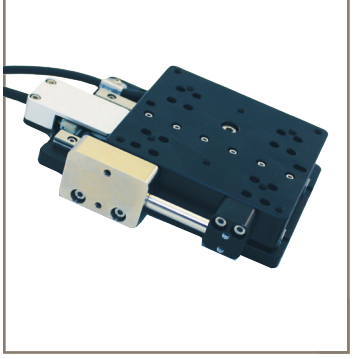
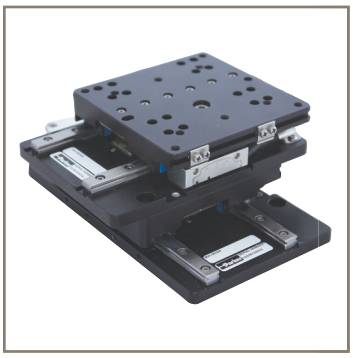
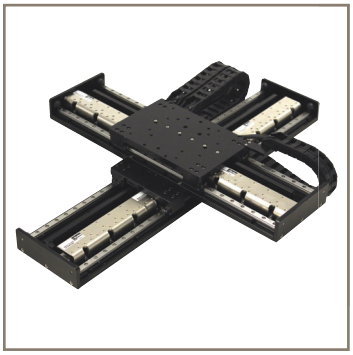
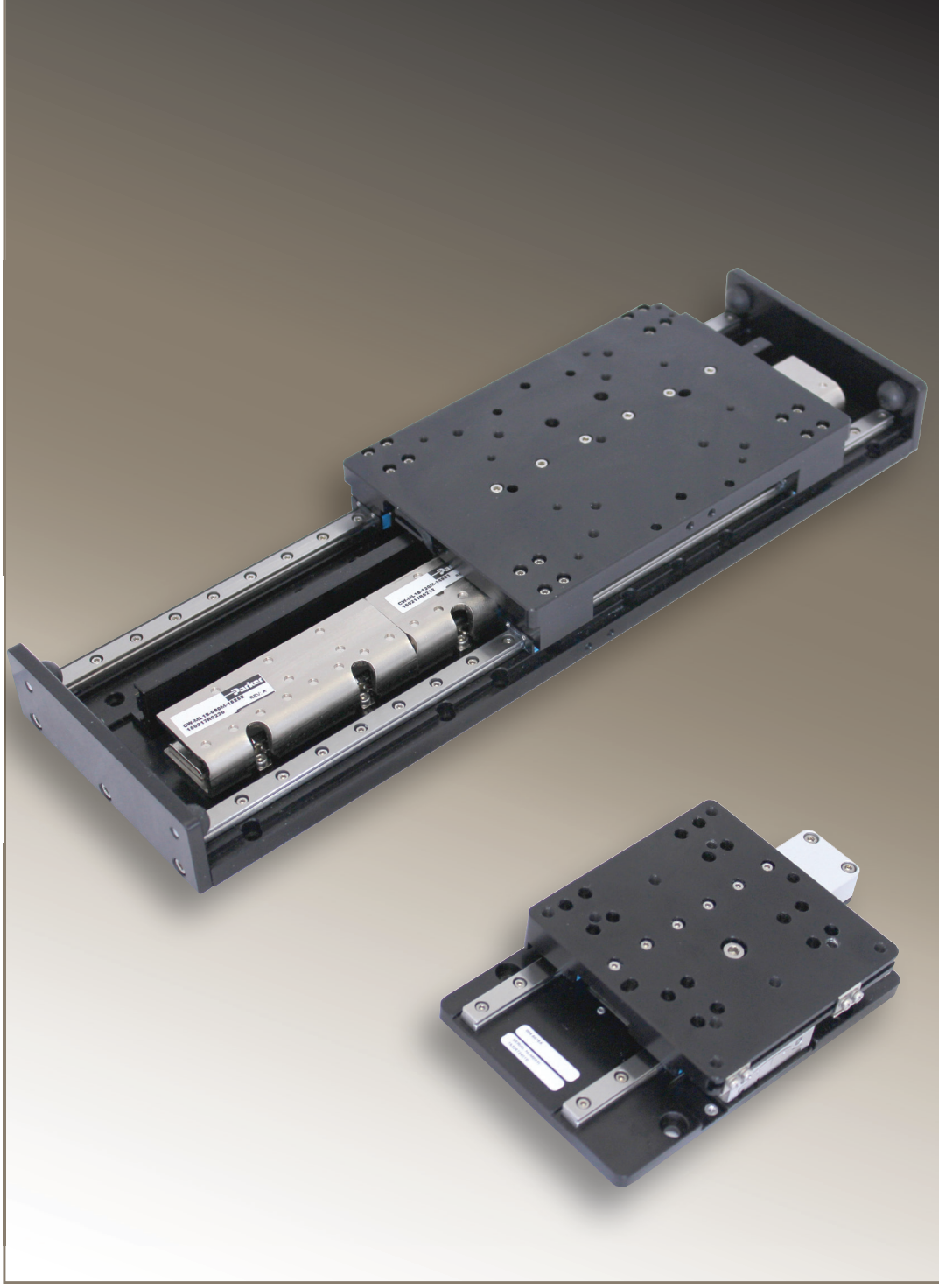




