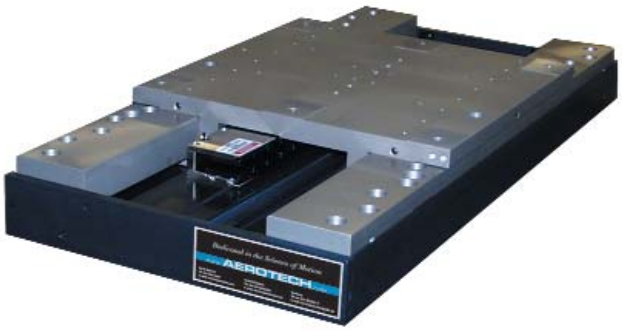
ABL8000 Series

Air Bearing, Linear Motor Stage

- Active air preload on all air-bearing surfaces
- Travel to 1 meter
- Linear encoder or laser interferometer feedback
- High stiffness for heavy loads and excellent geometrical performance
- Integrated XY subsystems including granite



Leading-edge manufacturing, particularly in the semiconductor and data storage industries, demands positioning tolerances beyond the capability of conventional ball-screw and mechanical-bearing positioning systems. The ABL8000, with its fully active preload, exceptionally high stiffness, and excellent geometric characteristics was designed specifically to meet those demands.

Air-Bearing Design

The ABL8000 incorporates an active 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 BLM series brushless linear servomotor. Aerotech's long history and experience as a motor manufacturer is reflected in this design. The BLM utilizes an ironless forcer, which means there is zero cogging and no attractive forces – resulting in unsurpassed smoothness of motion. Capable of generating high force and velocity, the BLM 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 ABL8000 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 clean room 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.

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

ABL8000 Series SPECIFICATIONS

Basic Model			ABL80020	ABL80030	ABL80040	ABL80050	ABL80075	ABL80100
Total Travel[1]			200 mm (8 in)	300 mm (12 in)	400 mm (16 in)	500 mm (20 in)	750 mm (30 in)	1000 mm (40 in)
Drive System			Linear Brushless Servomotor [BLM-142-A (-SC) or BLM-264-A (-LC)]					
Bus Voltage			Up to 320 VDC					
Continuous Current	A_{pk}		5.3 A (-SC); 8.7 A (-LC)					
	A_{rms}		3.8 A (-SC); 6.2 A (-LC)					
Feedback			Noncontact Linear Encoder (LN or LT) or Laser Interferometer					
Resolution	LN		0.001 µm - 0.2 µm (0.04 µin - 8 µin)					
	LT		0.005 µm - 1.0 µm (0.2 µin - 40 µin)					
	Laser Interferometer		0.3 nm - 79 nm (0.012 µin - 3.2 µin)					
Maximum Travel Speed[2]			2 m/s (80 in/s)					
Maximum Linear Acceleration			2 g - 20 m/s^2 (768 in/s^2) (no-load)					
Maximum Load[3]			70 kg (-SC); 120 kg (-LC)					
Continuous Stall Force[4,5]		Air (20 psi)	BLM-142-A [168.0 N (37.9 lb)]; BLM-264-A [276.0 N (62.0 lb)]					
		No Air	BLM-142-A [109.0 N (24.6 lb)]; BLM-264-A [207.0 N (46.4 lb)]					
Peak Force[5]			BLM-142-A [673.0 N (151.0 lb)]; BLM-264-A [1106.0 N (248.0 lb)]					
Overall Accuracy	LN	HALAR[6]	±0.5 µm (±20 µin)		±0.75 µm (±30 µin)		±1.0 µm (±40 µin)	
		Standard	±5.0 µm (±200 µin)					
	LT	HALAR[6]	±0.5 µm (±20 µin)		±0.75 µm (±30 µin)		±1.0 µm (±40 µin)	
		Standard	±8.0 µm (±320 µin)	±12.0 µm (±480 µin)	±16.0 µm (±640 µin)	±24.0 µm (±960 µin)	±30.0 µm (±1200 µin)	±40.0 µm (±1600 µin)
	Laser Interferometer		Standard ±10 ppm; Compensated ±1.5 ppm[7]					
Repeatability		LN	±0.2 µm (±8 µin)			±0.3 µm (±12 µin)	±0.4 µm (±16 µin)	
		LT	±0.2 µm (±8 µin)			±0.3 µm (±12 µin)	±0.4 µm (±16 µin)	
Straightness and Flatness	Differential		0.25 µm/25 mm (10 µin/in)		0.50 µm/25 mm (20 µin/in)			
	Maximum Deviation		±0.4 µm (±16 µin)	±0.75 µm (±30 µin)	±1.5 µm (±60 µin)	±2.0 µm (±80 µin)	±3.0 µm (±120 µin)	±4.0 µm (±160 µin)
Pitch/Roll/Yaw			2 arc sec	3 arc sec	4 arc sec	5 arc sec	7.5 arc sec	10 arc sec
Operating Pressure[8]			80 psi ±5 psi					
Air Consumption[9]			1.6 SCFM (-LC Single Axis); 1.0 SCFM (-SC Single Axis)					
Nominal Stage Weight			70.0 kg (154.3 lb)	77.0 kg (169.8 lb)	85.5 kg (188.5 lb)	93.5 kg (206.1 lb)	113.0 kg (249.1 lb)	131.5 kg (289.9 lb)
Moving Mass			10 kg (-SC); 16 kg (-LC)					
Material			Aluminum					
Finish			Hard Coating (62 Rockwell Hardness)					

