Air-Bearing Direct-Drive Linear Stage

ABL1500

Ultra-Precise Motion with Zero Maintenance

The ABL1500 series of linear air-bearing stages represents the pinnacle of linear motion performance, offering exceptional accuracy, stability and speed in high-precision applications. Featuring an active air preload on all bearing surfaces, ABL1500 is ideal for advanced manufacturing and inspection applications because it offers exceptionally fine horizontal and vertical straightness and angular performance. The large bearing surfaces create a stiff motion platform that supports large payloads and ensures precise, high-dynamic motion. Plus, the completely non-contact design results in virtually unlimited operational life without the need for regular maintenance or servicing.

Key Applications

ABL1500WB linear air-bearing stages are ideal for applications and processes requiring outstanding precision, geometric and dynamic performance and ultra-smooth motion, including:

- Semiconductor manufacturing & inspection
- Lithography
- Surface metrology
- Photonic device manufacturing
- Advanced packaging
- Laser microprocessing
- Synchrotron, beamline & other research applications

KEY FEATURES:

- Travel options from **50–500 mm**
- Supports payloads up to **35 kg**
- Ironless linear motor provides **ULTRA-SMOOTH MOTION** with zero cogging
- Optional 4 µm encoder scale option provides **SUB-NANOMETER RESOLUTION** for superior **DYNAMIC ACCURACY AND VELOCITY STABILITY**
- Rated for **NORMAL- AND SIDE-MOUNTING**
- **EASY TO INTEGRATE** with other ABL1500 stages and more to build multi-axis systems

ABL1500 Series SPECIFICATIONS

Mechanical Specifications			ABL1500-050	ABL1500-100	ABL1500-200
Travel			50 mm	100 mm	200 mm
Accuracy[1]	**E1**	**Calibrated (-PL2)**	±0.3 µm	±0.3 µm	±0.5 µm
		Standard	±2.0 µm	±4.0 µm	±8.0 µm
	E3	**Calibrated (-PL2)**	±0.2 µm	±0.2 µm	±0.4 µm
		Standard	±1.0 µm	±2.0 µm	±5.0 µm
Repeatability (Bi-Directional)[1]	**E1**		±0.1 µm	±0.2 µm	
	E3		±0.05 µm	±0.05 µm	±0.1 µm
Straightness[1]			±0.25 µm	±0.4 µm	±0.5 µm
Flatness[1]			±0.25 µm	±0.4 µm	±0.5 µm
Pitch			±0.5 arc sec	±1 arc sec	±2 arc sec
Roll			±0.5 arc sec	±1 arc sec	±2 arc sec
Yaw			±0.5 arc sec	±1 arc sec	±2 arc sec
Maximum Speed			2 m/s		
Maximum Acceleration			2 g (No Load)		
Maximum Force (Continuous)			93.6 N		
Load Capacity[2]	**Horizontal**		35 kg		
	Side		25 kg		
Operating Pressure			80 psi ±5 psig		
Air Consumption			24-30 SLPM @ 551 kPa (0.85-1.06 SCFM @ 5.51 bar)		
Moving Mass (No Load)			5.1 kg		
Stage Mass			14.7 kg	16.0 kg	18.6 kg
Material			Hardcoat Anodized Aluminum		
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 aove the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.
4. To protect air bearing against under-pressure, an in-line pressure switch tied to the motion controller/amplifier E-stop input is recommended.
5. Air supply must be clean, dry to 0° F dewpoint and filtered to 0.25 µm or better; recommend nitrogen at 99.9% purity.
6. For XY assemblies of ABL1500,the maximum upper axis travel is 200 mm. For upper axis travels greater than 200 mm but less than or equal to 500 mm, an ABL1500WB is required as the lower axis.

