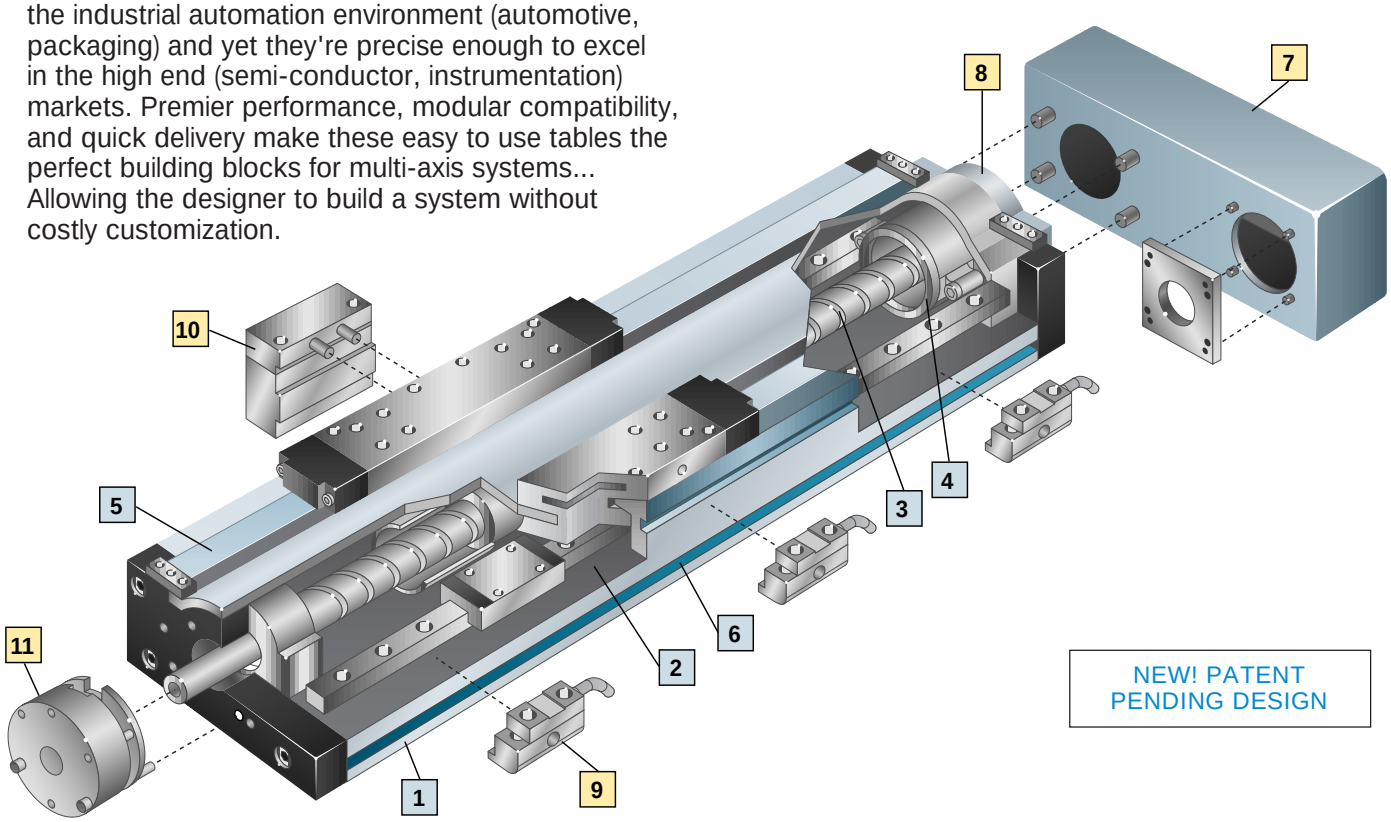
"Modular flexibility" is the attribute that clearly distinguishes the 400XR family of linear tables from all others. It allows each unit to be easily "optioned" to meet unique requirements — from the very basic to the highly complex. This compatible family of positioners offers reliable accuracy, versatility and strength. They are rugged enough to perform well in the industrial automation environment (automotive, packaging) and yet they're precise enough to excel in the high end (semi-conductor, instrumentation) markets. Premier performance, modular compatibility, and quick delivery make these easy to use tables the perfect building blocks for multi-axis systems... Allowing the designer to build a system without costly customization.



NEW! PATENT PENDING DESIGN

Features:

1. High Strength Aluminum Body

   The foundation of this "World Class Product" line is a compact, high strength extruded aluminum housing with a protective clear anodized finish.

2. Square Rail Linear Bearing

   These tables are equipped with square rail carriage support bearings which provide high load carrying capabilities, smooth precise motion and dependable performance.

3. High Efficiency Ballscrew Drive

   Precision ground, or rolled ballscrew drive (5, 10, 20, 25 mm lead) offers high throughput, efficiency, accuracy and repeatability.

4. Stiff Drive Screw Shaft Bearings

   To fully utilize the strengths inherent in the ground ballscrew, angular contact bearings are employed to provide continuous thrust load capacity.

5. Sealed for Protection

   A removable anodized aluminum cover combined with stainless steel strip seals provide protection to interior components and enhance the appearance.

6. Convenient Mounting Slots

   Continuous slots along the side of the table body provide a convenient means of mounting the table to a work surface as well as mounting accessories to the table.

Selectable Options:

7. Motor Mounts

   A large selection of servo and stepper motor sizes; plus selectable mounting configurations (in-line, wrap around, multi-positional) permit a wide variety of motor mounting possibilities.

   In-line mounting provides direct coupling of the motor shaft to the drive screw, while *parallel* (wrap around) minimizes the overall length of the motor/table combination, thereby dramatically reducing the required space envelope for multi-axis units.

8. Motor Couplers

   Bellows and Oldham couplers of various sizes are offered for effective transmission of motor torque to the drive screw.

9. Limit/Home Sensors

   Travel limiting sensors signal the motor to stop whenever the table carriage is approaching the end of travel. These sensors can be positioned over the length of the travel to restrict allowable motion. The “home” sensor provides a fixed reference point to which the carriage can be commanded to return repeatedly.

10. Encoders

    The Linear encoder offers direct positional feedback of the carriage location. The rotary shaft encoder couples directly to the drive shaft to nullify any incurred mechanical error (particularly useful with the parallel motor mount).

11. Shaft Brake

    The electromagnetic shaft brake couples directly to the drive screw and is employed primarily on vertical axes to halt carriage motion during a power loss.

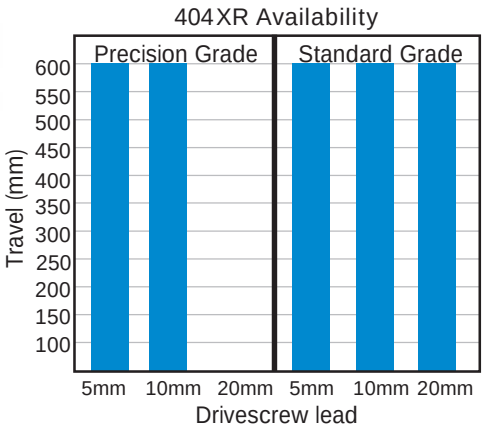
OVER 2 MILLION POSSIBLE SOLUTIONS

The 400XR family of tables is at the top of the chart when it comes to adaptability and flexibility. These tables offer an unrivaled array of features and options which can be easily matched and selected to fit. With over 2 million possible iterations, virtually any requirement can be satisfied quickly and economically. AND, since most of these options can be added effortlessly, field upgrades and redesigns are easily accommodated.

This catalog presents the 400XR family of linear tables which is comprised of two series, the 404XR and 406XR. The first section describes the 404XR Series. These tables are smaller and lighter, and are widely used where space is limited. The following section describes the larger 406XR Series. These are used for applications requiring longer travels and higher load capacity. The adapters and brackets illustrated in the multi-axis section, make it a simple process to combine the desired tables to form multi-axis systems, without any special design or manufacturing required. Daedal proudly presents the 400XR Family: Premier Performance; Modular Flexibility; Convenience; Compatibility; Cost Effective; and readily available for fast delivery.

Table of Contents

Daedal offers a complete line of linear and rotary, manual and motorized positioning tables. For instant information (including CAD drawings) on any Daedal table, 24 hours a day, visit our web site at www.daedalpositioning.com. For additional information covering the broad spectrum of products offered by Parker Hannifin Corporation including hydraulic, pneumatic, and electromechanical products, visit the Parker web site at www.parker.com.



The 404XR is a sleek compact positioner (47.8 x 95 mm profile) capable of carrying relatively high loads up to a distance of 600 mm. Its quick and accurate positioning capability can be attributed to a high strength extruded housing, square rail ball bearing system, and precision ground ballscrew drive. With its low profile design the 404XR is ideal for space restricted applications and its light weight construction make it well suited as secondary axes on multi-axis systems. These units offer a wide array of easily adapted options and accessories which permit easy configuration to specific requirements.

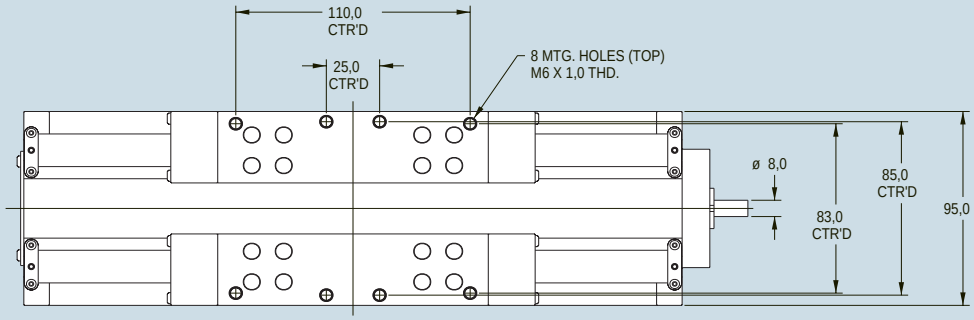
Common Characteristics	Precision	Standard
Performance		
Positional Repeatability (± µm)	1.3	5.0
Duty Cycle	100%	100%
Max Acceleration – m/sec² (in/sec²)	20 (773)	20 (773)
Rated Capacity[1]		
Normal load – kgf (lbs)	170 (375)	170 (375)
Axial load – kgf (lbs)	90 (198)	90 (198)
Motor Sizing		
Drive Screw Efficiency	90%	80%
Max Break-Away Torque – Nm (in-oz)	0.13 (18)	0.18 (26)
Max Running Torque – Nm (in-oz)	0.11 (16)	0.17 (24)
Linear Bearing – Coefficient of Friction	0.01	0.01
Ballscrew Diameter (mm)	16	16
Carriage Weight – kg (lbs)	0.70 (1.55)	0.70 (1.55)

[1] Refer to life/load charts found on page 19.

