

# PRO190LM Series

## Mechanical Bearing, Linear Motor Stage

Medium-size, high-stiffness design

Rugged mechanical construction

Direct-drive linear motor for ultra-precise motion

Ten models with travels from 100 mm to 1000 mm

Vacuum and cleanroom versions available

Available with ThermoComp™ for high-performance in changing environments

The PRO190LM is part of Aerotech's second-generation PRO-LM stage series with many improvements and added features. When higher stiffness, load capacity, and improved geometric performance is required, the PRO190LM is a solid alternative to the PRO165LM. Building on the fundamental precision design of other PRO-LM series stages, the PRO190LM is the ideal choice in many high-performance applications.

### Rugged Mechanical Construction

A long-life recirculating linear guide bearing system and a low-friction sealing solution make the PRO190LM an attractive solution for industrial applications such as laser machining. The basic external construction of the PRO190LM design provides protection from debris while the side-seals prevent dirt and particulates from entering the stage. The curved hard-cover design provides a natural shape that prevents excessive debris from collecting on the stage.

### Precision Motion Performance

The PRO190LM series stages are optimized with high-precision, noncontact linear encoders that are protected from debris by the stage sealing system. Precision recirculating linear bearings along with machining and assembly craftsmanship enable excellent geometric performance specifications.

Incremental and absolute encoders are available as standard options and enable minimum incremental motion down to 5 nm and sub-micrometer repeatability.

### Accurate Positioning with ThermoComp

Temperature changes and thermal effects are some of the largest error sources in precision machines. All PRO series



*The PRO190LM-0400 is one of 10 models in the PRO190LM series.*

stages are available with Aerotech's ThermoComp feature, an embedded temperature compensation unit that guarantees accurate positioning in variable temperature environments. Using this feature protects your process from real-world conditions, even in extreme industrial settings.

### Direct-Drive Linear Motor

Aerotech's high-power U-channel linear motors drive the PRO190LM. The ironlessforcer coil provides high force with zero cogging for super-smooth velocity and position control. This ironless design is ideal for applications requiring outstanding contour accuracy and smooth velocity profiling. As with all Aerotech linear motor stages, the linear motor has zero backlash, no windup, zero friction, and excellent dynamic responsiveness.

### Design and Integration Flexibility

The PRO190LM is designed with many standard features and options that make the design incredibly flexible and allow it to be easily tailored to a specific application. The PRO190LM is available in 10 different models with travels ranging from 100 mm to 1000 mm and speeds up to 2 m/s. Configurable cable management solutions are available for single and multi-axis systems as standard options.

Standard mounting holes for both English and metric optical tables are present in all travels. The tabletop is available with both English and metric mounting patterns and can be ordered with brush attachments to clear any debris that may collect on the stage hard cover. Tabletops with hole patterns that allow the direct attachment of several Aerotech rotary stages are also available.

The PRO190LM series is also available with cleanroom preparation and vacuum versions.

