XLM Series
User Manual

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SUPERSEDES: -

Important User Information

WARNING

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Parker Hannifin Corporation
Electronic Motion and Controls Division
1140 Sandy Hill Road
Irwin, PA 15642

PH: (724) 862-8200
800-254-6390
E-mail: emn.service@support.parker.com
www. parkermotion.com

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Revision Notes

REV: - INITIAL RELEASE

Thank you for your interest in the products and systems offered by Parker Hannifin Electronic Motion and Controls Division.

Introduction

For machinery or instrument builders who need smooth motion, high precision, and high rigidity, Parker offers the XLM series. The XLM is a linear motor driven positioner that provides micron level precision in three cross sections. Units are offered in sealed or open variants, with a wide array of linear encoder technology choices to fit a variety of application needs.

General Information

The intent of this guide is to provide general information for our XLM 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 contact 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. The user must ensure that the attachment of work pieces/tools or other devices on the moving carriage of the unit does not endanger persons and/or property.

Return Information

Parker offers warranty and non-warranty factory service. All returns must reference a "Return Material Authorization" (RMA) number that is obtained by your local Parker distributor.

Distribution channels request RMA's Online via Parker's sales portal (parkermotion.com/extranet) or contact Parker's customer service for additional support: emn.service@support.parker.com / 800-245-6903.

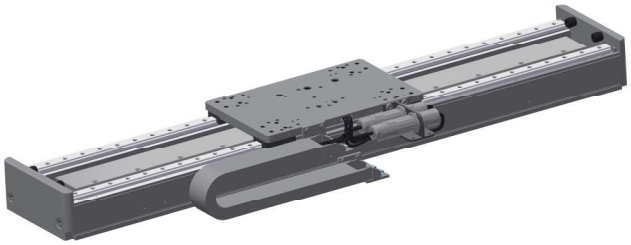
Configurations for a Variety of Environments

Applications for precision machinery and instruments can vary from factory floor to clean room. In some cases the stage is protected inside machinery where an open design allows for maximum use of space, while in others it is subject to adverse conditions requiring integrated protection. These variables were taken into account in the design of the XLM family, resulting in three distinct product configurations to cover the gamut of possibilities.

Open Design - Type UA/UB

- **Lower profile**
- **Narrower width**
- **Less operating friction**

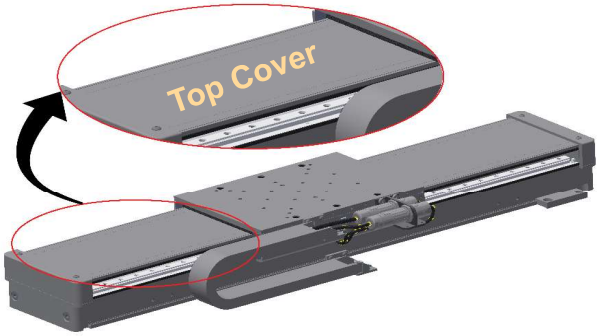
If the XLM will be installed in a protected area, the economical open design can be an attractive option. Lightest in weight and physically smallest of the three styles, the open design also operates with less friction for higher efficiency.



Covered Design - Type CA, CB, CC

- **Solid top cover**
- **Protection against falling materials**
- **No increase in friction**

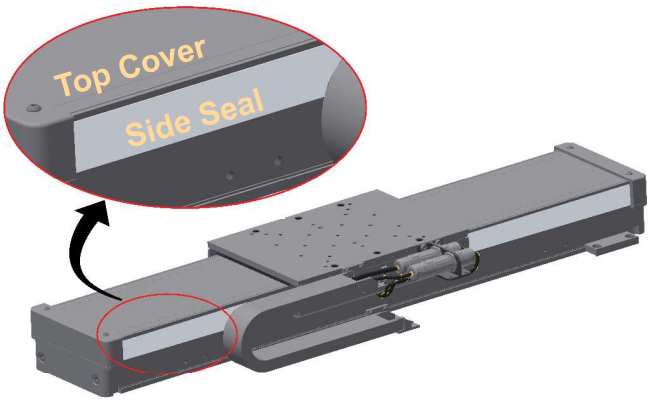
The covered design incorporates a solid **top cover** which provides effective protection against material or objects that may drop onto the stage. Friction is not increased by the cover, so operating efficiency is not affected.



Sealed Design - Type SA, SB, SC

- **IP30 environmental protection**
- **Protection against objects >2.5mm**

The sealed version of the XLM takes the covered version a step further with **side seals** in addition to a top cover. This provides ingress protection to IP30, preventing entry of foreign objects 2.5mm and larger.



XLM Design Advantages

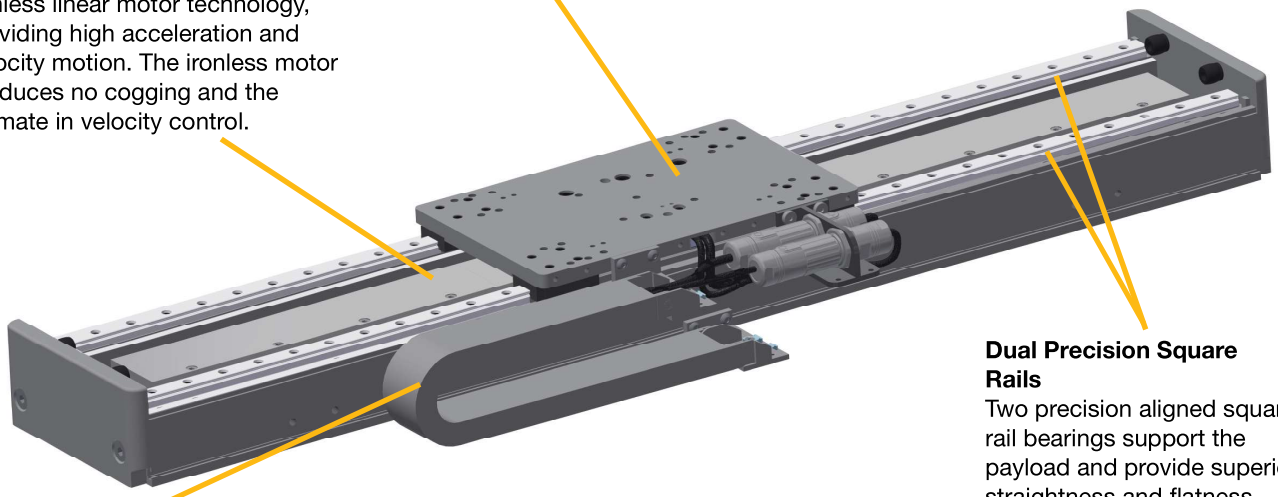
Open Style (U Version)

Tapped Holes and Dowel Pinning
The XLM has tapped holes in the top and thru counter bored holes in the base for mounting and dowel holes to ensure repeatable mounting.

Maximized Travel to Length Ratio
The compact design of the XLM results in a reduced stage footprint while maximizing performance.

Lower Profile
The open style design minimizes stage height, reducing Abbe error effects.

Center Driven Ironless Linear Motor
All XLM versions are driven using ironless linear motor technology, providing high acceleration and velocity motion. The ironless motor produces no cogging and the ultimate in velocity control.



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

High Flex Cabling
The XLM uses high flex extension cables, routed through the stage carrier assembly

Integrated and Adjustable Home and Limit Sensing
For incremental encoder versions, home and limit sensors have been integrated into the XLM 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 XLM provides maximum versatility with choice of three digital optical incremental encoder resolutions (1, 0.1, and 0.01 micron), a 1V p-p analog sine/cosine option, and two absolute Biss-C options (50nm and 5nm)

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

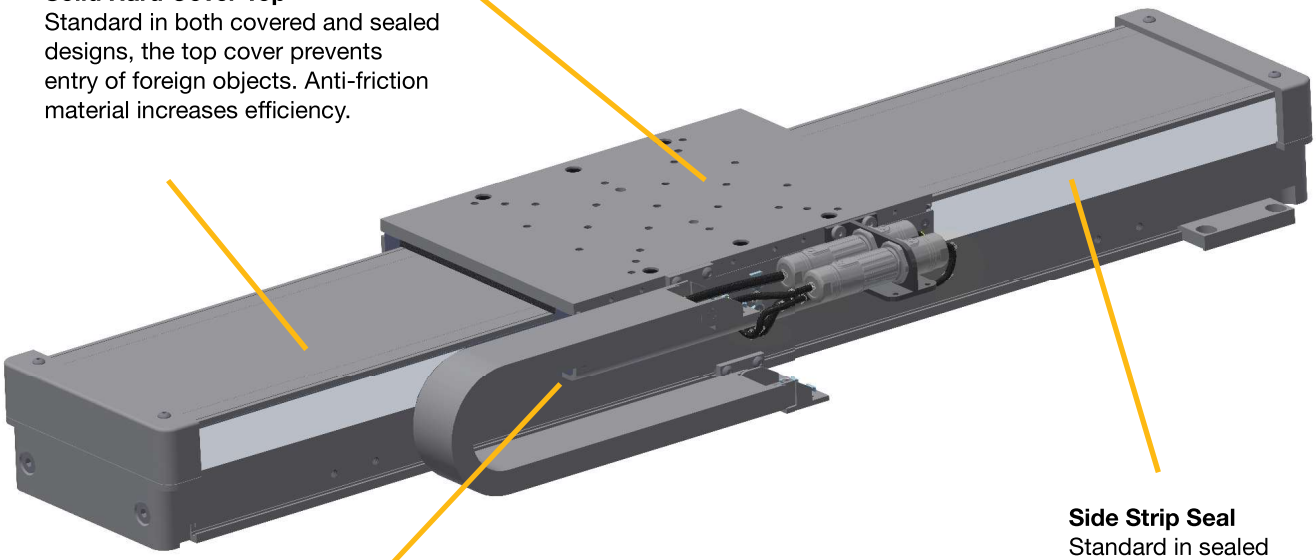
XLM Design Advantages

Covered/Sealed Style (C, S Versions)

Tapped Holes and Dowel Pinning
The XLM has tapped holes in both the top and base for ease of mounting and dowel pins to ensure repeatable mounting.

Center Driven Ironless Linear Motor
All XLM versions are driven using ironless linear motor technology, providing high acceleration and velocity motion. The ironless motor produces no cogging and the ultimate in velocity control.

Solid Hard Cover Top
Standard in both covered and sealed designs, the top cover prevents entry of foreign objects. Anti-friction material increases efficiency.



Side Strip Seal
Standard in sealed version, these provide enhanced ingress protection up to IP30 standard.

High Flex Cabling
The XLM uses high flex extension cables, routed through the stage carrier assembly

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

CE/UKCA and RoHS Compliance
The XLM conforms to both CE and RoHS directives as standard.

SIX Different Linear Encoder Technologies
The XLM provides maximum versatility with choice of three digital optical incremental encoder resolutions (1, 0.1, and 0.01 micron), a 1V p-p analog sine/cosine option, and two absolute Biss-C options (50nm and 5nm)

Unpacking and General Installation

Carefully remove the positioner from the shipping container and inspect the unit for any evidence of shipping damage. On heavier units (>40lb), 4 lifting lugs will be assembled on the unit. See Figure 3, Page 50. Use these to remove the positioner from the shipping container. Once removed the 4 lifting lugs must be disassembled from the positioner. 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 actuator is required to reduce risk of injury and provide optimal performance.

Positioner's should be mounted to a flat, stable surface by using toe clamps or thru-counter bored holes.

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

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

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.

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

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

DO NOT push in magnetically retained strip seals when removing positioner from shipping crate. Damaging strip seals may create additional friction during travel and may jeopardize the ability of the strip seals to protect the interior of the positioner.

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 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 degrees Celsius. 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
Vertical Operation is not recommended because in a power loss situation the carriage and payload will drop, 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 positioner's 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 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.

Dismantling and Disposal
Properly dispose of product and components in accordance with national and international regulations and laws.

EMC Directive 2014/30/EU

A Highly-Immune, Low-Emission Installation – Meeting the Requirements of the Electromagnetic Compatibility (EMC) Directive

Refer to drive and control manufacturers EMC Installation requirements. Some of the requirements are listed below but are not all inclusive.

To reduce the risk of electrical noise entering your system you must properly earth ground the enclosure, and remove all paint and other non-conductive surface coatings from the panel mounting surface and RF earth bonding locations. If you mount a drive in an equipment cabinet, terminate cable braids (screens) at the entrance of the enclosure. The only exception is for the motor braid, which must return to the drive's R-Clamp.

Do not return the motor braid to any other location as its function is to return high frequency chopping current back to the drive. This may require mounting an auxiliary connector on a sub-panel insulated from the main cabinet, or using a connector having an insulated internal screen from the connector housing. The shields of all other cables that enter or exit the enclosure must be RF bonded to the enclosure entrance point using an R-Clamp, bulkhead clamshell clamp, or other 360° bonding technique. This ensures that no stray noise will enter or exit the enclosure. Refer to the amplifier and motion control electronics installation instructions for specific requirements on meeting EMC compatibility.

XLM Series - Basic Specifications

Environmental Specifications	
Storage and Transport Humidity Range	10-95% Non Condensing 45
Operation Temperature to Achieve Product Specifications	20 Degrees C +/-1 Degrees 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. Higher temperature will reduce continuous force capability.

Mounting Surface Requirements
Proper mounting of the XLM 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 0.001mm/300mm.

XLM Series - Basic Specifications

	Units	XLM125	XLM145	XLM200
Size - Open style (W x H)	mm	125 x 50	145 x 65	200 x 77
Travel (Max)	mm	1010	1225	1500
Normal Load (Max)	kg	170	300	630
Thrust (Max)				
Continuous Peak	N N	27.47 98.42	79.35 262.06	127.35 414.04
Acceleration (Max – no load)	G	3	3	3
Speed (Max – no load)	m/s	3	3	3
Rated Bus Voltage	VDC	330	330	330
Repeatability [1]	µm	+/- 0.5	+/- 0.5	+/- 0.5
Accuracy [1, 2]	µm	+/- 4	+/- 4	+/- 8
Straightness & Flatness [1]	µm	+/- 3	+/- 3	+/- 4
Feedback Compatibility				
1 µm Optical (incremental) 0.1 µm Optical (incremental) 0.01 µm Optical (incremental) Analog Sine/Cosine 0.05 µm BiSS-C (absolute) 0.005 µm BiSS-C (absolute)		• • • • • •	• • • • • •	• • • • • •

[1] Precision grade version stage mounted to granite surface, 0.01 micron optical encoder
[2] Measurements taken at 35 mm above the center of the carriage, with linear slope correction.

Performance Specifications - XLM125

Specification	Units												
Travel (U Version)	mm	110	160	210	260	310	410	510	610	710	810	910	1010
Travel (C, S Versions)	mm	100	150	200	250	300	400	500	600	700	800	900	1000
Accuracy [1]	+/-µm	4	6	8	9	10	12	14	16	18	20	22	24
Resolution	µm	Encoder Dependent (See Encoder Specification)											
Bidirectional Repeatability (Resolution Dependant)[1]	+/-µm	0.5 + Encoder Resolution											
Horizontal Straightness[1]	+/-µm	3	4	4	5	6	8	9	10	12	13	14	15
Vertical Straightness[1]	+/-µm	3	4	4	5	6	8	9	10	12	13	14	15
Pitch[1]	arc sec	<=30											
Yaw[1]	arc sec	<=30											
Total Stage Mass (U Version)[3]	Kg	5.3	5.9	6.2	6.8	7.3	8.5	9.3	10.5	11.6	12.5	13.7	14.8
Total Stage Mass (C, S Versions)[3]	Kg	8.3	8.9	9.4	10	10.7	12	13	14.4	15.7	16.8	18	19.4

Motor Type		P2
Moving Mass	Kg	0.8 (U), 2.4 (C,S)
Continuous Force[2]	N	27.47 (U, C), 19.47 (S)
Peak Force[2]	N	98.42(U, C), 90.42 (S)
Max Speed	m/s	Feedback and Load Dependent (Max 3m/sec)
Max Acceleration	g's	Feedback and Load Dependent (Max 3g)

[1] Specifications based on following conditions: Single axis, fully bolted or clamped to AA granite mounting surface, ambient and stage temperature at 20° C, point of measurement centered in carriage, 35mm above the carriage mounting surface.

[2] Continuous and Peak forces shown equal the motor Continuous or Peak force less the RMS frictional resistance of the stage.

[3] Masses include cable management assembly.

