

# ANT180L Series

## Single-Axis Direct-Drive Nanopositioning Stage

Noncontact, non-cogging, frictionless direct-drive

Zero backlash or hysteresis

High resolution (1 nm), repeatability ( $\pm 100$  nm), and accuracy ( $\pm 150$  nm)

Anti-creep cross-roller bearings

Travel to 360 mm

Integral cable management for multi-axis systems



The ANT180L continues the expansion of Aerotech’s line of high precision cross-roller stages. With its nanometer resolution, superior bi-directional repeatability, and exceptional low-velocity performance, it is the ultimate solution for high-accuracy alignment, measurement, scanning, and other demanding applications.

### Noncontact Direct-Drive

The ANT180L is driven by a high-power linear motor with ironless forcer and U-channel magnet track. The direct-drive linear motor drives the stage to a peak unloaded acceleration of 2 g and maximum velocity of 500 mm/s. Because the forcer is ironless, it is a cog-free design that provides exceptional velocity control.

### Outstanding Resolution

The direct-drive linear motor and high-accuracy linear encoder make possible outstanding step-to-step resolution when coupled with an Aerotech control system. This is critical in spectroscopy, optical delay line, and other applications. Furthermore, the linear motor and high resolution linear encoder system also provide excellent in-position stability.

### Superior Geometry for High Performance

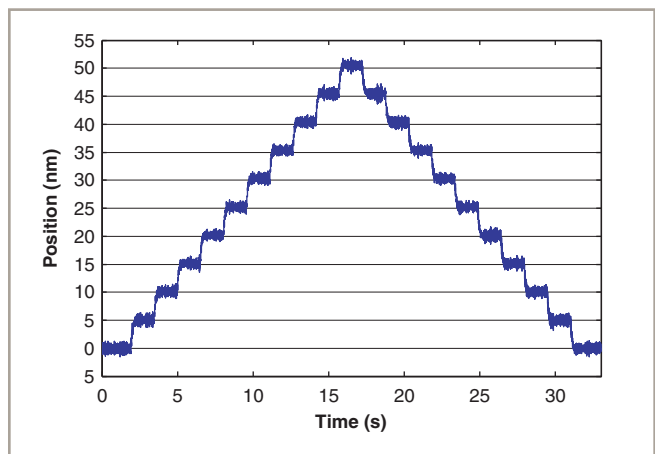
Its large cross section provides a robust and stable base axis for multi-axis systems. Aerotech’s ultra-stiff construction and compact two-piece design result in a stage with unparalleled geometrical tolerances. As a result, the straightness and flatness typically are  $< \pm 1 \mu\text{m}$  over the entire travel.

Designed for smooth, vibration-free motion, the ANT180L utilizes precision anti-cage creep cross-roller bearings for

outstanding smoothness of motion. Since neither the bearing system nor the drive system utilize any recirculating elements, the ANT180L exhibits the outstanding ripple-free motion required for scanning and inspection applications.

### Precision Alignment and Cable Management

ANT180L series stages are easily configured into XY and other multi-axis assemblies. Precision orthogonality alignment to 5 arc seconds and multi-axis cable management systems (CMS) are standard options. We include all customer-required cables, air hoses, etc. in our CMS bundle to facilitate incorporation into the final system. Both ends are fully connectorized for simple integration into the customer’s machine.



ANT180L 5 nm step plot. Best-in-class resolution and exceptional in-position stability for large travel stages. See additional performance graphs on the following pages.