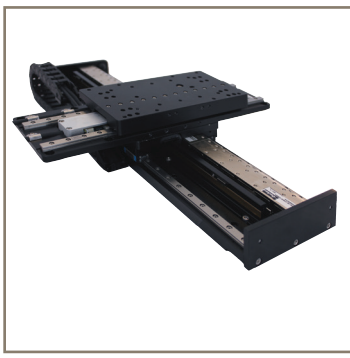
aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding





mSR Series

Miniature Square Rail Linear Positioner



IN POSITION TECHNOLOGIES LLC

help@iptech1.com
Phone: 877-IP-TECH1
Fax: 877-IP-TECH2
www.iptech1.com

ISO 9001:2008

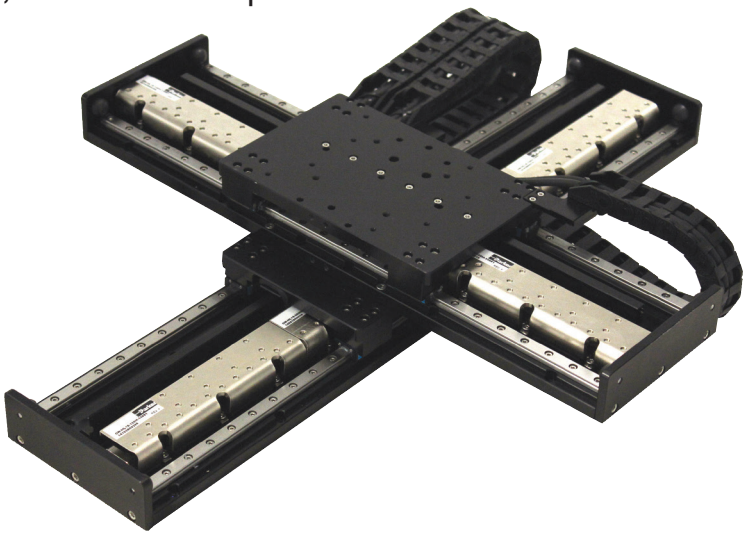
Arizona: 480-893-8086
Colorado: 303-231-9955
New Mexico: 505-223-6612

18 YEARS 1997-2015

ENGINEERING YOUR SUCCESS.

mSR Series Linear Positioners

Maximize your design, not its footprint.



For instrument builders who need smooth motion in a small package, the mSR is a linear positioner that provides sub-micron level precision in two different form factors (80 and 100).

The mSR series is a precision machined, square rail bearing guided linear positioner which is driven with one of two different linear servo motor technologies, and utilizes selectable levels of linear encoder technology that are configured to match the application need.

Within the same form factor, OEMs have two options:

- The precision grade mSR is the most accurate standard positioner ever made by Parker Electromechanical, achieving a repeatability of 100 nm and an accuracy of 5.0 microns over 50 millimeters of stroke.
- The more cost competitive standard version takes advantage of magnetic encoder technology, which is ideal for applications which do not require the same level of precision, to compete with similar ballscrew driven stages.

These positioners are ideal for a variety of applications, ranging from imaging systems in digital pathology equipment to metrology instruments in semiconductor or electronics manufacturing.

The mSR was developed to complement the successful MX80L positioner, and allows OEM's developing equipment a number of added layers of value, in an extremely compact package, which is easy to apply, and can be tailor-fitted to match the need regardless if one is interested in the reliability of a cost-competitive mechanically driven alternative, or a high precision positioner delivering best of breed performance – all in the same footprint.

Because of its compact, all-encompassing design, the mSR is an ideal positioning solution for applications in the life sciences. Typical applications range from imaging systems performing scanning operations to identify biological markers, to high-throughput processing of micro plates, to applications in cellular therapeutics requiring cell selection and high precision placement to supplement regenerative medicine techniques. Know that the mSR has been designed with typical instrument regulations and certifications in mind as all versions meet CE and RoHS requirements.

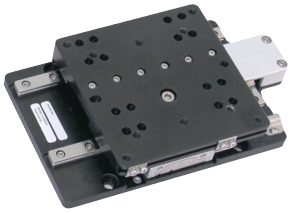
Likewise, the mSR is also ideal in application in electronics manufacturing due to its low profile and precision performance. Typical applications could range from semiconductor metrology, to wafer scribing.

