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Miniature Precision

Linear Motor and Screw Driven Stages

Miniaturization of fiber optics, photonics, electronics and biomedical processes has driven the need for smaller and more efficient positioners. Parker's MX80L Miniature Linear Motor Stage, the smallest linear servo motor driven positioner in the industry, is loaded with high performance features for both rapid linear translation and precise positioning of lighter loads in small work envelopes. The LX80L offers a small profile and linear motor performance with travel distances to 750 mm. The MX80S, with either a ballscrew or leadscrew drive, is ideal for higher thrust application.

The direct mounting compatibility of MX80 stages enables a large variety of two and three axis combinations to be configured with ease. When optioned with Parker's "Intelligent Servo Drives", 2 or 3 axis stages are transformed into complete *plug & run* systems with easy hookup and direct operation from a PC via the RS232 interface.

Miniature System Features:

- ***Miniature profile stage (25 X 80 mm)***
- ***Travel lengths to 750mm***
- ***Linear servo motor or ballscrew drives***
- ***Acceleration to 5gs; Velocity to 3 meters /sec,***
- ***Internal cable management***
- ***Square rail or cross roller bearing systems***
- ***Compatible mounting for multi-axis systems***
- ***Cleanroom prep, low ESD coating and vacuum prep options***
- ***Submicron precision***
- ***Thorough testing and certification***

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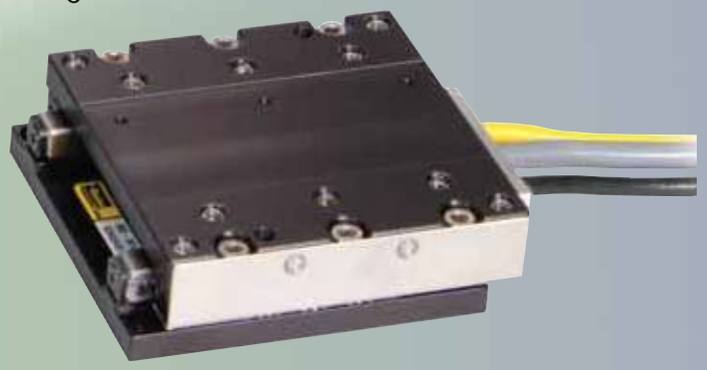
Parker Miniature Stages

- ***Small size***
- ***High acceleration***
- ***High velocity***
- ***High resolution***
- ***High repeatability***
- ***High accuracy***

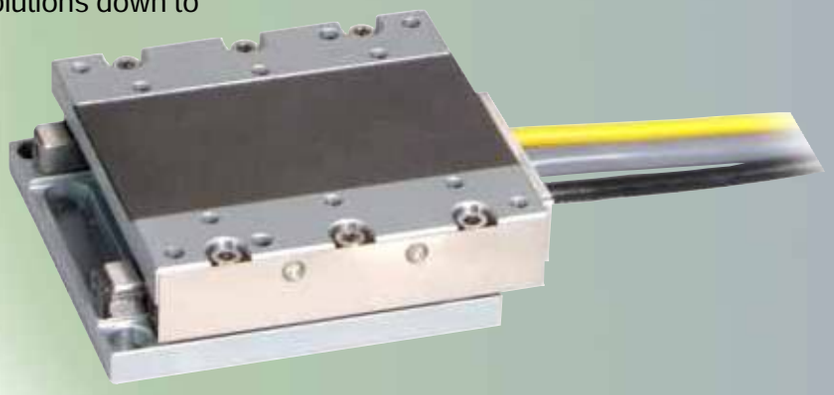
MX80LS Linear Motor Driven Stages

offer unmatched dynamics for rapid fire positioning of light work loads (5g acceleration) in applications requiring high throughput performance in a compact package.



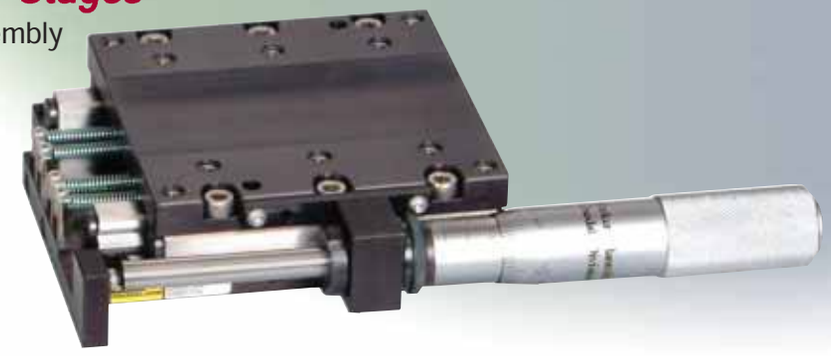
MX80LP Precision Grade Linear Motor Driven Stages

provide high precision positioning and linear motor dynamics for positioning light loads within a small workspace. They offer exceptional straightness and flatness of travel, and can position repeatedly within +/-0.4 microns with encoder resolutions down to 10 nanometers.



