

# ANT95-L Series

## 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 ANT95-L and ANT95-L-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

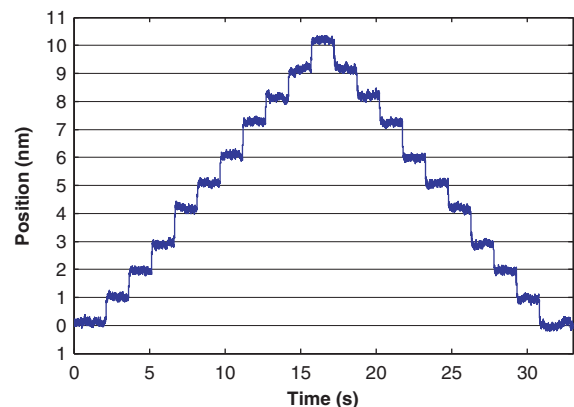
All of the original ANT series' direct-drive advantages have been preserved in the ANT95-L family. Only noncontact direct-drive technology offers the robust, accurate, and high-speed positioning necessary for mass production of precision devices. ANT95-L stages utilize advanced direct-drive technology 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 ANT95-L 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.



ANT95-50-L-PLUS 1 nm step plot. Best-in-class resolution and exceptional in-position stability for large travel stages.

## ANT95-L Series SPECIFICATIONS

Mechanical Specifications	ANT95-25-L	ANT95-25-L-PLUS	ANT95-50-L	ANT95-50-L-PLUS
Travel	25 mm	25 mm	50 mm	50 mm
Accuracy <sup>(1)</sup>	±2.5 µm (±100 µin)	±250 nm (±10 µin)	±2.5 µm (±100 µin)	±250 nm (±10 µin)
Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Repeatability (Bi-Directional) <sup>(1)</sup>	±100 nm (±4 µin)	±75 nm (±3 µin)	±100 nm (±4 µin)	±75 nm (±3 µin)
Repeatability (Uni-Directional)	±25 nm (±1 µin)	±25 nm (±1 µin)	±25 nm (±1 µin)	±25 nm (±1 µin)
Straightness <sup>(1)</sup>	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)
Flatness <sup>(1)</sup>	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)
Pitch	10 arc sec	10 arc sec	10 arc sec	10 arc sec
Roll	10 arc sec	10 arc sec	10 arc sec	10 arc sec
Yaw	5 arc sec	5 arc sec	5 arc sec	5 arc sec
Maximum Speed	500 mm/s (20 in/s)	500 mm/s (20 in/s)	500 mm/s (20 in/s)	500 mm/s (20 in/s)
Maximum Acceleration	5 g - 50 m/s <sup>2</sup> (No Load)	5 g - 50 m/s <sup>2</sup> (No Load)	4 g - 40 m/s <sup>2</sup> (No Load)	4 g - 40 m/s <sup>2</sup> (No Load)
Speed Stability	See graph for typical performance			
Settling Time	See graph for typical performance			
In-Position Stability <sup>(2)</sup>	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)
Maximum Force (Continuous)	7.75 N	7.75 N	9.5 N	9.5 N
Load Capacity <sup>(3)</sup>	Horizontal	5.0 kg (11 lb)	5.0 kg (11 lb)	7.0 kg (15.4 lb)
	Side	5.0 kg (11 lb)	5.0 kg (11 lb)	5.0 kg (11 lb)
Moving Mass	0.46 kg (1.0 lb)	0.46 kg (1.0 lb)	0.52 kg (1.1 lb)	0.52 kg (1.1 lb)
Stage Mass	0.8 kg (1.8 lb)	0.8 kg (1.8 lb)	1.2 kg (2.7 lb)	1.2 kg (2.7 lb)
Material	Aluminum Body/Black Hardcoat Finish			
MTBF (Mean Time Between Failure)	30,000 Hours			

Notes:

1. Certified with each stage.

2. In-Position Jitter listing is 3 sigma value.

3. Axis orientation for on-axis loading is listed.

• Specifications are for single-axis systems measured 25 mm above the tabletop. Performance of combined multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.

• -PLUS requires the use of an Aerotech controller.

Mechanical Specifications	ANT95-75-L	ANT95-75-L-PLUS	ANT95-100-L	ANT95-100-L-PLUS
Travel	75 mm	75 mm	100 mm	100 mm
Accuracy <sup>(1)</sup>	±4.0 µm (±160 µin)	±275 nm (±11 µin)	±5.0 µm (±200 µin)	±275 nm (±11 µin)
Resolution	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Repeatability (Bi-Directional) <sup>(1)</sup>	±100 nm (±4 µin)	±75 nm (±3 µin)	±100 nm (±4 µin)	±75 nm (±3 µin)
Repeatability (Uni-Directional)	±25 nm (±1 µin)	±25 nm (±1 µin)	±25 nm (±1 µin)	±25 nm (±1 µin)
Straightness <sup>(1)</sup>	±2.0 µm (±80 µin)	±2.0 µm (±80 µin)	±2.5 µm (±100 µin)	±2.5 µm (±100 µin)
Flatness <sup>(1)</sup>	±2.0 µm (±80 µin)	±2.0 µm (±80 µin)	±2.5 µm (±100 µin)	±2.5 µm (±100 µin)
Pitch	10 arc sec	10 arc sec	10 arc sec	10 arc sec
Roll	10 arc sec	10 arc sec	10 arc sec	10 arc sec
Yaw	5 arc sec	5 arc sec	5 arc sec	5 arc sec
Maximum Speed	500 mm/s (20 in/s)	500 mm/s (20 in/s)	500 mm/s (20 in/s)	500 mm/s (20 in/s)
Maximum Acceleration	3 g - 30 m/s <sup>2</sup> (No Load)	3 g - 30 m/s <sup>2</sup> (No Load)	3 g - 30 m/s <sup>2</sup> (No Load)	3 g - 30 m/s <sup>2</sup> (No Load)
Speed Stability	See graph for typical performance			
Settling Time	See graph for typical performance			
In-Position Stability <sup>(2)</sup>	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)
Maximum Force (Continuous)	9.5 N	9.5 N	12.9 N	12.9 N
Load Capacity <sup>(3)</sup>	Horizontal	7.0 kg (15.4 lb)	7.0 kg (15.4 lb)	7.0 kg (15.4 lb)
	Side	5.0 kg (11 lb)	5.0 kg (11 lb)	5.0 kg (11 lb)
Moving Mass	0.72 kg (1.6 lb)	0.72 kg (1.6 lb)	0.91 kg (2.0 lb)	0.91 kg (2.0 lb)
Stage Mass	1.64 kg (3.6 lb)	1.64 kg (3.6 lb)	2.1 kg (4.6 lb)	2.1 kg (4.6 lb)
Material	Aluminum Body/Black Hardcoat Finish			
MTBF (Mean Time Between Failure)	30,000 Hours			

