# 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.



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## 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] | | | 45.3 SLPM (1.6 SCFM) (-LC Single Axis); 28.3 SLPM (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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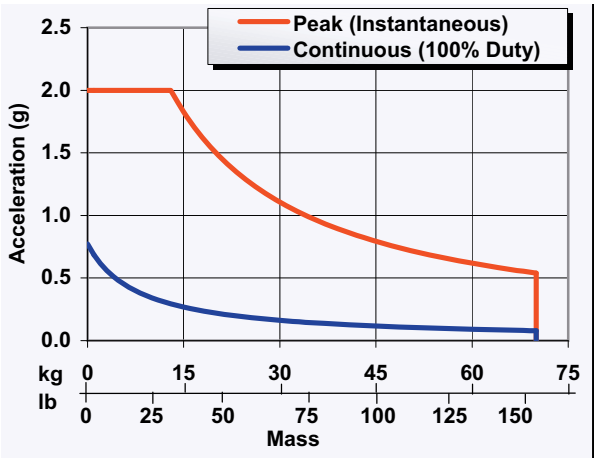
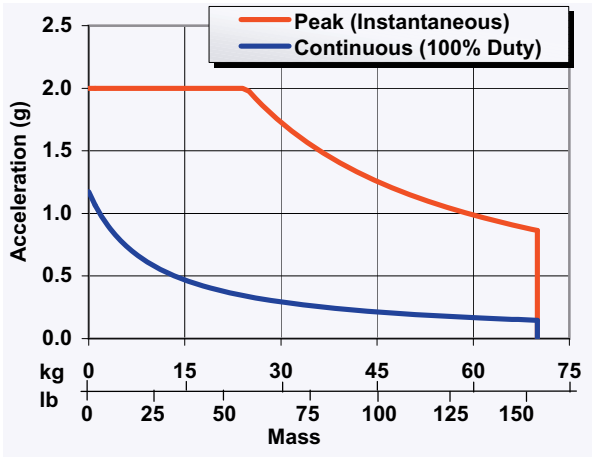
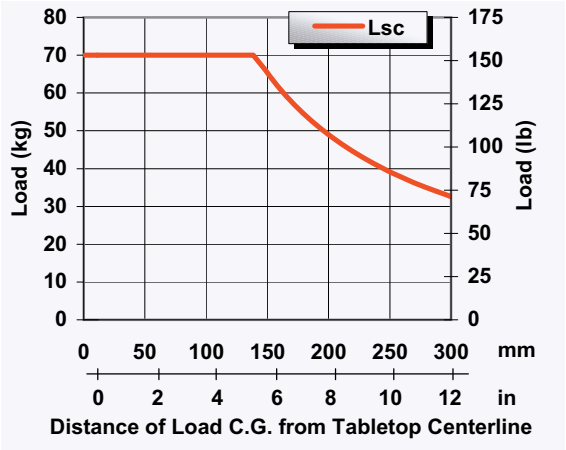
## ABL8000 Series SPECIFICATIONS



