

# ANT95L

## Single-Axis Linear Direct-Drive Nanopositioning Stages

Nanometer-level performance in a large travel format

High resolution (1 nm), repeatability (75 nm), and accuracy (250 nm)

In-position stability of <1 nm

Anti-creep crossed-roller bearings

High dynamic performance

## nano Motion Technology



### Introduction

Aerotech's ANT95 series stages are the world's first nanometer-level positioning systems with greater than 25 mm travel. The ANT95L and ANT95L-PLUS crossed-roller stages are the best-in-class in combining speed, accuracy, resolution, repeatability, reliability, and size, and are offered in two accuracy grades. As an evolution of the ANT stage family, these linear stages exhibit enhanced motion performance over Aerotech's first generation ANT series. Product improvements such as 5 g acceleration, 500 mm/s velocity, enhanced load capacity, and standardized, universal base mounting patterns allow the use of this flexible stage family in an even wider range of configurations than its predecessors.

### Noncontact Direct-Drive

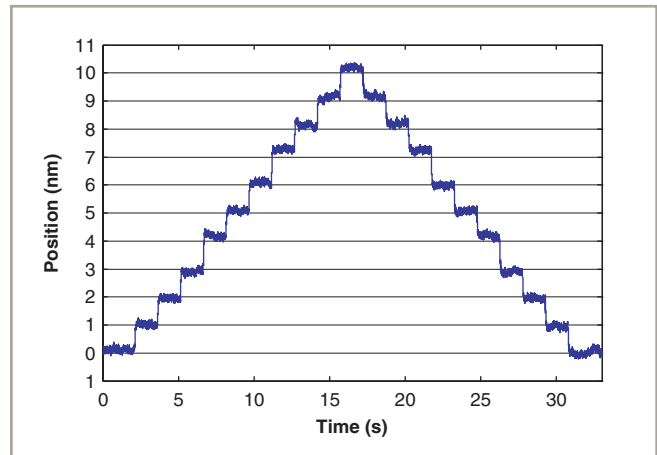
All of the original ANT series' direct-drive advantages have been preserved in the ANT95-L family. Only noncontact direct-drive technology offers the robust, accurate, and high-speed positioning necessary for mass production of precision devices. ANT95-L stages utilize advanced direct-drive technology pioneered by Aerotech to achieve the highest level of positioning performance. This direct-drive technology is high-performance, non-cogging, noncontact, high-speed, high-resolution, and high-accuracy. This unique drive and bearing combination, packaged in an extremely small-profile and footprint, offers tangible advantages in many applications such as high-precision positioning, disk-drive fabrication, fiber alignment, optical delay element actuation, sensor testing, and scanning processes that demand smooth and precise motion.

### Flexible System Design

The ANT95L family has universal mounting and tabletop patterns that allow for easy system integration. Two, three, or more axes can be easily combined for flexible system designs and multi-axis configurations.

### System Characteristics

Outstanding accuracy, position repeatability, and in-position stability require high system resolution. The ANT95-L stage's industry-leading 1 nm minimum incremental step size provides this high level of performance. Aerotech's direct-drive technology has no hysteresis or backlash, enabling accurate and repeatable nanometer-scale motion.



ANT95L 1 nm step plot. Best-in-class resolution and exceptional in-position stability for large travel stages.

# ANT95-L Series SPECIFICATIONS

Mechanical Specifications		ANT95L-025	ANT95L-050
<b>Travel</b>		25 mm	50 mm
<b>Accuracy<sup>(1)</sup></b>	<i>Base Performance</i>	±2.5 µm (±100 µin)	±2.5 µm (±100 µin)
	<i>Plus Performance</i>	±250 nm (±12 µin)	±250 nm (±10 µin)
<b>Resolution (Minimum Incremental Motion)</b>		1 nm (0.04 µin)	1 nm (0.04 µin)
<b>Repeatability (Bidirectional)<sup>(1)</sup></b>	<i>Base Performance</i>	±100 nm (±4 µin)	±100 nm (±4 µin)
	<i>Plus Performance</i>	±75 nm (±3 µin)	±75 nm (±3 µin)
<b>Repeatability (Unidirectional)<sup>(1)</sup></b>		±25 nm (±1 µin)	±25 nm (±1 µin)
<b>Straightness<sup>(1)</sup></b>		±1.0 µm (±40 µin)	±1.0 µm (±40 µin)
<b>Flatness<sup>(1)</sup></b>		±1.0 µm (±40 µin)	±1.0 µm (±40 µin)
<b>Pitch</b>		10 arc sec	10 arc sec
<b>Roll</b>		10 arc sec	10 arc sec
<b>Yaw</b>		5 arc sec	5 arc sec
<b>Maximum Speed</b>		500 mm/s (20 in/s)	500 mm/s (20 in/s)
<b>Maximum Acceleration</b>		5 g - 50 m/s <sup>2</sup> (No Load)	4 g - 40 m/s <sup>2</sup> (No Load)
<b>Speed Stability</b>		See graph for typical performance	
<b>Settling Time</b>		See graph for typical performance	
<b>In-Position Stability<sup>(2)</sup></b>		<1 nm (<0.04 µin)	<1 nm (<0.04 µin)
<b>Maximum Force (Continuous)</b>		7.75 N	9.5 N
<b>Load Capacity<sup>(3)</sup></b>	<i>Horizontal</i>	5.0 kg (11 lb)	7.0 kg (15.4 lb)
	<i>Side</i>	5.0 kg (11 lb)	5.0 kg (11 lb)
<b>Moving Mass</b>		0.46 kg (1.0 lb)	0.52 kg (1.4 lb)
<b>Stage Mass</b>		0.8 kg (1.8 lb)	1.2 kg (2.7 lb)
<b>Material</b>		Aluminum Body/Black Hardcoat Finish	
<b>MTBF (Mean Time Between Failure)</b>		30,000 Hours	

Notes:

1. Certified with each stage.
2. In-Position Jitter listing is 3σ value.
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. Consult factory for multi-axis or non-standard applications.
5. -PLUS requires the use of an Aerotech controller.

