User Information Guide

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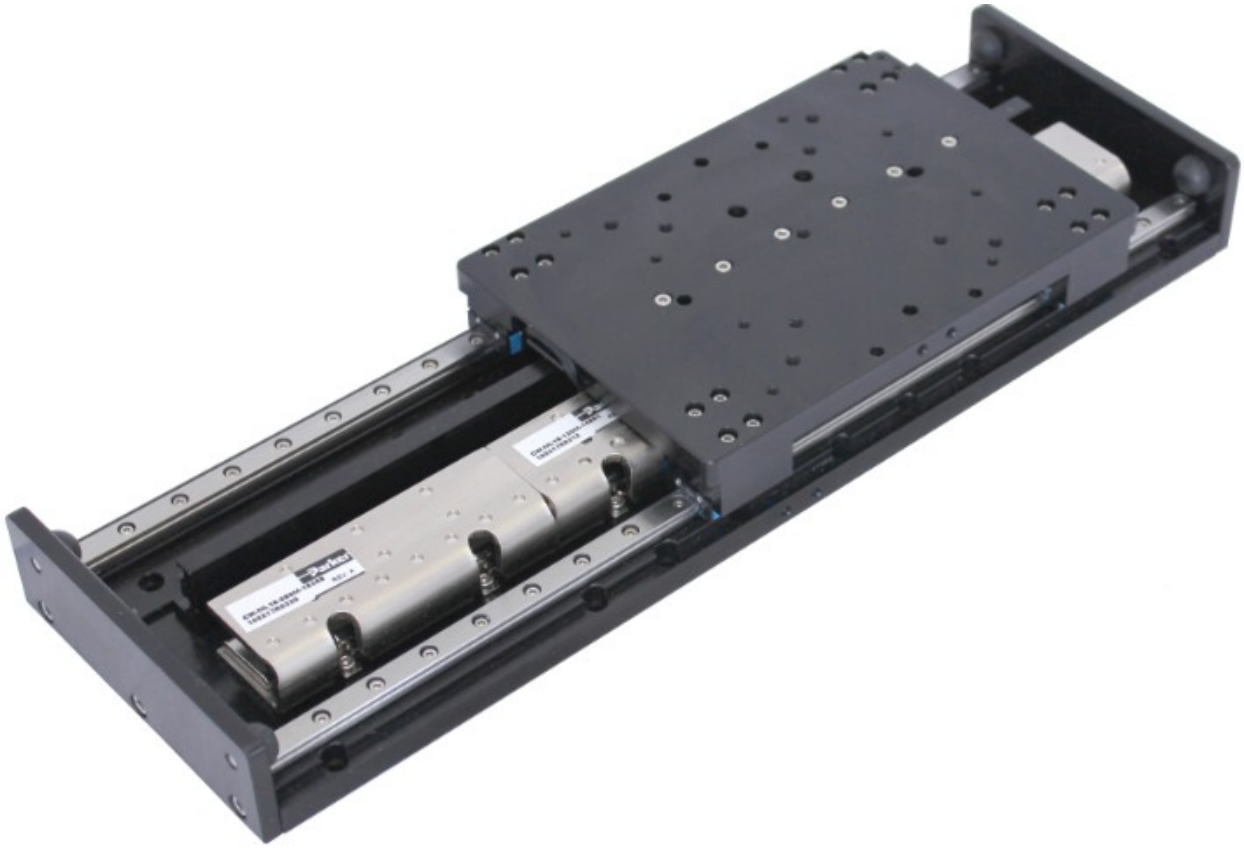
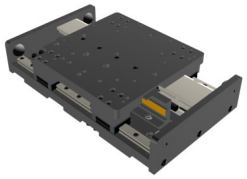
SUPERCEDES :



mSR100

Parker



Important User Information

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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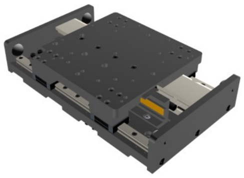

<u>**User Information Guide**</u>

MSR Series Product Manual

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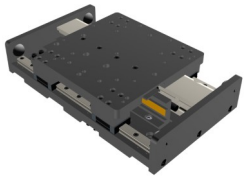

REVISON NOTES

REV 1 INITIAL RELEASE 4/30/15

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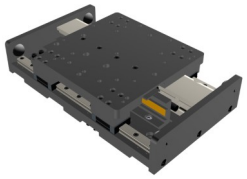


Introduction

The mSR is a linear positioner that fits a miniature foot print but delivers large value for customers looking to move a relatively light payload with high precision. All key components are integral to the unit - residing within the body of the stage to provide a clean looking, reliable, unobstructed package. At the heart of the mSR is an innovative, non-contact linear servo motors. This direct drive motor has been optimized for force, speed, and acceleration, to deliver outstanding performance and response. A variety of high precision non-contact linear encoders provides sub-micron resolution and repeatability. Selectable resolutions range from 10 nanometers to 1 micron. Precision linear 'square rails' provide extremely smooth - precise linear translation. Travel limit and home sensors are conveniently designed into the unit for easy adjustment over the entire travel of the stage. Each stage has been fitted with hi-flex cabling to address cable flexing concerns associated with multi-axis systems.

The mSR is intended to be integrated as a component into a machine with separate power electronics, and motion controller. As such the mSR is an incomplete machine, requiring proper power electronics to be added, as well as necessary machine guarding. The mSR is only rated for use in relatively clean environments moving relatively light payloads (≤12 kg).

General Information

Thank you for your interest in the products and systems offered by Parker Hannifin Electromechanical Automation Division. Our products and systems are recognized around the world for their functionality, performance, and reliability. Our products can be combined to form single or multi-axis systems with a full support of custom applications.

The intent of this guide is to provide general information for our MSR product line., including safety, basic maintenance and features. Not all of this information may be applicable to your product.

If you have any questions or challenges please call our factory support team at 800-245-6903.

It is the responsibility of the end user to ensure that equipment is installed and operated in accordance with both local and federal safety codes and guidelines.

Return Information

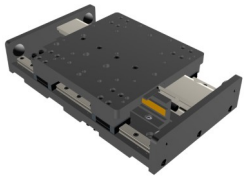
Returns

All returns must reference a "*R*eturn *M*aterial *A*uthorization" *(RMA)* number. Please call your local authorized distributor or Parker Customer Service Department at 800-245-6903 to obtain a "RMA" number.

