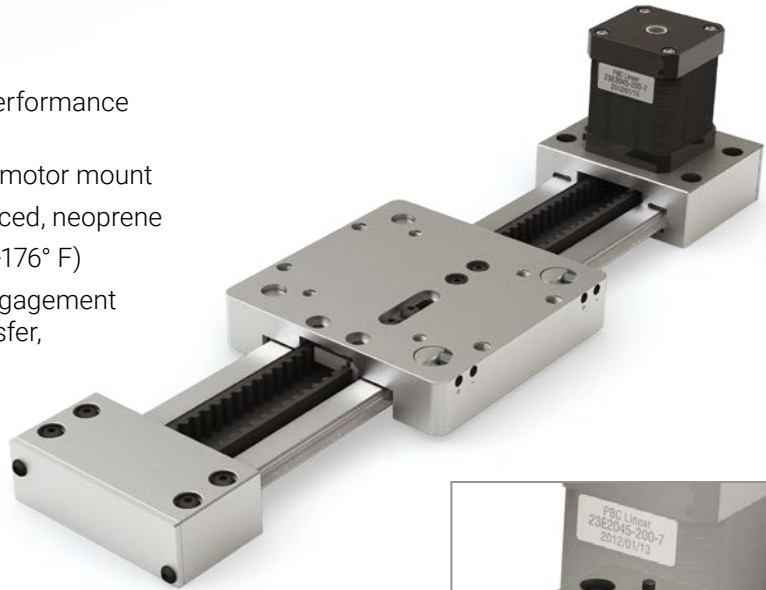
Ordering example: UGT040D-A10-0900-BD1A1-00L0-0. This is a SIMO Series, plain bearing – GST gliding surface technology, tall profile rail, 900 mm length, belt driven, 42 mm (NEMA 17) single stack motor, positioned on the left.

\*Note: Additional carriages are idlers.

## Belt Drive System Vertical Motor Mount

### Overview

- Vertical motor mount allows for high speed performance in the (UGA) low profile rail
- Consult factory for (UGT) tall rail with vertical motor mount
- Belt material: nylon covered, fiberglass reinforced, neoprene
- Temperature range: 0° C to +80° C (-32° F to +176° F)
- Rounded GT®2 tooth design creates better engagement with the pulley resulting in greater torque transfer, reduced vibration, and extended life



### Motor Options and Benefits

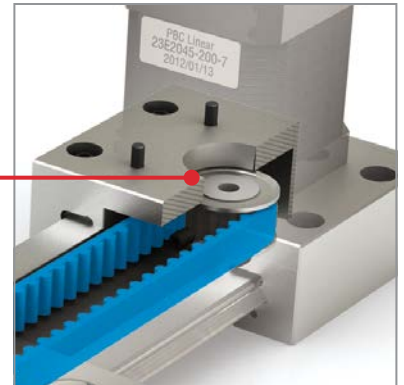
- Standard integrated stepper motors
  - 42 mm (NEMA 17)
  - 56 mm (NEMA 23)
- Integrated drive end pulley eliminates runout
- Reduces system cost
- Optional stub shaft and motor adapter plate – consult factory



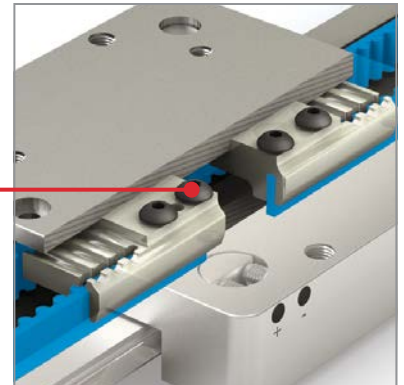
**Detailed information on motors on page 30**



Drive end pulley is directly integrated with motor shaft



Independent belt clamps allow for tensioning adjustments



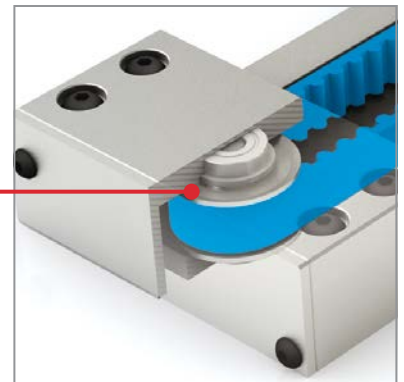
### Accessories

- Riser blocks
- Sensor brackets
- Brake knobs
- Covers



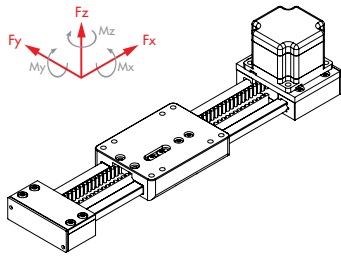
**Detailed information on accessories on page 31**

Idle end pulley incorporates integrated shaft design





## Belt Drive System Vertical Motor Mount



**GST**  
Plain Bearing  
Low Profile Rail  
Consult Factory for Tall Rail Options

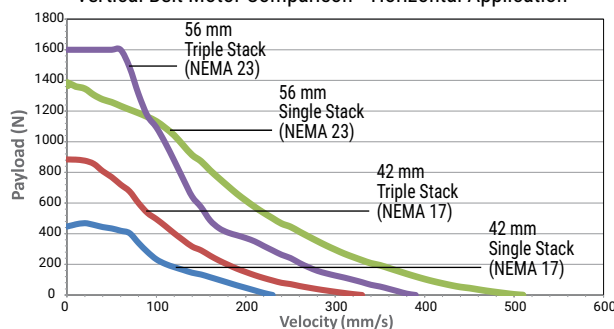
**CRT**  
V-Guide  
Low Profile Rail  
Consult Factory for Tall Rail Options

| Basic System Properties  |                  |                          |                          |
|--|------------------|--------------------------|--------------------------|
| MAX Velocity, no lube, continuous motion                                       | m/s              | 1.5                      | requires lubrication     |
| MAX Velocity, intermittent motion or with lube                                 | m/s              | 4.2                      | 5.5                      |
| MAX Acceleration ***   | m/s <sup>2</sup> | 50                       | 50                       |
| Stroke Length (MIN recommended)  | mm               | 5                        |                          |
| Stroke Length (Maximum)  | mm               | 1900                     | 1900                     |
| Belt Type & Size   |                  | GT®2 - 5 mm              |                          |
| Normal Operating Temperatures - MIN - MAX                                      | °C               | 0° - 80°                 |                          |
| Pulley Ratio   | mm/rev           | 65                       |                          |
| Pulley Pitch Diameter  | mm               | 20.7                     |                          |
| MAX Drive (input) Torque   | Nm               | 2.31                     |                          |
| MAX Drive (input) Speed  | rpm              | 3000                     |                          |
| Carriage Weight  | Kg               | 0.235                    | 0.355                    |
| Rail + Belt Weight   | Kg/m             | 1.0806                   | 1.7496                   |
| System Weight (excluding motor)  | Kg               | 0.41 + (1.0806 * length) | 0.53 + (1.7496 * length) |
| Static & Dynamic System Properties   |                  |                          |                          |
| MAX Static Load*   | Fx               | N                        | 200                      |
|  | Fy               |                          | 3150                     |
|  | Fz (Normal)      |                          | 6000                     |
|  | Fz (Inverted)    |                          | 2220                     |
| MAX Dynamic Load*<br>(For PBC Linear supplied motor,<br>refer to charts below) | Fx               | N                        | 200                      |
|  | Fy               |                          | 1600                     |
|  | Fz (Normal)      |                          | 1600                     |
|  | Fz (Inverted)    |                          | 1600                     |
| MAX Moments*   | Mx               | Nm                       | 100                      |
|  | My               |                          | 130                      |
|  | Mz               |                          | 120                      |
|  |                  |                          | 15                       |
| Coefficient of Friction (linear guide) $\mu$                                   |                  |                          | 0.125                    |
|  |                  |                          | 0.02                     |

\*The above moments and loads are MAX values, please consult or technical department for further information. \*\* Refer to pages 45 & 46 for combined load calculations. \*\*\*Increased acceleration may be possible in limited cases. Consult factory if exceeding limit.

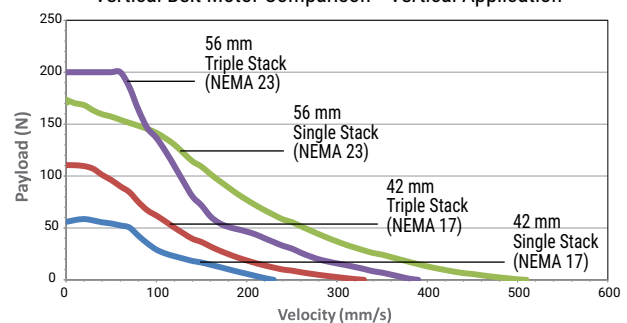
### Horizontal Applications

Vertical Belt Motor Comparison • Horizontal Application



### Vertical Applications

Vertical Belt Motor Comparison • Vertical Application

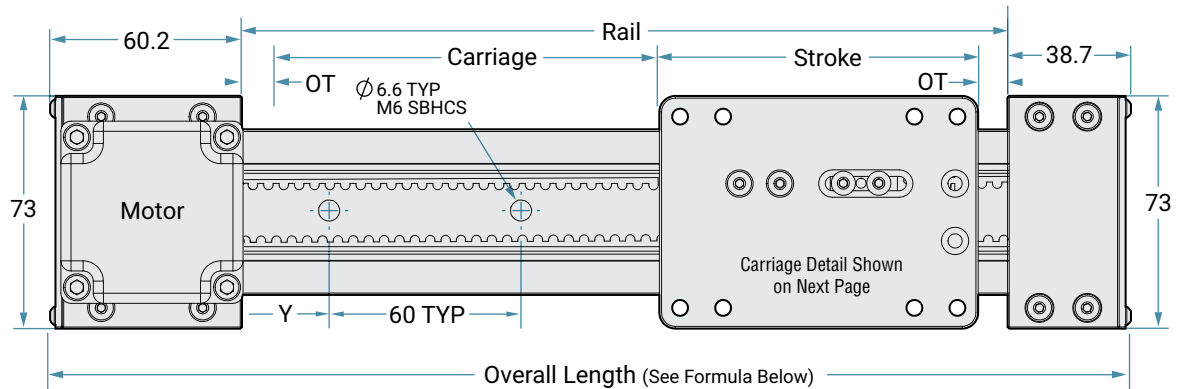


Note: Based on 2 m stroke, .125 C.O.F., and .3G acceleration. Use caution when applying a belt drive in a vertical application. Higher voltage amplifiers may produce higher speeds.

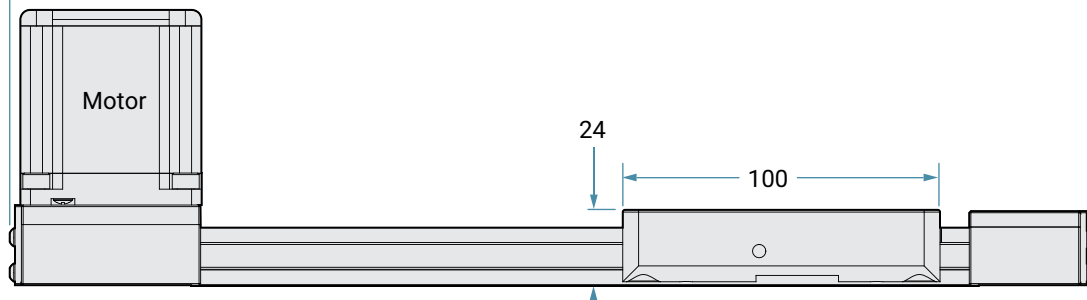
## Belt Drive System Vertical Motor Mount

### System Dimensions

Top View



Side View  
UGA Low  
Profile Rail



Note: GST bearing system shown. For low profile rail (UGA), specify Y dimension (hole to end) at time of order. No rail mounting holes in tall rail version (UGT). Tall rail version is mounted with toe clamps. Consult factory for (UGT) tall rail options.

#### Required for SIMO Series driven systems:

Minimum overtravel (OT)

- 10 mm for  $\leq 300$  mm stroke
- 25 mm for  $> 300$  mm stroke



**Consult Factory**  
800-962-8979

### Overall Length Calculation

$$\begin{aligned}
 &\text{Over-Travel Drive End} = \text{_____} \text{ mm} \\
 &+ \text{Carriage} = \text{100} \text{ mm} \\
 &+ \text{Stroke} = \text{_____} \text{ mm} \\
 &+ \text{Over-Travel Idle End} = \text{_____} \text{ mm} \\
 &= \text{*Rail} = \text{_____} \text{ mm} \\
 &+ \text{End Blocks} = \text{_____} \text{ mm} \\
 &= \text{Overall Length} = \text{_____} \text{ mm}
 \end{aligned}$$

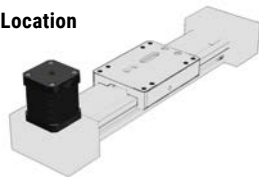
\* Rail dimension is specified at time of order

### Motor Lengths (Plus Mounting Plate)

| Motor Size      | Single Stack | Double Stack | Triple Stack |
|-----------------|--------------|--------------|--------------|
| 42 mm (NEMA 17) | 40 mm        | 48 mm        | 61 mm        |
| 56 mm (NEMA 23) | 55 mm        | 77 mm        | 77 mm        |

#### Motor Location

Top



Note: Specify motor location (in part number) for PBC Linear integrated motors. Contact factory for stub shaft and optional motor mounting plates.

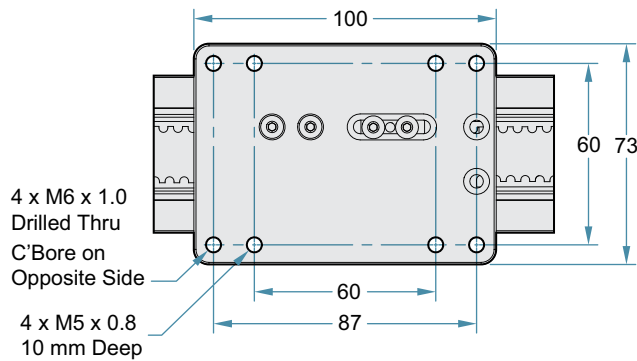


**Email an  
Application Engineer**

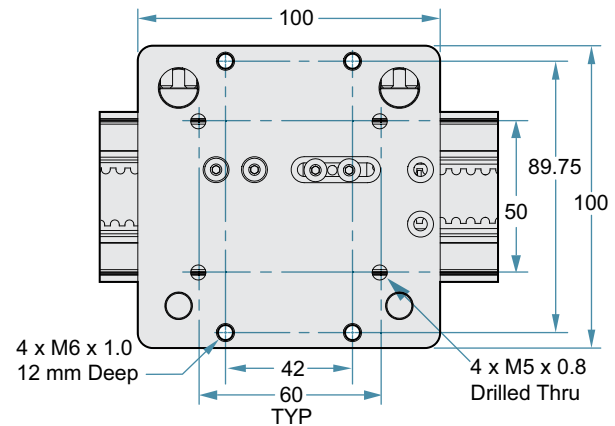
## Belt Drive System Vertical Motor Mount

### Carriage Dimensions Top View

#### Gliding Surface Technology – Plain Bearing



#### Cam Roller Technology – V-Guide Bearings



Uniform Dimensioning Provides Design Flexibility

### System Ordering Information

| UG          | A  | 040        | D          | - | XX  | X   | - | XXXX  | - | BD            | X                | XX   | - | 00          | X              | 0          | - | 0  |
|-------------|--|------------|------------|---|---|---|---|---|---|---------------|------------------|--|---|-------------|----------------|------------|---|--|
| Series      | Rail Type  | Rail Width | Order Type |   | Carriage Type   | Options   |   | Rail Length   |   | Drive Type    | Drive End Option | Motor Option   |   | Lead (mm)   | Motor Position | Accuracy   |   | # * Carriages  |
| SIMO Series | A Low Profile<br><br>Consult factory for tall profile rail options | 40 mm      | D Driven   |   | A1 GST with Frelon GOLD<br><br>B2 V-Guide with Stainless Steel Sealed Rollers & Lubrication | 0 None<br>1 Hand Brake<br>2 Lube<br>3 Both<br><br>1 Lube (required) |   | 2000 mm MAX<br><br>Consult factory for longer lengths |   | BD Belt Drive | 1 Standard       | 00 No Motor/Stub Shaft Only<br><br>Integrated Motor<br>B4 56 mm (N23) Single Stack<br>B5 56 mm (N23) Double Stack<br>B6 56 mm (N23) Triple Stack<br><br>3rd Party Motor Mount<br>1ZE 40 mm<br>1ZF 42 mm (N17)<br>1ZG 56-58 mm (N23)<br>1ZH 60 mm<br>1ZO Blank Plate<br><br>For custom options consult an application engineer at PBC Linear, 800-962-8979. |   | 00 Not Used | T Top          | 0 Not Used |   | 0 = 1/1<br>1 = 2/1<br>2 = 2/2<br>3 = 3/1<br>4 = 3/2<br>5 = 3/3<br>6 = 4/1<br>7 = 4/2<br>8 = 4/3<br>9 = 4/4<br><br># Carriages/ Master car position from drive end. |



Configure Online



See page 31 for replacement lubrication kits



Email an Application Engineer

Ordering example: UGA040D-A10-0900-BD1A1-00T0-0. This is a SIMO Series, plain bearing – GST gliding surface technology, low profile rail, 900 mm length, belt driven, 42 mm (NEMA 17) single stack motor.

