



XE Economy

Linear Positioners

Catalog 2006/US

Reliable, Cost-Effective Positioning



The 402/403XE series of positioners combines a rugged steel body construction with an integrated precision ball screw and bearing guide to produce a highly accurate, cost-effective line of positioners ideal for applications in the hard disk, semiconductor, medical, machine building and many other industries.

Features

- Integrated bearing
- Rigid steel body
- Significant force per dollar value
- Easily integrated into multi-axis designs
- Adjustment free
- Small package size

402/403XE Series

Flexible Motor Mounting Options

Provide a variety of motor drive options, including servo and stepper motors.

Precision Ball Screw Drive Train

Provides smooth motion with high accuracy and high mechanical efficiency.

Integrated Precision Screw and Guide Bearing

Provides a low profile, high accuracy, smooth motion, and robust adjustment free design over the life of the actuator.

Packaged Adjustable Limit Sensors

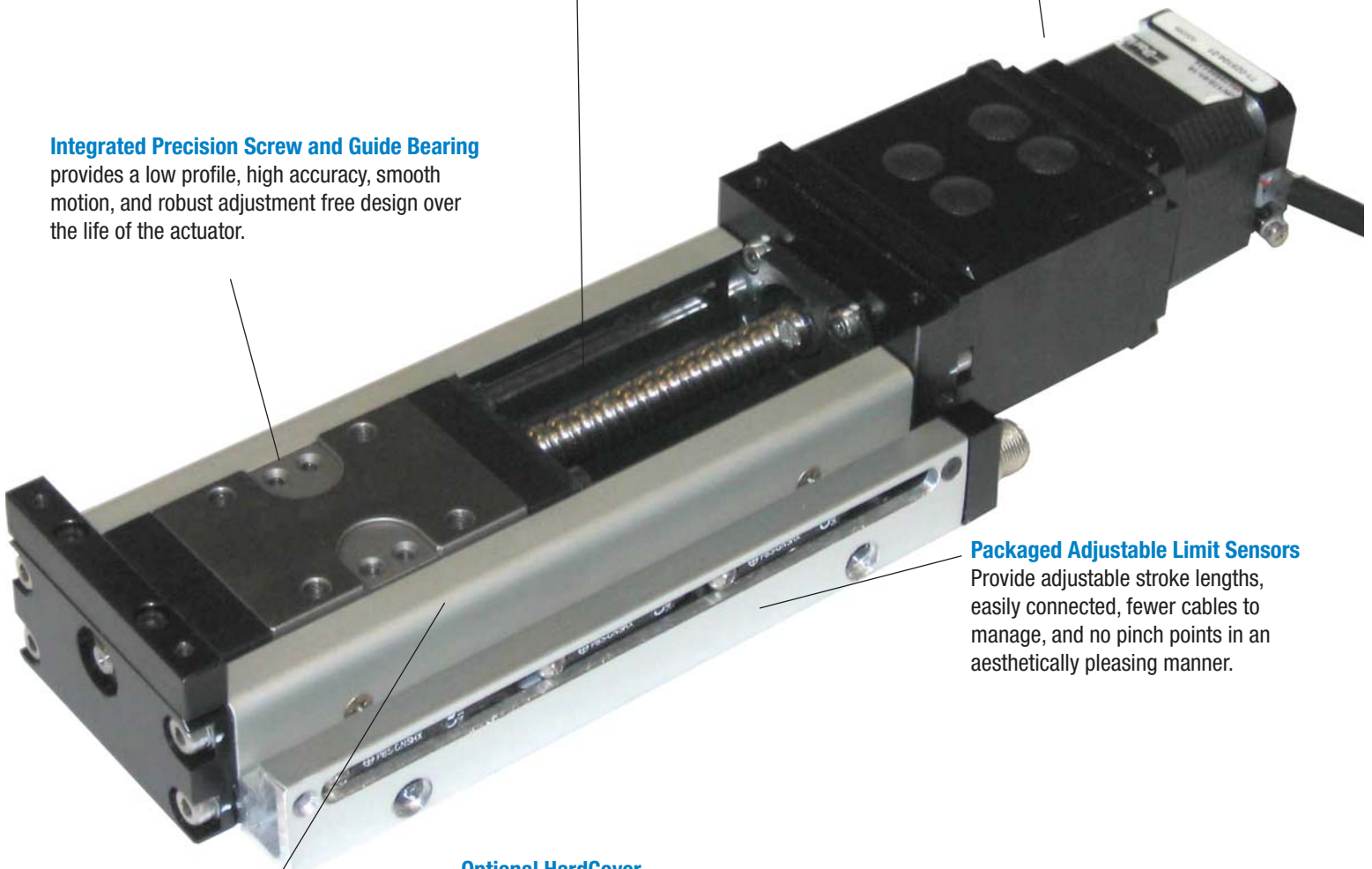
Provide adjustable stroke lengths, easily connected, fewer cables to manage, and no pinch points in an aesthetically pleasing manner.

Optional HardCover

Clear anodized cover provides protection from contamination falling into the positioner.

