

# PRO280LM Series

## Mechanical Bearing, Linear Motor Stage

Improved second-generation design

Rugged mechanical construction

Direct-drive linear motor for ultra-precise motion

Eight models with travels from 300 mm to 1500 mm

Vacuum and cleanroom versions available

Available with ThermoComp™ for high-performance in changing environments

The PRO280LM is part of Aerotech's second-generation PRO-LM stage series with many improvements and added features. Enhanced positioning specifications, improved stiffness, and competitive pricing make the PRO280LM stage the ideal choice for both medium and high-performance production applications. The PRO280LM design provides a good alternative to the PRO225LM for applications requiring higher motor force, higher stiffness, larger load capacity, or longer linear travels.

### Rugged Mechanical Construction

A long-life recirculating linear guide bearing system and a low-friction sealing solution make the PRO280LM an attractive solution for industrial applications such as laser machining. The basic external construction of the PRO280LM 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 PRO280LM 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.

## PRO Series Gen II

Up to:  
98% Higher Resolution  
46% Better Repeatability  
40% Reduction in Error Motions  
33% Improved Accuracy

Available with  
**ThermoComp™**



*The PRO280LM-0600 is one of eight models in the PRO280LM series.*

### Accurate Positioning with ThermoComp

Temperature changes and thermal effects are some of the largest error sources in precision machines. All PRO 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 PRO280LM. 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 PRO280LM 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 PRO280LM is available in eight different models with travels ranging from 300 mm to 1500 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 PRO280LM series is also available with cleanroom preparation and vacuum versions.

## PRO280LM Series SPECIFICATIONS

| Mechanical Specifications                  |            | PRO280LM   |                           |                           |                           |                           |                            |                            |                            |
|--|------------|--|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| Travel                                     |            | 300  | 400                       | 500                       | 600                       | 800                       | 1000                       | 1200                       | 1500                       |
| Accuracy <sup>(1)</sup>                    | Standard   | ±10 µm   | ±12 µm                    | ±14 µm                    | ±15.5 µm                  | ±17 µm                    | ±18 µm                     | ±21 µm                     | ±22 µm                     |
|  | Calibrated | ±1 µm  | ±1 µm                     | ±1 µm                     | ±1 µm                     | ±1.5 µm                   | ±1.5 µm                    | ±2 µm                      | ±2 µm                      |
| Resolution (Min. Incremental Motion)       |            | 5 nm (-E1 Encoder), 10 nm (-E3 Encoder)                    |                           |                           |                           |                           |                            |                            |                            |
| Bidirectional Repeatability <sup>(1)</sup> |            | ±0.4 µm  | ±0.4 µm                   | ±0.4 µm                   | ±0.4 µm                   | ±0.5 µm                   | ±0.5 µm                    | ±0.5 µm                    | ±0.5 µm                    |
| Horizontal Straightness <sup>(1)</sup>     |            | ±3 µm  | ±4 µm                     | ±5 µm                     | ±6 µm                     | ±7 µm                     | ±8 µm                      | ±8.5 µm                    | ±9.5 µm                    |
| Vertical Straightness <sup>(1)</sup>       |            | ±3 µm  | ±4 µm                     | ±5 µm                     | ±6 µm                     | ±7 µm                     | ±8 µm                      | ±8.5 µm                    | ±9.5 µm                    |
| Pitch                                      |            | 49 µrad<br>(10.1 arc sec)                                  | 60 µrad<br>(12.4 arc sec) | 70 µrad<br>(14.4 arc sec) | 78 µrad<br>(16.1 arc sec) | 90 µrad<br>(18.6 arc sec) | 110 µrad<br>(22.7 arc sec) | 120 µrad<br>(24.7 arc sec) | 130 µrad<br>(26.8 arc sec) |
| Roll                                       |            | 49 µrad<br>(10.1 arc sec)                                  | 60 µrad<br>(12.4 arc sec) | 70 µrad<br>(14.4 arc sec) | 78 µrad<br>(16.1 arc sec) | 90 µrad<br>(18.6 arc sec) | 110 µrad<br>(22.7 arc sec) | 120 µrad<br>(24.7 arc sec) | 130 µrad<br>(26.8 arc sec) |
| Yaw  |            | 49 µrad<br>(10.1 arc sec)                                  | 60 µrad<br>(12.4 arc sec) | 70 µrad<br>(14.4 arc sec) | 78 µrad<br>(16.1 arc sec) | 90 µrad<br>(18.6 arc sec) | 110 µrad<br>(22.7 arc sec) | 120 µrad<br>(24.7 arc sec) | 130 µrad<br>(26.8 arc sec) |
| Maximum Speed <sup>(2)</sup>               |            | 2 m/s  |                           |                           |                           |                           |                            |                            |                            |
| Maximum Acceleration <sup>(2)</sup>        |            | 3 g  |                           |                           |                           |                           |                            |                            |                            |
| Maximum Force, Continuous                  |            | 266.2 N – Standard<br>437.1 N – With Air Cooling (20 psig) |                           |                           |                           |                           |                            |                            |                            |
| Load Capacity <sup>(3)</sup>               | Horizontal | 150 kg   |                           |                           |                           |                           |                            |                            |                            |
|  | Side       | 150 kg   |                           |                           |                           |                           |                            |                            |                            |
| Moving Mass                                |            | 13.8 kg  |                           |                           |                           |                           |                            |                            |                            |
| Stage Mass                                 |            | 51.7 kg  | 56.9 kg                   | 62.2 kg                   | 67.4 kg                   | 78.0 kg                   | 88.5 kg                    | 99.0 kg                    | 114.8 kg                   |
| Material                                   |            | Anodized Aluminum  |                           |                           |                           |                           |                            |                            |                            |
| MTBF (Mean Time Between Failure)           |            | 20,000 Hours   |                           |                           |                           |                           |                            |                            |                            |