ABL1500 Series SPECIFICATIONS

Mechanical Specifications			ABL1500-300	ABL1500-400	ABL1500-500
Travel			300 mm	400 mm	500 mm
Accuracy[1]	**E1**	**Calibrated (-PL2)**	±0.5 µm	±0.6 µm	±0.6 µm
		Standard	±12.0 µm	±16.0 µm	±20.0 µm
	E3	**Calibrated (-PL2)**	±0.4 µm	±0.5 µm	±0.5 µm
		Standard	±5.0 µm	±5.0 µm	±5.0 µm
Repeatability (Bi-Directional)[1]	**E1**		±0.2 µm	±0.3 µm	
	E3		±0.15 µm	±0.2 µm	
Straightness[1]			±0.75 µm	±1.5 µm	±2.0 µm
Flatness[1]			±0.75 µm	±1.5 µm	±2.0 µm
Pitch			±3 arc sec	±4 arc sec	±5 arc sec
Roll			±3 arc sec	±4 arc sec	±5 arc sec
Yaw			±3 arc sec	±4 arc sec	±5 arc sec
Maximum Speed			2 m/s		
Maximum Acceleration			2 g (No Load)		
Maximum Force (Continuous)			93.6 N		
Load Capacity[2]	**Horizontal**		35 kg		
	Side		25 kg		
Operating Pressure			80 psi ±5 psig		
Air Consumption			24-30 SLPM @ 551 kPa (0.85-1.06 SCFM @ 5.51 bar)		
Moving Mass (No Load)			5.1 kg		
Stage Mass			21.3 kg	23.9 kg	26.5 kg
Material			Hardcoat Anodized Aluminum		
MTBF (Mean Time Between Failure)			30,000 Hours		

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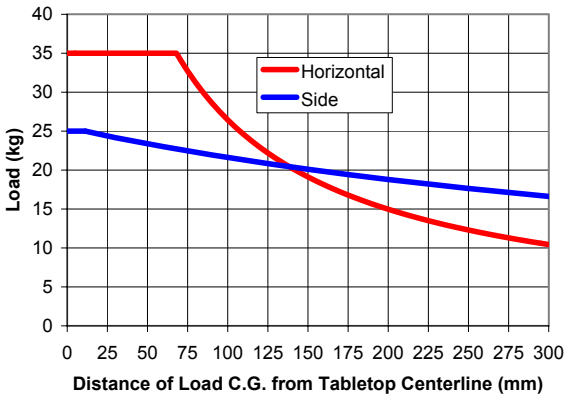
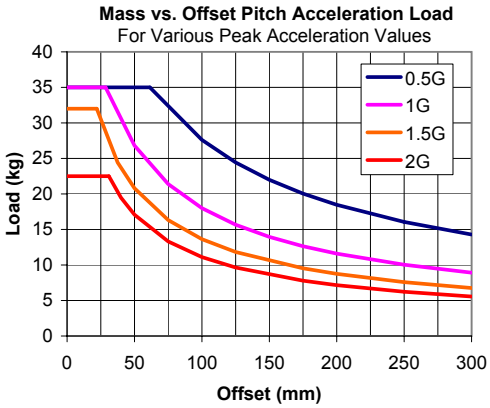
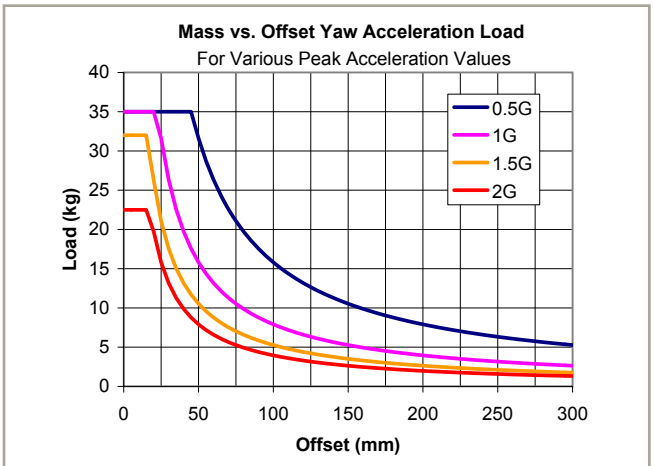
Electrical Specifications	
Drive System	Brushless Linear Servomotor
Feedback	Noncontact Linear Encoder (see signal period options on Order Information page)
Maximum Bus Voltage	up to 80 VDC
Limit Switches	5 V, Normally Closed
Home Switch	Near Center



Cantilever load performance for the ABL1500.