MX80M Micrometer Driven Stages

have a precision micrometer drive assembly for manually controlled point to point positioning along a linear path.



Parker Hannifin Corporation
Electromechanical Automation Division
Irwin, Pennsylvania

MX80S Ballscrew Driven Motorized Stages

offer high performance 100% duty operation with higher thrust (128 N) and velocities up to 100 mm/second.

MX80S Leadscrew Driven Motorized Stages

feature a PTFE coated leadscrew drive assembly for cost effective linear translation at velocities to 200 mm/second.

LX80L Long Travel Tables

offer linear motor dynamics and travels up to 750mm while maintaining a very small profile.

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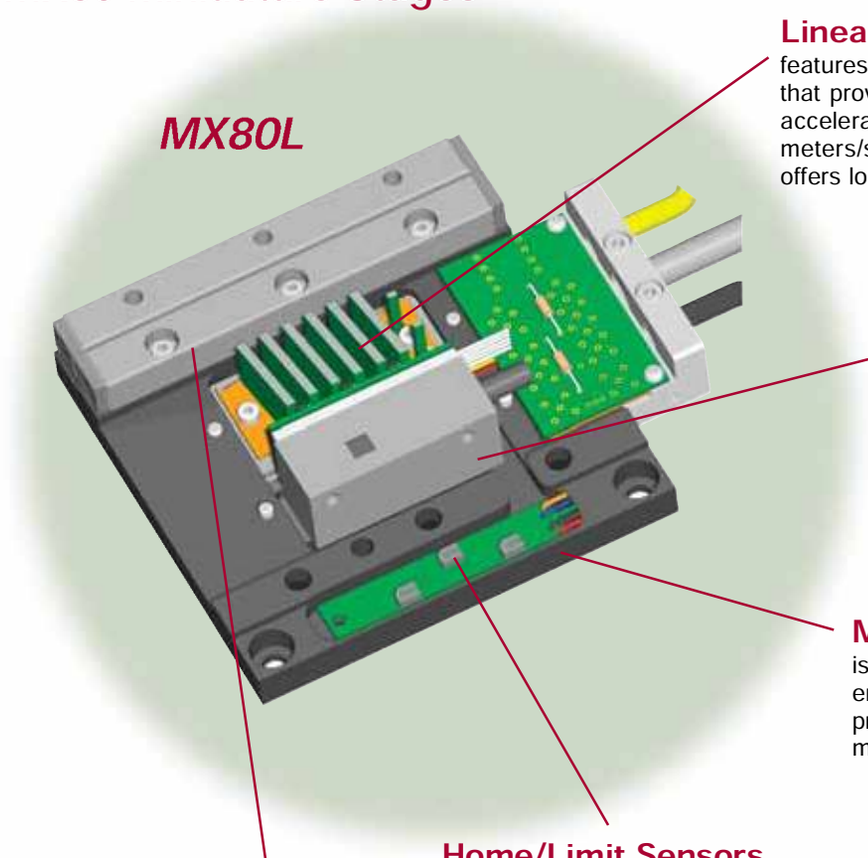
MX80 Minitiature Stages

Linear Servo Motor

features a patent pending ironcore design that provides high thrust density for linear acceleration to 5g's and velocities to 2 meters/second. The non-contact design offers long life and clean operation.



Optical Linear Encoders

are available in six standard resolutions (10nm, 20nm, 0.1µm, 0.5µm, 1.0µm, 5.0mm) and is fully integrated within the body of the stage. The non-contact design offers long life and clean operation.

Master Reference Surface

is a feature unique to the MX80 that enables customers to align their process to the actual travel path within microns.