\*Note: Additional carriages are idlers.

## Motors SIMO Series

### Integrated Stepper Motor

The driven SIMO Series systems are optimized for use with integrated stepper motors.

- 42 mm (NEMA 17)
- 56 mm (NEMA 23)
- Single, double, triple stack
- Performance specifications for each drive type:
  - Lead screw – page 23
  - Belt drive with horizontal motor mount – page 27
  - Belt drive with vertical motor mount – page 31
  - Ball screw – consult factory
- Standard wire connection is onboard plug
- Optional connections – consult factory
- Third party motor mount also available



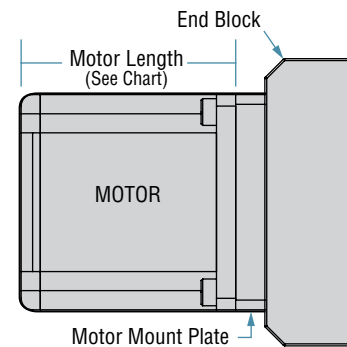
**Link to Motor Specifications Document**

### Motor Lengths

| Motor Size      | Single Stack | Double Stack | Triple Stack |
|-----------------|--------------|--------------|--------------|
| 42 mm (NEMA 17) | 40 mm        | 48 mm        | 61 mm        |
| 56 mm (NEMA 23) | 55 mm        | 77 mm        | 77 mm        |

Note: Overall length calculations should include 7.8 mm width for motor mounting plate.

### Top View



### Integrated Hybrid Linear Actuator Setup

- Lead screw aligned and fixed directly with motor
- Fewer components
- Greater accuracy
- More reliable
- Higher rigidity
- Greater value

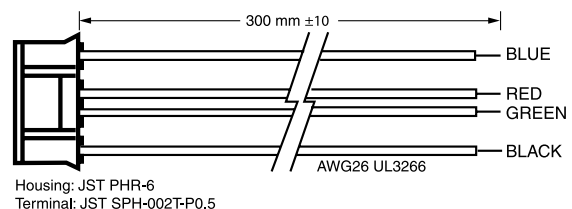


**Video Link: Constant Force Lead Screw Technology**

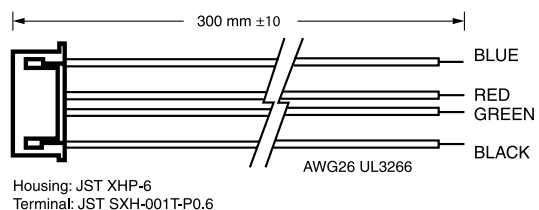
### Onboard Connector Plug

Included with Integrated Motor Actuator

NEMA 17 Connector  
PBC Part Number: 6200490



NEMA 23 Connector  
PBC Part Number: 6200491





## SIMO Series Application Data Sheet

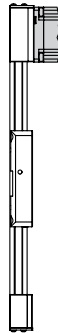
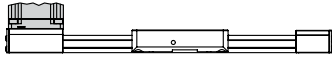
### Actuator Orientation



Horizontal



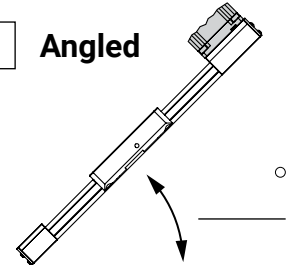
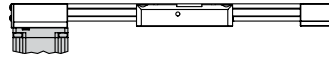
Vertical



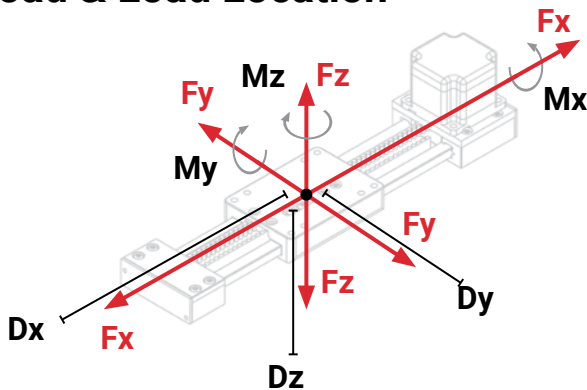
Inverted



Angled



### Load & Load Location



#### Load Applied

☐ lb

☐ N

FxA \_\_\_\_\_

FyA \_\_\_\_\_

FzA \_\_\_\_\_

#### Moment Applied

☐ in-lb

☐ N-m

MxA \_\_\_\_\_

MyA \_\_\_\_\_

MzA \_\_\_\_\_

#### Distance to Center of Gravity of Load

☐ in

☐ mm

Dx \_\_\_\_\_

Dy \_\_\_\_\_

Dz \_\_\_\_\_

### Motion Profile

Stroke Distance

☐ in

☐ mm

Move Time (seconds) \_\_\_\_\_

Dwell time (seconds) \_\_\_\_\_

Number of Cycles \_\_\_\_\_

☐ per min

☐ per hour

### Environment

☐ Clean Room

☐ General Shop

☐ Heavy Industrial

☐ Food/Washdown

☐ High Vibration

☐ Other: \_\_\_\_\_

### Bi-Directional Repeatability

☐  $> \pm 0.127$  mm ☐  $< \pm 0.127$  mm (Belt)

☐  $< \pm 0.1$  mm (Lead Screw)

☐  $< \pm 0.02$  mm (Anti-Backlash Lead Screw Nut)

☐ Other: \_\_\_\_\_

### General Application Description

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Date: \_\_\_\_\_

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Company Website: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

FAX TO: 815-389-5790

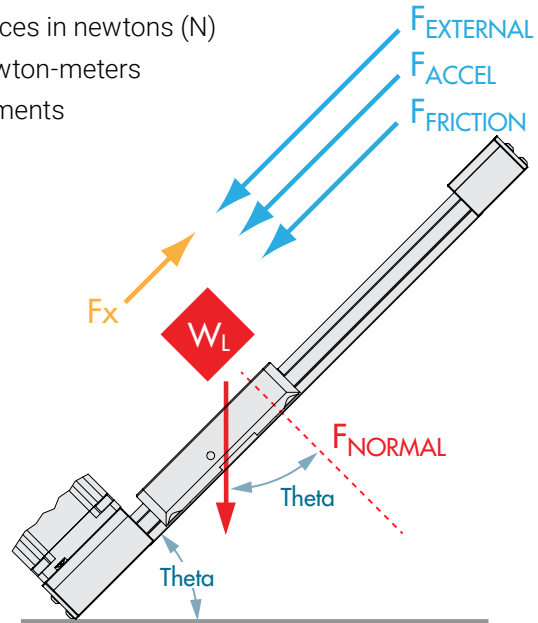
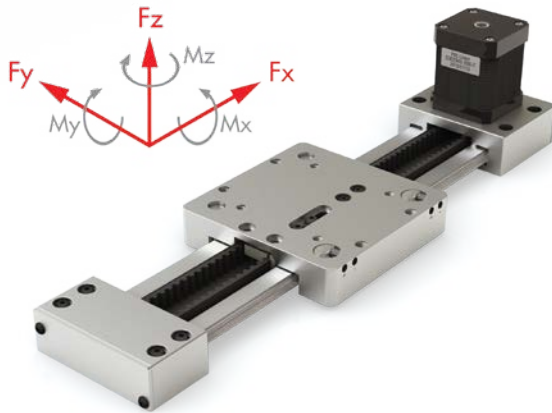
EMAIL TO: application.engineering@pbclinear.com

## SIMO Series Load Calculations

Inserting the values entered on page 29 and static maximum values from your selected configuration, use the formula below to verify acceptable loading conditions for your application.

Calculation Factors:

- $F_{ZA}$  and  $F_{YA}$  are the radial and axial results of applied external forces in newtons (N)
- $M_{XA}$ ,  $M_{YA}$  and  $M_{ZA}$  are the external moments being applied in newton-meters
- $F_y$ ,  $F_z$ ,  $M_x$ ,  $M_z$  are the load ratings for various directions and moments
- $Z$  is the relative safety factor as applied from the table below



### Single Load Force Calculations:

$$\frac{F_{ZA}}{F_z} < \frac{1}{Z}$$

$$\frac{F_{yA}}{F_y} < \frac{1}{Z}$$

$$\frac{M_{xA}}{M_x} < \frac{1}{Z}$$

$$\frac{M_{yA}}{M_y} < \frac{1}{Z}$$

$$\frac{M_{zA}}{M_z} < \frac{1}{Z}$$

### Multiple Load Force Calculation:

$$\frac{F_{ZA}}{F_z} + \frac{F_{yA}}{F_y} + \frac{M_{xA}}{M_x} + \frac{M_{yA}}{M_y} + \frac{M_{zA}}{M_z} < \frac{1}{Z}$$

### Safety Factor:

- Use the "Z" Safety Factor to adjust for dynamic forces and conditions particular to the application.

| Application Condition  | Z Safety Factor |
|--|-----------------|
| Consistently smooth motion with low frequency of travel reversal, slow speed (<30% MAX.), no shock load or vibration, no elastic yield or deformation, clean environment | 1.0 – 1.5       |
| Normal assembly or shop floor conditions, moderate speed (30% MAX. to 75% MAX.), normal shock or vibration conditions  | 1.5 – 2.0       |
| Frequent reversal of travel, high speeds (>75% MAX.), shock loads and/or vibration present, high elastic yield or deformation, heavy dirt and dust in environment        | 2.0 – 3.5       |

## SIMO Series Accessories

### Hand Knob

Hand adjustment knobs are used for manually adjusting screw driven systems

- Ideal for applications such as:
  - Camera or sensor placement, conveyor guide adjustments, jig, fixture, or tool making applications, and more!

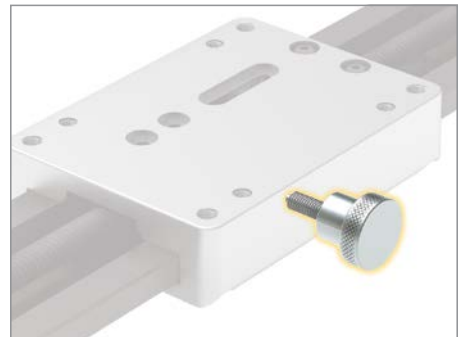


### Hand Brake

Hand brakes are used to manually lock position in GST screw driven systems

- Ideal for holding position in applications such as:
  - Label dispensing locations, bar code reader or sensor placements, pressure sensitive applications, and more!

Note: This is a friction brake (not a positive lock) and can be overcome if sufficient force is applied.

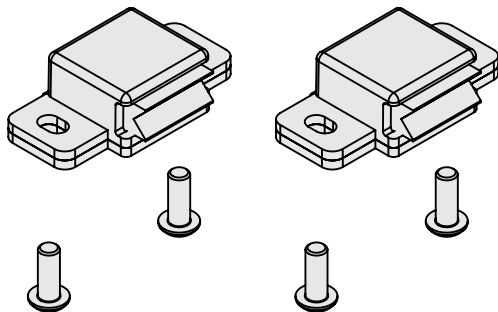


### Replacement Lubrication Kits

Used with CRT v-guide bearing systems

Part number: **UGA040A-LHA-KIT**

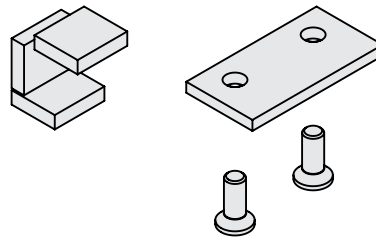
- (2) Lube Holder Asy RRC034 molded/hinged
- (4) BHSCS M3 x 0.5 x 8 mm long



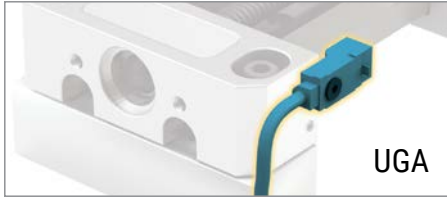
Used with GST plain bearing systems

Part number: **UGA040A-JKM-KIT**

- (2) Felt Strip F1 0.375 x 0.094 'k'
- (2) JKM Plate, UGA040
- (4) SFHCS M3 x 0.5 x 8 mm long




## SIMO Series Accessories



### Sensor Mounting

Sensor brackets accommodate a variety of sensor types

- End of travel / overtravel sensors
- Slot type sensors
- Proximity switches
- Consult factory for options

 **Consult Factory**  
800-962-8979



### Inductive Proximity Sensor Switches

Home sensor or position sensor with rectangular shape and only 11 mm width. DC 3-wire (10-30V DC)

6200418 Sensor, NPN, NO, 6200699 Sensor, PNP, NO



### Motor Mount

Motor mount option for attaching a stepper, servo, or smart motor, etc.

- One-piece main frame holds shaft-to-shaft centerline
- Easily attach with adapter plate and coupler
- Consult a PBC Linear Application Engineer about mounting options for other types of motor and coupler arrangements

 **Specifications on page 38**

 **Email an Application Engineer**



### System Covers

Covers help keep raceways clear of debris and contamination

- Consult a PBC Linear Application Engineer regarding your specific application to provide protection from corrosive elements in the application environment



### T-Nuts

Roll in t-nut for 5 mm slot with M5 tap. PBC Linear part number 6100443.



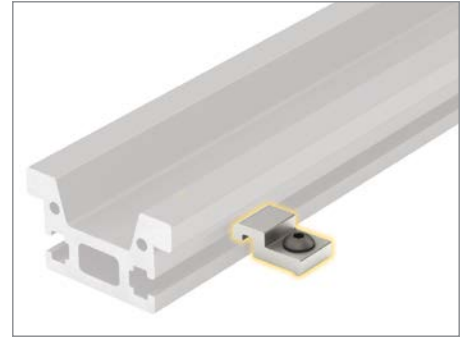
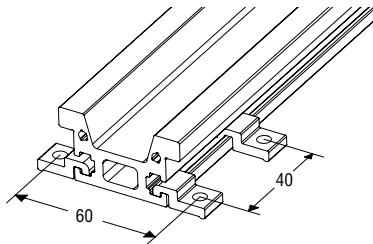
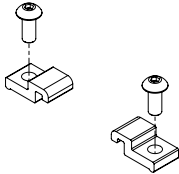
## SIMO Series Accessories

### Small Toe Clamp

Part Number: **UGT040A-TC-1**

Small toe clamps are used to secure the (UGT) tall rail to the mounting surface

- Mounted with one M5 x 0.8 BHCS (not included)
- 40 mm max spacing between clamps

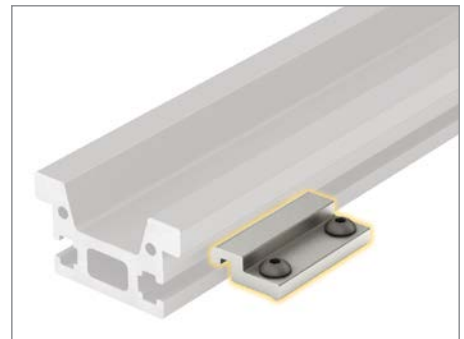
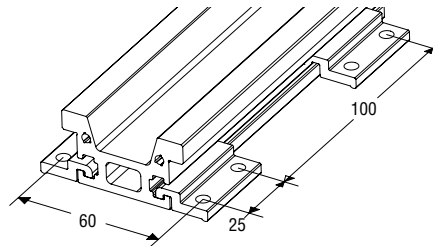
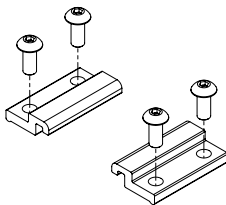


### Large Toe Clamp

Part Number: **UGT040A-TC-2**

Large toe clamps are used to secure the (UGT) tall rail to the mounting surface

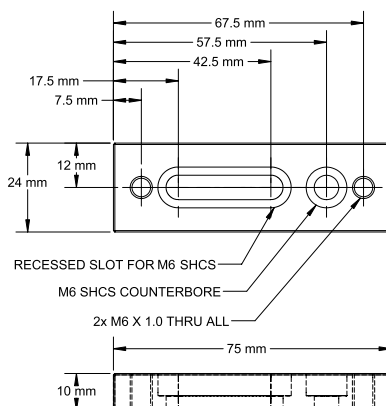
- Mounted with two M5 x 0.8 BHCS (not included)
- 100 mm max spacing between clamps



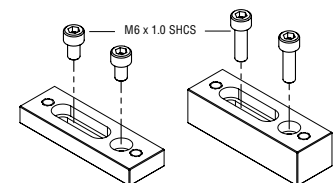
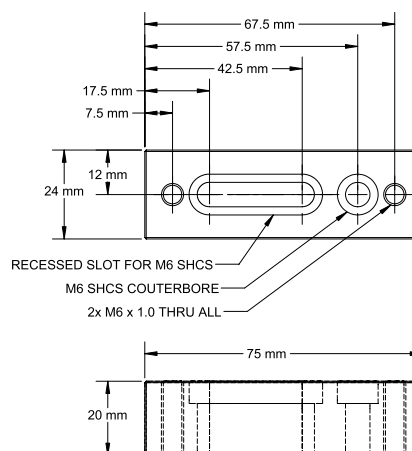
### Riser Block

Riser blocks provide clearance for the motor when using the (UGA) low profile rail

**10 mm Height Riser Block Dimensions**  
Typically used with 42 mm (NEMA 17) motor



**20 mm Height Riser Block Dimensions**  
Typically used with 56 mm (NEMA 23) motor



Part number: **UGA040A-RSRPLT-10**  
42 mm (Nema 17)

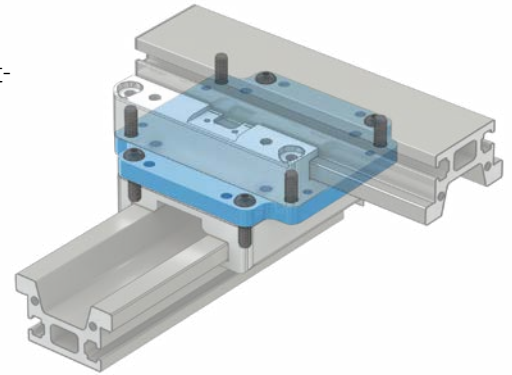
**UGA040A-RSRPLT-20**  
56 mm (Nema 23)

## Multi-Axis Systems Mounting Plates

### Option 1 Carriage-To-Carriage Mounting

Design multi-axis systems easily with the versatile carriage to carriage mounting plate.

