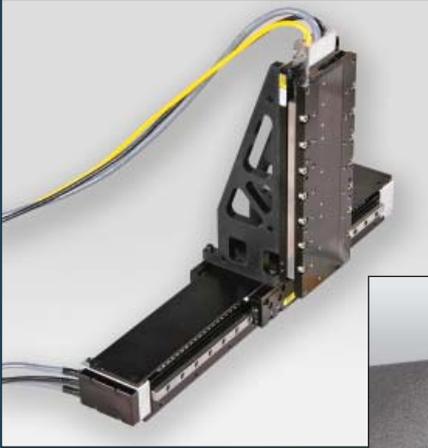


Miniature Precision

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:

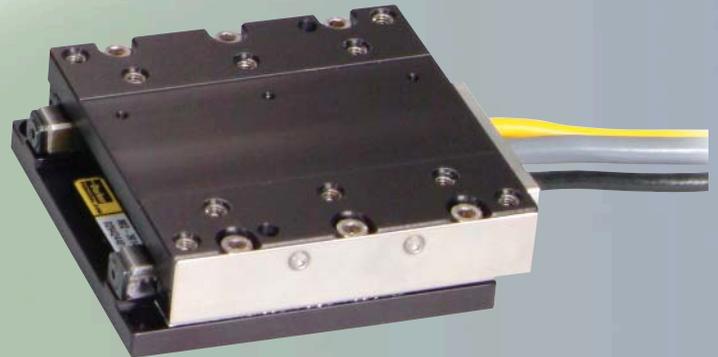
- Miniature profile stage (25 X 80 mm)
- Travel lengths to 750mm
- Linear servo motor or ballscrew drives
- Acceleration to 5gs; Velocity to 3 meters /sec
- Internal cable management
- Square rail or cross roller bearing systems
- Compatible mounting for multi-axis systems
- Cleanroom prep, low ESD coating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

Parker Miniature Stages

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

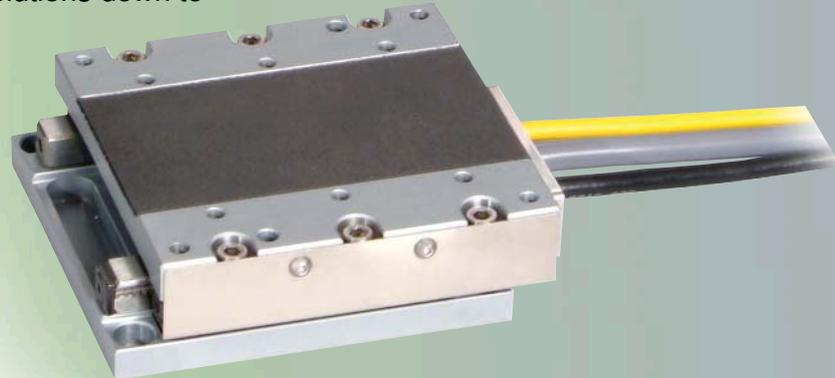
MX80LS Linear Motor Driven Stages

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



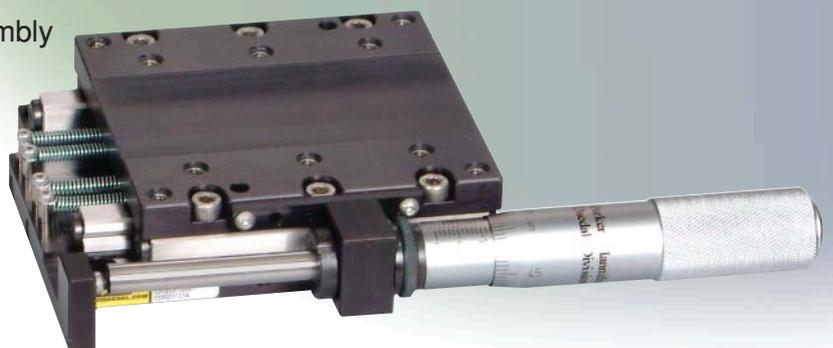
MX80LP Precision Grade Linear Motor Driven Stages

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.



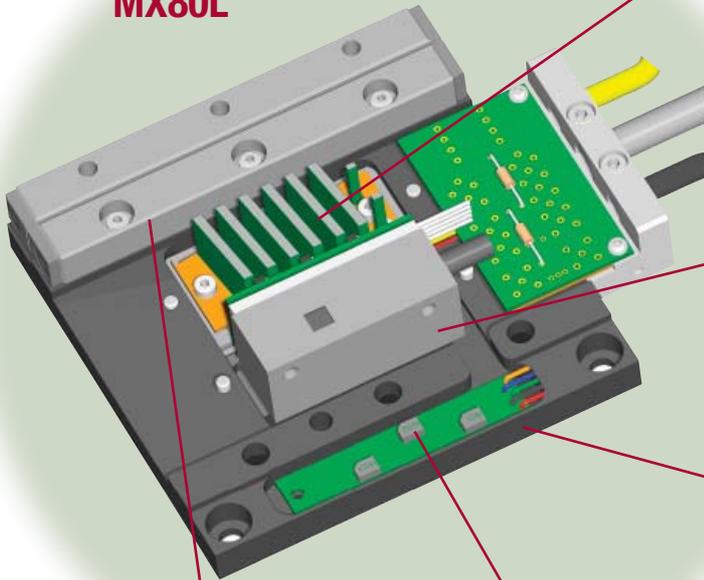
MX80M Micrometer Driven Stages

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



MX80 Miniature Stages

MX80L



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, 0.1 μ m, 0.5 μ m, 1.0 μ m, 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