# PRO190LM Series SPECIFICATIONS

Mechanical Specifications		PRO190LM									
Travel		100	150	200	250	300	400	500	600	800	1000
Accuracy <sup>(1)</sup>	Standard	±4 µm	±6 µm	±8 µm	±9 µm	±10 µm	±12 µm	±14 µm	±15.5 µm	±17 µm	±18 µm
	HALAR	±1 µm	±1 µm	±1 µm	±1 µm	±1 µm	±1 µm	±1 µm	±1 µm	±1.5 µm	±1.5 µm
Resolution (Min. Incremental Motion)		5 nm (-E1 Encoder), 10 nm (-E3 Encoder)									
Bidirectional Repeatability <sup>(1)</sup>		±0.3 µm	±0.4 µm	±0.4 µm	±0.4 µm	±0.4 µm	±0.4 µm	±0.4 µm	±0.4 µm	±0.5 µm	±0.5 µm
Horizontal Straightness <sup>(1)</sup>		±1.5 µm	±2 µm	±2.5 µm	±3 µm	±3.5 µm	±4.5 µm	±5.5 µm	±6.5 µm	±8 µm	±9.5 µm
Vertical Straightness <sup>(1)</sup>		±1.5 µm	±2 µm	±2.5 µm	±3 µm	±3.5 µm	±4.5 µm	±5.5 µm	±6.5 µm	±8 µm	±9.5 µm
Pitch		27 µrad (5.6 arc sec)	29 µrad (6 arc sec)	40 µrad (8.2 arc sec)	45 µrad (9.3 arc sec)	50 µrad (10.3 arc sec)	60 µrad (12.4 arc sec)	70 µrad (14.4 arc sec)	80 µrad (16.5 arc sec)	90 µrad (18.6 arc sec)	110 µrad (22.7 arc sec)
Roll		27 µrad (5.6 arc sec)	29 µrad (6 arc sec)	40 µrad (8.2 arc sec)	45 µrad (9.3 arc sec)	50 µrad (10.3 arc sec)	60 µrad (12.4 arc sec)	70 µrad (14.4 arc sec)	80 µrad (16.5 arc sec)	90 µrad (18.6 arc sec)	110 µrad (22.7 arc sec)
