# ABL1000 Series

## Air-Bearing, Direct-Drive Linear Stage
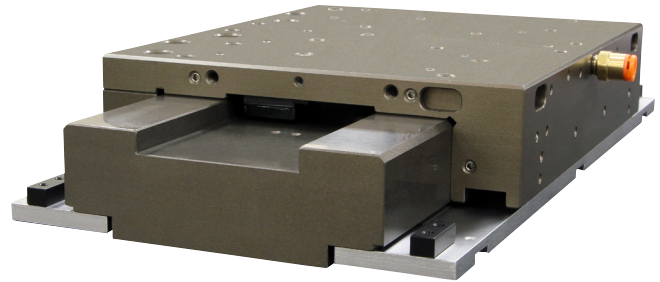
**Designed for high-performance alignment and assembly**

**0.5 nm closed-loop resolution**

**Fully preloaded air-bearing**

**Low-noise linear amplifiers**

**Complete noncontact design**



*ABL1000 series stages shown in an XY assembly configuration.*

ABL1000 series stages are the highest performance miniature air-bearing stages available. Aerotech has combined industry-leading 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. 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 and features a robust and perturbation-free cable management system.

### Feedback and Control System

A wide selection of state-of-the-art controllers are available along with a variety of high-performance linear and PWM amplifiers.

### Options

Convenient rack or panel-mount amplifiers are offered 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.

## ABL1000 Series SPECIFICATIONS

| ABL1000 | | ABL1000-025 | ABL1000-050 | ABL1000-100 |
|---|---|---|---|---|
| Total Travel | | 25 mm | 50 mm | 100 mm |
| Drive System | | Linear Brushless Servomotor | | |
| Resolution | -E2 Encoder | 0.5 nm | | |
| | -E1 Encoder | 2.5 nm | | |
| Maximum Travel Speed[1] | | 300 mm/s | | |
| Maximum Linear Acceleration | | 1 g - 10 m/s$^2$ (no load) | | |
| Maximum Load[2] | Horizontal | 15.0 kg | | |
| Accuracy | -E2 Encoder | ±0.2 µm[3] ±1 µm | ±0.2 µm[3] ±1 µm | ±0.2 µm[3] ±2 µm |
| | -E1 Encoder | ±0.3 µm[3] ±2 µm | ±0.3 µm[3] ±2 µm | ±0.3 µm[3] ±5 µm |
| Repeatability | -E2 Encoder[3] | ±50 nm (±2 µin) | | |
| | -E1 Encoder | ±50 nm [3]; ±100 nm | | |
| Straightness and Flatness[4] | | ±0.25 µm | ±0.25 µm | ±0.4 µm |
| Pitch and Yaw | | ±0.25 arc sec | ±0.50 arc sec | ±1.0 arc sec |
| Nominal Stage Weight | | 4.5 kg | 5.5 kg | 6.4 kg |
| Moving Mass | | 1.9 kg | | |
| Operating Pressure[5] | | 80 psi ±5 psi | | |
| Air Consumption[6][7] | | 17.5 SLPM | 17.5 SLPM | 17.5 SLPM |
| 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 -PL2 metrology 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. Maximum expected air consumption for single axis.
8. Specifications are for single-axis systems, measured 25 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Co or non-standard applications.