Rigid Steel U-Channel Body

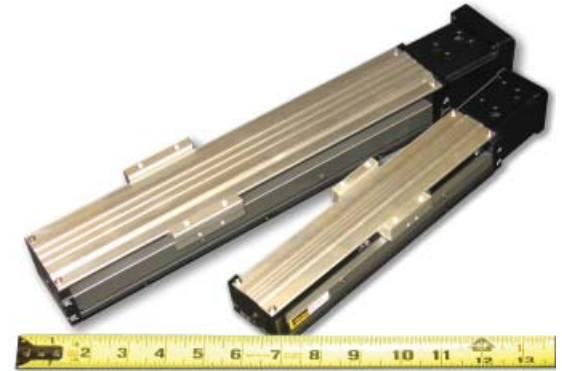
Provides structural rigidity for minimal deflection.





402XE Common Performance Specifications

	2mm Lead	5mm Lead	
Repeatability	+/- 5		µm
Flatness	15		µm
Straightness	15		µm
Breakaway Torque	0.06		Nm
Maximum Input Speed	90		RPS
Maximum Normal Load	90		Kg
Maximum Inverted Load	90		Kg
Static Permissible Pitch Moment	46		N-m
Static Permissible Roll Moment	134		N-m
Static Permissible Yaw Moment	51		N-m
Torsional Pitch Stiffness	17.7		Arc Second/Nm
Torsional Yaw Stiffness	11.8		Arc Second/Nm
Torsional Roll Stiffness	5.9		Arc Second/Nm
Drive Screw Diameter	8		mm
Drive Screw Efficiency	90		%
Linear Bearing Coefficient of Friction	0.01		
Running Torque	0.05		Nm
Maximum Axial Load	13	17	kg
Moment of Inertia X of Guide Rail	1.44E+04		mm ⁴
Moment of Inertia Y of Guide Rail	1.37E+05		mm ⁴
Weight of Carriage	0.26	0.26	Kg
Maximum Acceleration	2g's		
Allowable Duty Cycle	100%		
IP Rating ¹	20		



1. Applies to units with optional hardcover protection selected.

402XE WITH 2MM LEAD					
Specification	Unit	T01 (70MM)	T02 (120MM)	T03 (170MM)	T04 (220MM)
Accuracy over travel	µm	70	75	85	90
Input Inertia	x10 ⁻⁶ (Kg-m ²)	0.615	0.772	0.929	1.09
Weight of Total Table	Kg	1.19	1.40	1.60	1.81
402XE WITH 5MM LEAD					
Accuracy over travel	µm	70	75	85	90
Input Inertia	x10 ⁻⁶ (Kg-m ²)	0.741	0.898	1.06	1.21
Weight of Total Table	Kg	1.19	1.40	1.60	1.81

402/403XE Series

403XE Common Performance Specifications

	5mm Lead	10mm Lead	
Repeatability	+/- 5		µm
Breakaway Torque	0.15		N-m
Static Permissible Pitch Moment	101		N-m
Static Permissible Roll Moment	260		N-m
Static Permissible Yaw Moment	120		N-m
Drive Screw Diameter	10		mm
Drive Screw Efficiency	90		%
Linear Bearing Coefficient of friction	0.01		
Moment of Inertia X of Guide Rail	3.88E+04		mm ⁴
Moment of Inertia Y of Guide Rail	3.14E+05		mm ⁴
Running Torque	0.10		N-m
Maximum Axial load	31	27	kg
Maximum Normal Load	160		Kg
Maximum Inverted Load	160		Kg
Torsional Pitch Stiffness	9.2		Arc Second/Nm
Torsional Yaw Stiffness	6.1		Arc Second/Nm
Torsional Roll Stiffness	5.9		Arc Second/Nm
Weight of Carriage	0.3		Kg
Maximum Acceleration	2g's		
Allowable Duty Cycle	100%		
IP Rating ¹	20		



1. Applies to units with optional hardcover protection selected.

403XE WITH 5MM LEAD Specification	Units	T01 (55MM)	T02 (105MM)	T03 (205MM)	T04 (305MM)	T05 (405MM)	T06 (505MM)	T07 (605MM)	T08 (655MM)
Travel Accuracy	µm	70	80	90	95	100	110	120	Not Available
Flatness	µm	15	15	15	15	25	25	25	
Straightness	µm	15	15	15	15	25	25	25	
Maximum Input Speed	RPS	80	80	80	80	80	80	60	
Input Inertia	x10 ⁻⁶ (Kg-m ²)	1.72	2.10	2.87	3.63	4.40	5.17	5.93	
Weight of Total Table	Kg	1.85	2.25	2.85	3.55	4.25	4.85	5.55	
403XE WITH 10MM LEAD									
Accuracy over travel	µm	70	80	90	95	100	110	120	130
Maximum Input Speed	RPS	80	80	80	80	80	80	60	42
Input Inertia	x10 ⁻⁶ (Kg-m ²)	2.50	2.88	3.65	4.42	5.18	5.95	6.72	7.10
Weight of Total Table	Kg	1.85	2.25	2.85	3.55	4.25	4.85	5.55	5.85



Additional Options/Features

The 402/403XE Series offers complete flexibility, from motor-mounting options to cleanroom compatibility and a variety of offerings in between. Whether the application calls for a hardcover protection for the linear guide, cleanroom-compatible solutions, custom motors mounted at the factory, or an aesthetically appealing engineered limit sensor package, the 402/403XE can be customized to fit the task at hand.