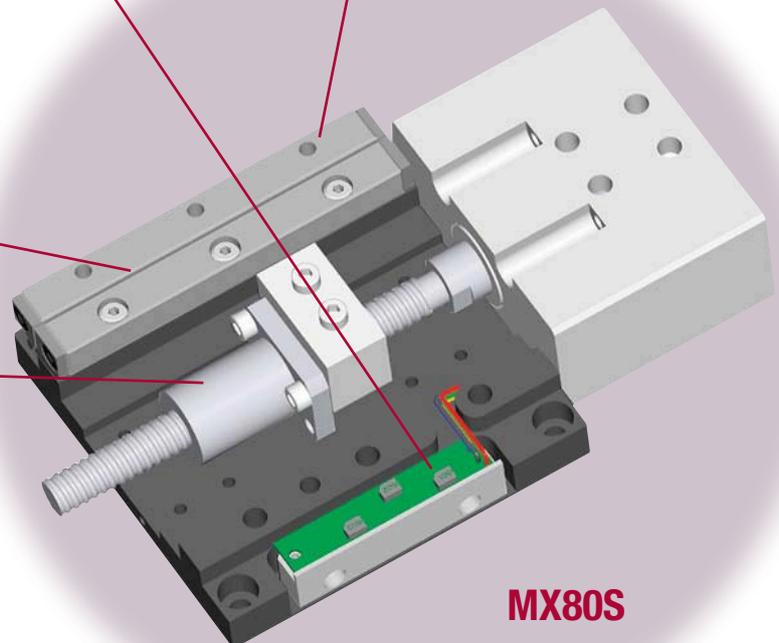
are reflective optical sensors completely housed within the body of the stage, and fully adjustable over the entire travel range.

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.



MX80S

LX80L Linear Motor Tables

- **Small Cross Section**
- **Long Travels**
- **High acceleration**
- **High velocity**
- **High repeatability**
- **High accuracy**

Magnet Rail

is a single rail of high energy rare earth magnets that offers lower weight and cost than double row magnet designs.

Linear Servo Motor

features patent pending ironcore design that provides high thrust density for linear acceleration to 5g's and velocities to 3 meters/second. The non-contact design offers long life and clean operation.

Optical Linear Encoders

are available in four standard resolutions (0.1 μm , 0.5 μm , 1.0 μm , 5.0 μm) and are fully integrated within the body of the table. The non-contact design offers long life and clean operation.

Internal Cable Management

is neatly packaged inside the table to minimize the overall system size and improve the aesthetics.

Hard Cover

protects the table's interior from intrusion of foreign objects as well as providing a polished appearance for equipment where the LX80L is prominent.

Home/Limit Sensors

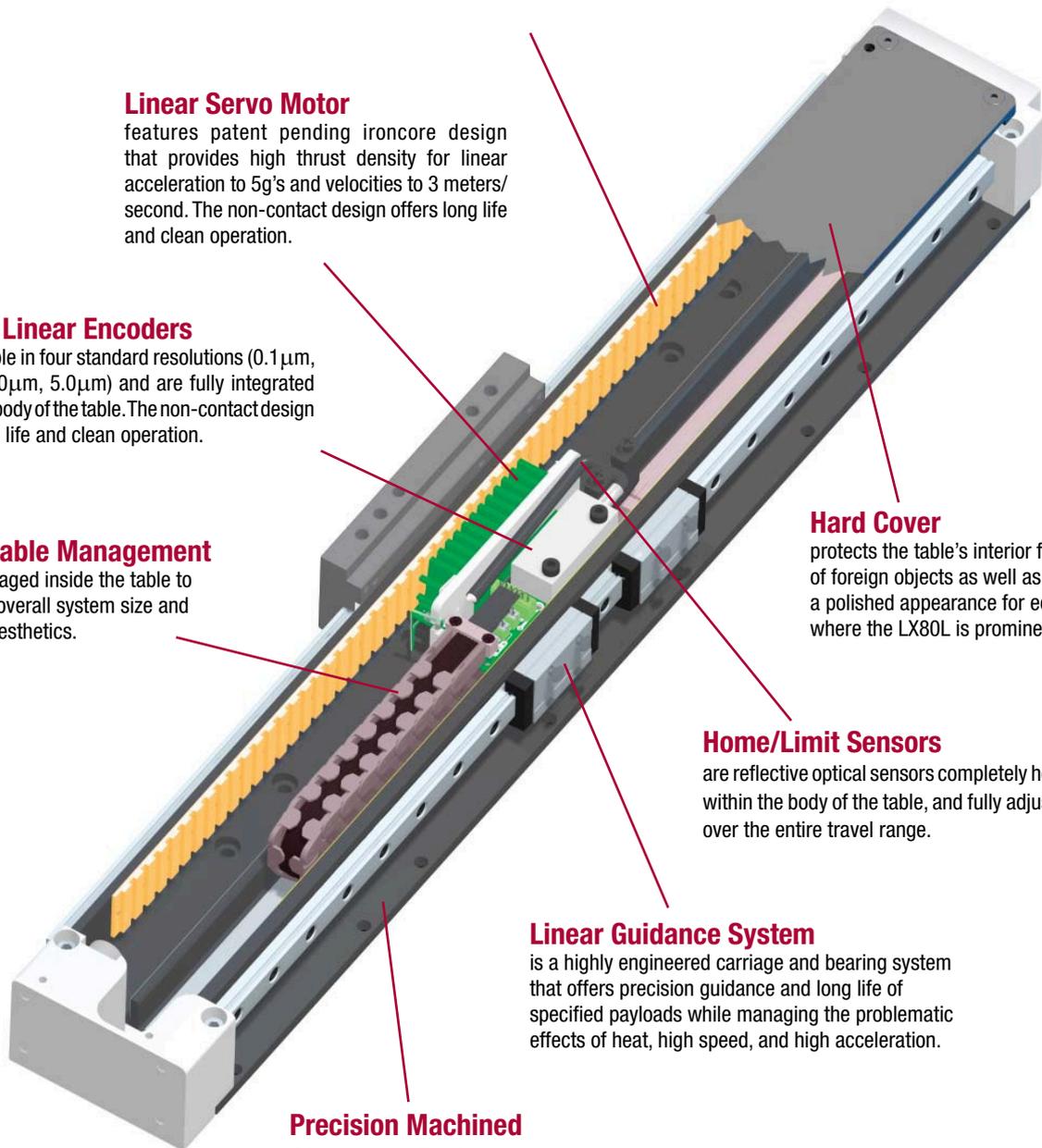
are reflective optical sensors completely housed within the body of the table, and fully adjustable over the entire travel range.

Linear Guidance System

is a highly engineered carriage and bearing system that offers precision guidance and long life of specified payloads while managing the problematic effects of heat, high speed, and high acceleration.