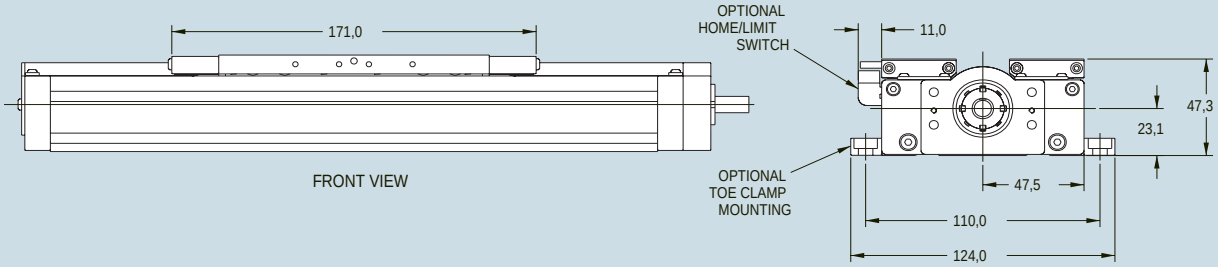
Travel Dependent Characteristics

Travel (mm)	Positional[2] Accuracy (µm)		Straightness & Flatness Accuracy (µm)	Input Inertia 10^{-6} kg-m-sec²			Max Screw Speed (Revs Per Second)	Total Table Weight (kg)
	Prec.	Std.	Prec./Std.	5mm	10mm	20mm	Prec./Std.	Prec./Std.
100	10	12	8	1.97	2.11	2.66	60	3.0
150	12	18	12	2.23	2.37	2.91	60	3.3
200	16	24	16	2.49	2.63	3.17	60	3.6
250	16	30	16	2.75	2.88	3.43	60	3.9
300	18	30	18	3.00	3.14	3.69	60	4.2
350	18	33	23	3.26	3.40	3.94	60	4.5
400	21	33	27	3.52	3.66	4.20	60	4.8
450	25	41	30	3.78	3.91	4.46	54	5.1
500	28	48	30	4.03	4.17	4.72	50	5.4
550	30	48	30	4.29	4.43	4.97	50	5.7
600	32	48	30	4.55	4.69	5.23	50	6.0

[2] Positional accuracy applys to in-line motor configurations only. Contact factory for parallel motor specifications.

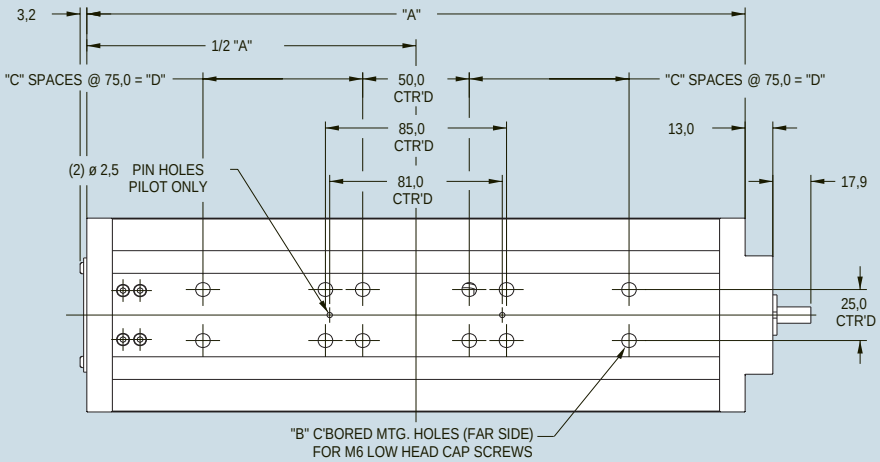


TOP VIEW



FRONT VIEW

END VIEW

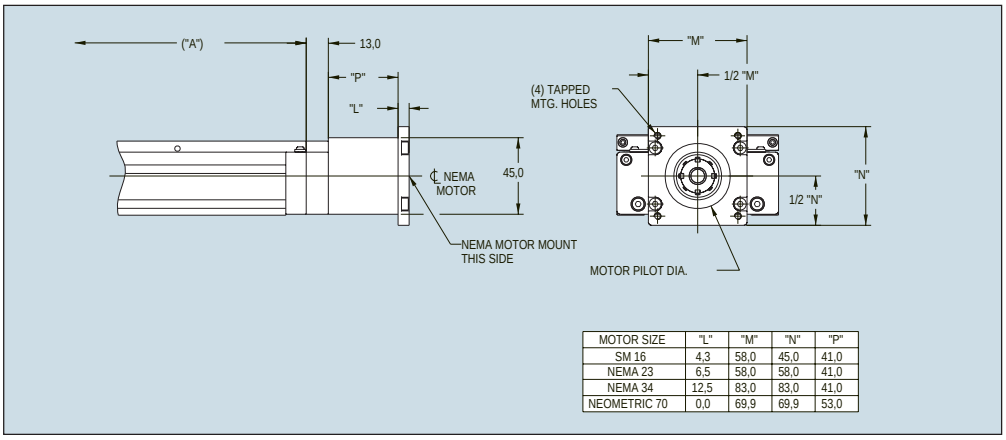


BOTTOM VIEW

MODEL	TRAVEL	A	B	C	D
404100XR	100	309	12	1	75,0
404150XR	150	359	12	1	75,0
404200XR	200	409	12	1	75,0
404250XR	250	459	16	2	150,0
404300XR	300	509	16	2	150,0
404350XR	350	559	16	2	150,0
404400XR	400	609	20	3	225,0
404450XR	450	659	20	3	225,0
404500XR	500	709	20	3	225,0
404550XR	550	759	24	4	300,0
404600XR	600	809	24	4	300,0

In-Line Motor Mount

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.

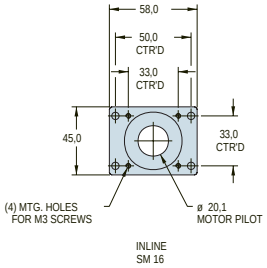


MOTOR SIZE	"L"	"M"	"N"	"P"
SM 16	4,3	58,0	45,0	41,0
NEMA 23	6,5	58,0	58,0	41,0
NEMA 34	12,5	83,0	83,0	41,0
NEOMETRIC 70	0,0	69,9	69,9	53,0

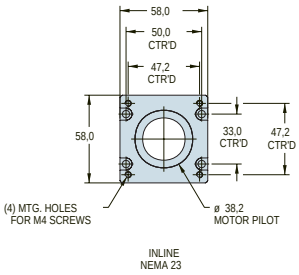
In-Line Adaptor Plates

Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number.

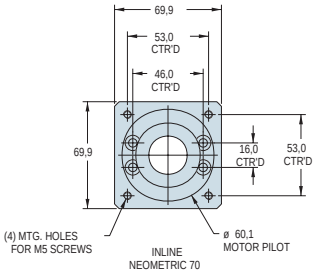
Part No. 100-2746-01
SM 16



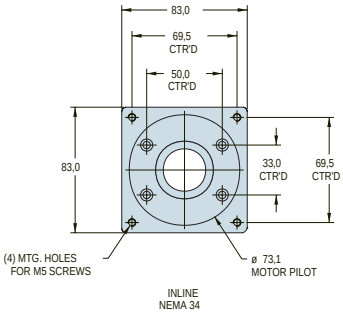
Part No. 100-2844-01
NEMA 23



Part No. 100-4047-01
NEOMETRIC 70

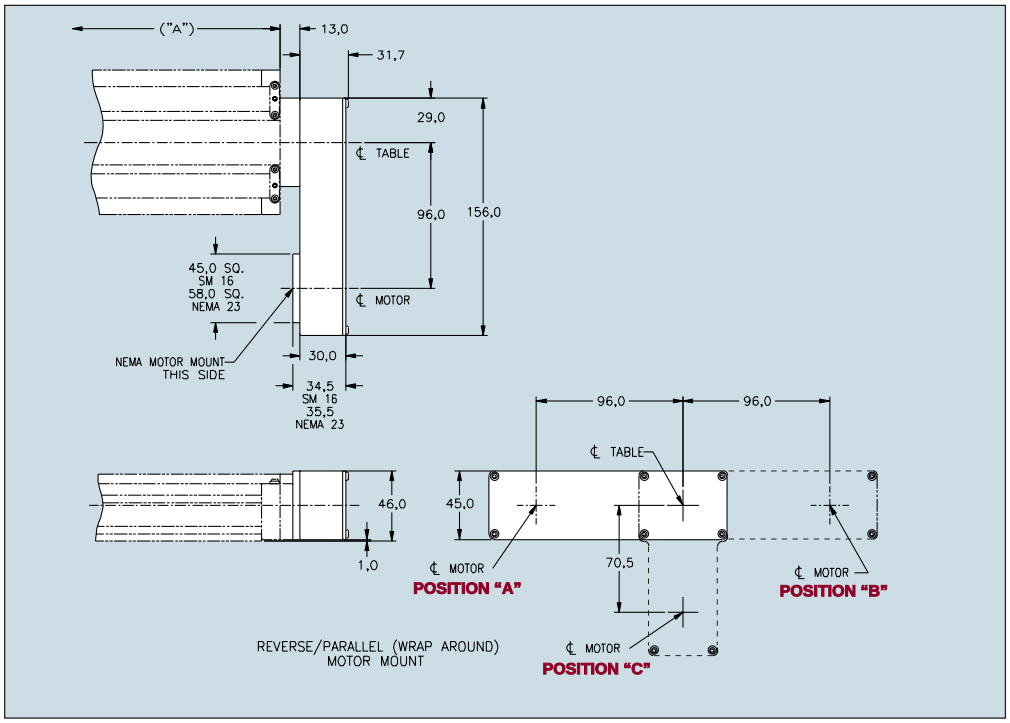


Part No. 100-2845-01
NEMA 34

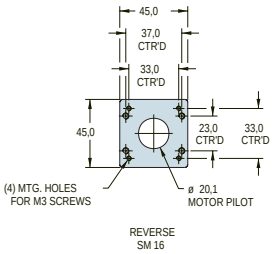


Parallel Motor Mounting

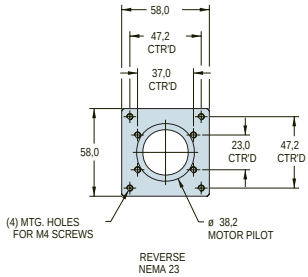
Parallel motor mounting is employed whenever a shorter overall unit length is needed. The motor is positioned along the sides or bottom of the table (designated by position A, B, or C).



SM 16



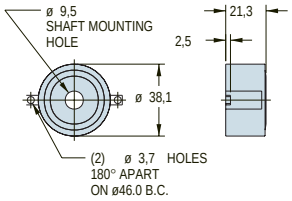
NEMA 23



Rotary Encoder

Part No. 006-1629-01

Modular rotary encoder couples directly to the drive screw for position feedback- all hardware included.