Repair Information

Out-of-Warranty Repair

Our Customer Service Department repairs Out-of-Warranty products. All returns must reference a "RMA" number. Please call your local authorized distributor or Parker Customer Service Department at 800-245-6903 to obtain a "RMA" number. You will be notified of any cost prior to making the repair.



Unpacking and General Installation

Carefully remove the positioner from the packaging materials and inspect the unit for any evidence of shipping damage. Report any damage immediately to your local authorized distributor. Please save the shipping container for damage inspection or future transportation.

Incorrect handling of the positioner may adversely affect the performance of the unit in its application. Standard handling and lifting practices should be employed, product may be heavy.

Please observe the following guidelines for handling and mounting of your new positioner.

Proper mounting of the positioneris required to reduce risk of injury and provide optimal performance.

Positioners should be mounted to a flat, stable surface by using thru-holes , counter bored holes, or tapped holes on the base of the unit.

Unless otherwise specified, the standard installation of the linear drive is horizontal.

DO NOT allow the positioner to drop onto any surface. Dropping the positioner can generate impact loads that may result in flat spots on bearing surfaces or misalignment of drive components, drastically effecting the performance of the product.

DO NOT drill holes into the positioner. Drilling holes into the positioner can generate particles and machining forces that may effect the operation of the positioner. Parker will drill holes if necessary; contact your local authorized distributor.

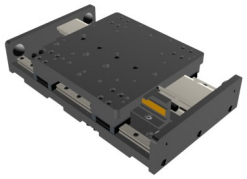
DO NOT subject the unit to impact loads such as hammering, riveting, etc. Impacts loads generated by hammering or riveting may result in flat spots on bearing surfaces or misalignment of drive components, drastically effecting the performance of the product.

DO NOT lift the positioner by cables or cable management system. Lifting positioner by cables or cable management system may effect electrical connections and/or cable management assembly. The unit should be lifted by the base structure only.

DO NOT expose positioner to mist, spray or submersion in liquids.

DO NOT disassemble positioner. Unauthorized adjustments may alter the positioner's specifications and will void the product warranty.

DO NOT transport a long axis without proper support as excessive deflection may occur.



Warnings and Precautions

Hot Surfaces

DO NOT touch motor coils located in the positioner after high duty operation. Motor temperature may approach 60°C. The unit itself may become warm or hot to the touch.

Electrical Shock

DO NOT take apart or touch any internal components of the positioner while unit is plugged into an electrical outlet. SHUT OFF power before replacing components to avoid electrical shock.

High Magnetic Field

Unit may be HAZARDOUS to people with Pace Makers or any other 'magnetically-sensitive' medical devices. Unit may have an effect on 'magnetically-sensitive' applications.

Ferrous Materials

The positioner will NOT keep out small ferrous materials in applications with air born metallic particles. The customer must take additional precautions in these applications to prevent intrusion of these ferrous particles.

Vertical Operation

Depending upon your load and counter balance selection the carriage and load may drop when mounted vertically in power loss situations potentially causing product damage or personal injury.

General Safety

Because linear motors can accelerate up to 3 g's and operate at high speeds, and sometimes positioners move without warning, keep all personnel away from dynamic travel range of positioner. Product does have pinch areas where moving elements relative to each other come together.

Moving Cables

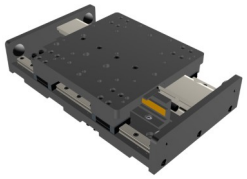
If the cables are to be moving, the use of high flex cabling is recommended to ensure long life .

Strain Relieve Electrical Components

All electrical components (such as motor, halls, encoders and limit/home switches) must be strain relieved. Failure to strain relieve electrical wires or cables may result in component failure and/or possible personal injury.

Pinch Points

Unit may have a pinch point because the top extends over the base of the table as well as moving elements relative to stationary elements. Proper care should be exercised.



Specification Conditions

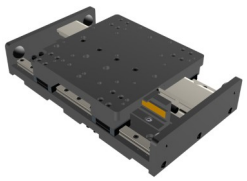
Environmental Specifications	
Storage and Transport Temperature Range	-20 to + 60 Degrees C.
Storage and Transport Humidity Range	10 - 95% Non Condensing
Operation Temperature to Achieve Specifications	20 Degrees C +/- 1 degree C
Operation Temperature range for basic motion [1]	5 to 40 Degrees C.
Operational Humidity Range	10 - 95% Non Condensing
Cleanliness	Operating area is to be clean and free of particulation. Normal room dust is acceptable but heavy particulation can cause malfunctions and damage.

[1] Minimum to maximum continuous operating temperature range (with NO guarantee of any specification except motion)

Mounting Surface Requirements

Proper mounting of the mSR is essential to optimize product performance. All specifications are based on the following conditions:

- The positioner must be bolted down to a flat surface which supports the entire length of the base using all mounting holes provided
- At a minimum for basic motion the positioner must be mounted to a flat, stable surface, with a flatness error less than or equal to 0.025mm/300mm, (specifications will be greatly varied from published specification with this flatness).
- To meet catalog specifications the surface must have a flatness error less than or equal to 0.003mm/300mm for Standard grade and 0.001mm/300mm for Precision grade.



Specifications

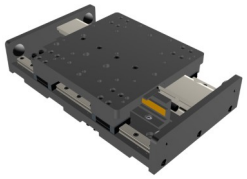
Specifications

		Units	25	50		100		150		200		250	
Travel		mm	LS	LS	LD	LS	LD	LS	LD	LS	LD	LS	LD
Size (WxH)		mm	100 x 35	100 x 35		100 x 35		100 x 35		100 x 35		100 x 35	
Normal Load		kg	12	12		12		12		12		12	
Continuous Thrust		N	11	11	16.7	11	16.7	11	16.7	11	16.7	11	16.7
Peak Thrust (Max)		N	33	33	50	33	50	33	50	33	50	33	50
Duty Cycle		%	100	100		100		100		100		100	
Acceleration (Max– no load)		G	3	3		3		3		3		3	
Rated Bus Voltage		Volts DC	48	48		48		48		48		48	
Straightness & Flatness[1]	Standard grade	µm	±5	±5		±8		±8		±8		±10	
	Precision grade		±3	±3		±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