Precision Machined Aluminum Body

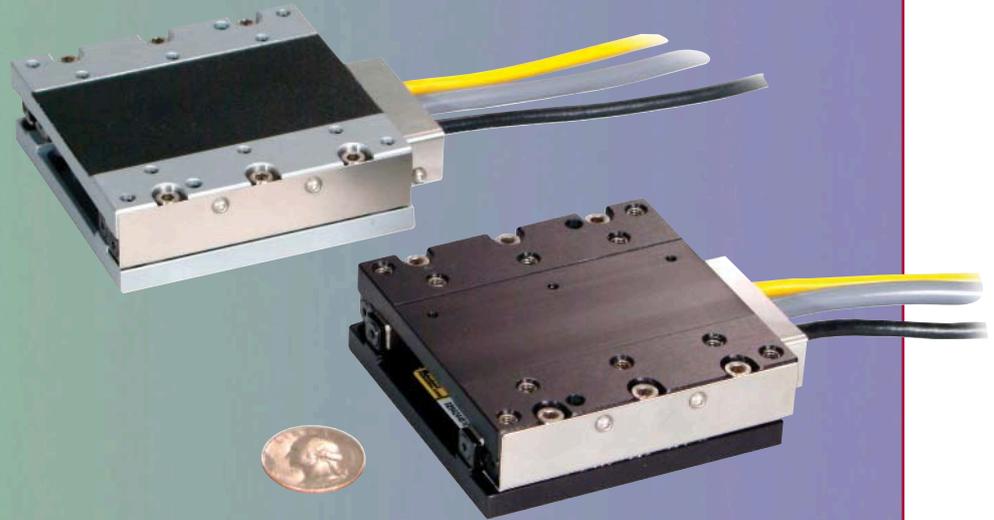
is designed to minimize weight and size, maximize strength, and provide outstanding straightness and flatness while .



MX80L-Miniature Linear Motor Stage

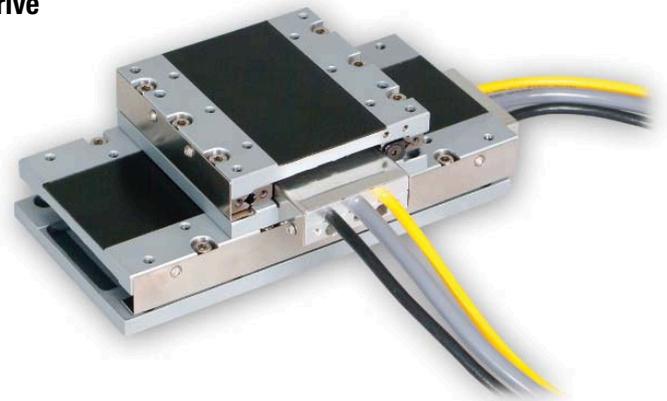
Features

- ❑ Miniature size
- ❑ 5g acceleration
- ❑ Fast settling
- ❑ Submicron precision
- ❑ High velocity (2 m/sec.)
- ❑ Multi-axis platform



Attributes:

- Low profile miniature size - (25 mm high X 80 mm wide)
- Linear servo motor drive
- Six linear encoder resolutions (0.01 μm to 5.0 μm)
- 25, 50, 100, 150 mm travels
- Cross Roller bearing (zero cage creep design)
- Precision or standard grade
- Cleanroom and low ESD options
- Fully adjustable optical home and limit sensors
- Dowel holes for repeatable mounting of payload
- Master reference surface to travel path
- "Plug-in" intelligent drive
- Pneumatic z-axis counterbalance
- No moving cables



Introduction

Miniaturization of fiber optics, photonics, electronics and biomedical processes has driven the need for smaller and more efficient positioners. Parker's MX80 miniature 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. Designed for today's 24/7 production demands, the MX80 has redefined "high-throughput automation" in the world of miniature positioners.

High Performance in a small package:

While the MX80 is small in size, it is large on performance and reliability. All key components are "built-in" - residing within the body of the stage to provide a clean looking, reliable, unobstructed package. At the heart of the MX80 is an innovative non-contact linear servo motor (patent pending). This direct drive motor has been optimized for force, speed, and acceleration, to deliver outstanding performance and response. A high precision non-contact linear encoder provides submicron resolution, repeatability and accuracy.

Selectable resolutions range from 10 nanometers to 5 microns. Precision ground cross roller bearing sets with a "zero cage creep" feature provide extremely smooth - precise linear translation. Optical travel limit and home sensors are conveniently designed into the unit for easy adjustment over the entire travel of the stage. Although there are no moving cables, a meter of hi-flex cabling is included and wired directly into the units. This hi-flex cabling addresses cable flexing concerns associated with the second or third axis in multi-axis system.

MX80L-Miniature Linear Motor Stage

Precision Series

Precision grade models are designed for high performance applications requiring the highest degree of positioning accuracy. They offer a steel body design with precisely ground mounting surfaces & bearing ways. They include higher resolution linear encoders, and are slope corrected, laser tested and certified for optimum precision.

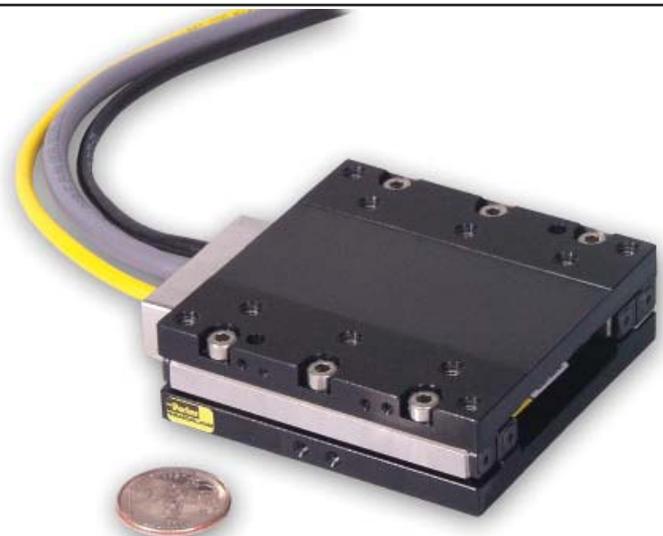
- 4g acceleration
- Repeatability to $\pm 0.4 \mu\text{m}$
- Straightness $\pm 0.4 \mu\text{m}$
- Steel body construction
- Precision ground mounting and bearing surfaces
- Hard chrome protective finish



Standard Series

Standard grade units offer a lower cost alternative for applications requiring high throughput performance with less demanding positioning requirements. They are constructed of high alloy aluminum, providing a lighter weight design which can accelerate to 5 g's.