Notes:
1. When mounting the ABL8000 in an XY configuration, the maximum upper axis length is 400 mm.
2. Maximum speed based on stage capability; maximum application velocity may be limited by system data rate and system resolution.
3. Maximum load based on bearing capability; maximum application load may be limited by acceleration requirements.
4. Thermal limitations of positioning stage with respect to performance may limit continuous force output.
5. Force may be limited by amplifier output.
6. Available with Aerotech controllers.
7. Requires environmental compensation.
8. To protect air bearing against under-pressure, an in-line pressure switch tied to the motion controller/amplifier E-stop input is recommended.
9. Air supply must be clean, dry to 0° F dewpoint and filtered to 0.25 µm or better; recommend nitrogen at 99.9% purity.
10. Specifications are for single-axis systems, measured 50 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.

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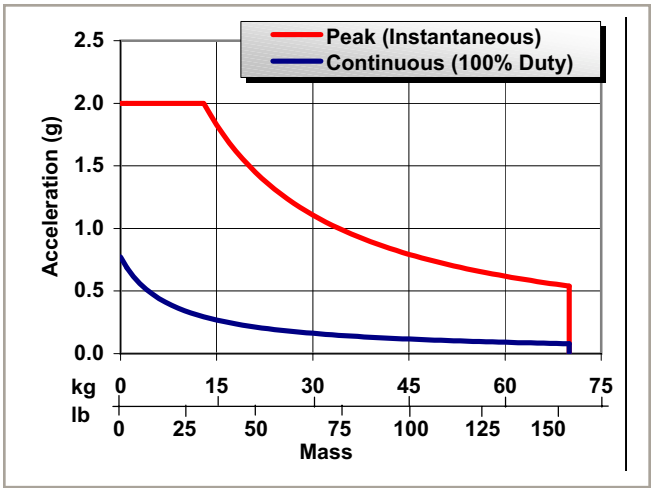
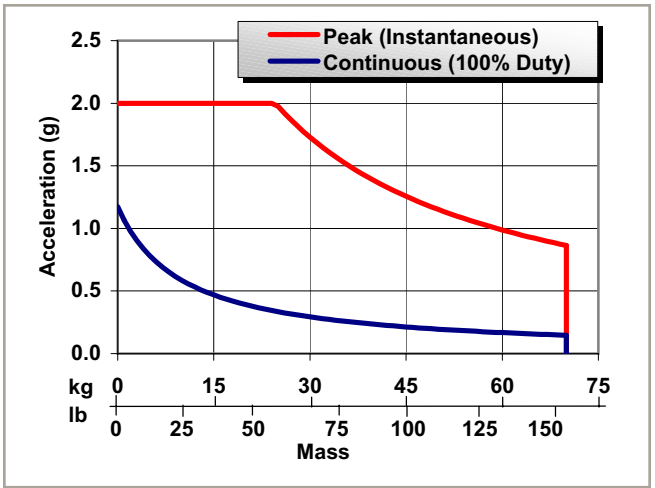
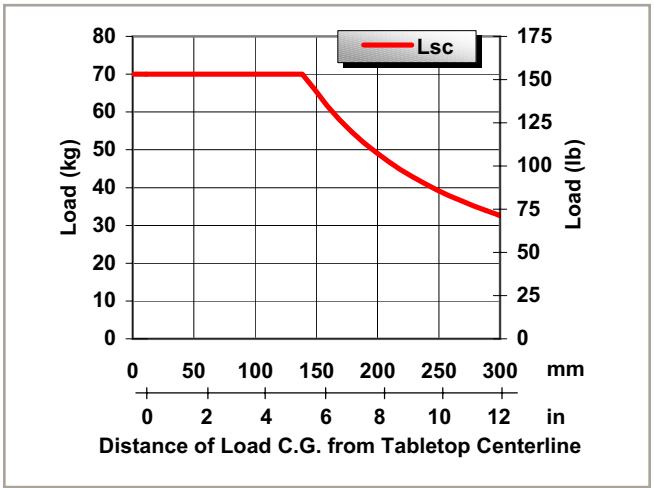
ABL8000 Series SPECIFICATIONS