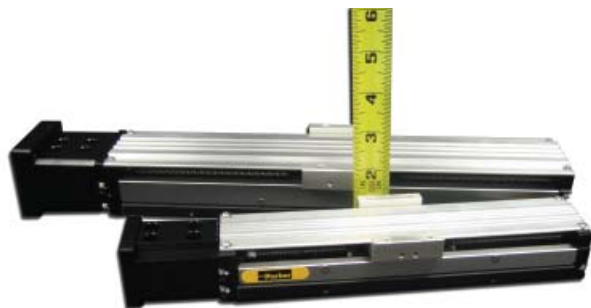
Motor Mounting Flexibility

With standard options for the NEMA 17, NEMA 16, NEMA 23, and other Parker Automation motors, the 402/403 XE allows the user to select the motor of their choice without being restricted to one model. To further customize the application solution, the 402/403XE can be ordered ready to mount onto most other manufacturers' motors as well.



HardCover Protection

For added protection to the bearing system and drive train, an optional hardcover is available. This will bring the positioner to an IP20 rating and prevent large particles from entering and damaging the screw or bearings.



Low-Profile Design

The highly integrated ball screw and guide bearing design allows for a greatly reduced overall height when compared to traditional stacking of a bearing and screw assembly. This results in a more compact footprint.



Rigidity

With the steel U channel body and integrated bearing design, the structural rigidity of the 402/403 XE is significantly stiffer than most aluminum body positioners. The increased stiffness results in reduced overall cost due to the elimination of support structures.

Cleanroom & Raydent Coatings

Cleanroom ratings are possible with the XE product. The actual cleanroom rating will be dependent upon such variables as the location of the sniffer device, the velocity of the table, etc. Consult the factory for specific cleanroom-capability details or test results.



402/403XE Demo Units

Order 803-0346 for a multi-axis demo unit to learn the product and display for shows and presentations. The demo will come in a watertight pelican carrying case and will be ready for demonstration programmed from the factory.

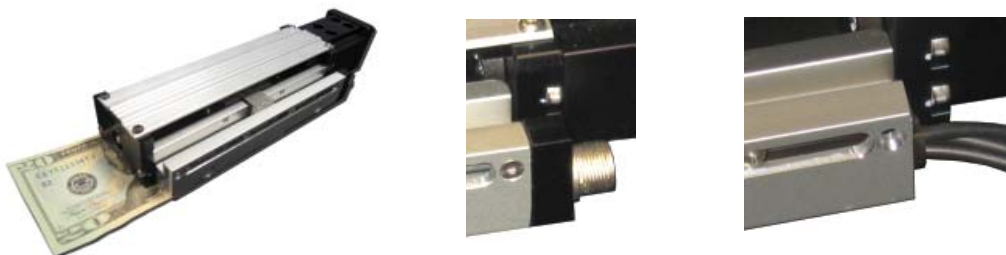


402/403XE Series

Limit Sensors

Packaged Limit Sensors

Limit sensor flexibility allows for a completely packaged sensor kit with a connectorized cable and a single cable to manage multi-axis solutions. It also allows for a simpler sensor pack out of which the sensor wires exit in a flying-leads style with 3 meters of cable from the point of the sensor. To further accommodate each application's unique needs, the sensors can be specified as NPN, PNP, normally open, or normally closed varieties. With the unmatched design, the sensor pack on the 402/403XE allows for fully adjustable sensors along the travel length of the positioner, which creates no pinch points for other cables or hoses to be sliced.



The limit/home switch installed on the 402XE and 403XE is a Hall effect sensor tripped by a magnet located in a housing attached to the carriage. On the switch body is an LED to indicate activation. Normally open sensors are typically used for home and normally closed are typically used for limits. With a current sinking sensor, the output lead provides a path to ground when activated, and with a current sourcing sensor, the output lead provides a positive (+) voltage potential relative to ground. Refer to your controller's manual for compatibility. Limit/home switch information is below.

Limit sensor mounting screws are reverse-thread style so tightening the screw loosens the limit sensor in the track and vice versa.

402/403XE Limit/Home Switch Specifications

	H2 or L2 Option	H3 or L3 Option	H4 or L4 Option	H5 or L5 Option	H11 or L11 Option	H12 or L12 Option	H13 or L13 Option	H14 or L14 Option
Switch Type	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.
Logic	NPN	NPN	PNP	PNP	NPN	NPN	PNP	PNP
Operating Voltage	10-30 VDC							
Voltage Drop	2.5 VDC Max							
Continuous Current	100 mA							
Repeatability	100 μ Max							
Reverse Polarity Protection	Yes							
Short-Circuit Protection	Yes							
Power-Up Pulse Suppression	Yes							
Enclosure Rating	IP67							
Operating Temperature	-25°C to +75°C							
Cable Length	3.0 m from Switch				3.0 m from end of Sensor Pack			