- 5g acceleration
- Repeatability to $\pm 0.8 \mu\text{m}$
- Straightness $\pm 0.8 \mu\text{m}$
- Light weight aluminum body
- Low luster black anodize finish



MX80L Miniature Linear Motor Stage

Specifications:

	Travel			
	25mm	50mm	100mm	150mm
Normal Load Capacity	8kg(18 lb)	8kg(18 lb)	8kg(18 lb)	8kg(18 lb)
Maximum Acceleration				
Precision Grade	4g	4g	4g	3g
Standard Grade	5g	5g	5g	4g
Maximum Velocity				
5.0µm resolution	1100 mm/sec	1500 mm/sec	2000 mm/sec	2000 mm/sec
1.0µm resolution	1100 mm/sec	1500 mm/sec	2000 mm/sec	2000 mm/sec
0.5µm resolution	1100 mm/sec	1500 mm/sec	1500 mm/sec	1500 mm/sec
0.1µm resolution	300 mm/sec	300 mm/sec	300 mm/sec	300 mm/sec
0.02µm resolution	60 mm/sec	60 mm/sec	60 mm/sec	60 mm/sec
0.01µm resolution	30 mm/sec	30 mm/sec	30 mm/sec	30 mm/sec
Peak Force	12N (2.7 lb)	12N (2.7lb)	24N (5.4 lb)	24N (5.4 lb)
Continuous Force	4N (.9 lb)	4N (.9 lb)	8N (1.8 lb)	8N (1.8 lb)
Duty Cycle	100%	100%	100%	100%
Straightness & Flatness				
Precision Grade	4 microns	4 microns	5 microns	6 microns
Standard Grade	6 microns	6 microns	10 microns	12 microns
Positional Accuracy				
Precision Grade ⁽¹⁾⁽²⁾⁽³⁾				
0.01 µm resolution	3 microns	4 microns	5 microns	5 microns
0.02 µm resolution	3 microns	4 microns	5 microns	5 microns
0.1 µm resolution	3 microns	4 microns	5 microns	5 microns
0.5 µm resolution	4 microns	5 microns	6 microns	6 microns
1.0 µm resolution	5 microns	6 microns	7 microns	7 microns
5.0 µm resolution	13 microns	14 microns	15 microns	15 microns
Standard Grade ⁽²⁾				
0.01 µm resolution	12 microns	15 microns	20 microns	20 microns
0.02 µm resolution	12 microns	15 microns	20 microns	20 microns
0.1 µm resolution	12 microns	15 microns	20 microns	20 microns
0.5 µm resolution	12 microns	15 microns	20 microns	20 microns
1.0 µm resolution	15 microns	20 microns	25 microns	25 microns
5.0 µm resolution	25 microns	30 microns	35 microns	35 microns
Bi-directional Repeatability				
Precision Grade ⁽¹⁾⁽²⁾⁽³⁾				
0.01 µm resolution			±0.4 microns	
0.02 µm resolution			±0.4 microns	
0.1 µm resolution			±0.5 microns	
0.5 µm resolution			±1.0 microns	
1.0 µm resolution			±2.0 microns	
5.0 µm resolution		±10.0 microns		
Standard Grade ⁽²⁾				
0.01 µm resolution			±0.8 microns	
0.02 µm resolution			±0.8 microns	
0.1 µm resolution			±0.8 microns	
0.5 µm resolution			±1.5 microns	
1.0 µm resolution			±2.0 microns	
5.0 µm resolution		±10.0 microns		
Unit Mass				
Precision Grade	590g	590g	1027g	1345g
Standard Grade	475g	475g	875g	1125g
Carriage Mass (unloaded)				
Precision Grade	282g	282g	509g	676g
Standard Grade	213g	213g	405g	537g

(1) Measured at the carriage center, 35mm above the 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) Precision grade with slope correction value provided. Consult factory if better accuracy is required.