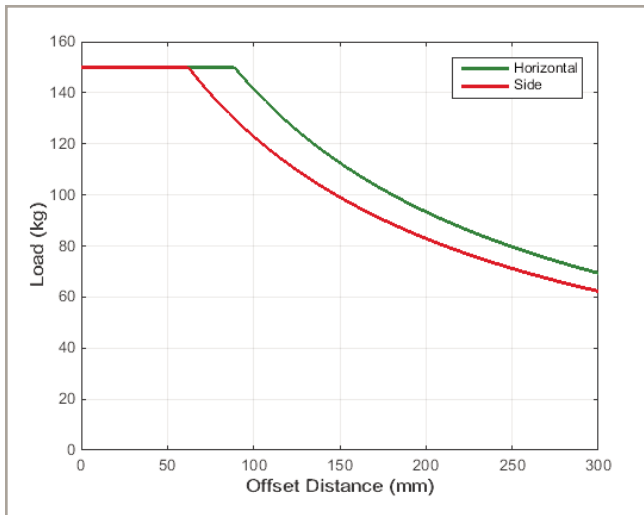
Notes:

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.

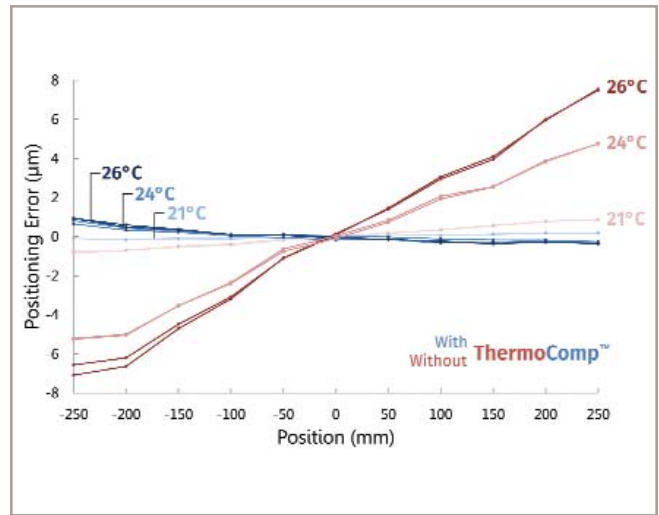
| Electrical Specifications |   |
|---------------------------|---|
| Drive System              | Brushless Linear Servomotor   |
| Feedback                  | Noncontact Encoder<br>Incremental – 1 Vpp and TTL (0.1 µm) Output<br>Absolute – EnDat 2.2 |
| Maximum Bus Voltage       | 320 VDC   |
| Limit 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                |