- Attach any combination of SIMO Series bearing type – GST, CRT, PRT
- Units may be comprised of either UGA (low profile) and/or UGT (tall) rails



#### Easy step-by-step mounting process:

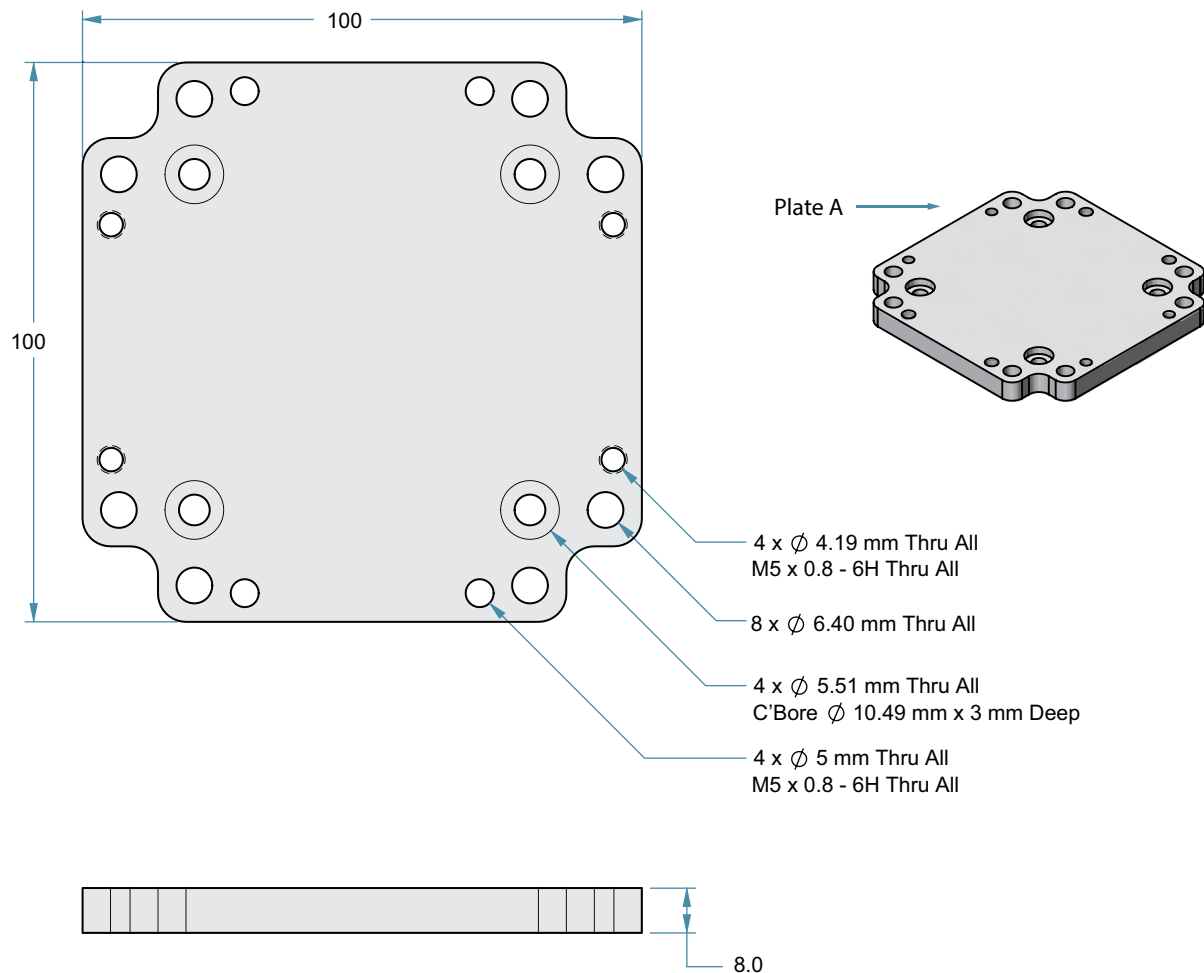
**Step 1:** Attach mounting plate to the base carriage

**Step 2:** Fasten screws (PBC Linear recommends using a low strength thread locker)

**Step 3:** Attach top carriage

**Step 4:** Fasten screws (PBC Linear recommends using a low strength thread locker)

### Mounting Plate Specifications Carriage-To-Carriage



# LDA Belgium

## Multi-Axis Systems Mounting Plates

### Option 2 Carriage-To-Rail Mounting

Design complex multi-axis systems easily with the carriage to rail mounting plate.

#### Easy step-by-step mounting process:

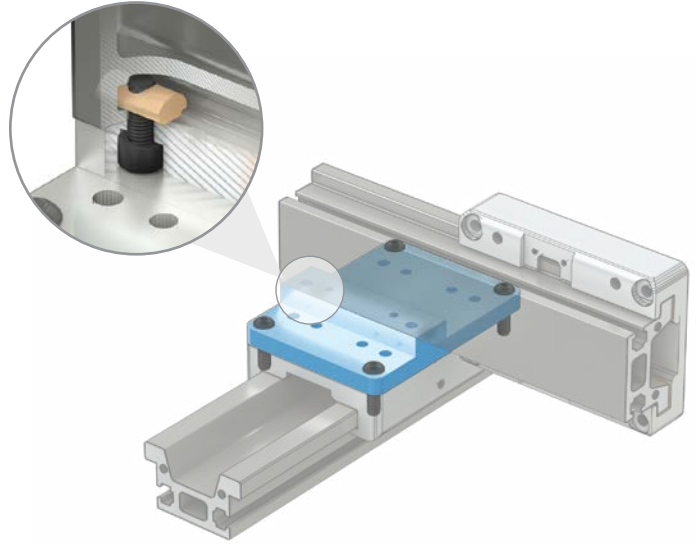
Note: For GST & CRT base-mounted assemblies (Kit #5), attach the top rail to the base carriage using toe clamps – no bracket is necessary. For side-mounted assemblies (Kit #6), attach plate B2 to plate B1, and position t-nuts in rail prior to the following steps.

**Step 1:** Attach mounting plate to the base carriage

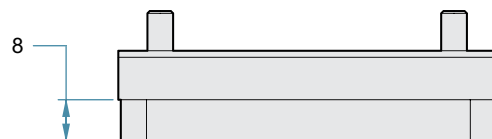
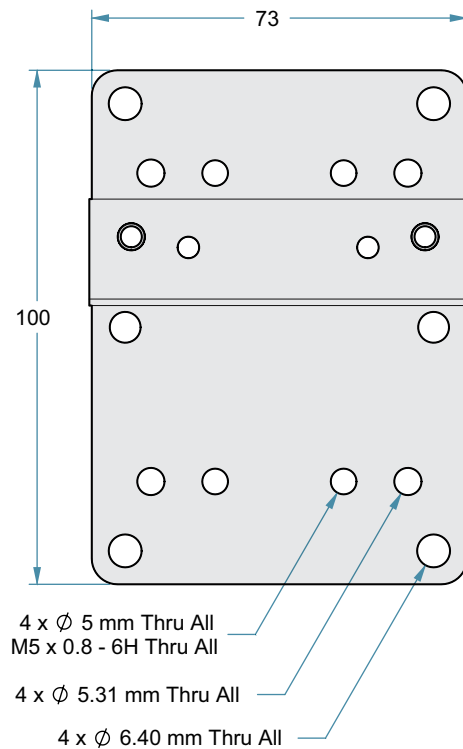
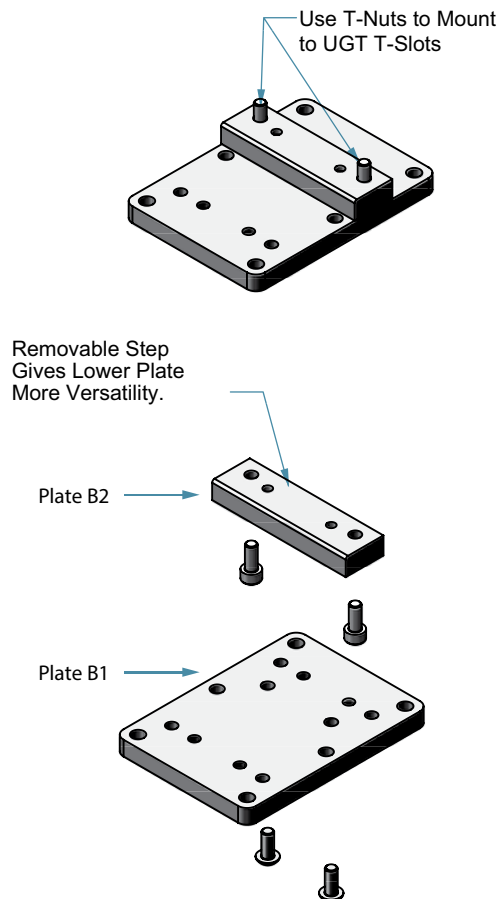
**Step 2:** Fasten screws (PBC Linear recommends using a low strength thread locker)

**Step 3:** Attach top rail, either with t-nuts (Kit #6), toe clamps (Kit #7), or by using the holes in the top rail (Kit #8).

**Step 4:** Fasten screws (PBC Linear recommends using a low strength thread locker)



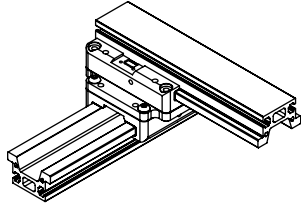
### Mounting Plate Specifications Carriage-To-Rail



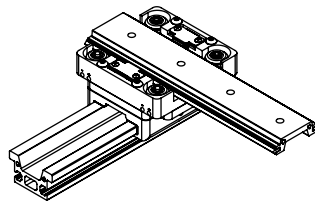
## Multi-Axis Systems Mounting Plates

### Option 1 Carriage-To-Carriage Mounting

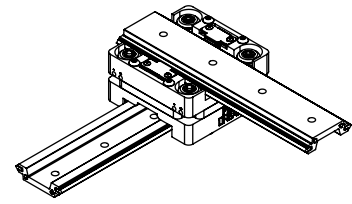
Connect any combination of UGA (low profile) and UGT (tall) rails using the carriage-to-carriage mounting plate.



Two UGT (tall) rails connected with the carriage mounting plate.

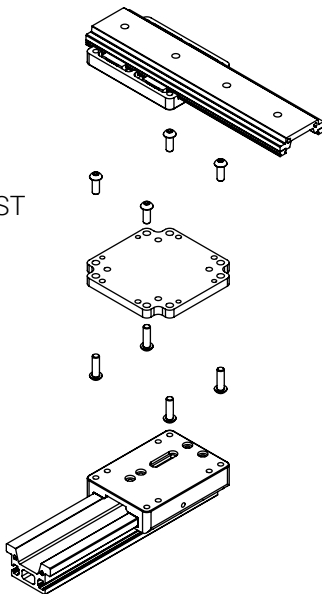


A combination—one UGT (tall) and one UGA (low profile) rail attached with the carriage mounting plate.

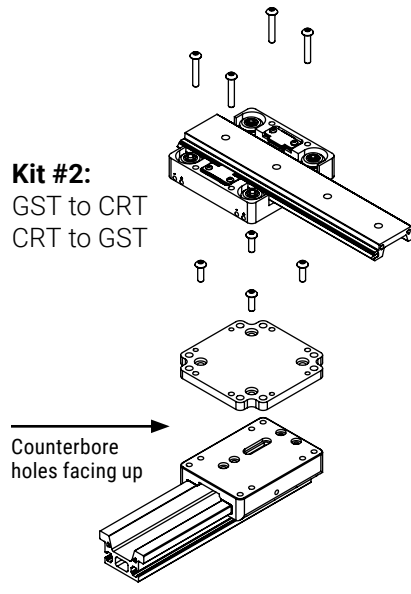


Two UGA (low profile) rails connected with the carriage mounting plate.

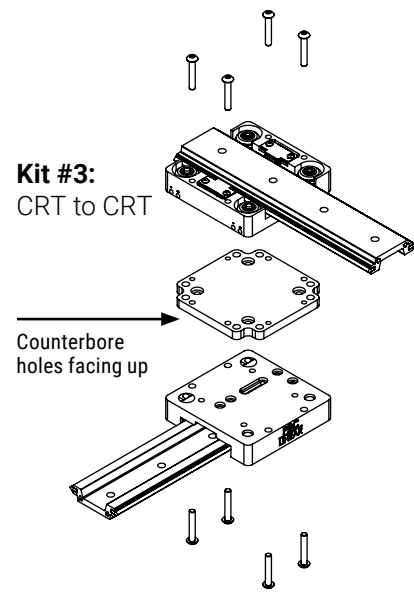
**Kit #1:**  
GST to GST



**Kit #2:**  
GST to CRT  
CRT to GST



**Kit #3:**  
CRT to CRT



### Ordering Information Carriage-To-Carriage Mounting

|   | Base System | Attached To | Parts Included in Kit  | Qty    | Kit Part Number |
|---|-------------|-------------|--|--------|-----------------|
| 1 | GST         | GST         | Plate A (carriage-to-carriage)<br>BHSCS M6 x 20                  | 1<br>8 | LATA-KIT-038    |
| 2 | GST         | CRT         | Plate A (carriage-to-carriage)<br>BHSCS M5 x 16<br>BHSCS M5 x 30 | 1      | LATA-KIT-039    |
|   | CRT         | GST         |  | 4<br>4 |                 |
| 3 | CRT         | CRT         | Plate A (carriage-to-carriage)<br>BHSCS M5 x 30                  | 1<br>8 | LATA-KIT-041    |

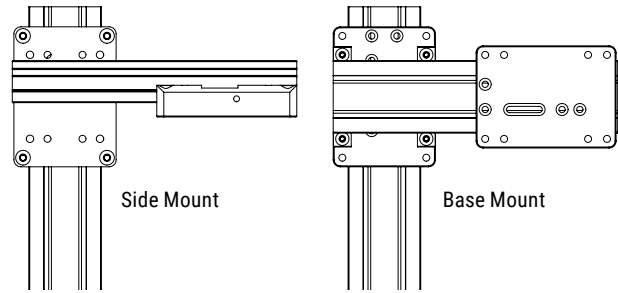
Note: **GST** = Gliding Surface Technology—Plain Bearings, **CRT** = Cam Roller Technology—V-Guide Bearings, **UGA** = Low profile rail, **UGT** = Tall rail.  
The carriage-to-carriage mounting plate has counterbores on one side to allow for flush mounting.



## Multi-Axis Systems Mounting Plates

### Option 2 Carriage-To-Rail Mounting

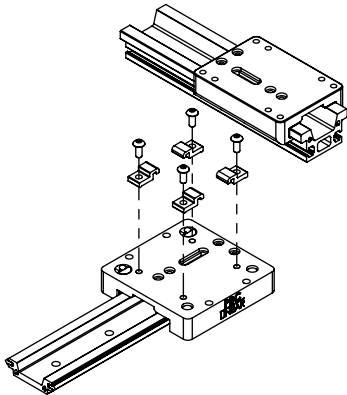
Rails can be mounted via side mount or base mount depending on the application requirements.