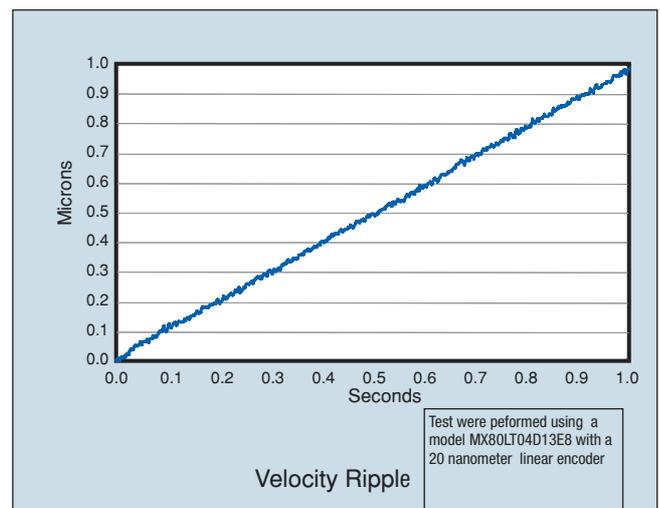
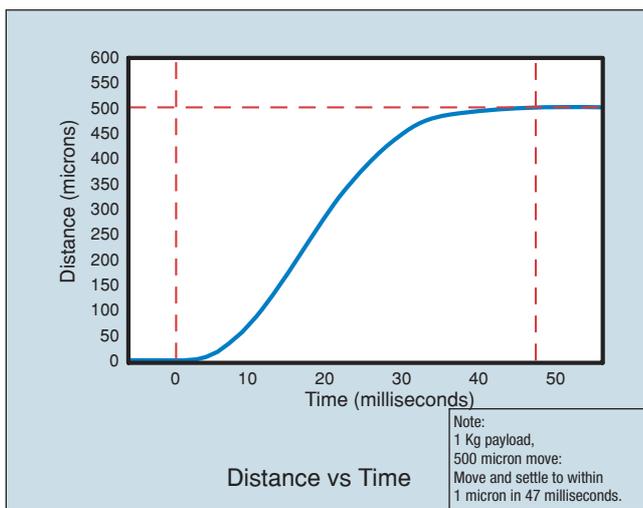
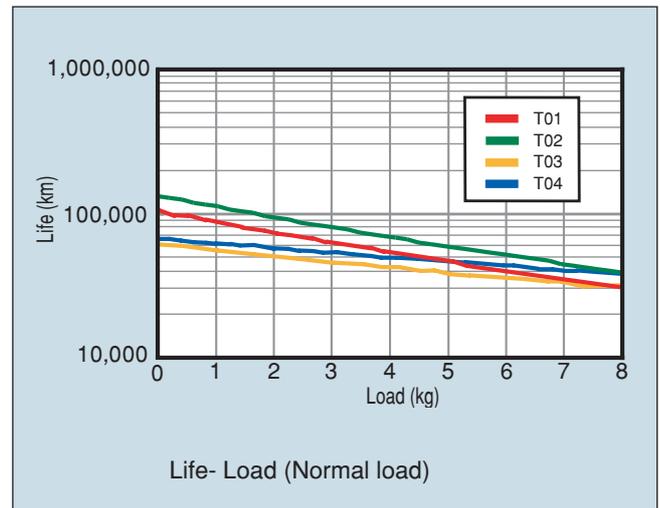
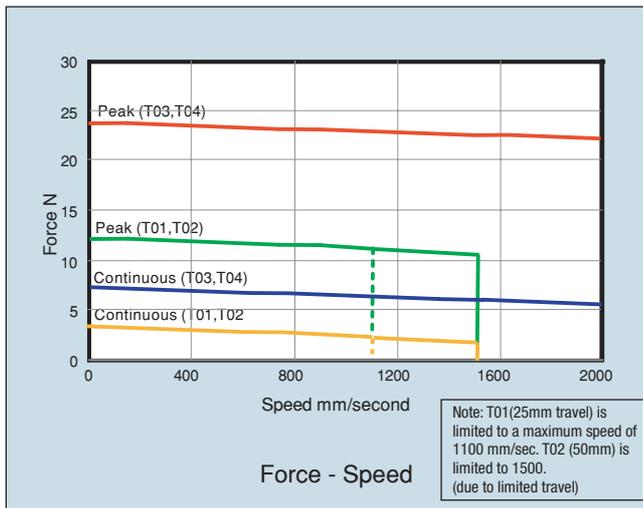
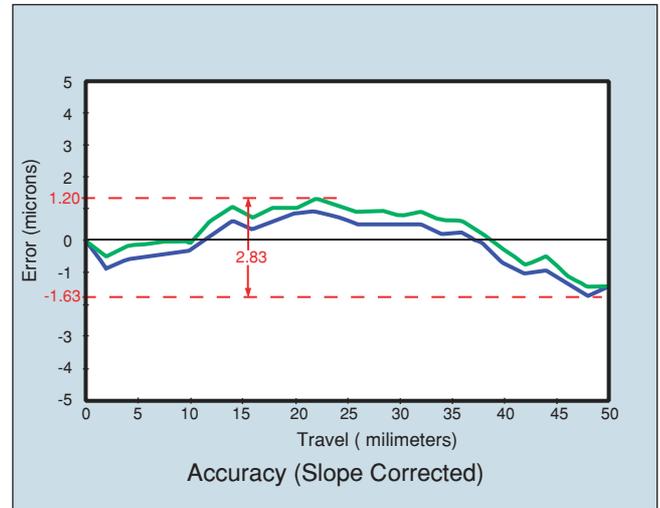
MX80L Miniature Linear Motor Stage

Specifications:

How we measure accuracy:

All published linear table accuracy and repeatability specifications vary according to testing and reporting methodology. Parker methodology includes data reporting over the entire table travel length, regardless of the start or stop position.

Testing is performed with the table unloaded and mounted to a stable granite surface, at 20° C. Accuracy and repeatability specifications are based on a peak to peak range of error, measured by a laser interferometer with the beam located 35mm above the center of the table top. The reported error totals six degrees of freedom (x,y,z, plus roll, pitch and yaw errors). Final table specifications are established from the maximum positive (+) error to the maximum negative (-) error.



MX80L Miniature Linear Motor Stages

Features and Options

CM04 to CM07

“Plug & Run” Cables Options



“User convenience” is high on the list of cable attributes found in the MX80. The high flex cabling and connectors are reliable, durable and offer easy hook-up for “plug and run” installation.

- High flex cables
- Plug-in compatibility with ViX drive
- CE compliant connectors and shielding
- CE compliant ferrite beads
- Color coded jackets and labeling

E_

Encoder Options A non-contact linear optical encoder provides a quadrature output and offers resolution ranging from 10 nanometer to 5 micron . On the MX80L, the encoder is internal to the stage body. There is no increase to the footprint of the unit and no additional external cabling is required.

H_ L_

Home and Limit Sensors Reflective optical home and limit sensors are completely housed within the body of the stage. An innovative design adds functionality without sacrificing geometry. Sensor triggers can be easily adjusted over the travel. The output format is an open collector type capable of sinking up to 50ma, and be set as N.O or N.C.

Zero Cage Creep Feature



High acceleration and smooth translation are both desired attributes in a linear-motor stage. The cross roller bearing system found in the MX80 provides extremely smooth linear translation, and with an anti-cage creep design, operates very well in high acceleration applications. This design employs a rack and pinion feature within the bearing races to eliminate bearing creep. As a result, the MX80 performs well,

Tooling Features



Innovative tooling features make mounting and alignment much 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.
- Two dowel pin holes are provided on the carriage top and base for repeatable mounting of positioner or tooling.

MX80L Miniature Linear Motor Stages Features and Options

R2 R20

Cleanroom Option



Both Precision and Standard grade products can be prepared for cleanroom compatibility. Preparation involves material changes, element modification and cleanroom compatible lubricants. The MX80L and MX80S with the **R2** option are class 10 cleanroom compatible. When applying an XY or XYZ combination in a cleanroom environment, moving wires need to be considered - please consult a Parker application engineer. The **R20** option includes both - low ESD and cleanroom preparation.

