ANT130-XY-ULTRA

Two Axis, Mechanical Bearing, Linear Motor Stage

nano Motion Technology

- **Integrated low-profile XY linear motor stage**
- **Nanometer-level performance in a large travel format**
- **2D system accuracy is 250 nm**
- **In-position stability of <1 nm**
- **High dynamic performance**

Introduction

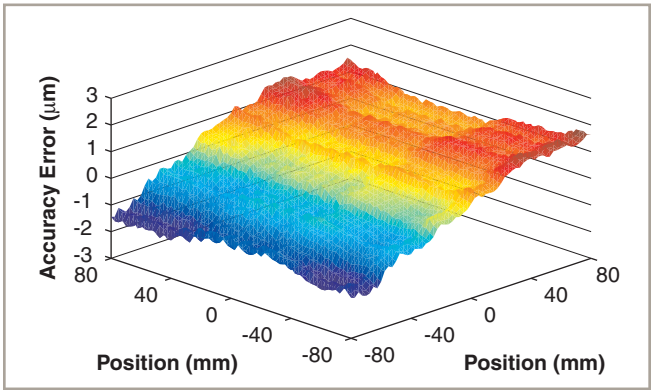
Aerotech's ANT130-XY-ULTRA is a long travel (up to 160 mm x 160 mm) nanopositioner for XY applications. Each axis uses crossed-roller bearings, as well as Aerotech's unique direct-drive for non-cogging, zero backlash motion. In addition, each stage receives a two-dimensional correction to achieve unmatched nanometer resolution, accuracy, and repeatability. This unique drive and bearing combination, packaged in an extremely low profile and small footprint, offers tangible advantages in your motion application.

The ANT130-XY-ULTRA extends the performance capability of Aerotech's ANT130-XY stage series to levels found nowhere else. The exceptional geometric and dynamic performance of the ANT130-XY-ULTRA make it an ideal choice for nearly all high-end motion applications in the lab or in production environments.

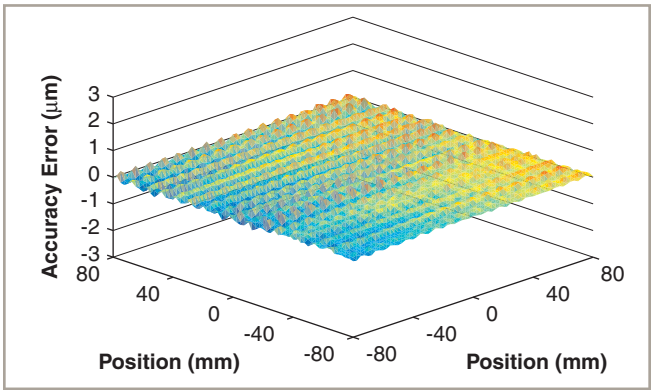
ULTRA Trajectory Management System

In order to achieve the highest possible system accuracy from our multi-axis nanopositioning systems, Aerotech has developed an advanced, interactive, dynamic trajectory management system. To take advantage of this sophisticated interactive calibration system, the mechanical system has to be completely assembled and functionally tested prior to calibration in our best-in-class metrology labs. Nano-level system accuracy can only be achieved under stringent environmental conditions, calibrating with the best test equipment, and utilizing the formidable capability of ULTIMUS. By implementing the ULTIMUS dynamic trajectory management system with the ANT130-XY-ULTRA, we are able to produce 2-dimensional accuracies of ±250 nm or better.

The plots below illustrate performance differences between a standard ANT130-XY and the -ULTRA version. Straightness errors, orthogonality errors, and accuracy errors caused by stage yawing are virtually eliminated.



ANT130-160-XY 2D accuracy plot showing planar accuracy error including straightness, orthogonality, and stage yawing.



ANT130-160-XY-ULTRA – exceptional 2D system accuracy with Aerotech's ULTRA version.