XLM125

Parameter:	Units:	Specifications:
Winding and Pole Length:		**P2**
Stall Force Continuous [1]	N	35.47
Stall Current Continuous [1, 4, 8]	Amps (Peak of sine)	5.19
Stall Current Continuous [1, 7]	Amps (DC)	4.49
Stall Current Continuous [1]	Amps (RMS)	3.67
Peak Force [6]	N	106.42
Peak Current [4, 6, 8]	Amps (Peak of sine)	15.56
Peak Current [6, 7]	Amps (DC)	13.47
Peak Current [6]	Amps (RMS)	11.00
Voltage Constant [3, 4]	Volts/m/s	7.9
Force Constant [9]	N/Amps (Peak of sine)	6.84
Force Constant [3, 4]	N/Amps (DC)	7.90
Force Constant [3]	N/Amps (RMS)	9.68
Resistance [14]	Ohms	1.71
Inductance [5]	mH	0.50
Maximum Bus Voltage	Volts DC	330
Thermal Resistance Wind-Ambient	°C/watt	1.68
Thermal Resistance Wind-Case	°C/watt	1.04
Thermal Resistance Case-Ambient	°C/watt	0.64
Motor Thermal Time Constant [12]	Minutes	25.00
Winding Thermal Time Constant [13]	Minutes	1.20
Electrical Time Constant [11]	Millisecs	0.29
Electrical Pitch [10]	mm	60.96
Rated Winding Temperature	°C	100

1.	**@ 25°C ambient, 100°C winding temperature**
2.	Measured with a 0.76 mm gap
3.	Measured Line to Line, +/- 10%
4.	Value is measured peak of sine wave
5.	+/-30%, Line-to-Line, inductance bridge measurement @1Khz
6.	Initial winding temperature must be 60°C or less before Peak Current is Applied
7.	DC current through a pair of motor phases of a trapezoidal (six state) commutated motor
8.	Peak of the sinusoidal current in a phase for a sinusoidal commutated motor
9.	Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%
10.	The Distance from the leading edge of a north pole to the leading edge of the next north pole
11.	Time for motor value to reach 63% of its final current after a step change in voltage
12.	Time the motor takes to reach 63% of its final temperature, given constant power
13.	Time for the winding to reach 63% of its final temperature rise above the rest of the motor, given constant power
14.	Measured between any 2 motor leads with delta connection at 25°C. At 100°C, multiply resistance by 1.295 (75°C rise * 0.393%/°C)

Mechanical Specifications - XLM125

Specification	Units	
Motor type		P2
Maximum Load	Kg	170[1]
Maximum Pitch Moment Load	Nm	88
Maximum Roll Moment Load	Nm	70
Maximum Yaw Moment Load	Nm	75
Pitch Torsional Spring Rate (C, S Versions)	arc-sec/Nm	1.14
Yaw Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.60
Roll Torsional Spring Rate (C, S Versions)	arc-sec/Nm	1.62
Pitch Torsional Spring Rate (U Version)	arc-sec/Nm	0.40
Yaw Torsional Spring Rate (U Version)	arc-sec/Nm	0.73
Roll Torsional Spring Rate (U Version)	arc-sec/Nm	1.34
Base Moment of Inertia (Narrow dimension)	kg-mm²	28,400
Base Moment of Inertia (Wide dimension)	kg-mm²	32,400
Running Friction RMS value over travel (U, C Versions)	N	8
Running Friction Peak value over travel (U, C Versions)	N	12
Running Friction RMS value over travel (S Version)	N	16
Running Friction Peak value over travel (S Version)	N	24
IP Rating		U (Uncovered) version: IP00 C (Covered) version: IP10 S (Sealed) version: *IP30

[1] Normal load centered on carriage with stage in horizontal orientation

* IP 30 Rating with the following additions during installation which includes mounting holes, carriage and base that are not used. All unused mounting holes must be covered by user.

Performance Specifications - XLM145

Specification	Units													
Travel (U Version, P3 Motor)	mm	125	175	225	275	325	425	525	625	725	825	925	1025	1225
Travel (C, S Versions, P3 Motor)	mm	100	150	200	250	300	400	500	600	700	800	900	1000	1200
Travel (U Version, P4 Motor)	mm	65	115	165	215	265	365	465	565	665	765	865	965	1165
Travel (C, S Versions, P4 Motor)	mm	40	90	140	190	240	340	440	540	640	740	840	940	1140
Accuracy [1]	+/-µm	4	6	8	9	10	12	14	16	18	20	22	24	26
Resolution	µm	Encoder Dependent (See Encoder Specification)												
Bidirectional Repeatability (Resolution Dependant)[1]	+/-µm	0.5 + Encoder Resolution												
Horizontal Straightness[1]	+/-µm	3	4	4	5	6	8	9	10	12	13	14	15	20
Vertical Straightness[1]	+/-µm	3	4	4	5	6	8	9	10	12	13	14	15	20
Pitch[1]	arc sec	<=30												
Yaw[1]	arc sec	<=30												
Total Stage Mass (U, P3 Motor)[3]	Kg	9.9	11	11.5	12.7	13.7	15.8	17.4	19.6	21.7	23.4	25.5	27.1	31.3
Total Stage Mass (C, S, P3 Motor)[3]	Kg	14.6	15.1	15.8	16.9	18.1	20.4	22.2	24.6	26.9	28.7	31	32.8	37.5
Total Stage Mass (U, P4 Motor)[3]	Kg	10.2	11.2	11.8	12.7	13.9	16	17.7	19.8	22	23.6	25.7	27.4	31.6
Total Stage Mass (C, S, P4 Motor)[3]	Kg	15.2	16.3	17	18.2	19.3	21.6	23.5	25.8	28.1	29.9	32.2	34.1	38.7

Motor Type		P3	P4
Moving Mass	Kg	1.3 (U), 4.0 (C, S)	1.5 (U), 4.5 (C, S)
Continuous Force[2]	N	58.60 (U, C),50.60 (S)	79.35 (U, C),71.35 (S)
Peak Force[2]	N	199.81 (U, C), 191.81 (S)	262.06 (U, C), 254.06 (S)
Max Speed	m/s	Feedback and Load Dependent (Max 3m/sec)	
Max Acceleration	g's	Feedback and Load Dependent (Max 3g)	

[1] Specifications based on following conditions: Single axis, fully bolted or clamped to AA granite mounting surface, ambient and stage temperature at 20° C, Point of measurement centered in carriage, 35mm above the carriage mounting surface.
[2] Continuous and Peak forces shown equal the motor Continuous or Peak force less the RMS frictional resistance of the stage.
[3] Masses include cable management assembly.

XLM145

Parameter:	Units:	Specifications:	
Winding and Pole Length:		**P3**	**P4**
Stall Force Continuous [1]	N	70.60	91.35
Stall Current Continuous [1, 4, 8]	Amps (Peak of sine)	4.31	4.19
Stall Current Continuous [1, 7]	Amps (DC)	3.74	3.63
Stall Current Continuous [1]	Amps (RMS)	3.05	2.96
Peak Force [6]	N	211.81	274.06
Peak Current [4, 6, 8]	Amps (Peak of sine)	12.94	12.56
Peak Current [6, 7]	Amps (DC)	11.21	10.88
Peak Current [6]	Amps (RMS)	9.15	8.88
Voltage Constant [3, 4]	Volts/m/s	18.9	25.2
Force Constant [9]	N/ Amps (Peak of sine)	16.37	21.82
Force Constant [3, 4]	N/Amps (DC)	18.90	25.20
Force Constant [3]	N/Amps (RMS)	23.15	30.86
Resistance [14]	Ohms	4.03	5.51
Inductance [5]	mH	1.80	2.40
Maximum Bus Voltage	Volts DC	330	330
Thermal Resistance Wind-Amb	°C/watt	1.03	0.80
Thermal Resistance Wind-Case	°C/watt	0.52	0.28
Thermal Resistance Case-Amb	°C/watt	0.51	0.52
Motor Thermal Time Constant [12]	Minutes	41.67	36.67
Winding Thermal Time Constant [13]	Minutes	1.00	1.00
Electrical Time Constant[11]	Millisecs	0.45	0.44
Electrical Pitch [10]	mm	60.96	60.96
Rated Winding Temperature	°C	100	100

1.	**@ 25°C ambient, 100°C winding temperature**
2.	Measured with a 0.76 mm gap
3.	Measured Line to Line, +/- 10%
4.	Value is measured peak of sine wave
5.	+/-30%, Line-to-Line, inductance bridge measurement @1Khz
6.	Initial winding temperature must be 60°C or less before Peak Current is Applied
7.	DC current through a pair of motor phases of a trapezoidal (six state) commutated motor
8.	Peak of the sinusoidal current in a phase for a sinusoidal commutated motor
9.	Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%
10.	The Distance from the leading edge of a north pole to the leading edge of the next north pole
11.	Time for motor value to reach 63% of its final current after a step change in voltage
12.	Time the motor takes to reach 63% of its final temperature, given constant power
13.	Time for the winding to reach 63% of its final temperature rise above the rest of the motor, given constant power
14.	Measured between any 2 motor leads with delta connection at 25ºC. At 100ºC, multiply resistance by 1.295 (75ºC rise * 0.393%/ºC)

Mechanical Specifications - XLM145

Specification	Units		
Motor type		P3	P4
Maximum Load	Kg	300[1]	300[1]
Maximum Pitch Moment Load	Nm	230	310
Maximum Roll Moment Load	Nm	140	140
Maximum Yaw Moment Load	Nm	190	250
Pitch Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.71	0.62
Yaw Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.30	0.20
Roll Torsional Spring Rate (C, S Versions)	arc-sec/Nm	1.82	2.22
Pitch Torsional Spring Rate (U Version)	arc-sec/Nm	0.36	0.31
Yaw Torsional Spring Rate (U Version)	arc-sec/Nm	0.32	0.21
Roll Torsional Spring Rate (U Version)	arc-sec/Nm	2.09	2.53
Base Moment of Inertia (Narrow dimension)	kg-mm^2	71,800	71,800
Base Moment of Inertia (Wide dimension)	kg-mm^2	81,900	81,900
Running Friction RMS value over travel (U, C Versions)	N	12	12
Running Friction Peak value over travel (U, C Versions)	N	16	16
Running Friction RMS value over travel (S Version)	N	20	20
Running Friction Peak value over travel (S Version)	N	28	28
IP Rating		U (Uncovered) version: IP00 C (Covered) version: IP10 S (Sealed) version: *IP30	

[1] Normal load centered on carriage with stage in horizontal orientation

* IP 30 Rating with the following additions during installation which includes mounting holes, carriage and base that are not used. All unused mounting holes must be covered by user.

Performance Specifications - XLM200

Specification	Units												
Travel (P3 Motor)	mm	200	300	400	500	600	700	800	900	1000	1200	1350	1500
Travel (C, S Versions, P4 Motor)	mm	140	240	340	440	540	640	740	840	940	1140	1290	1440
Travel (U Version, P4 Motor)	mm	160	260	360	460	560	660	760	860	960	1160	1310	1460
Accuracy [1]	+/-µm	8.0	10.0	12.0	14.0	16.0	17.0	18.0	19.0	20.0	24.0	26.0	30.0
Resolution	µm	Encoder Dependent (See Encoder Specification)											
Bidirectional Repeatability (Resolution Dependant)[1]	+/-µm	0.5 + Encoder Resolution											
Horizontal Straightness[1]	+/-µm	4	6	6	7	7	8	9	10	10	12	13	15
Vertical Straightness[1]	+/-µm	4	6	6	7	7	8	9	10	10	12	13	15
Pitch[1]	arc sec	<=30											
Yaw[1]	arc sec	<=30											
Total Stage Mass (U, P3 Motor)[3]	Kg	19.8	22.3	25.5	28	31.3	34.5	37	40.2	42.7	49	53.2	58
Total Stage Mass (C, S, P3 Motor)[3]	Kg	26.7	29.5	33	35.8	39.4	42.9	45.7	49.2	52	59.1	63.7	69
Total Stage Mass (U, P4 Motor)[3]	Kg	20.2	22.7	25.9	28.4	31.6	34.8	37.3	40.5	43	49.4	53.5	58.3
Total Stage Mass (C, S, P4 Motor)[3]	Kg	28.1	31	34.5	37.3	40.8	44.3	47.2	50.7	53.5	60.6	65.1	70.4

Motor Type		P3	P4
Moving Mass	Kg	2.9 (U), 6.1 (C, S)	3.2 (U), 7.5 (C, S)
Continuous Force[2]	N	102.53 (U,C), 88.53 (S)	127.35 (U,C), 113.35 (S)
Peak Force[2]	N	339.60 (U,C), 325.60 (S)	414.04 (U,C), 400.04 (S)
Max Acceleration	g's	Feedback and Load Dependent (Max 3g)	
Max Acceleration	g's	Feedback and Load Dependent (Max 3g)	

[1] Specifications based on following conditions: Single axis, fully bolted or clamped to AA granite mounting surface, ambient and stage temperature at 20° C, Point of measurement centered in carriage, 35mm above the carriage mounting surface.
[2] Continuous and Peak forces shown equal the motor Continuous or Peak force less the RMS frictional resistance of the stage.
[3] Masses include cable management assembly.

XLM200

Parameter:	Units:	Specifications:	
Winding and Pole Length:		**P3**	**P4**
Stall Force Continuous [1]	N	118.53	143.35
Stall Current Continuous [1, 4, 8]	Amps (Peak of sine)	5.80	5.25
Stall Current Continuous [1, 7]	Amps (DC)	5.02	4.55
Stall Current Continuous [1]	Amps (RMS)	4.10	3.72
Peak Force [6]	N	355.60	430.04
Peak Current [4, 6, 8]	Amps (Peak of sine)	17.40	15.76
Peak Current [6, 7]	Amps (DC)	15.07	13.65
Peak Current [6]	Amps (RMS)	12.30	11.15
Voltage Constant [3, 4]	Volts/m/s	23.60	31.50
Force Constant [9]	N/ Amps (Peak of sine)	20.44	27.28
Force Constant [3, 4]	N/Amps (DC)	23.60	31.50
Force Constant [3]	N/Amps (RMS)	28.90	38.58
Resistance [14]	Ohms	2.67	3.78
Inductance [5]	mH	2.30	3.00
Maximum Bus Voltage	Volts DC	330	330
Thermal Resistance Wind-Ambient	°C/watt	0.86	0.74
Thermal Resistance Wind-Case	°C/watt	0.50	0.40
Thermal Resistance Case-Ambient	°C/watt	0.36	0.34
Motor Thermal Time Constant [12]	Minutes	48.33	53.33
Winding Thermal Time Constant [13]	Minutes	2.17	2.17
Electrical Time Constant [11]	Millisecs	0.86	0.79
Electrical Pitch [10]	mm	60.96	60.96
Rated Winding Temperature	°C	100	100

1.	**@ 25°C ambient, 100°C winding temperature**
2.	Measured with a 0.76 mm gap
3.	Measured Line to Line, +/- 10%
4.	Value is measured peak of sine wave
5.	+/-30%, Line-to-Line, inductance bridge measurement @1Khz
6.	Initial winding temperature must be 60°C or less before Peak Current is Applied
7.	DC current through a pair of motor phases of a trapezoidal (six state) commutated motor
8.	Peak of the sinusoidal current in a phase for a sinusoidal commutated motor
9.	Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%
10.	The Distance from the leading edge of a north pole to the leading edge of the next north pole
11.	Time for motor value to reach 63% of its final current after a step change in voltage
12.	Time the motor takes to reach 63% of its final temperature, given constant power
13.	Time for the winding to reach 63% of its final temperature rise above the rest of the motor, given constant power
14.	Measured between any 2 motor leads with delta connection at 25°C. At 100°C, multiply resistance by 1.295 (75°C rise * 0.393%/°C)

Mechanical Specifications - XLM 200

Specification	Units		
Motor type		P3	P4
Maximum Load	Kg	630[1]	630[1]
Maximum Pitch Moment Load	Nm	450	600
Maximum Roll Moment Load	Nm	400	400
Maximum Yaw Moment Load	Nm	360	485
Pitch Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.85	0.74
Yaw Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.25	0.17
Roll Torsional Spring Rate (C, S Versions)	arc-sec/Nm	0.71	0.86
Pitch Torsional Spring Rate (U Version)	arc-sec/Nm	0.51	0.45
Yaw Torsional Spring Rate (U Version)	arc-sec/Nm	0.20	0.15
Roll Torsional Spring Rate (U Version)	arc-sec/Nm	0.48	0.61
Base Moment of Inertia (Narrow dimension)	kg-mm²	151,600	151,600
Base Moment of Inertia (Wide dimension)	kg-mm²	181,200	181,200
Running Friction RMS value over travel (U, C Versions)	N	16	16
Running Friction Peak value over travel (U, C Versions)	N	24	24
Running Friction RMS value over travel (S Version)	N	30	30
Running Friction Peak value over travel (S Version)	N	48	48
IP Rating		U (Uncovered) version: IP00 C (Covered) version: IP10 S (Sealed) version: *IP30	

[1] Normal load centered on carriage with stage in horizontal orientation
* IP 30 Rating requires user to seal all unused mounting holes in carriage and base.