R10 R20

Low ESD Coating



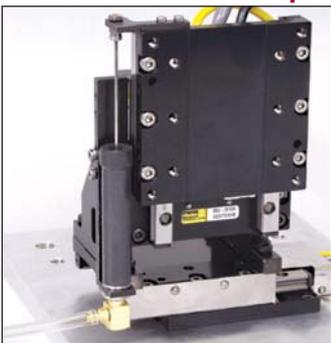
An optional 'low ESD' electroless nickel or Armoloy coating is offered for improved electrical conductivity, providing a low resistance to ground path for electric discharge.

R1

Environmental Protection Both precision and standard grade units have a hard coat protective finish. The precision units have a hard coat (Rc 78) satin chrome finish, and the standard units have a low lustre black anodized finish.

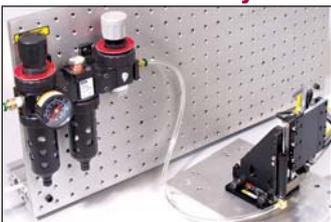
X2

Z-axis Counterbalance Option



A pneumatic Z-axis counterbalance is offered to prevent a sudden load drop if power to the motor is interrupted. A controlled vertical force is applied to the stage top to negate the effect of gravity and achieve equilibrium. A precisely regulated clean air supply of 0 to 60 psi is required for operation (see "Pneumatic Accessory Package").

Pneumatic Accessory Package (Part Number 002-2236-01)



This accessory is offered for use with the **X2** pneumatic counterbalance option. It consists of a pre-filter, a pressure regulator, a coalescing filter, and a precision regulator to precisely regulate air pressure and remove oil, water or debris down to 3 microns.

MX80 Miniature Linear Motor Stages

ViX Intelligent Servo & Microstep Drives/ Controllers



- Fully Digital Drive/Controller
- Compact size (4.9" x 1.65" x 3.35")
- Pre-configured for MX80L
- UL, cUL and CE compliant
- 24-80 VDC power input
- Dual RJ45 connections for optional CANopen, RS485 / RS232



The ViX servo and microstepping drives are the perfect drive solution to be paired with the MX80 family. These drives use advanced field oriented digital control technology to enhance dynamic performance and improve efficiency. In addition to servo and microstepping versions, the ViX family is offered with different levels of control. The servo version is useful in multi-axis systems where a multi-axis controller is used. The intelligent versions have a built-in controller ideal for single axis systems. Additionally, these intelligent versions can be easily "daisy chained" for multi-axis control where tight coordination is not necessary. The powerful EASI-V software, supplied with the drives, permits straight forward rapid configuration and tuning.

A10 A11 A12 ViX Servo Drive (MX80S)

A20 A21 A22 ViX Servo Drive (MX80L)

The ViX servo drive is the ideal drive solution when a multi-axis controller is used to control an MX80 stage. Depending on the selected version, the ViX will be configured for force, torque, velocity, or step & direction input command signals. Through advanced field oriented digital control technology, the ViX is able to offer superior control of the MX80L or MX80S.

- Pre-configured MX80 stage motor files
- EASI-V software and configuration wizard
- Panel or DIN rail mounting
- High performance encoder input to enable high throughput operation with sub-micron precision

A15 A25 ViX Servo Drive/Controller (MX80L & MX80S)

These ViX servo drive options are ideal for providing both servo drive and control functions in single axis or multi-axis systems when "daisy chained". They can accept streamed commands from a host computer or be programmed to operate from internal memory.

- Up to 16 sequences retained in internal memory
- Accepts streaming commands from host
- 5 digital inputs / 3 digital outputs
- Optional RS485 or CANopen fieldbus interface

A35 ViX Microstep Drive/Controller (MX80S)

These ViX stepper drive options are ideal for single axis systems, providing both stepper drive and control functions. They can accept streamed commands from a host computer or be programmed to operate from an internal memory. With the ViX intelligent microstep drive, full PWM control for accurate microstepping performance allows for accurate microstepping from 400 to 51,200 motor steps per revolution.

- Fully programmable resolution from 400 to 51,200 steps/rev.
- 5 digital inputs / 3 digital outputs
- Automatic standby current reduction
- Up to 16 sequences retained in internal memory
- Accepts streaming commands from host

MX80 Miniature Linear Motor Stages

E-AC and E-DC Microstepping Drive



- Selectable resolution up to 50,800 steps/rev.
- Anti-resonance circuitry suppresses midrange instability.
- Auto standby reduces motor current (and heating).
- Current waveforms to optimize smoothness.
- Optically isolated step and direction inputs.
- Short circuit and over temperature protection.

A30 E-AC Microstepping Drive (MX80S)

A31 E-DC Microstepping Drive (MX80S)

The E-AC and E-DC are low-cost, high-performance, high-reliability microstepping drives. These E Series drives incorporate an anti-resonance circuitry that aggressively and effectively suppresses step motor mid-range instability or oscillations, thus taking advantage of the full capabilities of the step motor. The E-AC accepts 120VAC direct-online power, while the E-DC drive is designed for 24VDC to 48VDC input power requirement

Other Characteristics:

- Auto-run feature to verify proper system operation
- Status/fault LED indicators to confirm proper operation
- ASIC and surface-mount technologies minimize product footprint, overall package size and increase product reliability
- Optically isolated fault output for embedded applications
- Certified as UL-recognized component
- Approvals: CE (LVD), and CE (EMC)

XL-PSU Power Supply Module

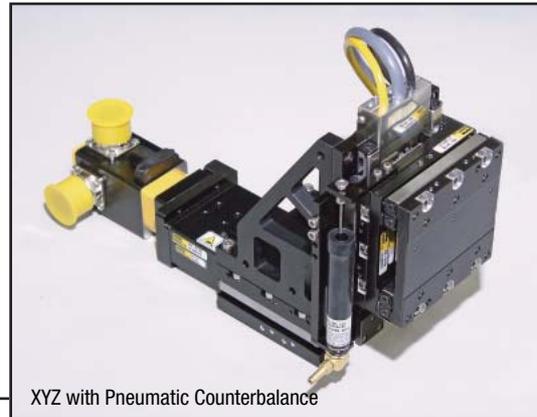


The Parker XL-PSU power supply offers a convenient way of powering a ViX series servo drive. The XL-PSU is a high capacitance power module providing continuous voltage potential for the fluctuating power demands of servo amplifiers through peak and continuous operation. The continuous rated output is 250W at 230VAC input, with a 1-second peak rating of 600W.