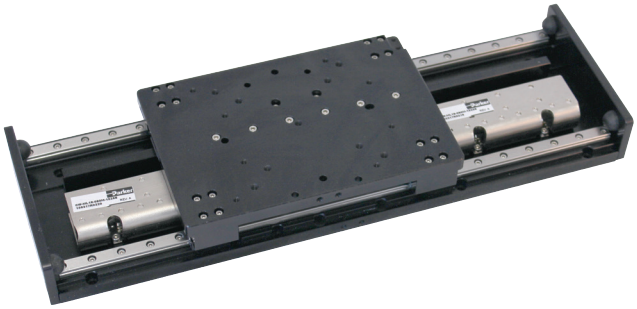
Features

- **Two miniature form factors: the mSR 80 measuring 80 x 25 mm, or the mSR 100 measuring 100 x 35 mm.**
- **Dual precision square rail bearings**
- **Six different linear encoder options**
- **Two different linear motor technologies**
- **Standard travel options ranging from 25 mm to 500 mm of stroke**
- **Integrated and adjustable home and limit sensing**
- **Common tapped mounting holes and dowel locating holes**
- **Complete error mapping on each precision grade version – with linear slope correction value provided**
- **CE and RoHS compliance**
- **A standard magnetic counterbalance (mSR 80 - 25 mm stroke)**

The Best of Both Worlds

The mSR design has been optimized around two different linear motor technologies to best suit packaging restraints and application needs. Each of these motors has been optimized to deliver best in class performance and response.



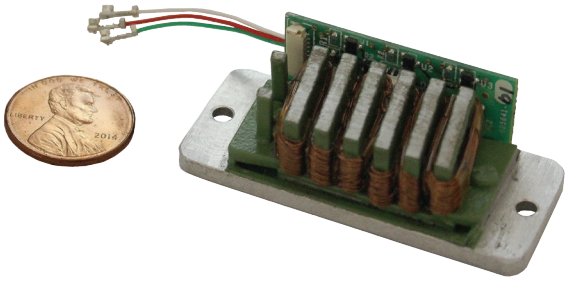


mSR 80 Ironcore

Ironcore Technology Benefits

- **High force per size**
- **Lower cost**
- **Excellent heat dissipation**

The mSR080 uses the same ironcore linear motor technology used on the MX80L, but it allows for a wider variety of encoder technologies to be applied in a similar foot print, delivering higher performance at a lower relative cost. The mSR080 has been designed to minimize the overall packaging while still achieving MX80L level thrust.

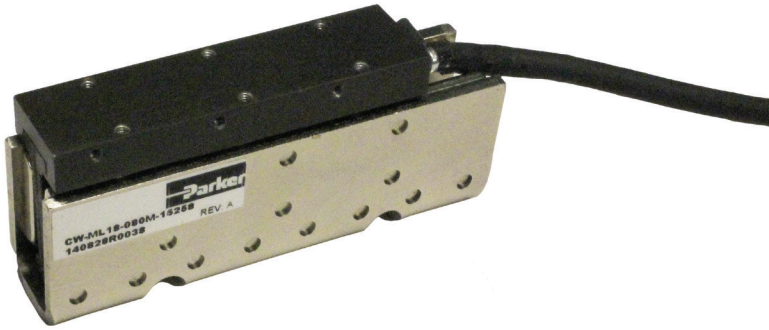


mSR 100 Ironless

Ironless Technology Benefits

- **No attractive forces between stator and magnet track – yielding smoother phase transitions**
- **No cogging**
- **Lower forcer weight**

The mSR100 makes use of Parker's latest ironless linear motor, the mL18. As a result the mSR100 is ideal for applications requiring a higher load than the mSR 80, extremely smooth motion, or minimal velocity ripple. The mSR100 also allows for strokes up to 500 mm, as well as a BiSS-C absolute encoder for applications requiring constant positional information.



mSR Series Linear Positioners

Maximize Instrument Performance — Not Its Size

The mSR (miniature square rail) positioner offers instrument builders optimized packaging of a linear motor, guidance and encoder, as well as limits and home senors in one complete solution.

Best of Breed Encoder Technology

The mSR positioner offers instrument builder's a plethora of different encoding technologies and resolutions to select from.

Standard incremental optical resolutions range from one micron all the way down to ten nanometers of resolution. This optical encoder offers exceptionally low sub-divisional errors, allowing for very tight control over velocity ripple.