### PRO280LM Series SPECIFICATIONS

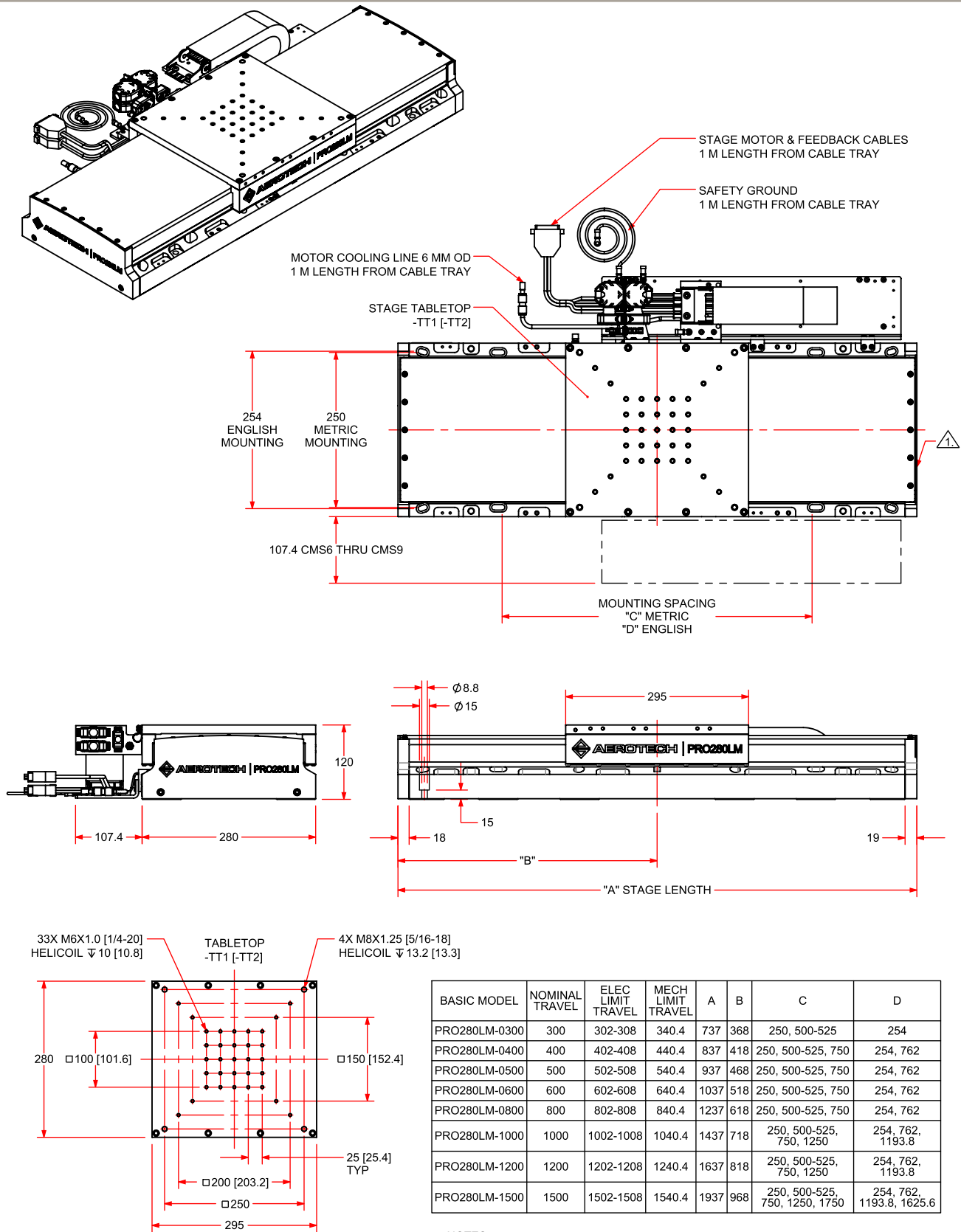


Cantilevered load capability of the PRO280LM.



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.