Encoder Specifications - XLM Series

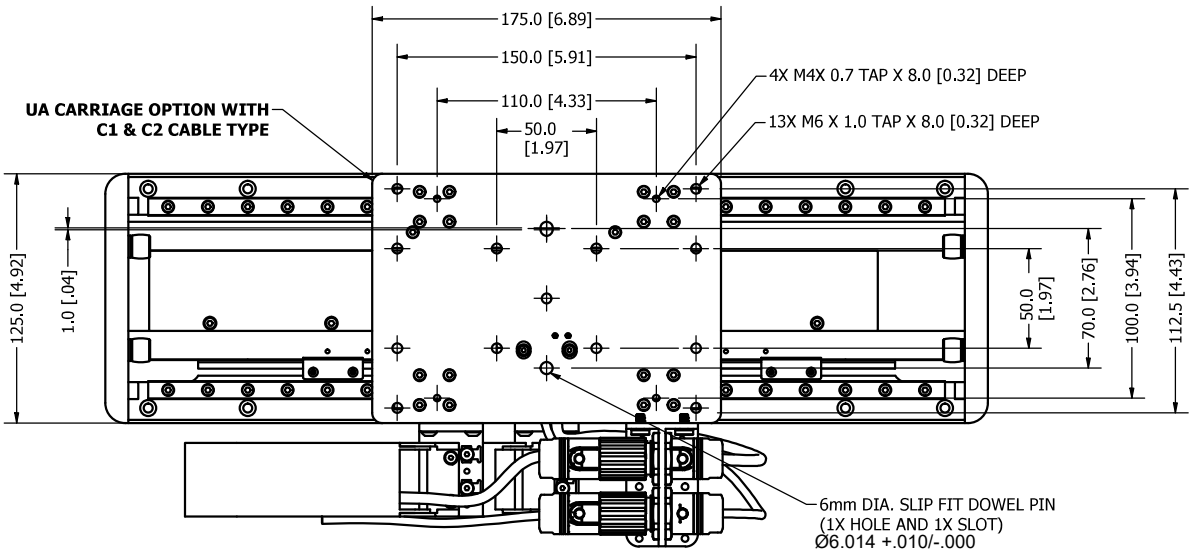
Encoder	Type	Resolution (µm)	Word Length (bit)	Scale Accuracy, un-mapped (+/-µm/m)	Max Speed (m/sec)	Clock Speed (MHz)	Supply Voltage (V)	Current (mA)	Scale Thermal Expansion (µm/m/°C)
E1	Digital Incremental (Differential)	1	n/a	5	>3	8	5 +/-5%	230	10.1
E2	Digital Incremental (Differential)	0.1	n/a	5	0.6	8	5 +/-5%	230	10.1
E3	Digital Incremental (Differential)	0.01	n/a	5	0.06	8	5 +/-5%	230	10.1
SC	1V P-P Sin/Cos Incremental (Differential)	20 / Controller DAC	n/a	5	>3	n/a	5 +/-5%	120	10.1
R1 / R3	Absolute (Biss-C)	0.05	32	5	>3	n/a	5 +/-5%	280	10.1
R2 / R4	Absolute (Biss-C)	0.005	32	5	>3	n/a	5 +/-5%	280	10.1

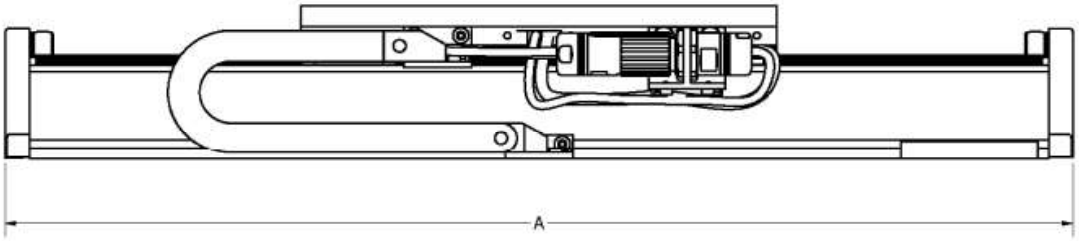
Sensor Specifications - XLM Series

Sensor Type	Supply Voltage (V)	Current (mA)	Output Type	Signal Voltage Range (V)	Max Current per Output (mA)
Hall Sensors	5	50	Single ended, NPN Open Collector	5 +/- 5%	15
End of Travel Limit Sensors (NPN output) Not available with Absolute Encoder options.	5 (powered by encoder supply)	Sames as encoder supply	Single ended, NPN Open Collector	5 to 24 +/- 5%	20
End of Travel Limit Sensors (PNP output) Not available with Absolute Encoder options.[1]	5 (powered by encoder supply)	Sames as encoder supply	Single ended, PNP Open Emitter	24 +/- 5%	20

[1] PNP output only available with C3, C4, C5, and C6 cable options. Not available with C1 or C2, direct-from-carriage cabling.

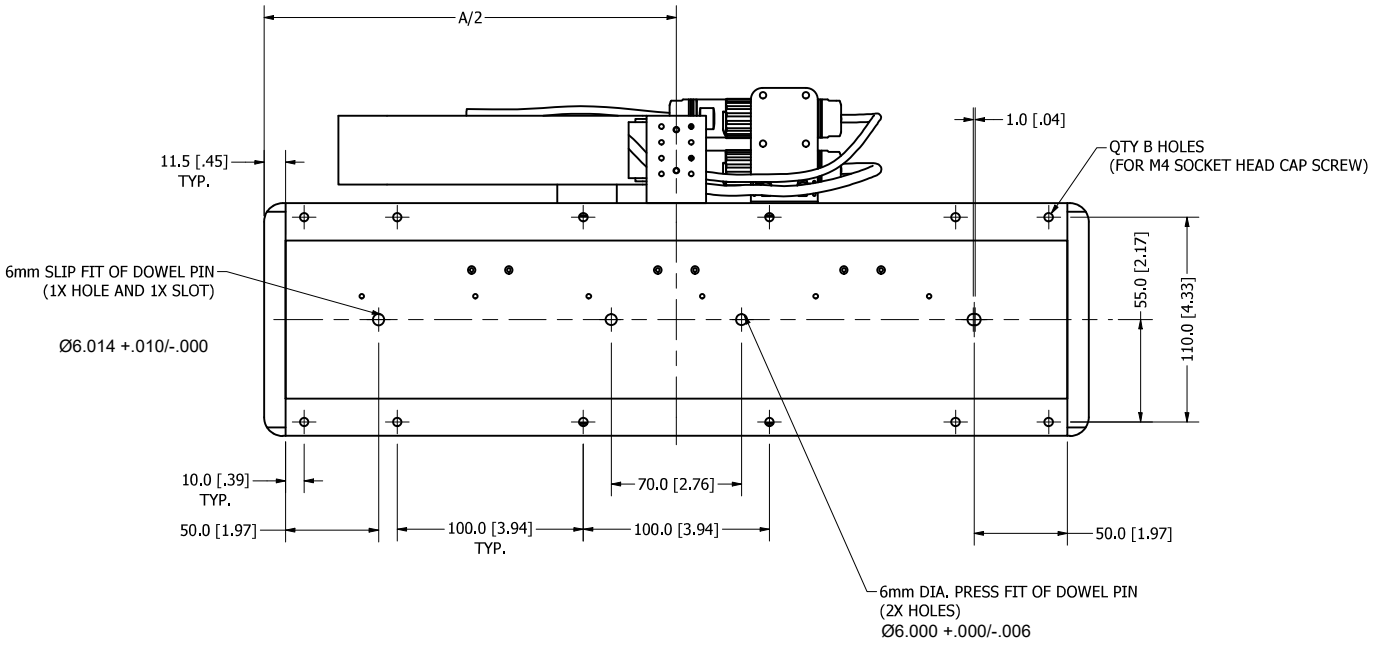
XLM125 Dimensions (Open) – mm [in]

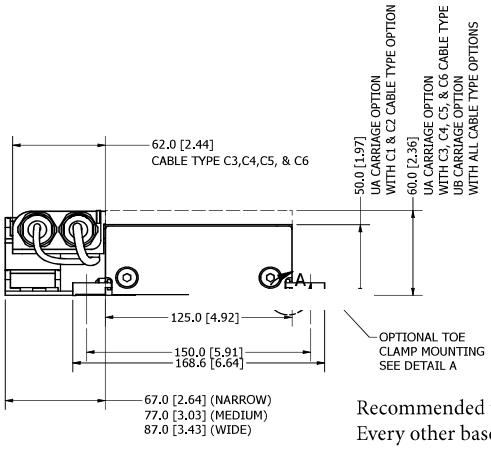




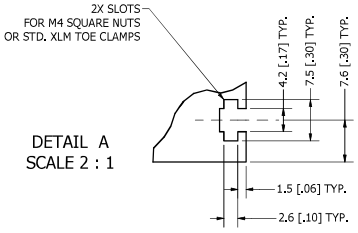
See table on page 36 for "A" dimension

XLM125 Dimensions (Open) – mm [in]



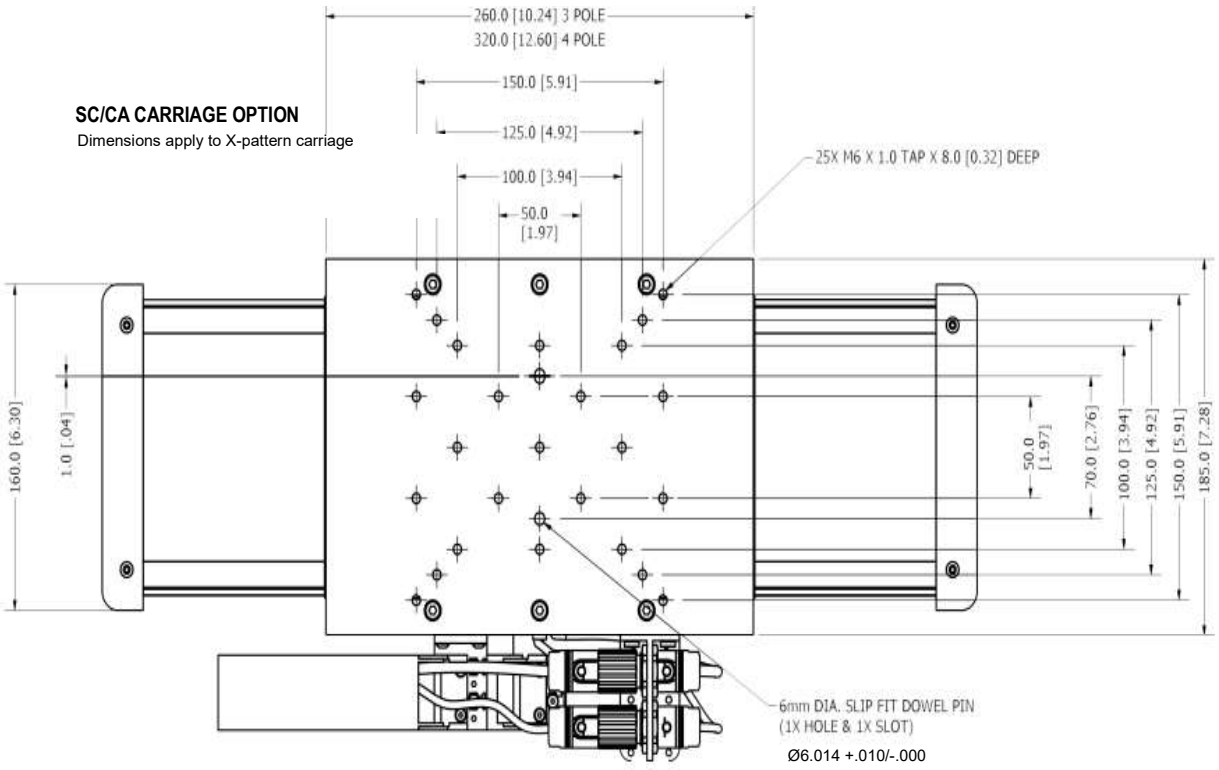


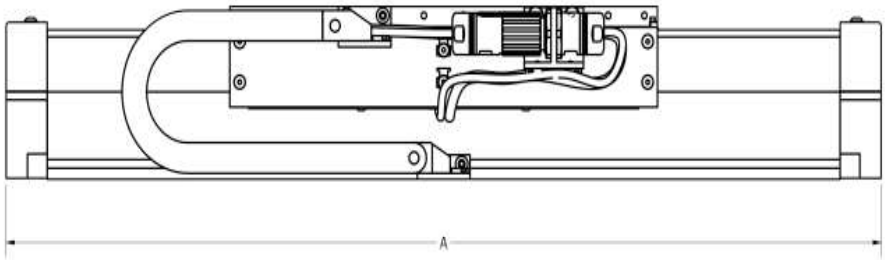
Recommended toe clamp spacing:
Every other base mounting hole.



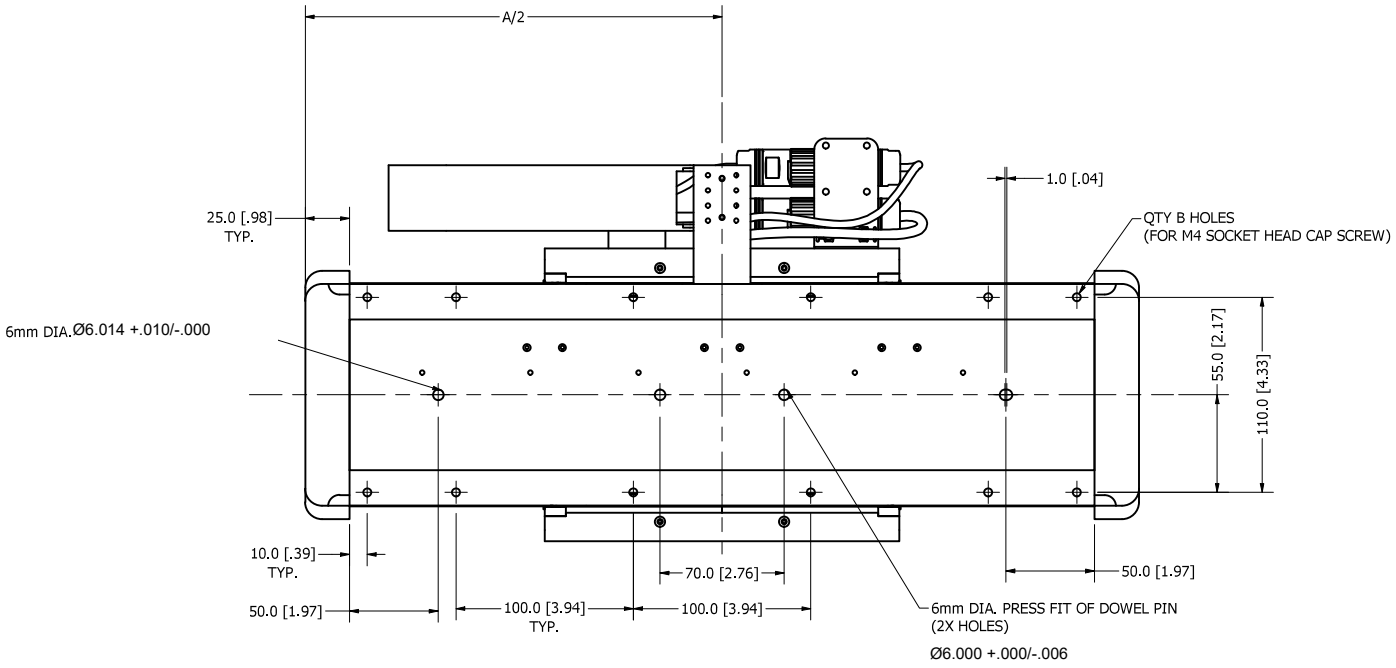
VIEW SHOWING SLOTS IN BASE

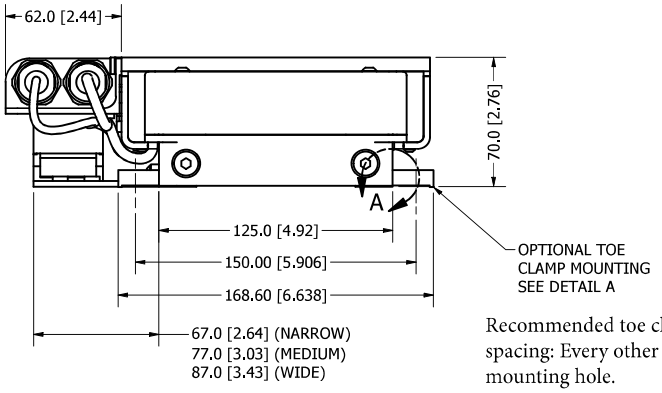
XLM125 Dimensions (Covered/Sealed) – mm [in]



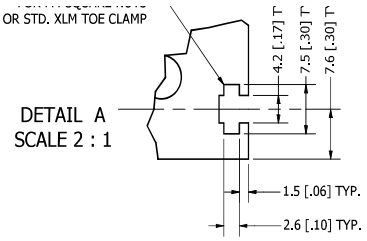


XLM125 Dimensions (Covered/Sealed) – mm [in]



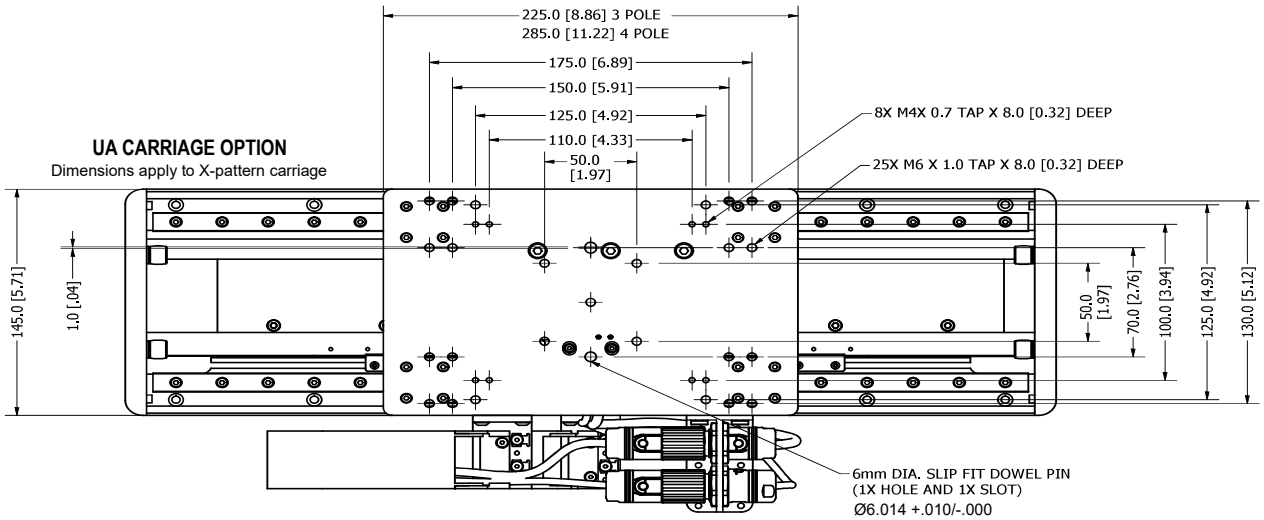


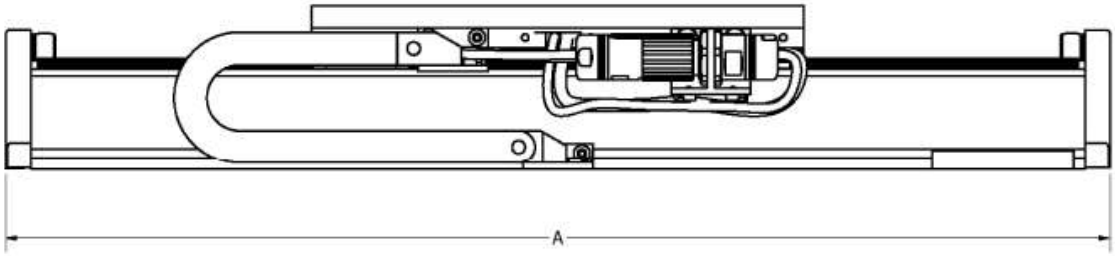
Recommended toe clamp spacing: Every other base mounting hole.