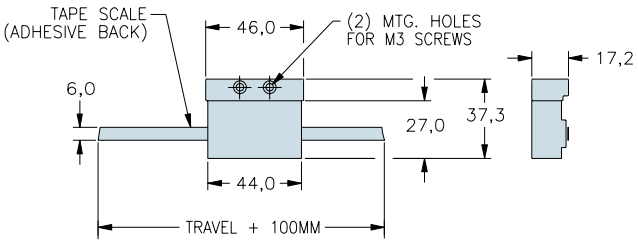


Input Power	5VDC, 135mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1250 lines/rev equals 5000 counts post quadrature (1µm with 5mm lead ballscrew)
Accuracy	±2 arc minutes

Linear Encoder (Tape Scale)

1.0 µm resolution
0.5 µm resolution
0.1 µm resolution

A linear position feedback device which mounts directly to the table carriage. (Factory installation required.)



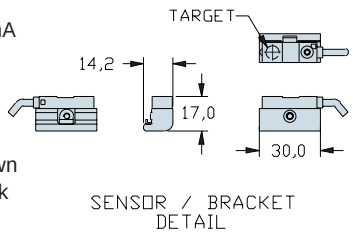
Input Power	5VDC, 150mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1.0, 0.5, 0.1 micron
Accuracy	±3 micron after linear slope correction
Reference Mark	±2 resolution bits (unidirectional)

Home or Limit Sensor

Part No. 006-1639-01 Normally Closed, Current Sinking
Part No. 006-1639-02 Normally Open, Current Sinking
Part No. 006-1639-03 Normally Closed, Current Sourcing
Part No. 006-1639-04 Normally Open, Current Sourcing

Target and mounting hardware included.

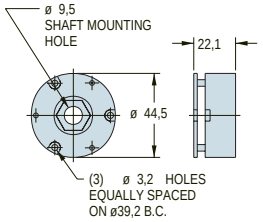
Input Power	5-30VDC, 20mA	
Output	100 mA max	
Repeatability (Typical)	±10 microns (unidirectional)	
Wire Color Code	(+) supply	Brown
	Output	Black
	(-) supply	Blue



Brake Assembly

Part No. 006-1627-01

Electromagnetic brake assembly used to prevent "backdriving" in vertical applications.

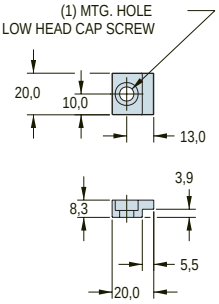


Input Power	24VDC, 0.23A
Holding Torque	1.0 N-m

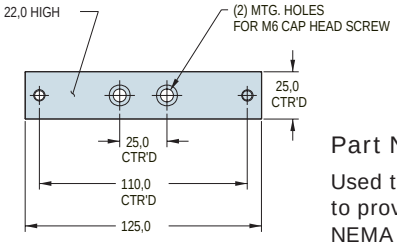
Toe Clamp

Part No. 100-2842-01

Used for convenient outboard mounting of 404XR to a base plate, riser plates, or Z-Axis bracket.



Riser Plate



Part No. 100-2849-01

Used to raise the table base to provide clearance for NEMA 23 and 34 motors.

How to Order

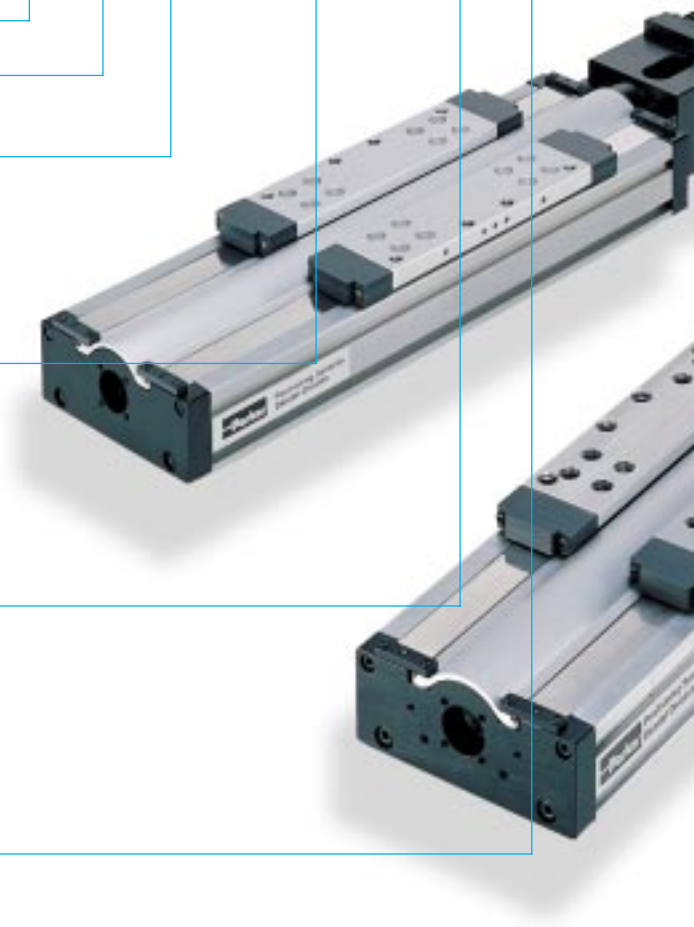
Order Example

404 | 350 | XR | M | P | – | D3 | – | H4 | L4

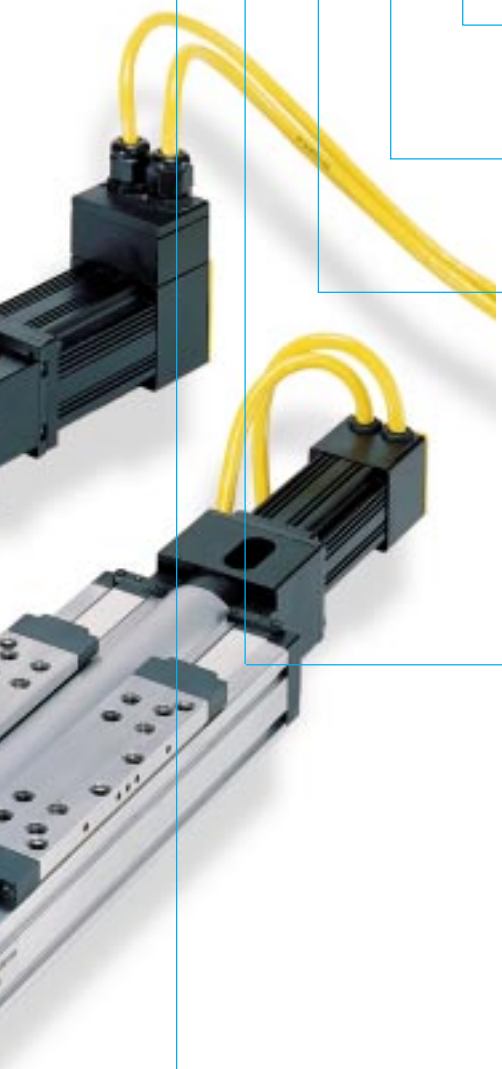
- **Model Series** 404
- **Table Travel**
  - 100 mm 100
  - 150 mm 150
  - 200 mm 200
  - 250 mm 250
  - 300 mm 300
  - 350 mm 350
  - 400 mm 400
  - 450 mm 450
  - 500 mm 500
  - 550 mm 550
  - 600 mm 600
- **Table Style** ..... XR
- **Mounting (Metric)** ..... M
- **Grade**
  - Precision grade (max travel 600 mm) ..... P
  - Standard grade (max travel 600 mm) ..... S
- **Drive Screw***
  - Free travel D1
  - 5 mm ball screw D2
  - 10 mm ball screw D3
  - 20 mm ball screw D4

*Refer to availability chart on page 4.

- **Home Sensor Assembly (one sensor)**
  - No home sensor H1
  - N.C. current sinking H2
  - N.O. current sinking H3
  - N.C. current sourcing H4
  - N.O. current sourcing H5
- **Travel Limit Sensor Assembly (two sensors)**
  - No limit sensors L1
  - N.C. current sinking L2
  - N.O. current sinking L3
  - N.C. current sourcing L4
  - N.O. current sourcing L5



C3 M4 E1 B1 R1 P1



Pinning Option

- P1 No pinning
- P2 X axis carriage dowel pin holes (requires matched Y axis)
- P3 Y axis base – dowel pin holes (requires matched X axis)
- P4 Z axis base dowel pinning (requires matching Z bracket)

Clean Room Rating

- R1 Class 1000 – no preparation
- R2 Class 100 – clean room preparation

Brake Option

- B1 No brake
- B2 Shaft brake

Encoder Option

- E1 No encoder
- E2 Linear encoder (tape scale) 1 micron
- E3 Linear encoder (tape scale) 0.5 micron
- E4 Linear encoder (tape scale) 0.1 micron
- E5 Rotary shaft encoder

Motor Mount

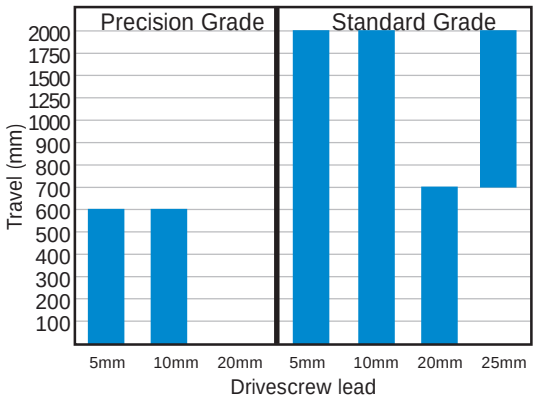
- M1 No motor mount
- M2 SM 16 - Inline mounting
- M3 NEMA 23 & SM 23 - In line mounting
- M4 NEMA 34 - In line mounting
- M5 SM16 - Parallel mounting, "A" location
- M6 SM16 - Parallel mounting, "B" location
- M7 SM16 - Parallel mounting, "C" location
- M8 NEMA 23 - Parallel mounting, "A" location
- M9 NEMA 23 - Parallel mounting, "B" location
- M10 NEMA 23 - Parallel mounting, "C" location
- M11 SM23 - Parallel mounting, "A" location
- M12 SM23 - Parallel mounting, "B" location
- M13 SM23 - Parallel mounting, "C" location
- M21 Neometric 70 - In line mounting

Motor Coupling

- C1 No coupling (required for parallel mounting)
- C2 6.3 mm (0.25") Oldham
- C3 6.3 mm (0.25") Bellows (required for precision grade)
- C4 9.5 mm (0.375") Oldham
- C5 9.5 mm (0.375") Bellows (required for precision grade)
- C6 11 mm (0.43") Oldham
- C7 11 mm (0.43") Bellows (required for precision grade)

Parker Hannifin Corporation
Daedal Division
Irwin, Pennsylvania

406XR Availability



The 406XR is the rugged big brother of the 404XR Series. It can position greater loads (up to 630 kgf) over longer (2 meters) travels. Because of its size and strength (28 kg-m, 200 lb-ft. moment load capacity) this durable table is ideal as the base unit in a multi-axis system. From high resolution to high throughput, selectable ballscrew leads (5, 10, 20, 25 mm) make the desired resolution/velocity ratio easy to achieve, and stainless steel seal strips alleviate environmental concerns.

