

ABL1500-B Series

Air Bearing, Linear Motor Stage

Integral bellows protect the drive and bearing system from contamination

Designed for high-performance scanning and inspection

Air-on-air preload on all air-bearing surfaces

Linear encoder feedback provides nanometer-level resolution

High stiffness for heavy loads and excellent geometrical performance

Travel up to 500 mm

Leading-edge manufacturing demands positioning tolerances beyond the capability of conventional ball-screw and mechanical-bearing positioning systems. The ABL1500-B, with its integral bellows, exceptionally high stiffness, and excellent geometric characteristics was designed specifically to meet those demands.

Air-Bearing Design for High Dynamic Performance

The ABL1500-B incorporates an air-on-air preload on both the vertical and horizontal surfaces. The opposing thin-film pressure maintains the bearing nominal gap tolerance. This design, in addition to the large air-bearing surface that distributes the load over a large surface area, results in a stage with outstanding stiffness that is ideal for heavy or offset loading.

Proprietary manufacturing techniques result in a stage with unsurpassed geometrical characteristics. The air bearing has an inherent averaging effect that maximizes performance. The thin film will fill small surface voids and allow for other irregularities. This characteristic yields superior pitch, roll, yaw, straightness and flatness specifications.

Linear Motor Drive

The driving force behind this stage is Aerotech's BLMC series brushless linear servomotor. Aerotech's long history and experience as a motor manufacturer is reflected in this design. The BLMC utilizes an ironlessforcer, which means



Aerotech's ABL1500-B, with its integral bellows, exceptionally high stiffness and excellent geometric characteristics, was designed to meet the demands of leading-edge manufacturing.

there is zero cogging and no attractive forces, resulting in unsurpassed smoothness of motion. Capable of generating high force and velocity, the BLMC represents the ultimate combination of power and performance.

Zero Maintenance

Our totally noncontact air bearing, noncontact linear motor drive, and noncontact feedback device ensure years of maintenance-free operation at the high performance levels that are expected of Aerotech equipment. Because there is no mechanical contact between moving elements, the ABL1500-B experiences no wear or reduction in performance over time. Service life is virtually unlimited and since there is no lubrication – only clean, dry gas – air bearings are ideal for cleanroom and medical applications.

Cable Management

We carefully optimize the cable bend radius to ensure years of trouble-free operation. In the unlikely event of failure, Aerotech's modular design makes cable replacement quick and easy with minimal downtime.

We include all customer-required cables, air hoses, etc. in our CMS bundle to facilitate integration into the final system. Both ends are fully connectorized for simple integration into the customer's machine.

Integral Bellows

The ABL1500-B uses an integral bellows system to provide a high level of environmental protection. This system protects the air bearings and drive system from process-generated contamination like abrasive debris. The design also has been optimized to minimize the influence of the bellows on the stage's geometric performance.

Mechanical Specifications			ABL1500-050	ABL1500-100	ABL1500-200
Travel			50 mm (2 in)	100 mm (4 in)	200 mm (8 in)
Accuracy ⁽¹⁾	E1	Calibrated	±0.3 µm (±12 µin)	±0.3 µm (±12 µin)	±0.5 µm (±20 µin)
		Standard	±2.0 µm (±80 µin)	±4.0 µm (±160 µin)	±8.0 µm (±320 µin)
	E3	Calibrated	±0.2 µm (±8 µin)	±0.2 µm (±8 µin)	±0.4 µm (±16 µin)
		Standard	±1.0 µm (±40 µin)	±2.0 µm (±80 µin)	±5.0 µm (±200 µin)
Repeatability (Bi-Directional) ⁽¹⁾			E1	±0.2 µm (±8 µin)	
			E3	±0.05 µm (±2 µin)	±0.05 µm (±2 µin)
Straightness ⁽¹⁾			±0.25 µm (±10 µin)	±0.4 µm (±16 µin)	±0.5 µm (±20 µin)
Flatness ⁽¹⁾			±0.25 µm (±10 µin)	±0.4 µm (±16 µin)	±0.5 µm (±20 µin)
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 (80 in/s)		
Maximum Acceleration			2 g - 20 m/s ² - 768 in/s ² (No Load)		
Maximum Force (Continuous)			93.6 N (21.0 lb)		
Load Capacity ⁽²⁾			Horizontal	35 kg (77.2 lb)	
			Side	25 kg (55 lb)	
Operating Pressure			80 psi (5.5 bar) ±5 psig (0.3 bar)		
Air Consumption			24-30 SLPM @ 551 kPa (0.85-1.06 SCFM @ 5.51 bar)		
Moving Mass (No Load)			5.1 kg (11.2 lb)		
Stage Mass			14.7 kg (32.4 lb)	16.0 kg (35.3 lb)	18.6 kg (41.0 lb)
Material			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 above 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 configurations, 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.