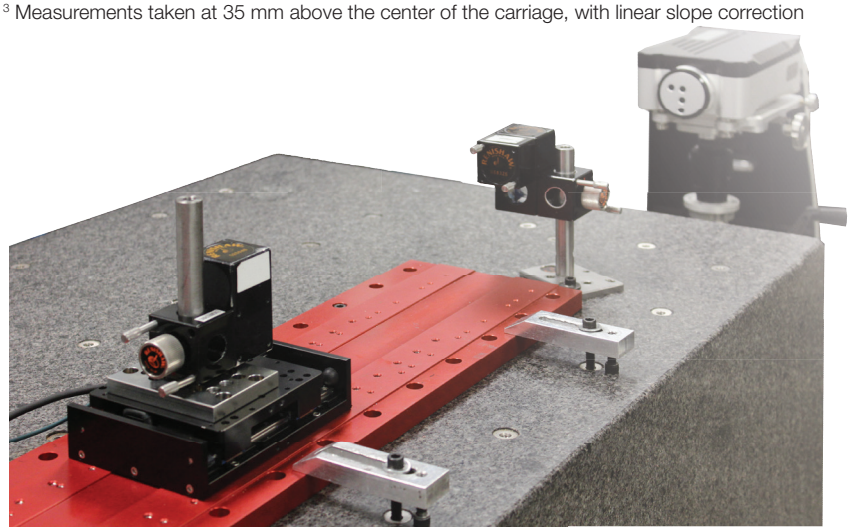
The analog (sine/cosine) encoder option is an ideal way to reach high resolution when paired with controls using interpolating technology to achieve high precision and high speed.

A one micron magnetic option is ideal for cost sensitive applications requiring more basic positioning, and lastly, the mSR 100offers a BiSS-C encoder option to give absolute feedback for applications requiring constant positional information.

mSR Series Specifications

	Units	mSR080	mSR100
Size (W x H)	mm	80 x 25	100 x 35
Travel (Max)	mm	150	500
Normal Load (Max)	kg	8	12
Thrust (Max)			
Continuous	N	8	16.7
Peak		24	50
Acceleration (Max – no load)	G	3	3
Speed (Max – no load) [1]	mm/s	2000	3000
Rated Bus Voltage	Volts DC	48	48
Repeatability [2]	µm	±0.1	±0.2
Accuracy [2, 3]	µm	5	5
Straightness & Flatness [2]	µm	±4	±4
Feedback Compatibility			
1 µm Optical (incremental)		•	•
0.1 µm Optical (incremental)		•	•
0.01 µm Optical (incremental)		•	•
Analog Sine/Cosine		•	•
1 µm Magnetic (incremental)		•	•
0.05 µm BiSS-C (absolute)			•

[1] At 48 Volt DC bus
[2] Precision grade version stage mounted to granite surface, 0.01 micron optical encoder, 50 mm stroke
[3] Measurements taken at 35 mm above the center of the carriage, with linear slope correction



Laser Grade Precision

Every precision grade mSR is thoroughly tested with Parker's laser interferometer to ensure that it meets product specification. Parker also provides test data, with a linear slope corrected value noted, yielding higher stage accuracy with controller compensation.