- Provides 80 VDC bus voltage for ViX drives & 24VDC output for powering logic, etc.
- Run up to three MX80 axes from single module
- No external EMC filters required
- AC input voltage: 95 to 264 VAC
- DC output: 80 VDC, 3.1A max continuous
- Logic output: 24 VDC, 1.8A max
- Dimensions: 7.7 x 2.0 x 5.1 inches
- Weight: 1 kg

MX80 Miniature Linear Motor Stages Multi- Axis Systems

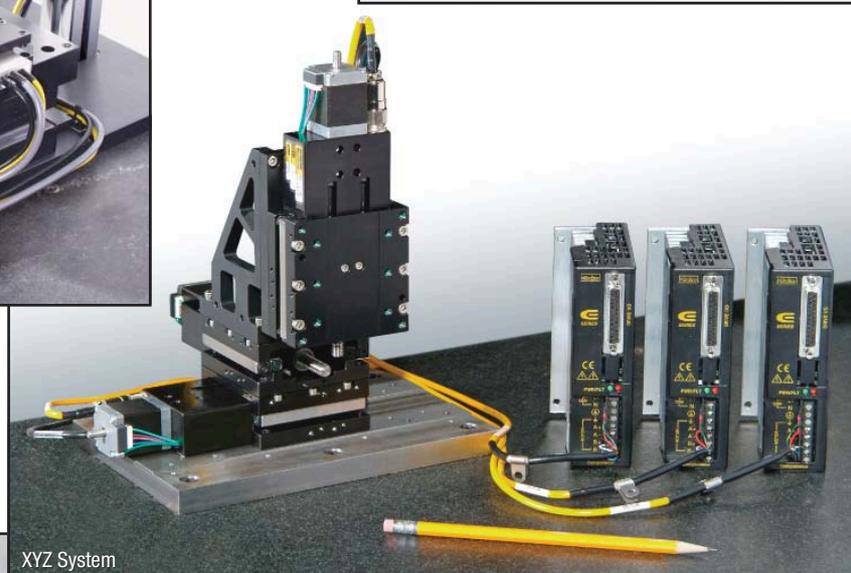
The direct mounting compatibility of MX80 stages enables a large variety of two and three axis combinations to be configured with ease. When optioned with Parker's "ViX Intelligent Servo Drives", 2 or 3 axis stages are transformed into complete plug & run systems offering easy hookup and direct operation from a PC via the RS232 interface. All necessary motor-drive setup, and testing are completed at the factory prior to shipping. For standard multi-axis configurations, please go to www.parkermotion.com



XYZ with Pneumatic Counterbalance



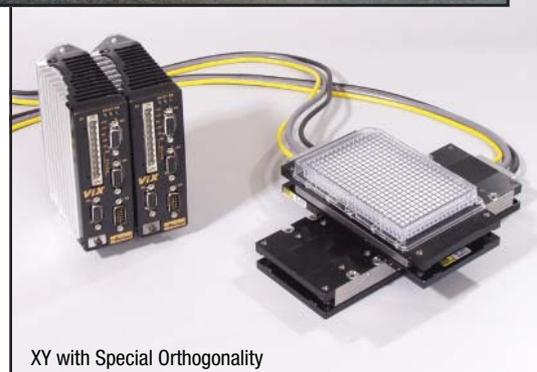
XYZ System with elevator table



XYZ System



Open Frame XY



XY with Special Orthogonality

MX80 Miniature Linear Motor Stages

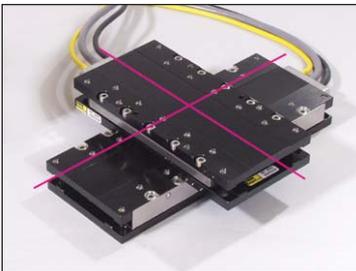
Multi- Axis Systems

Preconfigured Drive Electronics to complete the System

Servo motor drives and stepper motor drives (with or without integrated controller) are sized and configured for optimum MX80 performance. They offer easy hookup and direct operation from a PC. Seamless integration of drives and controls insures performance matched functionality of the completed motion system.

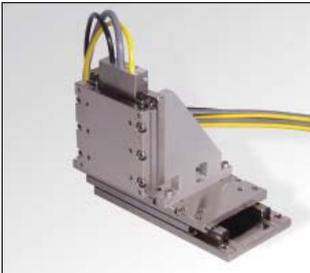


System Orthogonality



In any multi-axis positioning system, the perpendicular alignment of the axes must be clearly specified. "Degree of orthogonality" defines the perpendicular alignment of axis one to another. The MX80s offer two choices for orthogonality. As standard, (S3 or S4 designators) perpendicularity is held to within 60 arc seconds. For more exacting applications the MX80 can be optioned for 15 arc seconds orthogonality (S5 or S6 designators).

Z-axis Bracket



Lightweight aluminum Z-brackets are available for easy construction of vertical axis combinations.

- Standard models:
25 & 50 mm: p/n 002-2238-01
100 & 150mm: p/n 002-2240-01
- Low ESD models:
5 & 50 mm: p/n 002-2239-01
100 & 150mm: p/n 002-2241-01

