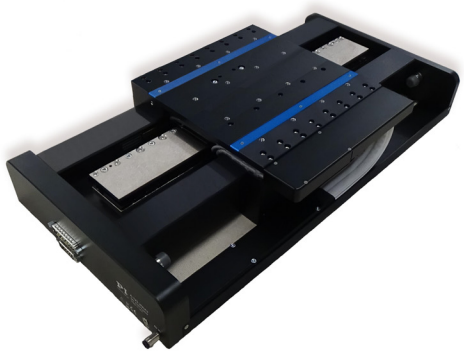
# PIglide AT3 Linear Stage with Air Bearings

## High Performance Nanopositioning Stage



## A-123

- Ideal for scanning applications or high-precision positioning
- Cleanroom compatible
- Size of the motion platform 210 mm × 210 mm
- Travel ranges 50 mm to 750 mm
- Resolution to 1 nm

### Product Overview

The stages in the PIglide are equipped with a servo drive linear motor with preloaded air bearings and integrated linear encoder. The combination of these noncontact components results in a frictionless motion platform that offers the highest performance, quality, and lifetime.
A high-force linear motor can drive the stage to top speed within a few milliseconds, and the high-capacity bearings can support payloads up to 60 kg. The laterally opposed, actively preloaded air bearing design in this model allows mounting in any orientation.

### Accessories and options

- Encoder
- PIglide filter and air preparation kits
- Single and multi-axis motion controller
- XY setups and individual configurations
- Cable track variations
- Options with counterweight for vertical (Z) orientation
- Customizations available
- Base plates made of granite and systems for reducing vibration

### Application fields

PIglide positioning systems are ideally suited for many high-precision applications such as metrology, photonics, and precision scanning in semiconductor or flat panel display manufacturing.
Thanks to the friction-free motion, no particles are formed, which makes PIglide stages ideal for cleanroom applications.

## Specifications

| Motion | A-123.050 | A-123.100 | A-123.150 | A-123.200 | A-123.350 | A-123.500 | A-123.750 | Unit | Tolerance |
|---|---|---|---|---|---|---|---|---|---|
| Active axes | X | X | X | X | X | X | X | | |
| Travel range | 50 | 100 | 150 | 200 | 350 | 500 | 750 | mm | |
| Pitch / yaw (1) | 5 | 10 | 15 | 15 | 20 | 25 | 35 | µrad | max. |
| Straightness / flatness (1) | ±0.5 | ±0.5 | ±0.5 | ±1 | ±1.5 | ±1.5 | ±2.5 | µm | max. |
| Straightness / flatness per 25 mm travel range (1) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | µm | max. |
| Velocity, unloaded (2) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | m/s | max. |
| Acceleration, unloaded (2) | 30 | 30 | 30 | 30 | 30 | 30 | 30 | m/s² | max. |

| Mechanical properties | A-123.050 | A-123.100 | A-123.150 | A-123.200 | A-123.350 | A-123.500 | A-123.750 | Unit | Tolerance |
|---|---|---|---|---|---|---|---|---|---|
| Load capacity in z (3) | 590 | 590 | 590 | 590 | 590 | 590 | 590 | N | max. |
| Load capacity in y (3) | 295 | 295 | 295 | 295 | 295 | 295 | 295 | N | max. |
| Moved mass | 5 | 5 | 5 | 5 | 5 | 5 | 5 | kg | |
| Overall mass | 14 | 15.5 | 16.5 | 18 | 21.5 | 25 | 32 | kg | |
| Guide type | Air bearing | Air bearing | Air bearing | Air bearing | Air bearing | Air bearing | Air bearing | | |

| Drive properties | A-123 | Unit | Tolerance |
|---|---|---|---|
| Drive type | Linear motor, ironless, 3-phase | | |
| Intermediate circuit voltage, effective | 48, nominal<br>80, max. | V DC | |
| Peak force | 298 | N | typ. |
| Nominal force | 87.5 | N | typ. |
| Force constant, effective | 19.9 | N/A | typ. |
| Resistance phase-phase | 3.6 | Ω | typ. |
| Inductivity phase-phase | 1.2 | mH | typ. |
| Back EMF phase-phase | 16 | V·s/m | max. |
| Cabling | External, moving cable | | |