		Units	300		350		400		450		500	
Travel		mm	LS	LD	LS	LD	LS	LD	LS	LD	LS	LD
Size (WxH)		mm	100 x 35		100 x 35		100 x 35		100 x 35		100 x 35	
Normal Load		kg	12		12		12		12		12	
Continuous Thrust		N	11	16.7	11	16.7	11	16.7	11	16.7	11	16.7
Peak Thrust (Max)		N	33	50	33	50	33	50	33	50	33	50
Duty Cycle		%	100		100		100		100		100	
Acceleration (Max– no load)		G	3		3		3		3		3	
Rated Bus Voltage		Volts DC	48		48		48		48		48	
Straightness & Flatness[1]	Standard grade	µm	±10		±12		±16		±20		±20	
	Precision grade		±5		±6		±8		±10		±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	2.70	3.05	2.93	3.37	3.25	3.60	3.48	3.84

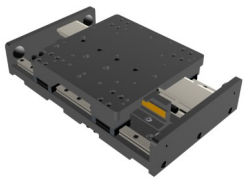
1 Precision grade version stage mounted to granite surface, 0.01 micron optical encoder

Continuous Power	
Motor	**Power (Watts)**
LS Motor	57.6
LD motor	104.6

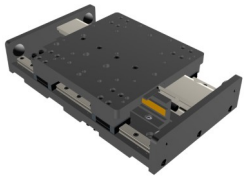


mSR100 Specifications (Travel & Encoder Dependent)

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)
Magnetic Encoder -1 Micron Resolution												
Max. Speed	**mm/s**	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	**µm**	±5.0										
Positional Accuracy	**µm**	20	30	30	40	40	40	40	50	50	50	50
Optical Encoder- 1 Micron Resolution												
Max. Speed	**mm/s**	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	**µm**	±2.0										
Positional Accuracy	**µm**	10	10	10	10	10	10	10	12	12	14	14
Positional Accuracy (Slope Corrected)	**µm**	6	6	6	6	6	7	7	7	7	8	8
Optical Encoder- 0.1 Micron Resolution												
Max. Speed	**mm/s**	300	300	300	300	300	300	300	300	300	300	300
Bi-directional Repeatability	**µm**	±0.4										
Positional Accuracy	**µm**	9	9	9	9	9	9	9	11	11	13	13
Positional Accuracy (Slope Corrected)	**µm**	5	5	5	5	5	6	6	6	6	7	7
Optical Encoder- 0.01 Micron Resolution												
Max. Speed	**mm/s**	30	30	30	30	30	30	30	30	30	30	30
Bi-directional Repeatability	**µm**	±0.2										
Positional Accuracy	**µm**	8	8	8	8	8	8	8	10	10	12	12
Positional Accuracy (Slope Corrected)	**µm**	4	4	4	4	4	5	5	5	5	6	6
BiSS-C Absolute Encoder - 0.05 Micron Resolution												
Max. Speed	**mm/s**	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	**µm**	±0.4										
Positional Accuracy	**µm**	9	9	9	9	9	9	9	11	11	13	13
Positional Accuracy (Slope Corrected)	**µm**	5	5	5	5	5	6	6	6	6	7	7



Specification	Units	Travel (mm) 300 (LS)	300 (LD)	350 (LS)	350 (LD)	400 (LS)	400 (LD)	450 (LS)	450 (LD)	500 (LS)	500 (LD)
Magnetic Encoder -1 Micron Resolution											
Max. Speed	**mm/s**	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	**µm**	±5.0									
Positional Accuracy	**µm**	60	60	60	60	60	60	60	60	60	60
Optical Encoder- 1 Micron Resolution											
Max. Speed	**mm/s**	1100	1500	3000	3000	3000	3000	3000	3000	3000	3000
Bi-directional Repeatability	**µm**	±2.0									
Positional Accuracy	**µm**	16	16	18	18	20	20	22	22	24	24
Positional Accuracy (Slope Corrected)	**µm**	8	8	9	9	9	9	10	10	10	10
Optical Encoder- 0.1 Micron Resolution											
Max. Speed	**mm/s**	300	300	300	300	300	300	300	300	300	300
Bi-directional Repeatability	**µm**	±0.4									
Positional Accuracy	**µm**	15	15	17	17	19	19	21	21	23	23
Positional Accuracy (Slope Corrected)	**µm**	7	7	8	8	8	8	9	9	9	9
Optical Encoder- 0.01 Micron Resolution											
Max. Speed	**mm/s**	30	30	30	30	30	30	30	30	30	30
Bi-directional Repeatability	**µm**	±0.2									
Positional Accuracy	**µm**	14	14	16	16	18	18	20	20	22	22
Positional Accuracy (Slope Corrected)	**µm**	6	6	7	7	7	7	8	8	8	8
BiSS-C Absolute Encoder - 0.05 Micron Resolution											
Max. Speed	**mm/s**	30	30	30	30	30	30	30	30	30	30
Bi-directional Repeatability	**µm**	±0.4									
Positional Accuracy	**µm**	15	15	17	17	19	19	21	21	23	23
Positional Accuracy (Slope Corrected)	**µm**	7	7	8	8	8	8	9	9	9	9



Part Number Nomenclature
mSR 100

Part Number Example:

MSR	100	L	050	P	LS	E3	H1	L1	CM03	X0

① Series

MSR	Series

② Size

100	100 mm wide profile

③ Drive Train

L	Linear Motor Drive

④ Stroke Length (mm)

025	25 mm
050	50 mm
100	100 mm
150	150 mm
200	200 mm
250	250 mm
300	300 mm
350	350 mm
400	400 mm
450	450 mm
500	500 mm

⑤ Grade

P	Precision (Optical, Sine/ Cosine, and Biss-C Absolute only)
S	Standard (Magnetic Encoder only)

⑥ Motor

LS	Ironless, single
LD	Ironless, double (50 to 500 mm stroke only)

⑦ Encoder

E1	1µ optical incremental
E2	0.1µ optical incremental
E3	0.01µ optical incremental
SC	Sine/ Cosine
M1	1µ magnetic incremental
R1	0.05µ BiSS-C Absolute

⑧ Home Sensor

H0	No home sensor (BiSS-C Absolute only)
H1	Home Sensor[1]

[1]Home sensor with M1 option
[1]Index mark with E1/E2/E3 or SC options

⑨ Limit Sensor

L0	No limit sensor (BiSS-C Absolute only)
L1	End-of-travel limit sensors

⑩ Cable Options

CM03	No cable management 3 meter
CM13	Single cable carrier, 3 meter
CM23	Double cable carrier, 3 meter

⑪ Other Options

X0	No options

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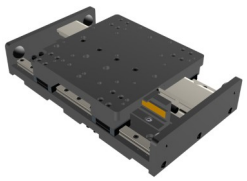
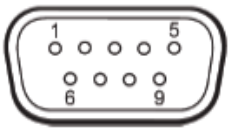