Yaw		27 µrad (5.6 arc sec)	29 µrad (6 arc sec)	40 µrad (8.2 arc sec)	45 µrad (9.3 arc sec)	50 µrad (10.3 arc sec)	60 µrad (12.4 arc sec)	70 µrad (14.4 arc sec)	80 µrad (16.5 arc sec)	90 µrad (18.6 arc sec)	110 µrad (22.7 arc sec)
Maximum Speed <sup>(2)</sup>		2 m/s									
Maximum Acceleration <sup>(2)</sup>		3 g									
Maximum Force, Continuous		106.7 N – Standard 154.7 – With Air Cooling (20 psig)									
Load Capacity <sup>(3)</sup>	Horizontal	60 kg									
	Side	60 kg									
Moving Mass		4.5 kg									
Stage Mass		14.4 kg	15.6 kg	16.8 kg	18.1 kg	19.3 kg	21.7 kg	24.2 kg	26.6 kg	31.5 kg	36.4 kg
Material		Anodized Aluminum									
MTBF (Mean Time Between Failure)		20,000 Hours									

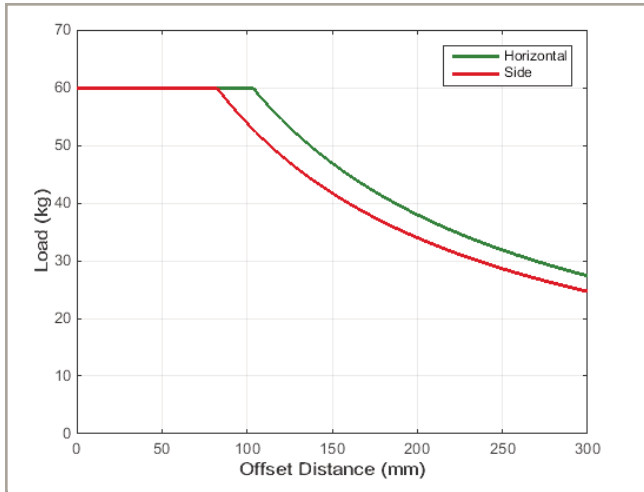
**Notes:**

1. Certified with -PL1 option.
2. Requires the selection of an appropriate amplifier with sufficient voltage and current.
3. Axis-orientation for on-axis loading is listed.
4. Specifications are for single-axis systems measured 25 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Contact factory for multi-axis applications.

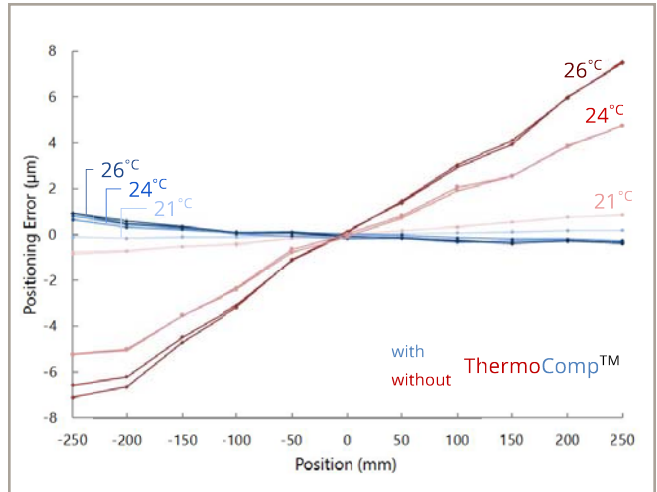
Electrical Specifications	
Drive System	Brushless Linear Servomotor
Feedback	Noncontact Encoder Incremental – 1 Vpp and TTL (0.1 µm) Output Absolute – EnDat 2.2
Maximum Bus Voltage	320 VDC
Limit Switches	5 V, Normally-Closed
Home Switch	Near Center