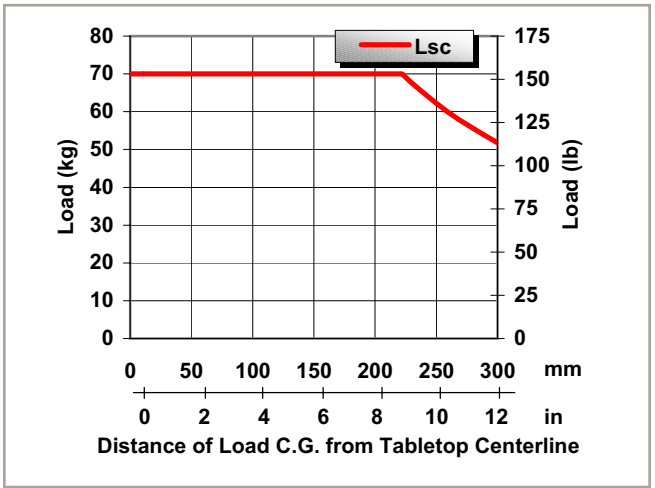
Acceleration vs. Mass (ABL8000-SC with BLM-142-A motor)



Acceleration vs. Mass (ABL8000-LC with BLM-264-A motor)



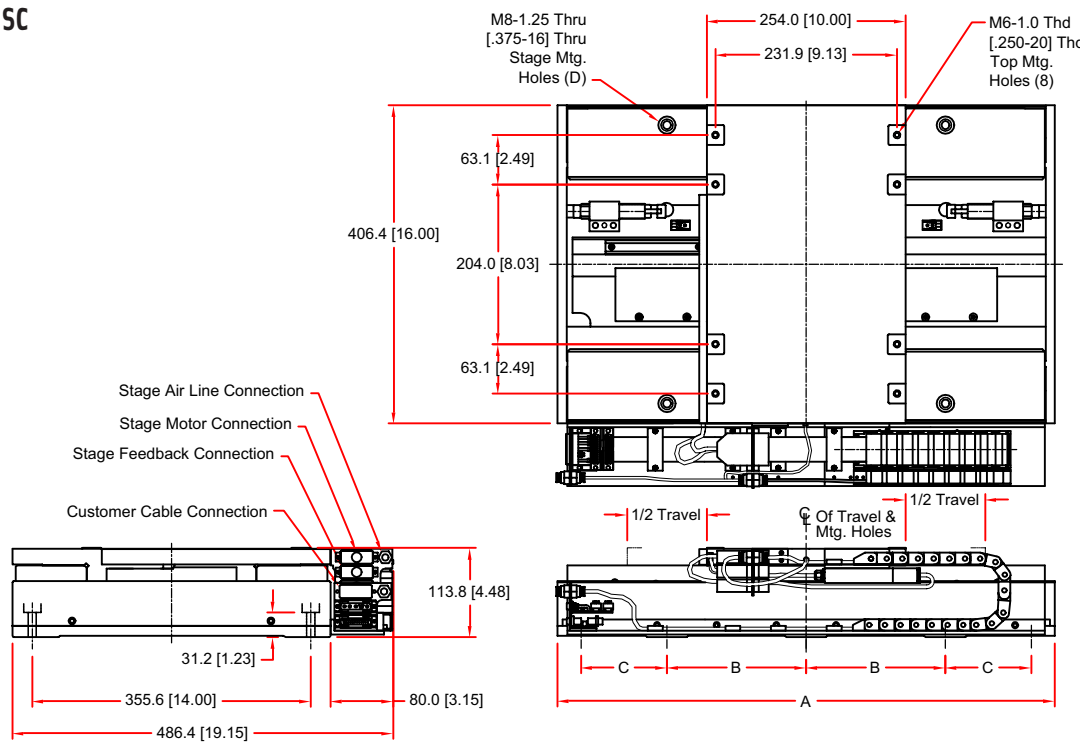
Lsc Cantilevered Load Capability (ABL8000-SC with BLM-142-A motor)