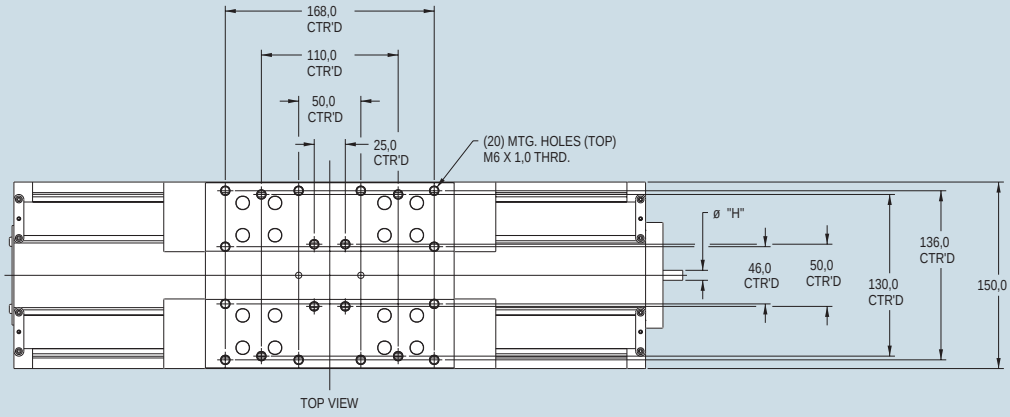
Common Characteristics	Precision	Standard
Performance		
Positional Repeatability (± µm)	1.3	5.0
Duty Cycle	100%	100%
Max Acceleration – m/sec² (in/sec²)	20 (773)	20 (773)
Rated Capacity[1]		
Normal load – kgf (lbs)	630 (1390)	630 (1390)
Axial load – kgf (lbs)	90 (198)	200 (440)
Motor Sizing		
Drive Screw Efficiency	90%	80%
Max Break-Away Torque – Nm (in-oz)		
0 to 600 mm Travel	.13 (18)	.18 (26)
700 to 2000 mm Travel	na	.39 (55)
Max Running Torque – Nm (in-oz)		
0 to 600 mm Travel	.11 (16)	.17 (24)
700 to 2000 mm Travel	na	.34 (48)
Linear Bearing – Coefficient of Friction	0.01	0.01
Ballscrew Diameter	refer to chart page 11	
Carriage Weight kg (lbs)	2.7 (5.94)	2.7 (5.94)

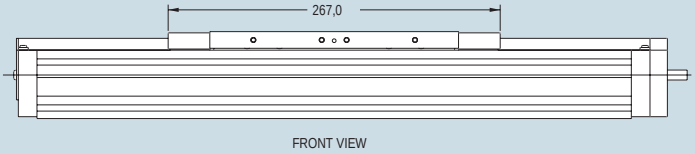
[1] Refer to life/load charts found on page 19.

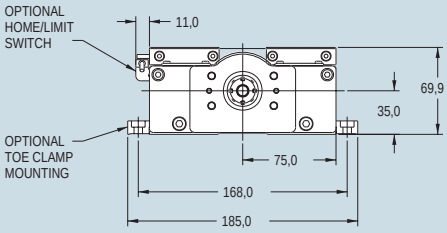
Travel Dependent Characteristics

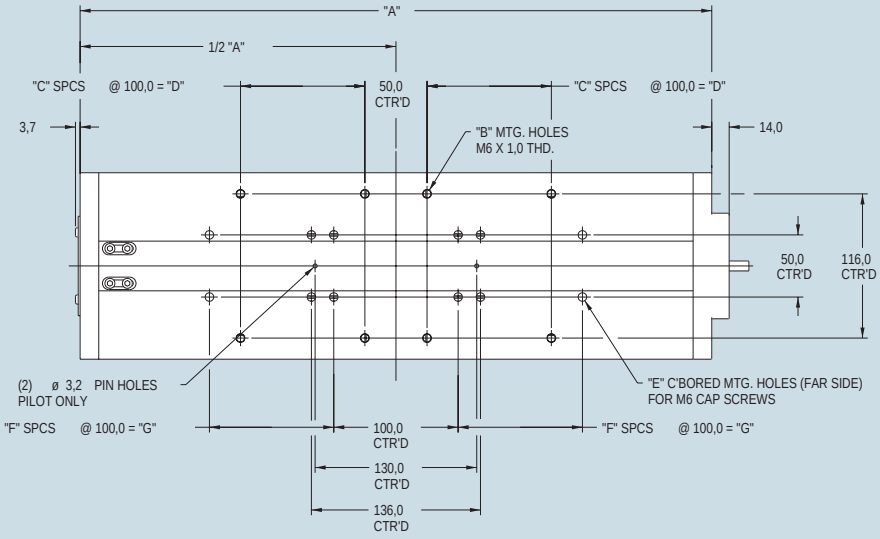
Travel (mm)	Positional[2] Accuracy (µm)		Straightness & Flatness Accuracy (µm)	Input Inertia 10^{-6} kg-m-sec²				Max Screw Speed (Revs Per Second)	Total Table Weight (kg)
	Prec.	Std.	Prec./Std.	5mm	10mm	20mm	25mm	Prec./Std.	Prec./Std.
100	12	15	11	6.27	14.70	48.50	na	60	8.7
200	15	24	16	6.86	15.30	49.10	na	60	10.0
300	15	30	19	7.44	15.90	49.70	na	60	11.3
400	20	41	25	8.03	16.50	70.00	na	60	12.6
500	25	48	32	8.61	17.10	70.60	na	50	13.9
600	30	50	35	9.20	17.60	71.20	na	50	15.2
700	na	140	40	33.80	42.30	na	95.80	60	19.2
800	na	160	45	36.90	45.30	na	98.90	50	20.7
900	na	180	50	40.00	48.40	na	101.90	40	22.2
1000	na	200	55	43.00	51.50	na	105.00	35	23.7
1250	na	250	75	50.70	59.10	na	112.60	24	27.6
1500	na	300	95	58.40	66.80	na	120.30	16	31.4
1750	na	350	115	66.10	74.50	na	128.50	13	35.2
2000	na	400	135	73.90	82.30	na	135.80	11	39.1

[2] Positional accuracy applys to in-line motor configurations only. Contact factory for parallel motor specifications.







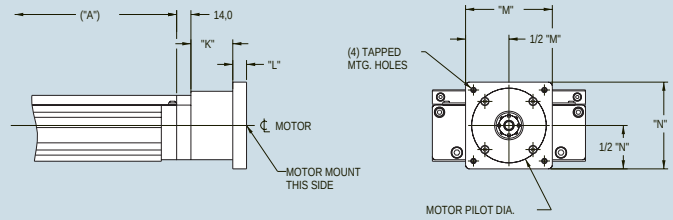


MODEL	TRAVEL	BALLSCREW DIAMETER	A	B	C	D	E	F	G	H
4060100XR	100	16	408	8	1	100,0	12	1	100,0	8,0
4060200XR	200	16	508	8	1	100,0	12	1	100,0	8,0
4060300XR	300	16	608	12	2	200,0	16	2	200,0	8,0
4060400XR	400	16	708	12	2	200,0	16	2	200,0	8,0
4060500XR	500	16	808	16	3	300,0	20	3	300,0	8,0
4060600XR	600	16	908	16	3	300,0	20	3	300,0	8,0
4060700XR	700	25	1008	20	4	400,0	24	4	400,0	10,0
4060800XR	800	25	1108	20	4	400,0	24	4	400,0	10,0
4060900XR	900	25	1208	24	5	500,0	28	5	500,0	10,0
4061000XR	1000	25	1308	24	5	500,0	28	5	500,0	10,0
4061250XR	1250	25	1558	32	7	700,0	32	6	600,0	10,0
4061500XR	1500	25	1808	36	8	800,0	40	8	800,0	10,0
4061750XR	1750	25	2058	40	9	900,0	44	9	900,0	10,0
4062000XR	2000	25	2308	44	10	1000,0	48	10	1000,0	10,0

Motor Mount Dimensions

In-Line Motor Mount

In-line motor mounting allows the motor to be mounted directly to the drive screw via the selected motor coupling.



NOTES:

* NO ADAPTER PLATE IS NEEDED FOR MOTOR MOUNTING, THEREFORE "L" EQUALS ZERO.

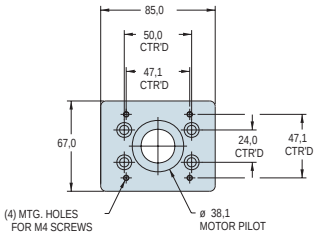
** NEMA 23/SM23 MOTOR MOUNT IS NOT SQUARE. IT IS 70,0MM X 65,0MM.

MOTOR SIZE	K	L	M	N
NEMA 23/SM 23**	41,0	0,0*	85,0	67,0
NEMA 34 NEOMETRIC 34	53,0	13,5	85,0	85,0
APEX 602/604** NEOMETRIC 70	53,0	0,0*	85,0	70,0
APEX 603 NEOMETRIC 92	53,0	12,5	92,0	92,0

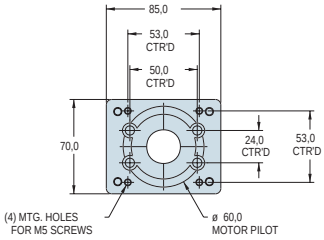
In-Line Adaptor Plates

Used to easily accommodate the mounting of different frame sizes. These adapter plates can be ordered separately by part number.