Mechanical Specifications			ABL1500-300	ABL1500-400	ABL1500-500
Travel			300 mm (12 in)	400 mm (16 in)	500 mm (20 in)
Accuracy ⁽¹⁾	E1	Calibrated	±0.5 µm (±20 µin)	±0.6 µm (±24 µin)	±0.6 µm (±24 µin)
		Standard	±12.0 µm (±480 µin)	±16.0 µm (±640 µin)	±20.0 µm (±800 µin)
	E3	Calibrated	±0.4 µm (±16 µin)	±0.5 µm (±20 µin)	±0.5 µm (±20 µin)
		Standard	±5.0 µm (±200 µin)	±5.0 µm (±200 µin)	±5.0 µm (±200 µin)
Repeatability (Bi-Directional) ⁽¹⁾			E1	±0.3 µm (±12 µin)	
			E3	±0.15 µm (±6 µin)	±0.2 µm (±8 µin)
Straightness ⁽¹⁾			±0.75 µm (±30 µin)	±1.5 µm (±60 µin)	±2.0 µm (±80 µin)
Flatness ⁽¹⁾			±0.75 µm (±30 µin)	±1.5 µm (±60 µin)	±2.0 µm (±80 µin)
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 (80 in/s)		
Maximum Acceleration			2 g - 20 m/s ² - 768 in/s ² (No Load)		
Maximum Force (Continuous)			93.6 N (21.0 lb)		
Load Capacity ⁽²⁾			Horizontal	35 kg (77.2 lb)	
			Side	25 kg (55 lb)	
Operating Pressure			80 psi (5.5 bar) ±5 psig (0.3 bar)		
Air Consumption			24-30 SLPM @ 551 kPa (0.85-1.06 SCFM @ 5.51 bar)		
Moving Mass (No Load)			5.1 kg (11.2 lb)		
Stage Mass			21.3 kg (47.0 lb)	23.9 kg (52.7 lb)	26.5 kg (58.4 lb)
Material			Aluminum		
MTBF (Mean Time Between Failure)			30,000 Hours		

