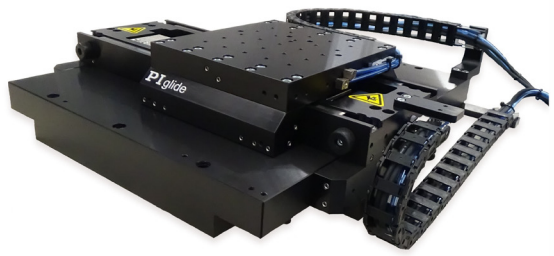
PIglide IS Planar Scanner with Air Bearing

High-Performance, Compact XY Nanopositioning System



A-311

- Ideal for scanning applications or high-precision positioning
- Cleanroom compatible
- Travel ranges to 200 mm × 200 mm
- Load capacity to 147 N
- Low profile
- Resolution to 1 nm

Product Overview

The high-precision PIglide IS XY planar scanner with air bearing has a flat design and is an alternative to the stacked XY stages. The efficient, compact design saves space in machines with limited installation space.

PIMag® magnetic direct drive

3-phase magnetic direct drives do not use mechanical components in the drivetrain, they transmit the drive force to the motion platform directly and without friction. The drives reach high velocities and accelerations. Ironless motors are particularly suitable for positioning tasks with the highest demands on precision because there is no undesirable interaction with the permanent magnets. This allows smooth running even at the lowest velocities and at the same time, there is no vibration at high velocities. Nonlinearity in control behavior is avoided and any position can be controlled easily. The drive force can be set freely.

Operation with digital controllers from leading manufacturers offers advanced control algorithms for improving the dynamics and error compensation.

Accessories and options

- Encoder
- PIglide filter and air preparation kit
- Multi-axis motion controller and direct drives
- Machine bases
- Base plates made of granite and systems for reducing vibration

Application fields

PIglide positioning systems are ideally suited for high-precision applications, such as inspection systems, laser marking, microscopy or scanning.

Specifications

Motion	A-311.Dxx	A-311.Axx	A-311.Bxx	A-311.Cxx	Unit	Tolerance
Travel range	50 × 50	100 × 100	150 × 150	200 × 200	mm	
Pitch (1)	20	30	40	50	µrad	max.
Yaw (1)	5	10	15	20	µrad	max.
Straightness (1)	±0.25	±0.25	±0.5	±0.5	µm	max.
Straightness per 10 mm travel range (1)	±10	±10	±10	±10	nm	max.
Flatness (1)	±0.5	±0.5	±1	±1	µm	max.
Flatness per 10 mm travel range (1)	±10	±10	±10	±10	nm	max.
XY orthogonality	25	25	25	25	µrad	max.
Velocity, unloaded (2)	2	2	2	2	m/s	max.
Acceleration of the upper axis, unloaded (2)	27.5	27.5	27.5	27.5	m/s²	max.
Acceleration of the lower axis, unloaded (2)	15	13	11	10	m/s²	max.

Mechanical properties	A-311.Dxx	A-311.Axx	A-311.Bxx	A-311.Cxx	Unit	Tolerance
Load capacity in z (3)	147	147	147	147	N	max.
Moved mass, upper axis	3	3	3	3	kg	
Moved mass, upper axis, lower axis	5.5	6.5	7.5	8.5	kg	
Overall mass	14.5	18.5	22.5	27.5	kg	
Guide type	Air bearing	Air bearing	Air bearing	Air bearing		

Drive properties	A-311	Unit	Tolerance
Drive type	Linear motor, ironless, 3-phase		
Intermediate circuit voltage, effective	48, nominal 80, max.	V DC	
Peak force	85	N	typ.
Nominal force	39	N	typ.
Force constant, effective	12.3	N/A	typ.
Resistance phase-phase	3.6	Ω	
Inductivity phase-phase	1.24	mH	
Back EMF phase-phase	10.1	V·s/m	max.
Cabling	External, movable drag chain		