Home/Limit Sensors

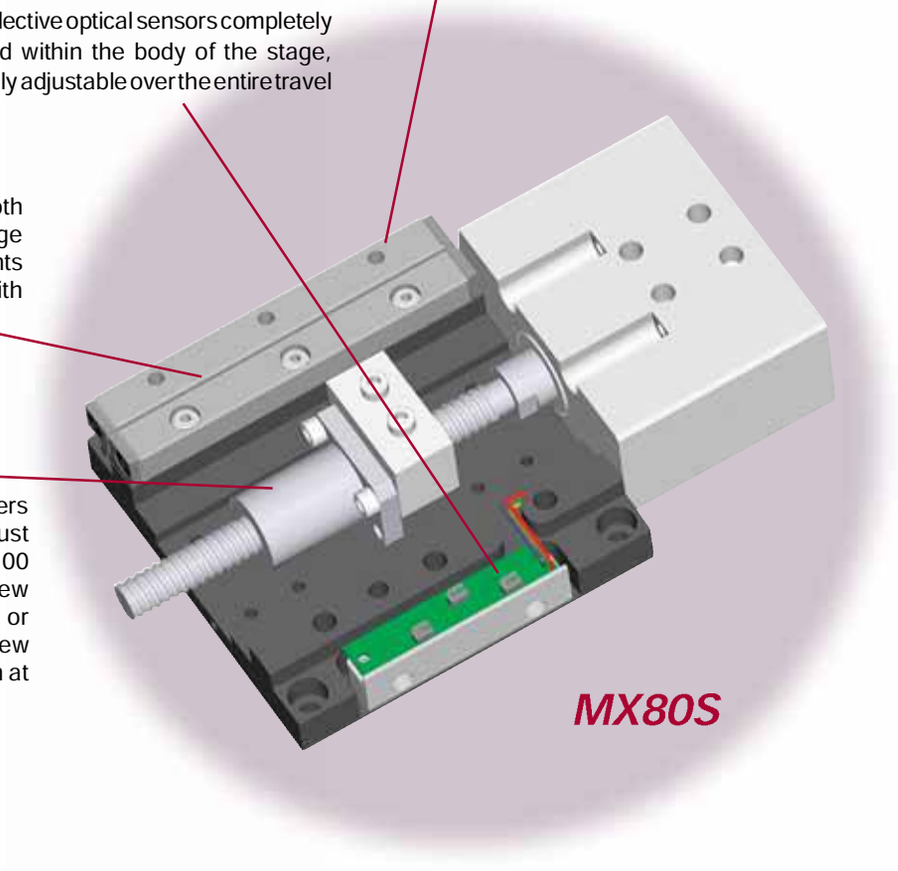
are reflective optical sensors completely housed within the body of the stage, and fully adjustable over the entire travel range.

Cross Roller Bearings

provide high stiffness and extremely smooth linear translation. A rack and pinion anti-cage creep design within the bearing races prevents cage creep even at 5g acceleration, or with cantilevered loads.

Ballscrew or leadscrew drive

The 2.0mm lead ballscrew driven stage offers high performance 24/7 operation with a thrust load capacity of 123N (28lb.) and velocity to 100 mm/second at 100% duty cycle. Leadscrew driven stages are available with 1mm, 2mm, or 10mm leads. The PTFE coated leadscrew provides extremely smooth linear translation at velocities up to 200 mm/second.



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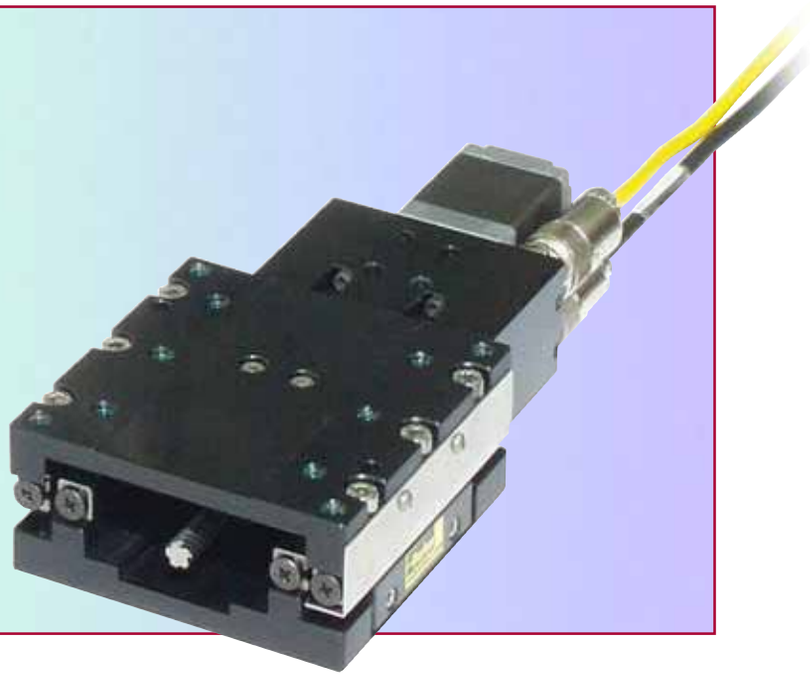
MX80S Miniature Stage Series