Notes:

1. Certified with each stage.

2. In-Position Jitter listing is 3 sigma value.

3. Axis orientation for on-axis loading is listed.

• Specifications are for single-axis systems measured 25 mm above the tabletop. Performance of combined multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.

• -PLUS requires the use of an Aerotech controller.

## ANT95-L Series SPECIFICATIONS

Electrical Specifications	ANT95-25-L	ANT95-25-L-PLUS	ANT95-50-L	ANT95-50-L-PLUS
Drive System	Brushless Linear Servomotor			
Feedback	Noncontact Linear Encoder			
Maximum Bus Voltage	±40 VDC			
Limit Switches	5 V, Normally Closed			
Home Switch	Near Center			

Electrical Specifications	ANT95-75-L	ANT95-75-L-PLUS	ANT95-100-L	ANT95-100-L-PLUS
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	ANT95-25-L	ANT95-25-L-PLUS	ANT95-50-L	ANT95-50-L-PLUS
Multi-Axis	A3200	Npaq-MXR Npaq MR-MXH Ndrive ML-MXH		
	Ensemble	Epaq-MXH Epaq MR-MXH Ensemble ML-MXH		
Single Axis	Soloist	Soloist ML-MXH		

Notes:

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

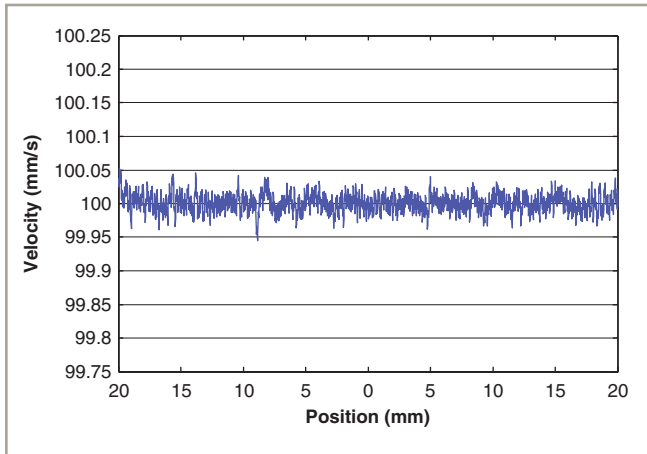
Recommended Controller	ANT95-75-L	ANT95-75-L-PLUS	ANT95-100-L	ANT95-100-L-PLUS
Multi-Axis	A3200	Npaq-MXR Npaq MR-MXH Ndrive ML-MXH		
	Ensemble	Epaq-MXH Epaq MR-MXH Ensemble ML-MXH		
Single Axis	Soloist	Soloist ML-MXH		

Notes:

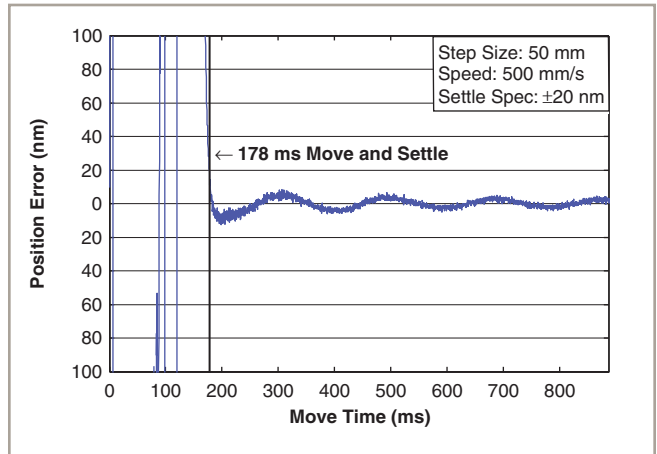
1. Linear amplifiers are required to achieve the listed specifications. Other options are available.

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.