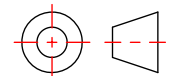
# PRO280LM Series DIMENSIONS



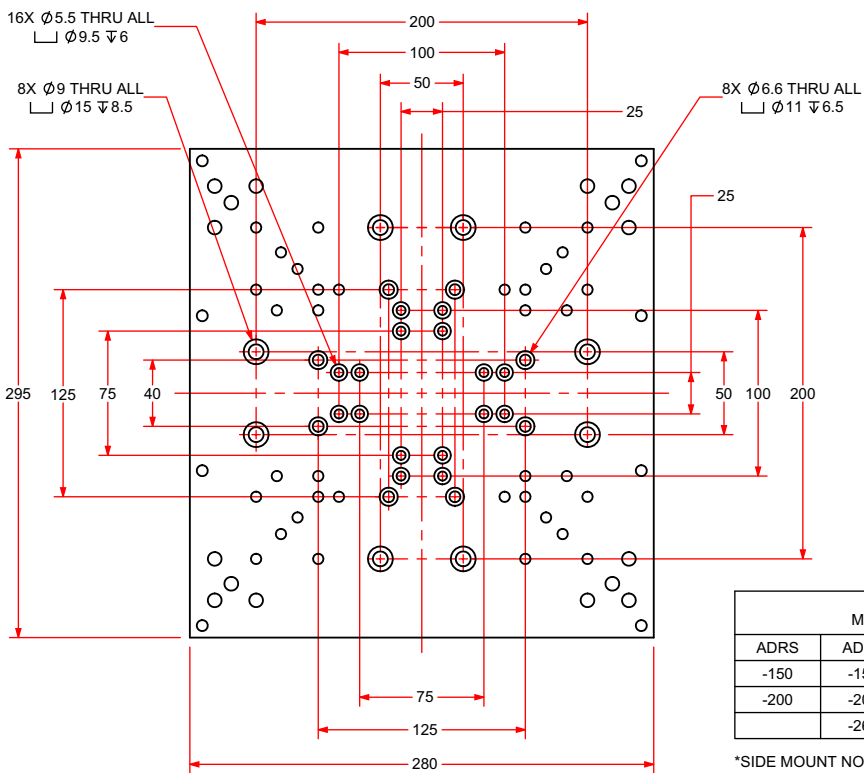
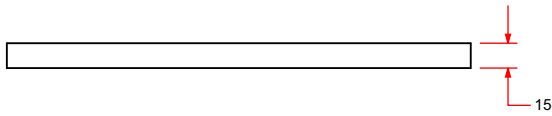
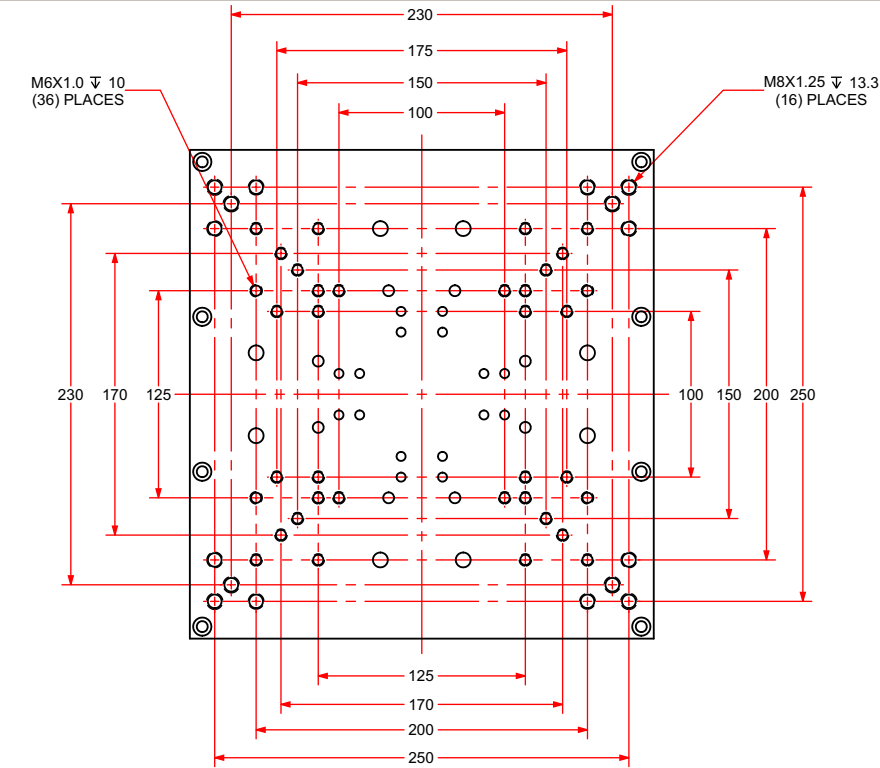
NOTES:

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

2. DIMENSIONS: MILLIMETERS.



# PRO280LM Series Accessory Tabletop DIMENSIONS

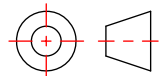


-TT3  
MOUNTS THE FOLLOWING

| ADRS | ADRT | AGR | ALAR     | CCS190DR |
|------|------|-----|----------|----------|
| -150 | -150 | 150 | -100-SP* | -240     |
| -200 | -200 | 200 | -100-LP* | -260     |
|      | -260 |     |          |          |

