# ABL1000 Series

## *Air Bearing, Linear Motor Stage*

- Designed for high-performance alignment and assembly
- Linear encoder feedback provides 2 nm resolution
- 1 nm closed-loop resolution with the Automation 3200
- Fully preloaded air-bearing
- Low-noise linear amplifiers
- Complete noncontact design

ABL 1000 series stages are the highest performance miniature air-bearing stages available. Aerotech has combined over 30 years of precision motion control and positioning system experience with the latest technologies to produce a truly outstanding miniature, linear air-bearing stage.

### Linear Stage

The linear positioner is a fully preloaded, noncontact design. Inherently frictionless, air bearings have proven to be the standard in precision applications, and Aerotech has now produced a miniature version. Driven by a noncontact linear brushless servomotor, this stage proves the ultimate solution whether the application requires small, accurate steps or constant smooth velocity. Superior magnetic field and motor coil design result in the highest force output of any miniature air-bearing stage. This stage offers superior servo performance. Years of research have resulted in a robust and perturbation-free cable management system.

### Feedback and Control System

A wide selection of state-of-the-art controllers are available, including the Automation 3200 software controller with digital drives, and the Soloist and Ensemble controllers (including the stand-alone Ensemble™ Epaq).

### Options

Convenient rack or panel-mount amplifiers are included with all systems. Aerotech's expert technical staff is experienced in custom system designs and will work with you to generate a system to meet the unique needs of your application.

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## ABL1000 Series SPECIFICATIONS

| Basic Model | | ABL1000 | | | |
|---|---|---|---|---|---|
| **Total Travel** | | 25 mm | 50 mm | 100 mm | 150 mm |
| **Drive System** | | Linear Brushless Servomotor | | | |
| **Bus Voltage** | | up to 160 VDC | | | |
| **Continuous Current** | **$A_{pk}$** | up to 2.9 A | | | |
| | **$A_{rms}$** | up to 2.1 A | | | |
| **BEMF, line-line, max.** | **V/m/sec** | 3.77952 | | | |
| | **V/in/sec** | 0.096 | | | |
| **Force Constant, Sinusoidal Drive** | **N/A (lb/A), pk** | 3.29 (0.739) | | | |
| | **NA (lb/A), rms** | 4.65 (1.04) | | | |
| **Resistance, 25 C, line-line** | **Ohms** | 5.2 | | | |
| **Resistance, 125 C, line-line** | **Ohms** | 7.28 | | | |
| **Inductance, line-line** | **mH** | 0.7 | | | |
| **Magnetic Pole Pitch** | **mm (inch)** | 16 (0.63) | | | |
| **Feedback** | | Noncontact Linear Encoder | | | |
| **Resolution** | **LN** | 1 nm (0.04 µin) | | | |
| | **LT** | 5 nm (0.2 µin) | | | |
| **Maximum Travel Speed**[1] | | 300 mm/s (12 in/s) | | | |
| **Maximum Linear Acceleration** | | 1 g - 10 m/s² (394 in/s²)(no load) | | | |
| **Maximum Load**[2] | **Horizontal** | 15.0 kg (33.0 lb) | | | |
| **Accuracy** | **LN** | ±0.2 µm (±8 µin)[3]<br>±1 µm (±40 µin) | ±0.2 µm (±8 µin)[3]<br>±1 µm (±40 µin) | ±0.2 µm (±8 µin)[3]<br>±2 µm (±80 µin) | ±0.5 µm (±20 µin)[3]<br>±5 µm (±200 µin) |
| | **LT** | ±0.3 µm (±12 µin)[3]<br>±2 µm (±80 µin) | ±0.3 µm (±12 µin)[3]<br>±2 µm (±80 µin) | ±0.3 µm (±12 µin)[3]<br>±5 µm (±200 µin) | ±0.5 µm (±20 µin)[3]<br>±5 µm (±200 µin) |
| **Repeatability** | **LN**[3] | ±50 nm (±2 µin) | | | |
| | **LT** | ±50 nm (±2 µin)[3]; ±100 nm (±4 µin) | | | |
| **Straightness and Flatness**[4] | **Differential** | 0.25 µm/25 mm (10 µin/in) | | | |
| | **Max Deviation** | ±0.25 µm (±10 µin) | ±0.25 µm (±10 µin) | ±0.4 µm (±16 µin) | ±0.4 µm (±16 µin) |
| **Pitch and Yaw** | | ±0.25 arc sec | ±0.50 arc sec | ±1.0 arc sec | ±1.5 arc sec |
| **Nominal Stage Weight** | | 4.5 kg (10 lb) | 5.5 kg (12 lb) | 6.4 kg (14 lb) | 12.7 kg (28 lb) |
| **Moving Mass** | | 1.9 kg (4.2 lb) | | | 4.8 kg (10.6 lb) |
| **Operating Pressure**[5] | | 80 psi ±5 psi | | | |
| **Air Consumption**[6] | | 0.5 SCFM | | | |
| **Construction** | | Aluminum Body/Hardcoat | | | |