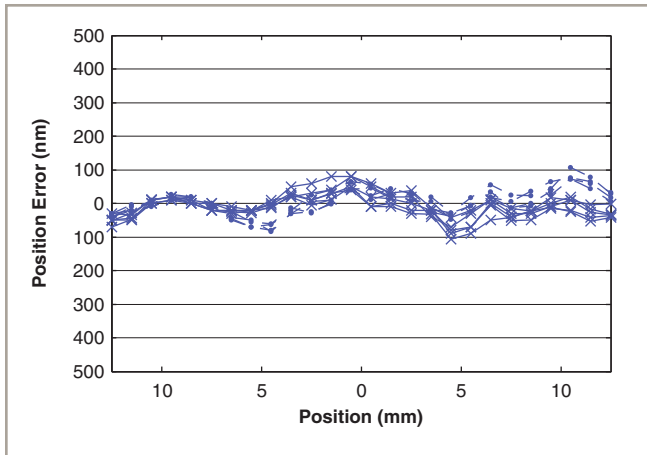
# ANT95-L/ANT95-L-PLUS Series PERFORMANCE



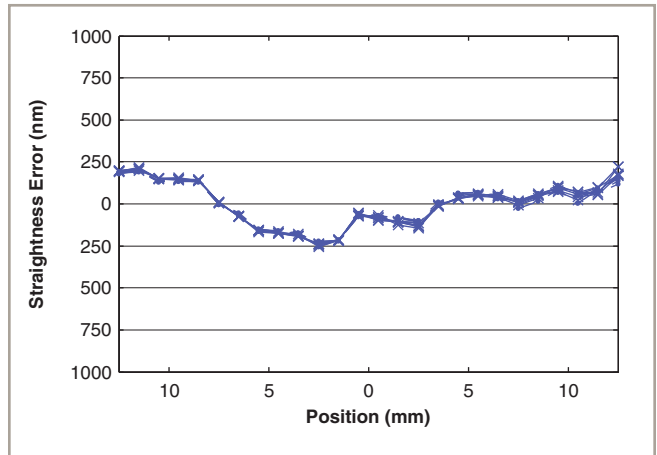
ANT95-50-L-PLUS velocity performance at 100 mm/s and 1 kg payload. Excellent speed stability is another feature of the ANT series stages.



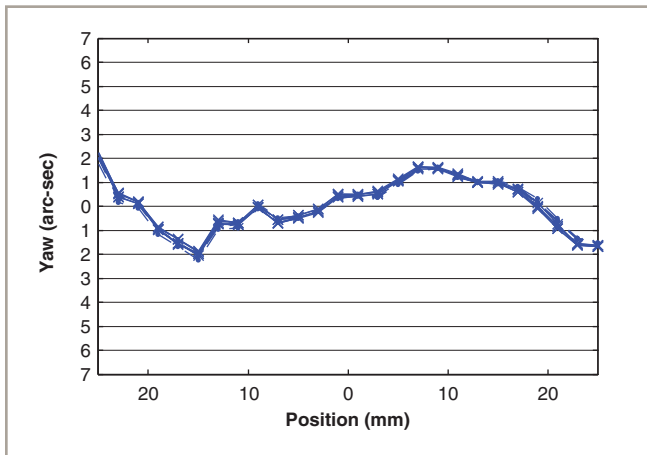
ANT95-50-L-PLUS step and settle performance at full travel and 1 kg payload. Outstanding settling time enhances throughput of most applications.



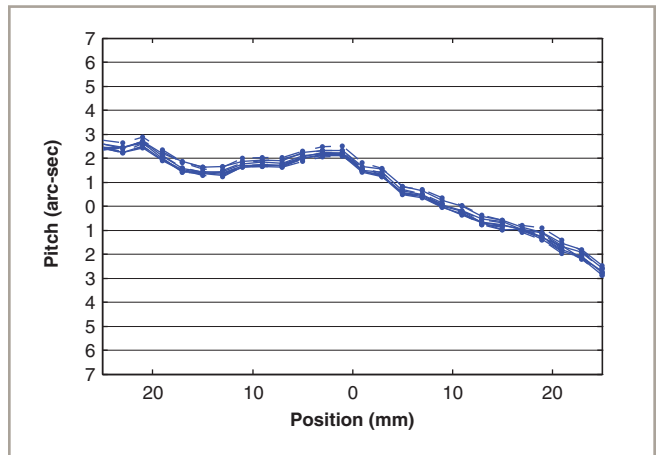
ANT95-25-L-PLUS accuracy and repeatability. This multiple test run over an extended period of time shows the high level of system accuracy and repeatability.



ANT95-25-L-PLUS straightness error, five runs, bi-directional. Exceptional and highly repeatable – five times more accurate than the stated specification.