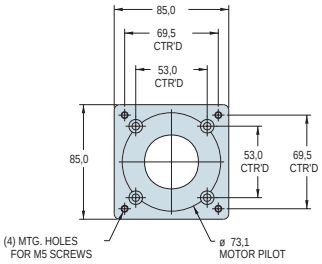
Part No. 100-3740-01 NEMA 23 or SM 23



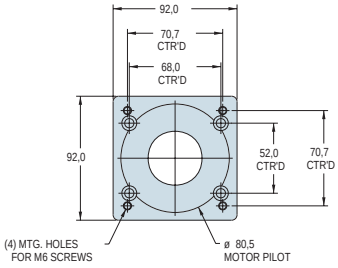
Part No. 100-3741-01 APEX 602 or NEO 70



Part No. 100-4597-01 NEMA 34 or NEO 34

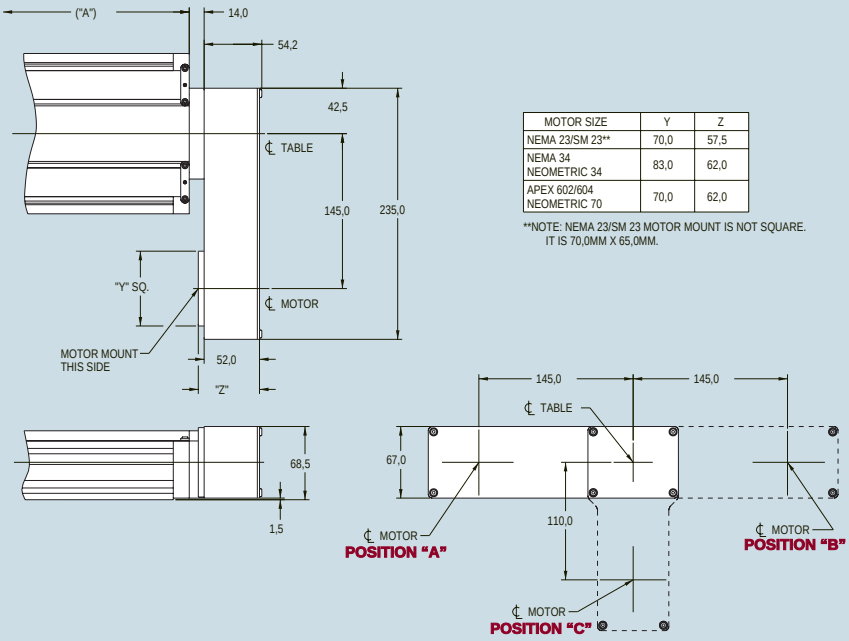


Part No. 100-3805-01 APEX 603 or NEO 92



Parallel Motor Mounting

Parallel motor mounting is employed whenever a shorter overall unit length is needed.
The motor is positioned along the sides or bottom of the table (designated by position A, B, or C).



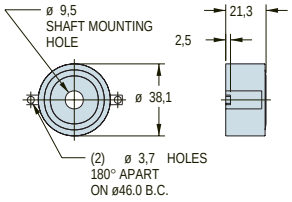
MOTOR SIZE	Y	Z
NEMA 23/SM 23**	70,0	57,5
NEMA 34 NEOMETRIC 34	83,0	62,0
APEX 602/604 NEOMETRIC 70	70,0	62,0

**NOTE: NEMA 23/SM 23 MOTOR MOUNT IS NOT SQUARE. IT IS 70,0MM X 65,0MM.

Rotary Encoder

Part No. 006-1629-01

Modular rotary encoder couples directly to the drive screw for position feedback- all hardware included.

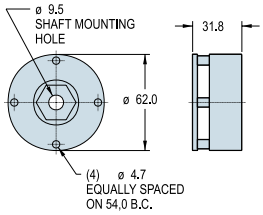


Input Power	5VDC, 135mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1250 lines/rev equals 5000 counts post quadrature (1µm with 5mm lead ballscrew)
Accuracy	±2 arc minutes

Brake Assembly

Part No. 006-1656-01

Electromagnetic brake assembly used to prevent "backdriving" in vertical applications.

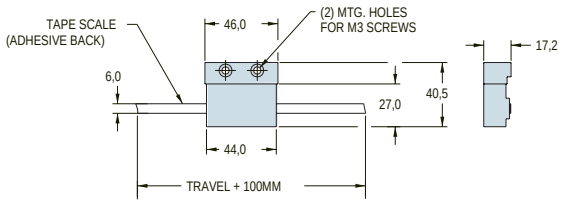


Input Power	24VDC, 0.31A
Holding Torque	5.6 N-m

Linear Encoder (Tape Scale)

1.0 µm resolution
0.5 µm resolution
0.1 µm resolution

A linear position feedback device which mounts directly to the table carriage. (Factory installation required.)

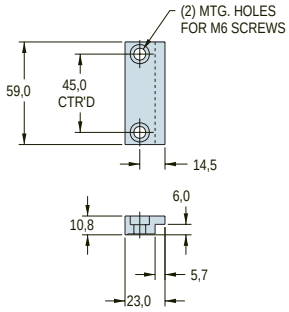


Input Power	5VDC, 150mA
Output	A/B quadrature and reference mark, differential line drive output
Resolution	1.0, 0.5, 0.1 micron
Accuracy	±3 micron after linear slope correction
Reference Mark	±2 resolution bits (unidirectional)

Toe Clamp

Part No. 100-4228-01

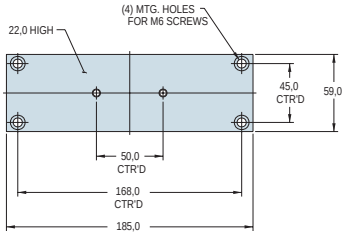
Used for convenient outboard mounting of 406XR to a base plate, riser plates, or Z-Axis bracket.



Riser Plate

Part No. 100-4401-01

Used to raise the table base to provide clearance for motors larger than NEMA 23 frame size.

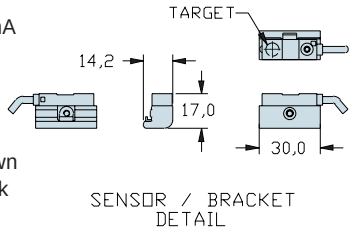


Home or Limit Sensor

Part No. 006-1639-01	Normally Closed, Current Sinking
Part No. 006-1639-02	Normally Open, Current Sinking
Part No. 006-1639-03	Normally Closed, Current Sourcing
Part No. 006-1639-04	Normally Open, Current Sourcing

Target and mounting hardware included.

Input Power	5-30VDC, 20mA
Output	100 mA max
Repeatability (Typical)	±10 microns (unidirectional)
Wire Color Code	(+) supply Brown Output Black (-) supply Blue



406XR

How to Order

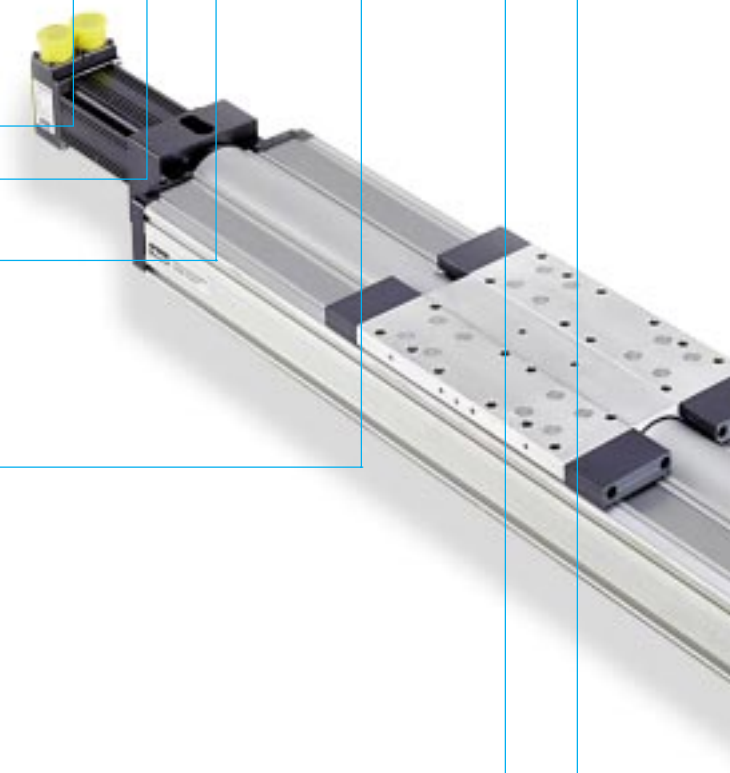
Order Example

406 600 XR M P – D3 – H4 L4

- ☑ Model Series 406
- ☑ Table Travel
  - 100 mm 100
  - 200 mm 200
  - 300 mm 300
  - 400 mm 400
  - 500 mm 500
  - 600 mm 600
  - 700 mm 700
  - 800 mm 800
  - 900 mm 900
  - 1000 mm 1000
  - 1250 mm 1250
  - 1500 mm 1500
  - 1750 mm 1750
  - 2000 mm 2000
- ☑ Table Style ..... XR
- ☑ Mounting (Metric) ..... M
- ☑ Grade
  - Precision grade (max travel 600 mm) ..... P
  - Standard grade (max travel 2000 mm) ..... S
- ☑ Drive Screw
  - Free travel D1
  - 5 mm ball screw D2
  - 10 mm ball screw D3
  - 20 mm ball screw D4
  - 25 mm ball screw D5

*Refer to availability chart on page 10.

- ☑ Home Sensor Assembly (one sensor)
  - No home sensor H1
  - N.C. current sinking H2
  - N.O. current sinking H3
  - N.C. current sourcing H4
  - N.O. current sourcing H5
- ☑ Travel Limit Sensor Assembly (two sensors)
  - No limit sensors L1
  - N.C. current sinking L2
  - N.O. current sinking L3
  - N.C. current sourcing L4
  - N.O. current sourcing L5



C3 M4 E1 R1 B1 P1

Pinning Option

- P1 No pinning
- P2 X axis carriage dowel pin holes (requires matched Y axis)
- P3 Y axis base – dowel pin holes (requires matched X axis)
- P4 Z axis base dowel pinning (requires matching Z bracket)

Brake Option

- B1 No brake
- B2 Shaft brake

Clean Room Rating

- R1 Class 1000 – no preparation
- R2 Class 100 – clean room preparation

Encoder Option

- E1 No encoder
- E2 Linear encoder (tape scale) 1 micron
- E3 Linear encoder (tape scale) 0.5 micron
- E4 Linear encoder (tape scale) 0.1 micron
- E5 Rotary shaft encoder

Motor Mount

- M1 No motor mount
- M3 NEMA 23 & SM23 - In line mounting
- M4 NEMA 34 In line mounting
- M8 NEMA 23 - Parallel mounting, “A” location
- M9 NEMA 23 - Parallel mounting, “B” location
- M10 NEMA 23 - Parallel mounting, “C” location
- M11 SM23 - Parallel mounting, “A” location
- M12 SM23 - Parallel mounting, “B” location
- M13 SM23 - Parallel mounting, “C” location
- M14 NEMA 34 - Parallel mounting, “A” location
- M15 NEMA 34 - Parallel mounting, “B” position
- M16 NEMA 34 - Parallel mounting, “C” position
- M17 Neometric 34 - In line mounting
- M18 Neometric 34 - Parallel mounting, “A” location
- M19 Neometric 34 - Parallel mounting, “B” location
- M20 Neometric 34 - Parallel mounting, “C” location
- M21 Neometric 70 - In line mounting
- M22 Neometric 70 - Parallel mounting, “A” location
- M23 Neometric 70 - Parallel mounting, “B” location
- M24 Neometric 70 - Parallel mounting, “C” location
- M25 APEX 602/604 - In line mounting
- M26 APEX 602/604 - Parallel mounting, “A” location
- M27 APEX 602/604 - Parallel mounting, “B” location
- M28 APEX 602/604 - Parallel mounting, “C” location
- M29 APEX 603 & Neometric 92 - In line mounting

Motor Coupling

- C1 No coupling (required for parallel mounting)
- C2 6.3mm (0.25”) Oldham
- C3 6.3mm (0.25”) Bellows (required for precision grade)
- C4 9.5mm (0.375”) Oldham
- C5 9.5mm (0.38”) Bellows (required for precision grade)
- C6 11.0mm (0.43”) Oldham
- C7 11.0mm (0.43”) Bellows (required for precision grade)
- C8 12.7mm (0.50”) Oldham
- C9 12.7mm (0.50”) Bellows (required for precision grade)
- C10 14.0mm (0.55”) Oldham
- C11 14.0mm (0.55”) Bellows (required for precision grade)

Parker Hannifin Corporation
Daedal Division
Irwin, Pennsylvania

Multi Axis Configurations

These diagrams and the following photographs show the most popular variations of multi-axis configurations. The brackets illustrated are required to produce that particular configuration.