Electrical Specifications

Motor Specifications	Units	3 Pole (LS Option)	5 Pole (LD Option)
Magnetic Pitch	mm	40	40
Continuous Force[1]	N	11	16.7
Peak Force	N	33	50
Continuous Current[1]	A(rms)	1.2	2.18
Peak Current[2,3]	A(rms)	3.5	6.5
Voltage Constant[2,3]	Volts/m/s	7.7	6.3
Force Constant[2]	N/A(rms)	9.4	7.65
Resistance[2]	Ohms	6.3	2.82
Inductance[4]	mH	1	0.5
Max Bus Voltage	VDC	48	48
Thermal Resistance	C/Watt	5.5	3.56
Winding Thermal Time Constant	Minutes	1.3	0.8
Motor Thermal Time Constant	Minutes	15	10



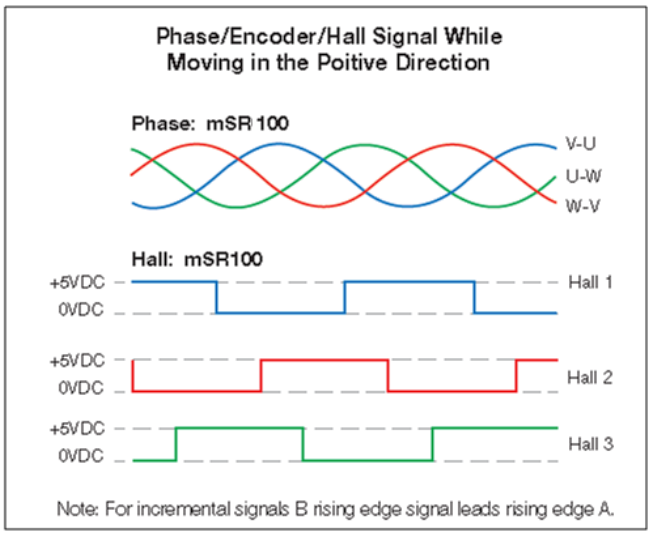
1 @ 25° C ambient, and winding temperature at 125° C

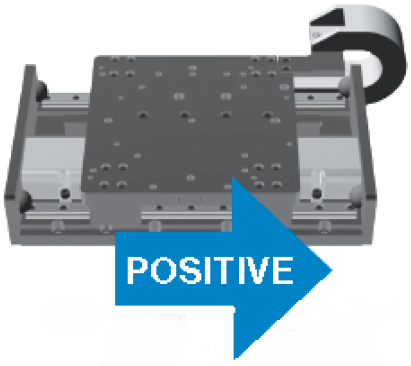
2 Measured line to line

3 Value is measured peak of sine

4 ±30% Line-to-Line, induction bridge measurement @ 1 Khz

Function	Color	Pin #
Motor Phase U	Red	1
Motor Phase V	Brown	2
Motor Phase W	Orange	3
PE Ground	Green/Yellow	4
Hall Power (+5Volts DC)	Black	5
Hall Ground	White	6
Hall 1	Yellow	7
Hall 2	Blue	8
Hall 3	Green	9





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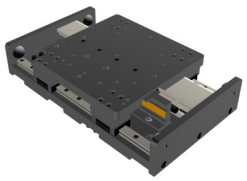
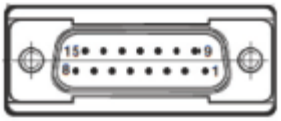
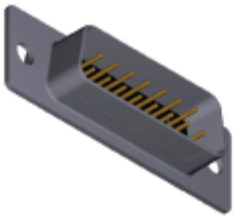


User Information Guide

Optical Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	2,9
Incremental Signals	A+	14
	A-	6
	B+	13
	B-	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Setup	(Used in installation)	1
Error Output	NPN	3





Sine Cosine Encoder

Function	Signal	Pin #
Power	5 Volts DC	4, 5
	0 Volts DC	12, 13
Incremental Signals	Cosine +	9
	Cosine -	1
	Sine +	10
	Sine -	2
Reference Mark	Z+	3
	Z-	11
Limits	Positive Limit	7
	Negative Limit	8
Setup	(Used in installation)	6
Error Output	NPN	14

Magnetic Encoder

Function	Signal	Pin #
Power	5 Volts DC	8
	Ground	9
Incremental Signals	A+	14
	A-	6
	B+	13
	B-	5
Reference Mark	Z+	12
	Z-	4
Limits	Positive Limit	11
	Negative Limit	10
Home	NPN	2
Error Output	NPN	3

BiSS-C Absolute Encoder

Function	Signal	Color
Power	5 Volts DC	Brown
	Ground	Green
		White
Serial Communications	MA+	Violet
	MA-	Yellow
	SLO+	Grey
	SLO-	Pink
Shield	Inner	Inner Shield
	Outer	Case

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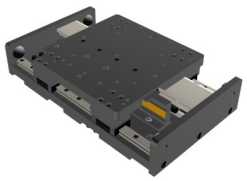
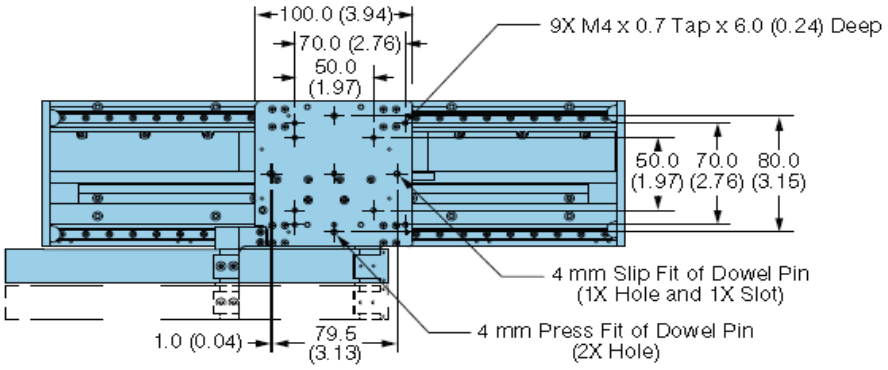
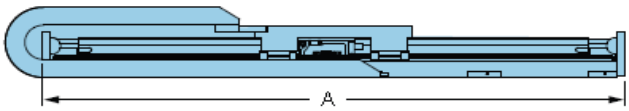
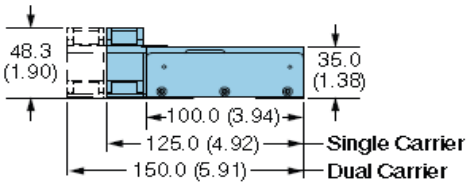