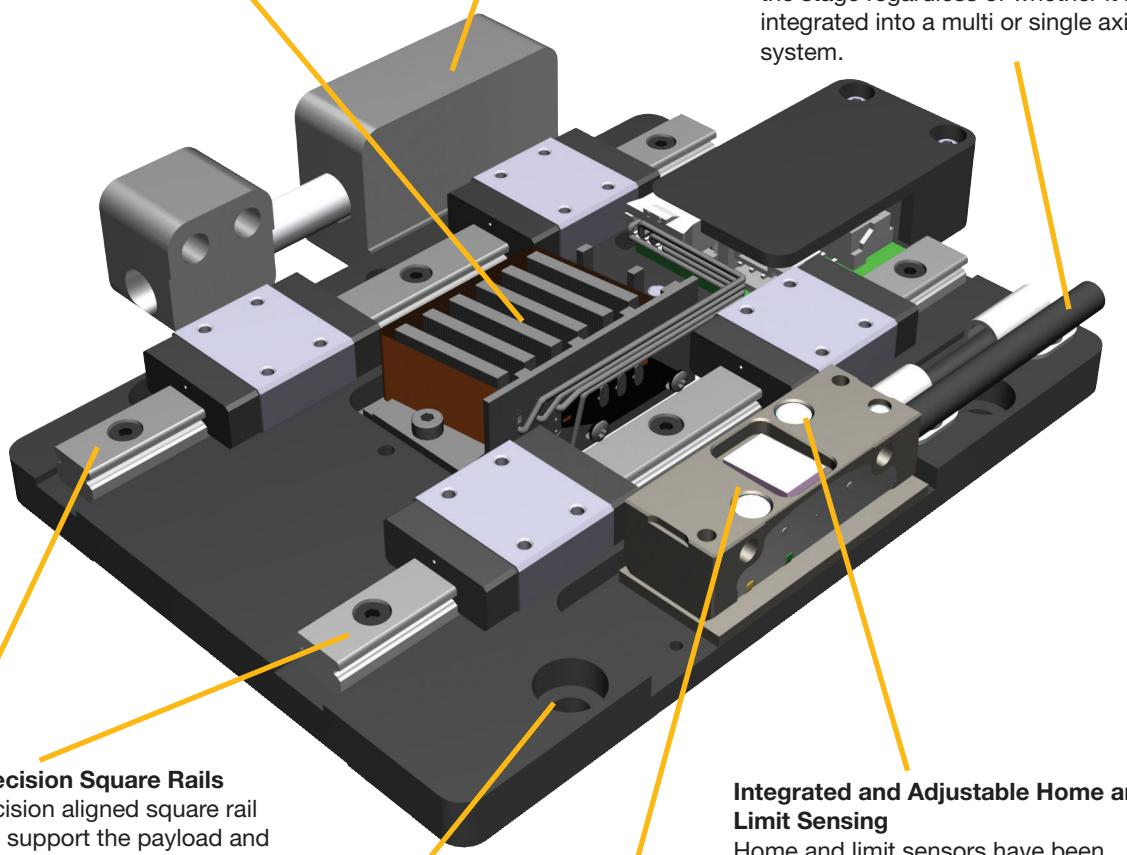
mSR Series Linear Positioners

mSR080 Design Advantages

Center Driven Ironcore Linear Motor
The mSR080 offers both a 4 and 8 pole ironcore linear motor based upon the application thrust requirements. Each of these motors have been optimized to operate on 48 Volts DC.

An Optional Magnetic Counterbalance
The mSR080 with 25 mm stroke has an optional magnetic counterbalance that can be used for Z axis applications. The magnetic counter balance is a more robust solution when compared to spring or pneumatic driven alternatives.

High Flex Cabling
The mSR uses high flex cabling as standard to ensure maximum life of the stage regardless of whether it's integrated into a multi or single axis system.



Dual Precision Square Rails
Two precision aligned square rail bearings support the payload and provide superior straightness and flatness.

Tapped Holes and Dowel Pinning
The mSR has tapped holes in both the top and base for ease of mounting and dowel pins to ensure repeatable mounting when configuring XY systems made with mSR's.

Five Different Linear Encoder Technologies
The mSR080 provides maximum versatility with three different optical encoder resolutions (1, 0.1, and 0.01 micron), an analog sine/cosine option as well as an economical 1 micron magnetic option.

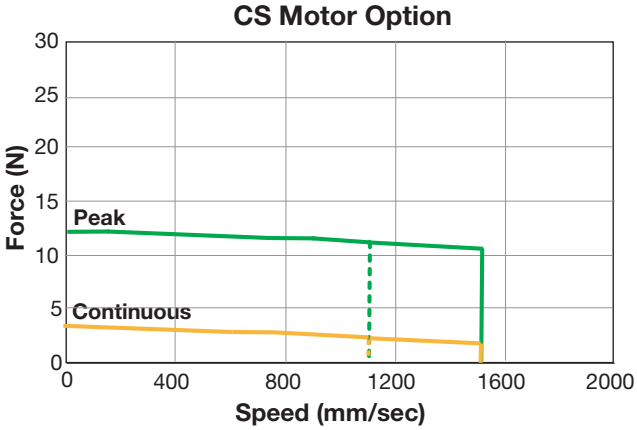
Integrated and Adjustable Home and Limit Sensing
Home and limit sensors have been integrated into the mSR080 encoder read head, and signals are passed through the same cable, minimizing the amount of cables requiring cable management

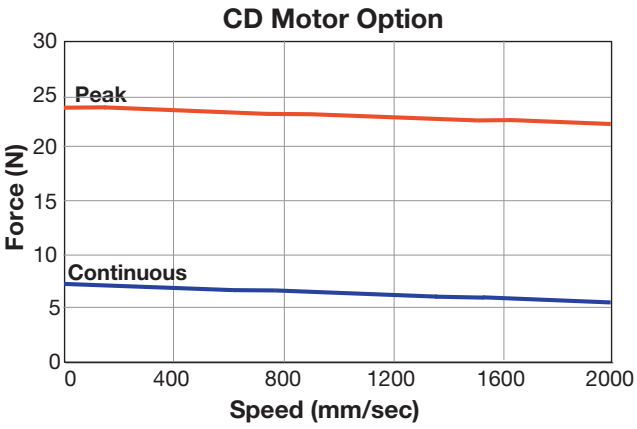
CE and RoHS Compliance
The mSR conforms to both CE and RoHS directives as standard.