## ANT180L Series SPECIFICATIONS

Mechanical Specifications			ANT180L-160	ANT180L-210	ANT180L-260	ANT180L-360
Travel			160 mm	210 mm	260 mm	360 mm
Accuracy <sup>(1)</sup>	High-Accuracy Incremental Encoder (-E3)	PLUS	±150 nm	±150 nm	±200 nm	±200 nm
		Base	±2.0 µm	±2.5 µm	±3.0 µm	±3.5 µm
	Incremental Encoder (-E1)	PLUS	±300 nm	±300 nm	±350 nm	±350 nm
		Base	±4.0 µm	±5.0 µm	±6.0 µm	±7.0 µm
Resolution (Minimum Incremental Motion)	High-Accuracy Incremental Encoder (-E3)	1 nm	1 nm	1 nm	1 nm	
	Incremental Encoder (-E1)	3 nm	3 nm	3 nm	3 nm	
Repeatability (Bi-Directional) <sup>(1)</sup>	High-Accuracy Incremental Encoder (-E3)	±100 nm	±100 nm	±125 nm	±125 nm	
	Incremental Encoder (-E1)	±150 nm	±150 nm	±175 nm	±175 nm	
Straightness <sup>(1)</sup>			±1.0 µm	±1.25 µm	±1.5 µm	±1.75 µm
Flatness <sup>(1)</sup>			±1.0 µm	±1.25 µm	±1.5 µm	±1.75 µm
Pitch			14 arc sec	14 arc sec	16 arc sec	16 arc sec
Roll			14 arc sec	14 arc sec	16 arc sec	16 arc sec
Yaw			10 arc sec	10 arc sec	12 arc sec	12 arc sec
Maximum Speed			500 mm/s	500 mm/s	500 mm/s	500 mm/s
Maximum Acceleration			2 g - 20 m/s <sup>2</sup> (No Load)	2 g - 20 m/s <sup>2</sup> (No Load)	2 g - 20 m/s <sup>2</sup> (No Load)	2 g - 20 m/s <sup>2</sup> (No Load)
Speed Stability			See graph for typical performance			
Settling Time			See graph for typical performance			
Maximum Force (Continuous)			110.5 N	110.5 N	110.5 N	110.5 N
Load Capacity <sup>(3)</sup>	Horizontal		30 kg	30 kg	30 kg	30 kg
	Side		20 kg	20 kg	20 kg	20 kg
Moving Mass			6.6 kg	7.8 kg	9.2 kg	11.7 kg
Stage Mass			12.8 kg	14.9 kg	17.6 kg	22.4 kg
Material			Aluminum Body/Black Hardcoat Finish			
MTBF (Mean Time Between Failure)			30,000 Hours			

**Notes:**

1. Certified with each stage.
2. Axis orientation for on-axis loading is listed.
3. 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.
4. -PLUS requires the use of an Aerotech controller.
5. Specifications are -E1 and -E3 only. Consult factory for other options.

Electrical Specifications	ANT180L-160	ANT180L-210	ANT180L-260	ANT180L-360
Drive System	Brushless Linear Servomotor			
Feedback	Noncontact Linear Encoder (see options on Order Information page)			
Maximum Bus Voltage	±80 VDC			
Limit Switches	5 V, Normally Open			
Home Switch	Near Center			

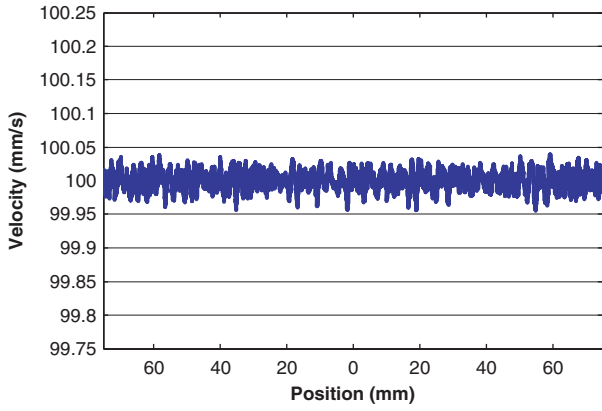
Recommended Controller		ANT180L
Multi-Axis	A3200	Npaq-MXR Npaq MR-MXH Ndrive ML-MXH
	Ensemble	Epaq-MXH Epaq MR-MXH Ensemble ML-MXH
Single Axis	Soloist	Soloist ML-MXH

**Notes:**

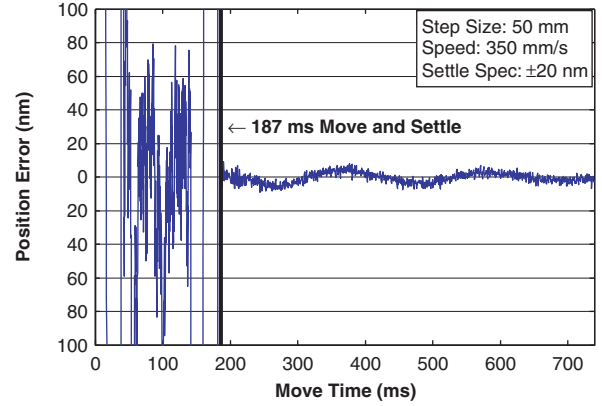
1. Linear amplifiers are required to achieve the listed specifications. Other options are available.

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 Sales Engineering for more information.