Ballscrew and Leadscrew Driven

Features:

- ❑ Miniature Size - Low Profile (35 mm high X 80 mm wide)
- ❑ Normal or cleanroom environments
- ❑ 25, 50, 100, 150 mm travels
- ❑ Multi-axis platform
- ❑ Ballscrew or Leadscrew drive options



Attributes:

- 1.5µm bi-directional repeatability
- Up to 123 N axial thrust
- 2g acceleration
- Cross roller bearing (zero cage creep option)
- Stepper or servo motor drive
- Digital limit/home system
- Optional linear encoder
- Cleanroom prep. option
- Low ESD option

The **MX80S** miniature positioner is the screw driven member of Parker's MX80 family. Like its counterparts, the **MX80L** linear motor driven stage and **MX80M** manual stage, the **MX80S** is designed for OEM applications requiring reliable linear positioning in space restricted applications. It is the complimentary product that bridges the product spectrum between the high dynamic linear motor performance of the MX80L, and the manual precision of the MX80M. The MX80S can be supplied with a high efficiency leadscrew drive capable of reaching 200mm per second velocity, or a precision ground ballscrew drive offering axial thrust to 123N.

The leadscrew drive employs a PTFE coated leadscrew with a preloaded nut to produce extremely smooth linear translation. A choice of three leads provides improved opportunity for matching desired velocity / resolution requirements.

The 2.0mm lead ballscrew stage offers high performance 24/7 operation with a thrust load capacity of 123N (28lb.) and velocity to 100 mm/second at 100% duty cycle.

	Ballscrew Drive	Leadscrew Drive
Axial Thrust	123 N	44 N
Repeatability	+/-1.5 µm	+/- 5.0 µm
Duty Cycle	100%	50%
Available Leads	2.0 mm	1.0, 2.0, 10.0 mm

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Specifications	Travel (Model) 25mm	50mm	100mm	150mm
Normal Load Capacity	8kg (18 lb)	8kg (18 lb)	8kg (18 lb)	8kg (18 lb)
Thrust Load Capacity				
Leadscrew Drive	44N (10 lb)	44N (10 lb)	44N (10 lb)	44N (10 lb)
Ballscrew Drive	123N (28 lb)	123N (28 lb)	123N (28 lb)	123N (28 lb)
Straightness & Flatness(1)(2)	8 microns	12 microns	16 microns	20 microns
Bi-directional Repeatability(1)(2)				
1.0 mm lead Leadscrew	±5.0 microns			
2.0 mm lead Leadscrew	±5.0 microns			
10.0 mm lead Leadscrew	±10.0 microns			
2.0 mm lead Ballscrew(3)	±1.5 microns			
Positional Accuracy (1)(2)				
1.0 mm lead Leadscrew	30 microns	45 microns	75 microns	100 microns
2.0 mm lead Leadscrew	30 microns	45 microns	75 microns	100 microns
10.0 mm lead Leadscrew	35 microns	50 microns	80 microns	105 microns
2.0 mm lead Ballscrew	10 microns	15 microns	18 microns	20 microns
Breakaway Torque				
Leadscrew Drive	0.021Nm			
Ballscrew Drive	0.050Nm			
Running Torque (max.)				
1.0 mm lead Leadscrew	0.028Nm	0.028Nm	0.035Nm	0.035Nm
2.0 mm lead Leadscrew	0.028Nm	0.028Nm	0.035Nm	0.035Nm
10.0 mm lead Leadscrew	0.021Nm	0.021Nm	0.021Nm	0.028Nm
2.0 mm lead Ballscrew	0.085Nm	0.085Nm	0.085Nm	0.085Nm
Inertia* (10^{-7}kg-m^2)				
1.0 mm lead Leadscrew	1.47	1.47	2.42	3.06
2.0 mm lead Leadscrew	1.62	1.62	2.68	3.42
10.0 mm lead Leadscrew	6.34	6.34	11.30	14.90
2.0 mm lead Ballscrew	4.19	4.19	6.08	7.68
* without motor & coupling				
Screw Speed (max.)				
Leadscrew	20 rps			
Ballscrew	50 rps			
Maximum Velocity				
1.0 mm lead Leadscrew	20 mm/sec			
2.0 mm lead Leadscrew	40 mm/sec			
10.0 mm lead Leadscrew	200 mm/sec			
2.0 mm lead Ballscrew	100 mm/sec			
Leadscrew Efficiency				
1.0 mm lead Leadscrew	40%			
2.0 mm lead Leadscrew	59%			
10.0 mm lead Leadscrew	78%			
2.0 mm lead Ballscrew	90%			
Screw Dia. Leadscrew	6.35 mm			
Ballscrew	8.00 mm			
Brg. Coefficient of Friction	0.003			
Duty Cycle Leadscrew	50%			
Ballscrew	100%			
Carriage Mass Leadscrew	194g	194g	353g	471g
Ballscrew	291g	291g	464g	595g
Unit Mass Leadscrew	597g	597g	1003g	1268g
(table only) Ballscrew	694g	694g	1114g	1392g
Unit Mass Leadscrew	748g	748g	1154g	1419g
(w/2stackstepper) Ballscrew	845g	845g	1265g	1513g