402/403XE Wiring Code

Power (+)	Brown
Output Signal	Black
Ground (-)	Blue

402/403XE Sensor Pack Wiring Code

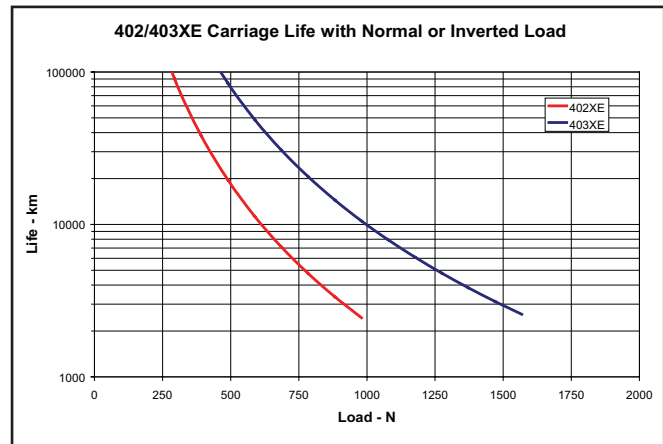
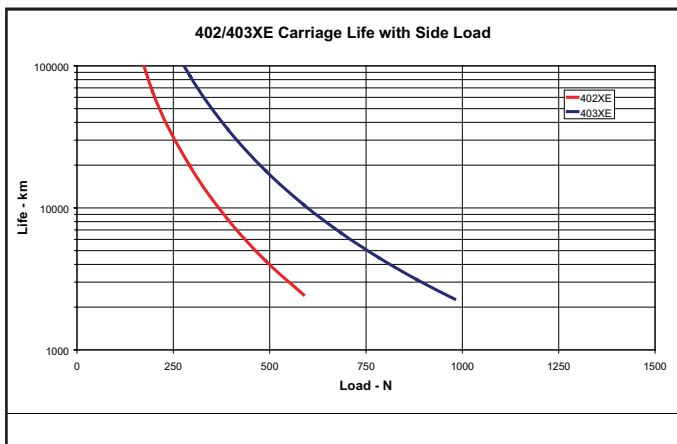
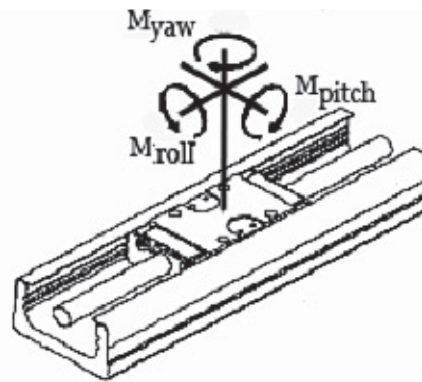
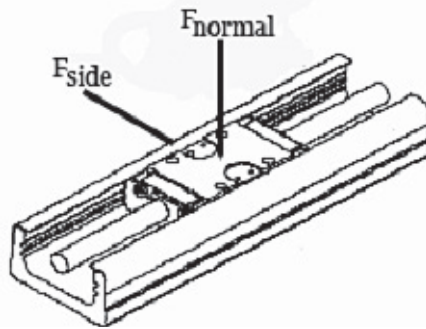
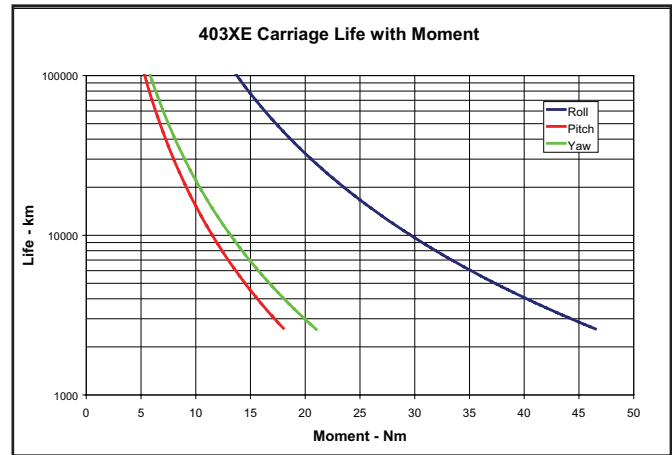
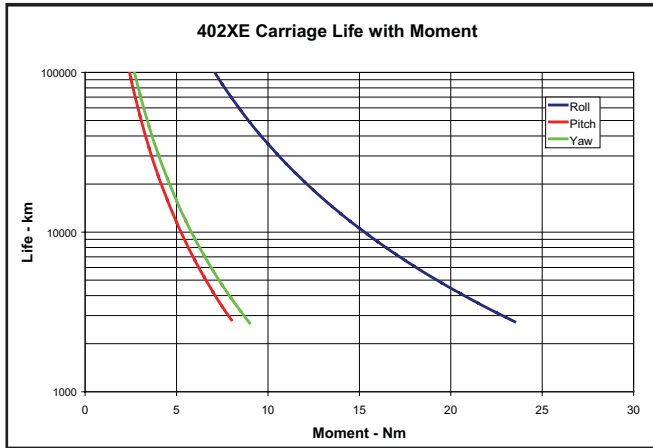
Power (+)	Red
Limit 1 ⁽¹⁾ Output Signal	Blue
Limit 1 ⁽¹⁾ Output Signal	Orange
Home Output Signal	Green
Ground (-)	Blue
Shield (Connect to Earth Ground)	Green w/ Yellow Stripe

⁽¹⁾ Limit 1 is the switch farthest from the connector on the sensor pack housing; Limit 2 is the switch closest to the connector.