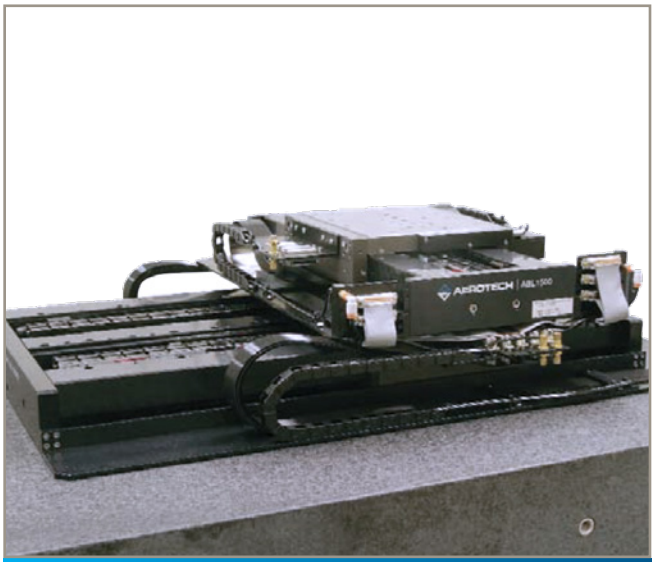


Mass versus offset pitch acceleration load for the ABL1500.



Mass versus offset yaw acceleration load for the ABL1500.

Optional Z-axis configuration with integral counterbalance. See the ABL1500Z data sheet.



Optional wide-body version for improved flatness and load performance. See the ABL1500WB data sheet.

Optional bellows waycovers for protection from contamination. See the ABL1500-B and ABL1500WB-B data sheets.

Travel (Required)

-050 50 mm travel

-100 100 mm travel

-200 200 mm travel

-300 300 mm travel

-400 400 mm travel

-500 500 mm travel

Feedback (Required)

-E1 Incremental linear encoder, 1 Vpp amplified sine output

-E2 Incremental linear encoder, 0.1 µm TTL line driver output

-E3 High-accuracy incremental linear encoder, 1 Vpp amplified sine output

Cable Management (Required)

-CMS1 Single axis cable management system

-CMS2 Cable management system for XY assembly

-CMS3 Cable management system for Y axis, upper axis only

-CMS4 Cable management system for YZ assembly, upper axis only

Note: For XY assemblies of ABL1500, the maximum upper axis travel is 200 mm. For upper axis travels greater than 200 mm but less than or equal to 500 mm, an ABL1500WB is required as the lower axis

Metrology (Required)

-PL1 Metrology, uncalibrated with performance plots

-PL2 Metrology, calibrated (HALAR) with performance plots

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.