Recommended Controller		
Multi-Axis	A3200	Ndrive HLe/Ndrive CP/Ndrive HPe/Npaq
	Ensemble	Ensemble HLe/Ensemble CP/Ensemble HPe
Single Axis	Soloist	Soloist CP/Soloist HPe

### PRO190LM Series SPECIFICATIONS

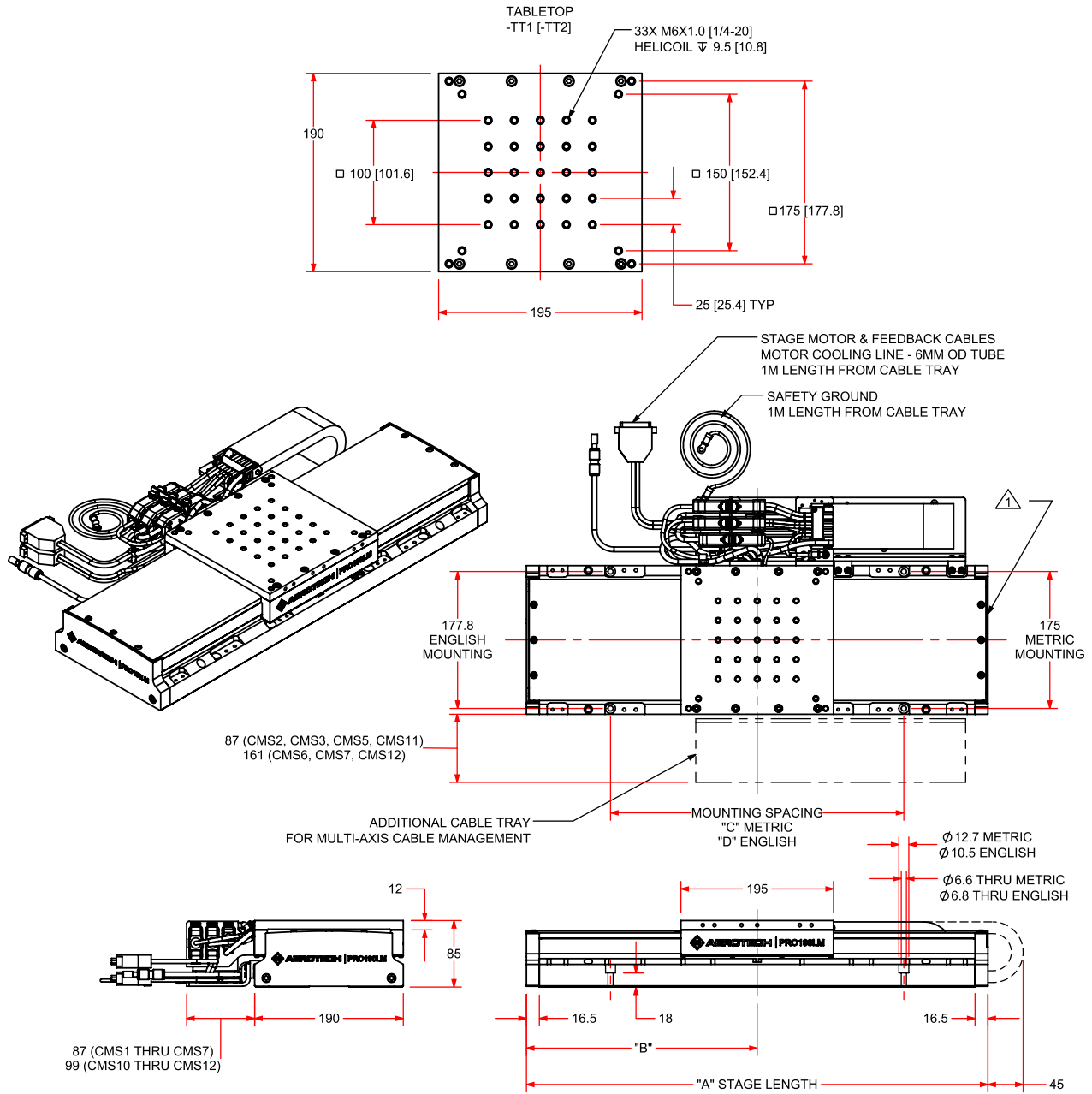


Cantilevered load capability of the PRO190LM.



Measurement data showing successful compensation of thermal related positioning errors at several temperatures using the ThermoComp feature. Results are typical of stage performance with and without ThermoComp.

# PRO190LM Series DIMENSIONS

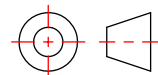


BASIC MODEL	NOMINAL TRAVEL	ELEC LIMIT TRAVEL	MECH LIMIT TRAVEL	A	B	C	D
PRO190LM-0100	100	105	125	390	195	175, 275	177.8
PRO190LM-0150	150	155	175	440	220	175, 275	177.8
PRO190LM-0200	200	205	225	490	245	175, 275	177.8
PRO190LM-0250	250	255	275	540	270	175, 375	177.8
PRO190LM-0300	300	305	325	590	295	175, 375	177.8, 431.8
PRO190LM-0400	400	405	425	690	345	175, 375, 575	177.8, 533.4
PRO190LM-0500	500	505	525	790	395	175, 375, 575	177.8, 533.4
PRO190LM-0600	600	605	625	890	445	175, 375, 575, 775	177.8, 533.4
PRO190LM-0800	800	805	825	1090	545	175, 375, 575, 775, 975	177.8, 533.4, 838.2
PRO190LM-1000	1000	1005	1025	1290	645	175, 375, 575, 775, 975, 1175	177.8, 533.4, 838.2, 1143