#### Kit #4:

GST to UGT Rail  
CRT to UGT Rail

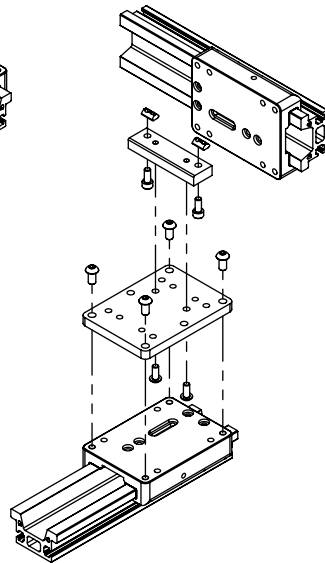
\* Base mount with toe clamps



#### Kit #5:

GST to UGT Rail  
CRT to UGT Rail

\* Side mount with t-nuts

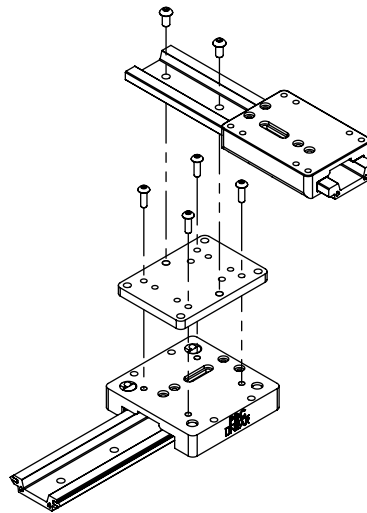


#### Kit #6:

GST to UGA Rail  
CRT to UGA Rail

\* Base mount with screws

\*\* Not designed for lead screw driven systems



### Ordering Information Carriage-To-Rail Mounting

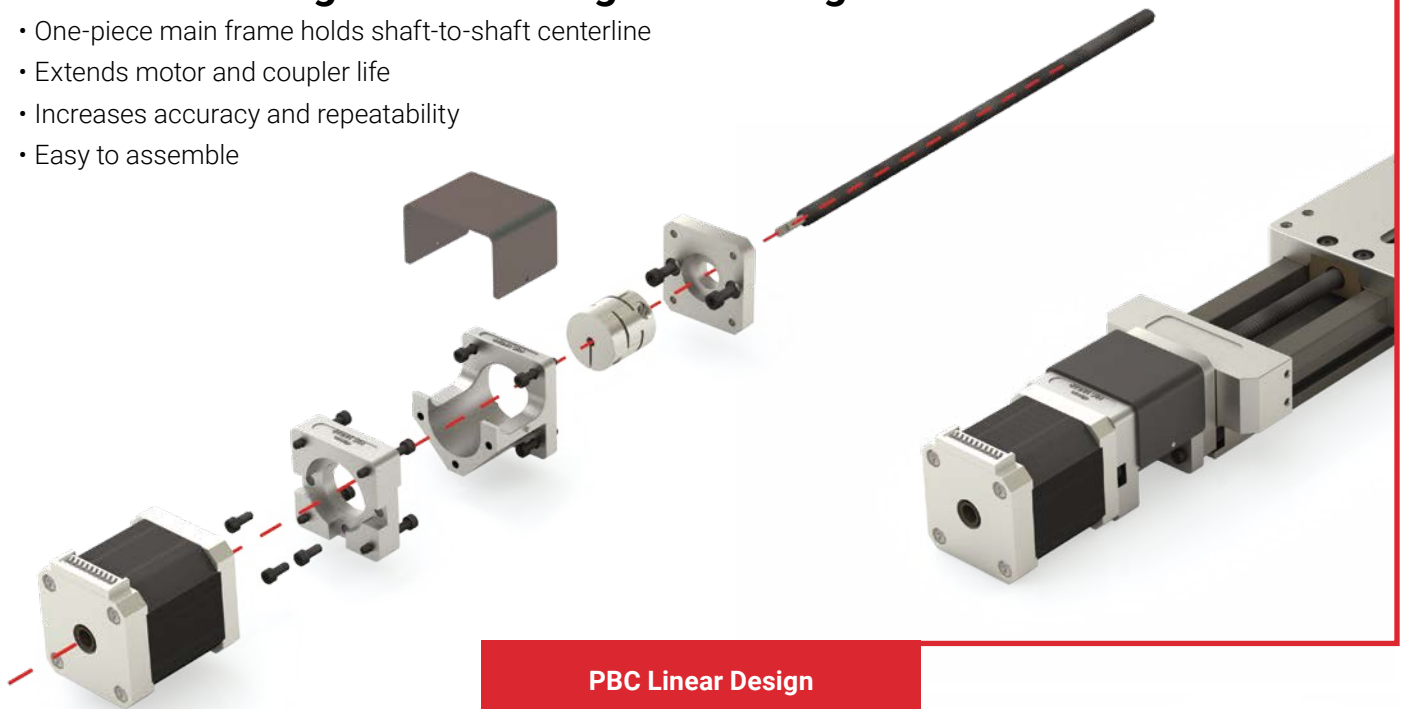
|   | Base System<br>(UGA or UGT) | Attached To Rail Type | Mount Type | Parts Included in Kit  | Qty                   | Kit Part Number |
|---|-----------------------------|-----------------------|------------|--|-----------------------|-----------------|
| 4 | GST                         | UGT                   | Base       | Small Toe Clamp  | 4                     | LATA-KIT-042    |
|   | CRT                         |                       |            | BHSCS M5 x 16 (4)  | 4                     |                 |
| 5 | GST                         | UGT                   | Side       | Plate B1 (carriage-to-rail)  | 1                     | LATA-KIT-043    |
|   | CRT                         |                       |            | Plate B2 (carriage-to-rail)<br>BHSCS M6 x 16 (4)<br>SHCS M5 x 12<br>T-Nuts M5<br>BHSCS M5 X 16 (4) | 1<br>4<br>2<br>2<br>2 |                 |
| 6 | GST                         | UGA                   | Base       | Plate B1 (carriage-to-rail)  | 1                     | LATA-KIT-045    |
|   | CRT                         |                       |            | BHSCS M6 x 16 (4)<br>BHSCS M6 x 12<br>BHSCS M5 X 16 (4)  | 4<br>2<br>2           |                 |

Note: **GST** = Gliding Surface Technology–Plain Bearings, **CRT** = Cam Roller Technology–V-Guide Bearings, **UGA** = Low profile rail, **UGT** = Tall rail.

## Motor Mount Product Comparison

### PBC Linear Design with Pre-Engineered Alignment

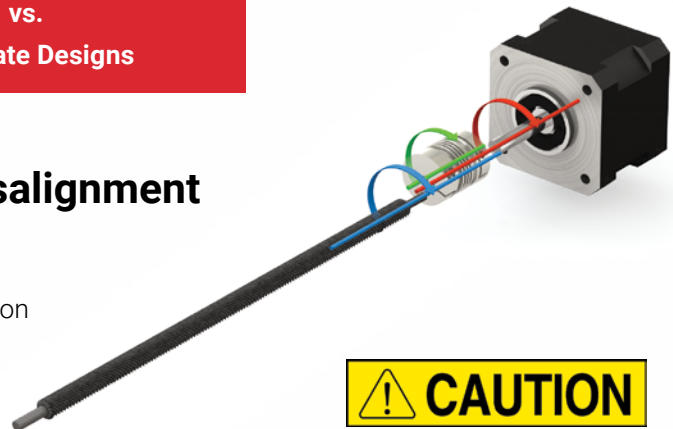
- One-piece main frame holds shaft-to-shaft centerline
- Extends motor and coupler life
- Increases accuracy and repeatability
- Easy to assemble



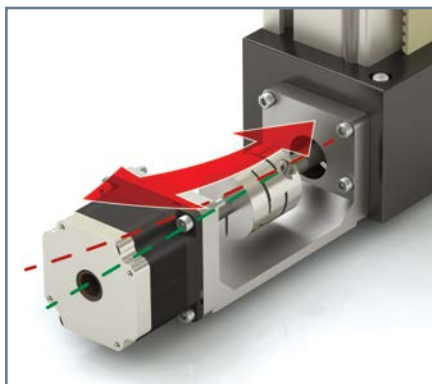
**PBC Linear Design  
vs.  
Alternate Designs**

### Problematic Designs Cause Misalignment

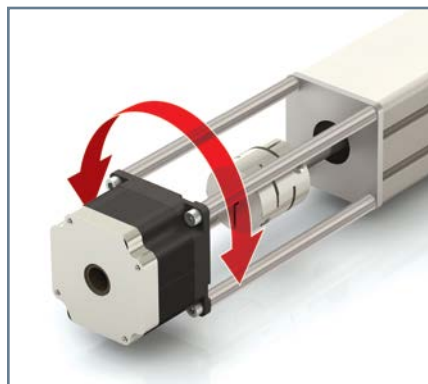
- Misalignment between motor shaft, coupler, and screw shortens life and affects motion quality
- Misalignment results in camming or lobbing motion that translates to inconsistent linear movement
- Difficult to align and prone to deflection
- Over-torque of coupler causes accuracy loss



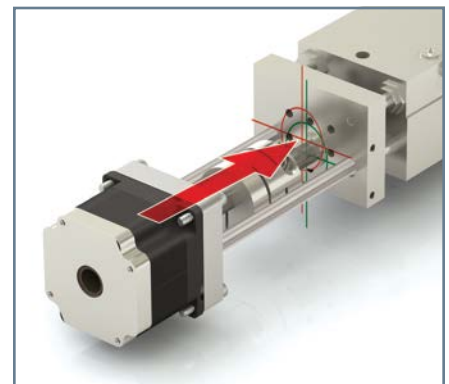
#### Problem #1: Deflection




#### Problem #2: Twist



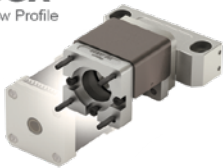
#### Problem #3: Off Centerline



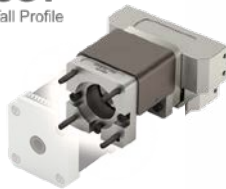
## Lead Screw or Ball Screw Driven System

| Screw Driven SIMO Series System<br>Lead Screw or Ball Screw<br>UGA (Low Profile) or UGT (tall profile) | Motor Size                         | Part Number     | Recommended Coupler<br>Ordered Separately or<br>Customer Supplied             | Included with<br>Motor Mount Purchase                         |
|--|------------------------------------|-----------------|---|---|
|                       | 40 mm                              | UGA040A-3PMM-SE | R + W EKL5<br><br>Maximum coupler<br>dimensions:<br>25 mm O.D. x 26 mm length | (1) Adapter plate with 2 SBHCS (Socket Button Head Cap Screw) |
|  | 42 mm<br>NEMA 17                   | UGA040A-3PMM-SF |   | (1) Main frame with 4 SBHCS                                   |
|  | 56 mm - 58 mm<br>NEMA 23           | UGA040A-3PMM-SG |   | (1) Motor plate with 3 SBHCS for attaching to frame*          |
|  | 60 mm                              | UGA040A-3PMM-SH |   | (1) Cover (plastic)   |
|  | Blank Plate<br>(customer machined) | UGA040A-3PMM-S0 |   | * Customer supplies motor screws                              |

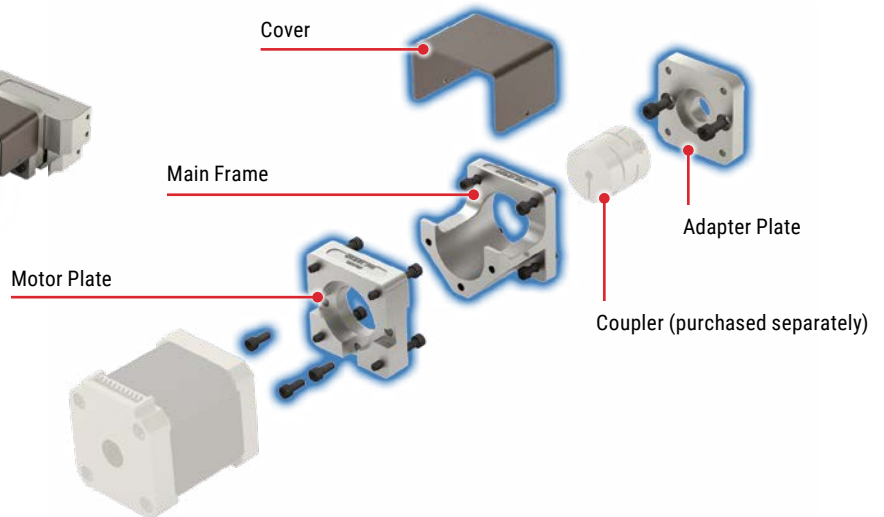
**UGA**  
Low Profile



**UGT**  
Tall Profile

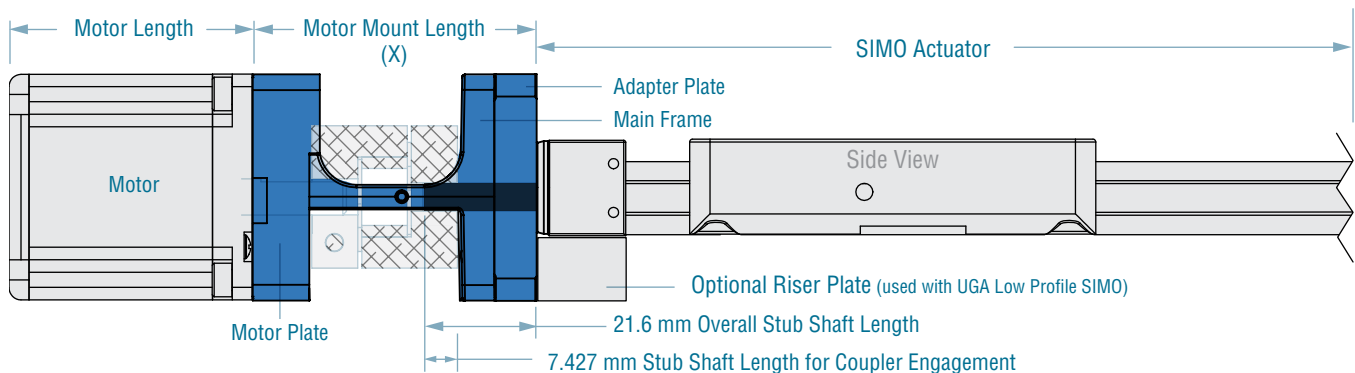


- Pre-engineered to hold centerlines
- 5 mm stub shaft diameter

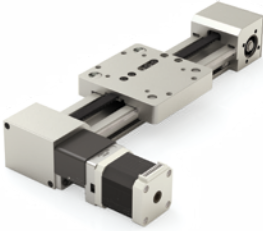


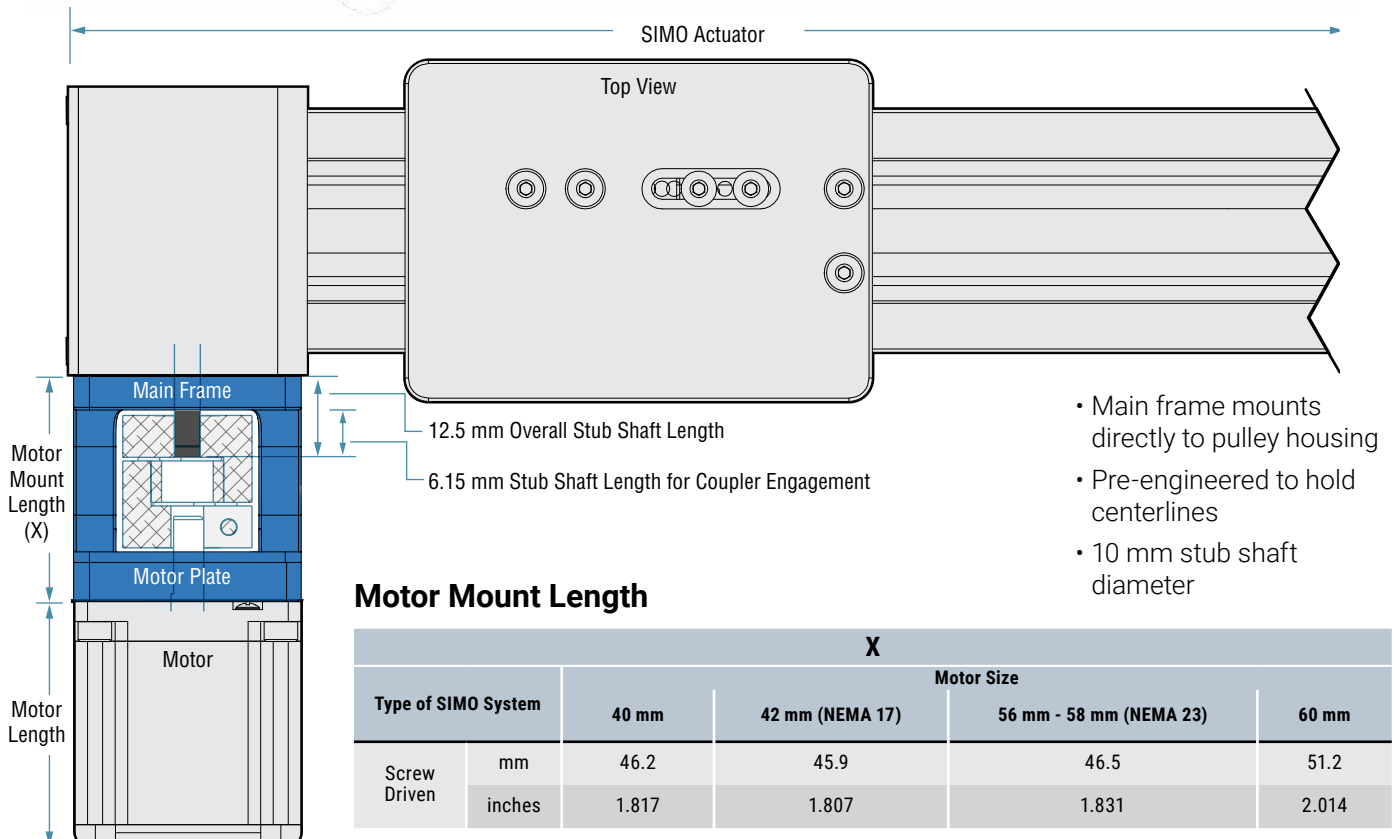
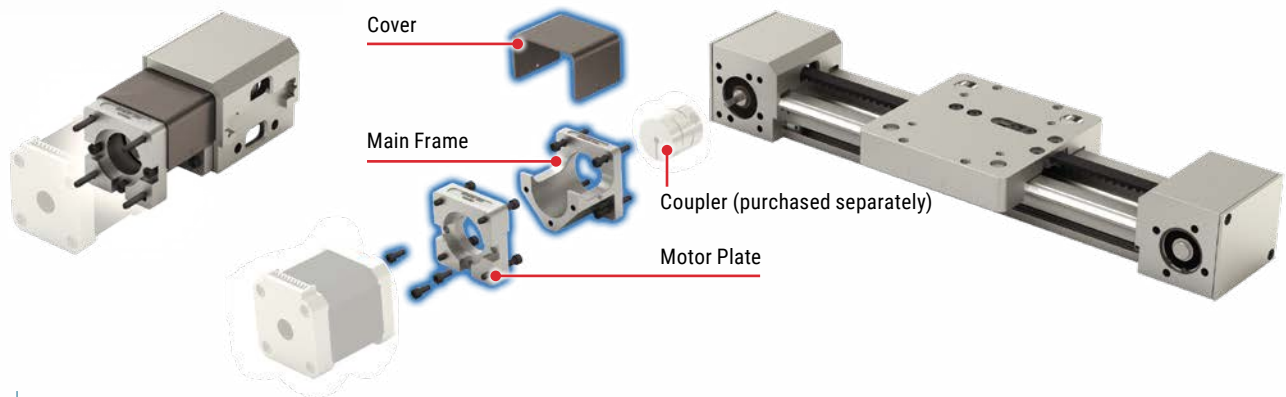
### Motor Mount Length

| Motor Mount Length (X) |        |            |                 |                         |       |
|------------------------|--------|------------|-----------------|-------------------------|-------|
| Type of SIMO System    |        | Motor Size |                 |                         |       |
|                        |        | 40 mm      | 42 mm (NEMA 17) | 56 mm - 58 mm (NEMA 23) | 60 mm |
| Screw Driven           | mm     | 54.0       | 53.7            | 54.3                    | 59.0  |
|                        | inches | 2.125      | 2.115           | 2.139                   | 2.322 |