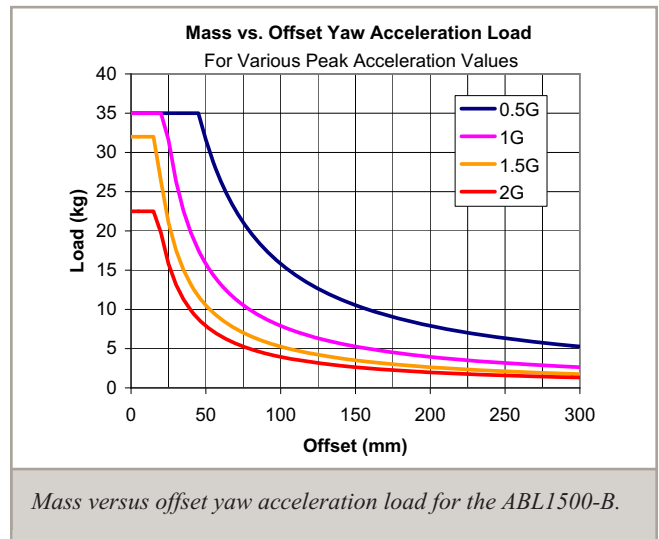
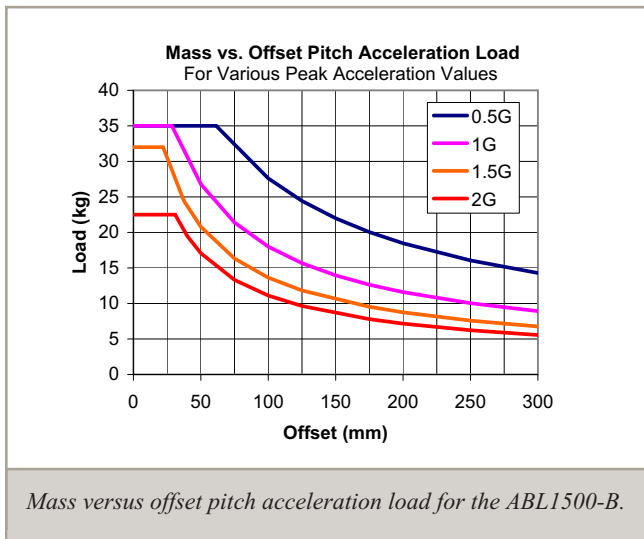
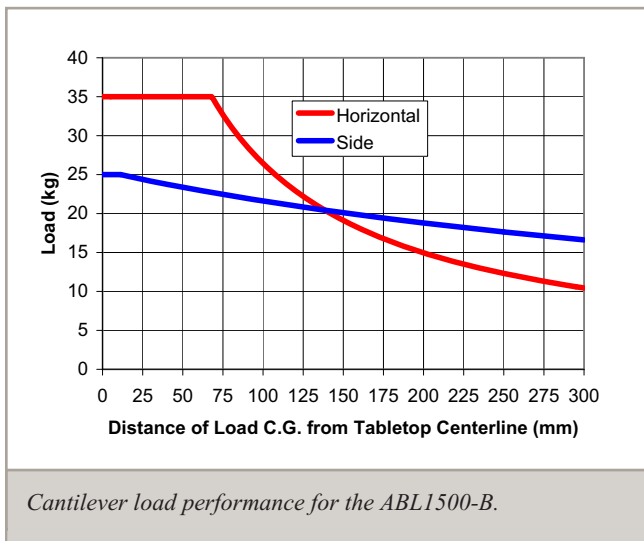
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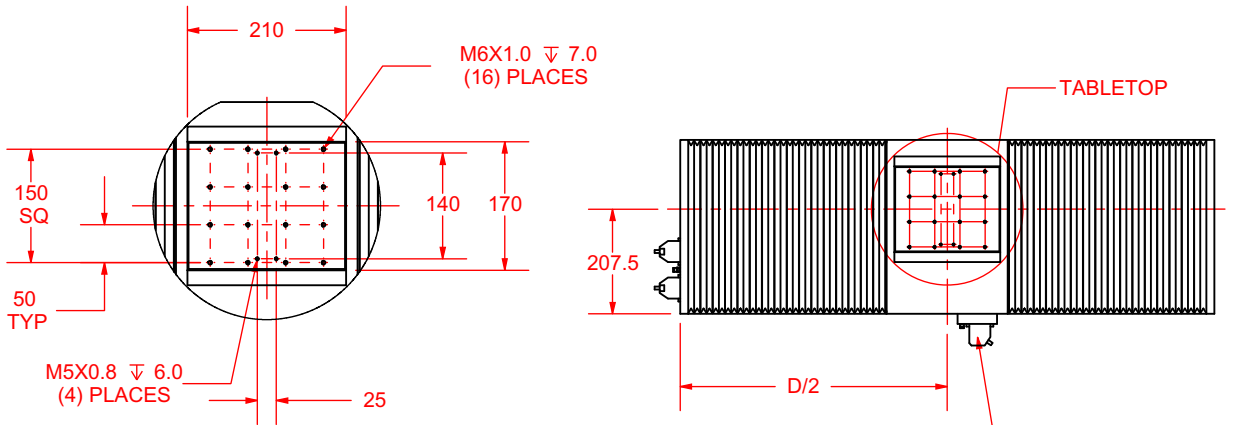
ABL1500-B Series SPECIFICATIONS