Mechanical Specifications		ANT95L-075	ANT95L-100
<b>Travel</b>		75 mm	100 mm
<b>Accuracy<sup>(1)</sup></b>	<i>Base Performance</i>	±4.0 µm (±160 µin)	±5.0 µm (±200 µin)
	<i>Plus Performance</i>	±275 nm (±11 µin)	±275 nm (±11 µin)
<b>Resolution (Minimum Incremental Motion)</b>		1 nm (0.04 µin)	1 nm (0.04 µin)
<b>Repeatability (Bidirectional)<sup>(1)</sup></b>	<i>Base Performance</i>	±100 nm (±4 µin)	±100 nm (±4 µin)
	<i>Plus Performance</i>	±75 nm (±3 µin)	±75 nm (±3 µin)
<b>Repeatability (Unidirectional)<sup>(1)</sup></b>		±25 nm (±1 µin)	±25 nm (±1 µin)
<b>Straightness<sup>(1)</sup></b>		±2.0 µm (±80 µin)	±2.5 µm (±100 µin)
<b>Flatness<sup>(1)</sup></b>		±2.0 µm (±80 µin)	±2.5 µm (±100 µin)
<b>Pitch</b>		10 arc sec	10 arc sec
<b>Roll</b>		10 arc sec	10 arc sec
<b>Yaw</b>		5 arc sec	5 arc sec
<b>Maximum Speed</b>		500 mm/s (20 in/s)	500 mm/s (20 in/s)
<b>Maximum Acceleration</b>		3 g - 30 m/s <sup>2</sup> (No Load)	3 g - 30 m/s <sup>2</sup> (No Load)
<b>Speed Stability</b>		See graph for typical performance	
<b>Settling Time</b>		See graph for typical performance	
<b>In-Position Stability<sup>(2)</sup></b>		<1 nm (<0.04 µin)	<1 nm (<0.04 µin)
<b>Maximum Force (Continuous)</b>		9.5 N	12.9 N
<b>Load Capacity<sup>(3)</sup></b>	<i>Horizontal</i>	7.0 kg (15.4 lb)	7.0 kg (15.4 lb)
	<i>Side</i>	5.0 kg (11 lb)	5.0 kg (11 lb)
<b>Moving Mass</b>		0.72 kg (1.6 lb)	0.91 kg (2.0 lb)
<b>Stage Mass</b>		1.64 kg (3.6 lb)	2.1 kg (4.6 lb)
<b>Material</b>		Aluminum Body/Black Hardcoat Finish	
<b>MTBF (Mean Time Between Failure)</b>		30,000 Hours	

Notes:

1. Certified with each stage.
2. In-Position Jitter listing is 3σ value.
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. Consult factory for multi-axis or non-standard applications.
5. -PLUS requires the use of an Aerotech controller.

## ANT95L Series SPECIFICATIONS

Electrical Specifications	ANT95L
Drive System	Brushless Linear Servomotor
Feedback	Noncontact Linear Encoder
Maximum Bus Voltage	±40 VDC
Limit Switches	5 V, Normally Closed
Home Switch	Near Center

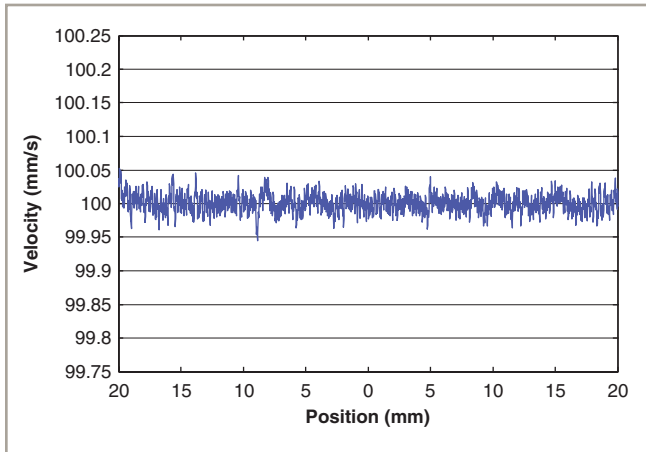
Recommended Controller		ANT95L
Multi-Axis	<b>A3200</b>	Npaq-MXR Npaq MR-MXH Ndrive ML-MXH
	<b>Ensemble</b>	Epaq-MXH Epaq MR-MXH Ensemble ML-MXH
Single Axis	<b>Soloist</b>	Soloist ML-MXH

Notes:

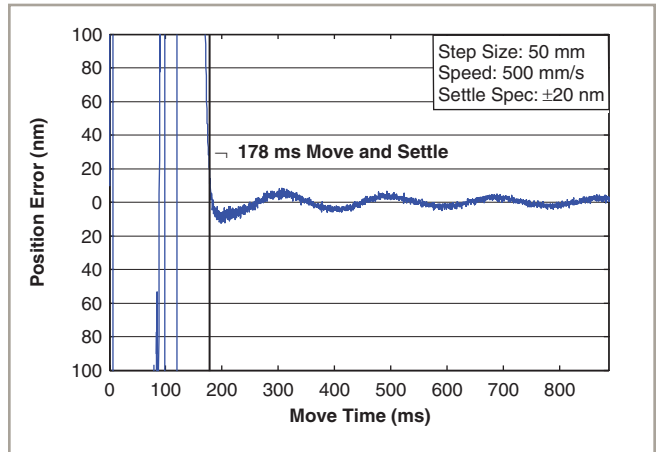
1. Linear amplifiers are required to achieve the listed specifications. Other options are available.

