PIglide AT1 Linear Stage with Air Bearings

High Performance Small Footprint Nanopositioning Stage

A-121

- Ideal for scanning applications or high-precision positioning
- Cleanroom compatible
- Size of the motion platform 115 mm × 115 mm
- Travel ranges to 350 mm
- Low profile from 60 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. The preloaded air bearing construction supports mounting in any orientation.

Accessories and options

- Encoder
- PIglide filter and air preparation kits
- Multi-axis motion controller and direct drives
- XY setups and individual configurations
- Cable track variations
- Counterbalance options for vertical assembly
- 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.

Motion	Unit	Toleran-ce	A-121. 050A1	A-121. 050B1	A-121. 100A1	A-121. 100B1	A-121. 150A1	A-121. 150B1	A-121. 200A1	A-121. 200B1
Active axes			X	X	X	X	X	X	X	X
Travel range in X	mm		50	50	100	100	150	150	200	200
Acceleration in X, unloa-ded	m/s²	Max.	20	20	20	20	20	20	20	20
Maximum velocity in X, unloaded	mm/s		500	500	1000	1000	1000	1000	1000	1000
Straightness (Linear cros-stalk in Y with motion in X)	µm	Max.	±0.25	±0.25	±0.25	±0.25	±0.5	±0.5	±0.75	±0.75
Flatness (Linear crosstalk in Z with motion in X)	µm	Max.	±0.25	±0.25	±0.25	±0.25	±0.5	±0.5	±0.75	±0.75
Pitch (Rotational crosstalk in θY with motion in X)	µrad	Max.	±10	±10	±10	±10	±10	±10	±10	±10
Yaw (Rotational crosstalk in θZ with motion in X)	µrad	Max.	±10	±10	±10	±10	±10	±10	±10	±10

Positioning	Unit	Toleran-ce	A-121. 050A1	A-121. 050B1	A-121. 100A1	A-121. 100B1	A-121. 150A1	A-121. 150B1	A-121. 200A1	A-121. 200B1
Positioning accuracy in X, calibrated	µm	Typ.	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5
Positioning accuracy in X, uncalibrated	µm	Typ.	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±2	±1.5
Bidirectional repeatability in X	µm	Typ.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Integrated sensor			Incremental linear encoder	Absolute linear encoder	Incremental linear encoder	Absolute linear encoder	Incremental linear encoder	Absolute linear encoder	Incremental linear encoder	Absolute linear encoder
Sensor signal			Sin/cos, 1 V peak-peak	BiSS-C	Sin/cos, 1 V peak-peak	BiSS-C	Sin/cos, 1 V peak-peak	BiSS-C	Sin/cos, 1 V peak-peak	BiSS-C
Sensor signal period	µm		20		20		20		20	
Sensor resolution	nm		4.88	1	4.88	1	4.88	1	4.88	1

Drive Properties	Unit	Toleran-ce	A-121. 050A1	A-121. 050B1	A-121. 100A1	A-121. 100B1	A-121. 150A1	A-121. 150B1	A-121. 200A1	A-121. 200B1
Drive type			Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor
Nominal voltage	V		48	48	48	48	48	48	48	48
Peak voltage	V		80	80	80	80	80	80	80	80
Nominal current, RMS	A	Typ.	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Peak current, RMS	A	Typ.	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Drive force in X	N	Typ.	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Peak force in X	N		33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
Force constant	N/A		9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Resistance phase-phase	Ω	Typ.	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Inductance phase-phase	mH		1	1	1	1	1	1	1	1
Back EMF phase-phase	V·s/m	Max.	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Pole pitch N-N	mm		40	40	40	40	40	40	40	40

Mechanical Properties	Unit	Toleran-ce	A-121. 050A1	A-121. 050B1	A-121. 100A1	A-121. 100B1	A-121. 150A1	A-121. 150B1	A-121. 200A1	A-121. 200B1
Permissible push force in Y	N	Max.	40	40	40	40	40	40	40	40
Permissible push force in Z	N	Max.	100	100	100	100	100	100	100	100
Permissible torque in θx	N·m	Max.	5	5	5	5	5	5	5	5
Permissible torque in θY	N·m	Max.	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Moved mass in X, unloaded	g		1200	1200	1200	1200	1200	1200	1200	1200
Guide			Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload	Air bearing guide/Air bearing guide with air preload
Overall mass	g		3500	3500	4200	4200	4500	4500	5200	5200
Material			Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware