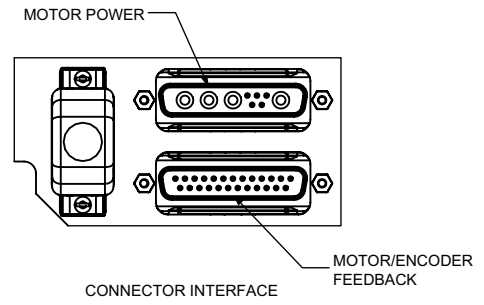
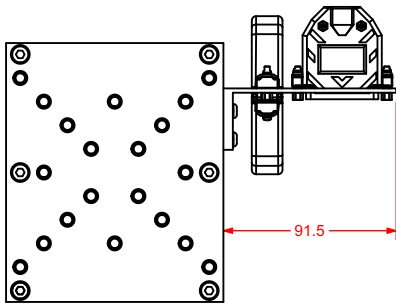
\*SIDE MOUNT NOT AVAILABLE

DIMENSIONS: MILLIMETERS

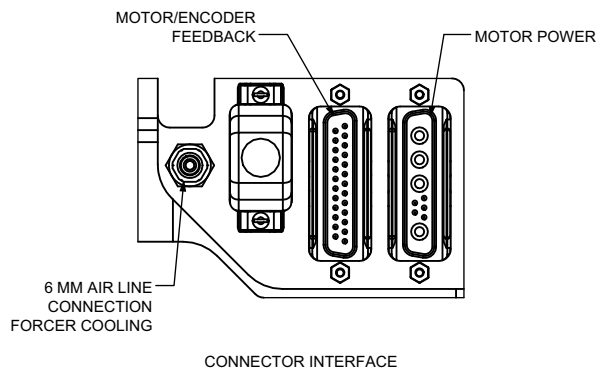
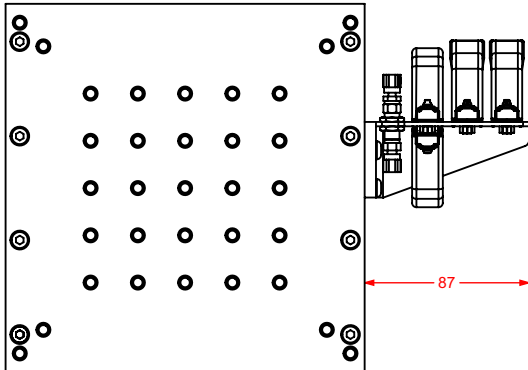


PRO280LM Series Cable Management (-CMS0) DIMENSIONS

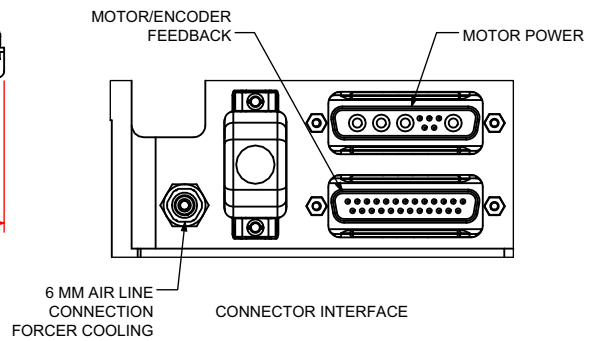
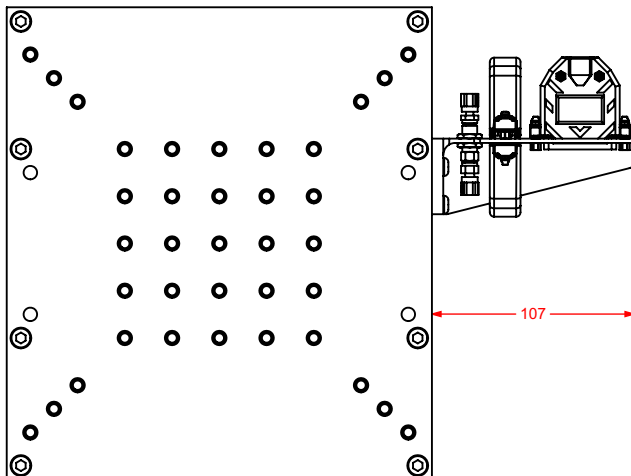
PRO115LM/PRO165LM -CMS0