## ABL1000 Series SPECIFICATIONS

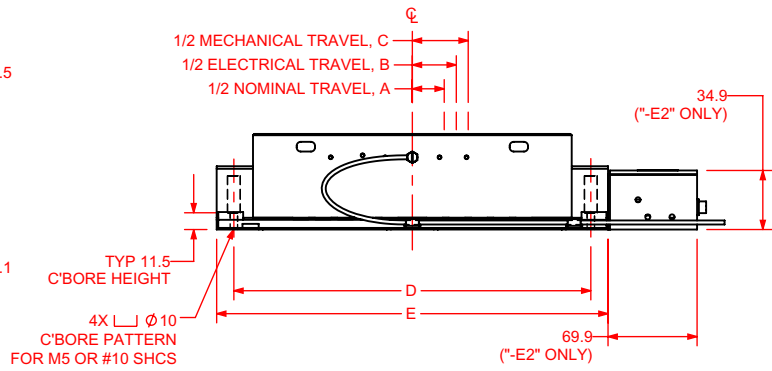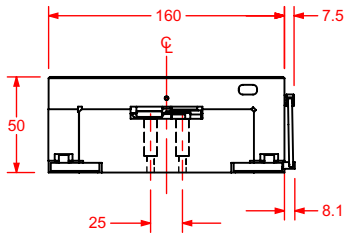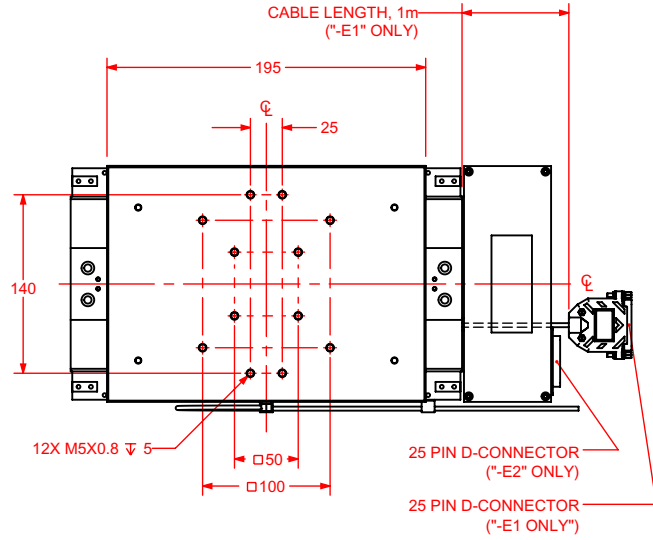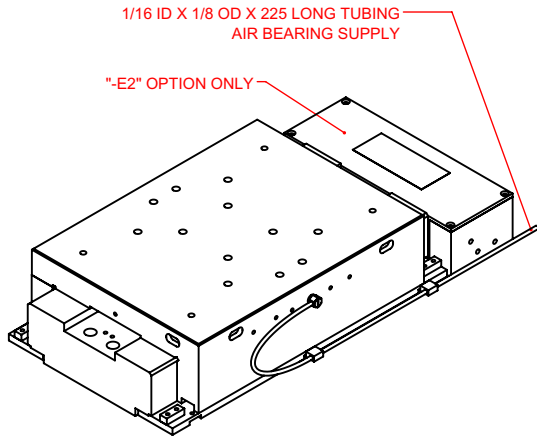| ABL1000WB | | ABL1000WB-050 | ABL1000WB-100 | ABL1000WB-150 |
|---|---|---|---|---|
| Nominal Travel | | 50 mm | 100 mm | 150 mm |
| Drive System | | Linear Brushless Servomotor | | |
| Resolution | -E2 Encoder | 0.5 nm | | |
| | -E1 Encoder | 2.5 nm | | |
| Maximum Travel Speed[1] | | 300 mm/s | | |
| Maximum Linear Acceleration | | 1 g - 10 m/s² (no load) | | |
| Maximum Load[2] | Horizontal | 15.0 kg (33.0 lb) | | |
| Accuracy | -E2 Encoder | ±0.2 µm[3] ±1 µm | ±0.2 µm[3] ±1 µm | ±0.2 µm[3] ±2 µm |
| | -E1 Encoder | ±0.3 µm[3] ±2 µm | ±0.3 µm[3] ±2 µm | ±0.3 µm[3] ±5 µm |
| Repeatability | -E2 Encoder[3] | ±50 nm (±2 µin) | | |
| | -E1 Encoder | ±50 nm[3] ; ±100 nm | | |
| Straightness and Flatness[4] | | ±0.25 µm | ±0.25 µm | ±0.4 µm |
| Pitch and Yaw | | ±0.25 arc sec | ±0.50 arc sec | ±1.0 arc sec |
| Nominal Stage Weight | | 9.7 kg | 10.7 kg | 11.6 kg |
| Moving Mass | | 4.3 kg | | |
| Operating Pressure[5] | | 80 psi ±5 psi | | |
| Air Consumption[6][7] | | 13.2 SLPM | 13.2 SLPM | 13.2 SLPM |
| 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 -PL2 metrology 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. Maximum expected air consumption for single axis.
8. Specifications are for single-axis systems, measured 25 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Co
or non-standard applications.

| 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 |

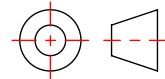| Recommended Controller | | |
|---|---|---|
| Multi-Axis | A3200 | Ndrive MP/Ndrive CP/Ndrive HLe/Npaq MXR |
| | Ensemble | Ensemble MP/Ensemble CP/Ensemble HLe/Epaq |
| Single Axis | Soloist | Soloist MP/Soloist CP/Soloist HLe |