(1) Measured at the carriage center, 35mm off mounting surface @ 20 C with no load. Unit bolted to granite surface, flat to within 1micron/300mm.
(2) Total accuracy and bi-directional repeatability over full travel (peak to peak).
(3) Repeatability valid with M21 servo motor .

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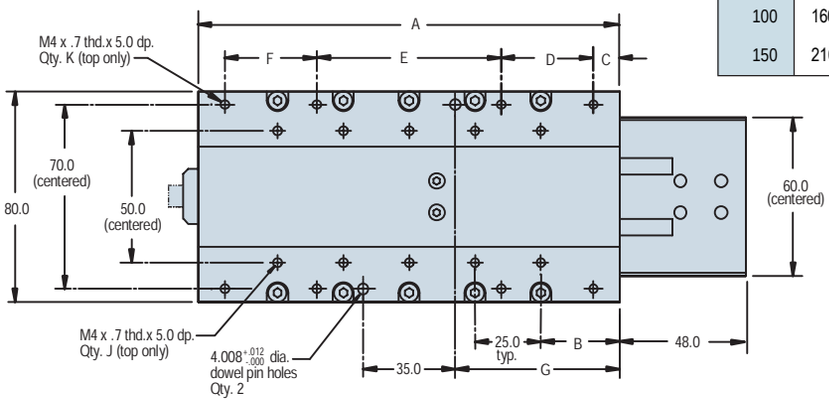
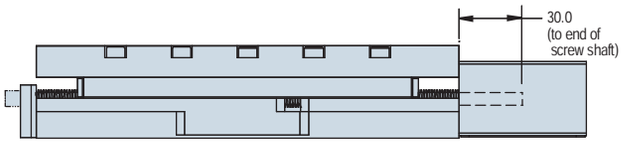
MX80S Miniature Linear Motor Stage

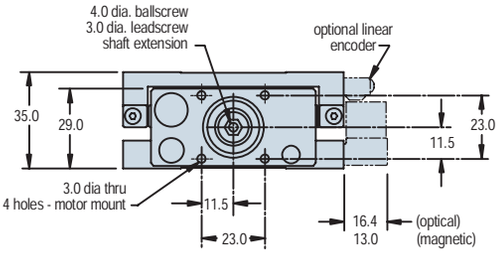
Dimensions

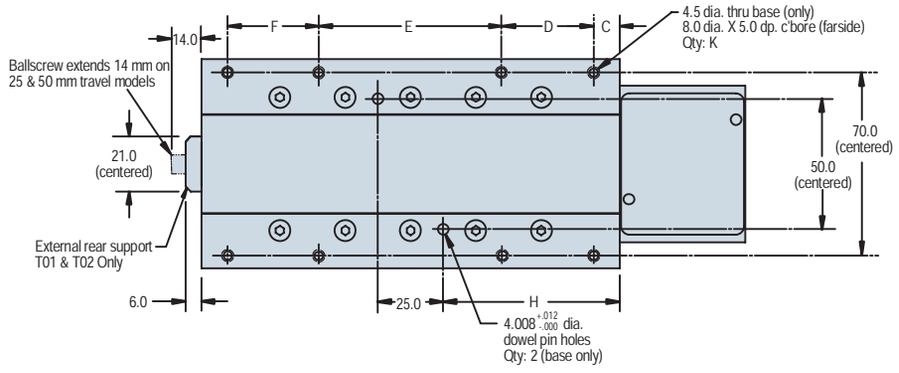
(millimeters)

Travel	Dimensions (mm)									
	A	B	C	D	E	F	G	H	J	K
25	80	15	5	70	n/a	n/a	22.5	27.5	6	4
50	80	15	5	70	n/a	n/a	22.5	27.5	6	4
100	160	30	10	35	70	35	62.5	67.5	10	8
150	210	30	5	65	70	65	87.5	92.5	14	8