VIEW SHOWING SLOTS IN BASE

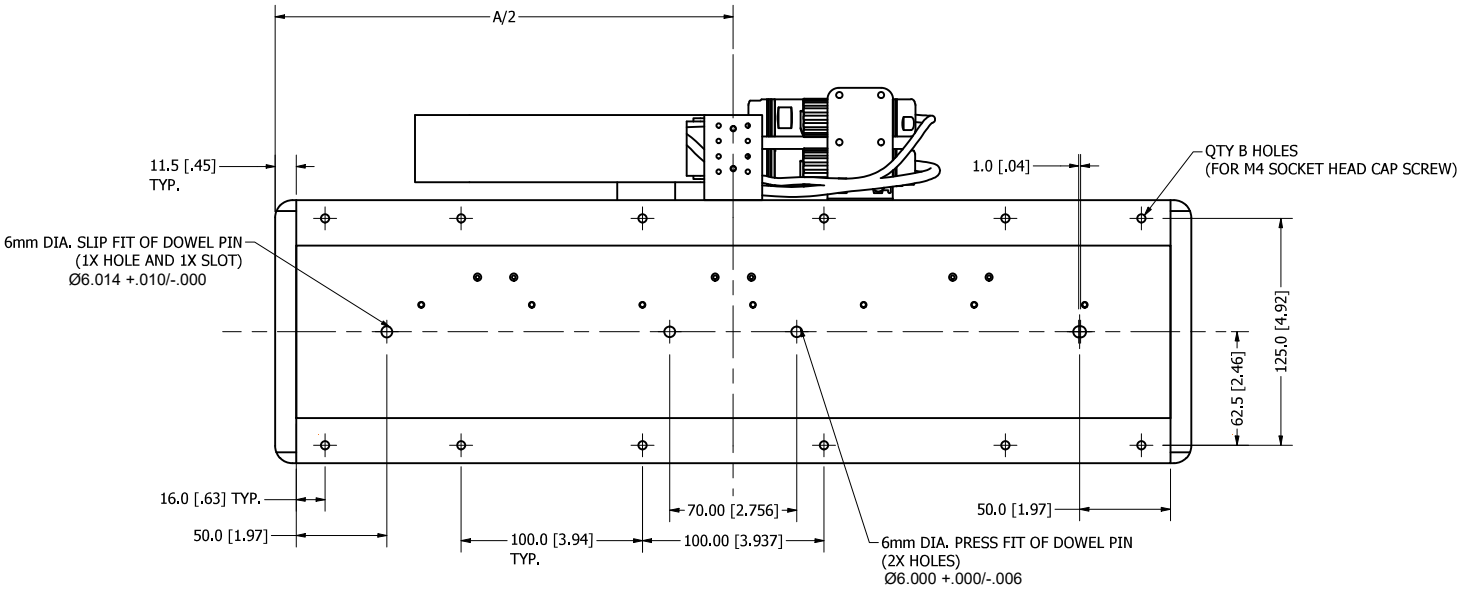
XLM145 Dimensions (Open) – mm [in]

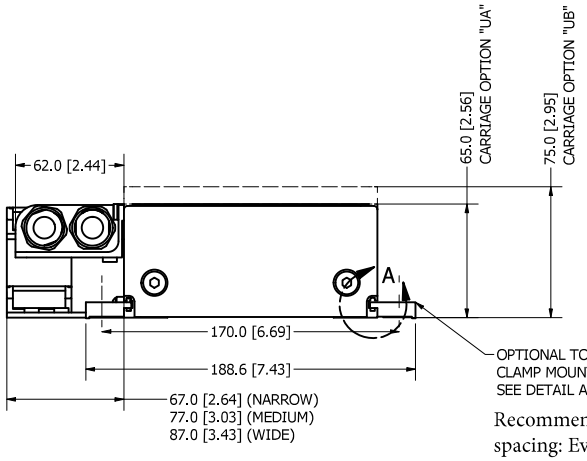




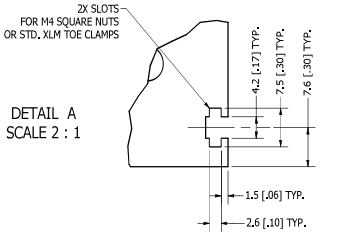
See table on page 36 for "A" dimension

XLM145 Dimensions (Open) – mm [in]



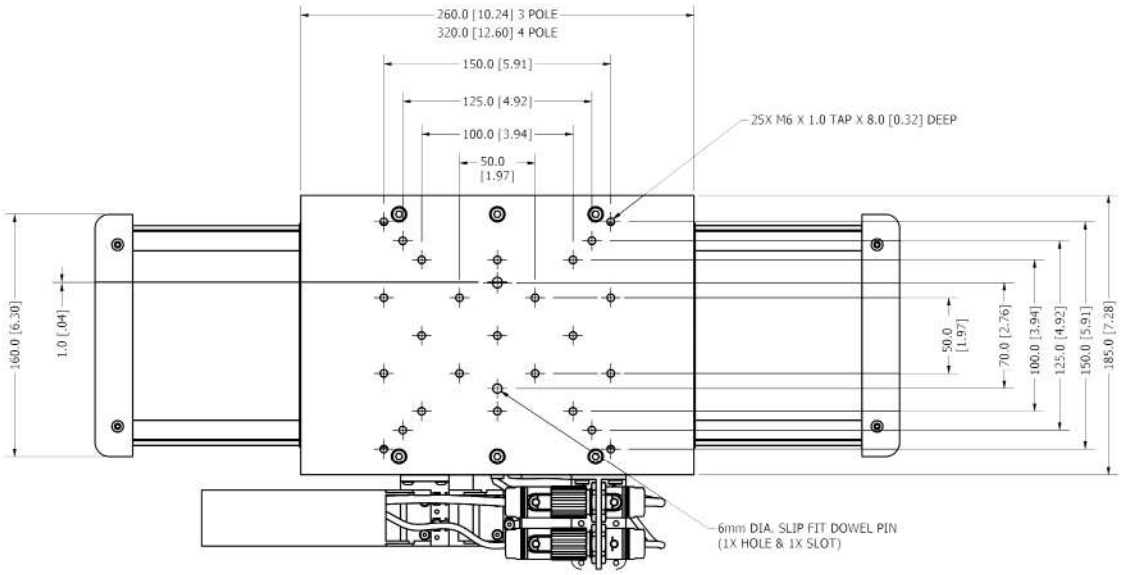


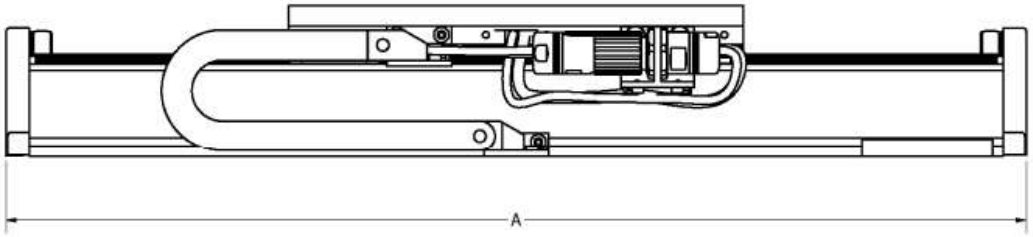
Recommended toe clamp spacing: Every other base mounting hole.



VIEW SHOWING SLOTS IN BASE

XLM145 Dimensions (Covered/Sealed) – mm [in]

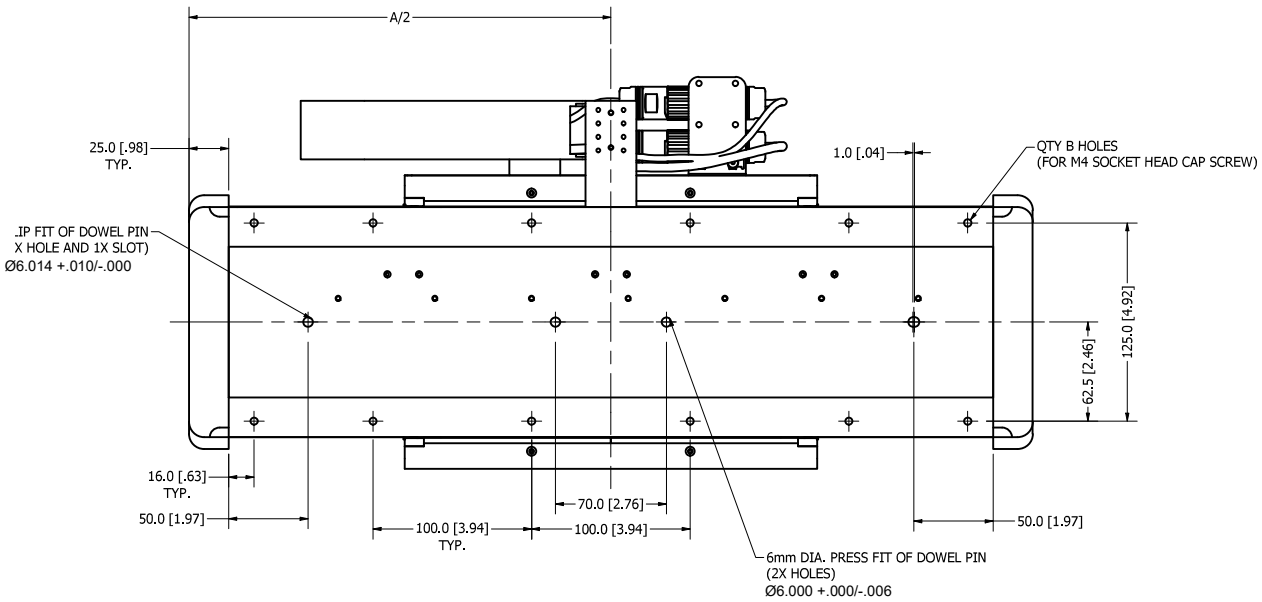


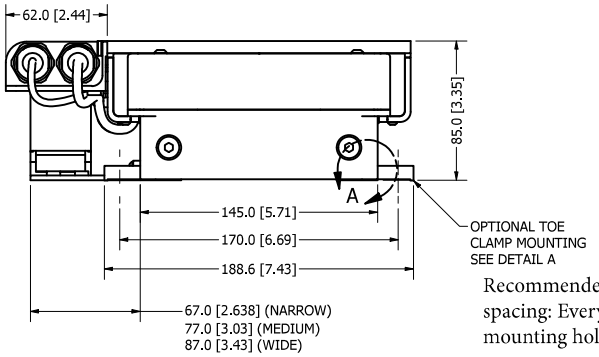


See table on page 36 for "A" dimension

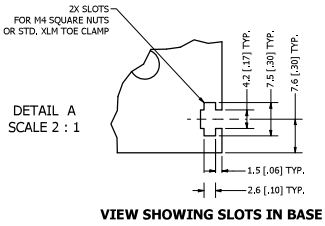
XLM145 Dimensions (Covered/Sealed) – mm [in]

SA/CA CARRIAGE OPTION
Dimensions apply to X-pattern



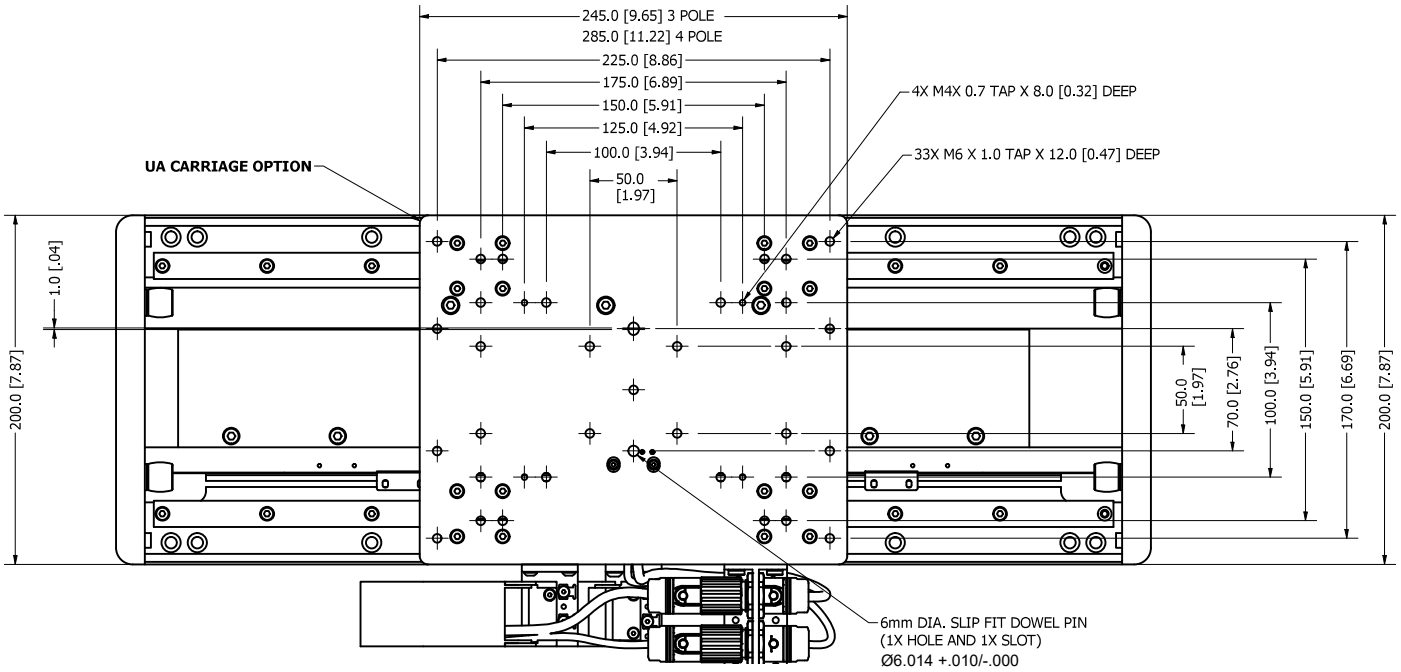


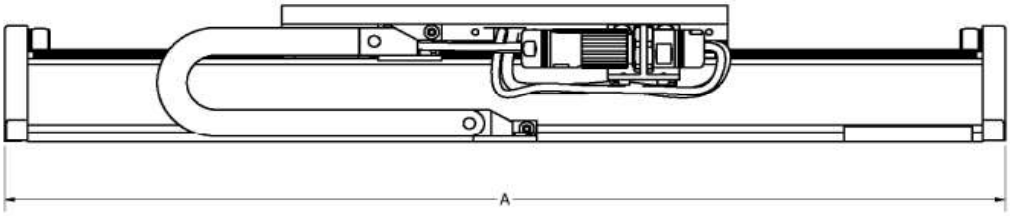
Recommended toe clamp spacing: Every other base mounting hole.