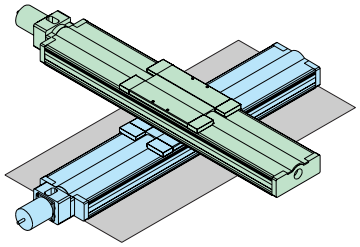


Figure 1
Two Axis (X-Y)
Horizontal Mounting

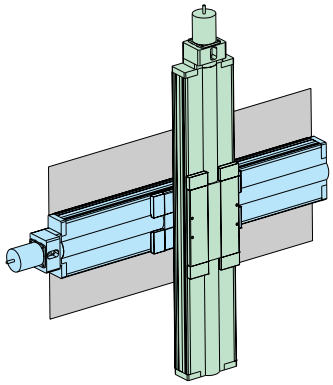


Figure 2
Two Axis (X-Y)
Vertical Mounting

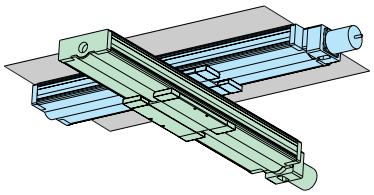


Figure 3
Two Axis (X-Y)
Inverted Mounting

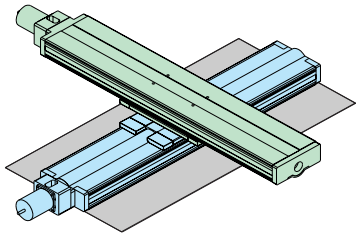


Figure 4
Two Axis-Carriage to Carriage
(Y Axis Inverted)

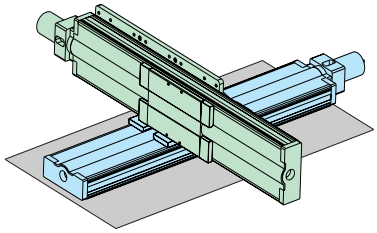


Figure 5
Two Axis Cartesian
Horizontal Mounting

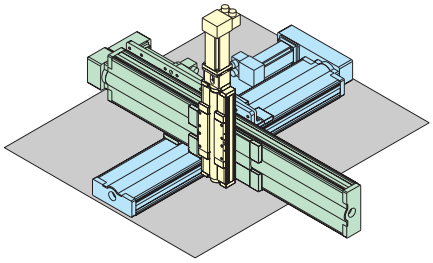


Figure 6
Three Axis Cartesian
Horizontal Mounting

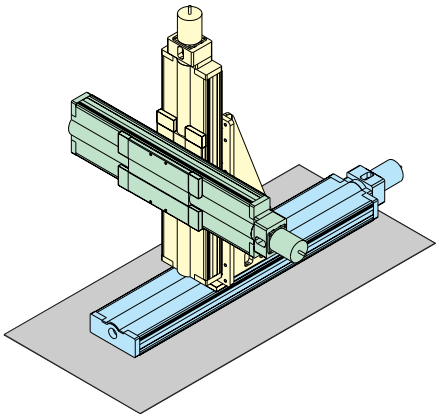


Figure 7
Three Axis (X-Z-Y)
Horizontal Mounting

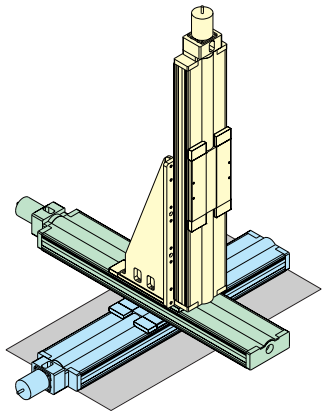


Figure 8
Three Axis (X-Y-Z)
Horizontal Mounting

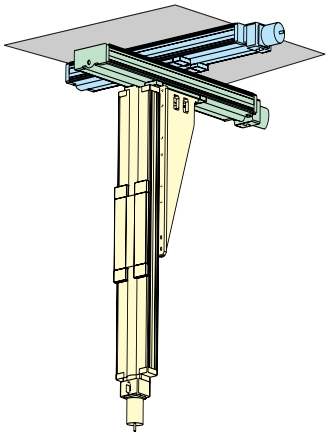
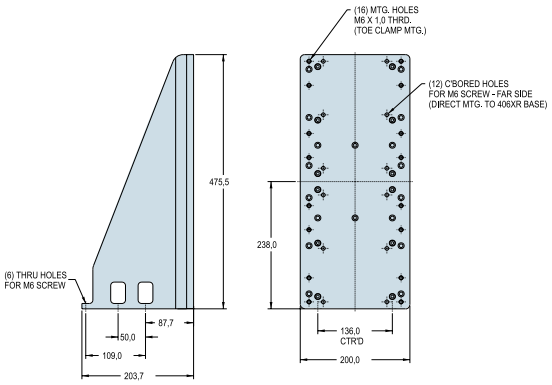
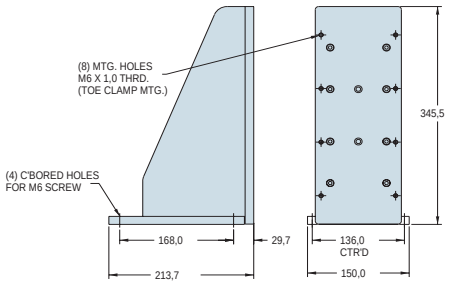


Figure 9
Three Axis (X-Y-Z)
Inverted Mounting



Part No. 002-1817-01
Z Axis Bracket
406XR to 406XR
Used to mount a 406XR (Z) axis to a 406XR base (X) axis.

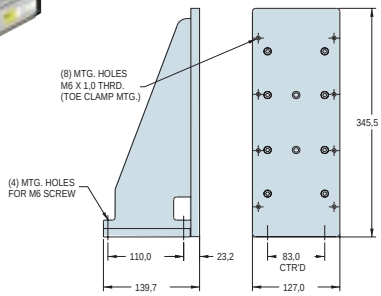


Part No. 002-1823-01
Z Axis Bracket
404XR to 406XR

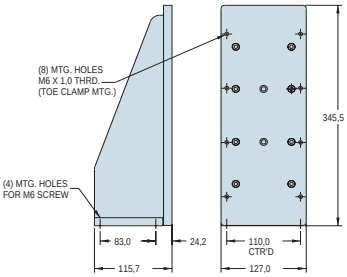
Two Axis X-Z
3:00 or 9:00 o'clock position

(2) 400XR Tables + (1) Z-Bracket

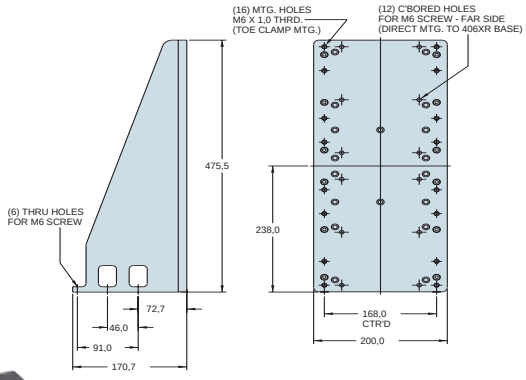
Vertical (Z) Axis table is at the 3:00 or 9:00 o'clock position. For reference, the motor end of the base (X) axis is the 3:00 o'clock position.



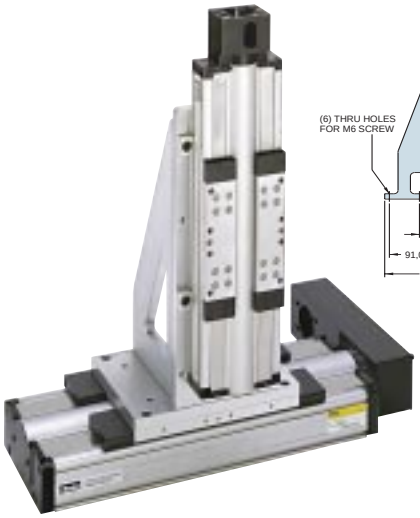
Part No. 002-1839-01
Z Axis Bracket
404XR to 404XR

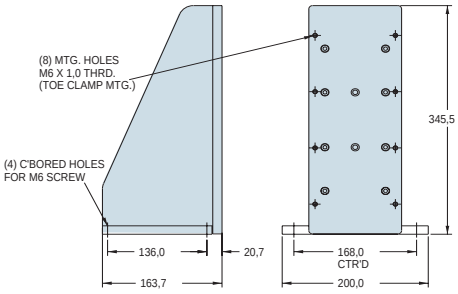


Part No. 002-1840-01
Z Axis Bracket
404XR to 404XR



Part No. 002-1818-01
Z Axis Bracket
406XR to 406XR
Used to mount a 406XR (Z) axis to a 406XR base (X) axis.





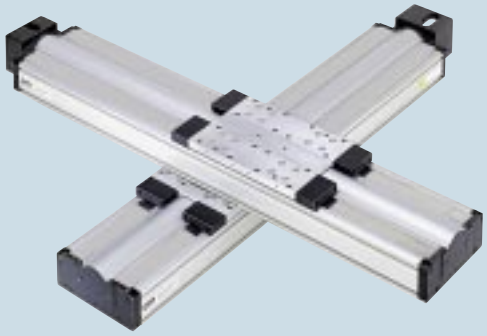
Part No. 002-1824-01
Z Axis Bracket
404XR to 406XR

Two Axis X-Z
6:00 or 12:00 o'clock positions

(2) 400XR Tables + (1) Z-Axis Bracket

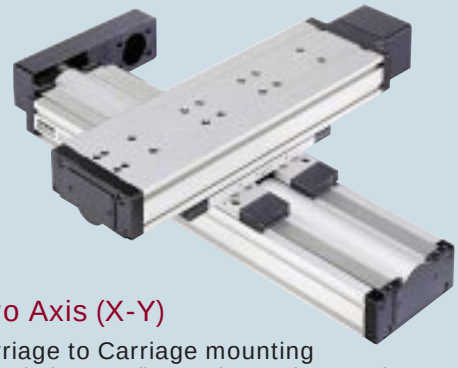
Vertical (Z) Axis table is at the 6:00 or 12:00 o'clock position. For reference, the motor end of the base (X) axis is the 3:00 o'clock position.