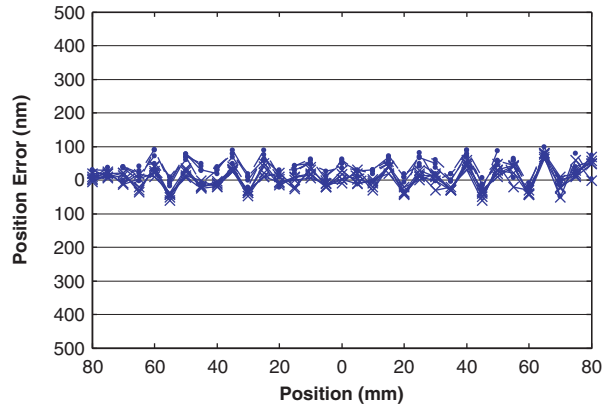
ANT180L Series PERFORMANCE



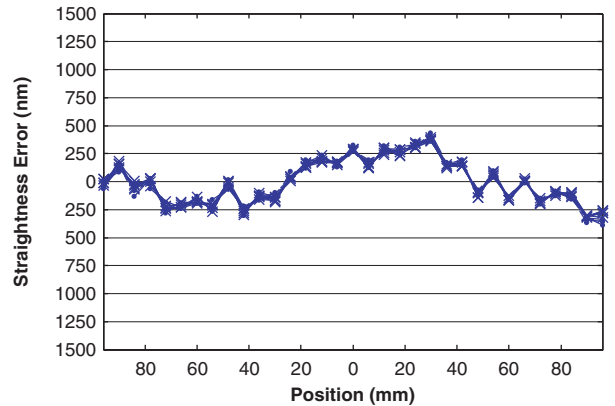
ANT180L-160 velocity performance at 100 mm/s and 1 kg payload. Excellent speed stability is another feature of the ANT Series stages.



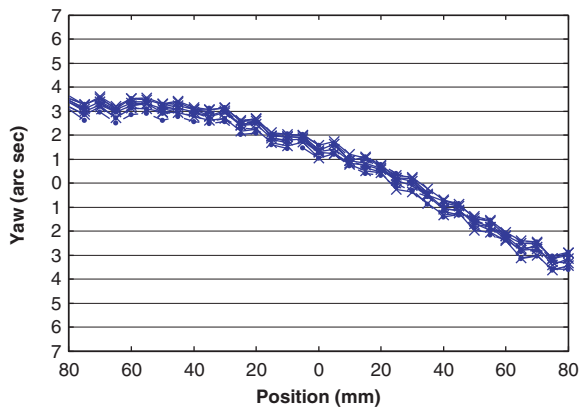
ANT180L-160 step and settle performance with 1 kg payload. Outstanding settling time enhances throughput of most applications.



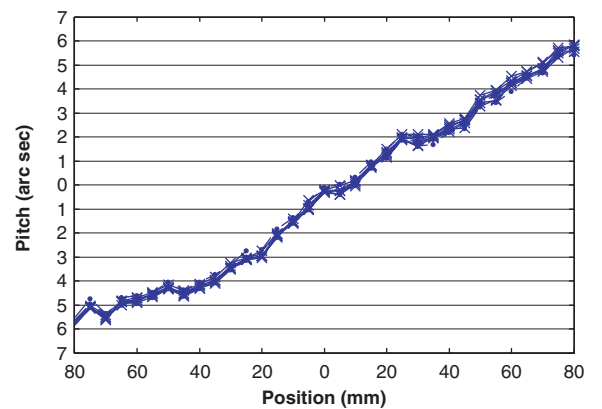
ANT180L-160 accuracy and repeatability, five runs, bi-directional over an extended period of time shows the high level of system accuracy and repeatability.



ANT180L-160 straightness error, one run, bi-directional. Exceptional and highly repeatable performance is assured with minimal straightness error.