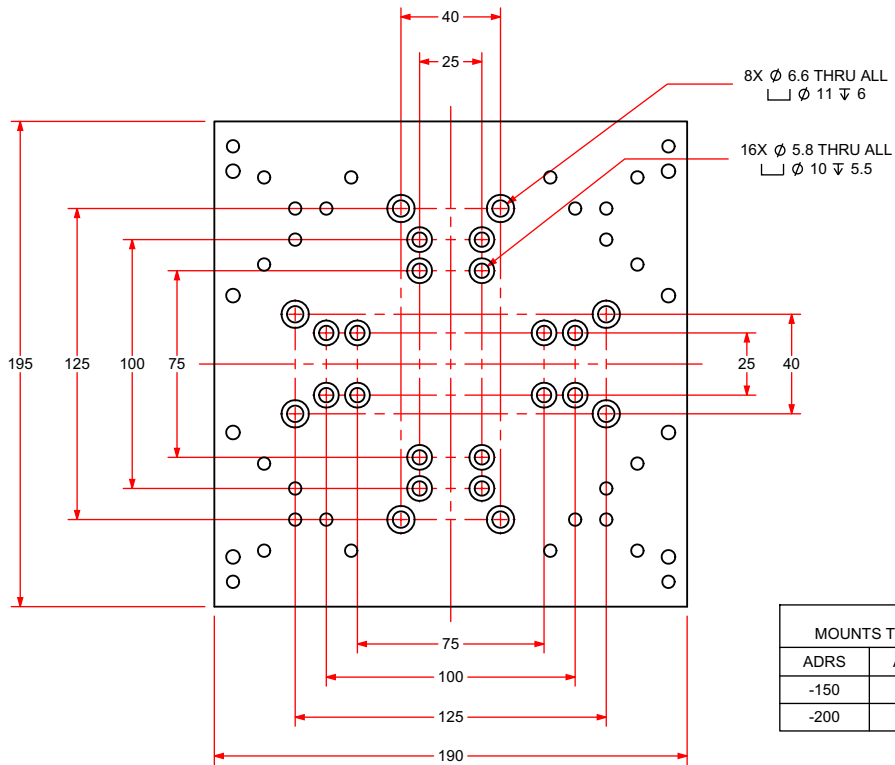
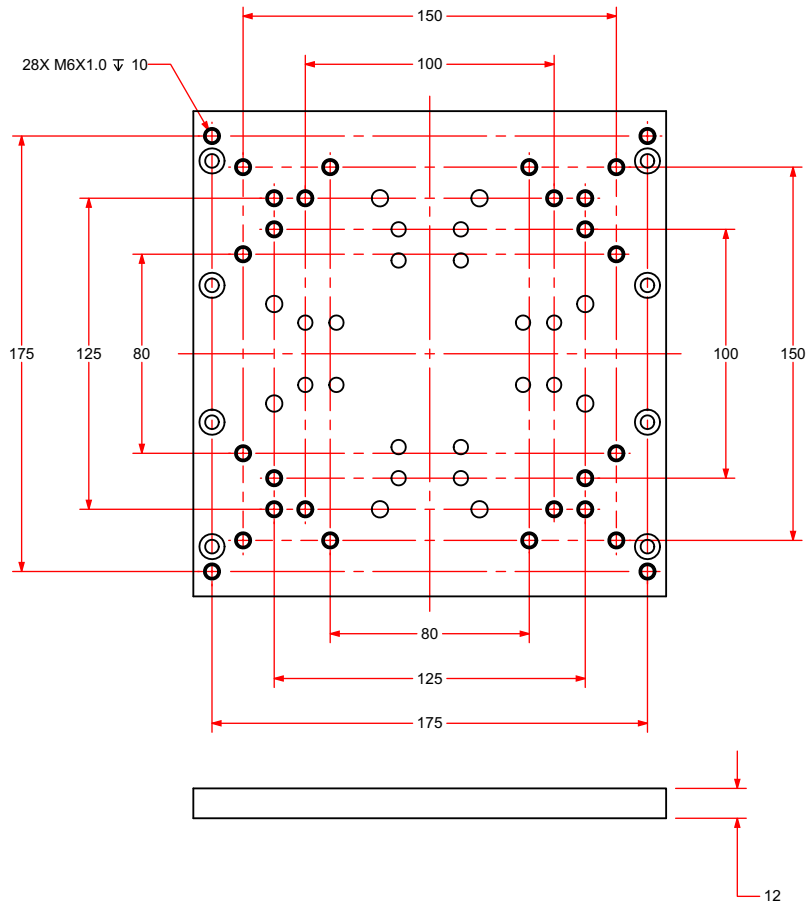
**NOTES:**

△ M5X0.8 FOR CUSTOMER-INSTALLED AIR PURGE FITTING.

2. DIMENSIONS: MILLIMETERS.

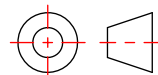


# PRO190LM Series Accessory Tabletop DIMENSIONS



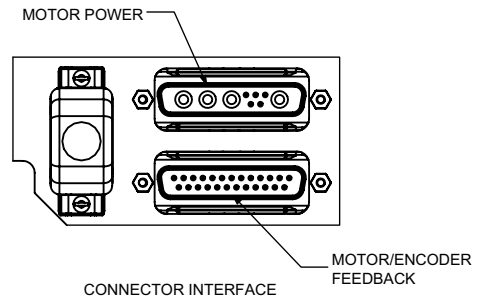
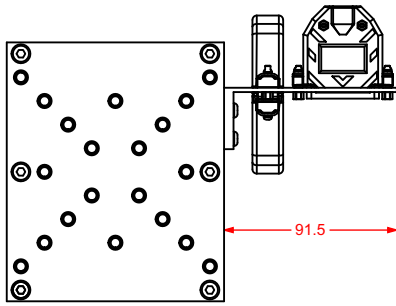
-TT3 MOUNTS THE FOLLOWING		
ADRS	ADRT	AGR
-150	-150	100
-200		