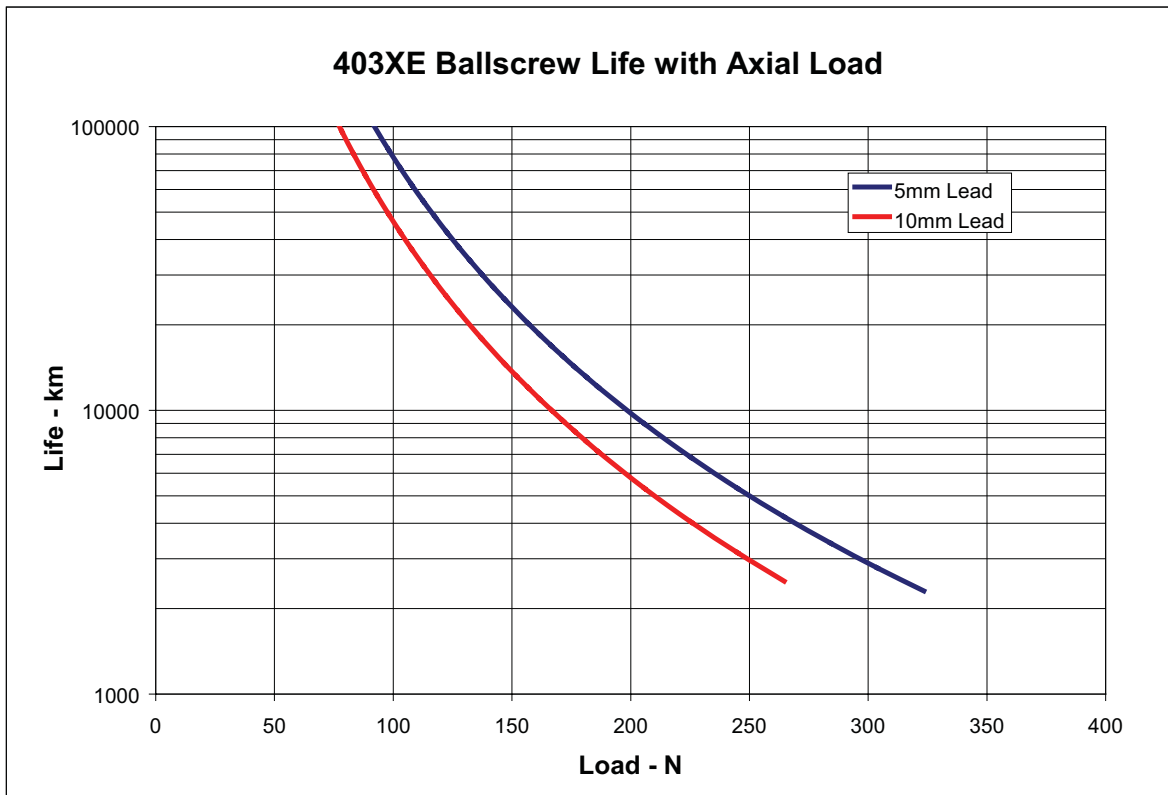
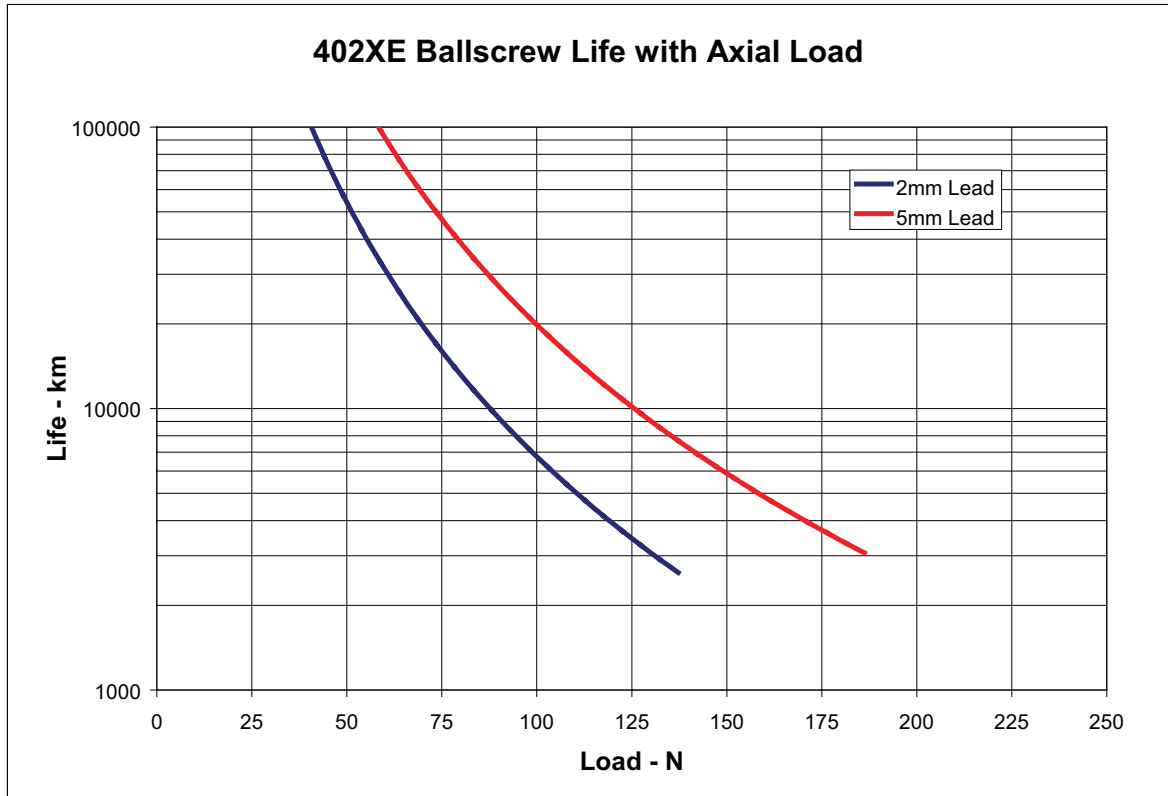
Engineering Reference Section

The following performance information is provided as a supplement to the product specification pages. The graphs 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-axis applications, the primary positioner at the bottom of the stack usually establishes the load limits for the combined axes. When determining life/load, it is critical to include the weight of all positioning elements that contribute to the load supported by the primary axis. For more information, download the product manual at www.parkermotion.com or contact our applications department at (800) 245-6903.