## ABL1000 Series DIMENSIONS

### ABL1000-025/-050/0100

1/16 ID X 1/8 OD X 225 LONG TUBING
AIR BEARING SUPPLY

"-E2" OPTION ONLY

CABLE LENGTH, 1m
("-E1" ONLY)

195

25

140

12X M5X0.8 ▽ 5

□50
□100

25 PIN D-CONNECTOR
("-E2" ONLY)

25 PIN D-CONNECTOR
("-E1 ONLY")

160     7.5

50

25     8.1

1/2 MECHANICAL TRAVEL, C
1/2 ELECTRICAL TRAVEL, B
1/2 NOMINAL TRAVEL, A

34.9
("-E2" ONLY)

TYP 11.5
C'BORE HEIGHT

4X ⌴ Ø10
C'BORE PATTERN
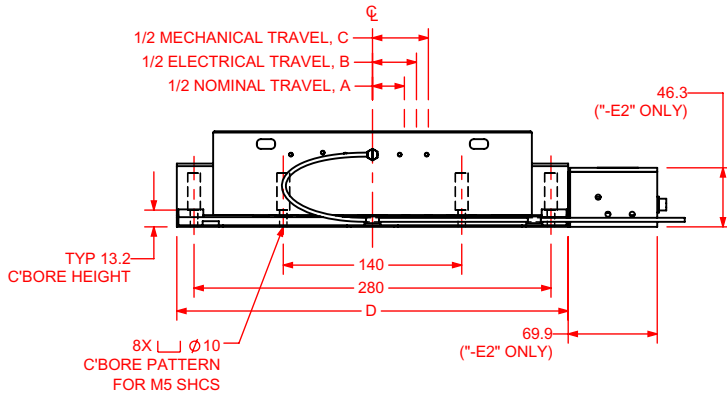FOR M5 OR #10 SHCS
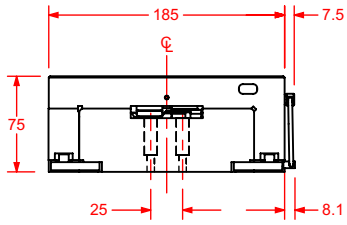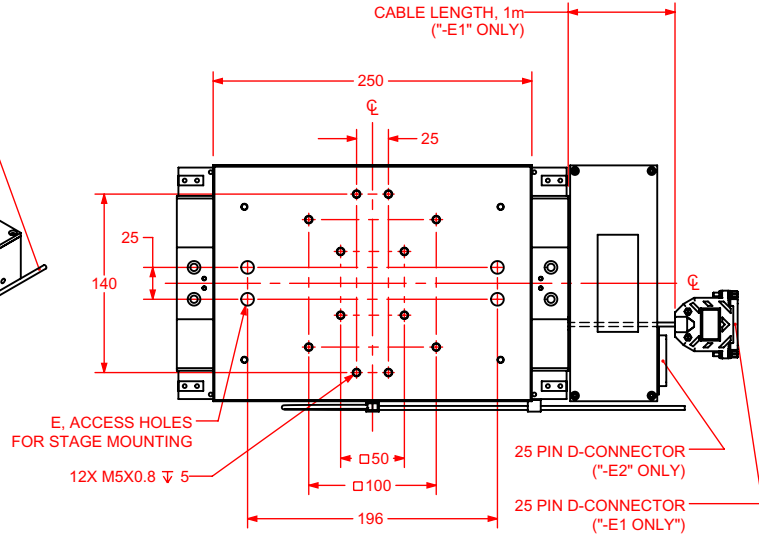
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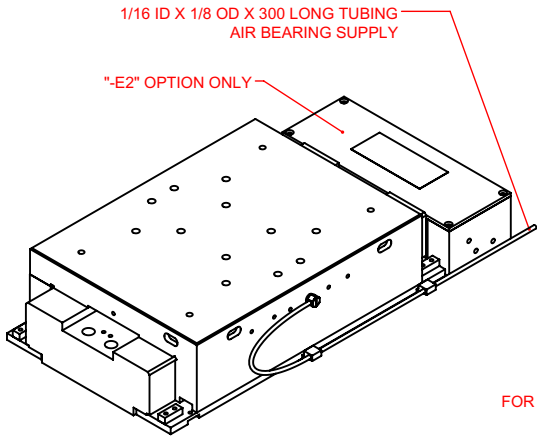E