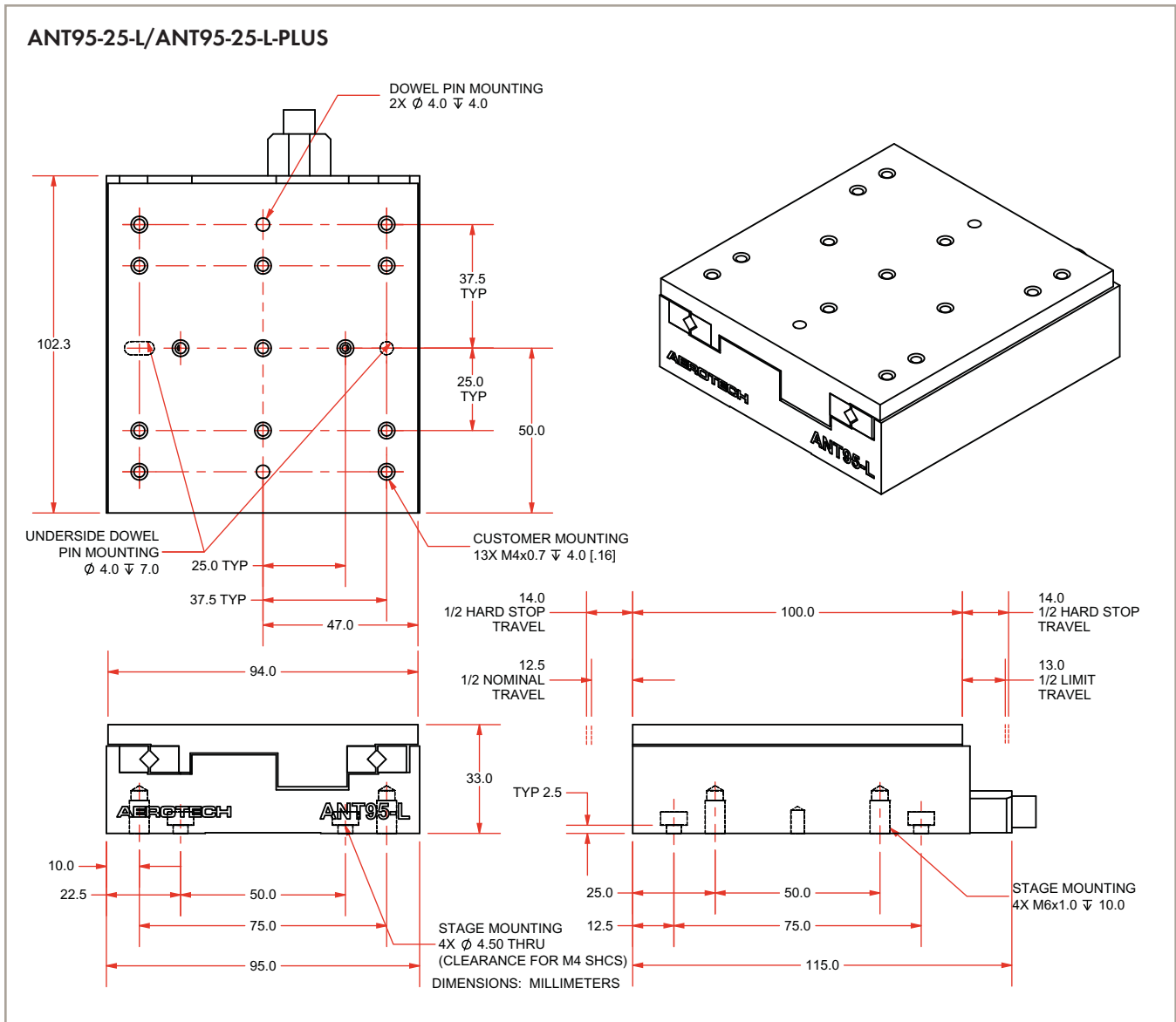


ANT95-50-L-PLUS yaw, five runs, bi-directional. Highly repeatable, minimal yaw error enhances system positioning accuracy.

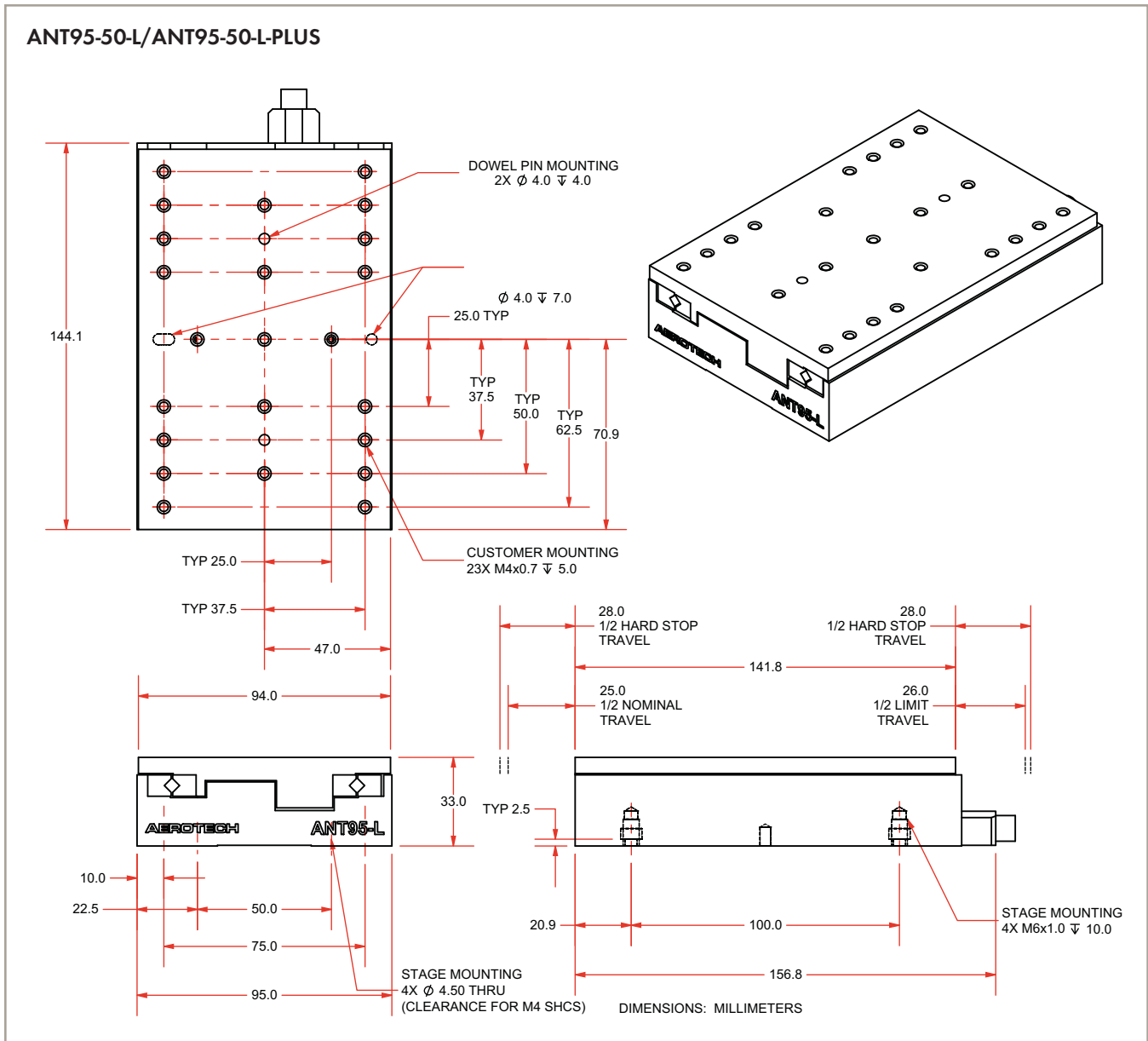


ANT95-50-L-PLUS pitch, five runs, bi-directional. Excellent repeatability/accuracy contribute to improved processing.