DIMENSIONS: MILLIMETERS

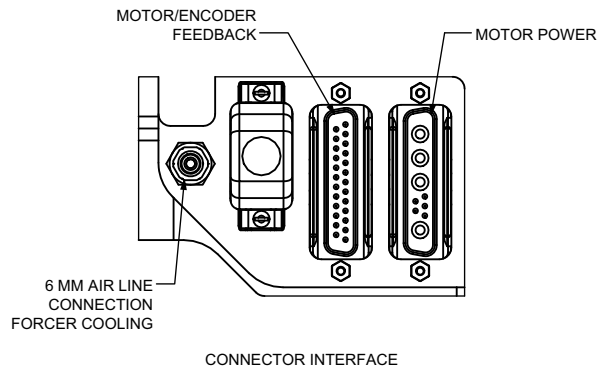
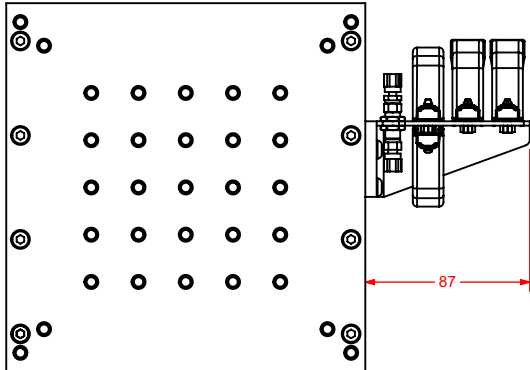


PRO190LM Series Cable Management (-CMS0) DIMENSIONS

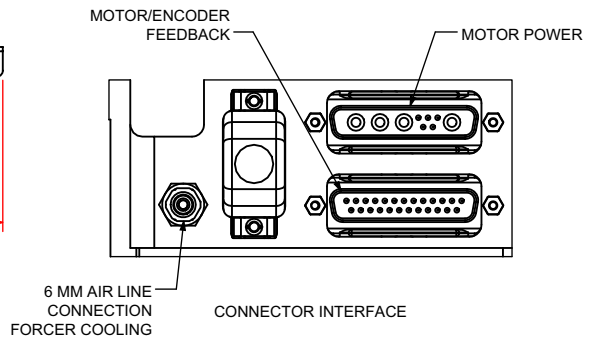
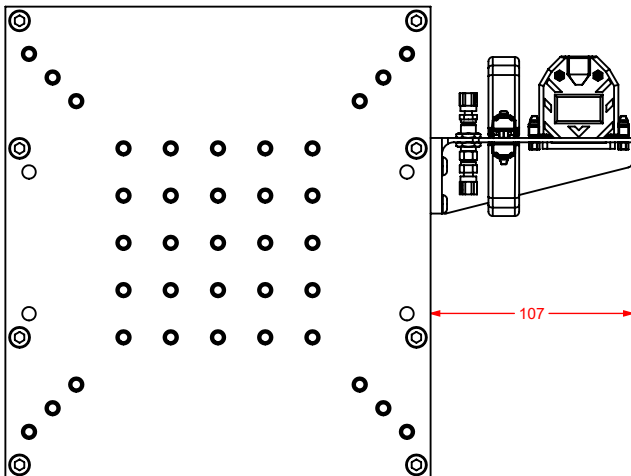
PRO115LM/PRO165LM -CMS0



PRO190LM -CMS0



PRO225LM/PRO280LM/PRO560LM -CMS0



DIMENSIONS: MILLIMETERS

## PRO190LM Series ORDERING INFORMATION

### PRO190LM Linear Motor Stage

-0100	100 mm travel stage with hardcover, side-seals, and limits
-0150	150 mm travel stage with hardcover, side-seals, and limits
-0200	200 mm travel stage with hardcover, side-seals, and limits
-0250	250 mm travel stage with hardcover, side-seals, and limits
-0300	300 mm travel stage with hardcover, side-seals, and limits
-0400	400 mm travel stage with hardcover, side-seals, and limits
-0500	500 mm travel stage with hardcover, side-seals, and limits
-0600	600 mm travel stage with hardcover, side-seals, and limits
-0800	800 mm travel stage with hardcover, side-seals, and limits
-1000	1000 mm travel stage with hardcover, side-seals, and limits