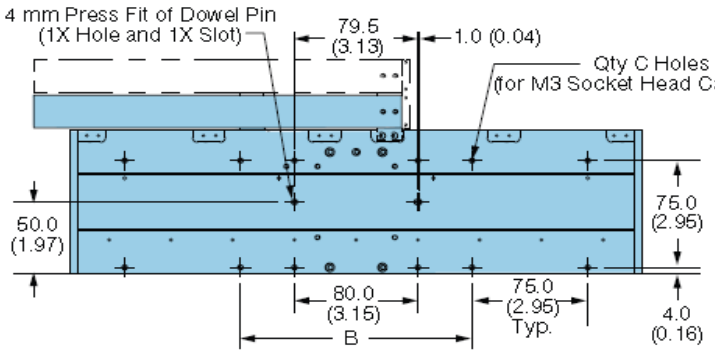
Dimensional Drawings - mSR100 - mm (in)

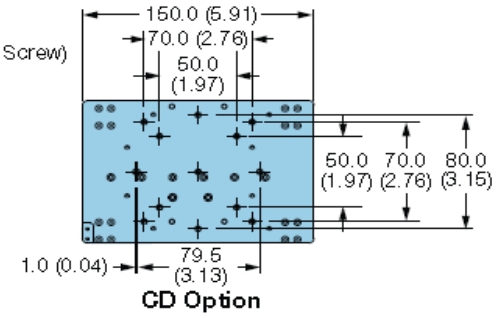


Mounting Requirements	
Hardware	SCH M3x10
Torque	12 in-lbs
Wrench Size	2.5mm Allen









Dimensions - mm (in)

Travel (mm)		A	B	C (QTY)
LS Option	LD Option			
25	-	145 (5.71)	100 (3.94)	8
50	-	170 (6.69)	125 (4.92)	8
100	**50**	220 (8.66)	150 (5.91)	8
150	**100**	270 (10.63)	200 (7.87)	8
200	**150**	320 (12.60)	125 (4.92)	8
250	**200**	370 (14.57)	150 (5.91)	12
300	**250**	420 (16.54)	200 (7.87)	12
350	**300**	470 (18.50)	125 (4.92)	12
400	**350**	520 (20.47)	150 (5.91)	12
450	**400**	570 (22.44)	200 (7.87)	16
500	**450**	620 (24.41)	125 (4.92)	16
-	**500**	670 (26.38)	150 (5.91)	16

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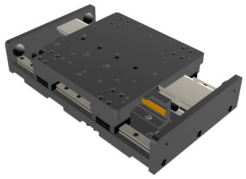
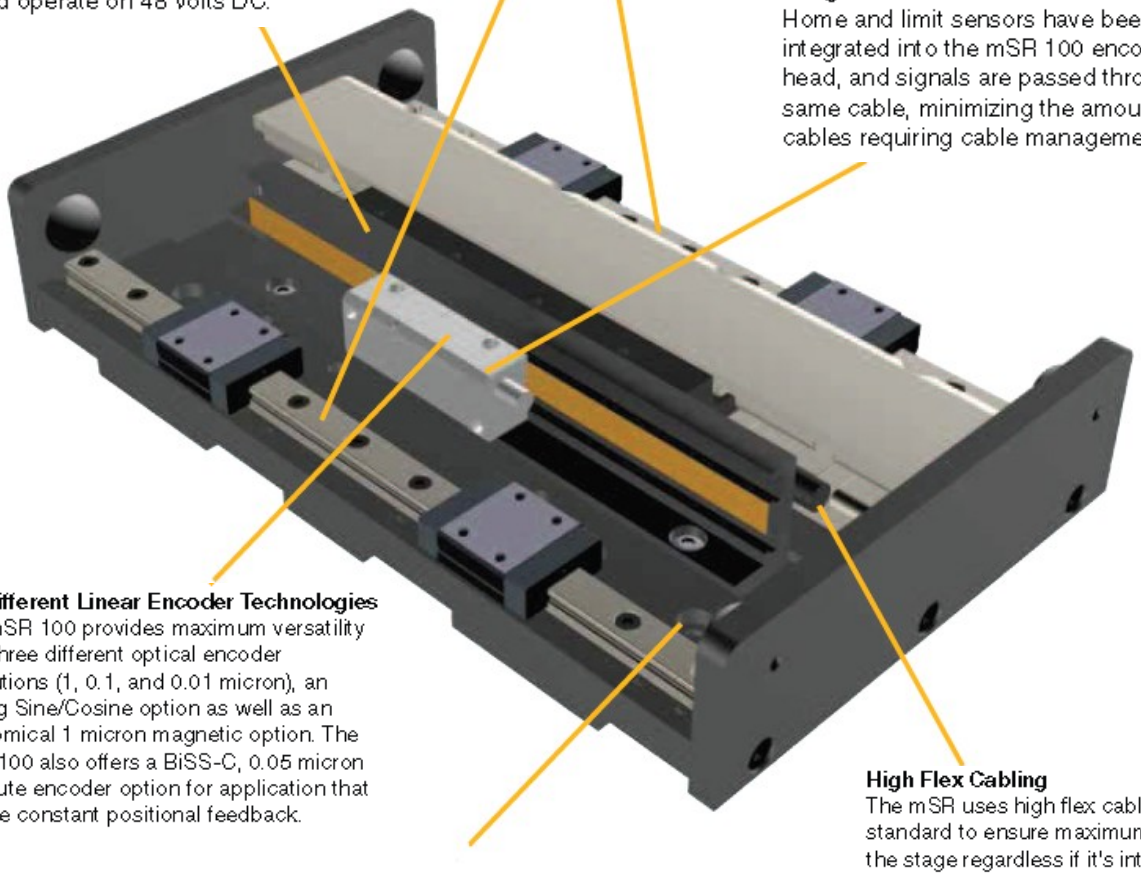


Assembly Diagram - mSR100

Center Driven Ironless Linear Motor
The mSR 100 offers both a 3 and 5 pole ironless linear motor (mL18)based upon the application thrust requirements. Each of these motors have been optimized 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 mSR 100 encoder read head, and signals are passed through the same cable, minimizing the amount of cables requiring cable management.

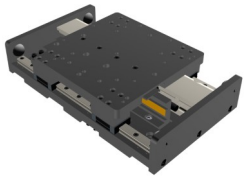


Six Different Linear Encoder Technologies
The mSR 100 provides maximum versatility with three different optical encoder resolutions (1, 0.1, and 0.01 micron), an analog Sine/Cosine option as well as an economical 1 micron magnetic option. The mSR 100 also offers a BiSS-C, 0.05 micron absolute encoder 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 if it's integrated into a multi 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.