Configurations



Two Axis (X-Y)

(2)Tables – Direct Mounting – no adapter or bracket



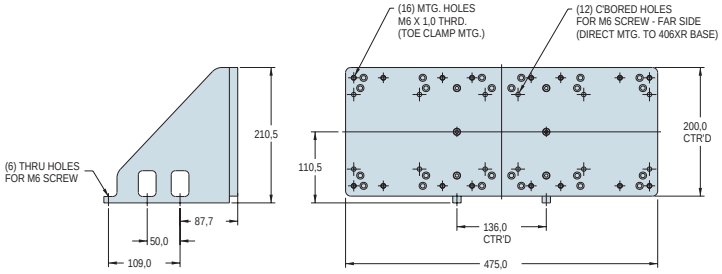
Two Axis (X-Y)

Carriage to Carriage mounting
(Y-Axis inverted), requires Adapter plate:
404XR to 404XR: Part No. 100-3945-01
404XR to 406XR: Part No. 100-4191-01
406XR to 406XR: Part No. 100-4191-01

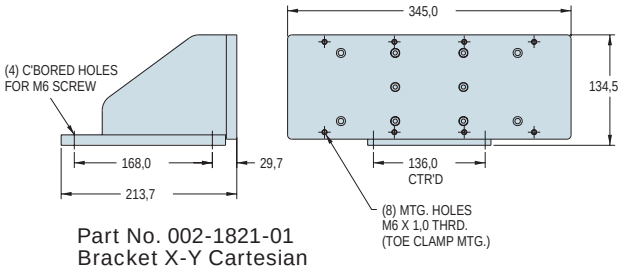
Two Axis Cartesian

(2) Tables + (1) Bracket

The second axis table (Y) is rotated 90 degrees about its travel axis, and mounted to the base axis (X) with the appropriate bracket.



Part No. 002-1819-01
Bracket X-Y Cartesian
406XR to 406XR
Used to mount a 406XR (Y) axis
to a 406XR base (X) axis.

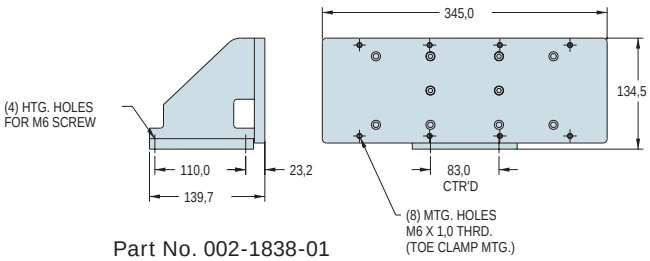


Part No. 002-1821-01
Bracket X-Y Cartesian
404XR to 406XR

Three Axis Cartesian

(3) Tables + (1) Bracket

The second axis table (Y) is rotated 90 degrees about its travel axis, and mounted to the base axis (X) with the appropriate bracket. The third (Z) axis is mounted directly to the (Y) axis.



Part No. 002-1838-01
Bracket X-Y Cartesian
404XR to 404XR

The following performance information is provided as a supplement to the product specifications pages. The following graphs and formulas are used to establish the table life relative to the applied loads. The useful life of a linear table at full catalog specifications is dependent on the forces acting upon it. These forces include both static components resulting from payload weight, and dynamic components due to acceleration/deceleration of the load. In multi-axes applications, the primary positioner at the bottom of the stack usually establishes the load limits for the combined axes. When determining load/life, it is critical to include the weight of all positioning elements that contribute to the load supported by the primary axis.

Table Life/Load Chart
Compression (normal load)

This graph provides a “rough cut” evaluation of the support bearing life / load characteristics. The curves show the life / load relationship when the applied load is centered on the carriage, normal(perpendicular) to the carriage mounting surface. For a thorough evaluation of life vs load, including off center, tension, and side loads refer to the charts and formulas on the following pages.

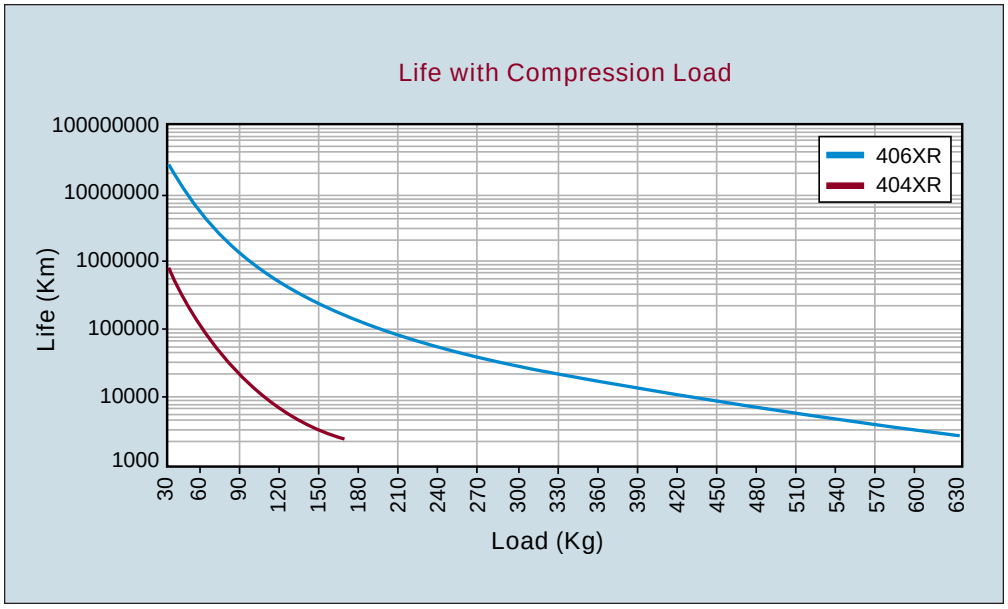
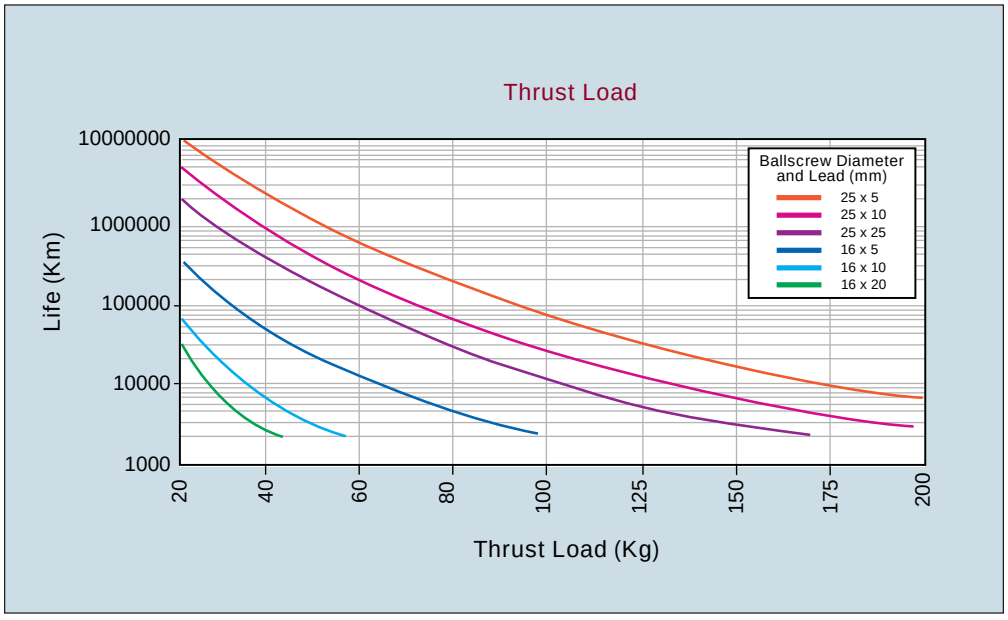


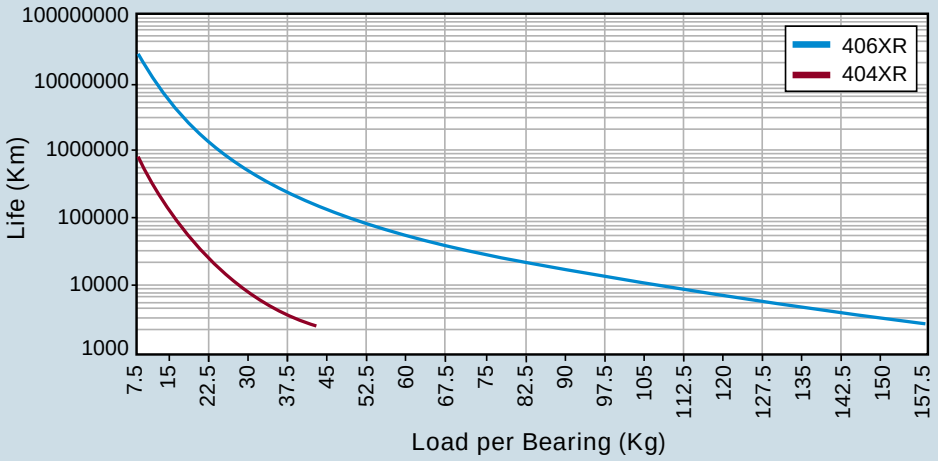
Table Life/Load Chart
Axial (thrust) load

This graph gives the table ballscrew life relative to the axial load.

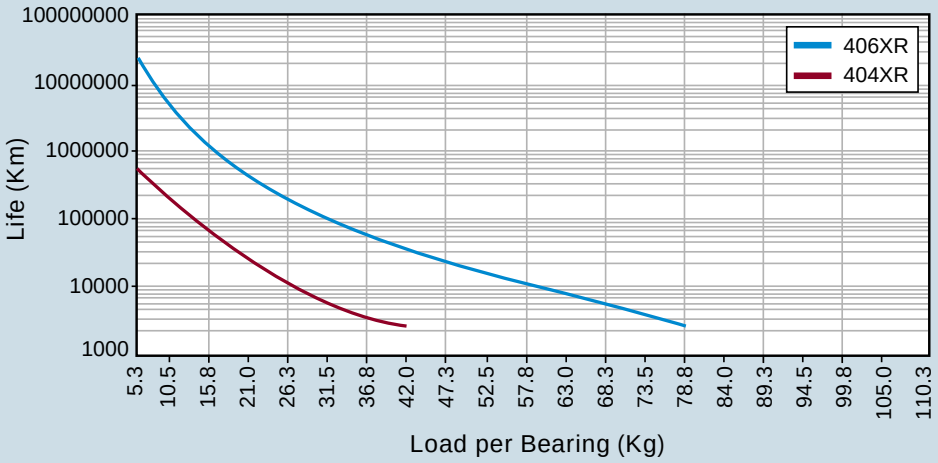


Engineering Reference

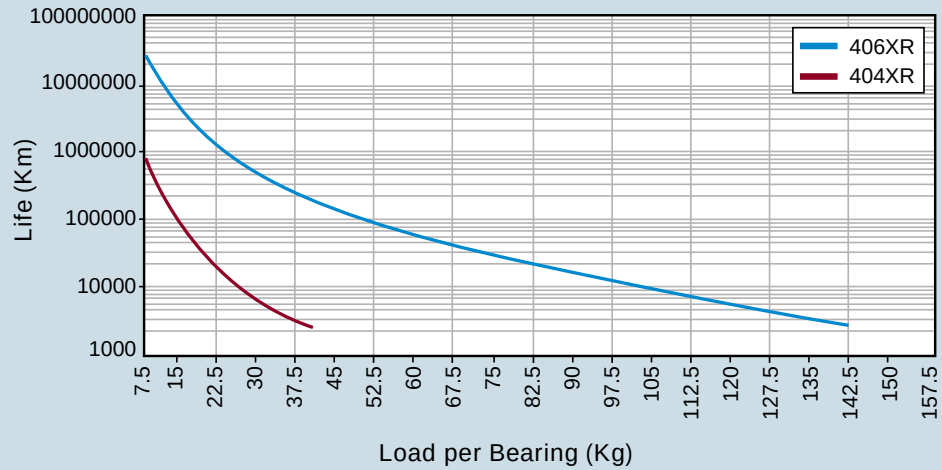
Life with Compression Load



Life with Tension Load



Life with Side Load



These charts are to be used in conjunction with the corresponding formulas (following pages) to establish the life / load for each bearing (4 per table).