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

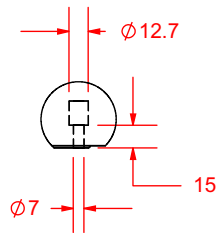
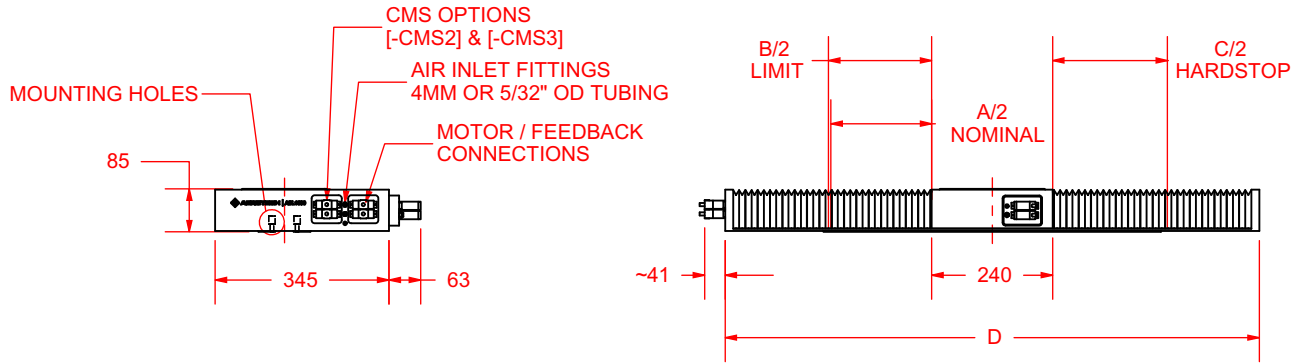
Recommended Controller		
Multi-Axis	A3200	Ndrive MP/Ndrive CP/Ndrive HLe/Npaq MXR
	Ensemble	Ensemble MP/Ensemble CP/Ensemble HLe/Epaq
Single Axis	Soloist	Soloist MP/Soloist CP/Soloist HLe



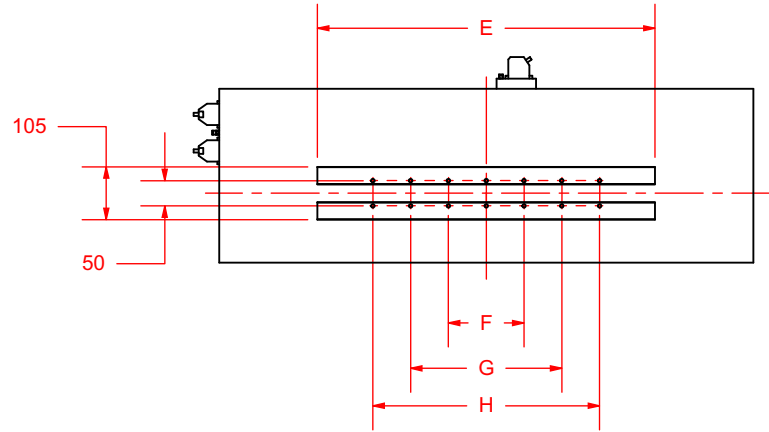
ABL1500-B



DETAIL TABLETOP
MOUNTING PATTERN CENTERED
ON CARRIAGE
SCALE 1 : 10



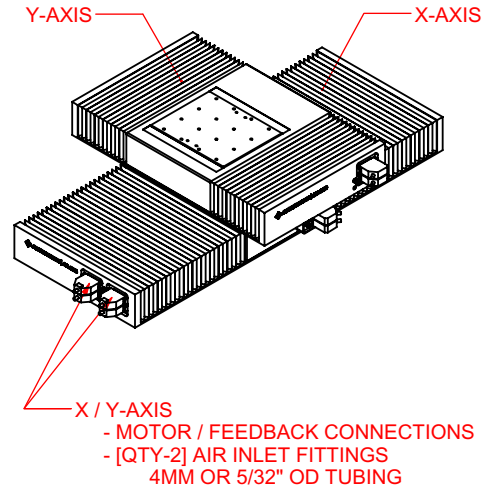
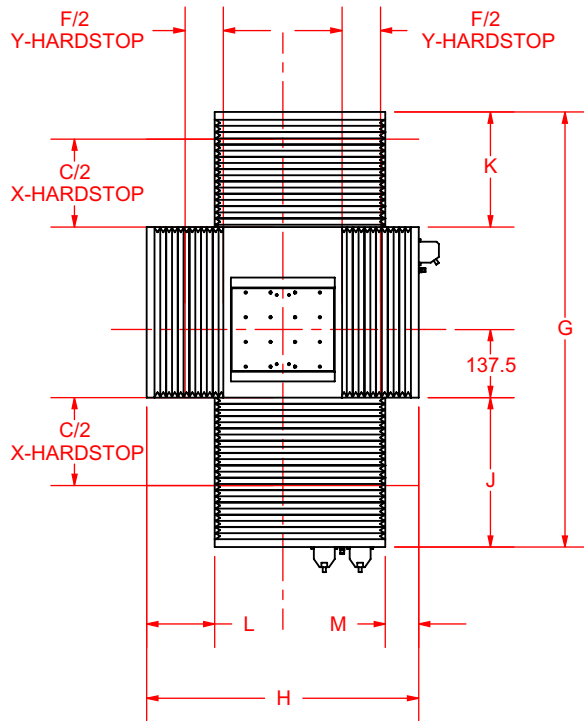
DETAIL MOUNTING HOLES
(J) PLACES
SCALE 1 : 5