ANT130-XY-ULTRA Series SPECIFICATIONS

Mechanical Specifications		ANT130-060-XY-ULTRA	ANT130-110-XY-ULTRA	ANT130-160-XY-ULTRA
Travel		60 mm	110 mm	160 mm
2D Accuracy(1)		±250 nm (±10 µin)	±300 nm (±12 µin)	±300 nm (±12 µin)
Resolution		1 nm (0.04 µin)	1 nm (0.04 µin)	1 nm (0.04 µin)
Repeatability (Bi-Directional)(1)		±75 nm (±3 µin)	±75 nm (±3 µin)	±75 nm (±3 µin)
Repeatability (Uni-Directional)		±25 nm (±1 µin)	±25 nm (±1 µin)	±25 nm (±1 µin)
Straightness(1)		±250 nm (±10 µin)	±300 nm (±12 µin)	±300 nm (±12 µin)
Flatness(1)		±1.0 µm (±40 µin)	±1.0 µm (±40 µin)	±1.0 µm (±40 µin)
Pitch		10 arc sec	12 arc sec	12 arc sec
Roll		10 arc sec	12 arc sec	12 arc sec
Yaw		5 arc sec	6 arc sec	6 arc sec
Orthogonality		1.0 arc sec	0.5 arc sec	0.5 arc sec
Maximum Speed		350 mm/s (14 in/s) (Upper Axis)	350 mm/s (14 in/s) (Upper Axis)	350 mm/s (14 in/s) (Upper Axis)
Maximum Acceleration		1 g - 10 m/s^2 (No Load)(Upper Axis)	1 g - 10 m/s^2 (No Load)(Upper Axis)	1 g - 10 m/s^2 (No Load)(Upper Axis)
Speed Stability		See graph for typical performance		
Settling Time		See graph for typical performance		
In-Position Stability(2)		<1 nm (<0.04 µin)	<1 nm (<0.04 µin)	<1 nm (<0.04 µin)
Maximum Force (Continuous)		23 N	23 N	23 N
Load Capacity(3)	**Horizontal**	12.0 kg (26.5 lb)	12.0 kg (26.5 lb)	12.0 kg (26.5 lb)
Moving Mass	**Upper**	1.5 kg (3.3 lb)	2.1 kg (4.6 lb)	2.1 kg (4.6 lb)
	Lower	4.2 kg (9.2 lb)	5.7 kg (12.5 lb)	5.7 kg (12.5 lb)
Stage Mass		5.5 kg (12.1 lb)	7.4 kg (16.3 lb)	7.4 kg (16.3 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 XY systems measured 25 mm above the tabletop. Consult factory for multi-axis or non-standard applications.
• -ULTRA requires the use of an Aerotech controller.

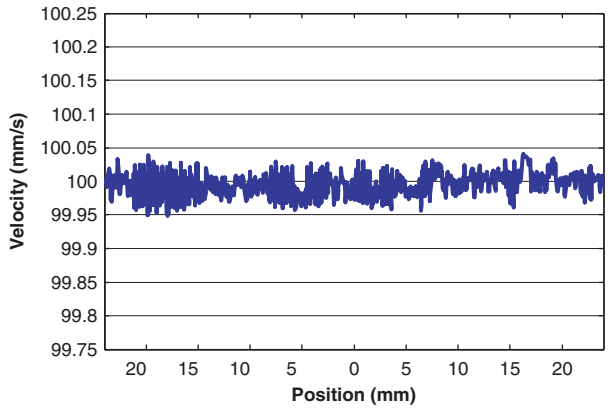
Electrical Specifications	ANT130-060-XY-ULTRA	ANT130-110-XY-ULTRA	ANT130-160-XY-ULTRA
Drive System	Brushless Linear Servomotor		
Feedback	Noncontact Linear Encoder		
Maximum Bus Voltage	±40 VDC		
Limit Switches	5 V, Normally Closed		
Home Switch	Near Center		

Recommended Controller		ANT130-060-XY-ULTRA	ANT130-110-XY-ULTRA	ANT130-160-XY-ULTRA
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		