Lsc Cantilevered Load Capability (ABL8000-LC with BLM-264-A motor)

ABL8000 Series DIMENSIONS

ABL8000-SC



Basic Model	Total Travel	Dimensions - Millimeters [Inches]			
		A	B	C	D
ABL80020-SC	200.0 [8.00]	533.4 [21.00]	177.8 [7.00]	-	6
ABL80030-SC	300.0 [12.00]	635.0 [25.00]	177.8 [7.00]	-	6
ABL80040-SC	400.0 [16.00]	736.6 [29.00]	228.6 [9.00]	-	6
ABL80050-SC	500.0 [20.00]	838.2 [33.00]	228.6 [9.00]	-	6
ABL80075-SC	750.0 [30.00]	1092.2 [43.00]	228.6 [9.00]	285.8 [11.25]	10
ABL80100-SC	1000.0 [40.00]	1346.2 [53.00]	228.6 [9.00]	285.8 [11.25]	10

The ABL8000 is typically provided as a complete XY assembly with integrated cable management for customer cabling, as well as a granite mounting base.

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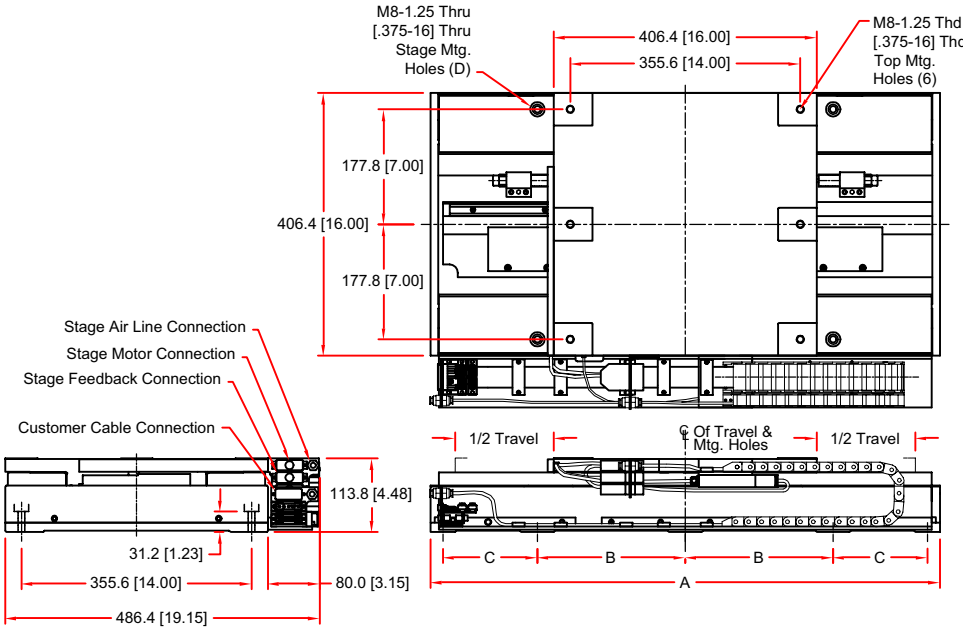
ABL8000 Series DIMENSIONS