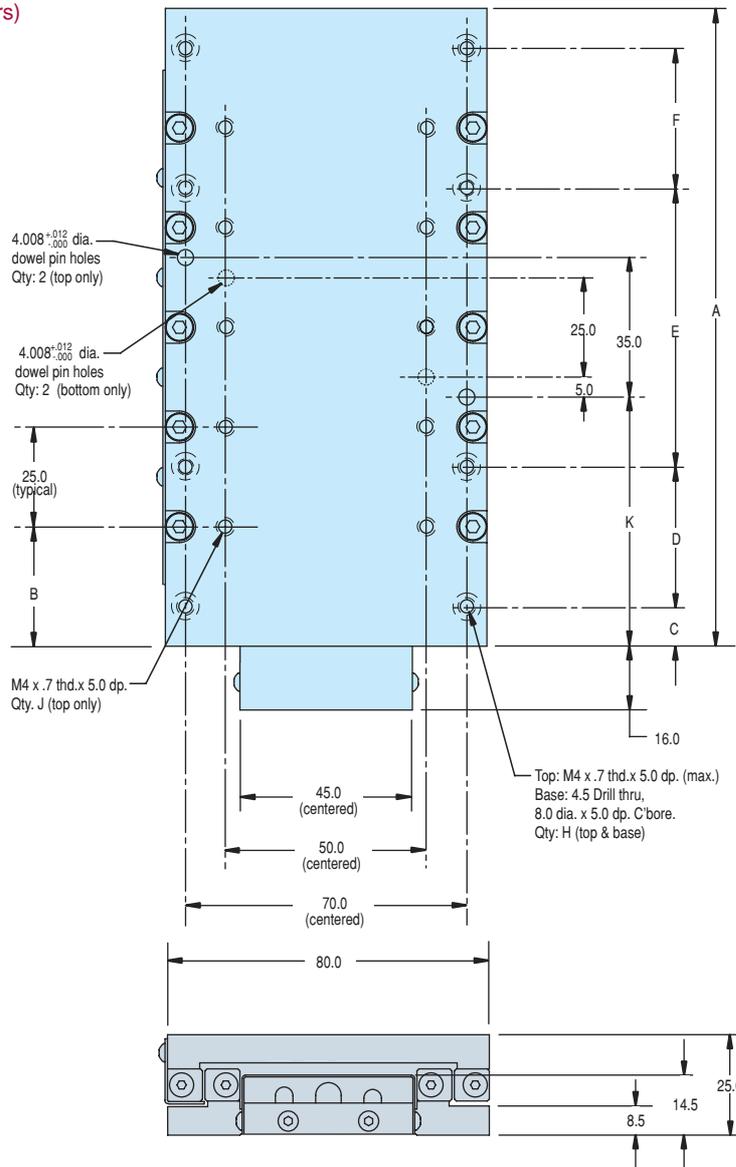


Custom Solutions

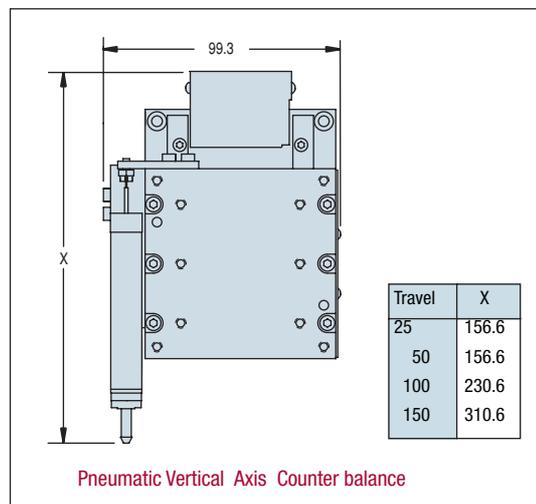
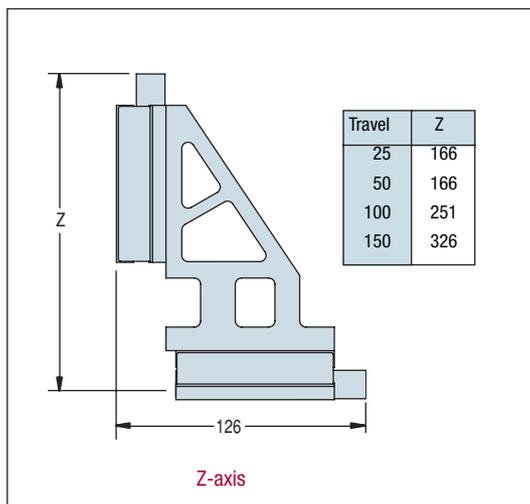
The direct mounting capability and standard bracket offering of the MX80 family allow a large variety of two and three axis systems to be created. Beyond these typical configurations, Parker's years of experience of building both standard and custom positioning systems uniquely enables us to customize these systems to your exact requirements. We are able to add custom brackets, counterbalances, surface finishes, fixtures, etc. to solve your specific application.

MX80L Miniature Linear Motor Stage

Dimensions (millimeters)



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

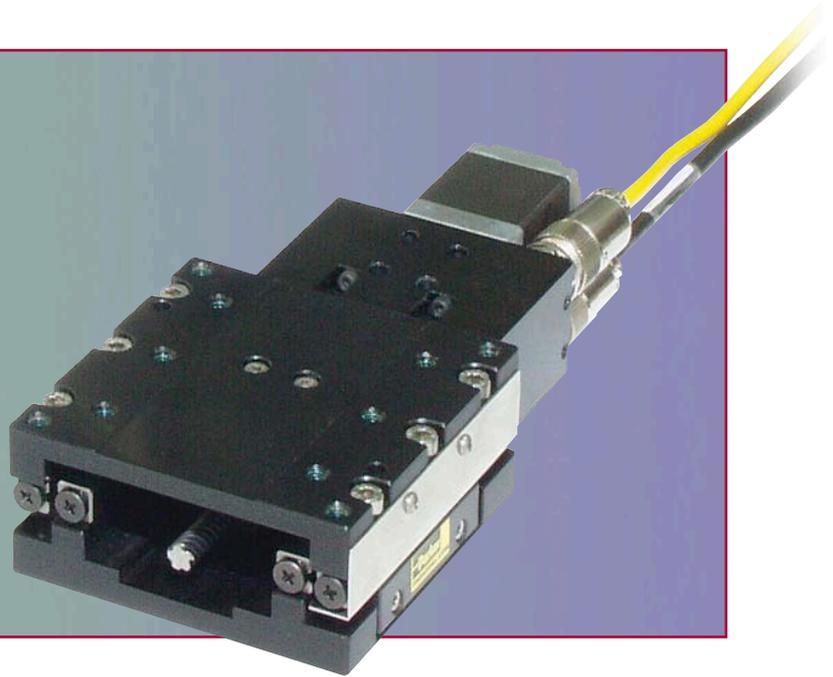


MX80S Miniature Stage Series

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