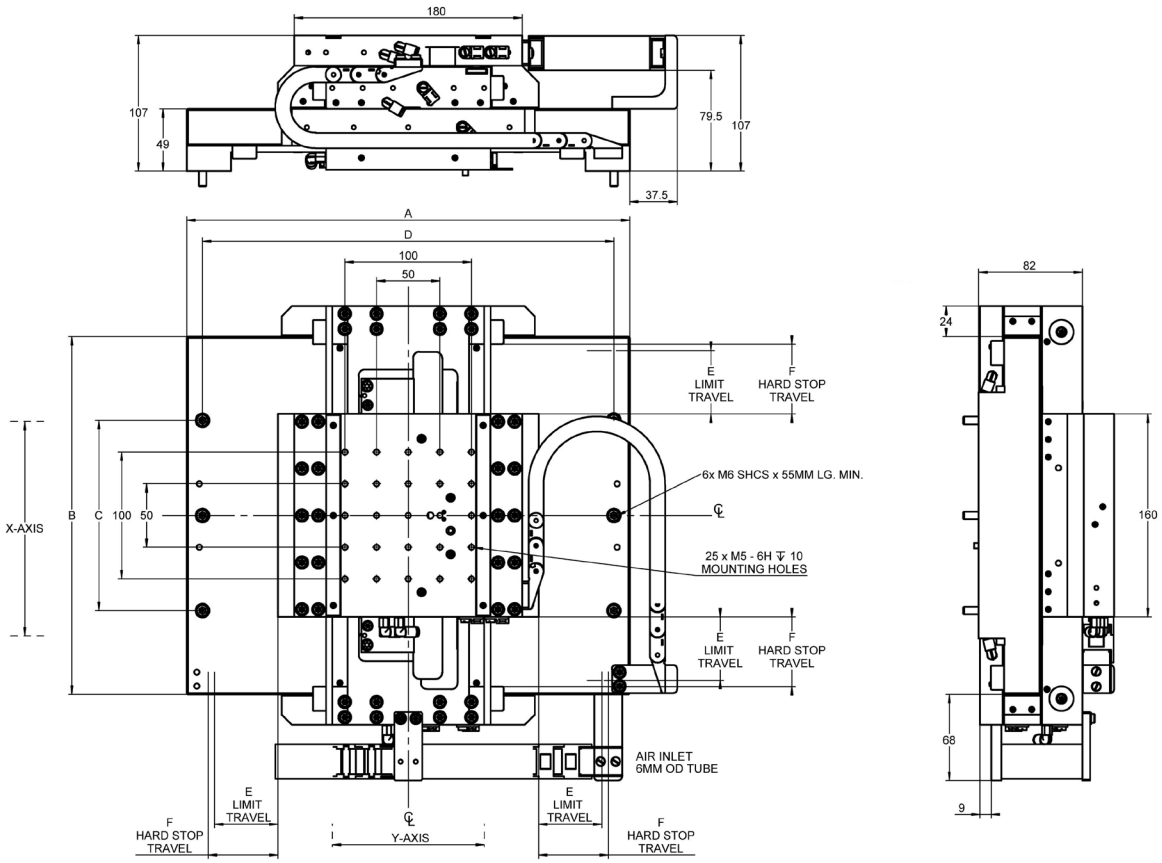
Positioning	A-311.xAx	A-311.xBx	A-311.xCx
Integrated sensor	Incremental linear encoder	Absolute encoder	Incremental linear encoder
Sensor signal	Sin/cos, 1 V peak-peak, 20 µm signal period	BiSS-C	A/B quadrature, TTL
Sensor resolution	1.2 nm [4]	1 nm	50 nm
Bidirectional repeatability	±0.05 µm [4]	±0.05 µm	±0.05 µm
Accuracy, uncompensated [5]	A-311.Dxx: ± 1 µm A-311.Axx: ± 1.5 µm A-311.Bxx: ± 2 µm A-311.Cxx: ± 2.5 µm	A-311.Axx: ± 1.5 µm A-311.Axx: ± 1.5 µm A-311.Axx: ± 1.5 µm A-311.Axx: ± 1.5 µm	A-311.Dxx: ± 1 µm A-311.Axx: ± 1.5 µm A-311.Bxx: ± 2 µm A-311.Cxx: ± 2.5 µm
Accuracy, with error compensation [5]	±0.5 µm	±0.5 µm	±0.5 µm

Miscellaneous	A-311
Operating pressure [6]	60 to 70 psi (415 to 485 kPa)
Air consumption	< 2 SCFM (56 SLPM)
Air quality	Clean (filtered to 1.0 µm or better) - ISO 8573-1 Class 1 Oil free - ISO 8573-1 Class 1 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. The stage is designed for horizontal operation only.
[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.

All specifications apply per axis, if not otherwise described.

Drawings and Images



	A	B	C	D	E	F
A-311.Dxx	300	232	100	275	25	30
A-311.Axx	350	282	150	325	50	55
A-311.Bxx	400	332	200	375	75	80
A-311.Cxx	450	382	250	425	100	105

A-311.xxx, dimensions in mm

Ordering Information

50 mm × 50 mm Travel Range

A-311.DA1
PIglide IS Planar Scanner, Air Bearing, 50 mm × 50 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

A-311.DB1
PIglide IS Planar Scanner, Air Bearing, 50 mm × 50 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

A-311.DC1
PIglide IS Planar Scanner, Air Bearing, 50 mm × 50 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

100 mm × 100 mm Travel Range

A-311.AA1
PIglide IS Planar Scanner, Air Bearing, 100 mm × 100 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

A-311.AB1
PIglide IS Planar Scanner, Air Bearing, 100 mm × 100 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

A-311.AC1
PIglide IS Planar Scanner, Air Bearing, 100 mm × 100 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

150 mm × 150 mm Travel Range

A-311.BA1
PIglide IS Planar Scanner, Air Bearing, 150 mm × 150 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

A-311.BB1
PIglide IS Planar Scanner, Air Bearing, 150 mm × 150 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

A-311.BC1
PIglide IS Planar Scanner, Air Bearing, 150 mm × 150 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

200 mm × 200 mm Travel Range

A-311.CA1
PIglide IS Planar Scanner, Air Bearing, 200 mm × 200 mm Travel Range, Linear Encoder with Sin/Cos Signal Transmission, 20 µm Signal Period, 3-Phase Linear Motor, 48 V

A-311.CB1
PIglide IS Planar Scanner, Air Bearing, 200 mm × 200 mm Travel Range, Absolute Encoder, 1 nm Sensor Resolution, 3-Phase Linear Motor, 48 V

A-311.CC1
PIglide IS Planar Scanner, Air Bearing, 200 mm × 200 mm Travel Range, Linear Encoder with A/B Quadrature Signal Transmission, 50 nm Sensor Resolution, 3-Phase Linear Motor, 48 V