Setting the Optical Encoder Limits

The mSR100 with the optical encoder option comes equipped with adjustable end of travel limit sensors. The sensors are activated by magnetic targets located in a slot on the encoder scale bracket as shown in Image #3 below. The factory setting location of the limit sensor targets provide the full nominal travel of the stage with approximately 2mm of over travel before the stage encounters the hard stop.
To adjust travel, simple loosen the screw on the target ~1/4 turn using a 1.3mm hex wrench, slide the target to the desired position, and tighten the screws.

NOTE: The active length of the target is approximately 9mm. If the target is moved greater than 9 mm from the stage hard stop, the stage can move beyond the active area of the target and shut off on the other side of the target. This can lead to having the stage behind a limit sensor. Caution in setup and programming should be taken to avoid this potential issue.

Limit sensor hysteresis: Limit sensor can have up to 1.5 mm of hysteresis which means after activation the stage must move more than 1.5 mm away from the activation point to release the limit sensor from being active.

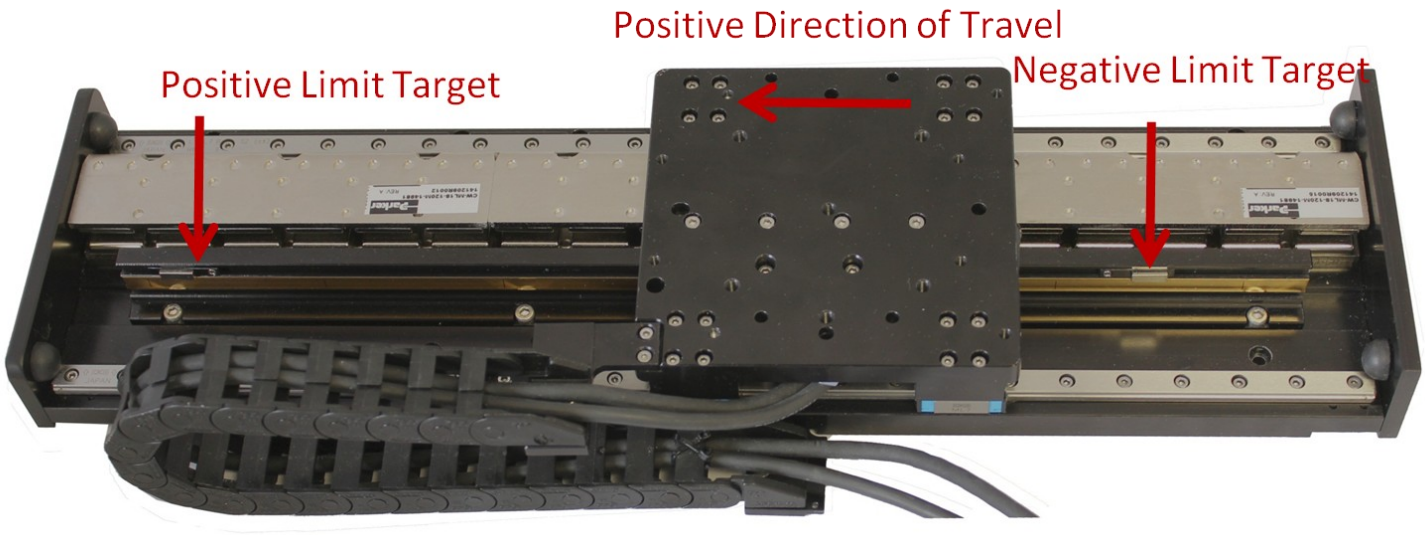
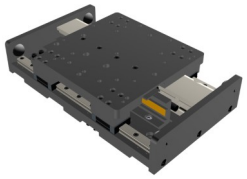


Image 3



Setting the Magnetic Encoder Limits

The mSR100 with the magnetic encoder option comes equipped with adjustable end of travel limit sensors and a home sensor. The sensors are activated by magnetic targets located in a slot on the encoder scale bracket as shown in image #4 below. The factory setting location of the limit sensor targets provide the full nominal travel of the stage with approximately 2mm of over travel before the stage encounters the hard stop. The home sensor is set such that during a positive direction move the home sensor trips approximately in the center of the travel of the stage.

To adjust travel, simple loosen the screw on the target ~1/4 turn using a 1.3mm hex wrench, slide the target to the desired position, and tighten the screws.

NOTE: The active length of the target is approximately 9mm, if the target is moved greater than 9 mm from the stage hard stop, the stage can move beyond the active area of the target and shut off on the other side of the target. This can lead to having the stage behind a limit sensor. Caution in setup and programming should be taken to avoid this potential issue.

Limit sensor hysteresis: Limit sensor can have up to 2 mm of hysteresis which means after activation the stage must move more than 2 mm away from the activation point to release the limit sensor from being active.

Home sensor hysteresis: Home sensor can have up to 0.6 mm of hysteresis which means after activation the stage must move more than 0.6 mm away from the activation point to release the home sensor from being active.

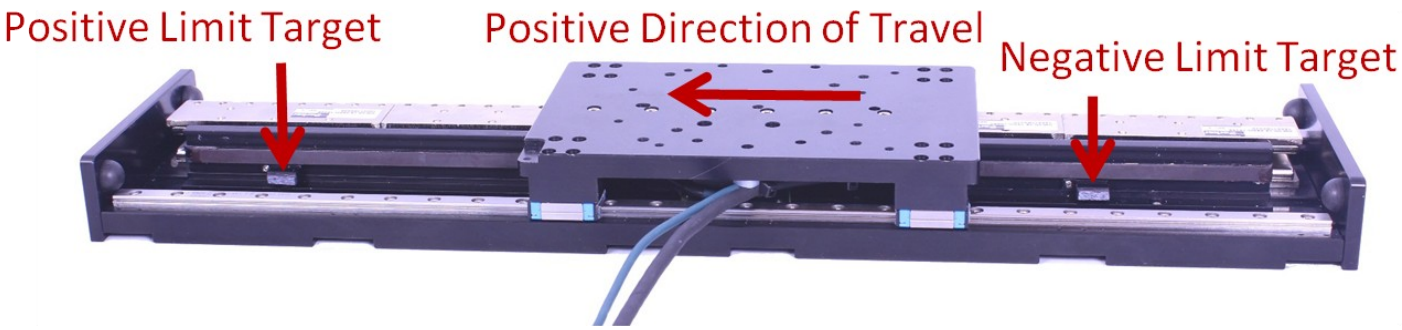
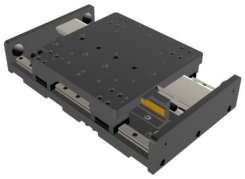