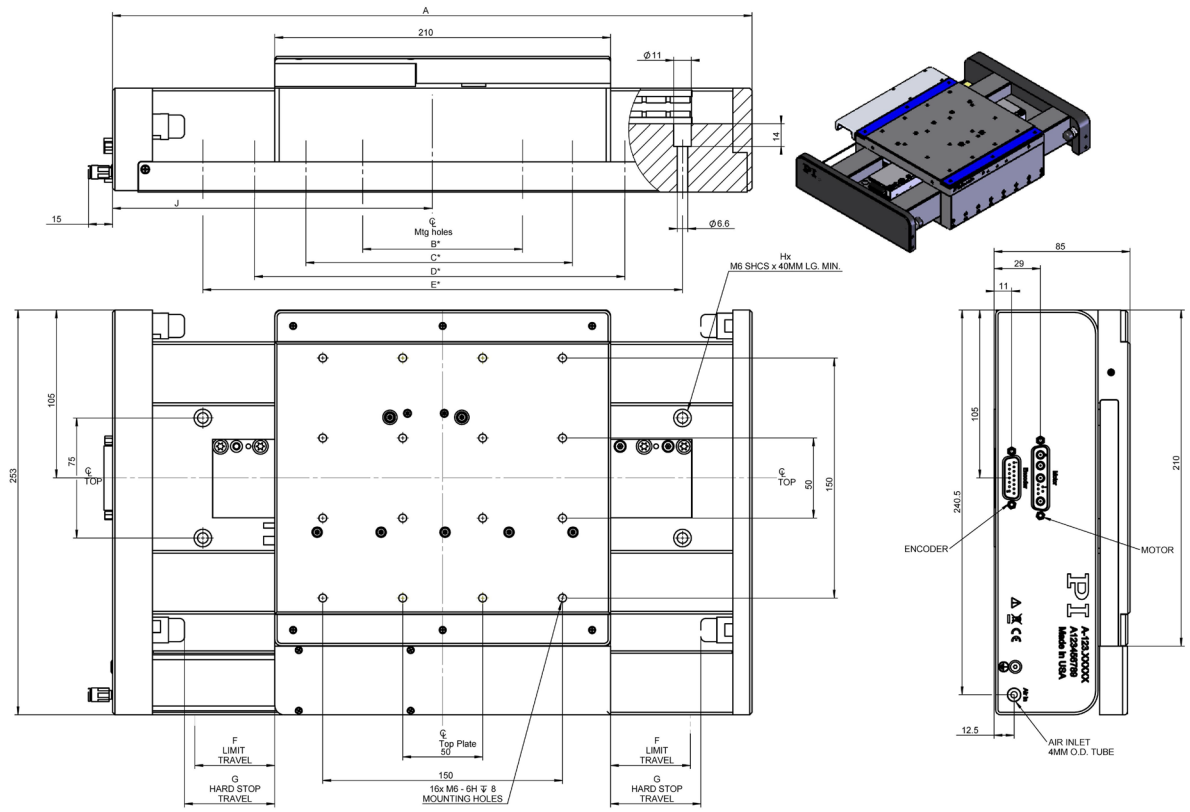
| Positioning | A-123.xxxA | A-123.xxxB | A-123.xxxC |
|---|---|---|---|
| Integrated Sensor | Incremental linear encoder | Absolute encoder | Incremental linear encoder |
| Sensor signal | Sin/cos, 1 V peak-peak,<br>20 µm signal period | BiSS-C | A/B quadrature, TTL |
| Sensor resolution | 1.2 nm (4) | 1 nm | 50 nm |
| Bidirectional repeatability | A-123.050: ± 0.25 µm (4)<br>A-123.100: ± 0.25 µm (4)<br>A-123.150: ± 0.25 µm (4)<br>A-123.200: ± 0.25 µm (4)<br>A-123.350: ± 0.5 µm (4)<br>A-123.500: ± 0.5 µm (4) | A-123.050: ± 0.25 µm<br>A-123.100: ± 0.25 µm<br>A-123.150: ± 0.25 µm<br>A-123.200: ± 0.25 µm<br>A-123.350: ± 0.5 µm<br>A-123.500: ± 0.5 µm<br>A-123.750: ± 0.75 µm | A-123.050: ± 0.25 µm<br>A-123.100: ± 0.25 µm<br>A-123.150: ± 0.25 µm<br>A-123.200: ± 0.25 µm<br>A-123.350: ± 0.5 µm<br>A-123.500: ± 0.5 µm<br>A-123.750: ± 0.75 µm |

| | | | |
|---|---|---|---|
| | A-123.750: ± 0.75 µm [4] | | |
| Accuracy, uncompensated [5] | A-123.050: ± 1 µm<br>A-123.100: ± 1 µm<br>A-123.150: ± 1.5 µm<br>A-123.200: ± 2 µm<br>A-123.350: ± 3 µm<br>A-123.500: ± 3.5 µm<br>A-123.750: ± 5 µm | A-123.050: ± 1.5 µm<br>A-123.100: ± 1.5 µm<br>A-123.150: ± 1.5 µm<br>A-123.200: ± 1.5 µm<br>A-123.350: ± 1.5 µm<br>A-123.500: ± 1.5 µm<br>A-123.750: ± 1.5 µm | A-123.050: ± 1 µm<br>A-123.100: ± 1 µm<br>A-123.150: ± 1.5 µm<br>A-123.200: ± 2 µm<br>A-123.350: ± 3 µm<br>A-123.500: ± 3.5 µm<br>A-123.750: ± 5 µm |
| Accuracy, with error compensation [5] | A-123.050: ± 0.5 µm<br>A-123.100: ± 0.5 µm<br>A-123.150: ± 0.5 µm<br>A-123.200: ± 0.5 µm<br>A-123.350: ± 1 µm<br>A-123.500: ± 1 µm<br>A-123.750: ± 1.5 µm | A-123.050: ± 1.5 µm<br>A-123.100: ± 1.5 µm<br>A-123.150: ± 1.5 µm<br>A-123.200: ± 1.5 µm<br>A-123.350: ± 1.5 µm<br>A-123.500: ± 1.5 µm<br>A-123.750: ± 1.5 µm | A-123.050: ± 0.5 µm<br>A-123.100: ± 0.5 µm<br>A-123.150: ± 0.5 µm<br>A-123.200: ± 0.5 µm<br>A-123.350: ± 1 µm<br>A-123.500: ± 1 µm<br>A-123.750: ± 1.5 µm |