mSR080 Specifications

			Travel (mm)				
Specification		**Units**	**25**	**35**	**50**	**100**	**150**
Max. Load		kg (lb)	4 (9)	4 (9)	8 (18)	8 (18)	8 (18)
Peak Thrust		N (lb)	12 (2.7)	12 (2.7)	24 (5.4)	24 (5.4)	24 (5.4)
Continuous Thrust		N (lb)	4 (0.9)	4 (0.9)	8 (1.8)	8 (1.8)	8 (1.8)
Duty Cycle (Acceleration and Load Dependent)		%			100		
Acceleration (Unloaded)		G's			3		
Straightness & Flatness	**Standard Grade**	µm	±6	±6	±8	±10	±15
	Precision Grade		±3	±3	±4	±5	±10
Carriage Mass		kg	0.2365	0.2365	0.3065	0.4115	0.519
Stage Mass		kg	0.525	0.5815	0.7395	1.0665	1.403
Magnetic Encoder – 1 Micron Resolution							
Max. Speed		mm/s	1100	1500	2000	2000	2000
Bi-Directional Repeatability		µm			±5.0		
Positional Accuracy		µm	20	20	30	40	40
Optical Encoder – 1 Micron Resolution							
Max. Speed		mm/s	1100	1500	2000	2000	2000
Bi-Directional Repeatability		µm			±2.0		
Positional Accuracy		µm	9	9	9	11	13
Positional Accuracy (Slope Corrected)		µm	5	6	6	6	7
Optical Encoder – 0.1 Micron Resolution							
Max. Speed		mm/s	300	300	300	300	300
Bi-Directional Repeatability		µm			±0.3		
Positional Accuracy		µm	8	8	8	10	12
Positional Accuracy (Slope Corrected)		µm	4	5	5	5	6
Optical Encoder – 0.01 Micron Resolution							
Max. Speed		mm/s	30	30	30	30	30
Bi-Directional Repeatability		µm			±0.1		
Positional Accuracy		µm	8	8	8	10	12
Positional Accuracy (Slope Corrected)		µm	4	5	5	5	6