Image 4



Cable Carrier

The mSR100 can be fitted with cable carriers to transport the stage cables or user cables. These cable carriers can be purchased as an option assembled to the stage at the time of order, or can be purchased as an accessory. Cable carriers are available in a single or dual version, (see image 5 and 6 below). If purchased as an accessory, mount the cable carriers as shown in accordance to the images below using the 4 flathead screws pro-

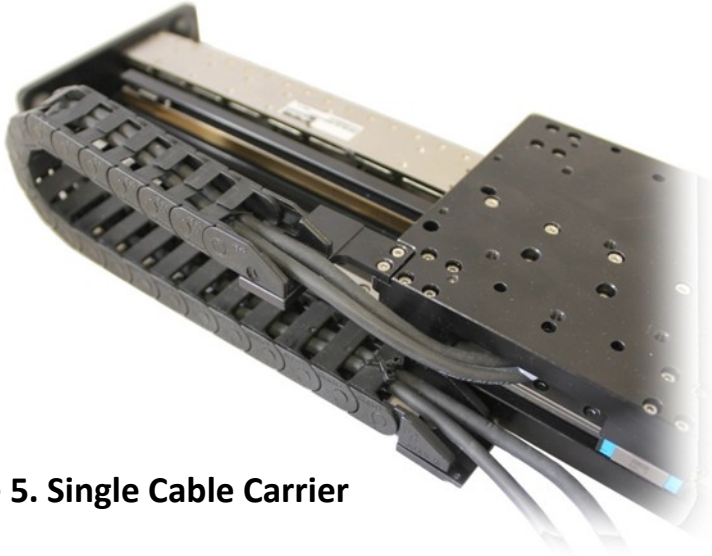


Image 5. Single Cable Carrier

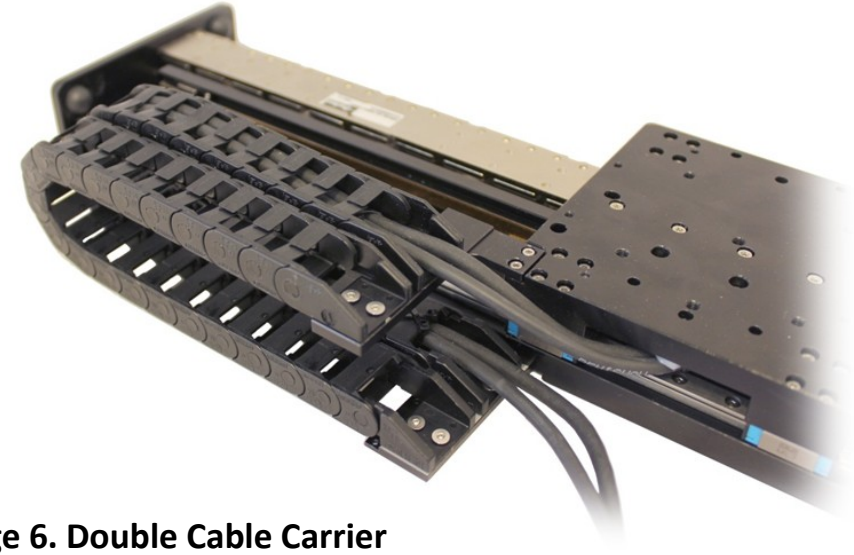


Image 6. Double Cable Carrier

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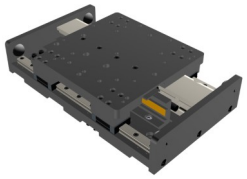
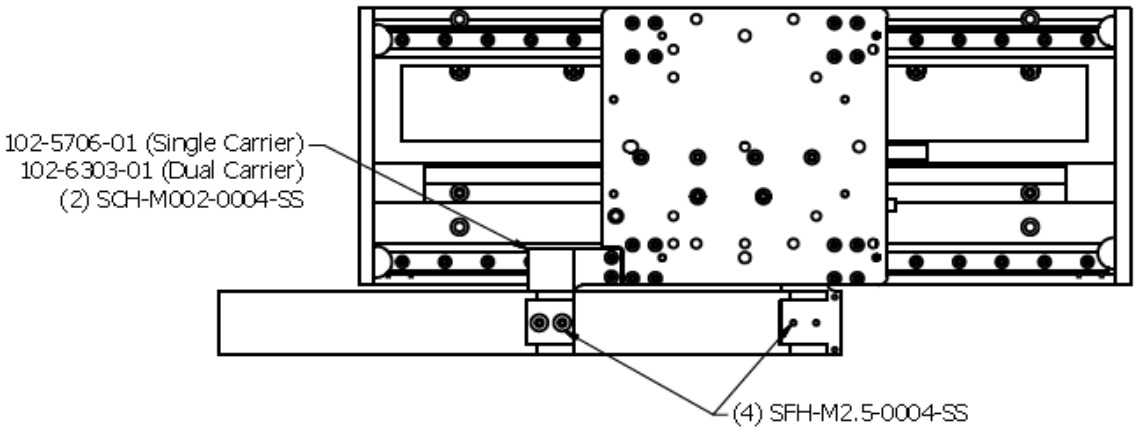
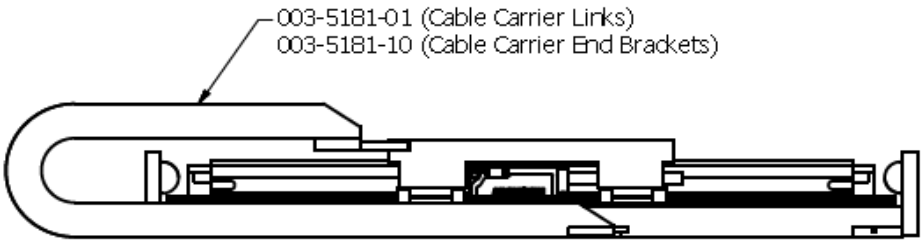
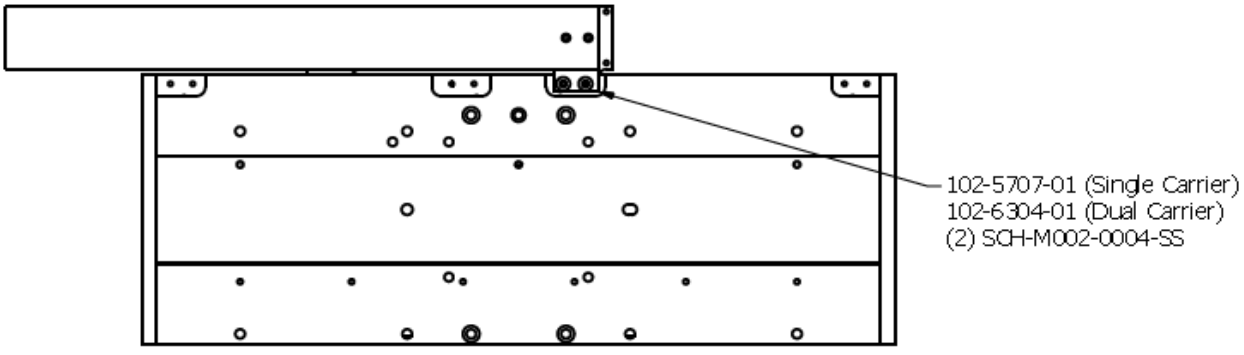