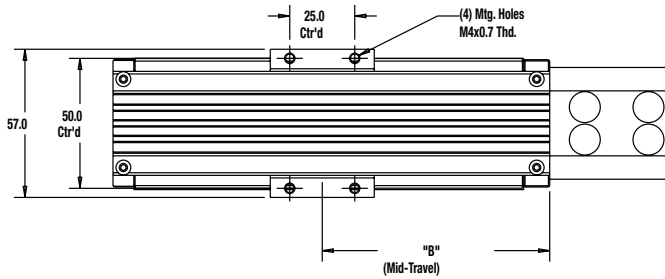
402/403XE Series

Engineering Reference Section

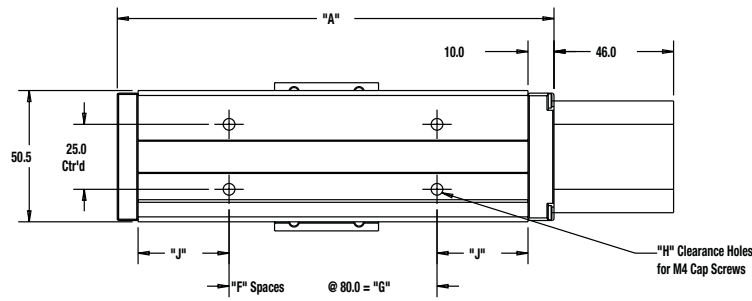
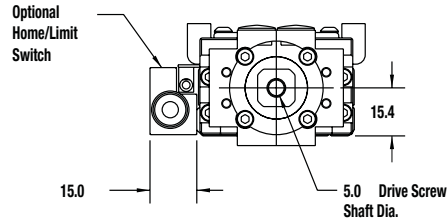
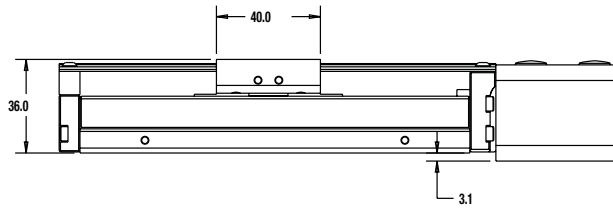




402 Dimensions

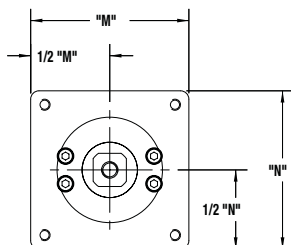
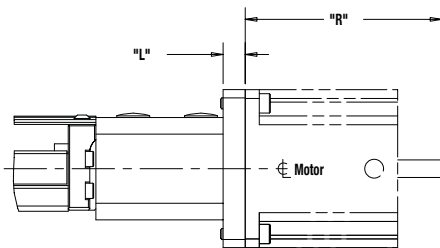
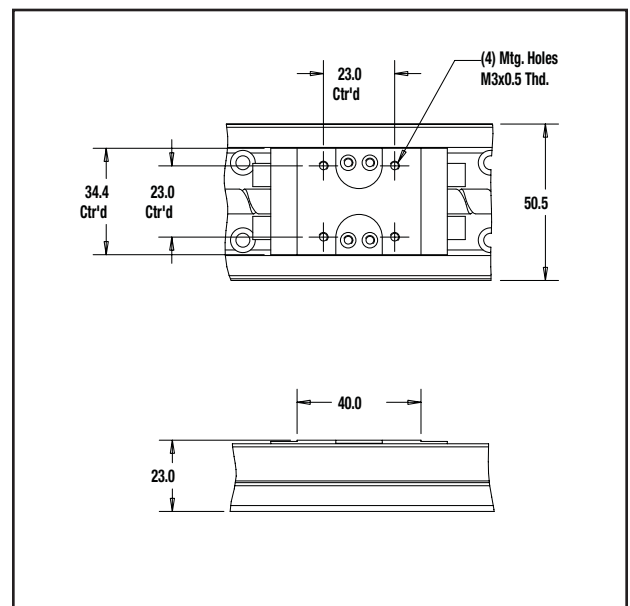


Order Code	Travel	"A"	"B"	"F"	"G"	"H"	"J"
T01	70mm	168.0	87.5	1	80.0	4	35.0
T02	120mm	218.0	112.5	2	160.0	6	20.0
T03	170mm	268.0	137.5	2	160.0	6	45.0
T04	220mm	318.0	162.5	3	240.0	8	30.0