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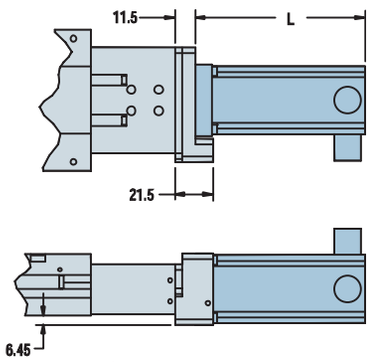
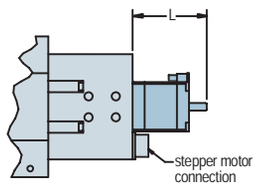
Motor			L
Stepper	1 Stack	NEMA 11	42.0
Stepper	2 Stack	NEMA 11	50.0
Stepper	3 Stack	NEMA 11	61.5
Servo	1 Stack	NEMA 16	83.6



Mounting - Servo Motor



Mounting - Stepper Motor

MX80S Miniature Linear Motor Stage

Order Example:

MX80S | T02 | M | S | K | - | D1 | M1 | H3L3 | CM12 | E1 | Z1 | R1 | A11 | X1 | S1

Model MX80S

Travel
- 25 mm T01
- 50 mm T02
- 100 mm T03
- 150 mm* T04

(* Stepper Only)

Mounting (metric) ..... M

Grade
- Standard ..... S
- Precision ..... P

Bearing Type
- Standard Cross Roller ..... J
- ACS Cross Roller ..... K

Drive Type
- 1 mm Lead Screw ....(std. grade only)..... D1
- 2 mm Lead screw .... (std. grade only)..... D2
- 10 mm Lead screw ...(std. grade only)..... D3
- 2 mm Ballscrew .....(prec.grade only)..... D6

Motor
- No Motor, Flange or Coupling M0
- NEMA 16 Flange - No Motor or Coupling M1
- 1 Stack NEMA 11 Stepper M14
- 2 Stack NEMA 11 Stepper M15
- 3 Stack NEMA 11 Stepper M16
- 1 Stack NEMA 16 Servo M21

Home/Limit Switch*

None H1L1

	H2L2	H2L3	H3L2	H3L3
Home	NC	NC	NO	NO
Limits	NC	NO	NC	NO

* NC= Normally Closed; NO= Normally Open

Cable Options (Hi Flex)
- None CM01
- Limits (only) - w/ flying leads - 1 meter CM02
- Limits (only) - w/ flying leads - 3 meter CM03
- Limits (only) - w/ ViX connector - 1 meter CM04
- Limits (only) - w/ ViX connector - 3 meter CM05
- Stepper Motor & Limits w/ViX connector - 1meter CM06
- Stepper Motor & Limits w/ViX connector - 3 meter CM07
- Stepper Motor - no Limits w/ViX connector - 1meter CM08
- Stepper Motor - no Limits w/ViX connector - 3 meter CM09
- CM10 Stepper Motor (E drive) & Limits - 1 meter
- CM11 Stepper Motor (E drive) & Limits - 3 meter
- CM12 Stepper Motor (E drive) no Limits - 1 meter
- CM13 Stepper Motor (E drive) no Limits - 3 meter
- CM15 Servo Motor, Encoder & Limits w/ ViX connector - 3 meter
- CM17 Servo Motor, Encoder, no Limits w/ ViX connector - 3 meter

Axis Designator
- S1 None (single axis)
- S2 X axis base unit (cables @12 o'clock)
- S3 Y-axis 60 arc sec.(cables @ 3 o'clock)
- S4 Y-axis 60 arc sec.(cables @ 9 o'clock)
- S5 Y-axis 15 arc sec.(cables @ 3 o'clock)
- S6 Y-axis 15 arc sec.(cables @ 9 o'clock)

X1 **Required Designator**

Digital Drive Options
- A1 No drive
- A10 ViX250-AE servo (torque mode)
- A11 ViX250-AE servo (velocity mode)
- A12 ViX250-AE servo step/direction mode
- A15 ViX250-IE servo drive/controller
- A30 E-AC Stepper Drive
- A31 E-DC Stepper Drive
- A35 ViX250-IM stepper drive/controller

Environmental Options
- R1 Standard finish - black anodized
- R2 Clean room prep.
- R10 Low ESD finish
- R20 Low ESD finish and clean room prep.