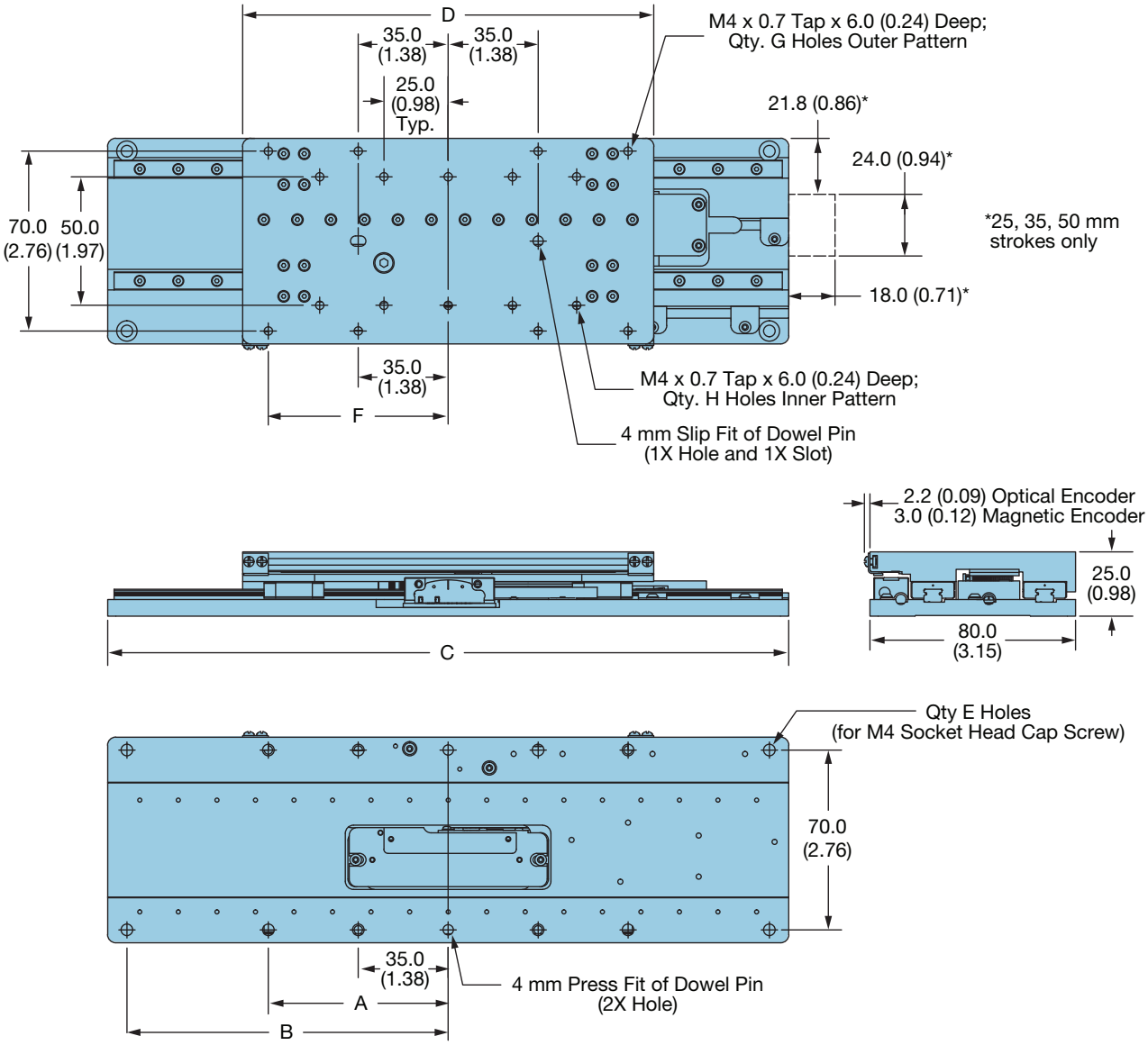
mSR080 Force/Speed Performance





mSR Series Linear Positioners

mSR080 Dimensions – mm (in)



Dimensions – mm (in)

Travel (mm)	A	B	C	D	Qty. E	F	Qty. G	Qty. H
25	—	—	110 (4.33)	80	4	—	4	6
35	—	—	120 (4.72)	80	4	—	4	6
50	70 (2.76)	—	165 (6.50)	110 (4.33)	8	—	8	6
100	70 (2.76)	125 (4.92)	265 (10.43)	160 (6.30)	12	70 (2.76)	8	10
150	100 (3.94)	175 (6.89)	365 (14.37)	210 (8.27)	12	100 (3.94)	8	14