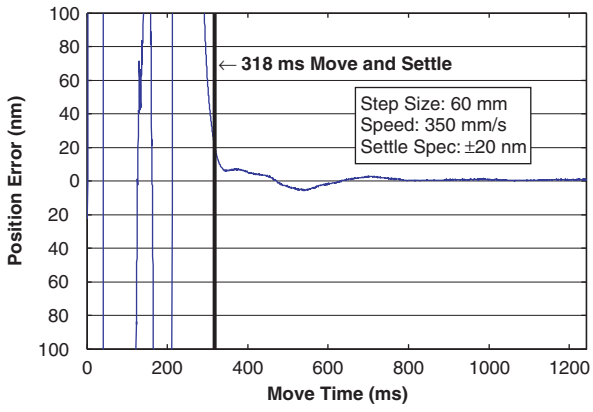
Notes:
1. Linear amplifiers are required to achieve the listed specifications. Other options are available.

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.

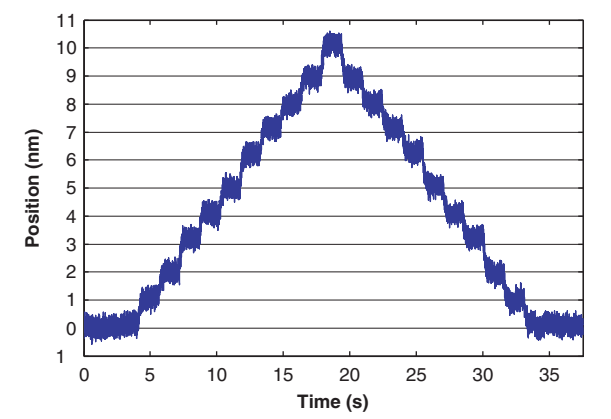
ANT130-XY-ULTRA Series PERFORMANCE



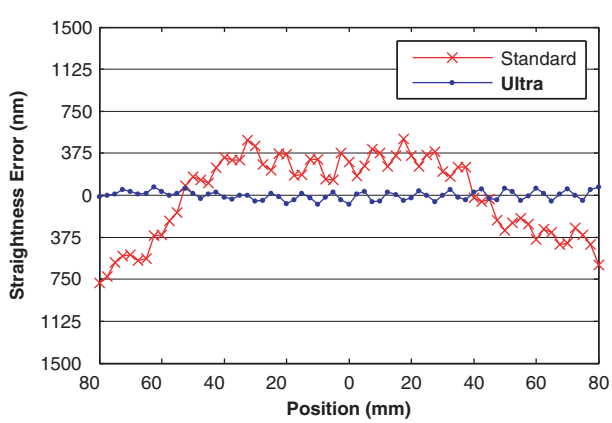
ANT130-060-XY-ULTRA velocity performance at 100 mm/s and 1 kg payload for the X (lower) axis. This outstanding speed stability enhances most scanning or laser machining applications.



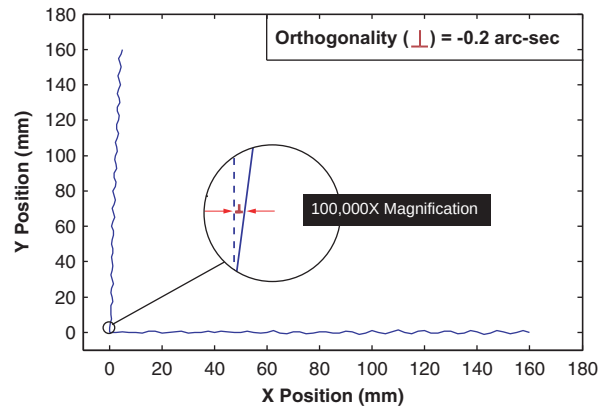
ANT130-060-XY-ULTRA step and settle performance at full travel and 1 kg payload for the X (lower) axis. Industry-best settling times significantly improve throughput for most applications.