Note: To ensure the achievement and repeatability of specifications over an extended period of time, environmental temperature must be controlled to within 0.25°C/24 hours. If this is not possible, alternate products are available. Please consult Aerotech Application Engineering for more information.

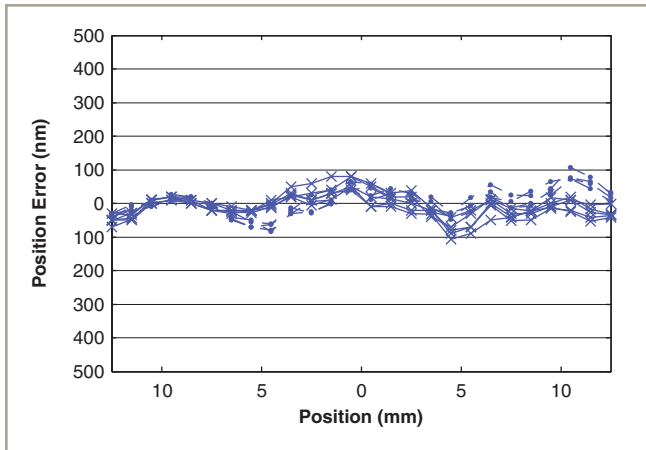
# ANT95L/ANT95L-PLUS Series PERFORMANCE



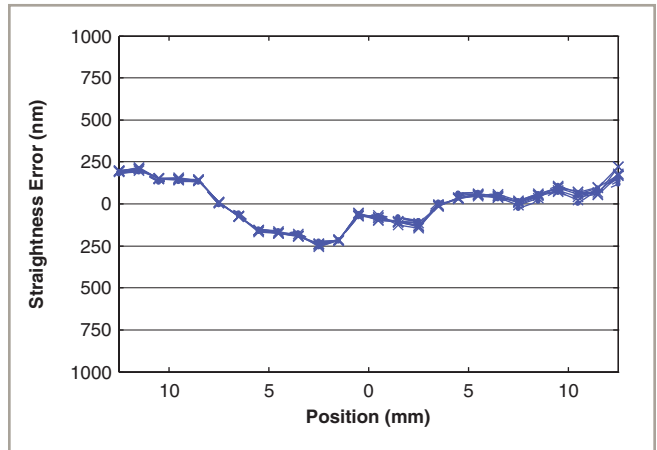
ANT95L-050PLUS velocity performance at 100 mm/s and 1 kg payload. Excellent speed stability is another feature of the ANT series stages.



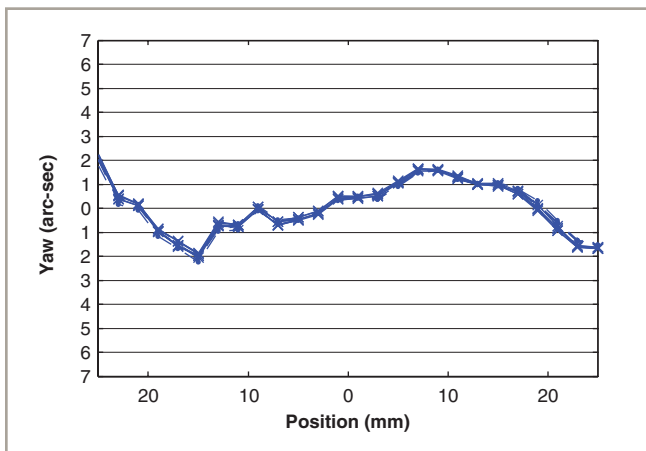
ANT95L-050PLUS step and settle performance at full travel and 1 kg payload. Outstanding settling time enhances throughput of most applications.



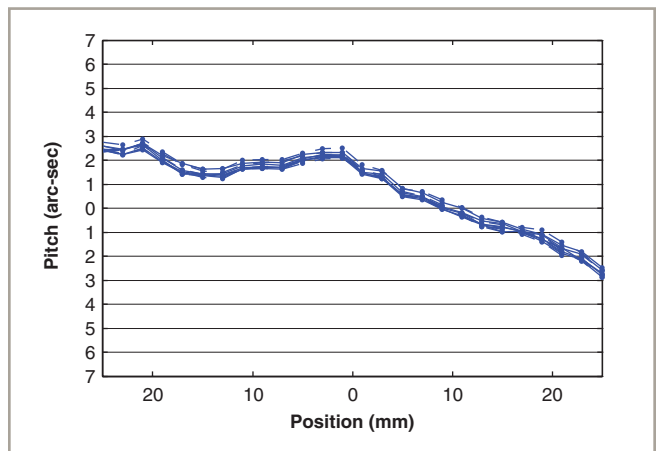
ANT95L-025PLUS accuracy and repeatability. This multiple test run over an extended period of time shows the high level of system accuracy and repeatability.



ANT95L-025PLUS straightness error, five runs, bi-directional. Exceptional and highly repeatable – five times more accurate than the stated specification.