Notes:
1. Maximum speed based on stage capability; maximum application velocity may be limited by system data rate and system resolution.
2. Max load for XY configuration is 10.0 kg
3. Values with Aerotech controls and HAL option.
4. Dependent on flatness of stage mounting surface.
5. To protect air bearing against under-pressure, an in-line pressure switch tied to the controller E-stop input is required.
6. Air supply must be clean, dry to 0° F dew point, and filtered to 0.25 µm or better; recommend nitrogen at 99.99% purity.
7. ABL10150 must be used as the bottom axis of an XY stack.
8. 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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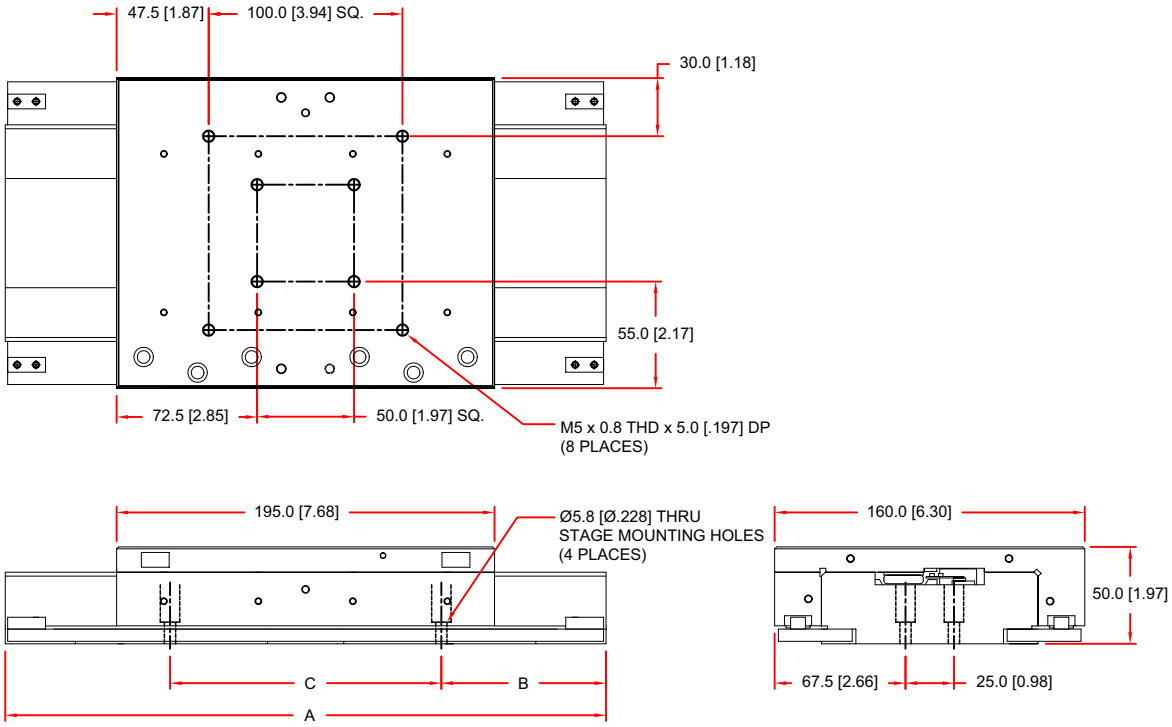
# ABL1000 Series DIMENSIONS