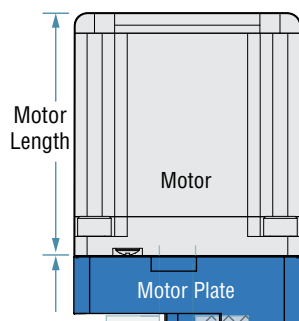
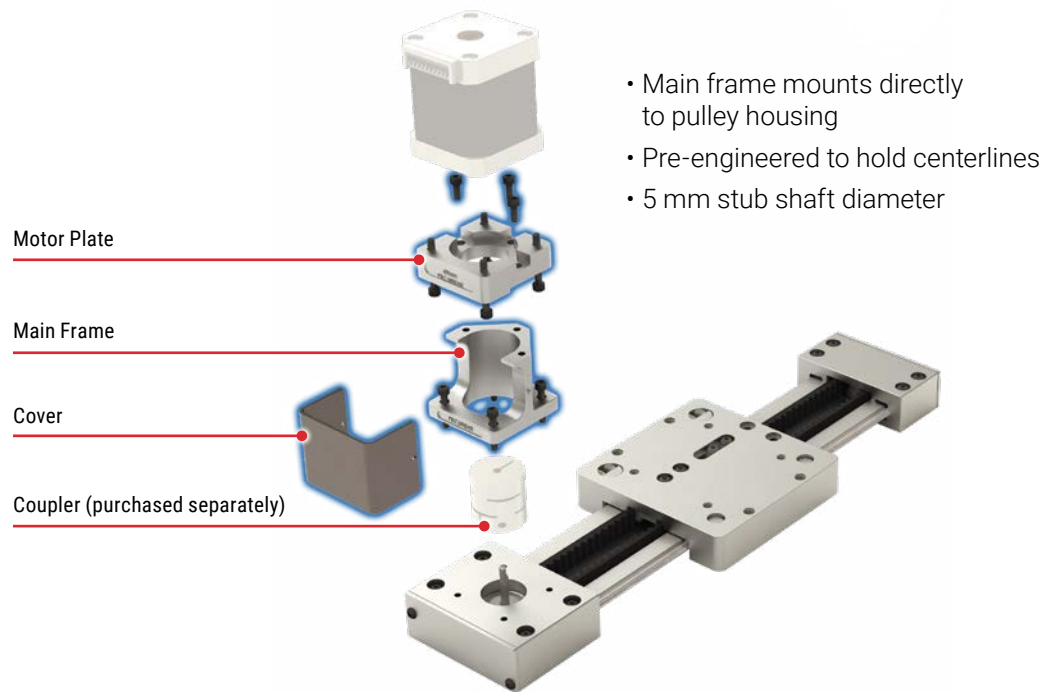
## Horizontal Belt Driven System

| Belt Driven SIMO Series System  | Motor Size                      | Part Number     | Recommended Coupler<br>Ordered Separately or<br>Customer Supplied          | Included with<br>Motor Mount Purchase                      |
|---|---------------------------------|-----------------|--|--|
|  | 40 mm                           | UGA040A-3PMM-HE | R + W EKL5<br><br>Maximum coupler dimensions:<br>25 mm O.D. x 26 mm length | (1) Main frame with 4 SBHCS (Socket Button Head Cap Screw) |
|   | 42 mm NEMA 17                   | UGA040A-3PMM-HF |  | (1) Motor plate with 3 SBHCS for attaching to frame*       |
|   | 56 mm - 58 mm NEMA 23           | UGA040A-3PMM-HG |  | (1) Cover (plastic)  |
|   | 60 mm                           | UGA040A-3PMM-HH |  | * Customer supplies motor screws                           |
|   | Blank Plate (customer machined) | UGA040A-3PMM-H0 |  |  |



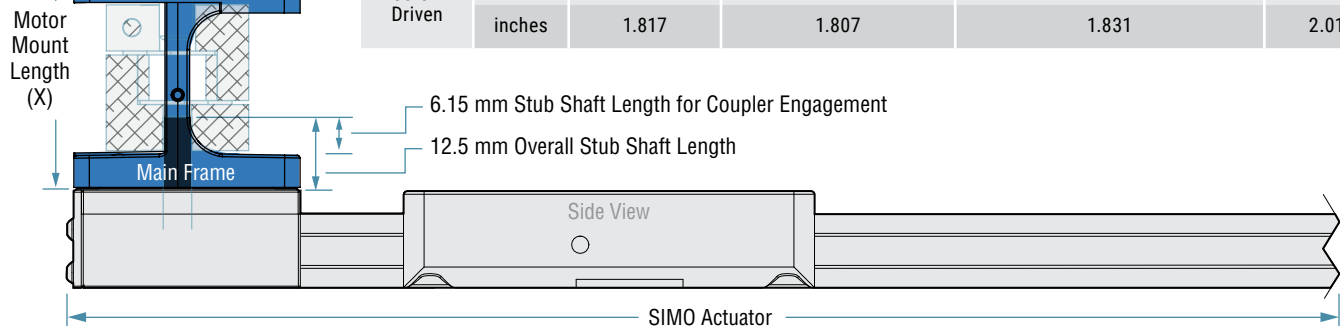
## Vertical Belt Driven System

| Belt Driven SIMO Series System  | Motor Size                      | Part Number     | Recommended Coupler<br>Ordered Separately or<br>Customer Supplied             | Included with<br>Motor Mount Purchase                         |
|---|---------------------------------|-----------------|---|---|
|  | 40 mm                           | UGA040A-3PMM-VE | R + W EKL5<br><br>Maximum coupler<br>dimensions:<br>25 mm O.D. x 26 mm length | (1) Main frame with 4 SBHCS<br>(Socket Button Head Cap Screw) |
|   | 42 mm NEMA 17                   | UGA040A-3PMM-VF |   | (1) Motor plate with 3 SBHCS<br>for attaching to frame*       |
|   | 56 mm - 58 mm NEMA 23           | UGA040A-3PMM-VG |   | (1) Cover (plastic)   |
|   | 60 mm                           | UGA040A-3PMM-VH |   |   |
|   | Blank Plate (customer machined) | UGA040A-3PMM-V0 |   |   |



### Motor Mount Length

|                     |        | X          |                 |                         |       |
|---------------------|--------|------------|-----------------|-------------------------|-------|
|                     |        | Motor Size |                 |                         |       |
| Type of SIMO System |        | 40 mm      | 42 mm (NEMA 17) | 56 mm - 58 mm (NEMA 23) | 60 mm |
| Screw Driven        | mm     | 46.2       | 45.9            | 46.5                    | 51.2  |
|                     | inches | 1.817      | 1.807           | 1.831                   | 2.014 |

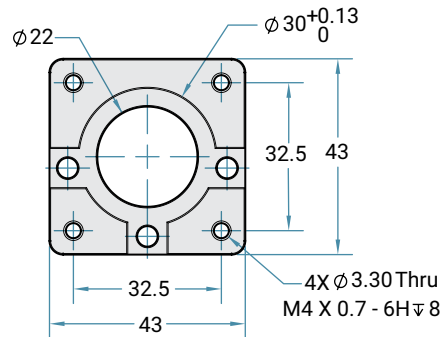
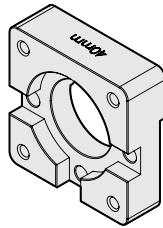




## Motor Plate Dimensions

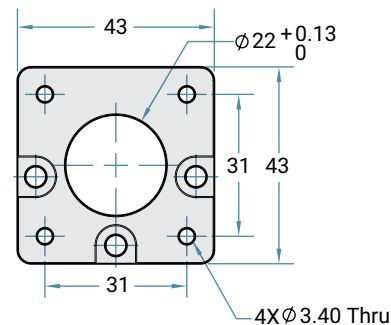
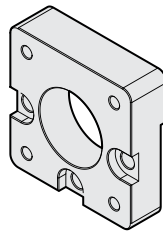
### Motor Size: 40 mm

- Material: Anodized aluminum



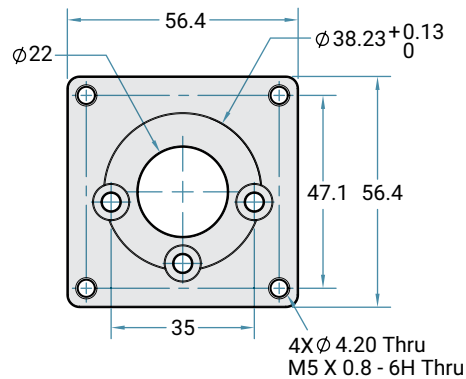
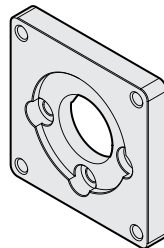
### Motor Size: 42 mm (NEMA 17)

- Material: Anodized aluminum



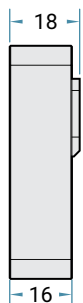
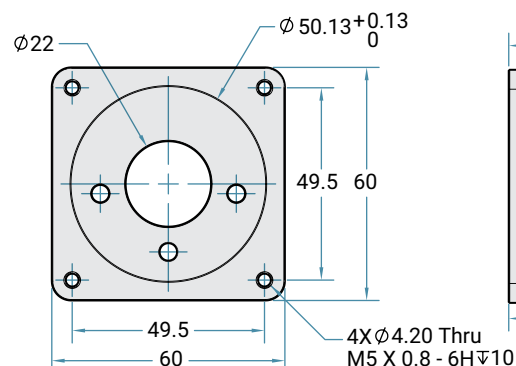
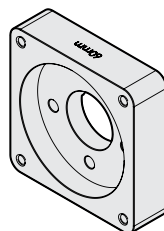
### Motor Size: 56 mm – 58 mm (NEMA 23)

- Material: Anodized aluminum



### Motor Size: 60 mm

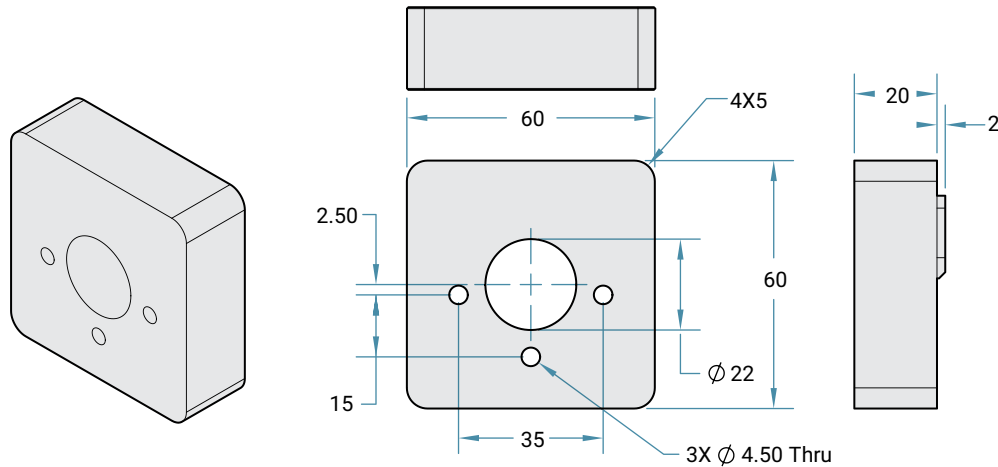
- Material: Anodized aluminum



## Blank Plate & Main Frame Dimensions

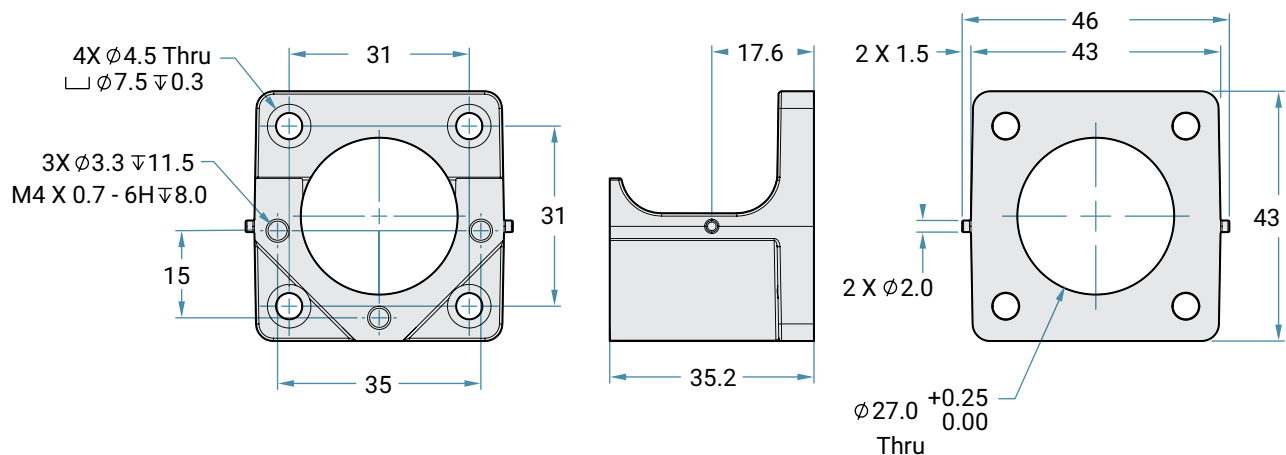
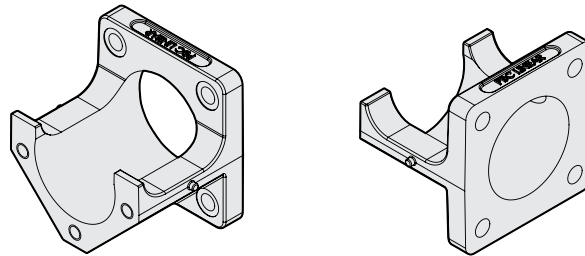
### Blank Plate

- Intended use: To give customers the ability to machine the plate to match non-standard motor configurations
- Material: Anodized aluminum
- Tip: It is best to clamp on center hole when machining hole pattern for motor attachment.



### Main Frame

- Material: Die cast aluminum, clear chromate



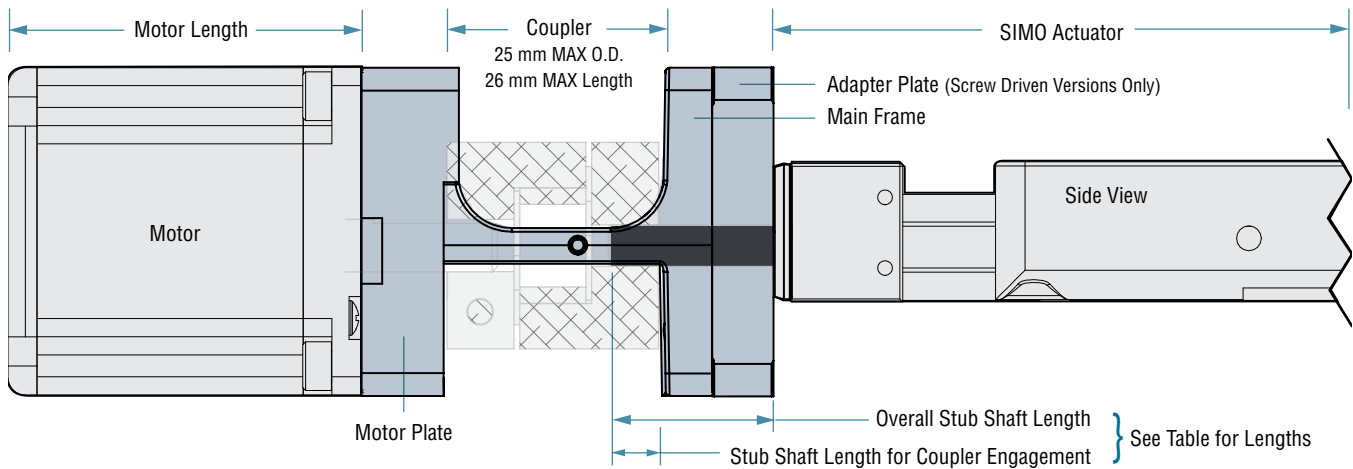
## Design Considerations

### Coupler

- Simo Series motor mounts are designed to work optimally with the R+W EKL5 coupler
- Other couplers can be used under the following conditions:
  - Maximum O.D. = 25 mm
  - Maximum length = 26 mm
  - Coupler should be sized per the SIMO Series actuator.