69.9
("-E2" ONLY)

STAGE SHOWN AT MID TRAVEL

| MODEL | TOTAL TRAVEL | A 1/2 NOMINAL TRAVEL | B 1/2 ELECTRICAL TRAVEL | C 1/2 MECHANICAL TRAVEL | D STAGE MOUNTING | E STAGE BASE LENGTH |
|---|---|---|---|---|---|---|
| ABL1000-025 | 25 | 12.5 | 15 | 20 | 165 | 235 |
| ABL1000-050 | 50 | 25 | 27.5 | 32.5 | 140 | 260 |
| ABL1000-100 | 100 | 50 | 51 | 57.5 | 140 | 310 |

DIMENSIONS: MILLIMETERS

## ABL1000 Series DIMENSIONS

### ABL1000-050/-100/-150WB

1/16 ID X 1/8 OD X 300 LONG TUBING
AIR BEARING SUPPLY

"-E2" OPTION ONLY

CABLE LENGTH, 1m
("-E1" ONLY)

250

25

25

140

E, ACCESS HOLES
FOR STAGE MOUNTING

12X M5X0.8 ▽ 5

□50

□100

196

25 PIN D-CONNECTOR
("-E2" ONLY)

25 PIN D-CONNECTOR
("-E1 ONLY")

185

7.5

75

25

8.1

1/2 MECHANICAL TRAVEL, C

1/2 ELECTRICAL TRAVEL, B

1/2 NOMINAL TRAVEL, A

46.3
("-E2" ONLY)

TYP 13.2
C'BORE HEIGHT

140

280

D

69.9
("-E2" ONLY)

8X ⌴ Ø10
C'BORE PATTERN
FOR M5 SHCS

STAGE SHOWN AT MID TRAVEL

| MODEL | TOTAL TRAVEL | A 1/2 NOMINAL TRAVEL | B 1/2 ELECTRICAL TRAVEL | C 1/2 MECHANICAL TRAVEL | D STAGE BASE LENGTH | E STAGE MOUNTING ACCESS HOLES |
|---|---|---|---|---|---|---|
| ABL1000WB-050 | 50 | 25.0 | 25.7 | 28.4 | 307 | 4X Ø10 THRU |
| ABL1000WB-100 | 100 | 50.0 | 50.7 | 53.4 | 357 | 4X Ø10 THRU |
| ABL1000WB-150 | 150 | 75.0 | 75.7 | 78.4 | 407 | - |

DIMENSIONS: MILLIMETERS
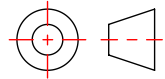
## ABL1000 Air-Bearing Direct-Drive Linear Stage ORDERING INFORMATION

### Travel (Required)

| | |
|---|---|
| -025 | 25 mm travel |
| -050 | 50 mm travel |
| -100 | 100 mm travel |

### Feedback      (Required)

| | |
|---|---|
| -E1 | Incremental linear encoder; 1 Vpp amplified sine output |
| -E2 | High-accuracy incremental linear encoder; 1 Vpp amplified sine output |

### Cable Management (Optional)

| | |
|---|---|
| -CMS1 | Cable management system for single axis |
| -CMS2 | Cable management system for lower (X) axis of XY assembly |
| -CMS3 | Cable management system for upper (Y) axis of XY assembly |
| -CMS4 | Cable management system for use with vertical (Z) or rotary (T) 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 spare parts, 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 a separate line item)

| | |
|---|---|
| ABF | Air-bearing filtration kit |

## ABL1000WB Wide Body Air-Bearing Direct-Drive Linear Stage ORDERING INFORMATION

### Travel (Required)

| | |
|---|---|
| -050 | 50 mm travel |
| -100 | 100 mm travel |
| -150 | 150 mm travel |

### Feedback (Required)

| | |
|---|---|
| -E1 | Incremental linear encoder; 1 Vpp amplified sine output |
| -E2 | High-accuracy incremental linear encoder; 1 Vpp amplified sine output |

### Cable Management (Optional)

| | |
|---|---|
| -CMS1 | Cable management system for single axis |
| -CMS2 | Cable management system for lower (X) axis of XY assembly |
| -CMS3 | Cable management system for upper (Y) axis of XY assembly |

### 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<br>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<br>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. |

### Accessories (to be ordered as a separate line item)

| | |
|---|---|
| ABF | Air-bearing filtration kit |