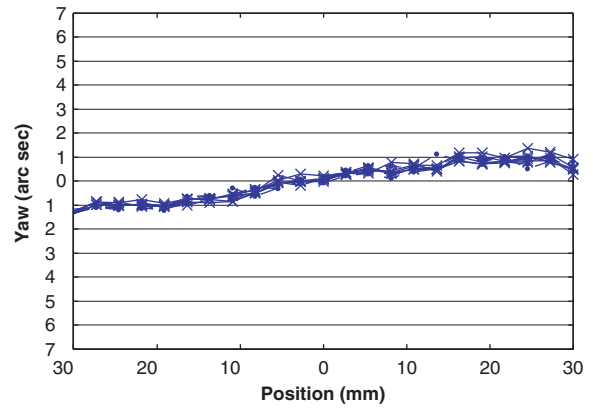
ANT130-060-XY-ULTRA lower axis 1 nm step plot. Best-in-class resolution and exceptional in-position stability for large travel stages.



ANT130-160-XY straightness error comparison between the BASE and ULTRA models shows a dramatic improvement in this specification.

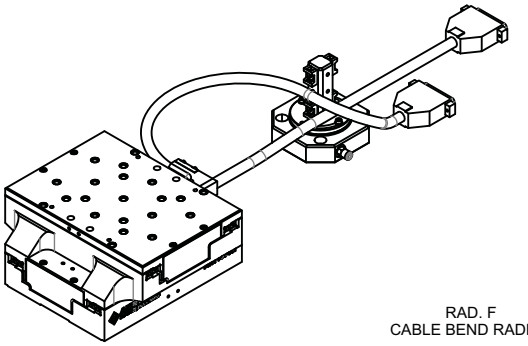


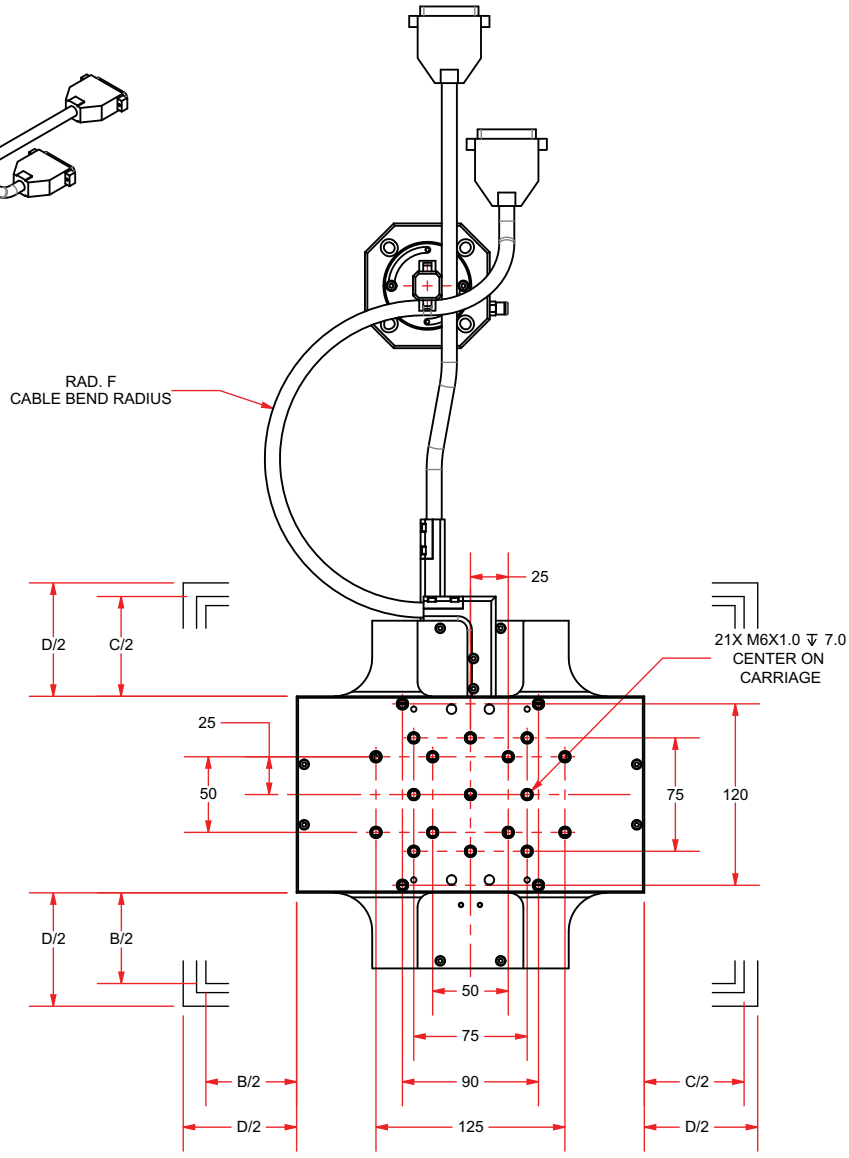
ANT130-060-XY-ULTRA orthogonality. The inset is magnified 100,000X for clarity. The ULTRA model orthogonality is a twenty-fold improvement over the BASE model orthogonality.