#### **CAUTION**

Verify coupler bore diameters and depths will accept both actuator stub shaft and motor shaft.



### Stub Shaft Dimensions

| Type of SIMO System                      | Screw Driven | Horizontal Belt | Vertical Belt |
|--|--------------|-----------------|---------------|
| Stub Shaft Diameter                      | 5 mm         | 10 mm           | 5 mm          |
| Overall Stub Shaft Length                | 21.6 mm      | 12.5 mm         | 12.5 mm       |
| Stub Shaft Length for Coupler Engagement | 7.427 mm     | 6.15 mm         | 6.15 mm       |

## Assembly Procedure

### Screw Driven System

#### SIMO Series UGA/UGT with Lead Screw

Components:

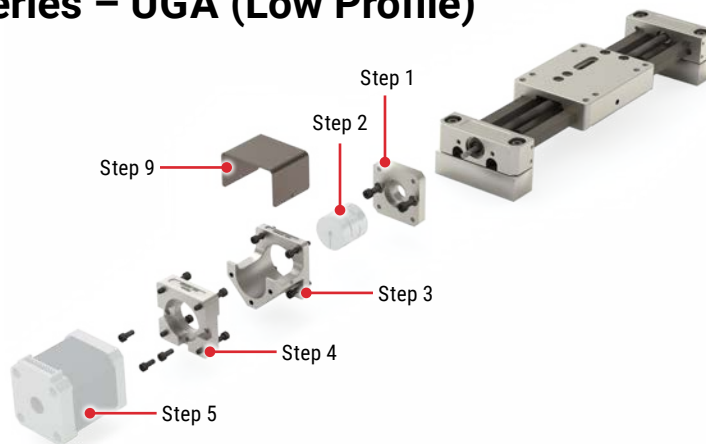
- Base actuator unit
- Motor (customer supplied)
- Motor Mount Kit
  - Adapter Plate
  - Motor Plate
  - Main Frame
  - Cover
- Coupler (customer supplied)

**Fasteners:** (9) M4 x 12 mm SBHCS (supplied by PBC Linear),  
(4) Customer supplied motor fasteners (See Table 2)

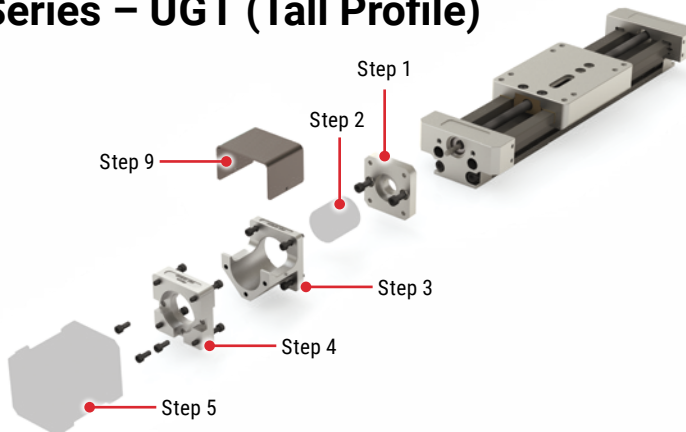
**Tools Required:** Hex Key (See Table 1)

**Suggested Thread Locker:** Blue Loctite® 242 or equivalent

#### Simo Series – UGA (Low Profile)



#### Simo Series – UGT (Tall Profile)



**Table 1**

**Hex Key Size Needed**

|          |                 |
|----------|-----------------|
| M3 SHCS  | = 2.5 mm Driver |
| M4 SBHCS | = 2.5 mm Driver |
| M5 SHCS  | = 4 mm Driver   |

**Table 2**

**Customer Supplied Fasteners**

|                   |                 |
|-------------------|-----------------|
| NEMA 17 Motor     | = M3 x 0.5 SHCS |
| NEMA 23 Motor     | = M5 x 0.8 SHCS |
| 60 mm Servo Motor | = M5 x 0.8 SHCS |

**Table 3**

**Fastener Torque Values**

|          |                            |
|----------|----------------------------|
| M3 SHCS  | = 8-10 in/lb [1.0-1.2 Nm]  |
| M4 SBHCS | = 17-21 in/lb [2.0-2.4 Nm] |
| M5 SHCS  | = 37-45 in/lb [4.2-5.1 Nm] |

#### Assembly Steps

1. Install lead screw adapter plate to actuator end cap using hex key and (2) M4 x 12 mm SBHCS. Apply blue Loctite® 242 or equivalent threadlocker and torque to 17-21 in/lb [2.0-2.4 Nm] (See Table 3).
2. Slide coupling onto shaft and leave loose.
3. Install main frame to lead screw adapter plate using (4) M4 x 12 mm SBHCS. Snug fasteners, but do not tighten.
4. Install motor plate to main frame using (3) M4 x 12 mm SBHCS. Apply blue Loctite® 242 or equivalent threadlocker and torque to 17-21 in/lb [2.0-2.4 Nm] (See Table 3).
5. Install motor to motor plate with customer supplied fasteners (See Table 2) and install shaft into coupling. Snug fasteners, but do not tighten.
6. Manually move carriage plate to align coupler and motor.
7. Check for proper shaft engagement on both sides (per coupler manufacturer specs).
8. Once system is aligned, final torque all fasteners appropriately (See Table 3).
9. Install cover on pins in casting (snaps in place).

## Assembly Procedure

### Horizontal Belt Driven System

#### Simo Series UGT with Horizontal Belt

Components:

- Base actuator unit
- Motor (customer supplied)
- Motor Mount Kit
  - Motor Plate
  - Main Frame
  - Cover
- Coupler (customer supplied)

**Fasteners:** (7) M4 x 12 mm SBHCS (supplied by PBC Linear), (4) Customer supplied motor fasteners (See Table 2)

**Tools Required:** Hex Key (See Table 1)

**Suggested Thread Locker:** Blue Loctite® 242 or equivalent

**Table 1**

**Hex Key Size Needed**

|          |                 |
|----------|-----------------|
| M3 SHCS  | = 2.5 mm Driver |
| M4 SBHCS | = 2.5 mm Driver |
| M5 SHCS  | = 4 mm Driver   |

**Table 2**

**Customer Supplied Fasteners**

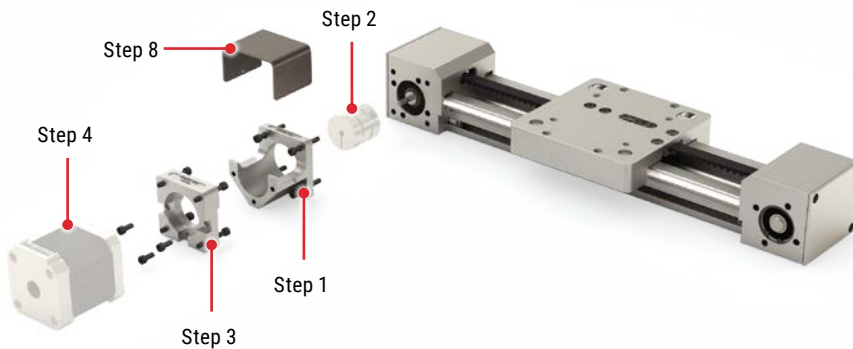
|                   |                 |
|-------------------|-----------------|
| NEMA 17 Motor     | = M3 x 0.5 SHCS |
| NEMA 23 Motor     | = M5 x 0.8 SHCS |
| 60 mm Servo Motor | = M5 x 0.8 SHCS |

**Table 3**

**Fastener Torque Values**

|          |                            |
|----------|----------------------------|
| M3 SHCS  | = 8-10 in/lb [1.0-1.2 Nm]  |
| M4 SBHCS | = 17-21 in/lb [2.0-2.4 Nm] |
| M5 SHCS  | = 37-45 in/lb [4.2-5.1 Nm] |

#### Simo Series – UGT (Tall Profile)



#### Assembly Steps

1. Install main frame to pulley housing using hex key and (4) M4 x 12 mm SBHCS. Snug fasteners, but do not tighten.
2. Slide coupling onto shaft and leave loose.
3. Install motor plate to main frame using (3) M4 x 12 mm SBHCS. Apply blue Loctite® 242 or equivalent threadlocker and torque to 17-21 in/lb [2.0-2.4 Nm] (See Table 3).
4. Install motor to motor plate with customer supplied fasteners (See Table 2) and install shaft into coupling. Snug fasteners, but do not tighten.
5. Manually move carriage plate to align coupler and motor.
6. Check for proper shaft engagement on both sides (per coupler manufacturer specs).
7. Once system is aligned, final torque all fasteners appropriately (See Table 3).
8. Install cover on pins in casting (snaps in place).



## Assembly Procedure

### Vertical Belt Driven System

#### Simo Series UGA with Vertical Belt

Components:

- Base actuator unit
- Motor (customer supplied)
- Motor Mount Kit
  - Motor Plate
  - Main Frame
  - Cover
- Coupler (customer supplied)

**Fasteners:** (7) M4 x 12 mm SBHCS (supplied by PBC Linear),  
(4) Customer supplied motor fasteners (See Table 2)

**Tools Required:** Hex Key (See Table 1)

**Suggested Thread Locker:** Blue Loctite® 242 or equivalent

**Table 1**

**Hex Key Size Needed**

|          |                 |
|----------|-----------------|
| M3 SHCS  | = 2.5 mm Driver |
| M4 SBHCS | = 2.5 mm Driver |
| M5 SHCS  | = 4 mm Driver   |

**Table 2**

**Customer Supplied Fasteners**

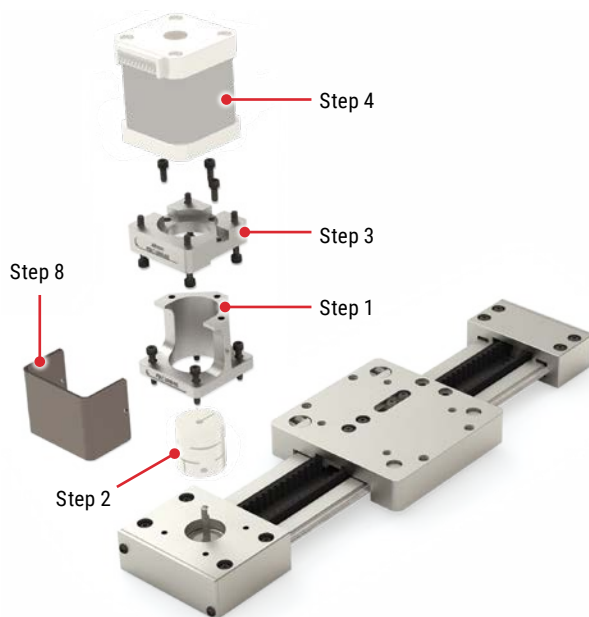
|                   |                 |
|-------------------|-----------------|
| NEMA 17 Motor     | = M3 x 0.5 SHCS |
| NEMA 23 Motor     | = M5 x 0.8 SHCS |
| 60 mm Servo Motor | = M5 x 0.8 SHCS |

**Table 3**

**Fastener Torque Values**

|          |                            |
|----------|----------------------------|
| M3 SHCS  | = 8-10 in/lb [1.0-1.2 Nm]  |
| M4 SBHCS | = 17-21 in/lb [2.0-2.4 Nm] |
| M5 SHCS  | = 37-45 in/lb [4.2-5.1 Nm] |

#### Simo Series – UGA (Low Profile)



#### Assembly Steps

1. Install main frame to pulley housing using hex key and (4) M4 x 12 mm SBHCS. Snug fasteners, but do not tighten.
2. Slide coupling onto shaft and leave loose.
3. Install motor plate to main frame using (3) M4 x 12 mm SBHCS. Apply blue Loctite® 242 or equivalent threadlocker and torque to 17-21 in/lb [2.0-2.4 Nm] (See Table 3).
4. Install motor to motor plate with customer supplied fasteners (See Table 2) and install shaft into coupling. Snug fasteners, but do not tighten.
5. Manually move carriage plate to align coupler and motor.
6. Check for proper shaft engagement on both sides (per coupler manufacturer specs).
7. Once system is aligned, final torque all fasteners appropriately (See Table 3).
8. Install cover on pins in casting (snaps in place).

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### Tips for Safe Installation and Operation

- Only qualified personnel should transport, assemble, operate, and maintain this equipment.
- Always wear appropriate personal protection equipment, such as safety glasses and hearing protection.
- Read and observe the installation, operating, and safety instructions provided by the manufacturer. Incorrect handling and operation may result in damage to equipment and personal injury.
- Comply with all installation specifications and requirements to ensure proper setup.
- Provide a flat and stable mounting surface.
- Be sure sufficient space is provided to permit full carriage travel with no hard stops.
- Be sure power is OFF before performing actuator maintenance.
- The unit should be checked regularly for worn or damaged components. Follow recommended service intervals and replace defective parts immediately. Always replace parts with the same make and model as the original.
- Be aware that most actuator configurations are not self-braking. A load can move if the drive force is disconnected, or if drive train components (motors, pulleys, belts) are detached. This is particularly true for vertical applications. The load should be secured prior to service. Consider installing an electromechanical power-off brake in vertical configurations to prevent potential damage or personal injury.
- Actuators should be wiped down occasionally to keep them clean. Use fluids sparingly, and be sure none seeps inside. Do not use strong or harsh cleaning agents.
- Always test run actuators after maintenance work is completed.
- Do not back-drive the lead screw by moving the carriage by hand. See “Manual Movement of Carriage” in the Installation section for the proper procedure.

## User Manual

### Lead Screw UGA: Mounting with Riser Plates

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing actuator maintenance.

1. Establish the location where the two riser plates will be installed.
2. Drill and tap two M6 x 1.0 threaded holes in the mounting surface for each riser plate (see illustrations below). Drill to a depth appropriate for the application.
3. Attach each riser plate to the mounting surface with two M6 x 1.0 SHCS and torque to 6.5-8.0 N-m/57-70 in-lb. Fastener length to be determined by installer, as appropriate for the application.
4. Attach the actuator to each riser plate with two M6 x 1.0 x 25mm SHCS and torque to 6.5-8.0 N-m/57-70 in-lb.

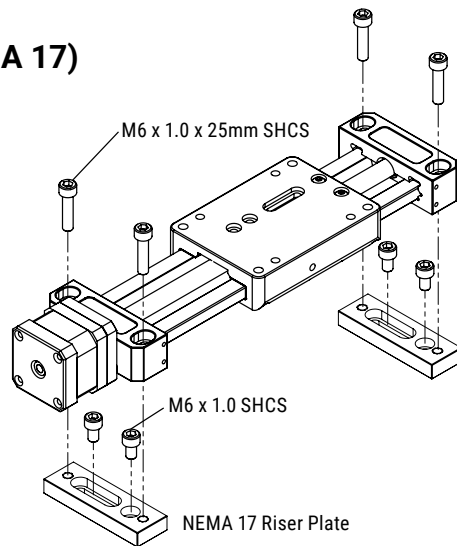
#### Tools Required

5 mm hex wrench

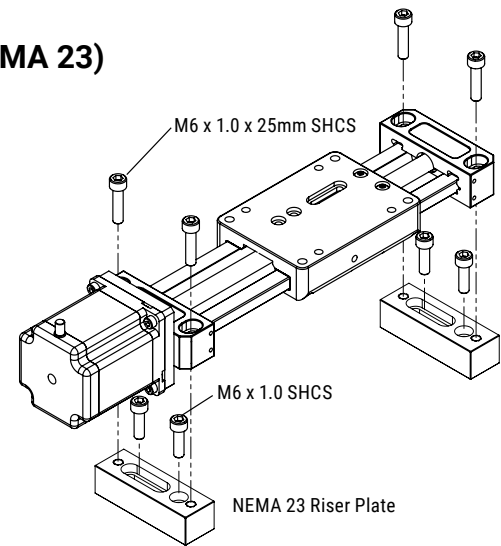
#### Parts List

Riser Plates  
M6 x 1.0 x 25 mm SHCS  
M6 x 1.0 SHCS

#### 42 mm (NEMA 17) Riser Plate Installation

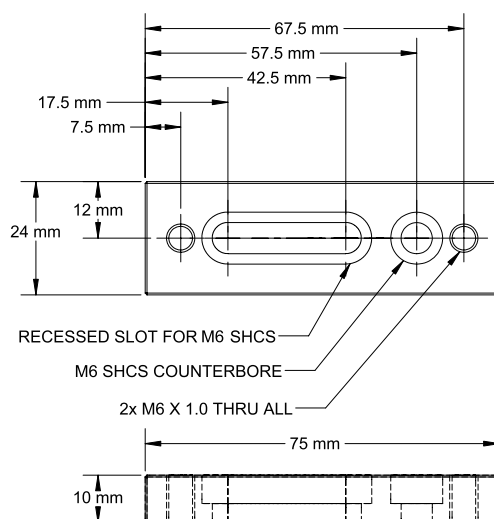


#### 56 mm (NEMA 23) Riser Plate Installation



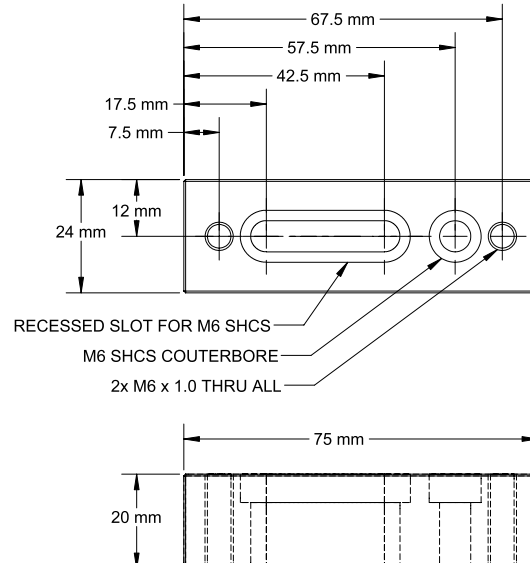
#### 10 mm Height Riser Block Dimensions

Typically used with 40-42 mm (NEMA 17) motors



#### 20 mm Height Riser Block Dimensions

Typically used with 56-60 mm (NEMA 23) motors



### Lead Screw UGA: Mounting with End Blocks

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing actuator maintenance.