| Miscellaneous | A-123 |
|---|---|
| Operating pressure [6] | 75 to 85 psi (515 to 585 kPa) |
| Air consumption | < 1.0 SCFM (28 SLPM) |
| Air quality | Clean (filtered to 1.0 µm or better) - ISO 8573-1 Class 1<br>Oil free - ISO 8573-1 Class 1<br>Dry (-15 °C dew point) - ISO 8573-1 Class 3 |
| Materials | Hardcoat aluminum, stainless steel fasteners |

[1] Dependent on the flatness of the surface, on which the stage is mounted.
[2] Can be limited by the payload, controller or drive.
[3] Assumes payload CG is centered no more than 50 mm above the motion platform.
[4] Assumes 16384x interpolation. Contact PI for the use of other factors.
[5] Improved accuracy can be obtained with controller-based error compensation. The stage must be ordered with a controller from PI to reach these values. Accuracy values assume short-term duration and do not consider the long-term effects of thermal drift on the stage.
[6] To protect the stage against damage, it is recommended to connect an air pressure sensor to the Motion-Stop input of the controller.

## Drawings and Images




| MODEL | A | B* | C* | D* | E* | F | G | Hx | J |
|---|---|---|---|---|---|---|---|---|---|
| A-123.050 | 350 | | | | 250 | 25 | 31.5 | 4 | 181.5 |
| A-123.100 | 400 | 100 | | | 300 | 50 | 56.5 | 8 | 206.5 |
| A-123.150 | 450 | 100 | | | 350 | 75 | 81.5 | 8 | 231.5 |
| A-123.200 | 500 | 100 | | | 400 | 100 | 106.5 | 8 | 256.5 |
| A-123.350 | 650 | 100 | 325 | | 550 | 175 | 181.5 | 12 | 331.5 |
| A-123.500 | 800 | 100 | 300 | 500 | 700 | 250 | 256.5 | 16 | 406.5 |
| A-123.750 | 1050 | 100 | 400 | 700 | 1000 | 375 | 381.5 | 16 | 531.5 |

*A-123, dimensions in mm.*

** The mounting holes are symmetric around the center line located at "J"*

## Ordering Information

### Travel range 50 mm

**A-123.050A1**
PIglide AT3 Linear Stage, Air Bearing, 50 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.050B1**
PIglide AT3 Linear Stage, Air Bearing, 50 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.050C1**
PIglide AT3 Linear Stage, Air Bearing, 50 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

### Travel range 100 mm

**A-123.100A1**
PIglide AT3 Linear Stage, Air Bearing, 100 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.100B1**
PIglide AT3 Linear Stage, Air Bearing, 100 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.100C1**
PIglide AT3 Linear Stage, Air Bearing, 100 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

### Travel range 150 mm

**A-123.150A1**
PIglide AT3 Linear Stage, Air Bearing, 150 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.150B1**
PIglide AT3 Linear Stage, Air Bearing, 150 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.150C1**
PIglide AT3 Linear Stage, Air Bearing, 150 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

### Travel range 200 mm

**A-123.200A1**
PIglide AT3 Linear Stage, Air Bearing, 200 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.200B1**
PIglide AT3 Linear Stage, Air Bearing, 200 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.200C1**
PIglide AT3 Linear Stage, Air Bearing, 200 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

### Travel range 350 mm

**A-123.350A1**
PIglide AT3 Linear Stage, Air Bearing, 350 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.350B1**
PIglide AT3 Linear Stage, Air Bearing, 350 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.350C1**
PIglide AT3 Linear Stage, Air Bearing, 350 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

### Travel range 500 mm

**A-123.500A1**
PIglide AT3 Linear Stage, Air Bearing, 500 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.500B1**
PIglide AT3 Linear Stage, Air Bearing, 500 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.500C1**
PIglide AT3 Linear Stage, Air Bearing, 500 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**Travel range 750 mm**

**A-123.750A1**
PIglide AT3 Linear Stage, Air Bearing, 750 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

**A-123.750B1**
PIglide AT3 Linear Stage, Air Bearing, 750 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

**A-123.750C1**
PIglide AT3 Linear Stage, Air Bearing, 750 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V