Several dimensions, which are specific to each linear positioning table model, and the load geometry are required for these computations. These dimensions are supplied in the catalog information for each positioner. The dimensions are referenced as follows:

- d1 – bearing block center-to-center longitudinal spacing
- d2 – bearing rail center-to-center lateral spacing
- da – Rail center-to-carriage mounting surface

	d1	d2	da
404XR	80	50	28
406XR	114	90.3	42.5

Horizontal Translation — Normal Load

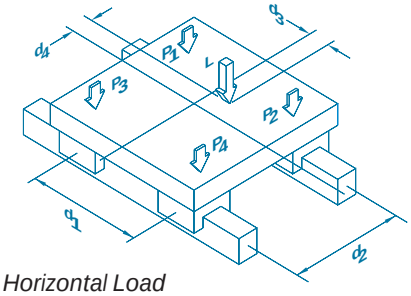


Figure 1: Horizontal Load

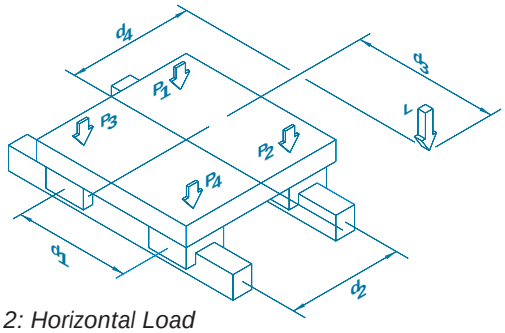


Figure 2: Horizontal Load

$$P_1 = \left[\frac{L}{4}\right] - \left[\frac{L}{2} * \frac{d_3}{d_1}\right] + \left[\frac{L}{2} * \frac{d_4}{d_2}\right]$$

$$P_2 = \left[\frac{L}{4}\right] + \left[\frac{L}{2} * \frac{d_3}{d_1}\right] + \left[\frac{L}{2} * \frac{d_4}{d_2}\right]$$

$$P_3 = \left[\frac{L}{4}\right] - \left[\frac{L}{2} * \frac{d_3}{d_1}\right] - \left[\frac{L}{2} * \frac{d_4}{d_2}\right]$$

$$P_4 = \left[\frac{L}{4}\right] + \left[\frac{L}{2} * \frac{d_3}{d_1}\right] - \left[\frac{L}{2} * \frac{d_4}{d_2}\right]$$

Figure 1 shows a normal load applied to the carriage translating horizontally. The vector L, defined by the CG of the load, is shown applied at a point whose coordinate distances from the center of the carriage are given by distances d3 and d4.

With the positioner at rest or moving with uniform velocity, the loads on each of the four bearing blocks are given by the above equations:

Note that each of the four bearing blocks will experience either compressional or tensional loading; the magnitude of these forces at each bearing is dependent upon the location of the load vector with respect to the center of the positioner carriage. For each bearing, the maximum of the forces in tension and compression is plotted on the load charts for the specific model positioner to determine the life of the table in the application.

The calculations for loads whose CG falls outside the carriage mounting surface area, as shown in Figure 2, are identical to those used with Figure 1. In either case, accelerations and decelerations of the load must be considered in calculating the dynamic forces which determine the life of the system in a particular application.

Horizontal Translation — Side Load

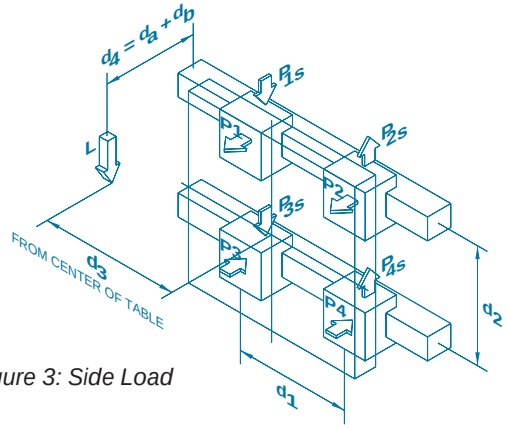


Figure 3: Side Load

$$P_1 = P_2 = \frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

$$P_3 = P_4 = -\frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

$$P_{1s} = P_{3s} = \frac{L}{4} + \left[\frac{L}{2} * \frac{d_3}{d_1}\right]$$

$$P_{2s} = P_{4s} = \frac{L}{4} - \left[\frac{L}{2} * \frac{d_3}{d_1}\right]$$

The previous loading scenarios have involved only normal forces (compressional or tensional) on the bearings. Consider a positioner as shown in Figure 3, which involves a lateral (side) load applied to the carriage which translates horizontally. The load vector (L) is shown applied at a point whose coordinate distances from the center of the carriage bearing system are given by dimensions d3 and d4. Note that d4 is the sum of distance da—the distance between bearing and center and carriage surface which is provided for each linear positioner—plus db, the distance of the load CG from the mounting surface of the carriage.

The loading felt by each of the four bearing blocks when the positioner is stationary or moving with uniform velocity is given by the above equations:

Here P1, P2, P3 and P4 are the normal loads (tensional and compressional) and P1S, P2S, P3S and P4S are the side loads. For each bearing, the largest side loads and normal loads in both tension and compression are identified for calculating the positioner life in the application.

For round rail/ball bushing type bearings, the forces are plotted individually on the appropriate curves to determine the service life.

For linear motion guide bearing positioners, an "equivalent load per bearing" is calculated for the life determination. Equations listed in Table A, page 22, apply for the Daedal positioners which incorporate linear motion guide bearings. As shown in Table A, this "equivalent load" is plotted on the indicated load/life graph to determine the positioner's service life.

Again, accelerations and decelerations of the load must be considered in calculating the dynamic forces which determine the life of the system in a particular application.

Vertical Translation

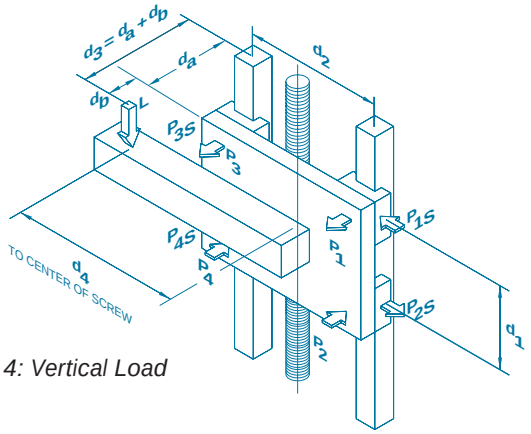


Figure 4: Vertical Load

$$P_1 = P_3 = \frac{L}{2}\left[\frac{d_3}{d_1}\right]$$

$$P_2 = P_4 = -\frac{L}{2}\left[\frac{d_3}{d_1}\right]$$

$$P_{1s} = P_{3s} = \frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

$$P_{2s} = P_{4s} = -\frac{L}{2}\left[\frac{d_4}{d_2}\right]$$

Figure 4 shows a load applied to the positioner carriage which translates vertically. The load vector (L) is shown applied at a point whose coordinate distances from the center of the carriage bearing system are given by distances d3 and d4. Note that here d3 is the sum of distance da, which is given for the particular linear positioner plus db, the distance of the load CG from the mounting surface of the carriage. d4 is the horizontal distance of the load vector (L) from the carriage centerline.

The loading felt by each of the four bearing blocks when the positioner is stationary or moving with uniform velocity is given by the above equations:

P1 through P4 and P1S through P4S are respectively the normal and side loads on each bearing block. For each bearing, the largest side loads and normal loads in both tension and compression are determined and, for linear motion guides, "equivalent loads" are computed from the equations in Table A (below) following the same procedure described in the preceding section for *Horizontal Translation with Side Load* to calculate the positioner life in the applications.

Once more, accelerations and decelerations of the load must be considered in calculating the dynamic forces which determine the life of the system in a particular application.

Table A - Linear Motion Guide Bearing Load/Life Computation

Positioner	Loads	Compute*	Evaluate Life On
400XR	Side & tension Ps > Pt Side & tension Ps ≤ Pt	Pe = (0.5 * Pt) + Ps Pe = (0.5 * Ps) + Pt	Side load chart Tension chart
	Side & compression Ps > Pc Side & compression Ps ≤ Pc	Pe = (0.5 * Pc) + Ps Pe = (0.5 * Ps) + Pc	Side load chart Compression chart

Example Computations

Example 1

Horizontal Translation with Side Loads, 404XR Positioner

L = 20 Kgf
50 mm from carriage surface;
130 mm from carriage center.

Figure 3 (page 21) shows this configuration with dimensions given here.

d1 = 80 mm
db = 50 mm
d2 = 50 mm
d3 = 130 mm
da = 28 mm
d4 = da + db = 78 mm

The normal and side force components on each bearing block are computed from the equations as shown:

$$P_1 = P_2 = \frac{L}{2}\left[\frac{d_4}{d_2}\right] = 15.7 \text{ (tension) Kgf}$$

$$P_3 = P_4 = -\frac{L}{2}\left[\frac{d_4}{d_2}\right] = -15.7 \text{ (compression) Kgf}$$

$$P_{1s} = P_{3s} = \frac{L}{4} + \left[\frac{L}{2} * \frac{d_3}{d_1}\right] = 21.3 \text{ Kgf}$$

$$P_{2s} = P_{4s} = \frac{L}{4} - \left[\frac{L}{2} * \frac{d_3}{d_1}\right] = -11.3 \text{ Kgf}$$

Life for each bearing needs to be evaluated independently. For bearings with a side load, refer to the combined equivalent loading factors (Table A).

Example:

Bearing 1 has P1=15.7Kgf tension and P1s=21.3Kgf side load

P1s>Pt⩾Pe=(0.5Pt+Ps)=29.1Kgf

Refer to side load chart (page 20)

Life @ 29.1Kgf-50,000km

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