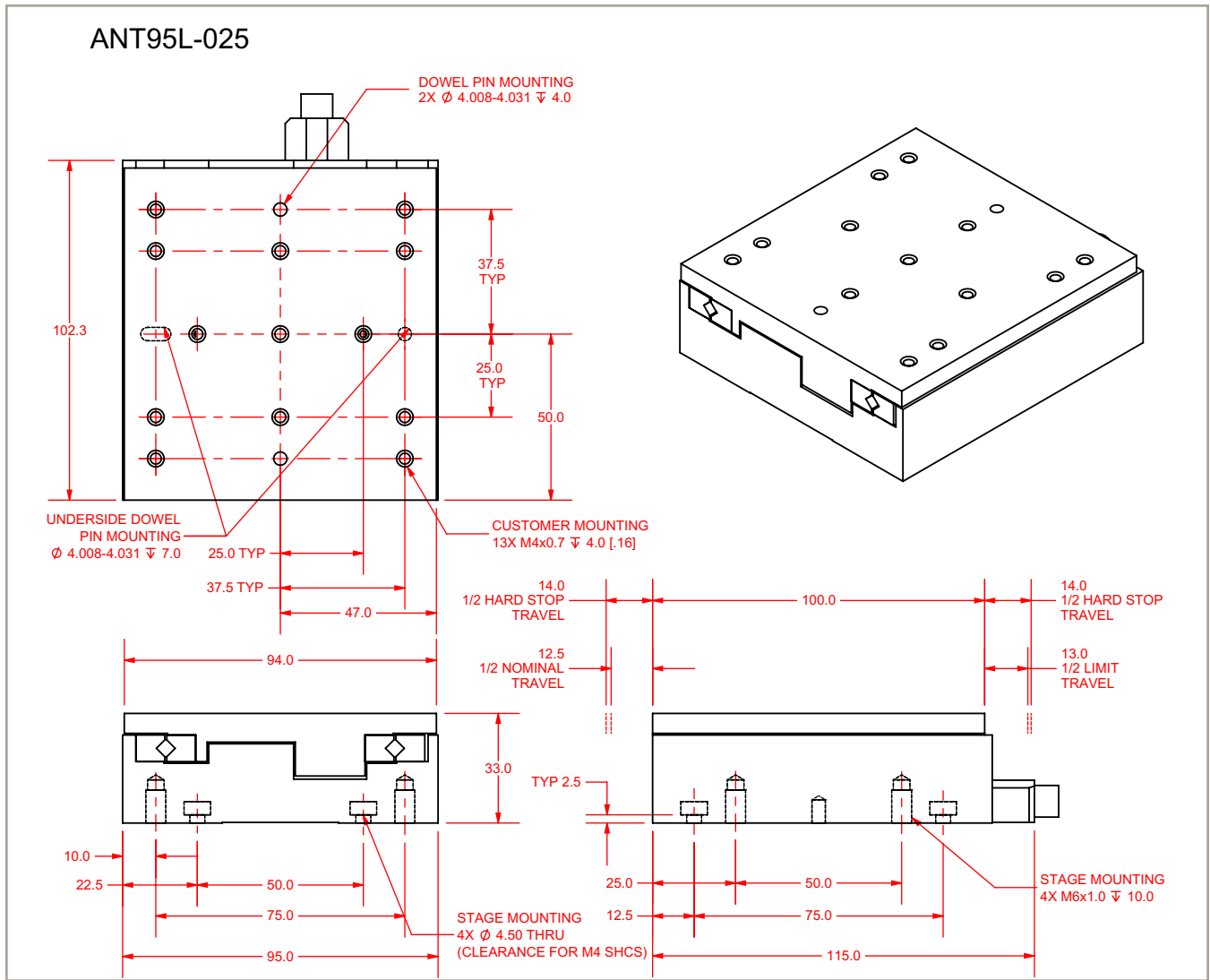


ANT95L-050PLUS yaw, five runs, bi-directional. Highly repeatable, minimal yaw error enhances system positioning accuracy.