# ANT95-25-L/ANT95-25-L-PLUS DIMENSIONS

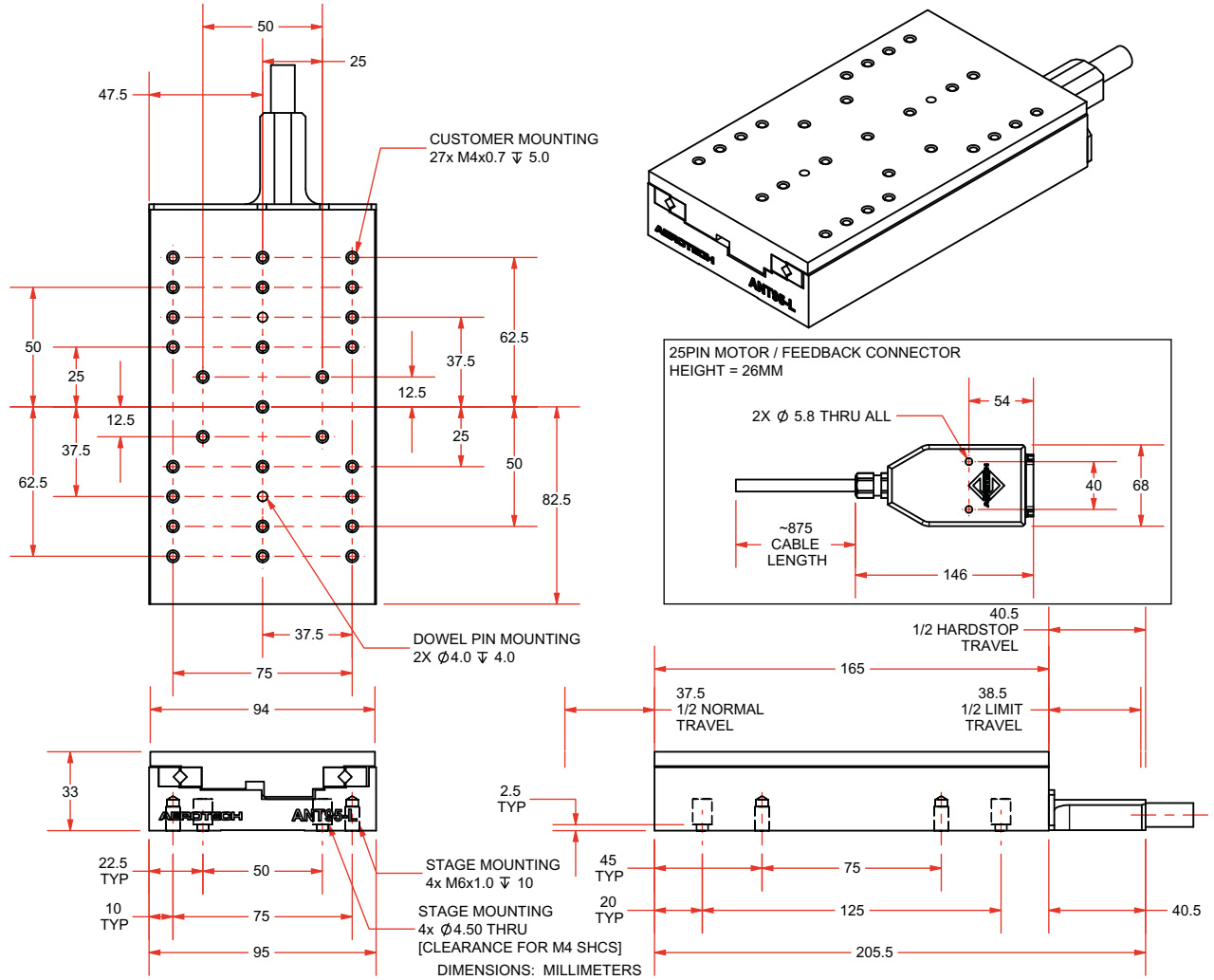


# ANT95-50-L/ANT95-50-L-PLUS DIMENSIONS



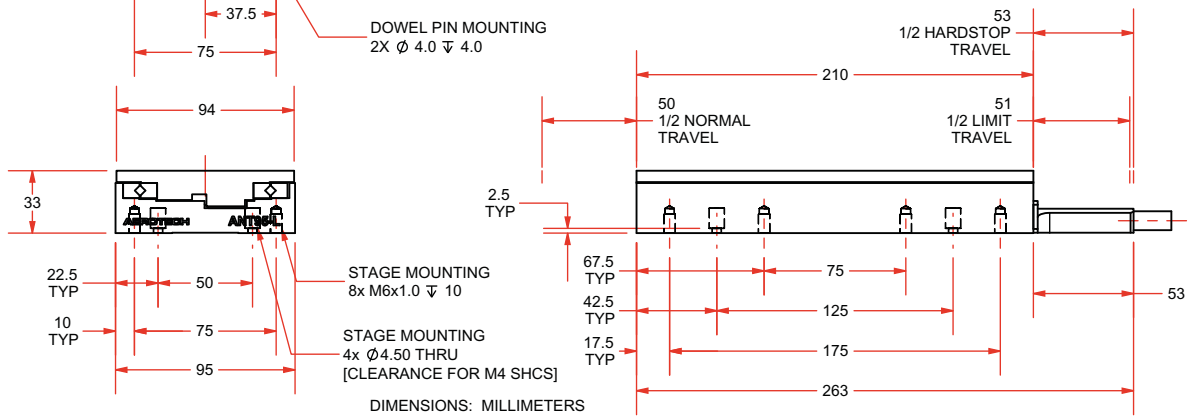