Cable Carrier Mounting







*** Longer travels use additional supports**

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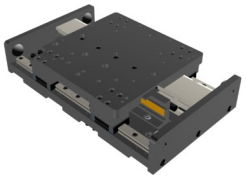
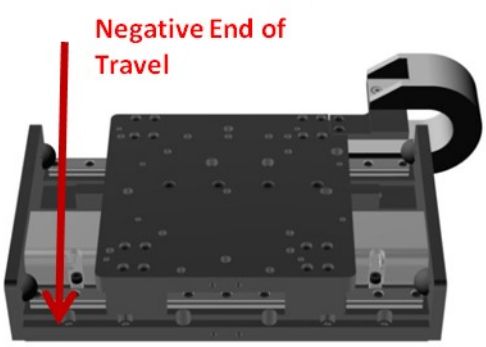
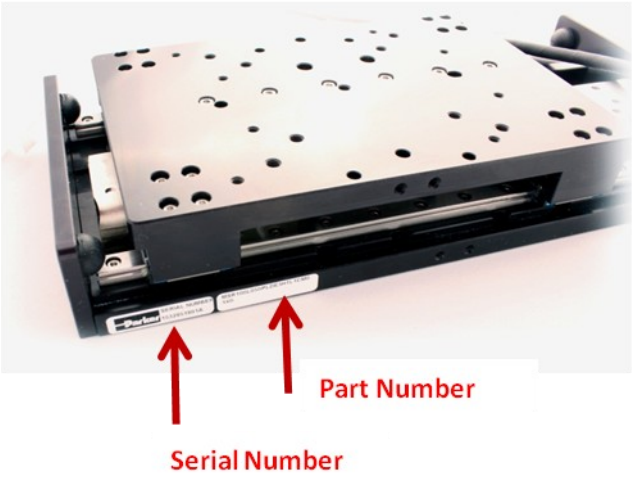


Part and Serial Number Location

The mSR 100 part number and serial number can be located at the negative end of travel, on the base of the positioner, opposite the cables.





Caution and Warning Label

The mSR Caution and Warning label is located on the motor phase an hall cable (9 pin D-Sub), as pictured below.

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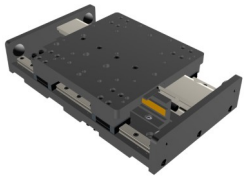


Maintenance and Life Expectancy

Maintenance:

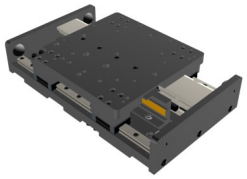
The mSR100 is designed to be a maintenance free device. The drive train is a non-contact linear motor and does not need maintenance of any kind. The linear bearings are designed with internal lubricators that provide lubrication of the bearings for the life of the stage. Beside normal cleaning of surfaces (if needed) no other maintenance is required.

Life:

The operational life of the mSR100 is limited by two primary factors, the linear bearings and the bending life of the cables. If the rated load of the stage is not exceeded, the typical bearing life is on the order of 2,540 km in a clean environment. Contamination or solvents on the bearings can result in lower life performance. The cable flex life in a cable carrier with a bend radius of 25mm is 10 million cycles. Cable flex life increases with larger bend radius.

Spare Parts

Description	Part #
Limit Kit,MSR100 Optical	002-3547-01
Limit Kit,MSR100 Magnetic	002-3548-01
Z bracket, 25-50mm	002-2238-01
Z bracket, 100-150mm	002-2240-01



Compliance Documents

RoHS Compliance Statement

We hereby certify that the following item(s) produced by Parker Hannifin Corporation complies with the requirements of the EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in the electrical and electronic equipment (RoHS) and other national and international legislation similarly restricting the use of materials.

Substance	RoHS Threshold
Cadmium (Cd)	0.01% or 100ppm
Lead (Pb)	0.1% or 1000ppm
Mercury (Hg)	0.1% or 1000ppm
Hexavalent Chromium (Cr(VI))	0.1% or 1000ppm
Polybrominated biphenyls (PBB)	0.1% or 1000ppm
Polybrominated diphenyl ethers (PBDE)	0.1% or 1000ppm

CE DECLARATION OF INCORPORATION

ACCORDING TO EC DIRECTIVE 2006/42/EC (ANNEX II, PART 1,SECTION B) FOR PARTLY COMPLETED MACHINERIES

EN ISO 12100	Safety of Machinery– basic concepts.
EN 60034-1	Rotating electrical machines– Part 1: Rating and performance
EN 60034-5	Rotating electrical machines - Part 5: Degrees of protection provide by the integral design (IP code)
EN 60034-18	Rotating electrical machines - Part 18-1: Functional evaluation of insulation systems
EN/IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: general requirements
EN 60085	Electrical Insulation– Thermal evaluation and designation
EN 349	Safety of Machinery– Minimum gaps to avoid crushing of parts of the human body

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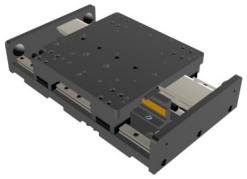
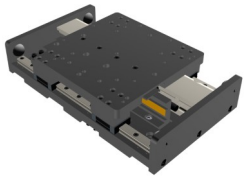


Notes



Notes

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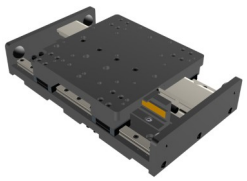

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