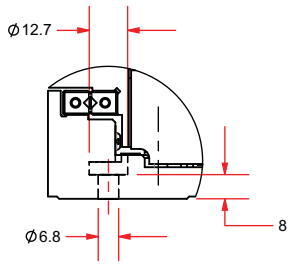


*ANT130-060-XY-ULTRA Y (upper) axis yaw, five runs, bi-directional. Highly repeatable, lowest angular error over **full** travel.*

ANT130-XY-ULTRA DIMENSIONS

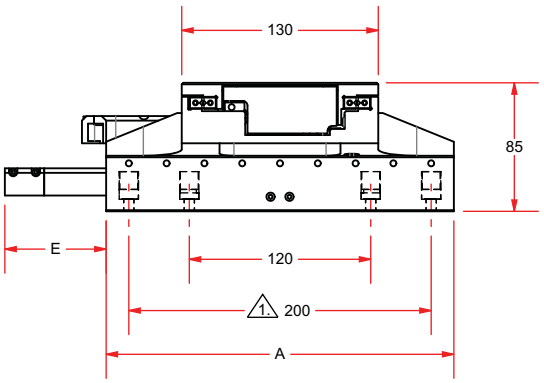


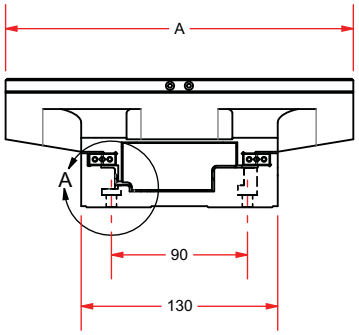




DETAIL A
SCALE 2 : 5
MOUNTING HOLE TYP.

MODEL	A = STAGE LENGTH	B = NOMINAL TRAVEL	C = LIMIT TRAVEL	D = HARDSTOP TRAVEL	E	F
ANT130-060-XY	180	60 X 60	66 X 66	75 X 75	42	~87.5
ANT130-110-XY	230	110 X 110	116 X 116	125 X 125	67	~100
ANT130-160-XY	280	160 X 160	166 X 166	175 X 175	92	~112.5