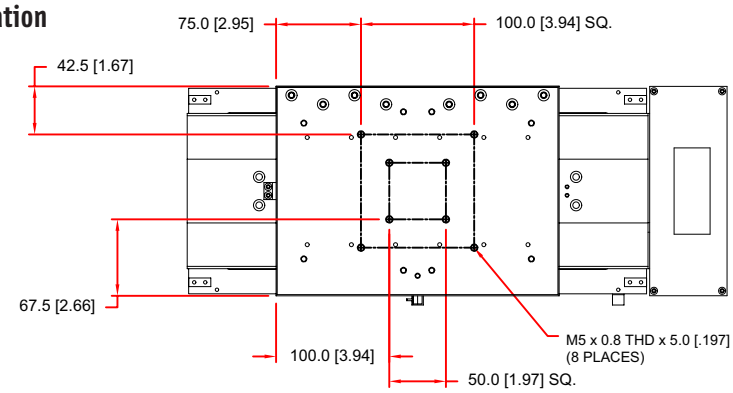
## ABL10025/50/100 Single-Axis Configuration

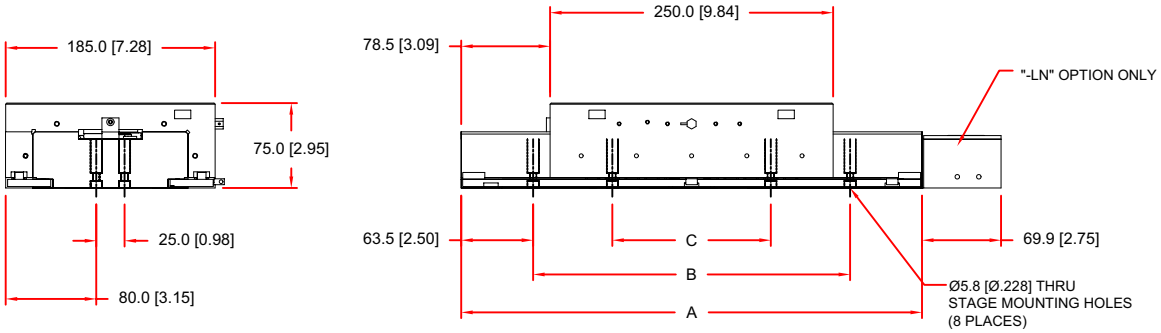



| Basic Model | Total Travel | Dimensions - Millimeters [Inches] | | |
|---|---|---|---|---|
| | | A | B | C |
| ABL10025 | 25.0 [1.00] | 235.0 [9.25] | 35.0 [1.38] | 165.0 [6.49] |
| ABL10050 | 50.0 [2.00] | 260.0 [10.24] | 60.0 [2.36] | 140.0 [5.51] |
| ABL10100 | 100.0 [4.00] | 310.0 [12.20] | 85.0 [3.35] | 140.0 [5.51] |