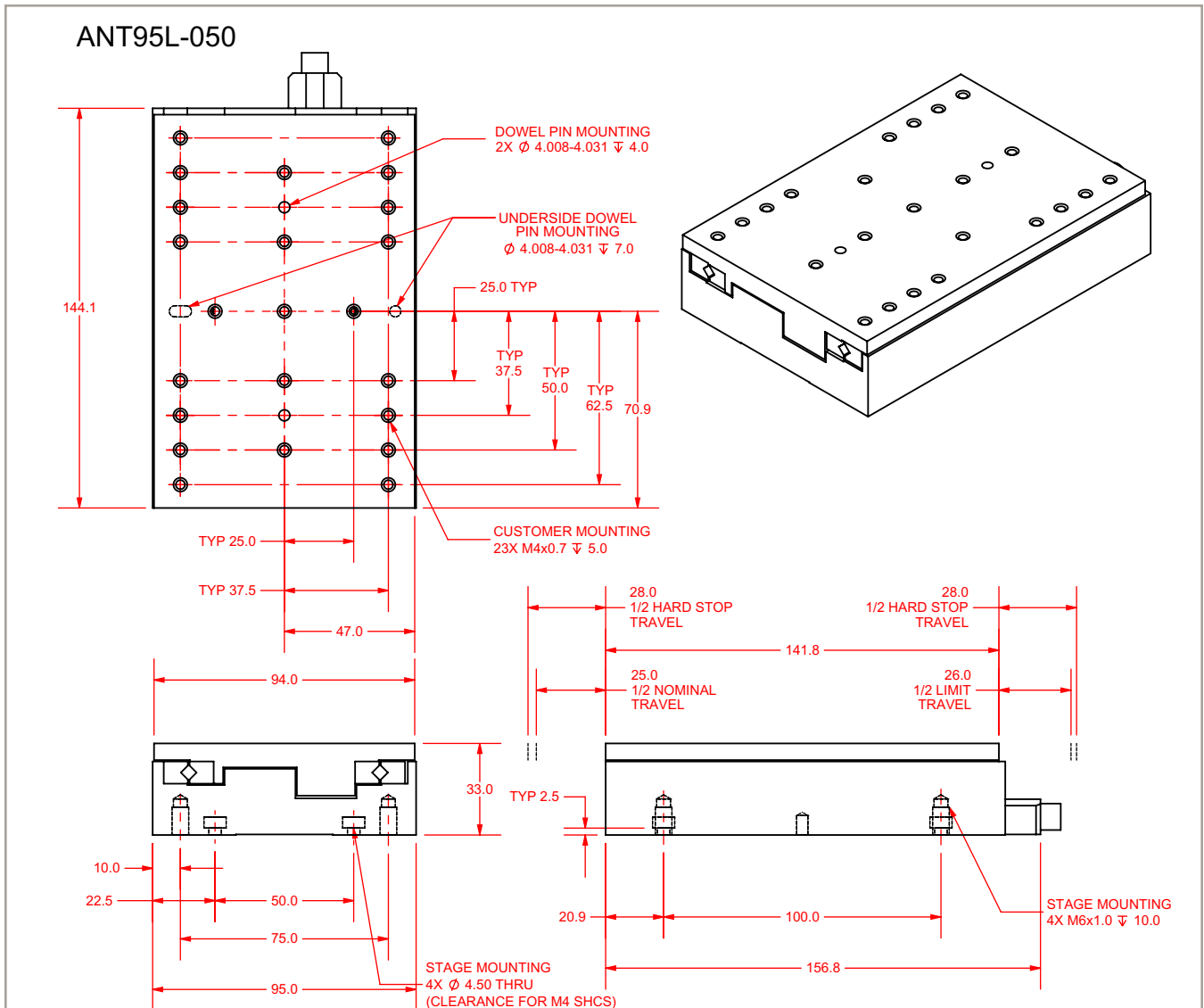


ANT95L-050PLUS pitch, five runs, bi-directional. Excellent repeatability/accuracy contribute to improved processing.