ABL8000-LC



Basic Model	Total Travel	Dimensions - Millimeters [Inches]			
		A	B	C	D
ABL80020-LC	200.0 [8.00]	685.8 [27.00]	228.6 [9.00]	-	6
ABL80030-LC	300.0 [12.00]	787.4 [31.00]	228.6 [9.00]	-	6
ABL80040-LC	400.0 [16.00]	889.0 [35.00]	228.6 [9.00]	-	6
ABL80050-LC	500.0 [20.00]	990.6 [39.00]	228.6 [9.00]	-	6
ABL80075-LC	750.0 [30.00]	1244.6 [49.00]	228.6 [9.00]	285.8 [11.25]	10
ABL80100-LC	1000.0 [40.00]	1498.6 [59.00]	228.6 [9.00]	285.8 [11.25]	10

ABL8000 Series ORDERING INFORMATION

Ordering Example

ABL80	030	-SC	-M	-5	-NC	-LN30AS	SINGLE-CMS
Series	Travel	Carriage	Mounting and Grid Pattern	Motor	Limit Switch	Encoder Resolution	Options
	020 = 200 mm 030 = 300 mm 040 = 400 mm 050 = 500 mm 075 = 750 mm 100 = 1000 mm	SC LC	-M -U	-P -S	-NC -NO	LNxxAS	-SINGLE-CMS -SINGLE-CUST. HOSE -SINGLE-CUST. CABLE -SINGLE-CUST. CABLE & HOSE -XY-CMS -XY-CUST. HOSE -XY-CUST. CABLE -XY-CUST. CABLE & HOSE

ABL8000 Series Linear Air-Bearing Stage

ABL80020	200 mm (8 in) travel linear air-bearing stage with linear motor and limits
ABL80030	300 mm (12 in) travel linear air-bearing stage with linear motor and limits
ABL80040	400 mm (16 in) travel linear air-bearing stage with linear motor and limits
ABL80050	500 mm (20 in) travel linear air-bearing stage with linear motor and limits
ABL80075	750 mm (30 in) travel linear air-bearing stage with linear motor and limits
ABL80100	1000 mm (40 in) travel linear air-bearing stage with linear motor and limits

Carriage

-SC	250 mm (10 in) length carriage (single-axis or y-axis use only; requires -5 motor)
-LC	400 mm (16 in) length carriage (required for x-axis in XY configuration; requires -10 motor)

Note: When mounting the ABL8000 in an XY configuration, the maximum upper axis length is 400 mm.

Mounting and Grid Pattern

-M	Metric dimension mounting pattern and holes
-U	English dimension mounting pattern and holes

Motor

-P	MT-P magnet track
-S	MT-S magnet track

Limits

-NC	Normally-closed end of travel limit switches (standard)
-NO	Normally-open end of travel limit switches

High-Accuracy Linear Encoders

-LN20AS	High-accuracy linear encoder for ABL80020; amplified sine output
-LN30AS	High-accuracy lInear encoder for ABL80030; amplified sine output
-LN40AS	High-accuracy linear encoder for ABL80040; amplified sine output
-LN50AS	High-accuracy linear encoder for ABL80050; amplified sine output
-LN75AS	High-accuracy linear encoder for ABL80075; amplified sine output
-LN100AS	High-accuracy linear encoder for ABL80100; amplified sine output

Options

-SINGLE-CMS	Cable management system for single-axis applications
-SINGLE-CUST. HOSE	Single CMS; 0.25 inch customer hose
-SINGL-CUST. CABLE	Single CMS; one customer cable
-SINGLE-CUST. CABLE & HOSE	Single CMS; once customer cable and 0.25 inch hose
-XY-CMS	Cable management system for X-Y assembly; order with each axis
-XY-CUST. HOSE	XY CMS; customer hose
-XY-CUST. CABLE	XY CMS; customer cable
-XY-CUST. CABLE & HOSE	XY CMS; customer cable & hose

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