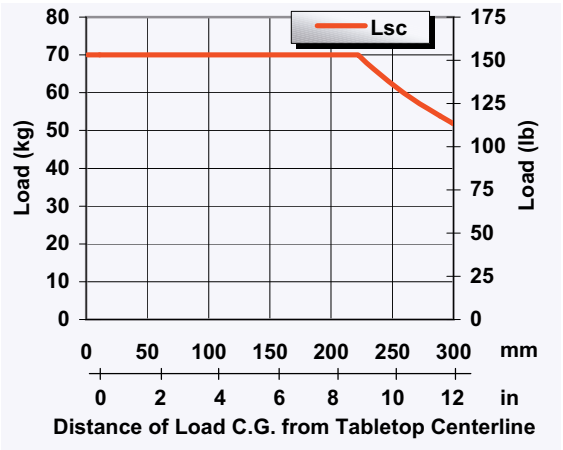

*Acceleration vs. Mass (ABL8000-SC with BLM-142-A motor)*




*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)*



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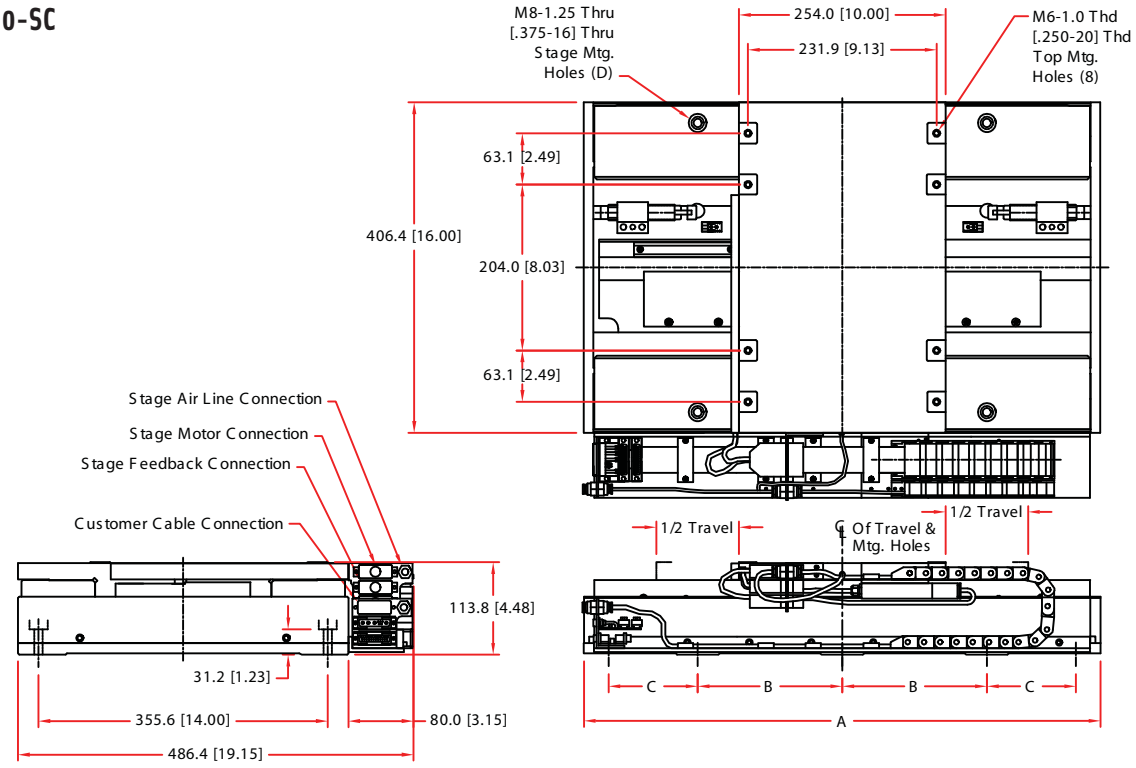
## ABL8000 Series DIMENSIONS

### ABL8000-SC




| Basic Model | Total Travel | Dimensions - Millimeters [Inches] | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| ABL80020-SC | 200.0 [7.87] | 533.4 [21.00] | 177.8 [7.00] | - | 6 |
| ABL80030-SC | 300.0 [11.81] | 635.0 [25.00] | 177.8 [7.00] | - | 6 |
| ABL80040-SC | 400.0 [15.75] | 736.6 [29.00] | 228.6 [9.00] | - | 6 |
| ABL80050-SC | 500.0 [19.69] | 838.2 [33.00] | 228.6 [9.00] | - | 6 |
| ABL80075-SC | 750.0 [29.53] | 1092.2 [43.00] | 228.6 [9.00] | 285.8 [11.25] | 10 |
| ABL80100-SC | 1000.0 [39.37] | 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.*