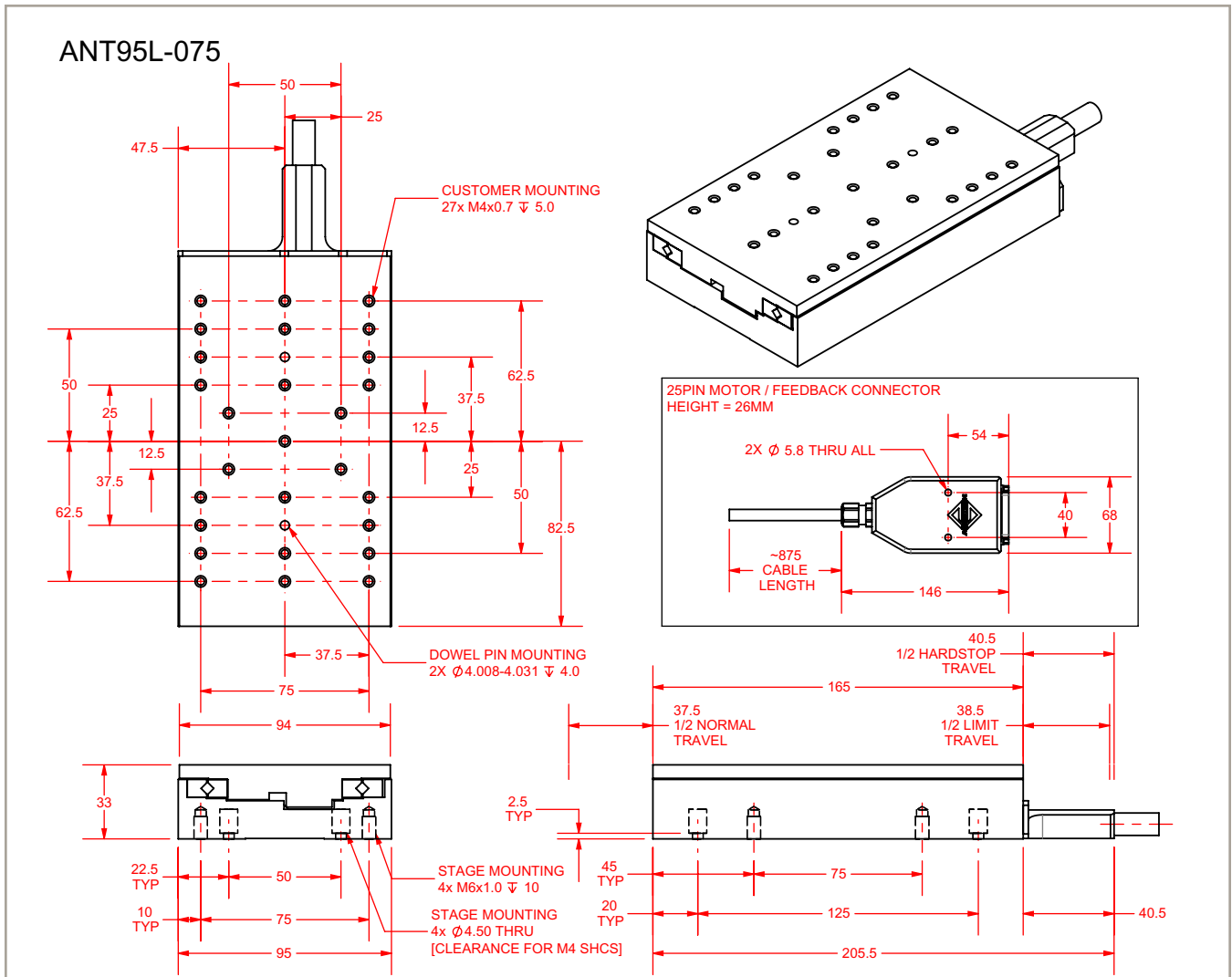
ANT95L-025 DIMENSIONS



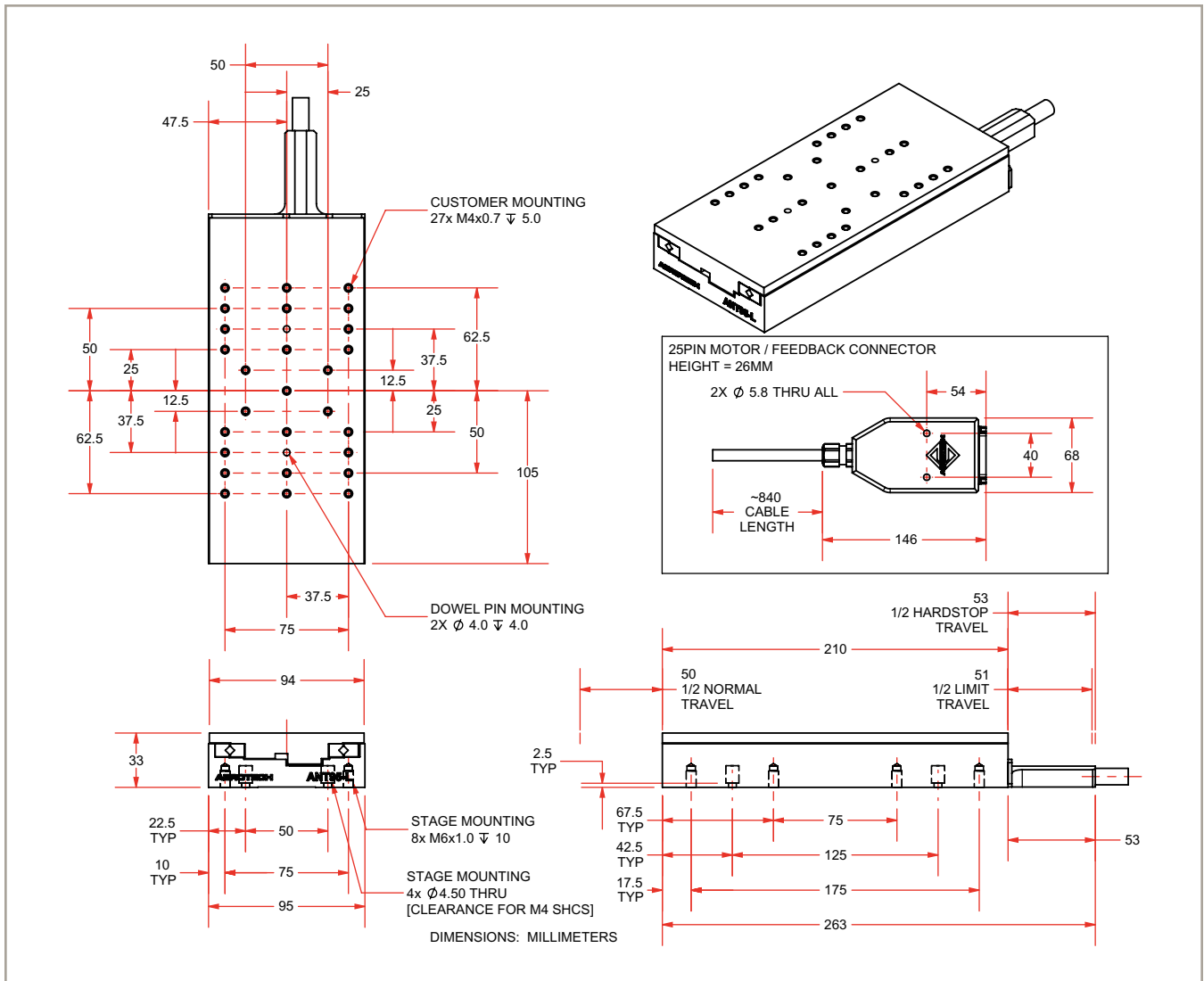