### Tabletop (Required)

-TT1	Tabletop with metric dimension mounting pattern and holes
-TT2	Tabletop with English dimension mounting pattern and holes
-TT3	Accessory tabletop with mounting pattern for Aerotech rotary stages; see drawings for the supported stage types
-TT4	Tabletop with metric dimension mounting pattern and holes and optional brushes to assist in debris removal from hardcover
-TT5	Tabletop with English dimension mounting pattern and holes and optional brushes to assist in debris removal from hardcover
-TT6	Accessory tabletop with wiper and mounting pattern for Aerotech rotary stages; see drawings for the supported stage types

Note: -TT1 option required for lower axis of XY.

### Encoder (Required)

-E1	Incremental linear encoder; 1 Vpp
-E2	Incremental linear encoder; 0.1 $\mu$ m digital TTL output
-E3	Absolute linear encoder; EnDat 2.2

### CMS (Required)

-CMS0	No external cable management system; motor/feedback connector bracket located on carriage (-CMS0)
-CMS1	External cable management system for single axis (-X-CMS)
-CMS2	External cable management system for lower-axis of two-axis PRO XY assembly; flying leads to PRO stages; order with lower-axis only (-XY-CMS)
-CMS3	External cable management system for lower-axis of two-axis (XZ or XT) assembly; connectorized at top for Z or T axis; order with lower-axis only (-XZ/XT-CMS)
-CMS4	External cable management system for upper-axis of two-axis PRO XY assembly; flying leads to PRO stages; order with upper-axis only (-Y-CMS)
-CMS5	External cable management system for upper-axis of two-axis (YZ or YT) assembly; connectorized at the top for Z or T axis; order with upper-axis only (-YZ/YT-CMS)
-CMS6	External cable management system for lower-axis of three-axis (XYZ or XYT) assembly; flying leads to PRO stages; order with lower-axis only (-XYZ/XYT-CMS)
-CMS7	External cable management system for lower-axis of three-axis (XZT) assembly; connectorized at the top for Z and T axis; order with lower-axis only (-XZT-CMS)
-CMS10	External cable management system for upper-axis of two-axis PRO190LM/225LM XY assembly; flying leads to PRO stages; order with upper-axis only when bottom axis is PRO225LM (-Y-CMS w/225LM)
-CMS11	External cable management system for upper-axis of three-axis PRO190LM/225LM/Z (YZ or YT) assembly; connectorized at the top for Z or T axis; order with upper-axis only when bottom axis is PRO225LM (-YZ/YT-CMS w/225LM)
-CMS12	External cable management system for upper-axis of four-axis PRO190LM/225LM/Z/T stack (YZT) assembly; connectorized at the top for Z and T axis; order with upper-axis only when bottom is PRO225LM (-YZT-CMS)

### Lifting (Optional)

-LF1	Lifting hardware
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Note: Lifting option only available on travels 400 mm and greater. Lifting should never be ordered on the upper-axis of an XY set (only order on lower-axis)

### Metrology (Required)

-PL0	No Accuracy, Straightness, and Flatness plots (standard)
-PL1	Accuracy, Straightness, and Flatness plots provided

## PRO190LM Series ORDERING INFORMATION

### ThermoComp (Optional)

-TCMP ThermoComp™ integrated thermal compensation feature

Note: An A3200 controller must be used with the –TCMP option.

### Accessories (to be ordered as separate line item)

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HALAR	High-accuracy system correction
ALIGNMENT-NPA	Non-precision XY assembly
ALIGNMENT-NPAZ	Non-precision XZ or YZ assembly
ALIGNMENT-PA10	XY assembly; 10 arc sec orthogonality; alignment to within 7 microns orthogonality for short travel stages
ALIGNMENT-PA10Z	XZ or YZ assembly with L-bracket; 10 arc sec orthogonality; alignment to within 10 microns orthogonality for short travel stages
ALIGNMENT-PA5	XY assembly; 5 arc sec orthogonality; alignment to within 3 microns orthogonality for short travel stages
ALIGNMENT-PA5Z	XZ or YZ assembly with L-bracket; 5 arc sec orthogonality; alignment to within 5 microns orthogonality for short travel stages