Z-Channel Location
- Z1 No Z-Channel
- Z3 Center Position

Encoder Option
- E1 No encoder
- E2 1.0 µm resolution (optical)
- E3 0.5 µm resolution (optical)
- E4 0.1 µm resolution (optical)
- E5 5.0 µm resolution (optical)
- E12 1.0 µm resolution(magnetic)
- E15 5.0 µm resolution(magnetic)

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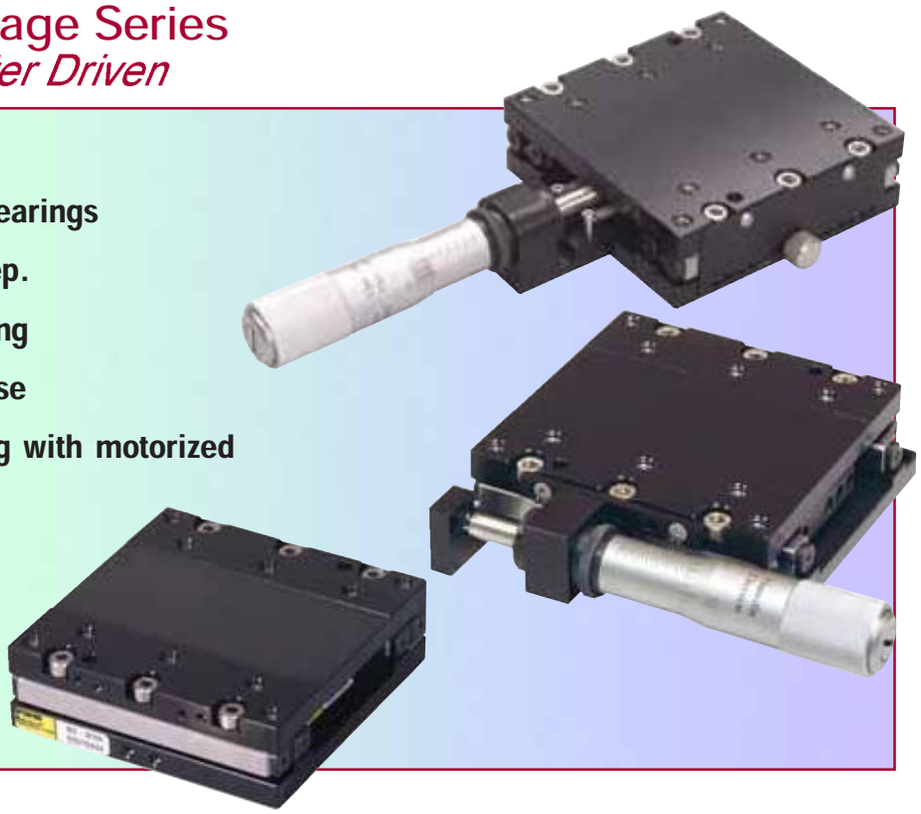
MX80M Miniature Stage Series
Free Travel & Micrometer Driven

Features:

- ❑ Precision cross roller bearings
- ❑ Optional clean room prep.
- ❑ Optional Low ESD coating
- ❑ Dowel holes in top & base
- ❑ Interchangable mounting with motorized MX80 models
- ❑ Positive position lock



The MX80M stages are offered as free travel or micrometer driven units with 25mm or 50mm travel. They include innovative tooling features to make mounting and precision alignment quicker and easier. A hardened steel master reference surface is provided along the side of the stage to allow fixturing or other tooling elements to be precisely aligned with the actual travel path. Dowel pin holes are provided on the carriage top for repeatable mounting or tooling. Also available are custom features such as a steel body design, vacuum prepped units, and anti cage creep bearings for high dynamic applications up to 150 mm travel.

Order Example:

MX80M | T02 | M | - | S | C2 | D22 | R1 | X4 | S1

Travel
- 25 mm T01
- 50 mm T02

Mounting (metric) ..... M

Grade (standard) ..... S

Style
- Free Travel C1
- Center Drive C2
- Side Drive C3

Drive Type
- None D1
- Metric Micrometer D20
- English Micrometer..... D21
- Digital Micrometer D22

X-Y Orthogonality
- S1 None (No X-Y configuration)
- S2 X-axis base unit (mic. @ 12:00 position)
- S3 Y-axis 60 arc second (mic. @ 3:00 position)
- S4 Y-axis 60 arc second (mic. @ 9:00 position)
- S5 Y-axis 15 arc second (mic. @ 3:00 position)
- S6 Y-axis 15 arc second (mic. @ 9:00 position)

Lock Options
- X1 No Lock
- X4 With Lock

Environmental
- R1 Black Anodize (Standard)
- R2 Cleanroom Prep.
- R10 Low ESD Finish
- R20 Low ESD Finish w/Clean Room Prep.