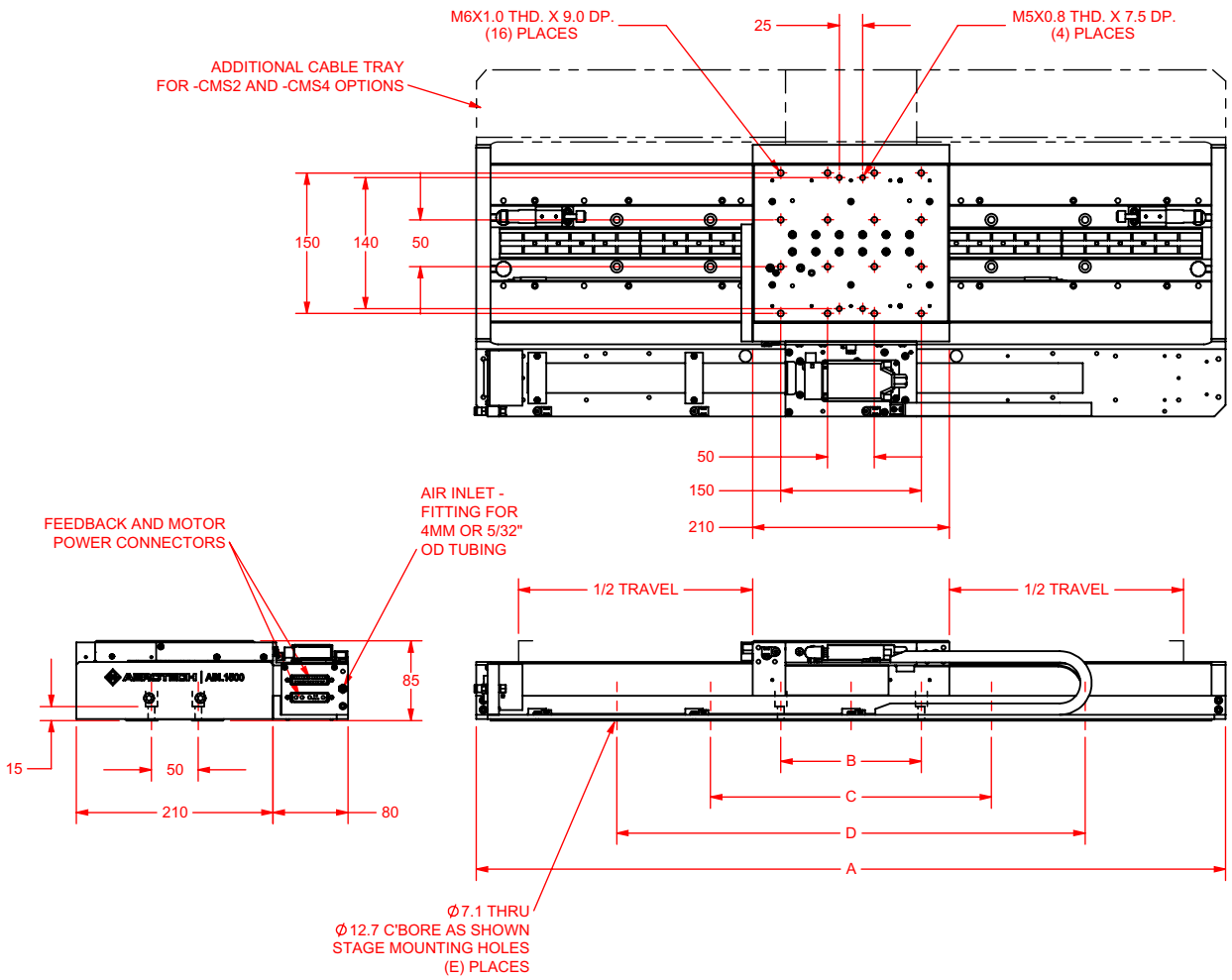
-TAC **Integration - Test as components**
Testing and integration of individual items as discrete components that ship together. This is typically used for spareparts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.

Accessories (To Be Ordered As Separate Line Item)

ALIGN-NPA	Non-precision XY assembly
ALIGN-PA10	XY assembly; 10 arc sec orthogonality. Alignment to within 7 microns orthogonality for short travel stages.
ALIGN-PA5	XY assembly; 5 arc sec orthogonality. Alignment to within 3 microns orthogonality for short travel stages.
ABF	Air-bearing filtration kit

ABL1500 Series DIMENSIONS

ABL1500



BASIC MODEL	NOMINAL TRAVEL	ELEC LIMIT TRAVEL	MECH LIMIT TRAVEL	DIMENSIONS - MILLIMETERS				
				A	B	C	D	E
ABL1500-050	50	60	105	350	150	-	-	4
ABL1500-100	100	110	155	400	150	-	-	4
ABL1500-200	200	210	255	500	150	250	-	10
ABL1500-300	300	310	355	600	150	300	-	10
ABL1500-400	400	410	455	700	150	300	450	14
ABL1500-500	500	510	555	800	150	300	500	14