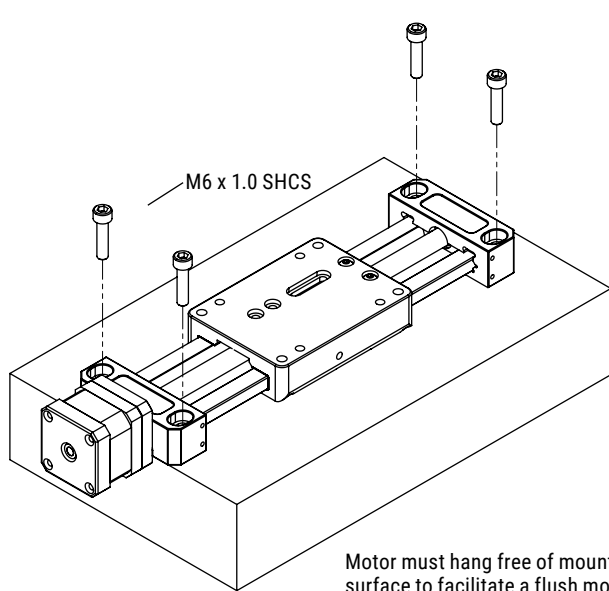
1. Establish the location where the actuator will be installed.
2. Drill and tap two M6 x 1.0 threaded holes in the mounting surface for each end block (see illustrations below). Drill to a depth appropriate for the application.
3. Attach each end block to the mounting surface with two M6 x 1.0 SHCS and torque to 6.5-8.0 N-m/57-70 in-lb. Fastener length to be determined by installer, as appropriate for the application.

#### TOOLS REQUIRED

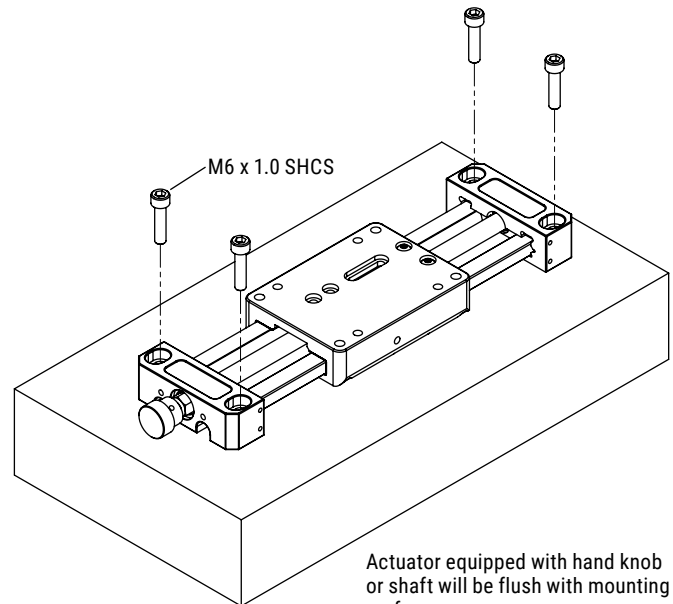
5 mm hex wrench

#### PARTS LIST

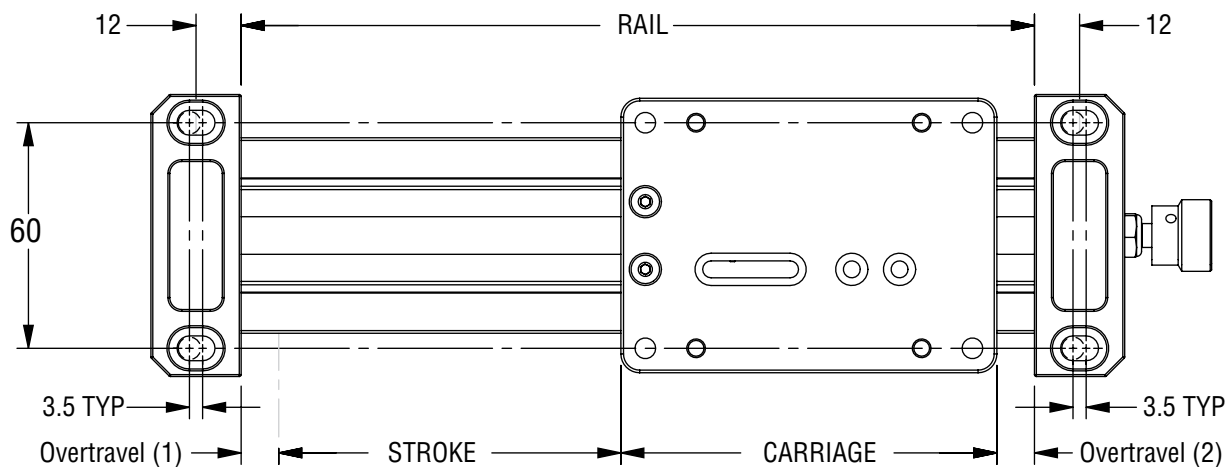
M6 x 1.0 SHCS



Motor must hang free of mounting surface to facilitate a flush mount without riser plates



Actuator equipped with hand knob or shaft will be flush with mounting surface



**Mounting Pattern** (60 mm) by (Rail) + 24 mm **OR** (60 mm) by (Carriage + Stroke + OT(1) + OT(2) + 24 mm)

## User Manual

### Vertical Belt UGA: Extrusion Mount

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing actuator maintenance.

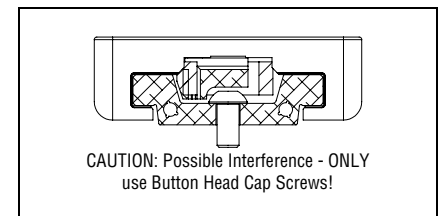
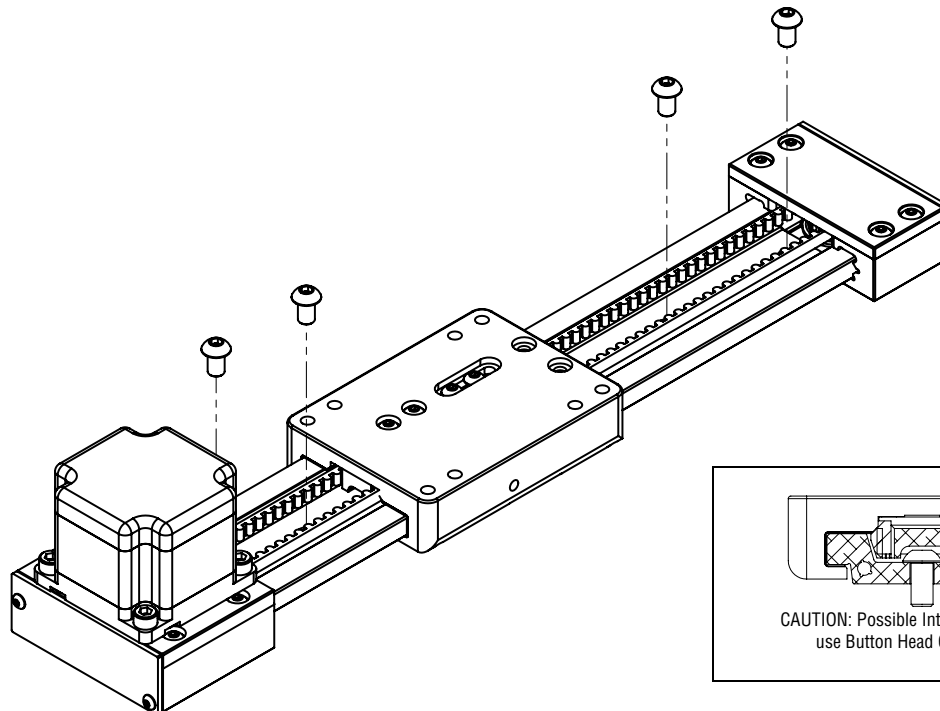
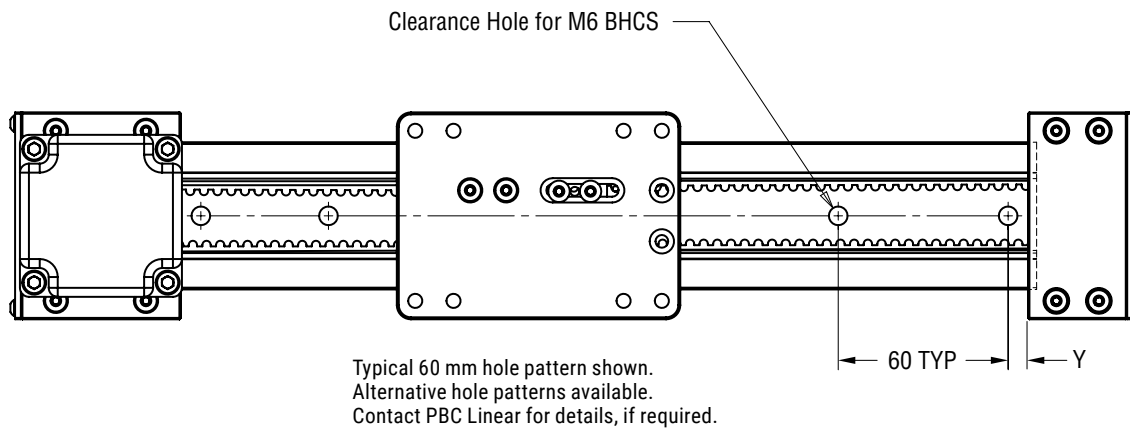
1. Establish the location where the actuator will be installed.
2. Drill and tap M6 x 1.0 threaded holes in the mounting surface using typical hole pattern shown below or applicable alternative. Drill to a depth appropriate for the application.
3. Attach the actuator to the mounting surface with M6 x 1.0 BHCS and torque to 10 N-m/88.5 in-lb. Fastener length to be determined by installer, as appropriate for the application.

#### Tools Required

4 mm hex wrench

#### Parts List

M6 x 1.0 BHCS





# LDA Belgium

## User Manual

### UGT: Mounting with Toe Clamps

#### Toe Clamp Installation

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing maintenance.

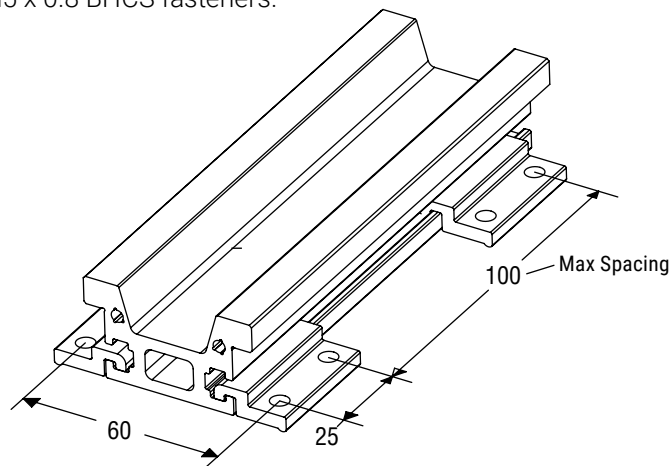
1. Establish the location where the actuator and toe clamps will be installed.
2. Drill and tap an M5 x 0.8 threaded hole in the mounting surface for each single toe clamp, or two M5 x 0.8 threaded holes for each double. See illustrations below.
3. Position toe clamps on the actuator as show in the illustrations below, then install with M5 x 0.8 BHCS fasteners.

#### Tools Required

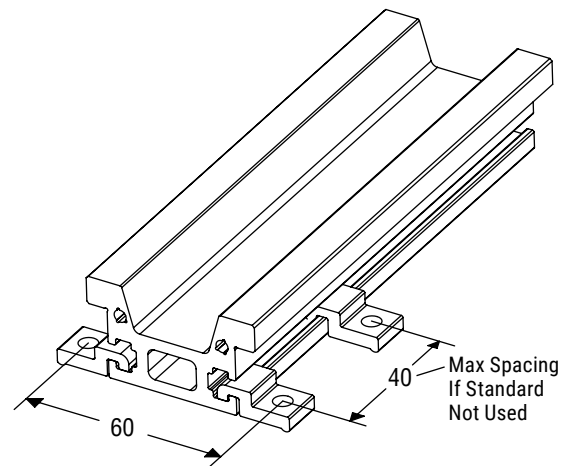
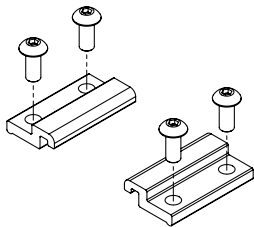
3 mm hex wrench

#### Parts List

M5 x 0.8 BHCS

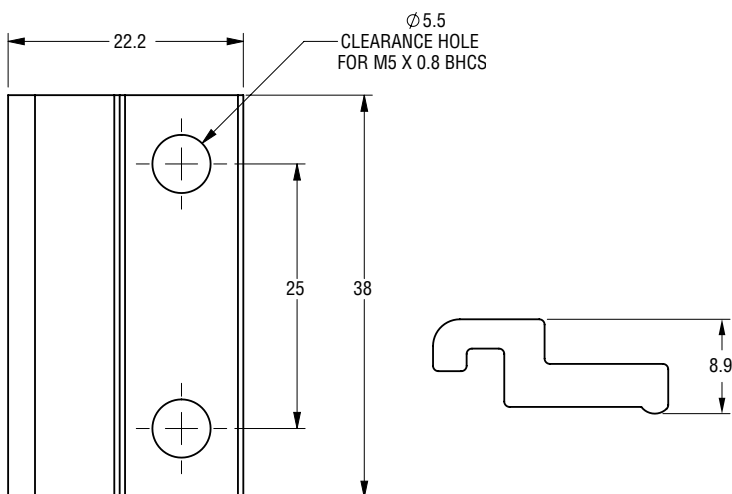


**Standard  
Double Toe Clamp**

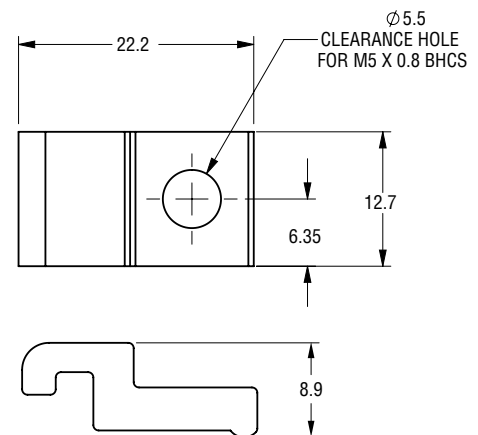


**Optional  
Single Toe Clamp**

Used when space is limited  
Also used to clamp the rail  
onto a standard carriage for  
XY systems



Part No.: UGT040A-TC-2



Part No.: UGT040A-TC-1

### Initial Lubrication During Installation (CRT)

Some PBC Linear systems are shipped with a preservative lubrication applied to the raceways. If so, additional lubrication should be applied during installation. Proper lubrication dissipates heat, increases service life, and reduces friction, wear, and corrosion. Recommended lubricants are listed where applicable, but there are some lubricants which **SHOULD NOT** be used on any SIMO configuration.

**DO NOT USE:** WD40; motor oil; oils with additives; moly or other filled greases; PTFE sprays, oils, or greases; or sprays containing fluorocarbons or silicone.

### Plain Bearing Lubrication (GST - Gliding Surface Technology)

The GST plain bearing utilizes bonded FrelonGOLD®, self-lubricating, maintenance-free bearing surfaces. If desired, adding lubrication will increase life, lessen noise, and lower the coefficient of friction. Oil or grease can be brushed on the raceway, or a lubrication storage system can be added via the optional “JKM” lube kit for GST carriages (Part# UGA040A-JKM-KIT).