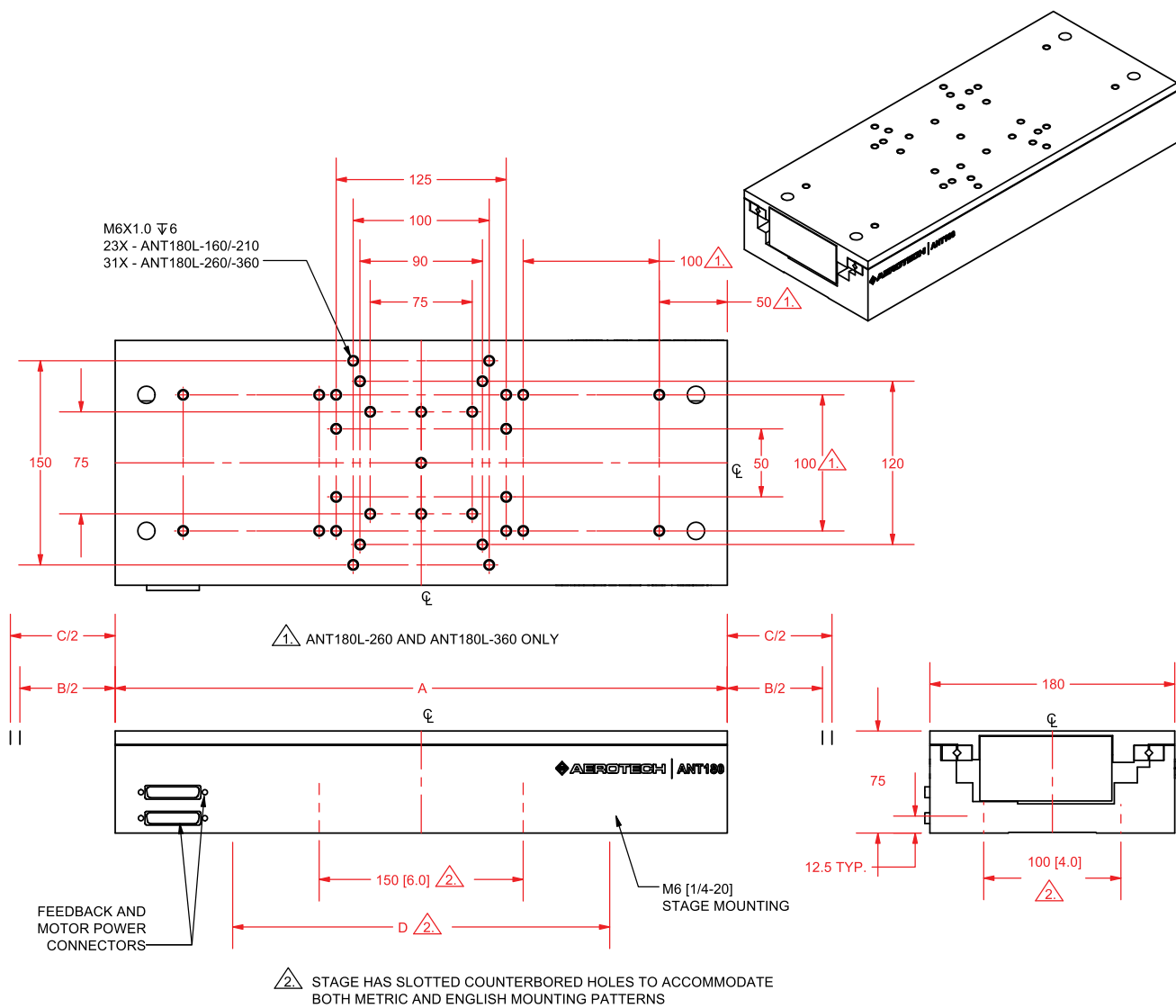


ANT180L-160 yaw, five runs, bi-directional. Highly repeatable, minimal yaw error enhances system positioning accuracy.



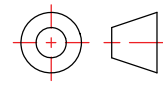
ANT180L-160 pitch, five runs, bi-directional. Excellent repeatability/accuracy contribute to improved processing.

# ANT180L Series DIMENSIONS



STAGE MODEL	A = STAGE LENGTH	B = NOMINAL TRAVEL	C = HARDSTOP TRAVEL	D = MOUNTING PATTERN LENGTH (mm [in])
ANT180L-160	325	160	174	-
ANT180L-210	375	210	224	225 [9.0]
ANT180L-260	450	260	274	275 [11.0]
ANT180L-360	575	360	374	350 [14.0]

DIMENSIONS: MILLIMETERS



**ANT180L Series ORDERING INFORMATION****ANT180L Single-Axis Direct-Drive Nanopositioning Stage****Travel (Required)**


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-160	160 mm travel stage
-210	210 mm travel stage
-260	260 mm travel stage
-360	360 mm travel stage

**Feedback (Required)**


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-E1	Incremental encoder, 1 Vpp
-E2	Incremental encoder, 0.1 $\mu\text{m}$ TTL output
-E3	High-accuracy incremental encoder, 1 Vpp

**Cable Management (Optional)**


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-CMS1	Cable management system for XY assembly - order with lower-axis only
-CMS2	Cable management system for XY assembly w/6 mm air line - order with lower-axis only
-CMS3	Cable management system for XYZ assembly - order with lower-axis only
-CMS4	Cable management system for XYZ assembly w/6 mm air line - order with lower-axis only
-CMS5	Cable management system for XY assembly - order with upper-axis only
-CMS6	Cable management system for XY assembly w/6 mm air line - order with upper-axis only
-CMS7	Cable management system for XYZ assembly - order with upper-axis only
-CMS8	Cable management system for XYZ assembly w/6 mm air line - order with upper-axis only

**Metrology (Required)**


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-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	Integration - Test as system 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	Integration - Test as components 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 separate line item)**


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ALIGN-PA10	XY assembly; 10 arc sec orthogonality
ALIGN-PA5	XY assembly; 5 arc sec orthogonality