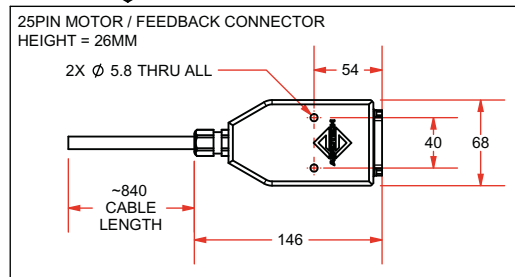
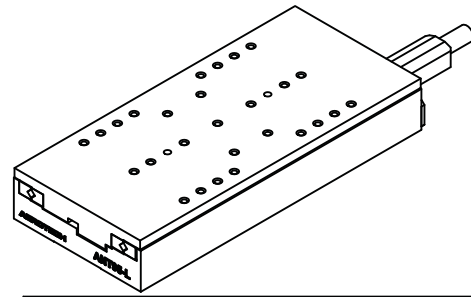
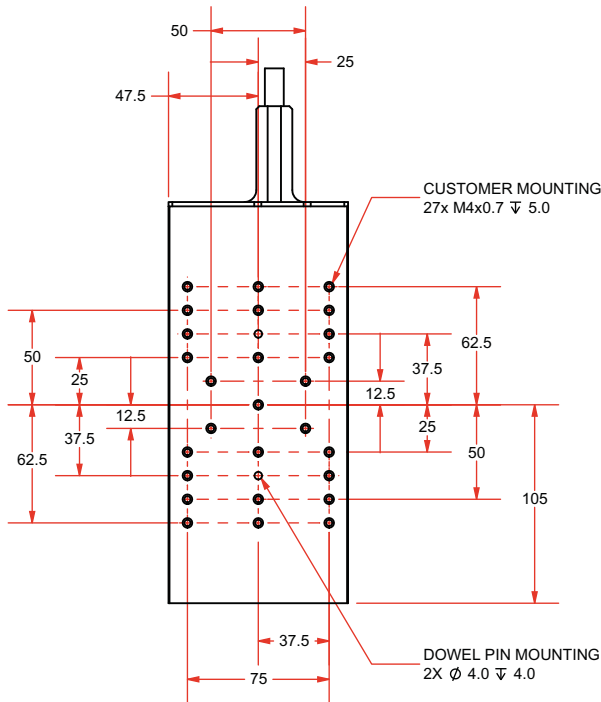
ANT95-75-L/ANT95-75-L-PLUS DIMENSIONS