VIEW SHOWING SLOTS IN BASE

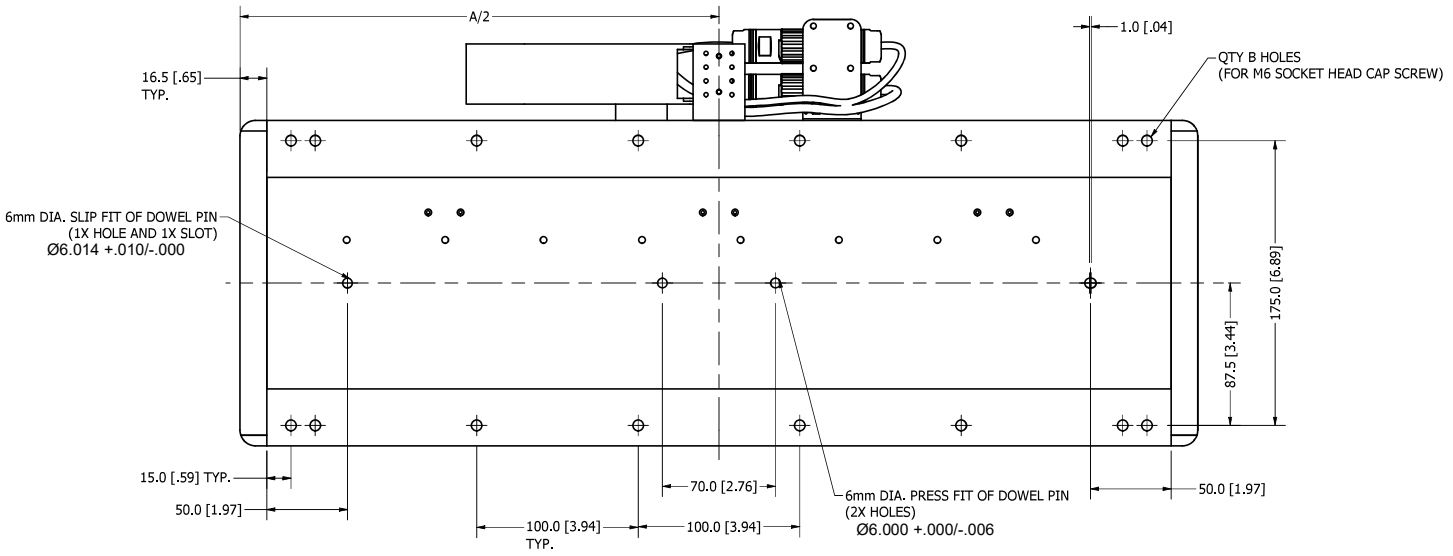
XLM200 Dimensions (Open) – mm [in]

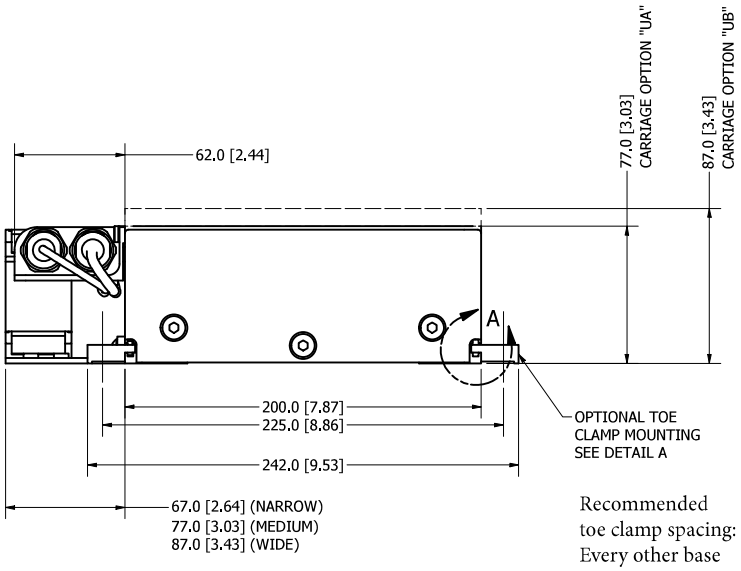




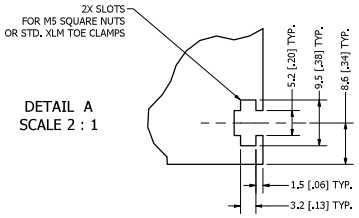
See table on page 36 for "A" dimension

XLM200 Dimensions (Open) – mm [in]



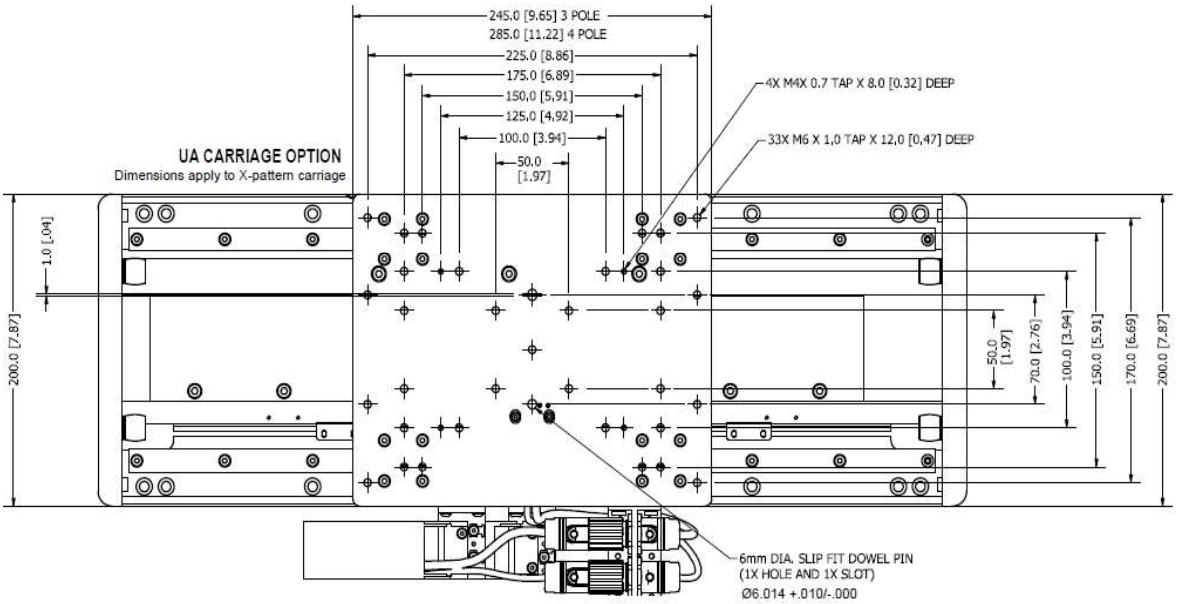


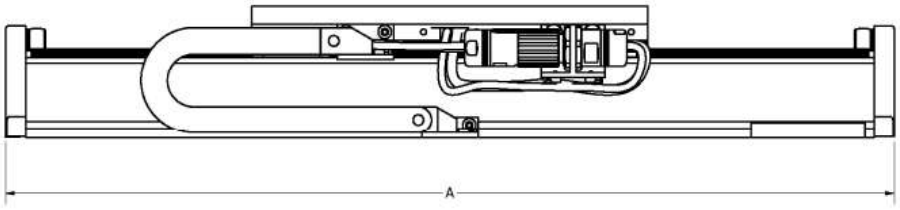
Recommended toe clamp spacing: Every other base mounting hole.



VIEW SHOWING SLOTS IN BASE

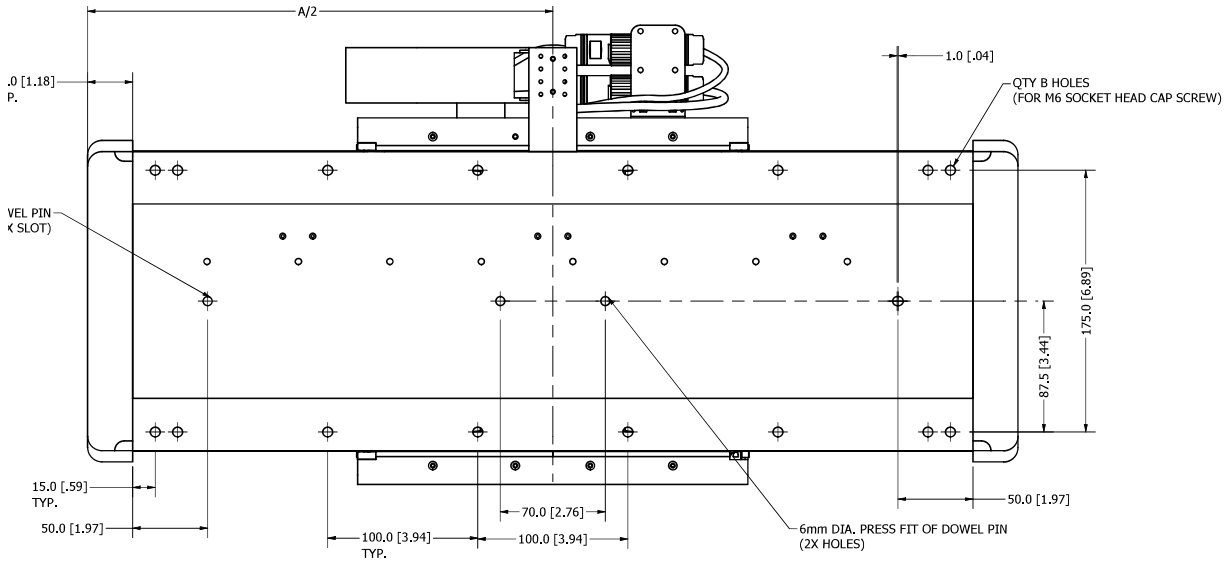
XLM200 Dimensions (Covered/Sealed) – mm [in]

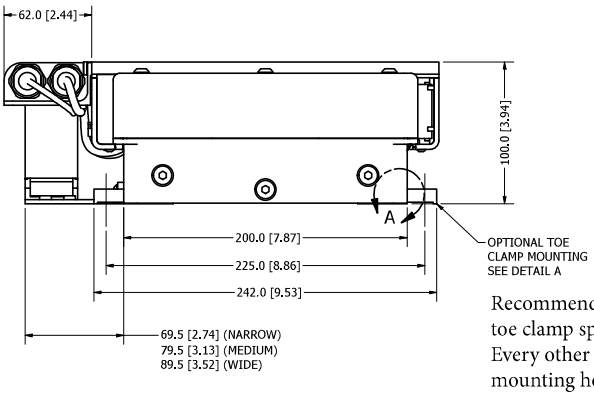




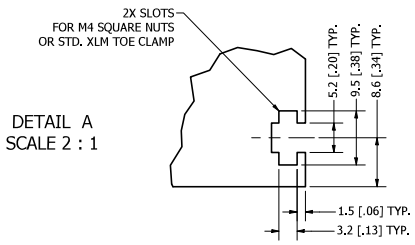
See table on page 36 for "A" dimension

XLM200 Dimensions (Covered/Sealed) – mm [in]





Recommended toe clamp spacing: Every other base mounting hole.



VIEW SHOWING SLOTS IN BASE

XLM125 Nominal Travel Lengths

XML125 - Open		
Nominal Travel (mm)	**A (mm)**	**B**
110	343	8
160	393	12
210	443	12
260	493	12
310	543	12
410	643	16
510	743	16
610	843	20
710	943	20
810	1043	24
910	1143	24
1010	1243	28

C (mm):
71.1 Carriage: UA with Cable Type: C3, C4, C5, or C6
60.0 Carriage: UB with Cable Type: C1, or C2

XML125 - Covered and Sealed		
Nominal Travel (mm)	**A (mm)**	**B**
100	370	8
150	420	12
200	470	12
250	520	12
300	570	12
400	670	16
500	770	16
600	870	20
700	970	20
800	1070	24
900	1170	24
1000	1270	28

B = Number of Base Holes

XLM145 Nominal Travel Lengths

XML145 - Open			
Nominal Travel (mm)			
3-Pole	**4-Pole**	A (mm)	B
125	**65**	405	12
175	**115**	455	12
225	**165**	505	12
275	**215**	555	12
325	**265**	605	16
425	**365**	705	16
525	**465**	805	20
625	**565**	905	20
725	**665**	1005	24
825	**765**	1105	24
925	**865**	1205	28
1025	**965**	1305	28
1225	**1165**	1505	32

XML145 - Covered and Sealed			
Nominal Travel (mm)			
3-Pole	**4-Pole**	A (mm)	B
100	**40**	432	12
150	**90**	482	12
200	**140**	532	12
250	**190**	582	12
300	**240**	632	16
400	**340**	732	16
500	**440**	832	20
600	**540**	932	20
700	**640**	1032	24
800	**740**	1132	24
900	**840**	1232	28
1000	**940**	1332	28
1200	**1140**	1532	32

B = Number of Base Holes

XLM200 Nominal Travel Lengths

XML200 - Open			
Nominal Travel (mm)			
3-Pole	4-Pole	A (mm)	B
200	160	543	12
300	260	643	16
400	360	743	16
500	460	843	20
600	560	943	20
700	660	1043	24
800	760	1143	24
900	860	1243	28
1000	960	1343	28
1200	1160	1543	32
1350	1310	1693	36
1500	1460	1843	40

XML200 - Covered and Sealed			
Nominal Travel (mm)			
3-Pole	4-Pole	A (mm)	B
200	140	570	12
300	240	670	16
400	340	770	16
500	440	870	20
600	540	970	20
700	640	1070	24
800	740	1170	24
900	840	1270	28
1000	940	1370	28
1200	1140	1570	32
1350	1290	1720	36
1500	1440	1870	40

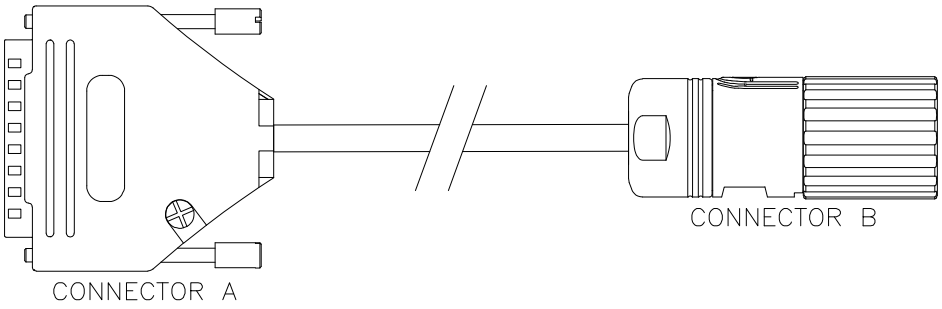
B = Number of Base Holes

XLM Cable Specifications

006-2862-03.00 / 006-2862-05.00 - XLM Feedback Extension Cable (C3, C4, C5 & C6), Digital (E1, E2 & E3) or Absolute Encoder (R1, R2, R3 & R4)

Connector A

Male 25 Pin D-SUB	
Function	**Pin #**
24VDC PNP Supply	1
Reserved	2
LIMIT- PNP-NC (Digital only)	3
LIMIT+ PNP-NC (Digital only)	4
+5 Volts DC	5
Reserved	6
A+ /MA+	7
A- / MA-	8
B+	9
B-	10
Z+ / SLO+	11
Z- / SLO-	12
CAL (Digital only)	13
Reserved	14
LIMIT- NPN-NC (Digital only)	15
LIMIT+ NPN-NC (Digital only)	16
GND Encoder/Halls	17
GND NPN / PNP	18
TEMP+	19
TEMP-	20
HALL 1	21
HALL 2	22
HALL 3	23
Reserved	24
Reserved	25
SHLD	SHLD



Connector B

17 Pin Series 617 Connector	
Function	**Pin #**
+5 Volts DC	1
GND	2
A+ /MA+	3
A- / MA-	4
B+	5
B-	6
Z+ / SLO+	7
Z- / SLO-	8
LIMIT+ (Digital only)	9
LIMIT- (Digital only)	10
Reserved	11
CAL	12
HALL 1	13
HALL 2	14
HALL 3	15
TEMP+	16
TEMP-	17
SHLD	SHLD

XLM Feedback Extension Cables Electrical Specifications

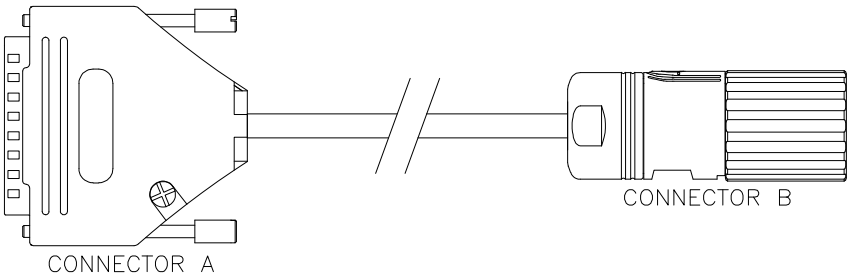
Description	Specification
+5VDC Supply Voltage	+/-5% with a maximum current of 300mA (Encoder Dependent)
PNP 24VDC Supply Voltage	+5% / -20% with a maximum current of 100mA
NPN Output	Normally Closed, Current Sinking, Open Collector +5 to +24 VDC, 20mA Max
PNP Output	Normally Closed, Current Sourcing, 20mA Max
Hall Output	See Phase-Hall Alignment Diagrams

XLM Cable Specifications

006-2863-03.00 / 006-2863-05.00 - XLM Feedback Extension Cable (C3, C4, C5 & C6), Analog Encoder (SC)

Connector A

Male 25 Pin D-SUB	
Function	**Pin #**
24VDC PNP Supply	1
Reserved	2
LIMIT- PNP-NC	3
LIMIT+ PNP-NC	4
+5 Volts DC	5
Reserved	6
SIN+	7
SIN-	8
COS+	9
COS-	10
Z+	11
Z-	12
CAL	13
Reserved	14
LIMIT- NPN-NC	15
LIMIT+ NPN-NC	16
GND Encoder/Halls	17
GND NPN / PNP	18
TEMP+	19
TEMP-	20
HALL 1	21
HALL 2	22
HALL 3	23
SETUP	24
Reserved	25
SHLD	SHLD



Connector B

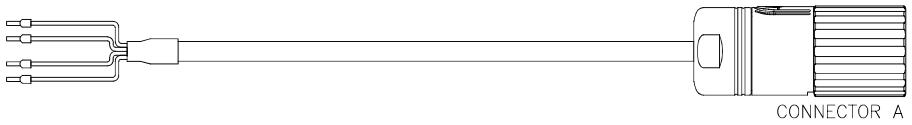
17 Pin Series 617 Connector	
Function	**Pin #**
+5 Volts DC	1
GND	2
SIN+	3
SIN-	4
COS+	5
COS-	6
Z+	7
Z-	8
LIMIT+	9
LIMIT-	10
SETUP	11
CAL	12
HALL 1	13
HALL 2	14
HALL 3	15
TEMP+	16
TEMP-	17
SHLD	SHLD

XLM Feedback Extension Cables Electrical Specifications

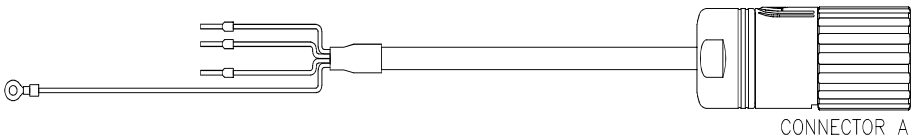
Description	Specification
+5VDC Supply Voltage	+/-5% with a maximum current of 300mA (Encoder Dependent)
PNP 24VDC Supply Voltage	+5% / -20% with a maximum current of 100mA
NPN Output	Normally Closed, Current Sinking, Open Collector +5 to +24 VDC, 20mA Max
PNP Output	Normally Closed, Current Sourcing, 20mA Max
Hall Output	See Phase-Hall Alignment Diagrams