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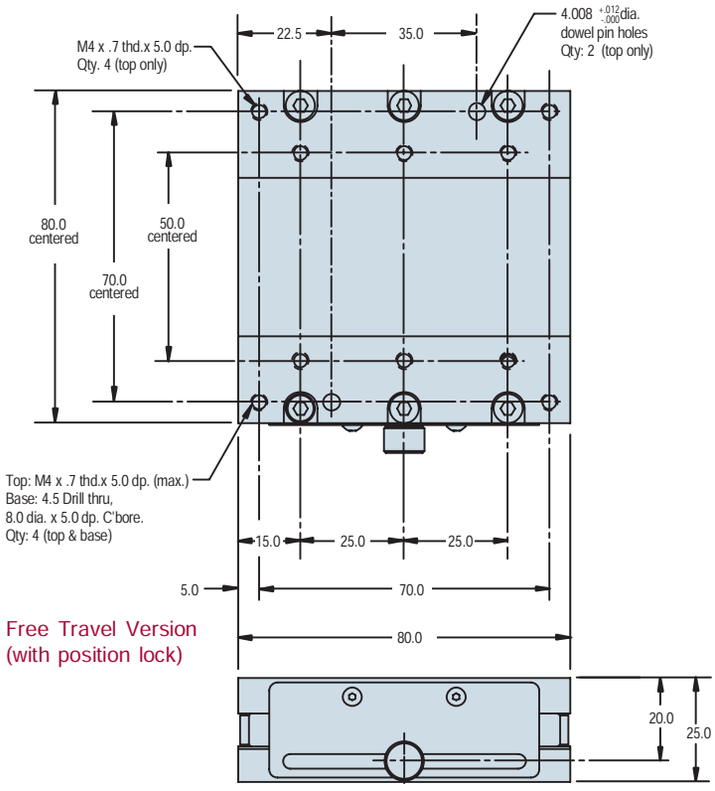
MX80M Miniature Stage Series

Dimensions (mm)

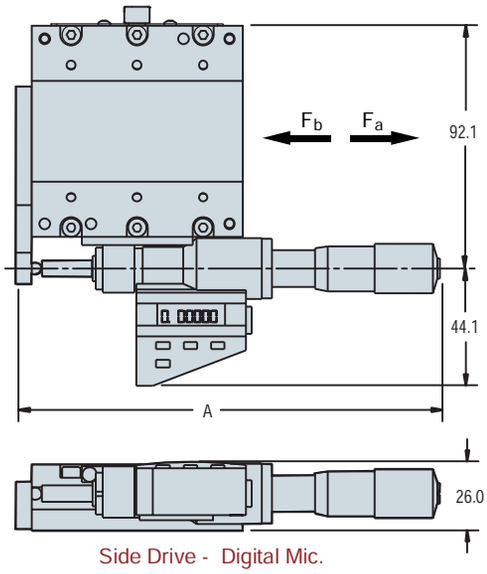


Free Travel Version
(with position lock)

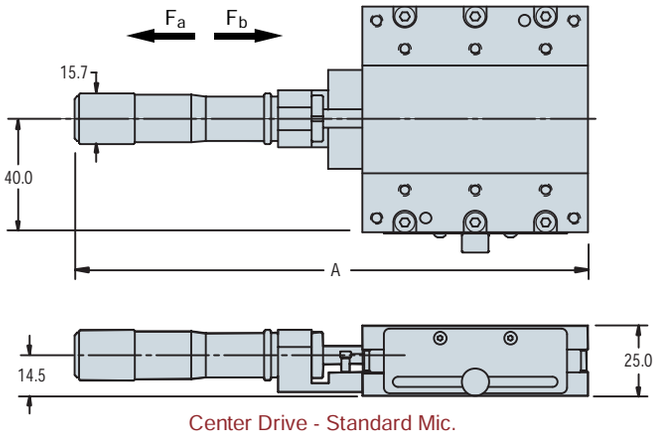
Specifications:

Travels: 25mm, 50mm
Straight Line Accuracy: 2 µm /25mm travel
Micrometer resolution: 0.001inch or 0.01 mm
Digital Micrometer: 0.00005 in. and 0.001mm
Load Capacity:
Normal : 20 kg (44 lb.)
Axial (F_a): 4.5 kg
Axial (F_b): 0.6 kg (25mm travel)
Axial (F_b): 1.0 kg (50mm travel)
Note: F_a = force acting against micrometer,
F_b = force acting against spring

2D & 3D CAD files Download from parkermotion.com



Side Drive - Digital Mic.



Center Drive - Standard Mic.

Drive	Micrometer	Travel	A
Center Drive	Standard	25mm	182.2
"	"	50mm	231.4
"	Digital	25mm	225.6
"	"	50mm	273.5
Side Drive	Standard	25mm	117.2
"	"	50mm	167.4
"	Digital	25mm	160.6
"	"	50mm	209.5