ANT95-75-L/ANT95-75-L-PLUS



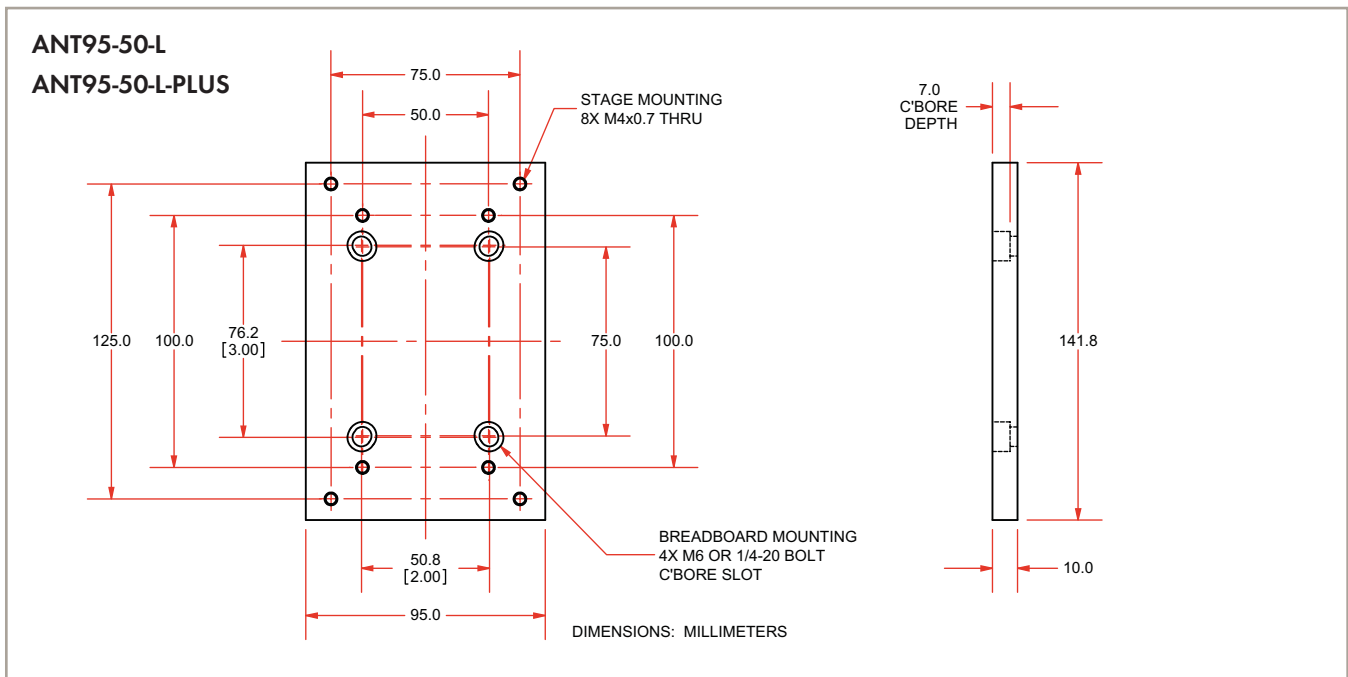
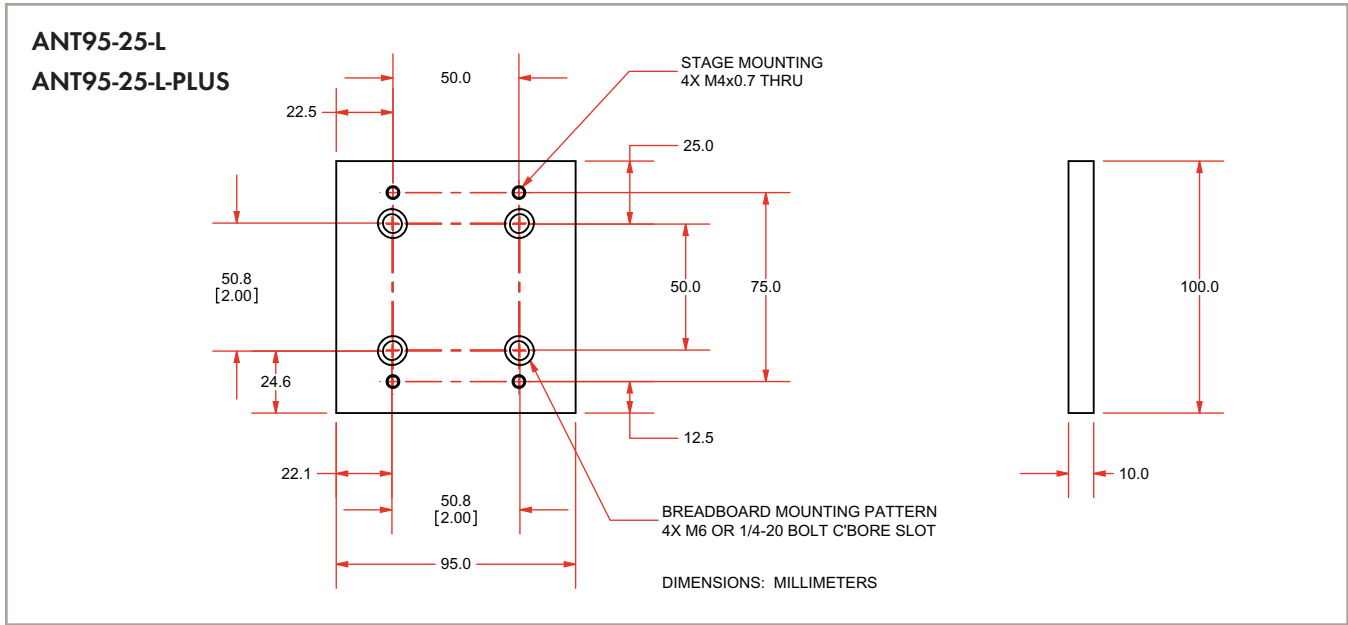
# ANT95-100-L/ANT95-100-L-PLUS DIMENSIONS