XLM Cable Specifications

006-2865-03.00 / 006-2865-05.00 - XLM Power Extension Cable (C3 & C4), Flying Leads, Universal



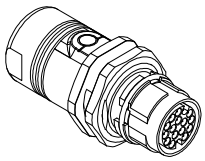
006-2877-03.00 / 006-2877-05.00 - XLM Power Extension Cable (C5 & C6), Flying Leads, P Series



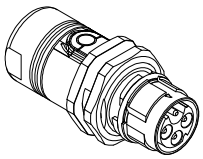
Connector A

4-Position Series 917 Connector			
Function	**AWG**	**Color**	**Pin #**
***U**	20	Red/Yellow	1
***V**	20	Brown/Yellow	2
W	20	Orange/Yellow	3
PE GND	20	Green/Yellow	E
Shield	Shield	Shield	Case
***FOR R3/R4 OPTIONS**			
U = BRN/YEL			
V = RED/YEL			

XLM C3, C4, C5 & C6 OPTIONS – TABLE SIDE CONNECTOR PINOUTS



MOTOR FEEDBACK



MOTOR POWER

Motor Power Connector

4 Position Series 917 Connector	
Function	**Pin #**
U	1
V	2
W	3
PE GND	E
SHLD	SHLD

Motor Feedback: Digital & Absolute

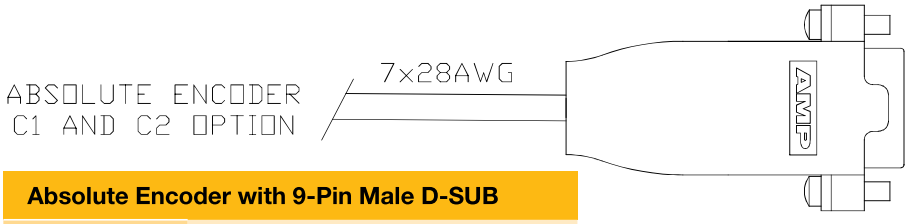
17 Pin Series 617 Connector	
Function	**Pin #**
+5 Volts DC	1
GND	2
A+ / MA+	3
A- / MA-	4
B+	5
B-	6
Z+ / SLO+	7
Z- / SLO-	8
LIMIT+ (Digital only)	9
LIMIT- (Digital only)	10
Reserved	11
CAL	12
HALL 1	13
HALL 2	14
HALL 3	15
TEMP+	16
TEMP-	17
SHLD	SHLD

Motor Feedback: Analog

17 Pin Series 617 Connector	
Function	**Pin #**
+5 Volts DC	1
GND	2
SIN+	3
SIN-	4
COS+	5
COS-	6
Z+	7
Z-	8
LIMIT+	9
LIMIT-	10
SETUP	11
CAL	12
HALL 1	13
HALL 2	14
HALL 3	15
TEMP+	16
TEMP-	17
SHLD	SHLD

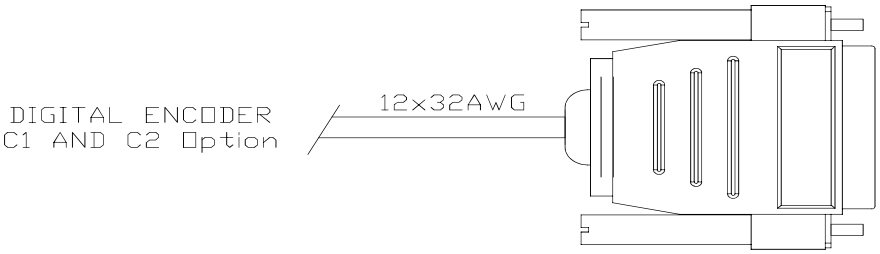
XLM Cable Specifications

XLM C1, C2 OPTIONS – ABSOLUTE ENCODER PINOUT



Absolute Encoder with 9-Pin Male D-SUB			
Function	**AWG**	**Color**	**Pin #**
5VDC	28	Brown	4, 5
0V	28	White	8
0V	28	Green	9
MA+	28	Violet	2
MA-	28	Yellow	3
SLO+	28	Gray	6
SLO-	28	Pink	7
Inner Shield		Shield	1
Outer Shield		Shield	Case

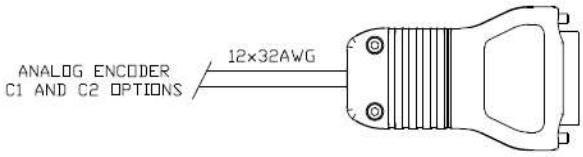
XLM C1, C2 OPTIONS – DIGITAL ENCODER PINOUT



Digital Encoder with 15-Pin Male D-SUB			
Function	**AWG**	**Color**	**Pin #**
5VDC	32	Brown	7, 8
0V	32	White	2, 9
A+	32	Red	14
A-	32	Blue	6
B+	32	Yellow	13
B-	32	Green	5
Z+	32	Violet	12
Z-	32	Gray	4
Limit+	32	Pink	11
Limit-	32	Black	10
E	32	Orange	3
CAL	32	Clear	1
SHLD		SHLD	Case

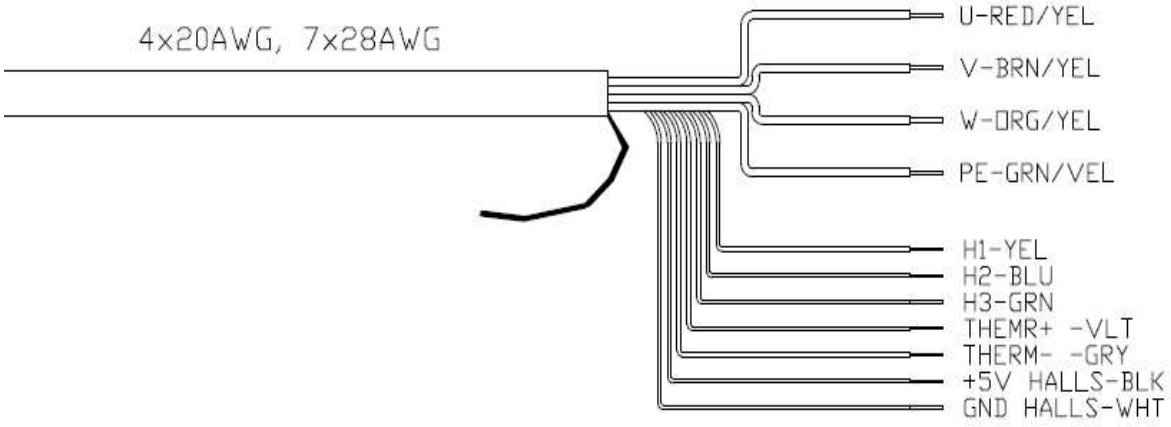
XLM Cable Specifications

XLM C1, C2 OPTIONS – ANALOG ENCODER PINOUT

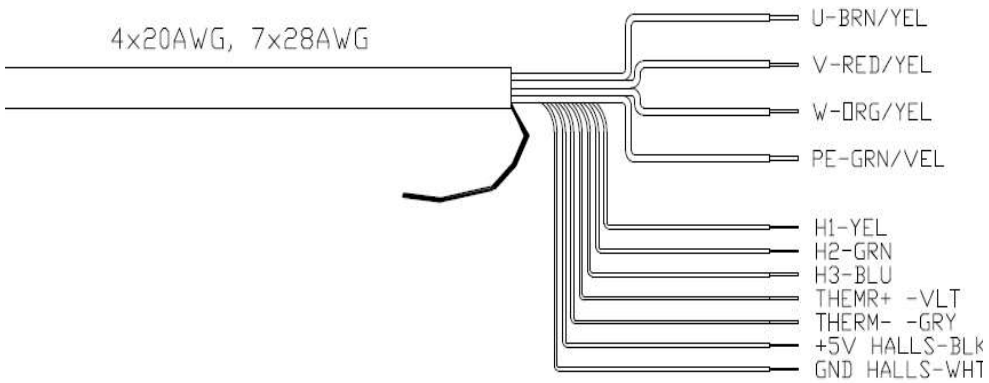


Analog Encoder with 15-Pin Male D-SUB			
Function	**AWG**	**Color**	**Pin #**
5 VDC	32	Brown	4, 5
0V	32	White	12, 13
SIN+	32	Red	9
SIN-	32	Blue	1
COS+	32	Yellow	10
COS-	32	Green	2
Z+	32	Violet	3
Z-	32	Gray	11
LIMIT+	32	Pink	7
LIMIT-	32	Black	8
CAL	32	Orange	14
SETUP	32	Clear	6
Inner Shield		Shield	
Outer Shield		Shield	Case

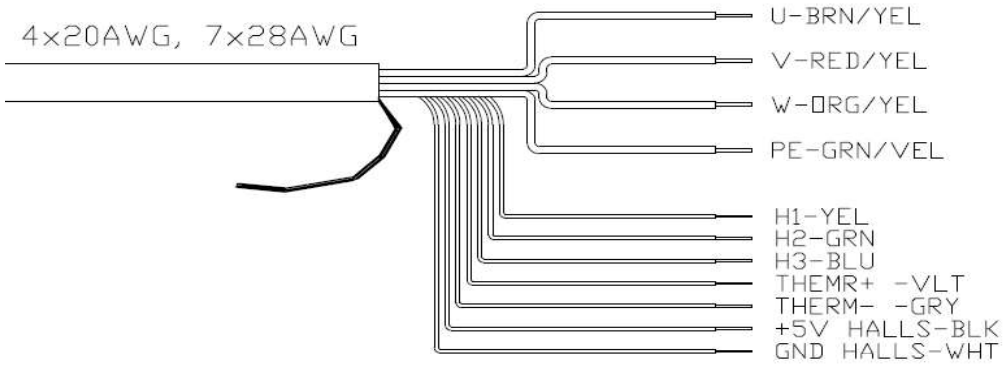
XLM125-P2 AND XLM200-P3/P4,C1/C2 & E1/E2/E3/SC/R1/R2 OPTIONS - MOTOR/ HALLS/TEMP



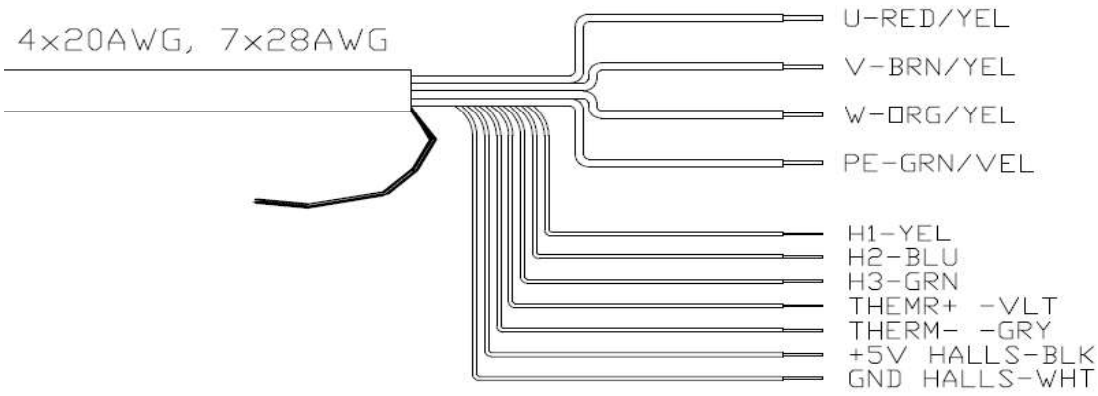
XLM125-P2 AND XLM200-P3/P4,C1/C2 & R3/R4 OPTIONS - MOTOR/HALLS/TEMP



XLM145-P3/P4,C1/C2 & E1/E2/E3/SC/R1/R2 OPTIONS - MOTOR/HALLS/TEMP

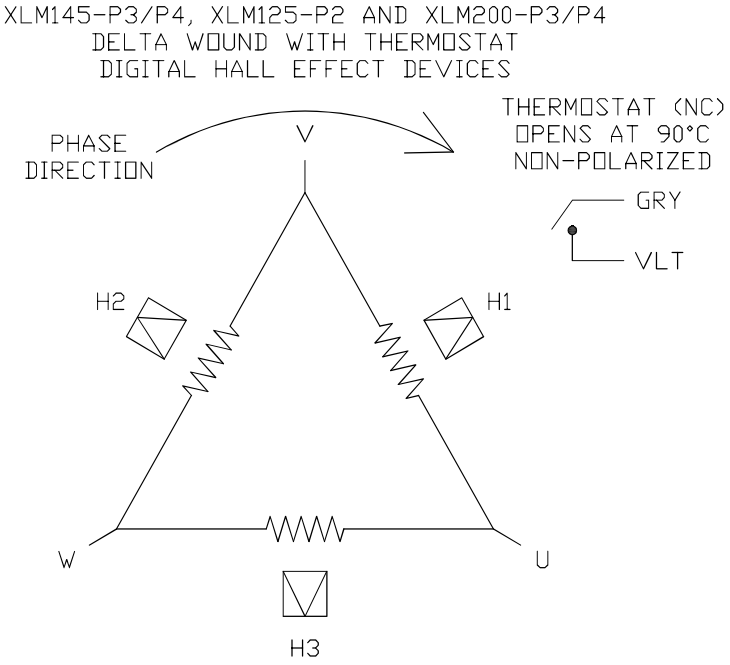


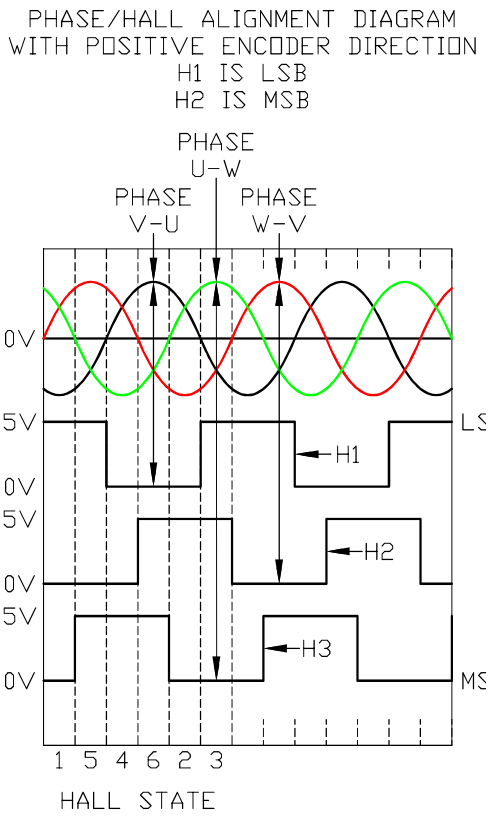
XLM145-P3/P4,C1/C2 & R3/R4 OPTIONS - MOTOR/HALLS/TEMP



XLM Cable Specifications

PHASE-HALL ALIGNMENT DIAGRAM

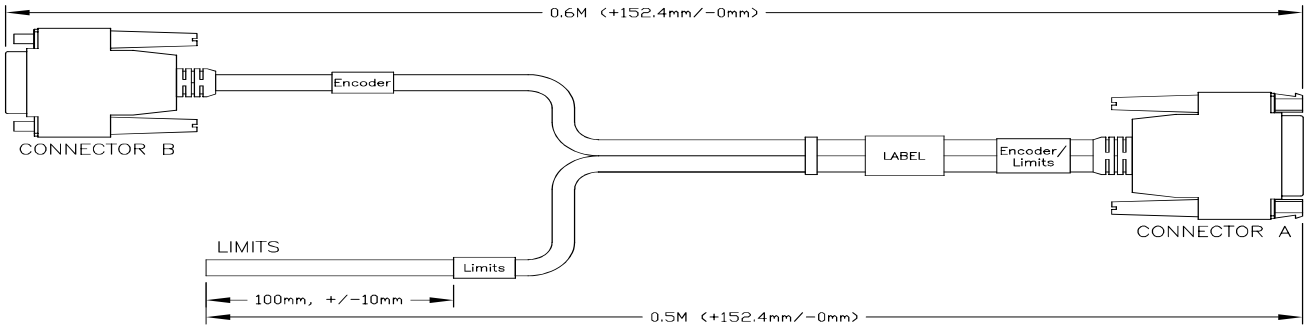




FOR R3 AND R4 THE ENCODER DIRECTION IS NEGATIVE

XLM Accessories

006-2866-01 - XLM to ACR7xV/IPA Adapter Cable, Digital (E1, E2 & E3) or Analog Encoder (SC), to be used with C3 or C4

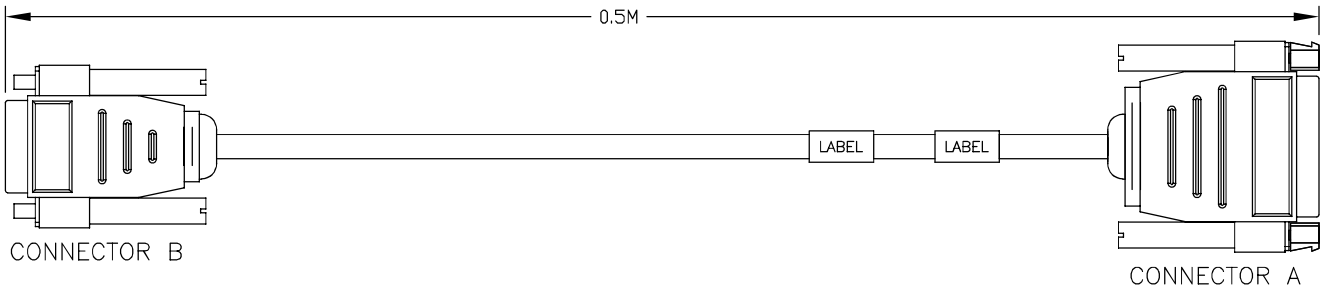


CONNECTOR B - Male 15 Pin HD-SUB	
ACR7xV/IPA	
Function	**Pin #**
Z+	1
Z-	2
GND Encoder/Halls	3
+5V	5
TEMP-	6
A-/SIN-	7
A+/SIN+	8
HALL 1	9
TEMP+	10
B-/COS-	11
B+/COS+	12
HALL 2	13
HALL 3	14
SHIELD	SHIELD