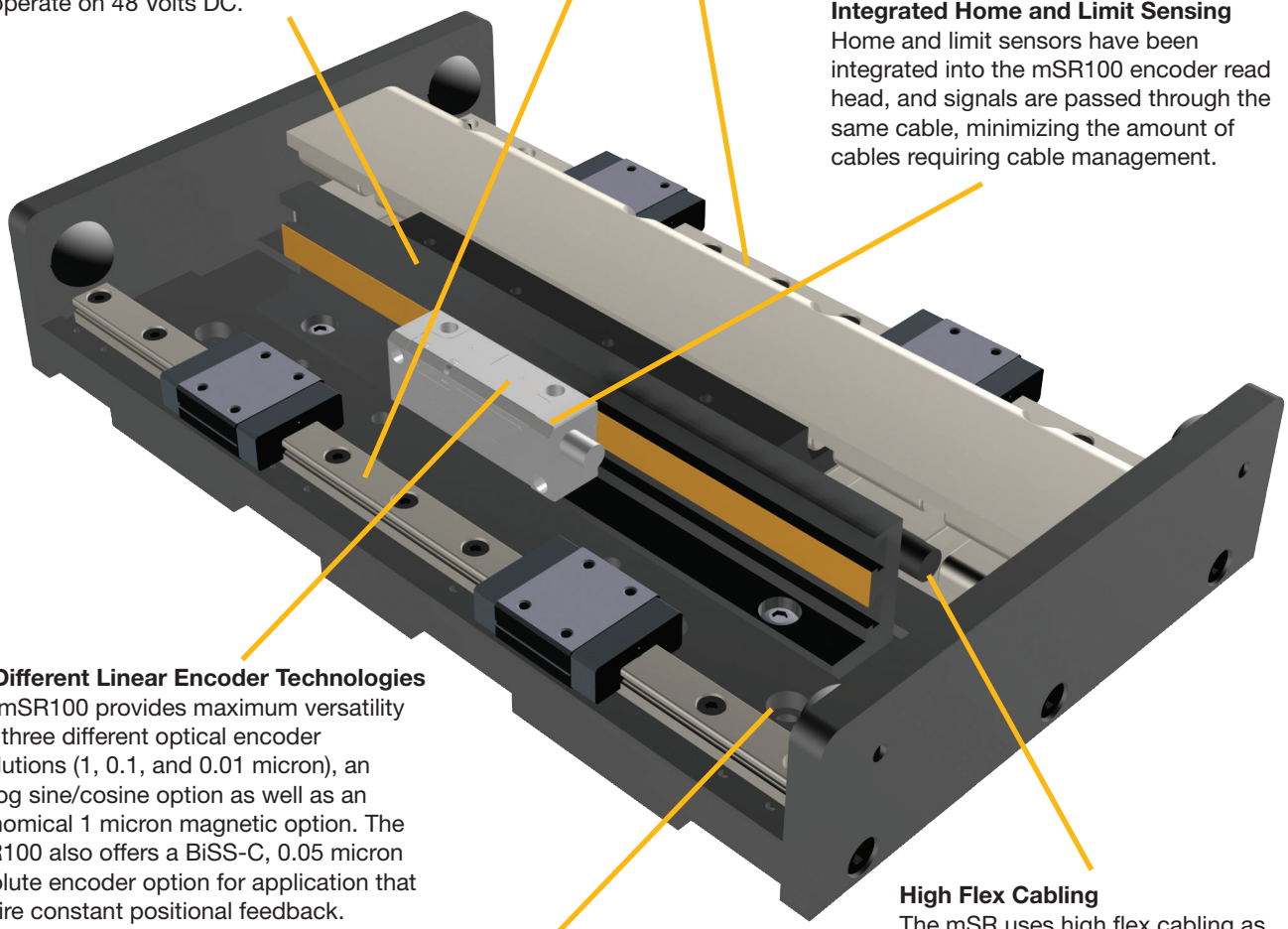
mSR Series Linear Positioners

mSR100 Design Advantages

Center Driven Ironless Linear Motor
The mSR100 offers both a 3 and 5 pole ironless linear motor (mL18) — space based upon the application thrust requirements. Each of these motors have been optimized to operate on 48 Volts DC.

Dual Precision Square Rails
Two precision aligned square rail bearings to support the payload and provide superior straightness and flatness.

Integrated Home and Limit Sensing
Home and limit sensors have been integrated into the mSR100 encoder read head, and signals are passed through the same cable, minimizing the amount of cables requiring cable management.



Six Different Linear Encoder Technologies
The mSR100 provides maximum versatility with three different optical encoder resolutions (1, 0.1, and 0.01 micron), an analog sine/cosine option as well as an economical 1 micron magnetic option. The mSR100 also offers a BiSS-C, 0.05 micron absolute encoder option for application that require constant positional feedback.

High Flex Cabling
The mSR uses high flex cabling as standard to ensure maximum life of the stage regardless of whether it's integrated into a multi or single axis system.

Tapped Holes and Dowel Pinning
The mSR has tapped holes in both the top and base for ease of mounting, and dowel pins to ensure repeatable mounting when configuring XY systems made with mSR's.

CE and RoHS Compliance
The mSR conforms to both CE and RoHS directives as standard.

mSR100 Specifications

Specification	Units	Travel (mm)										
		25 (LS)	50 (LS)	50 (LD)	100 (LS)	100 (LD)	150 (LS)	150 (LD)	200 (LS)	200 (LD)	250 (LS)	250 (LD)
Max. Load	kg (lb)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)
Peak Thrust	N (lb)	33 (7.4)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)
Continuous Thrust	N (lb)	11 (2.5)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)
Duty Cycle (Acceleration and Load Dependent)	%	100										
Acceleration (Unloaded)	G's	3										
Straightness & Flatness – Standard Grade	µm	±5	±5	±5	±8	±8	±8	±8	±8	±8	±10	±10
Straightness & Flatness – Precision Grade	µm	±3	±3	±3	±4	±4	±4	±4	±4	±4	±5	±5
Carriage Mass	kg	0.34	0.34	0.46	0.34	0.46	0.34	0.46	0.34	0.46	0.34	0.46
Stage Mass	kg	1.06	1.21	1.57	1.45	1.80	1.68	2.03	1.91	2.35	2.23	2.59

Specification	Units	Travel (mm)									
		300 (LS)	300 (LD)	350 (LS)	350 (LD)	400 (LS)	400 (LD)	450 (LS)	450 (LD)	500 (LS)	500 (LD)
Max. Load	kg (lb)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)	12 (26.5)
Peak Thrust	N (lb)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)	33 (7.4)	50 (11.2)
Continuous Thrust	N (lb)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)	11 (2.5)	16.7 (3.75)
Duty Cycle (Acceleration and Load Dependent)	%	100									
Acceleration (Unloaded)	G's	3									
Straightness & Flatness – Standard Grade	µm	±10	±10	±12	±12	±16	±16	±20	±20	±20	±20
Straightness & Flatness – Precision Grade	µm	±5	±5	±6	±6	±8	±8	±10	±10	±12	±12
Carriage Mass	kg	0.34	0.46	0.34	0.46	0.34	0.46	0.34	0..46	0.34	0.46
Stage Mass	kg	2.47	2.82	2.7	3.05	2.93	3.37	3.25	3.6	3.48	3.84

mSR100 Force/Speed Performance