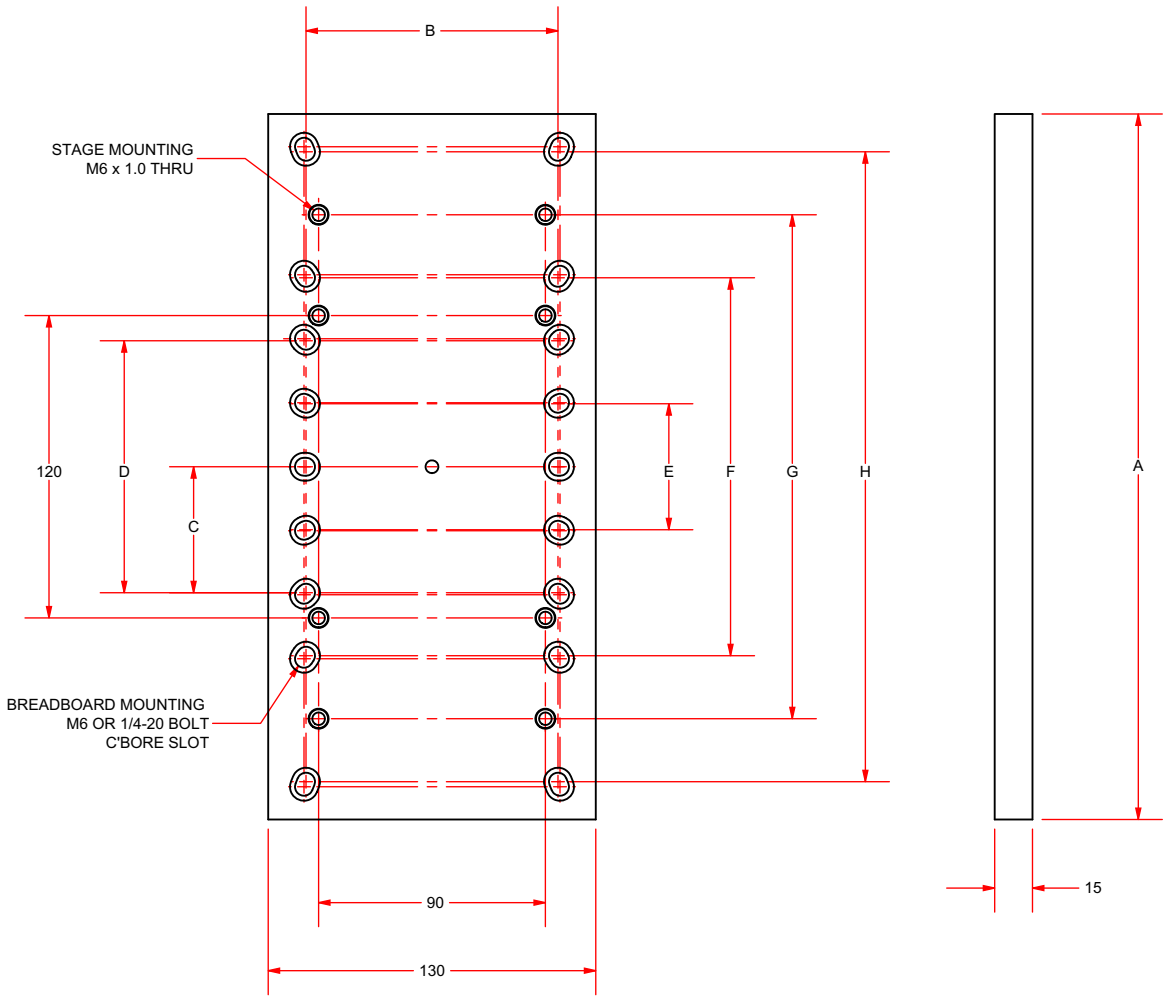




1. ANT130-110-XY AND ANT130-160-XY ONLY

DIMENSIONS: MILLIMETERS

ANT130-XY-ULTRA Mounting Plate DIMENSIONS



	LENGTH	MOUNTING						
OPTION	A	B	C	D	E	F	G	H
MP-ANT130-035	155	100[4.0]	50[2.0]	100[4.0]	--	--	--	--
MP-ANT130-060	180	100[4.0]	--	--	50[2.0]	150[6.0]	--	--
MP-ANT130-110	230	100[4.0]	--	--	50[2.0]	150[6.0]	200	--
MP-ANT130-160	280	100[4.0]	--	--	50[2.0]	150[6.0]	200	250[10.0]

DIMENSIONS: MILLIMETERS

ANT130-XY-ULTRA Series ORDERING INFORMATION

ANT130-XY-ULTRA Series Linear Stage

ANT130-XY-ULTRA	Aerotech nanotranslation crossed-roller linear positioner with 2D calibration

Linear Stage Travel

ANT130-060-XY-ULTRA	60 mm travel XY stage with linear motor and limits (high accuracy version)
ANT130-110-XY-ULTRA	110 mm travel XY stage with linear motor and limits (high accuracy version)
ANT130-160-XY-ULTRA	160 mm travel XY stage with linear motor and limits (high accuracy version)

Output Cable Connectors

-25DU	Single 25-pin D connector (standard)
-4DU-25DU	4-pin HPD and 25-pin D connectors

Note: -25DU single 25-pin connector option not valid for systems using bus voltages greater than 80 V

Options

-MP	Breadboard mounting plate