# ANT95L-050 DIMENSIONS



ANT95L-075 DIMENSIONS

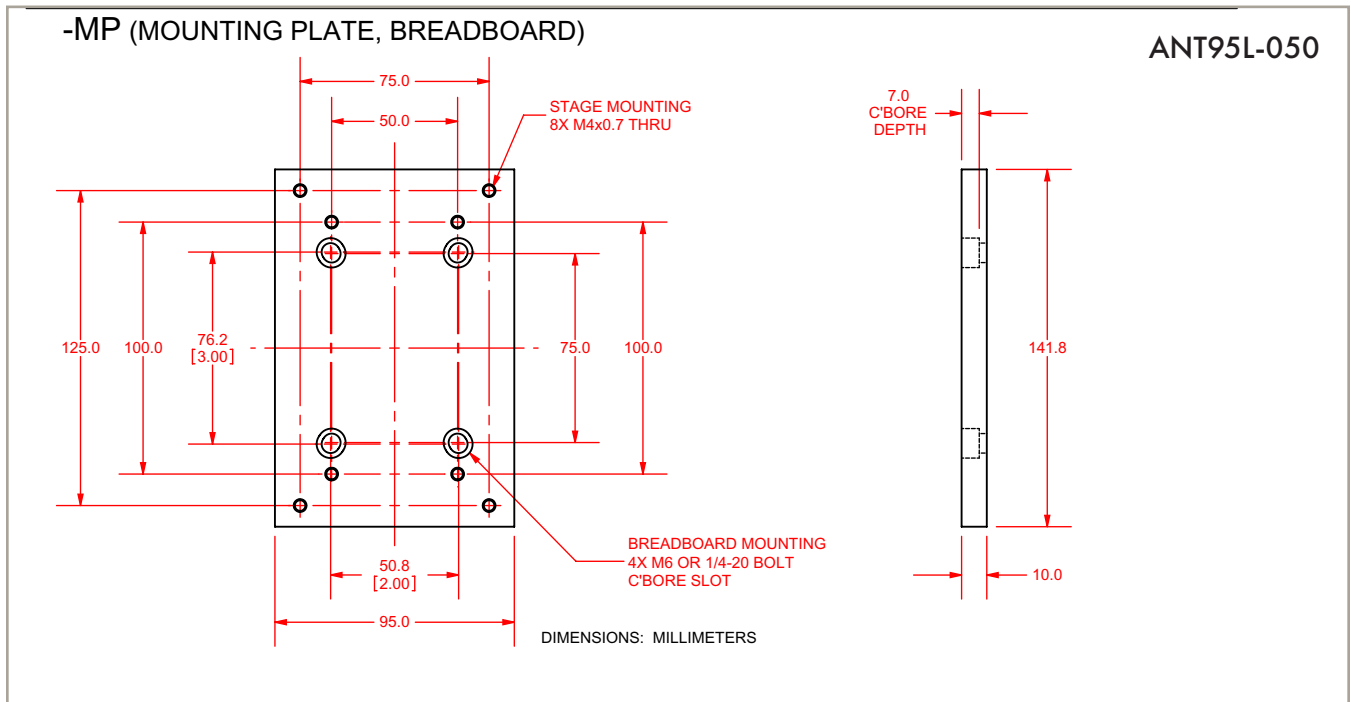
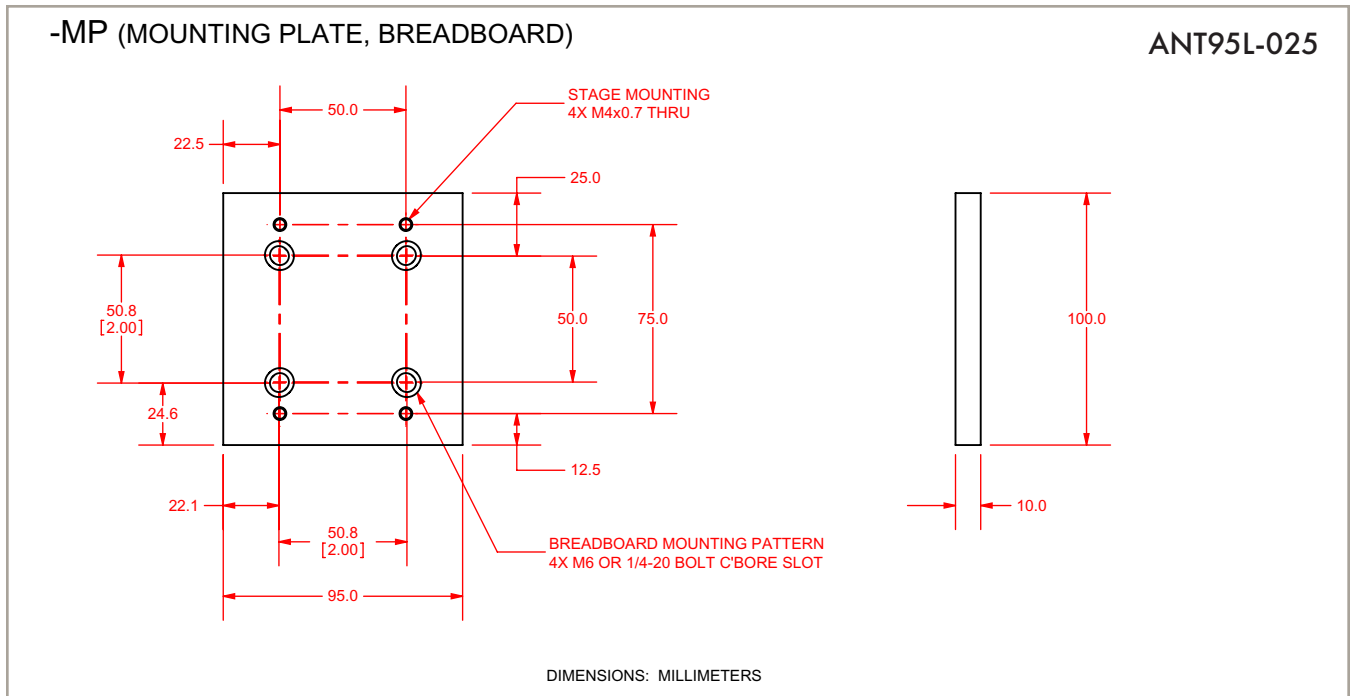