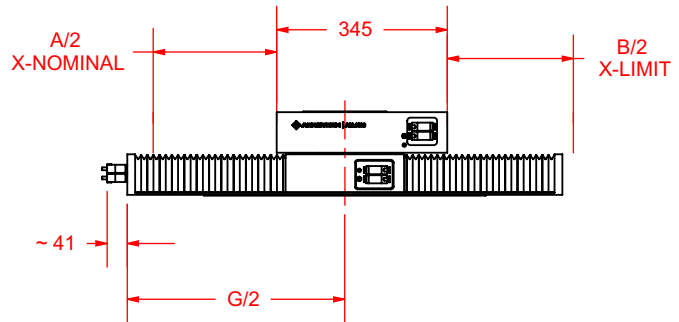
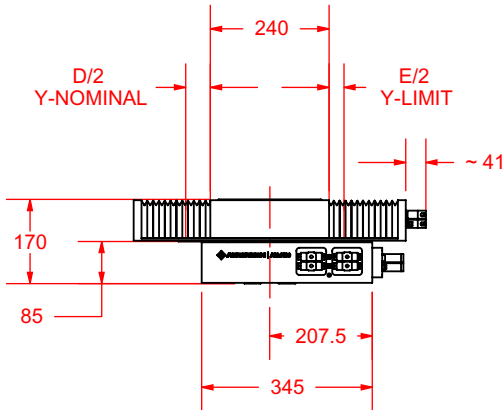
MODEL #	A	B	C	D	E	F	G	H	J
ABL1500-B-050	50	60	105	500	320	200	-	-	4
ABL1500-B-100	100	110	155	550	370	150	-	-	4
ABL1500-B-200	200	210	255	730	470	150	250	-	8
ABL1500-B-300	300	310	355	880	570	150	300	-	8
ABL1500-B-400	400	410	455	1060	670	150	300	450	14
ABL1500-B-500	500	510	555	1220	770	150	300	500	14

DIMENSIONS: MILLIMETERS

ABL1500-B-XY



CMS CONFIG.	X-AXIS OPTION	Y-AXIS OPTION
1	-CMS2	-CMS4



** REFER TO ABL1500-B SINGLE AXIS CATALG DRAWING FOR TABLETOP AND STAGE MOUNTING INFORMATION. **

MODEL #		A	B	C	D	E	F	G	H	J	K	L	M
X-AXIS	Y-AXIS												
ABL1500-B-050	ABL1500-B-050	50	60	105	50	60	105	500	500	112.5	42.5	112.5	42.5
ABL1500-B-100		100	110	155				550		137.5	67.5		
ABL1500-B-200		200	210	255				730		227.5	157.5		
ABL1500-B-300		300	310	355				880		302.5	232.5		
ABL1500-B-400		400	410	455				1060		392.5	322.5		
ABL1500-B-500		500	510	555				1220		472.5	402.5		
ABL1500-B-050	ABL1500-B-100	50	60	105	100	110	155	500	550	112.5	42.5	137.5	67.5
ABL1500-B-100		100	110	155				550		137.5	67.5		
ABL1500-B-200		200	210	255				730		227.5	157.5		
ABL1500-B-300		300	310	355				880		302.5	232.5		
ABL1500-B-400		400	410	455				1060		392.5	322.5		
ABL1500-B-500		500	510	555				1220		472.5	402.5		

DIMENSIONS: MILLIMETERS

ABL1500-B Series ORDERING INFORMATION

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 μ m 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 XIO, 2 extra cables, 1 extra air
-CMS4	Cable management system for Y axis, upper axis only
-CMS5	Cable management system for YZ assembly, upper axis only
-CMS6	Cable management system for YIO, 2 extra cables, 1 extra air, upper axis only

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

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-B Series ORDERING INFORMATION



An example of an ABL1500-B/ABL1500WB-B in an XY configuration.