**IMPORTANT:** Oil is recommended for saturating the felt strips in the “JKM” lube kit. If grease is used on bearing surfaces, the felt strip **MUST** be removed or the grease will cause the strip to act as a brake! **DO NOT** disassemble a driven system. **DO** contact a PBC Linear application engineer for guidance regarding felt strip removal.

Recommended Lubricants: way lube oils, lightweight oils, 3-IN-ONE® oils, and lightweight petroleum-based greases.

Proceed as follows:

- Wipe or brush a thin layer of lubricant along the entire length of the guide rail raceways.
- Move the carriage back and forth at least four times to thoroughly distribute lubricant.

### V-Guide Bearing Lubrication (CRT - Cam Roller Technology)

The inside of the V-Wheels are sealed for life and require no lubrication during normal operation. The outer race should be routinely inspected for damage and wear. Note: Do not attempt to disassemble V-Wheels.

The V-Guide stainless steel raceways are lubricated by oil-filled, porous polymer lubricators mounted in the carriage. This advanced polymer provides better performance and longer life than similar wiper/lubricators equipped with oil saturated felt. Note: These lubricators may emit a squealing or chirping sound when replacement is necessary.

Additional lubrication will increase life, lessen noise, and lower the coefficient of friction.

Recommended Grease: Synthetic oil based lithium-soap grease with an ISO VG32-100 viscosity.

Recommended Oil: Synthetic oil CLP or CGLP based on DIN 51517, or HLP based on DIN51524.

Viscosity range should be ISO VG32-100.

Proceed as follows:

- Wipe or brush a thin layer of lubricant along the entire length of the V-Guide raceways.
- Move the carriage back and forth at least four times to thoroughly distribute lubricant.

# LDA Belgium

## User Manual

### Relubrication

Linear guide raceways should be relubricated periodically with oil or grease. Recommended lubricants are listed where applicable, but there are some lubricants which **SHOULD NOT** be used on any SIMO configuration.

**DO NOT USE:** WD40; motor oil; oils with additives; moly or other filled greases; PTFE sprays, oils, or greases; or sprays containing fluorocarbons or silicone.

The relubrication interval is dependent on many operating and environmental conditions, such as load, stroke, velocity, acceleration, lubrication type, mounting position/orientation, UV exposure, temperature, and humidity. The actual lubrication interval should be determined by tests conducted under actual application conditions.

While the actual relubrication intervals are application specific and determined only through testing, the following “first check” guidelines can typically be used as a starting reference point under “normal” conditions:

*Relubrication every 1000 km; 50000 cycles; or six months (whichever occurs first)*

#### Extended Lubrication Interval

If your actuator is equipped with the optional “JKM” lube kit (GST), oil-filled wipers (CRT), or “EZ” lube system (PRT), you can extend the first check to:

*Relubrication every 2500 km; 100000 cycles; or one year (whichever comes first)*

### Extreme Applications

Unusually demanding circumstances (high speeds, extreme temperatures, shock, vibration, contamination, submersion) will require more frequent relubrication intervals.

### Lead Screw

The PTFE coated lead screw and polymer nut require no lubrication during normal operation, but should be routinely inspected for damage and wear. In certain applications, however, an external lubricant may be desirable. Contact a PBC Linear applications engineer for guidance regarding additional lubrication.

### Recommended Lubricants

#### Plain Bearing (GST - Gliding Surface Technology)

Recommended Lubricants: way lube oils, lightweight oils, 3-IN-ONE® oils, and lightweight petroleum-based greases.

#### V-Guide Bearing (CRT - Cam Roller Technology)

Recommended Grease: Synthetic oil based lithium-soap grease with an ISO VG32-100 viscosity.

Recommended Oil: Synthetic oil CLP or CGLP based on DIN 51517, or HLP based on DIN51524.

Viscosity range should be ISO VG32-100.

# LDA Belgium

## User Manual

### Horizontal and Vertical Belt Tension Adjustment

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing maintenance.

1. Push the carriage to the idle end of the assembly (see Figure 1).
2. Using a 2.5 mm hex wrench, loosen both belt adjustment screws slightly (see Figure 1). There should be some tension to prevent the belt from detaching.
3. Place a half inch diameter dowel pin, two to three inches long, between the carriage and the idle end block (see Figure 2).
4. While pushing the carriage against the dowel pin to keep the belt taut, tighten both belt adjustment screws.
5. Back the carriage up 300 mm from the idle end block (see Figure 3).
6. Depress the belt with a tension gage positioned centrally between the carriage and the idle end block (see Figure 3).
7. Pushing the belt halfway down should indicate 3 lbf (13.3 N), plus or minus .5 lbf (2.22 N).
8. If the tension is incorrect, repeat the above procedure, either increasing or decreasing the tension as required to reach 3 lbf (13.3 N), plus or minus .5 lbf (2.22 N).

#### Tools Required

2.5 mm hex wrench  
Tension Gage

#### Parts List

1/2 inch Dowel Pin  
(two to three inches long)

Figure 1

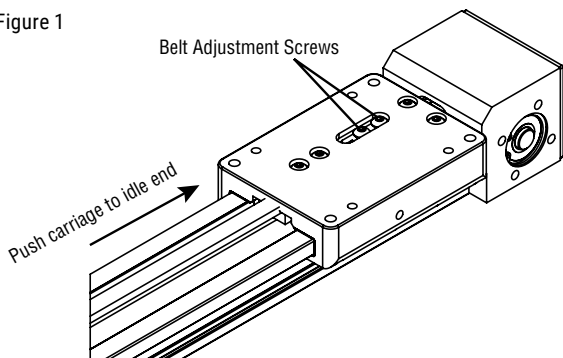


Figure 2

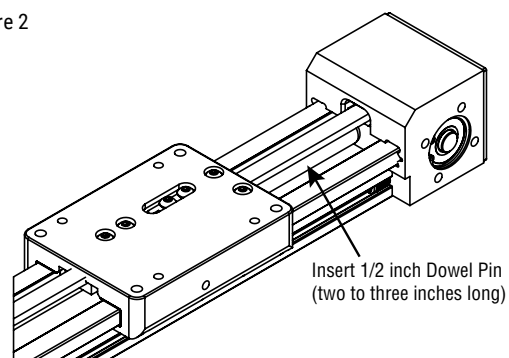
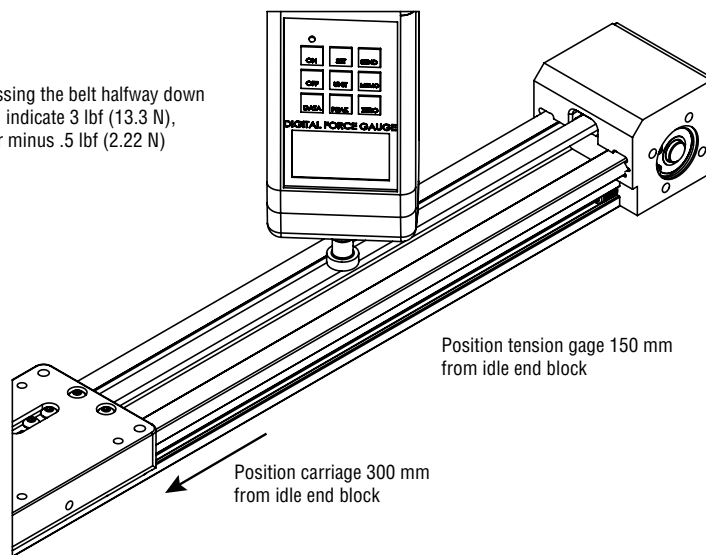


Figure 3

Depressing the belt halfway down should indicate 3 lbf (13.3 N), plus or minus .5 lbf (2.22 N)



# LDA Belgium

## User Manual

### Horizontal Belt Replacement

PBC Linear recommends using low strength threadlocker on mounting screws.

Be sure power is OFF before performing maintenance.

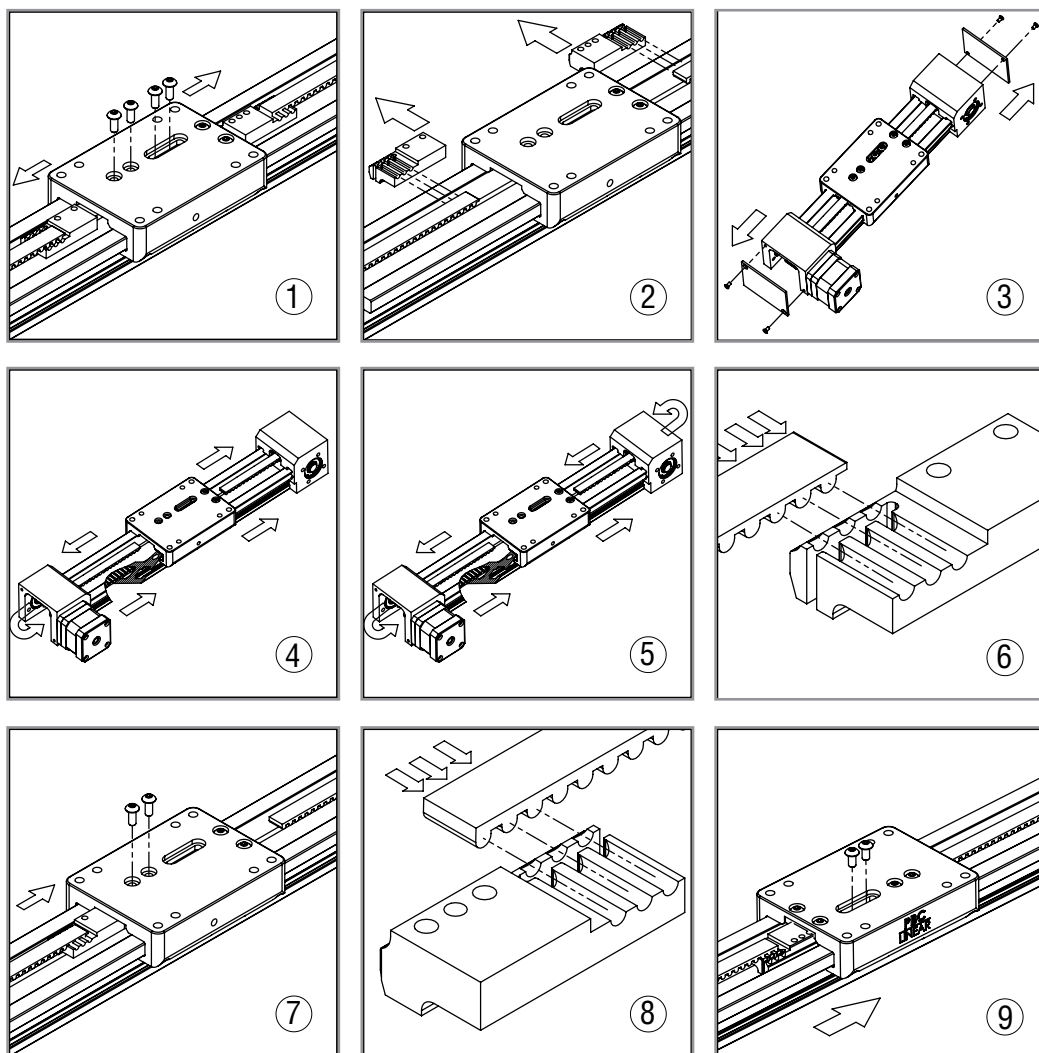
1. Remove four M4 button head cap screws securing the pulley clamps, then pull both clamps from beneath the carriage.
2. Remove both pulley clamps from the belt.
3. Remove the actuator end plates, if applicable.
4. Pull the belt around the pulley through the drive end block, then around the pulley through the idle end block, then pull it free of the actuator.
5. Feed the new belt through the actuator as show in the illustration. Be sure not to miss a tooth when wrapping the belt around the pulleys!
6. Insert the new belt end into the fixed pulley clamp. Be sure that all belt teeth engage the clamp.
7. Slide the fixed pulley clamp under the carriage, then fully tighten the two M4 x 0.7 button head cap screws that secure it in place.
8. Insert the other end of the belt into the adjustable pulley clamp. Be sure that all belt teeth engage the clamp.
9. Slide the adjustable pulley clamp under the carriage. Insert, but do not fully tighten the two button head cap screws. Follow the "Horizontal Belt Tension Adjustment" procedure on the previous page to set belt tension.

#### Tools Required

2.5 mm hex wrench

#### Parts List

Pulley Belt  
M4 x 0.7 BHCS





### Vertical Belt Replacement

PBC Linear recommends using low strength threadlocker on mounting screws.  
Be sure power is OFF before performing maintenance.

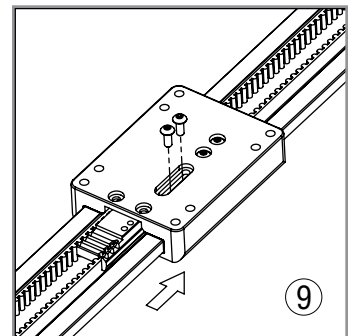
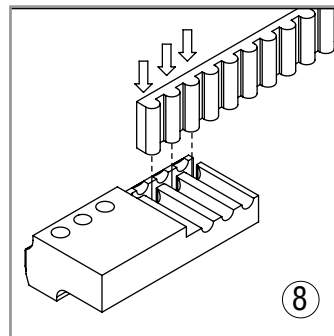
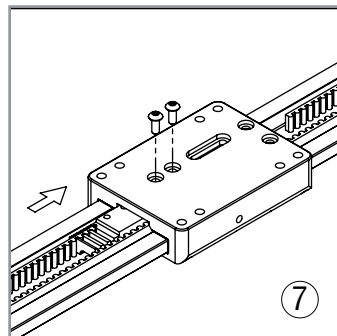
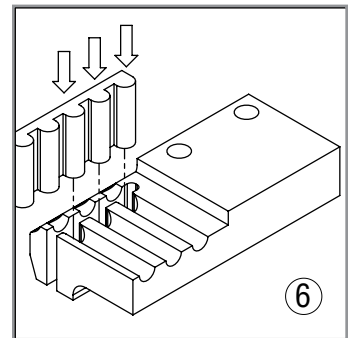
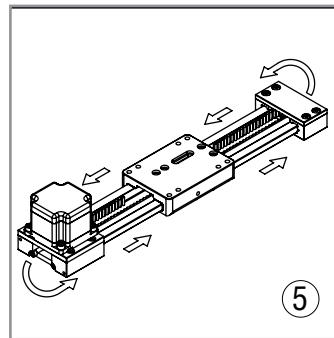
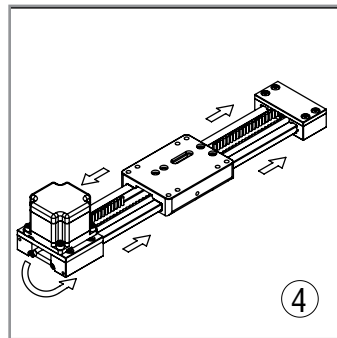
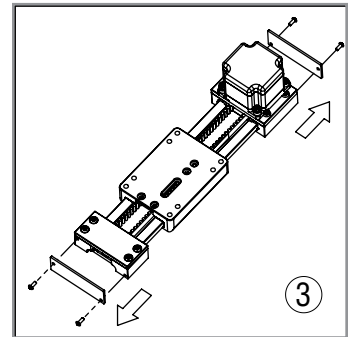
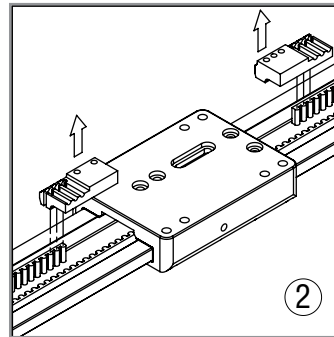
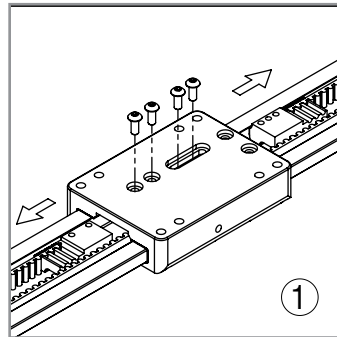
#### Tools Required

2.5 mm hex wrench

#### Parts List

Pulley Belt  
M4 x 0.7 BHCS

1. Remove four M4 button head cap screws securing the pulley clamps, then pull both clamps from beneath the carriage.
2. Remove both pulley clamps from the belt.
3. Remove the actuator end plates, if applicable.
4. Pull the belt around the pulley through the drive end block, then around the pulley through the idle end block, then pull it free of the actuator.
5. Feed the new belt through the actuator as show in the illustration. Be sure not to miss a tooth when wrapping the belt around the pulleys!
6. Insert the new belt end into the fixed pulley clamp. Be sure that all belt teeth engage the clamp.
7. Slide the fixed pulley clamp under the carriage, then fully tighten the two M4 x 0.7 button head cap screws that secure it in place.
8. Insert the other end of the belt into the adjustable pulley clamp. Be sure that all belt teeth engage the clamp.
9. Slide the adjustable pulley clamp under the carriage. Insert, but do not fully tighten the two button head cap screws. Follow the "Vertical Belt Tension Adjustment" procedure on the previous page to set belt tension.





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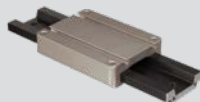
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