*An example of a single axis, 1000 mm travel ABL8000 without granite.*



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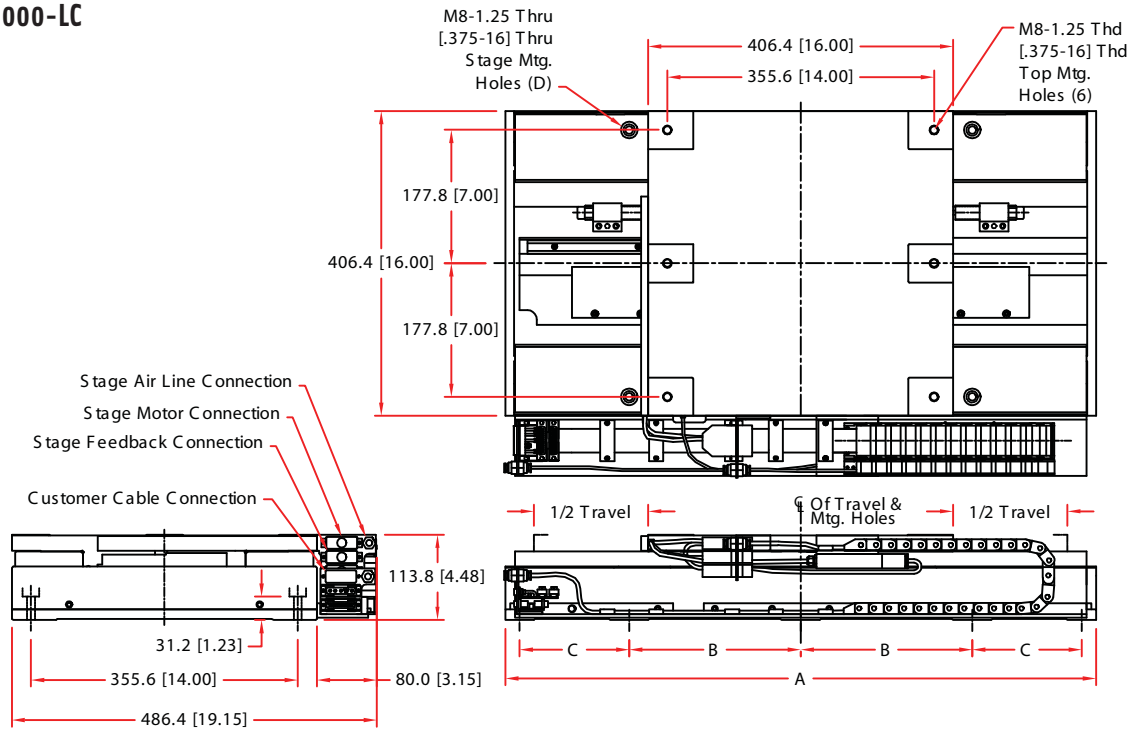
# ABL8000 Series DIMENSIONS

## ABL8000-LC




| Basic Model | Total Travel | Dimensions - Millimeters [Inches] | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| ABL80020-LC | 200.0 [7.87] | 685.8 [27.00] | 228.6 [9.00] | - | 6 |
| ABL80030-LC | 300.0 [11.81] | 787.4 [31.00] | 228.6 [9.00] | - | 6 |
| ABL80040-LC | 400.0 [15.75] | 889.0 [35.00] | 228.6 [9.00] | - | 6 |
| ABL80050-LC | 500.0 [19.69] | 990.6 [39.00] | 228.6 [9.00] | - | 6 |
| ABL80075-LC | 750.0 [29.53] | 1244.6 [49.00] | 228.6 [9.00] | 285.8 [11.25] | 10 |
| ABL80100-LC | 1000.0 [39.37] | 1498.6 [59.00] | 228.6 [9.00] | 285.8 [11.25] | 10 |



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## 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<br>030 = 300 mm<br>040 = 400 mm<br>050 = 500 mm<br>075 = 750 mm<br>100 = 1000 mm | SC<br>LC | -M<br>-U | -P<br>-S | -NC<br>-NO | LNxxAS | -SINGLE-CMS<br>-SINGLE-CUST. HOSE<br>-SINGLE-CUST. CABLE<br>-SINGLE-CUST. CABLE & HOSE<br>-XY-CMS<br>-XY-CUST. HOSE<br>-XY-CUST. CABLE<br>-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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