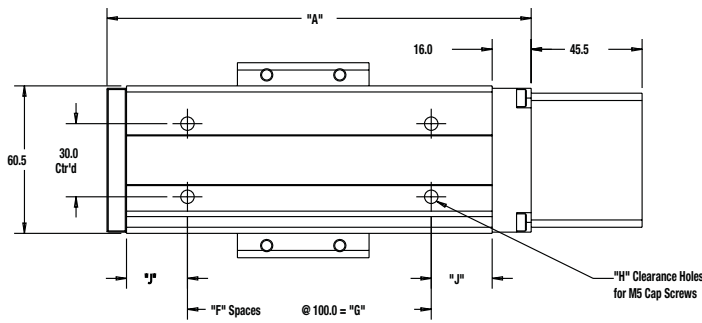
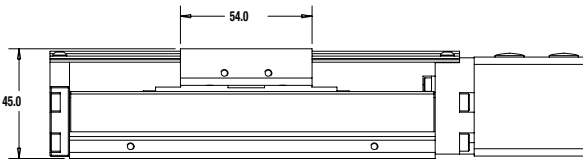
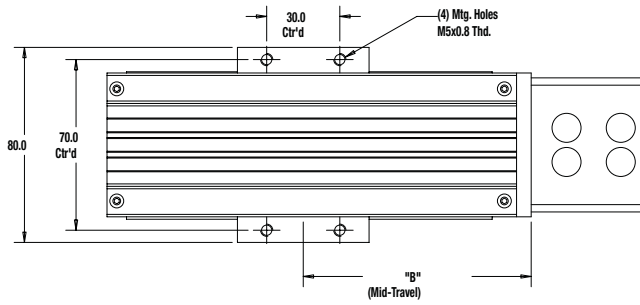
Motor Option	Motor or Motor Size	L	M	N	R
M2	SM16/BE16	8.0	40.6	40.6	N/A
M3	NEMA23/SM23	8.0	57.2	57.2	N/A
M37	NEMA17	8.0	43.0	37.0	N/A
M41	SM162AQ-NPSN	8.0	37.0	40.6	136.7
M46	HV232-02-10	8.0	57.2	57.2	71.1
M61	BE23	15.0	57.2	57.2	N/A

Without Hardcover

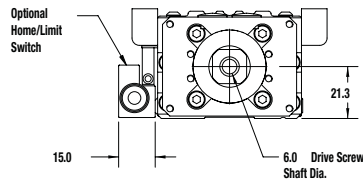


402/403XE Series

403 Dimensions

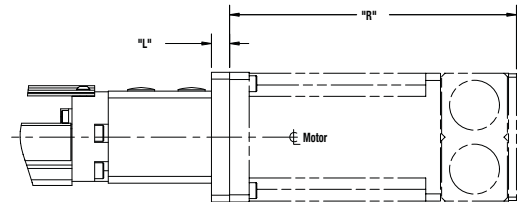
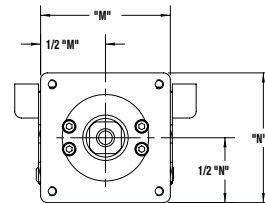
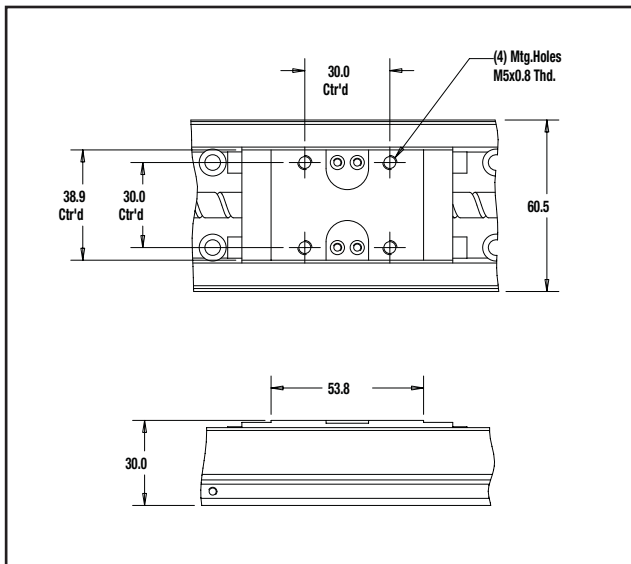


Order Code	Travel	"A"	"B"	"F"	"G"	"H"	"J"
T01	55mm	174.0	93.5	1	100.0	4	25.0
T02	105mm	224.0	118.5	1	100.0	4	50.0
T03	205mm	324.0	168.5	2	200.0	6	50.0
T04	305mm	424.0	218.5	3	300.0	8	50.0
T05	405mm	524.0	268.5	4	400.0	10	50.0
T06	505mm	624.0	318.5	5	500.0	12	50.0
T07	605mm	724.0	368.5	6	600.0	14	50.0
T08	655mm	774.0	393.5	7	700.0	16	25.0



Motor Option	Motor or Motor Size	L	M	N	R
M2	SM16/BE16	8.0	40.6	40.6	N/A
M3	NEMA23/SM23	8.0	57.2	57.2	N/A
M37	NEMA17	8.0	55.0	37.0	N/A
M41	SM162AQ-NPSN	8.0	40.6	40.6	136.7
M42	SM232AQ-NPSN	8.0	57.2	57.2	126.5
M46	HV232-02-10	8.0	57.2	57.2	71.1
M61	BE23	15.0	57.2	57.2	N/A

Without Hardcover





402XE How to order

Order Example:

402 T03 XE S D9 H4 L5 M2 C3 R11 P1

Model Series

402 (50 mm)..... **402**

Travel

70 mm..... **T01** ²
 120 mm..... **T02**
 170 mm..... **T03**
 220 mm..... **T04**