LIMITS	
Function	**Color**
24VDC PNP Supply	Red
RESERVED	Blue
LIMIT- PNP-N.C.	Brown
LIMIT+ PNP-N.C.	Green
RESERVED	Yellow
LIMIT- NPN-N.C.	Gray
LIMIT+ NPN-N.C.	Pink
GND NPN/PNP	White
SHIELD	SHIELD

CONNECTOR A - Female 25 Pin D-SUB	
Encoder/Limits	
Function	**Pin #**
24VDC PNP Supply	1
LIMIT- PNP-N.C.	3
LIMIT+ PNP-N.C.	4
+5V	5
A+/SIN+	7
A-/SIN-	8
B+/COS+	9
B-/COS-	10
Z+	11
Z-	12
LIMIT- NPN-N.C.	15
LIMIT+ NPN-N.C.	16
GND Encoder/Halls	17
GND NPN/PNP	18
TEMP+	19
TEMP-	20
HALL 1	21
HALL 2	22
HALL 3	23
SHIELD	SHIELD

006-2878-01 - XLM to ACR7xV/IPA Adapter Cable, Absolute Encoder (R1, R2, R3 & R4), To be used with C3 or C4

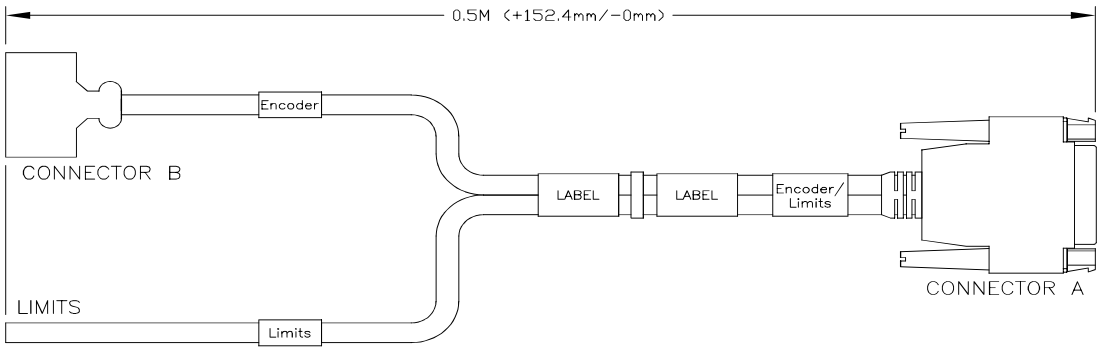


CONNECTOR B - Male 15 Pin HD-SUB		
IPA/ACR7 Absolute Encoder		
Function	**Color**	**Pin #**
SLO+	Green	1
SLO-	Orange	2
GND	White	3
+5V	Brown	5
MA+	Red	9
TEMP+	Yellow	10
MA-	Blue	13
TEMP-	Black	15
SHIELD	SHIELD	SHIELD

CONNECTOR A - Female 25 Pin D-SUB		
Absolute Encoder		
Function	**Color**	**Pin #**
+5V	Brown	5
MA+	Red	7
MA-	Blue	8
SLO+	Green	11
SLO-	Orange	12
GND	White	17
TEMP+	Yellow	19
TEMP-	Black	20
SHIELD	SHIELD	SHIELD

XLM Accessories

006-2867-01 - XLM to P Series Adapter Cable, Digital Encoder (E1, E2 & E3)
To be used with C5 or C6
(Limits are not available with the Absolute Encoder (R1, R2, R3 & R4)



LIMITS	
Function	**Color**
24VDC PNP Supply	Red
RESERVED	Blue
LIMIT- PNP-N. C.	Brown
LIMIT+ PNP-N. C.	Green
RESERVED	Yellow
LIMIT- NPN-N. C.	Gray
LIMIT+ NPN-N. C.	Pink
GND NPN/PNP	White

CONNECTOR A - Female 25 Pin D-SUB	
Encoder/Limits	
Function	**Pin #**
24VDC PNP Supply	1
LIMIT- PNP-N. C.	3
LIMIT+ PNP-N. C.	4
+5V	5
A+/MA+	7
A-/MA-	8
B+	9
B-	10
Z+/ SLO+	11
Z-/ SLO-	12
LIMIT- NPN-N. C.	15
LIMIT+ NPN-N. C.	16
GND Encoder/Halls	17
GND NPN/PNP	18
HALL 1	21
HALL 2	22
HALL 3	23
SHIELD	SHIELD

XLM Ordering Information

Fill in an order code from each of the numbered fields to create a complete part number

Order Example:

①	②	③	④	⑤	⑥	⑦	⑧	⑨
XLM	200	– P3	UA	– 0300	– E3	S	– C1	K0

① Series

XLM	Series

② Base Size (width in mm)

125	125 mm wide profile
145	145 mm wide profile
200	200 mm wide profile

③ Winding & Pole Length

P2	Parallel, 2 pole length
P3	Parallel, 3 pole length
P4	Parallel, 4 pole length

④ Sealing and Carriage Type

UA	Uncovered with Carriage A Mount
UB	Uncovered with Carriage B Mount
CA	Covered with Carriage A Mount
CB	Covered with Carriage B Mount
CC	Covered with Carriage C Mount
SA	Sealed with Carriage A Mount
SB	Sealed with Carriage B Mount
SC	Sealed with Carriage C Mount

⑤ Travel (mm) - See table on facing page for available travel lengths by base size and features.

⑥ Encoder

E1	1µ optical incremental
E2	0.1µ optical incremental
E3	0.01µ optical incremental
SC	Sine/Cosine 1V p-p
R1	Absolute BiSS-C 50 nm, 32 Bit, value increases right to left
R2	Absolute BiSS-C 5 nm, 32 Bit, value increases right to left
R3	Absolute BiSS-C 50 nm, 32 Bit, value increases left to right
R4	Absolute BiSS-C 5 nm, 32 Bit, value increases left to right

⑦ Scale

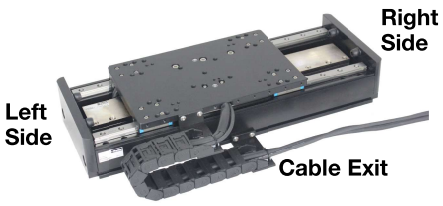
S	Steel

⑧ Cable Type

C1	3 meter cable direct from carriage, no connectors
C2	5 meter cable direct from carriage, no connectors, Sine/Cosine and Absolute ONLY (SC, R1, R2, R3, & R4)
C3	Carriage-mounted connectors with 3m universal extension cables
C4	Carriage-mounted connectors with 5m universal extension cables
C5	Carriage-mounted connectors with 3m P-Drive extension cables (NOT AVAILABLE WITH THE SC, R1, R2, R3 & R4 OPTIONS)
C6	Carriage-mounted connectors with 5m P-Drive extension cables (NOT AVAILABLE WITH THE SC, R1, R2, R3 & R4 OPTIONS)

⑨ Cable Carrier

K0	None
K1	Side carrier, narrow, cable exit to right
K2	Side carrier, medium, cable exit to right
K3	Side carrier, wide, cable exit to right
K4	Side carrier, narrow, cable exit to left
K5	Side carrier, medium, cable exit to left
K6	Side carrier, wide, cable exit to left



XLM Ordering Information

Use the following four-digit travel lengths for position ⑤ in the part number.

Series	XLM125		XLM145				XLM200			
Winding & Pole Length	P2		P3		P4		P3		P4	
Sealing	UA,UB	CA,CB,CC SA,SB,SC	UA,UB	CA,CB,CC SA,SB,SC	UA,UB	CA,CB,CC SA,SB,SC	UA,UB	CA,CB,CC SA,SB,SC	UA,UB	CA,CB,CC SA,SB,SC
Travel (mm) ⑤	0110	0100	0125	0100	0065	0040	0200	0200	0160	0140
	0160	0150	0175	0150	0115	0090	0300	0300	0260	0240
	0210	0200	0225	0200	0165	0140	0400	0400	0360	0340
	0260	0250	0275	0250	0215	0190	0500	0500	0460	0440
	0310	0300	0325	0300	0265	0240	0600	0600	0560	0540
	0410	0400	0425	0400	0365	0340	0700	0700	0660	0640
	0510	0500	0525	0500	0465	0440	0800	0800	0760	0740
	0610	0600	0625	0600	0565	0540	0900	0900	0860	0840
	0710	0700	0725	0700	0665	0640	1000	1000	0960	0940
	0810	0800	0825	0800	0765	0740	1200	1200	1160	1140
	0910	0900	0925	0900	0865	0840	1350	1350	1310	1290
	1010	1000	1025	1000	0965	0940	1500	1500	1460	1440
			1225	1200	1165	1140				

Stage Mounting

On open XLM units, the mounting locations are accessible from the top of the stage along the length of the base. On covered and sealed units, refer to Top Cover Removal section to gain access to the mounting locations. On all XLM sizes, socket head cap screws should be used to secure the table to its mounting surface. Use the following hardware recommendations to complete this.
XLM125: M4 Socket Head Cap Screws
XLM145: M4 Socket Head Cap Screw
XLM200: M6 Socket Head Cap Screws

Before you begin any motion of the positioner, the shipping strap needs removed. See Figures 2-3 below for reference. When removing the screws attached to the base, you will have to slide the square nuts from the slot at either end of the positioner.

Figure 1:

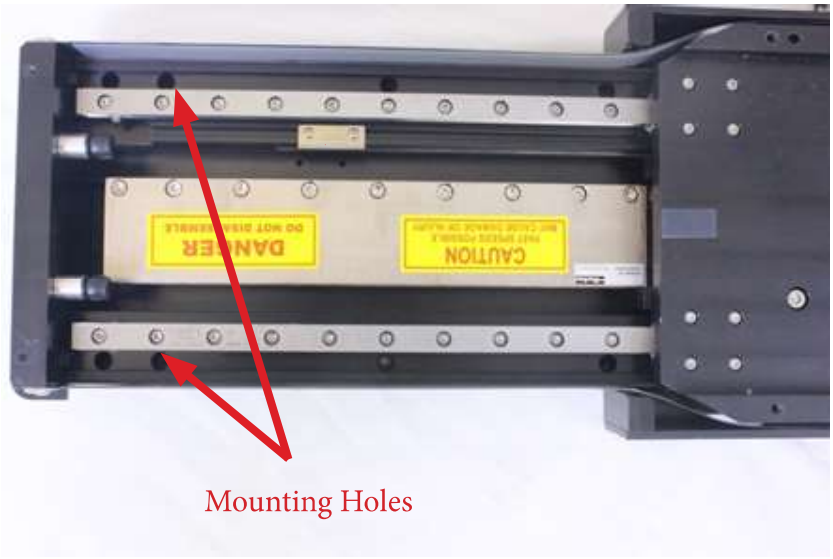


Figure 2:

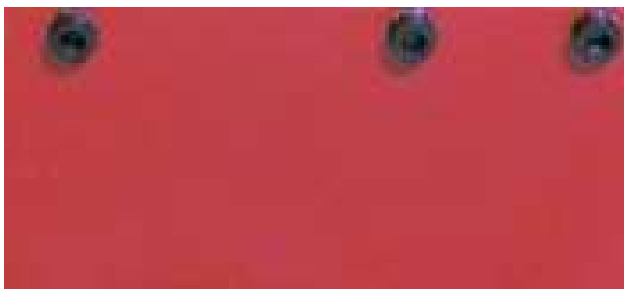


Figure 3:

Top Cover Removal

To remove the top cover on covered and sealed units, you must first remove the (6) screws in the top carriage (See Figure 2). You can then lift the carriage off the unit. Take care as the cables from the table could be constrained to the carriage thus limiting the motion and position the carriage can be placed.

Figure 2:

Next, you need to remove the (4) screws that secure the cover endcaps at each end of the table (See Figure 3). The endcaps will lift straight off.

Figure 3:
At this point, you can lift the cover off and have access to the mounting holes as well as the adjustable limits.

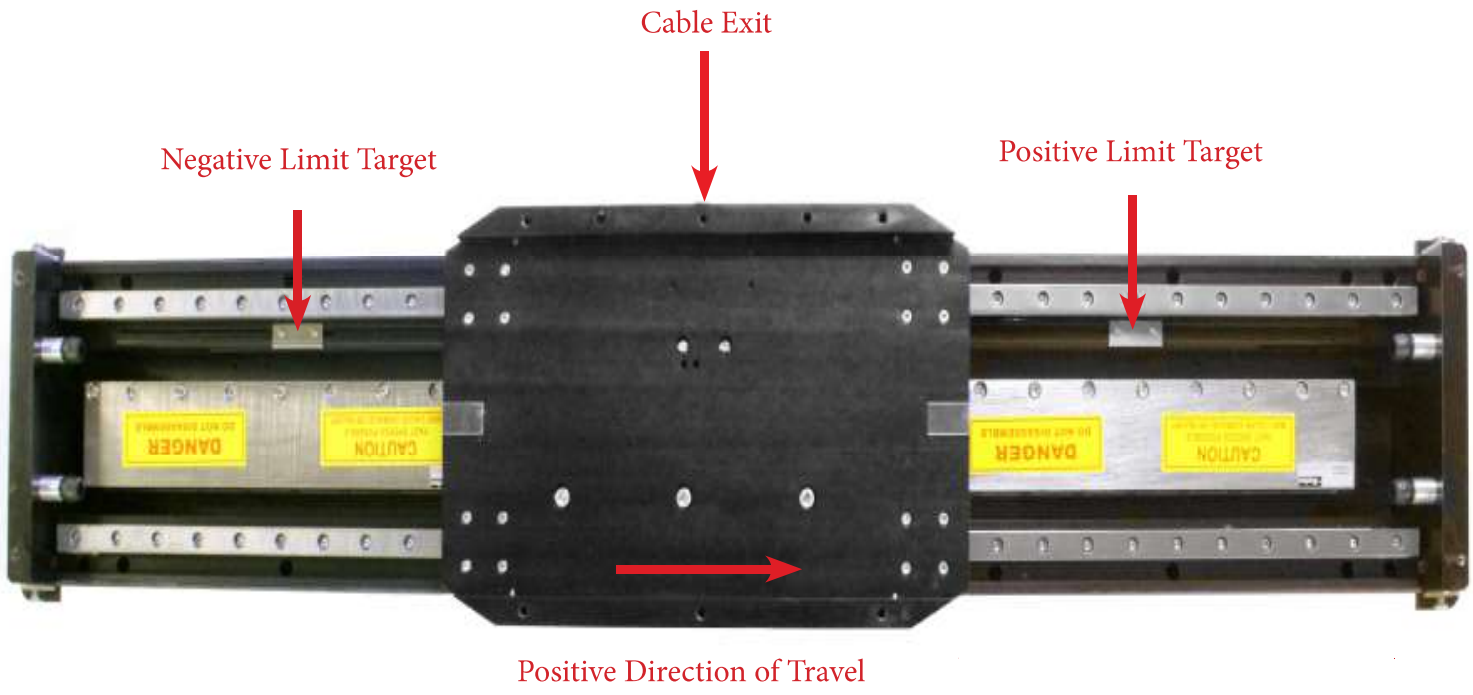
Setting the Optical Encoder Limits

The XLM 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 base (See Figure 4). The factory setting location of the limit sensor targets provide the full nominal travel of the stage with a minimum of 5mm of over travel before the stage encounters the hard stop. To adjust travel, simply loosen the screws, slide the target to the desired position, and tighten the screws.

NOTE: The active length of the target is approximately 30 mm. If the target is moved greater than 30 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 situation.

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.

Figure 4:



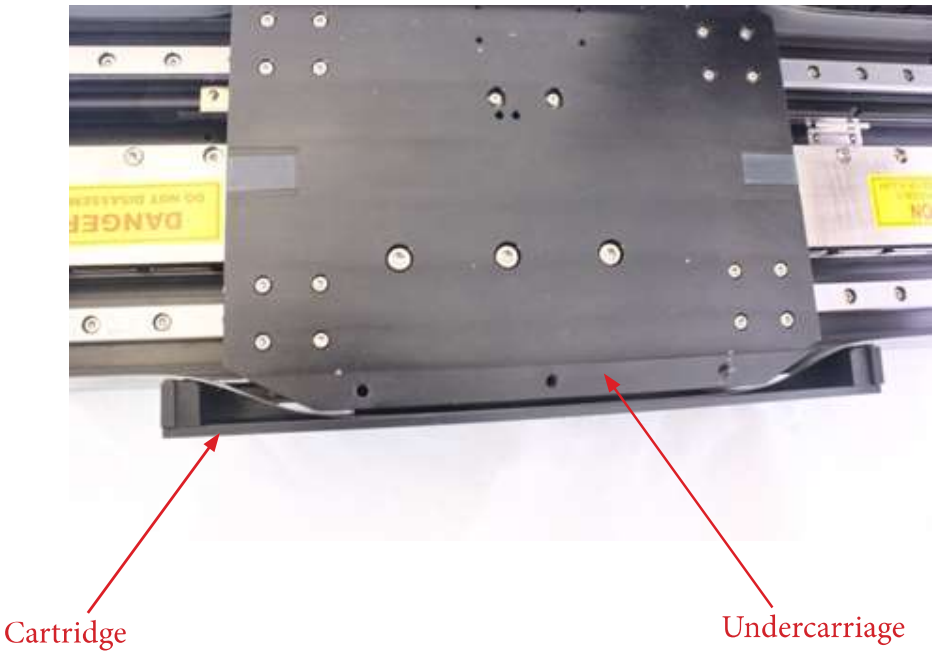
Strip Seal Removal

If you have a sealed unit, once you have performed the Top Cover Removal steps, you can then remove the (4) screws holding the end clamps of the strip seal (See Figure 5).