Miscellaneous	Unit	Toleran-ce	A-121. 050A1	A-121. 050B1	A-121. 100A1	A-121. 100B1	A-121. 150A1	A-121. 150B1	A-121. 200A1	A-121. 200B1
Operating temperature range	°C		+15 to +25	+15 to +25	+15 to +25	+15 to +25	+15 to +25	+15 to +25	+15 to +25	+15 to +25
Connector			D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)
Sensor connector			D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)
Operating pressure	kPa		450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)
Air consumption	L/min	Max.	28	28	28	28	28	28	28	28
Air quality			Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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
Recommended controllers / drivers			A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x

Motion	Unit	Toleran-ce	A-121.250A1	A-121.250B1	A-121.350A1	A-121.350B1
Active axes			X	X	X	X
Travel range in X	mm		250	250	350	350
Acceleration in X, unloaded	m/s²	Max.	20	20	20	20
Maximum velocity in X, unloaded	mm/s		1000	1000	1000	1000
Straightness (Linear crosstalk in Y with motion in X)	µm	Max.	±1	±1	±1.25	±1.25
Flatness (Linear crosstalk in Z with motion in X)	µm	Max.	±1	±1	±1.25	±1.25
Pitch (Rotational crosstalk in θY with motion in X)	µrad	Max.	±12.5	±12.5	±17.5	±17.5
Yaw (Rotational crosstalk in θZ with motion in X)	µrad	Max.	±12.5	±12.5	±17.5	±17.5

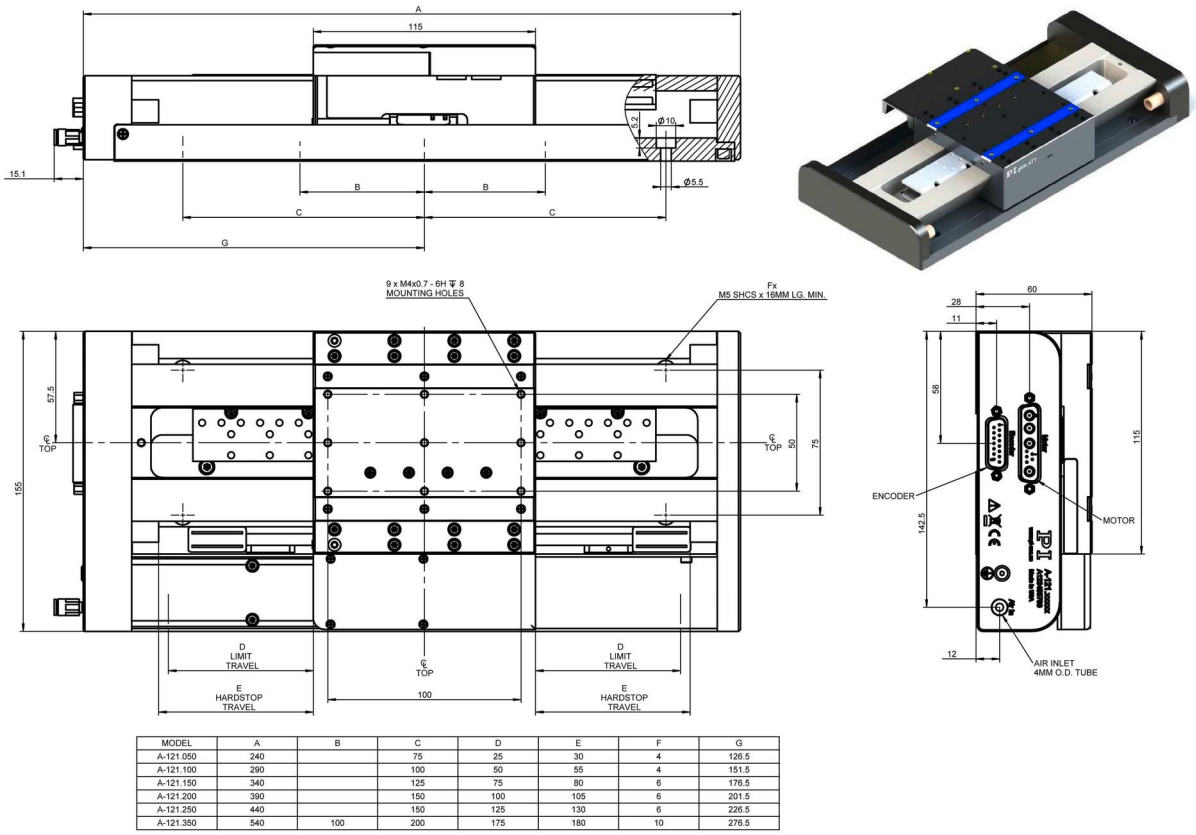
Positioning	Unit	Toleran-ce	A-121.250A1	A-121.250B1	A-121.350A1	A-121.350B1
Positioning accuracy in X, calibrated	µm	Typ.	±0.5	±0.5	±0.5	±0.5
Positioning accuracy in X, uncalibrated	µm	Typ.	±2	±1.5	±3	±1.5
Bidirectional repeatability in X	µm	Typ.	0.5	0.5	0.5	0.5
Integrated sensor			Incremental linear encoder	Absolute linear encoder	Incremental linear encoder	Absolute linear encoder
Sensor signal			Sin/cos, 1 V peak-peak	BiSS-C	Sin/cos, 1 V peak-peak	BiSS-C
Sensor signal period	µm		20		20	
Sensor resolution	nm		4.88	1	4.88	1