## ANT95-100-L/ANT95-100-L-PLUS

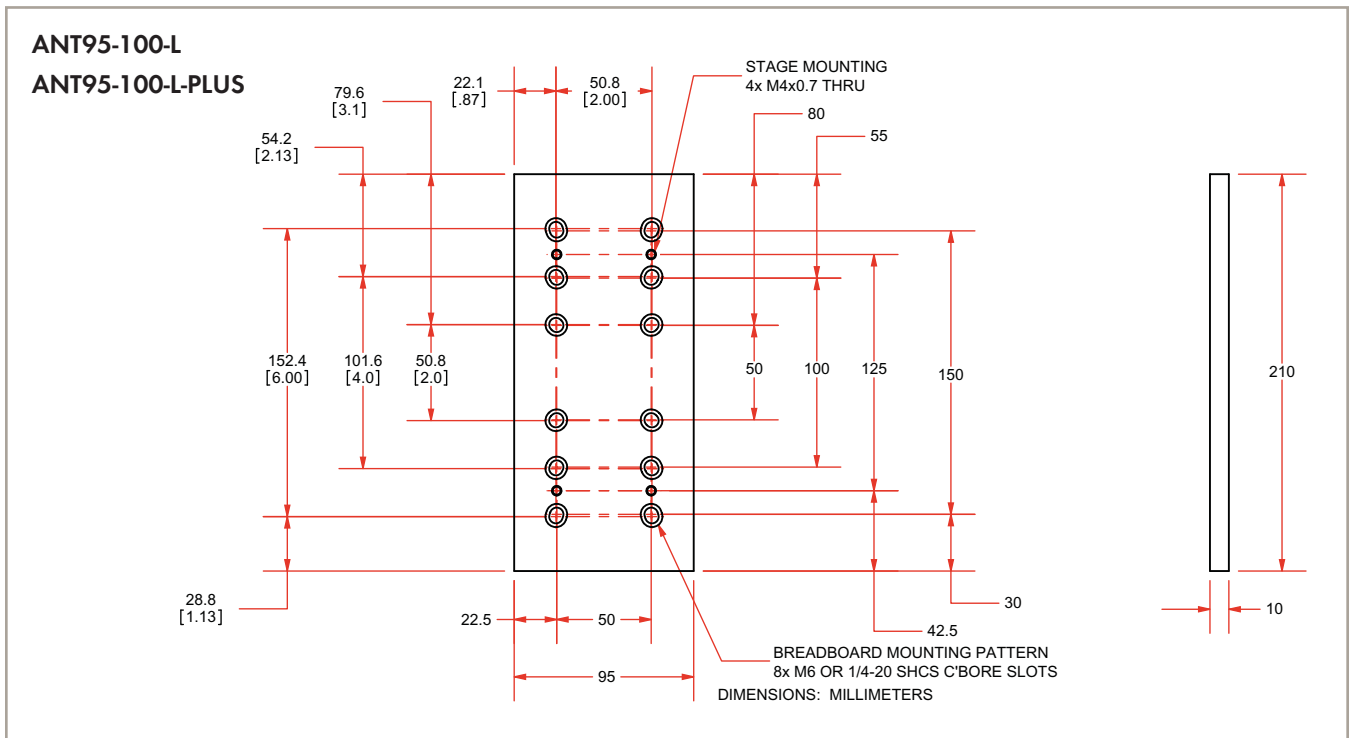
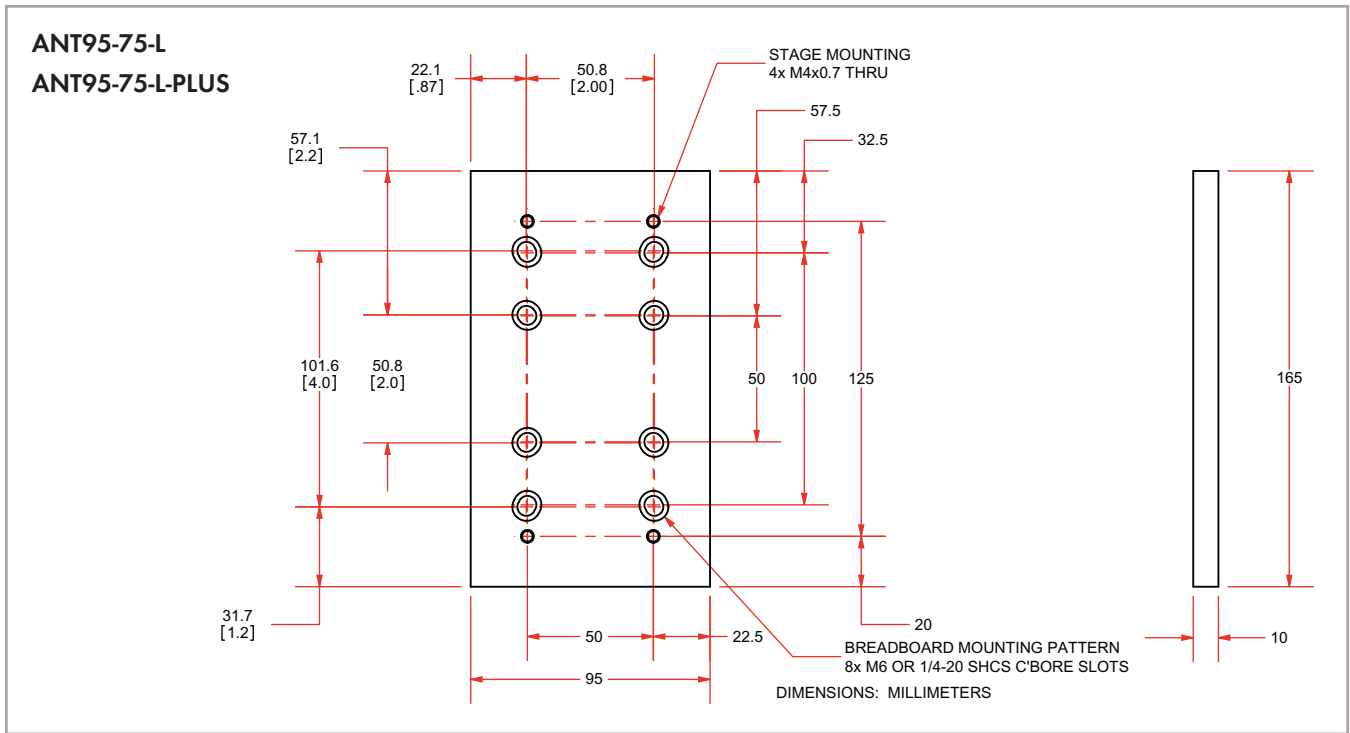




ANT95-25-L/ANT95-50-L and ANT95-25-L-PLUS/ANT95-50-L-PLUS Mounting Plate DIMENSIONS



ANT95-75-L/ANT95-100-L and ANT95-75-L-PLUS/ANT95-100-L-PLUS Mounting Plate DIMENSIONS



## ANT95-L Series ORDERING INFORMATION

### ANT95-L Series Linear Stage

ANT95-L/ANT95-L-PLUS Aerotech nanotranslation crossed-roller linear positioner

#### Linear Stage Travel

ANT95-25-L	25 mm (1 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits
ANT95-25-L-PLUS	25 mm (1 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits (High Accuracy Version)
ANT95-50-L	50 mm (2 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits
ANT95-50-L-PLUS	50 mm (2 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits (High Accuracy Version)
ANT95-75-L	75 mm (3 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits
ANT95-75-L-PLUS	75 mm (3 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits (High Accuracy Version)
ANT95-100-L	100 mm (4 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits
ANT95-100-L-PLUS	100 mm (4 in) travel stage with proprietary direct-drive motor technology, 1 Vp-p sinusoidal output linear encoder and limits (High Accuracy Version)

#### Options

-MP	Breadboard mounting plate
-AP	XY adapter plate (6 mm thick; ANT95-50-L and ANT95-50-L-PLUS only)