Figure 5:

Then, you can grab the strip seal on either side of the undercarriage and work the strip seal up out of the cartridge (See Figure 6). Safety Point: The strip seal is sharp and care must be taken to not get cut, protective gloves are recommended when handling the strip seal.

Figure 6:



Strip Seal Installation

Care should be taken when handling strip seal because edges and end of strip seal can be sharp causing laceration.

If you are installing strip seals to a covered unit or re-installing strip seals on sealed unit, you must follow the following points:

1. You will want to reverse the process of Strip Seal Removal steps above. To get the strip seal back into the undercarriage, you will have to form the strip seal inside the cartridge (See Figure 6).

2. Once in, you will need to make sure the strip seal is fully seated on top of the magnets located along the base (See Figure 7).

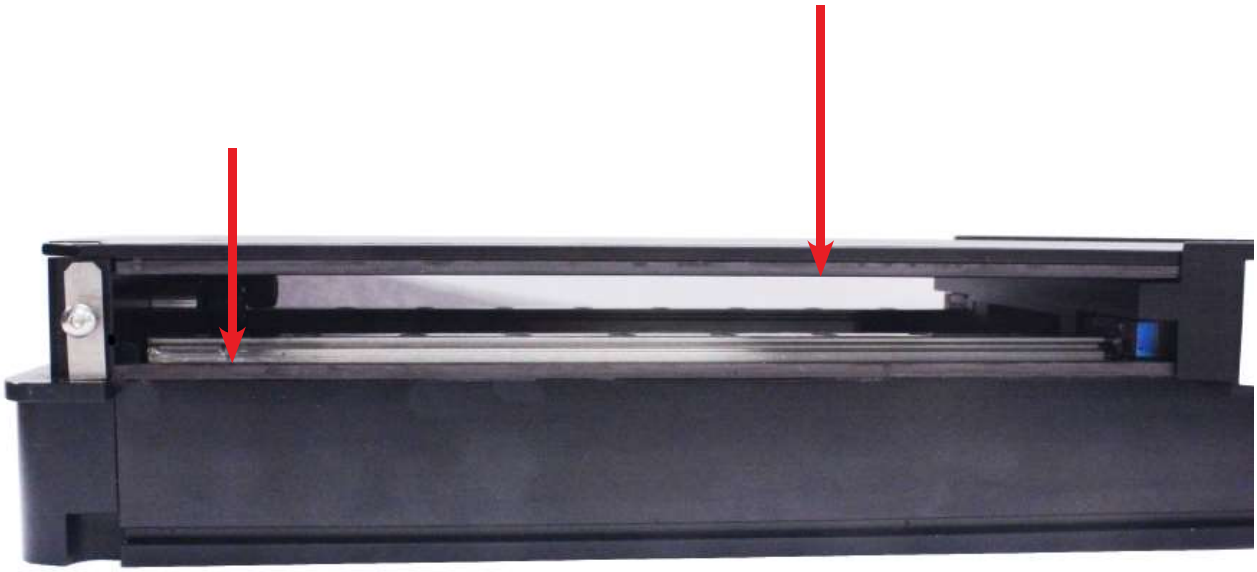
3. When that is complete and you have secured the strip seal with the end clamps (See Figure 5), you can lower the top cover on to the stage. Again, you will have to make sure to guide the cover inside the strip seals on both sides and make sure the strip seal is seated on the magnet located along the top cover.

4. Once you have those seated properly, you can install the endcaps (See Figure 3).

5. At this point, you can cycle the undercarriage along the length of travel to make sure the strip seal is tracking properly. If it is not, you may need to realign the strip seal end clamps and then cycle again.

6. Once complete, continue to close the stage.

Figure 7:

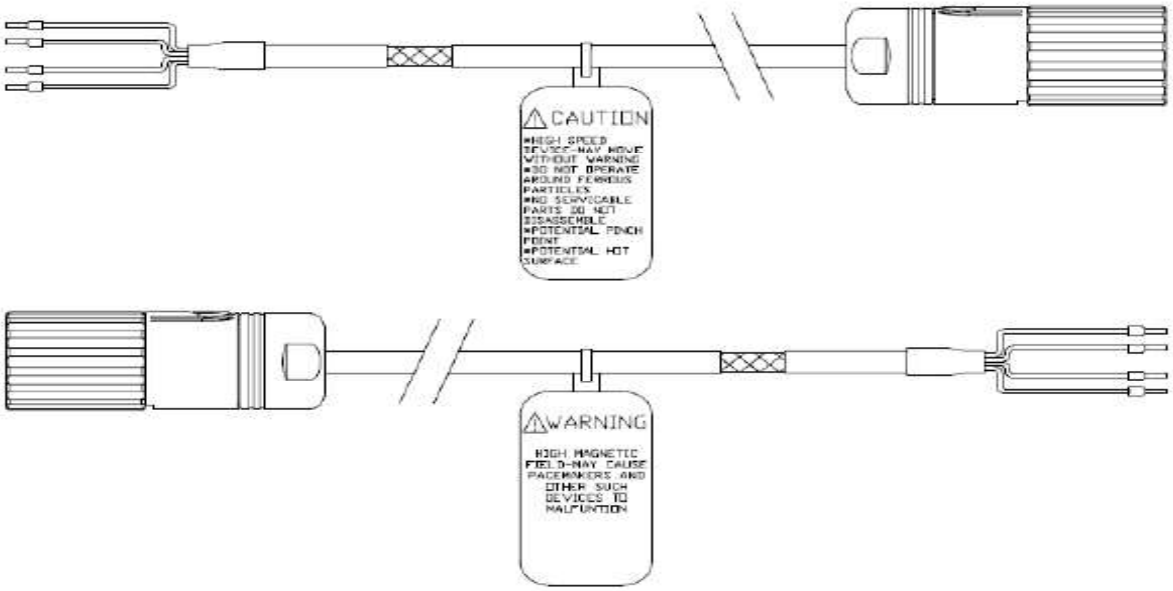


Part Number and Serial Number Location

The XLM part number and serial number can be located lower left side of the base, opposite of the cables.

Caution and Warning Label

The XLM Caution and Warning label is located on the motor cable, as pictured below:



Maintenance and Life Expectancy

Maintenance:

The XLM 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 XLM 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 Number
Optical Encoder Limit/Home Kit	002-4299-01
Narrow Cable Carrier Link (1 Piece)	003-4029-05
Narrow Cable Carrier Link End Brackets	003-4030-05
Medium Cable Carrier Link (1 Piece)	003-4029-06
Medium Cable Carrier Link End Brackets	003-4030-06
Wide Cable Carrier Link (1 Piece)	003-4029-07
Wide Cable Carrier Link End Brackets	003-4030-07
3 Meter Universal C3 Motor Extension Cable	006-2865-03.00
3 Meter Universal (E1, E2, E3, R1, R2, R3 & R4) Feedback Extension Cable	006-2862-03.00
5 Meter Universal C4 Motor Extension Cable	006-2865-05.00
5 Meter Universal (E1, E2, E3, R1, R2, R3 & R4) Feedback Extension Cable	006-2862-05.00
3 Meter Analog (SC) Feedback Extension Cable	006-2863-03.00
5 Meter Analog (SC) Feedback Extension Cable	006-2863-05.00
Adapter Cable, IPA, Digital/Analog	006-2866-01
Adapter Cable, IPA, Absolute	006-2878-01
Adapter Cable, P-Series, Digital	006-2867-01
3 Meter P-Series (C5) Motor Extension Cable	006-2877-03.00
5 Meter P-Series (C6) Motor Extension Cable	006-2877-05.00

Replacement Strip Seal Parts

XLM 125

XLM Model Number	Strip Seal Number	Quantity Needed
XLM125-P2Sx-0100	002-4205-01	2
XLM125-P2Sx-0150	002-4205-02	2
XLM125-P2Sx-0200	002-4205-03	2
XLM125-P2Sx-0250	002-4205-04	2
XLM125-P2Sx-0300	002-4205-05	2
XLM125-P2Sx-0400	002-4205-07	2
XLM125-P2Sx-0500	002-4205-09	2
XLM125-P2Sx-0600	002-4205-11	2
XLM125-P2Sx-0700	002-4205-13	2
XLM125-P2Sx-0800	002-4205-15	2
XLM125-P2Sx-0900	002-4205-17	2
XLM125-P2Sx-1000	002-4205-19	2

XLM 145

XLM Model Number	Strip Seal Number	Quantity Needed
XLM145-P3Sx-0100 XLM145-P4Sx-0040	002-4225-01	2
XLM145-P3Sx-0150 XLM145-P4Sx-0090	002-4225-02	2
XLM145-P3Sx-0200 XLM145-P4Sx-0140	002-4225-03	2
XLM145-P3Sx-0250 XLM145-P4Sx-0190	002-4225-04	2
XLM145-P3Sx-0300 XLM145-P4Sx-0240	002-4225-05	2
XLM145-P3Sx-0400 XLM145-P4Sx-0340	002-4225-07	2
XLM145-P3Sx-0500 XLM145-P4Sx-0440	002-4225-09	2
XLM145-P3Sx-0600 XLM145-P4Sx-0540	002-4225-11	2
XLM145-P3Sx-0700 XLM145-P4Sx-0640	002-4225-13	2
XLM145-P3Sx-0800 XLM145-P4Sx-0740	002-4225-15	2
XLM145-P3Sx-0900 XLM145-P4Sx-0840	002-4225-17	2
XLM145-P3Sx-1000 XLM145-P4Sx-0940	002-4225-19	2
XLM145-P3Sx-1200 XLM145-P4Sx-1140	002-4225-23	2

XLM 200

XLM Model Number	Strip Seal Number	Quantity Needed
XLM200-P3Sx-0200 XLM200-P4Sx-0140	002-4245-03	2
XLM200-P3Sx-0300 XLM200-P4Sx-0240	002-4245-05	2
XLM200-P3Sx-0400 XLM200-P4Sx-0340	002-4245-07	2
XLM200-P3Sx-0500 XLM200-P4Sx-0440	002-4245-09	2
XLM200-P3Sx-0600 XLM200-P4Sx-0540	002-4245-11	2
XLM200-P3Sx-0700 XLM200-P4Sx-0640	002-4245-13	2
XLM200-P3Sx-0800 XLM200-P4Sx-0740	002-4245-15	2
XLM200-P3Sx-0900 XLM200-P4Sx-0840	002-4245-17	2
XLM200-P3Sx-1000 XLM200-P4Sx-0940	002-4245-19	2
XLM200-P3Sx-1200 XLM200-P4Sx-1140	002-4245-23	2
XLM200-P3Sx-1350 XLM200-P4Sx-1290	002-4245-26	2
XLM200-P3Sx-1500 XLM200-P4Sx-1140	002-4245-29	2

UKCA DECLARATION OF CONFORMITY

In accordance with UK Government guidance

MANUFACTURER	**Parker Hannifin Corporation**
AUTHORIZED PERSON	**James Monnich**
ADDRESS	**Electronic Motion and Controls Division** **1140 Sandy Hill Road** **Irwin, PA 15642**
PRODUCT	XLM Series Positioner's
MODEL/TYPE	XLM125, XLM145, XLM200
YEAR OF MANUFACTURE	From: 2023

The object of the declaration described above is in conformity with the relevant UK Statutory Instrument (and their amendments):

2016 No. 1091	The Electromagnetic Compatibility Regulations 2016
2008 No. 1597	Supply of Machinery (Safety) Regulations 2008
2012 No. 3032	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

These products must be installed and operated with reference to the instructions in the Product Manual. All instruction, warnings and safety information of the Product Manual must be adhered to.

The partly completed machinery must not be put into service until the final machinery, into which it is to be incorporated, has been declared in conformity with the provisions of directive "Supply of Machinery (Safety) Regulation 2008".

The manufacturer commits to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents on the partly completed machinery electronically by our documentation department. The intellectual rights of the manufacturer of the incomplete machine are not affected.

This Declaration is issued under the sole responsibility of the manufacturer.

James Monnich, Engineering Manager
January 11, 2023

DECLARATION OF INCORPORATION

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

MANUFACTURER **AUTHORIZED PERSON**	**Parker Hannifin Corporation** **James Monnich**
ADDRESS	**Electronic Motion and Controls Division** **1140 Sandy Hill Road** **Irwin, PA 15642**
PRODUCT	XLM Series Positioner's
MODEL/TYPE	XLM125, XLM145, XLM200
YEAR OF MANUFACTURE	From: 2023

The above mentioned Manufacturer/Authorized person declare that the product is complying with the following essential requirements of the machinery directive 2006/42/EC.

Annex 1, Article 1.1.1, 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.4.1, 1.5.4, 1.5.8, 1.6.1

EN ISO 12100	Safety Of Machinery - General Principles For Design - Risk Assessment And Risk Reduction
IEC 60034-1:2010-02	Rotating electrical machines – Part 1: Rang and performance
CEI/EN 60034-5:2000+A1:2006	Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification
IEC 60034-18-1 Ed. 2.0:2010-03	Rotating Electrical Machines - Part 18-1: Functional Evaluation Of Insulation Systems - General Guidelines
IEC 60204-1:2005+A1:2008	Safety Of Machinery - Electrical Equipment Of Machines - Part 1: General Requirements
IEC 60085 Ed. 4.0 b:2007-11	Electrical insulation – Thermal evaluation and designation
EN 349:1993+A1:2008	Safety of machinery- Minimum gaps to avoid crushing of parts of the human body.
RoHS 3 (EU 2015/863)	Restriction of the use of certain hazardous substances

These products must be installed and operated with reference to the instructions in the Product Manual. All instruction, warnings and safety information of the Product Manual must be adhered to.
The partly completed machinery must not be put into service until the final machinery, into which it is to be incorporated, has been declared in conformity with the provisions of directive 2006/42/EC on machinery.
The machinery related special technical documentation according Annex VII B has been created
The manufacturer commits to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents on the partly completed machinery electronically by our documentation department. The intellectual rights of the manufacturer of the incomplete machine are not affected.

This Declaration is issued under the sole responsibility of the manufacturer.

James Monnich, Engineering Manager
January 11, 2023

EM Sales Offices

Australia

Parker Hannifin (Australia) Pty Ltd.
9 Carrington Road
Castle Hill NSW 2154
Australia
Tel: +61 (0) 2 9842 5111

Brazil

Parker Hannifin Ind. Com Ltda.
Estrada Municipal Joel De Paula
900 São Josã Dos Campos
12247-015 São Paulo Brazil
Tel: 0800 727 5375
Email: automation.brazil@parker.com

Canada

Parker Hannifin (Canada) Inc.
160 Chisholm Dr
Milton, Ontario L9T 3G9
Tel: 905-693-3000
Email: miltoncustservice@parker.com

China

Parker Hannifin Motion & Control
(Shanghai) Co., Ltd
280 Yunqiao Rd. Jin Qiao Export
Processing Zone
Shanghai 201206, China
Tel: 86-21 28995000

France

Sales Company France
142 Rue De La Foret
Contamine-Sur-Arve
France 74130
Tel: +33 (4) 5025 8025

Germany

Electromechanical Europe
Parker Hannifin GmbH & Co KG
Robert-Bosch-Strasse 22
D-77656 Offenburg
Germany
Tel: +49 (0) 7815090
Email: em-motion@parker.com

India

Parker Hannifin India PVT, LTD.
Plot El-26, Midc
Ttc Industrial Area
Mahape Navi Mumbai,
400709 India
Tel: 91-22-41242500

Italy

Sales Company Italy Via Caboto 1
Corsico Corsico (Milano)
20094 Italy
Tel: 0039 02 451921
Email: parker.italy@parker.com

Korea

Parker Hannifin Korea
9th Floor KAMCO Yangjae Tower
949-3 Dogok 1-dong Gangnam-gu
Seoul 135-860, Korea
Tel: 82-2-559-0454

Mexico

Antiguo Camino A San Lorenzo 338
Zona Industrial
Toluca, Mexico 54963
Tel: +52 722 275-4200
Email: contacto@parker.com

Singapore

Parker Hannifin Singapore Pte Ltd
11 Fourth Chin Bee Road
Singapore 619702
Tel: +65 6887 6300

Taiwan

Parker Hannifin Taiwan Co., Ltd
8F No 22 Wuquan 7th Road
Wuku District
New Taipei City, Taiwan 24890
Tel: +886 2 2298 8987
enquiry.taiwan@parker.com

Thailand

Parker Hannifin (Thailand) Co., Ltd.
1265 Rama 9 Road, Pattanakarn
Suanluang, Bangkok 10250
Thailand
Tel: +66 2186 7000
Email: infoTH_OTH@parker.com

UK

Parker Hannifin Ltd.
Tachbrook Park Drive
Tachbrook Park
Warwick CV34 6TU
Tel: +44 (0) 1926 317878
Email: parker.uk@parker.com

USA

EMC Division HQ
850 Arthur Avenue
Elk Grove Village, IL 60007
Tel: 800-221-9257
emn.service@support.parker.com

EMC Electromechanical Products
1140 Sandy Hill Road
Irwin, PA 15642
Tel: 800-358-9070
emn.service@support.parker.com

Issue Date TBD

Parker Hannifin Corporation
Electronic Motion and Controls Div.
1140 Sandy Hill Road
Irwin, PA 15642
phone 800 358 9070
fax 724 861 3330
parker.com/emc