Drive Properties	Unit	Toleran-ce	A-121.250A1	A-121.250B1	A-121.350A1	A-121.350B1
Drive type			Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor	Electric motor/Magnetic direct drive/Ironless 3-phase linear motor
Nominal voltage	V		48	48	48	48
Peak voltage	V		80	80	80	80
Nominal current, RMS	A	Typ.	1.2	1.2	1.2	1.2
Peak current, RMS	A	Typ.	3.5	3.5	3.5	3.5
Drive force in X	N	Typ.	11.1	11.1	11.1	11.1
Peak force in X	N		33.2	33.2	33.2	33.2
Force constant	N/A		9.4	9.4	9.4	9.4
Resistance phase-phase	Ω	Typ.	6.3	6.3	6.3	6.3
Inductance phase-phase	mH		1	1	1	1
Back EMF phase-phase	V·s/m	Max.	7.7	7.7	7.7	7.7
Pole pitch N-N	mm		40	40	40	40

Mechanical Properties	Unit	Toleran-ce	A-121.250A1	A-121.250B1	A-121.350A1	A-121.350B1
Permissible push force in Y	N	Max.	40	40	40	40
Permissible push force in Z	N	Max.	100	100	100	100
Permissible torque in θx	N·m	Max.	5	5	5	5
Permissible torque in θY	N·m	Max.	8.3	8.3	8.3	8.3
Moved mass in X, unloa-ded	g		1200	1200	1200	1200
Guide			Air bearing guide/Air bea-ring guide with air pre-load	Air bearing guide/Air bea-ring guide with air pre-load	Air bearing guide/Air bea-ring guide with air pre-load	Air bearing guide/Air bea-ring guide with air pre-load
Overall mass	g		5700	5700	6800	6800
Material			Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware	Hardcoat aluminum, stainless steel mounting hardware

Miscellaneous	Unit	Toleran-ce	A-121.250A1	A-121.250B1	A-121.350A1	A-121.350B1
Operating temperature range	°C		+15 to +25	+15 to +25	+15 to +25	+15 to +25
Connector			D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)	D-sub 9W4 (m)
Sensor connector			D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)
Operating pressure	kPa		450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)	450 to 520 (65 to 75 psi)
Air consumption	L/min	Max.	28	28	28	28
Air quality			Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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	Clean (filtered up 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
Recommended controllers / drivers			A-81x, A-82x	A-81x, A-82x	A-81x, A-82x	A-81x, A-82x

Drawings / Images



MODEL	A	B	C	D	E	F	G
A-121.050	240		75	25	30	4	126.5
A-121.100	290		100	50	55	4	151.5
A-121.150	340		125	75	80	6	176.5
A-121.200	390		150	100	105	6	201.5
A-121.250	440		150	125	130	6	226.5
A-121.350	540	100	200	175	180	10	276.5

A-121, dimensions in mm

Order Information

A-121.050A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 50 mm travel range; 100 N load capacity; 500 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.050B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 50 mm travel range; 100 N load capacity; 500 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C

A-121.100A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 100 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.100B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 100 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C

Order Information

A-121.150A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 150 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.150B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 150 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C

A-121.200A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 200 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.200B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 200 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C

A-121.250A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 250 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.250B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 250 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C

A-121.350A1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 350 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; incremental linear encoder, 20 µm sensor signal period, sin/cos, 1 V peak-peak

A-121.350B1
PIglide AT1 linear stage with air bearing; ironless 3-phase linear motor; 350 mm travel range; 100 N load capacity; 1000 mm/s maximum velocity; absolute linear encoder, 1 nm sensor resolution, BiSS-C