PRO190LM -CMS0



PRO225LM/PRO280LM/PRO560LM -CMS0



DIMENSIONS: MILLIMETERS

## PRO280LM Series ORDERING INFORMATION

### Travel (Required)

|       |                      |
|-------|----------------------|
| -0300 | 300 mm travel stage  |
| -0400 | 400 mm travel stage  |
| -0500 | 500 mm travel stage  |
| -0600 | 600 mm travel stage  |
| -0800 | 800 mm travel stage  |
| -1000 | 1000 mm travel stage |
| -1200 | 1200 mm travel stage |
| -1500 | 1500 mm travel stage |

### Mounting Orientation (Required)

|      |                                      |
|------|--------------------------------------|
|      | Normal mounting orientation          |
| -MT1 | Side-mounted or vertical orientation |
| -MT2 | Inverted mounting orientation        |

### Tabletop(Required)

|      |  |
|------|--|
| -TT1 | Tabletop with metric dimension mounting                              |
| -TT2 | Tabletop with English dimension mounting                             |
| -TT3 | Accessory tabletop with mounting for select rotary stages            |
| -TT4 | Tabletop with metric dimension mounting and wiper brushes            |
| -TT5 | Tabletop with English dimension mounting and wiper brushes           |
| -TT6 | Accessory tabletop with mounting for select rotary stages and wipers |

NOTE: -TT1 or -TT4 tabletop option required for lower axis of XY.

### Feedback (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                         |

### Cable Management (Required)

|       |   |
|-------|---|
| -CMS0 | No external CMS, motor/feedback connector bracket on carriage   |
| -CMS1 | External CMS for single axis                                    |
| -CMS2 | External CMS for lower-axis of two-axis PRO (XY) assembly       |
| -CMS3 | External CMS for lower-axis of two-axis (XZ or XT) assembly     |
| -CMS4 | External CMS for upper-axis of two-axis PRO (XY) assembly       |
| -CMS5 | External CMS for upper-axis of two-axis (YZ or YT) assembly     |
| -CMS6 | External CMS for lower-axis of three-axis (XYZ or XYT) assembly |
| -CMS7 | External CMS for lower-axis of three-axis (XZT) assembly        |
| -CMS8 | External CMS for upper-axis of four-axis (XYZT) assembly        |
| -CMS9 | External CMS for lower-axis of four-axis (XYZT) assembly        |

### Lifting Hardware (Optional)

|     |                  |
|-----|------------------|
| -LF | Lifting hardware |
|-----|------------------|

NOTE: Lifting option available on all travels. Lifting should never be ordered on the upper-axis of an XY set (only order on lower-axis).

### ThermoComp (Optional)

|       |  |
|-------|--|
| -TCMP | ThermoComp integrated thermal compensation, single or lower axis |
|-------|--|

NOTE: An A3200 controller must be used with the -TCMP option.

### Metrology (Required)

|      |  |
|------|--|
| -PL0 | No metrology performance plots                       |
| -PL1 | Metrology, uncalibrated with performance plots       |
| -PL2 | Metrology, calibrated (HALAR) with performance plots |

## PRO280LM Series ORDERING INFORMATION

### Integration (Required)

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

|      |  |
|------|--|
| -TAS | <b>Integration - Test as system</b><br><br>Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.         |
| -TAC | <b>Integration - Test as components</b><br><br>Testing and integration of individual items as discrete components. This is typically used for spare parts, replacement parts, or items that will not be used or shipped together (ex: stage only). These components may or may not be part of a larger system. |

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

|             |  |
|-------------|--|
| ALIGN-NPA   | Non-precision XY assembly  |
| ALIGN-NPAZ  | Non-precision XZ or YZ assembly  |
| ALIGN-PA10  | XY assembly; 10 arc sec orthogonality. Alignment to within 7 microns orthogonality for short travel stages.                          |
| ALIGN-PA10Z | XZ or YZ assembly with L-bracket; 10 arc second orthogonality. Alignment to within 10 microns orthogonality for short travel stages. |
| ALIGN-PA5   | XY assembly; 5 arc sec orthogonality. Alignment to within 3 microns orthogonality for short travel stages.                           |
| ALIGN-PA5Z  | XZ or YZ assembly with L-bracket; 5 arc second orthogonality. Alignment to within 5 microns orthogonality for short travel stages.   |