Family

XE Series..... **XE**

Grade

Standard Grade..... **S**

Drive Screw

5 mm..... **D2**
 2 mm..... **D9**

Home Sensor

No home sensor **H1**
 N.C. sinking, flying leads **H2**
 N.O. sinking, flying leads **H3**
 N.C. sourcing, flying leads **H4**
 N.O. sourcing, flying leads **H5**
 N.C. sinking, sensor pack **H11**
 N.O. sinking, sensor pack **H12** ¹
 N.C. sourcing sensor pack **H13** ¹
 N.O. sourcing sensor pack **H14** ¹

Limit Sensor

None..... **L1**
 N.C. sinking, flying leads **L2**
 N.O. sinking, flying leads **L3**
 N.C. sourcing, flying leads **L4**
 N.O. sourcing, flying leads **L5**
 N.C. sinking, sensor pack **L11**
 N.O. sinking, sensor pack **L12**
 N.C. sourcing sensor pack **L13**
 N.O. sourcing sensor pack **L14**

Orthogonality Options

P1 X axis for single axis
³ **P20** X axis for X-Y assembly motor@ 12:00
³ **P43** Y axis, for X-Y assembly motor@ 3:00
³ **P49** Y axis, for X-Y assembly motor@ 9:00

Environmental Options

R11 HardCover
⁴ **R12** HardCover, Cleanroom prep
R13 No Cover
⁴ **R14** No Cover, Cleanroom prep

Motor Coupling

C1 Not required
C2 0.25" Oldham
C3 0.25" Bellows
C4 .375 Oldham
C5 .375 Bellows
C24 5mm Oldham
C25 5mm Bellows

Motor Mount

M1 MTR Block coupling housing only
M2 MTR Block with flange kit for SM16
M3 MTR Block with flange kit for NEMA 23
M37 MTR Block with flange kit for NEMA 17
⁵ **M41** SM162AQ-NPSN motor mounted
⁶ **M46** HV232-02-10 Stepper motor mounted
M61 MTR Block with flange kit for BE23

Notes:

1. Must be ordered with L11, L12, L13, or L14 limit option
2. Limited to H1L2, H1L3, H1L4, H1L5, H1L1, or H2L1, H3L1, H4L1, or H5L1 home and limit options
3. Pinning to 130 arc-sec orthogonality
4. Cleanroom class rating should be checked for each application due to variation of compatibility at different speeds
5. Order with C2 or C3 coupling option
6. Order with C4 or C4 coupling option

402/403XE Series

403XE How to order

Order Example:

403 T04 XE S D2 H3 L2 M4 C3 R13 P1

Model Series

403 (60 mm)..... **403**

Travel

55 mm..... **T01** ³

105 mm..... **T02** ³

205 mm..... **T03**

305 mm..... **T04**

405 mm..... **T05**

505 mm..... **T06**

605 mm..... **T07**

655 mm..... **T08** ¹

Family

XE Series..... **XE**

Grade

Standard **S**

Drive Screw

5 mm..... **D2**

10 mm..... **D3**

Home Sensor

No home sensor **H1**

N.C. sinking, flying leads **H2**

N.O. sinking, flying leads **H3**

N.C. sourcing, flying leads **H4**

N.O. sourcing, flying leads..... **H5**

N.C. sinking, sensor pack **H11** ²

N.O. sinking, sensor pack **H12** ²

N.C. sourcing sensor pack **H13** ²

N.O. sourcing sensor pack **H14** ²

Limit Sensor

None..... **L1**

N.C. sinking, flying leads **L2**

N.O. sinking, flying leads **L3**

N.C. sourcing, flying leads **L4**

N.O. sourcing, flying leads **L5**

N.C. sinking, sensor pack **L11**

N.O. sinking, sensor pack **L12**

N.C. sourcing sensor pack **L13**

N.O. sourcing sensor pack **L14**

Orthogonality Options

- P1** X axis for single axis
- ⁴ **P20** X axis for X-Y assembly motor@ 12:00
- ⁴ **P43** Y axis, for X-Y assembly motor@ 3:00
- ⁴ **P49** Y axis, for X-Y assembly motor@ 9:00

Environmental Optional

- R11** HardCover
- ⁵ **R12** HardCover, Cleanroom prep.
- R13** No Cover
- ⁵ **R14** No Cover, Cleanroom prep.

Motor Coupling

- C1** Not required
- C2** 0.25" Oldham
- C3** 0.25" Bellows
- C4** .375 Oldham
- C5** .375 Bellows
- C24** 5mm Oldham
- C25** 5mm Bellows

Motor Mount

- M1** MTR Block coupling housing only
- M2** MTR Block assembly SM16
- M3** MTR Block assembly NEMA 23
- M37** MTR Block assembly NEMA 17
- ⁶ **M41** SM162AQ-NPSN motor mounted
- M42** SM232AQ-NPSN Servo motor
- ⁷ **M61** HV232-02-10 Stepper motor mounted
- M61** MTR Block with flange kit for BE23

Notes:

1. Only available with D3 drive option
2. Must be ordered with L11, L12, L13, or L14 limit option
3. Limited to H1L2, H1L3, H1L4, H1L5, H1L1, or H2L1, H3L1, H4L1, or H5L1 home and limit options
4. Pinning to 130 arc-sec orthogonality
5. Cleanroom class rating should be checked for each application due to variation of compatibility at different speeds
6. Order with C2 or C3 coupling option
7. Order with C4 or C4 coupling option



 **WARNING**

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