# ABL1000 Series DIMENSIONS

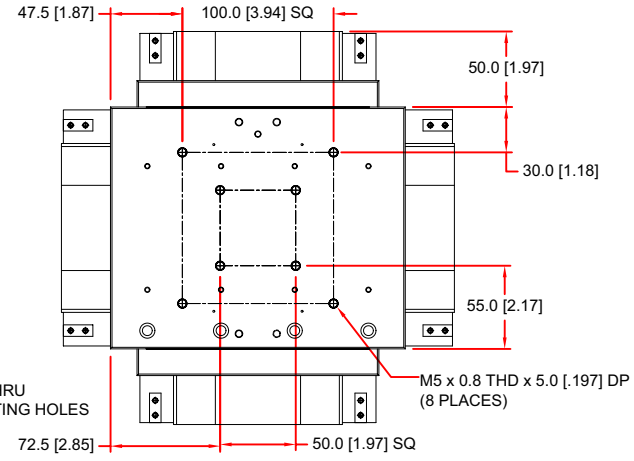
## ABL10150 Single-Axis Configuration



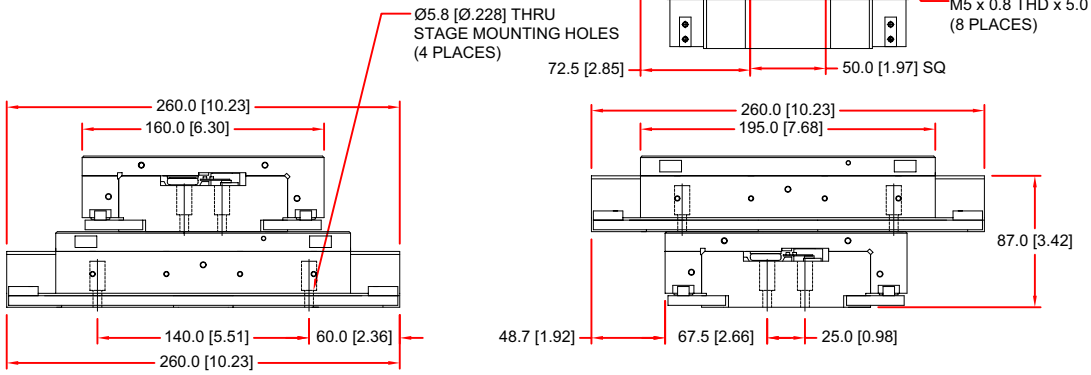




| Basic Model | Total Travel | Dimensions - Millimeters [Inches] | | |
|---|---|---|---|---|
| | | A | B | C |
| ABL10150 | 150.0[6.00] | 407.0[16.02] | 280.0[11.02] | 140.0[5.51] |

## XY Configuration (ABL10050 shown)




DIMENSIONS - MILLIMETERS [INCHES]



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# ABL1000 Series ORDERING INFORMATION

## Ordering Example

| ABL10 | 100 | -LT |
|---|---|---|
| Series | Travel | Feedback |
| | 025 | -LT |
| | 050 | -LN |
| | 100 | -LT/lower |
| | 150 | -LN/lower |
| | | -LT/upper |
| | | -LN/upper |

## ABL1000 Series Linear Air-Bearing Stage

| | |
|---|---|
| ABL1000 | Linear air-bearing positioner |

Note: Requires clean, dry air supply. In-line under-pressure switch provided.

## Linear Stage Travel (X, Y)

| | |
|---|---|
| ABL10025* | 25 mm (1 in) travel stage with linear motor |
| ABL10050 | 50 mm (2 in) travel stage with linear motor |
| ABL10100 | 100 mm (4 in) travel stage with linear motor |
| ABL10150** | 150 mm (6 in) travel stage with linear motor |

*ABL10025 can only be used in an XY configuration with the ABL10150 as the lower axis

**ABL10150 can only be used as the upper XY axis with an ABL10150 lower axis

## Feedback

| | |
|---|---|
| -LT | Linear encoder feedback (10 nm resolution); amplified sine output |
| -LN | High-accuracy linear encoder feedback (2 nm resolution); amplified sine output |
| -LT/lower | LT option with lower axis cable management |
| -LN/lower | LN option with lower axis cable management |
| -LT/upper | LT option with upper axis cable management |
| -LN/upper | LN option with upper axis cable management |