# ANT95L-100 DIMENSIONS

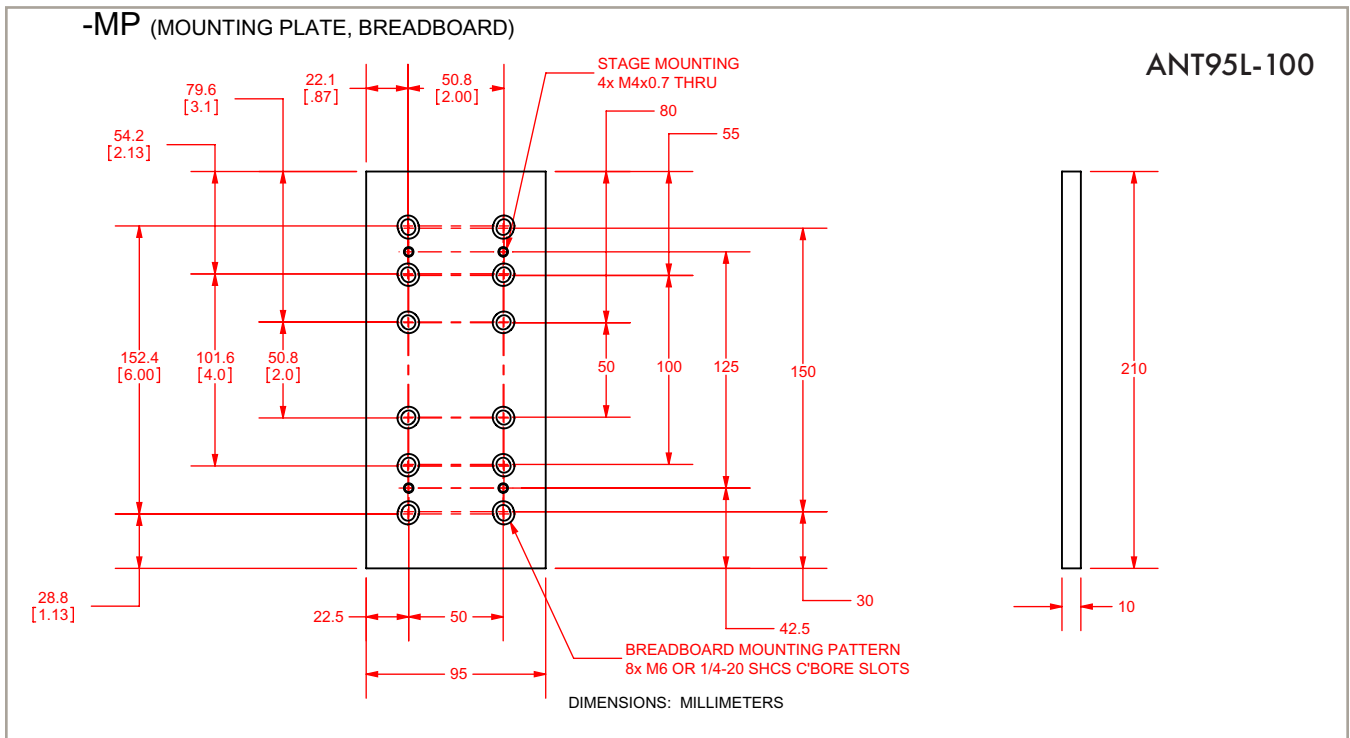
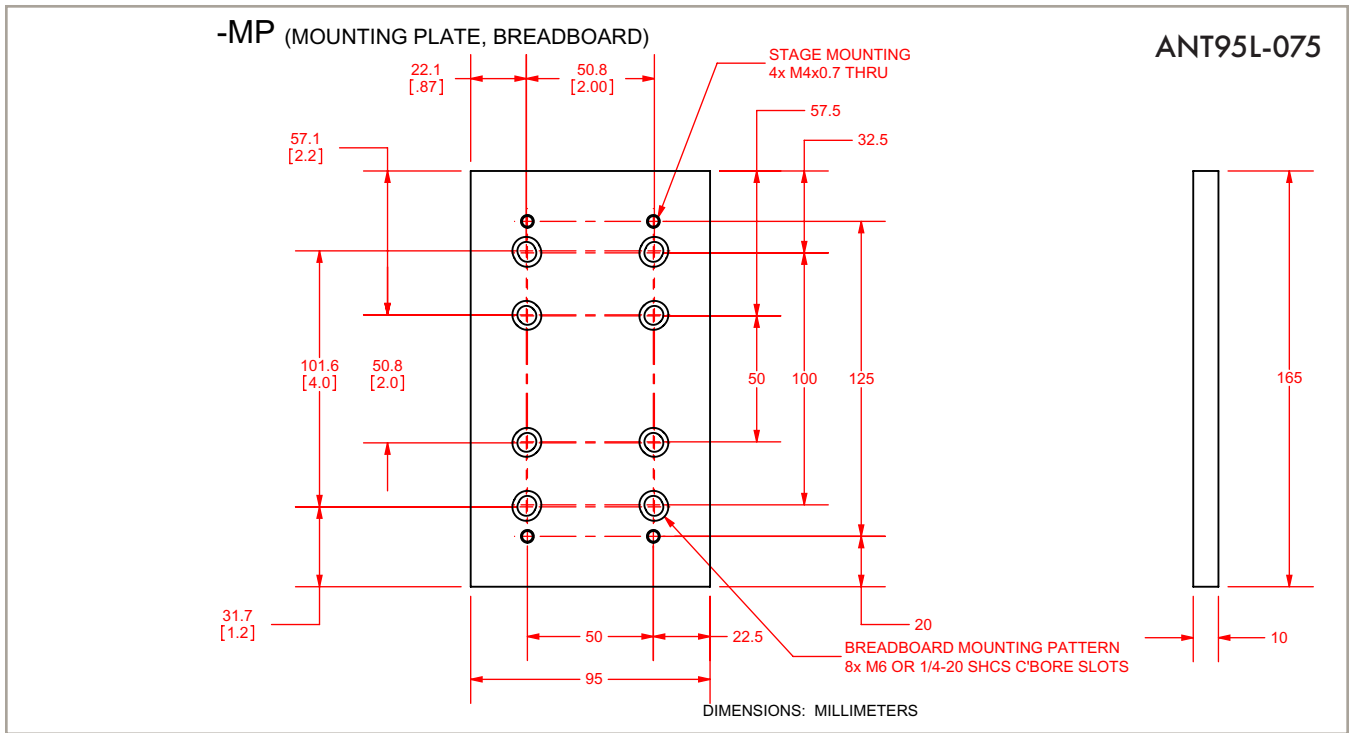




ANT95L-025L/ANT95L-050 Mounting Plate DIMENSIONS



# ANT95L-75/ANT95L-100 Mounting Plate DIMENSIONS



## ANT95L Single-Axis Linear Direct-Drive Nanopositioning Stage Series ORDERING INFORMATION

### Travel (Required)

-025	25 mm travel
-050	50 mm travel
-075	75 mm travel
-100	100 mm travel

### Mounting Plate (Optional)

-MP	Mounting plate
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### Performance Grade (Required)

-PL1	Base performance
-PL2	High-accuracy performance, PLUS

### 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	<p><b>Integration - Test as system</b></p> <p>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.</p>
-TAC	<p><b>Integration - Test as components</b></p> <p>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.</p>