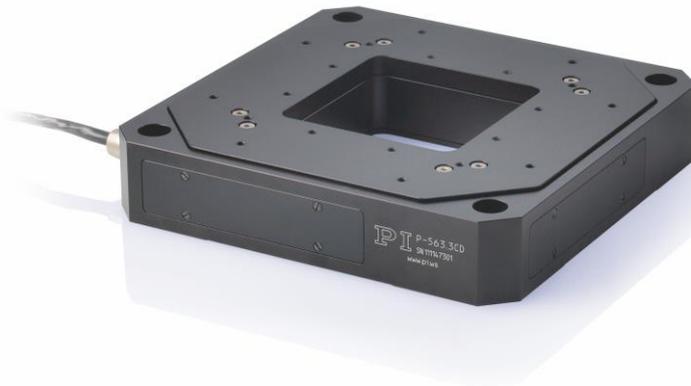


PIMars Nanopositioning Stage

High-Precision Nanopositioning System for up to 3 Axes



P-561 • P-562 • P-563

- Parallel kinematics for faster response times and higher multi-axis accuracy
- Travel ranges to 300 × 300 × 300 μm
- Highest linearity due to capacitive sensors
- Zero-play, high-precision flexure guide system
- Excellent scanning flatness
- High dynamics XYZ version
- Clear aperture 66 mm × 66 mm
- Outstanding lifetime due to PICMA® piezo actuators
- UHV versions to 10⁻⁹ hPa

Fields of application

- Scanning microscopy
- Mask/wafer positioning
- Interferometry
- Measuring technology
- Biotechnology
- Scanning and screening

Outstanding lifetime thanks to PICMA® piezo actuators

The patented PICMA® piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA® actuators offer an up to ten times longer lifetime than conventional polymer-insulated actuators. 100 billion cycles without a single failure are proven.

Subnanometer resolution with capacitive sensors

Capacitive sensors measure with subnanometer resolution without contacting. They guarantee excellent linearity of motion, long-term stability, and a bandwidth in the kHz range.

High guiding accuracy due to zero-play flexure guides

Flexure guides are free of maintenance, friction, and wear, and do not require lubrication. Their stiffness allows high load capacity and they are insensitive to shock and vibration. They are 100 % vacuum compatible and work in a wide temperature range.

Automatic configuration and fast component exchange

Mechanics and controllers can be combined as required and exchanged quickly. All servo and linearization parameters are stored in the ID chip of the Sub-D connector of the mechanics. The autocalibration function of the digital controllers uses this data each time the controller is switched on.

High tracking accuracy in the nanometer range due to parallel position measuring

All degrees of freedom are measured against a single fixed reference. Undesired crosstalk of motion to another axis can be actively compensated in real time (depending on the bandwidth) (active guiding). High tracking accuracy is achieved in the nanometer range even in dynamic operation.

Suitable for sophisticated vacuum applications

All components used in the piezo systems are excellently suited for use in vacuum. No lubricant or grease is necessary for operating. Polymer-free piezo systems allow particularly low outgas rates.

Specifications

	P-561.3CD P-561.3CL	P-562.3CD P-562.3CL	P-563.3CD P-563.3CL	P-561.3DD	Unit	Tolerance
PIMars XYZ piezo-nanopositioning system, closed-loop travel	100 × 100 × 100	200 × 200 × 200	300 × 300 × 300	45 × 45 × 15, direct drive	µm	
Motion and positioning						
Integrated sensor	Capacitive	Capacitive	Capacitive	Capacitive		
Travel range at -20 to 120 V, open loop	150 × 150 × 150	300 × 300 × 300	340 × 340 × 340	58 × 58 × 18	µm	+20 % / - 0 %
Resolution, open loop	0.2	0.4	0.5	0.1	nm	typ.
Resolution, closed loop	0.8	1	2	0.2	nm	typ.
Linearity error	0.03	0.03	0.03	0.01*	%	typ.
Repeatability in X / Y / Z	2 / 2 / 2	2 / 2 / 4	2 / 2 / 4	2 / 2 / 2	nm	typ.
Pitch in X, Y	±1	±2	±2	±3	µrad	typ.
Crosstalk θ_x, θ_y (motion in Z)	±15	±20	±25	±3	µrad	typ.
Yaw in X, Y	±6	±10	±10	±3	µrad	typ.
Flatness in X, Y	±15	±20	±25	±10	nm	typ.
Crosstalk in X, Y (motion in Z)	±30	±50	±50	±20	nm	typ.
Mechanical properties						
Resonant frequency in X / Y / Z, no load	190 / 190 / 380	160 / 160 / 315	140 / 140 / 250	920 / 920 / 1050	Hz	±20 %
Resonant frequency in X / Y / Z, under load, 100 g	-	145 / 145 / 275	120 / 120 / 215	860 / 860 / 950	Hz	±20 %
Resonant frequency in X / Y / Z, under load, 330 g	140 / 140 / 300	130 / 130 / 195	110 / 110 / 170	500 / 500 / 470	Hz	±20 %
Load capacity**	5	5	5	5	kg	max.
Drive properties						
Piezo ceramic	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-885 in Z, P-888 in XY		
Electrical capacitance in X / Y / Z	5.2 / 5.2 / 10.4	7.4 / 7.4 / 14.8	7.4 / 7.4 / 14.8	38 / 38 / 6	µF	±20 %
Miscellaneous						
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	°C	
Material	Aluminum	Aluminum	Aluminum	Aluminum		
Mass	1.45	1.45	1.45	1.55	kg	±5 %
Sensor/voltage connection	CD version: Sub-D 25W3 (m), 1.5 m cable CL version: LEMO					

	P-561.3CD P-561.3CL	P-562.3CD P-562.3CL	P-563.3CD P-563.3CL	P-561.3DD	Unit	Tolerance
Recommended electronics	E-503, E-505, E-621, E-712, E-727					

* With digital controller. Nonlinearity of direct drive stages measured with analog controllers is typically up to 0.1 %.

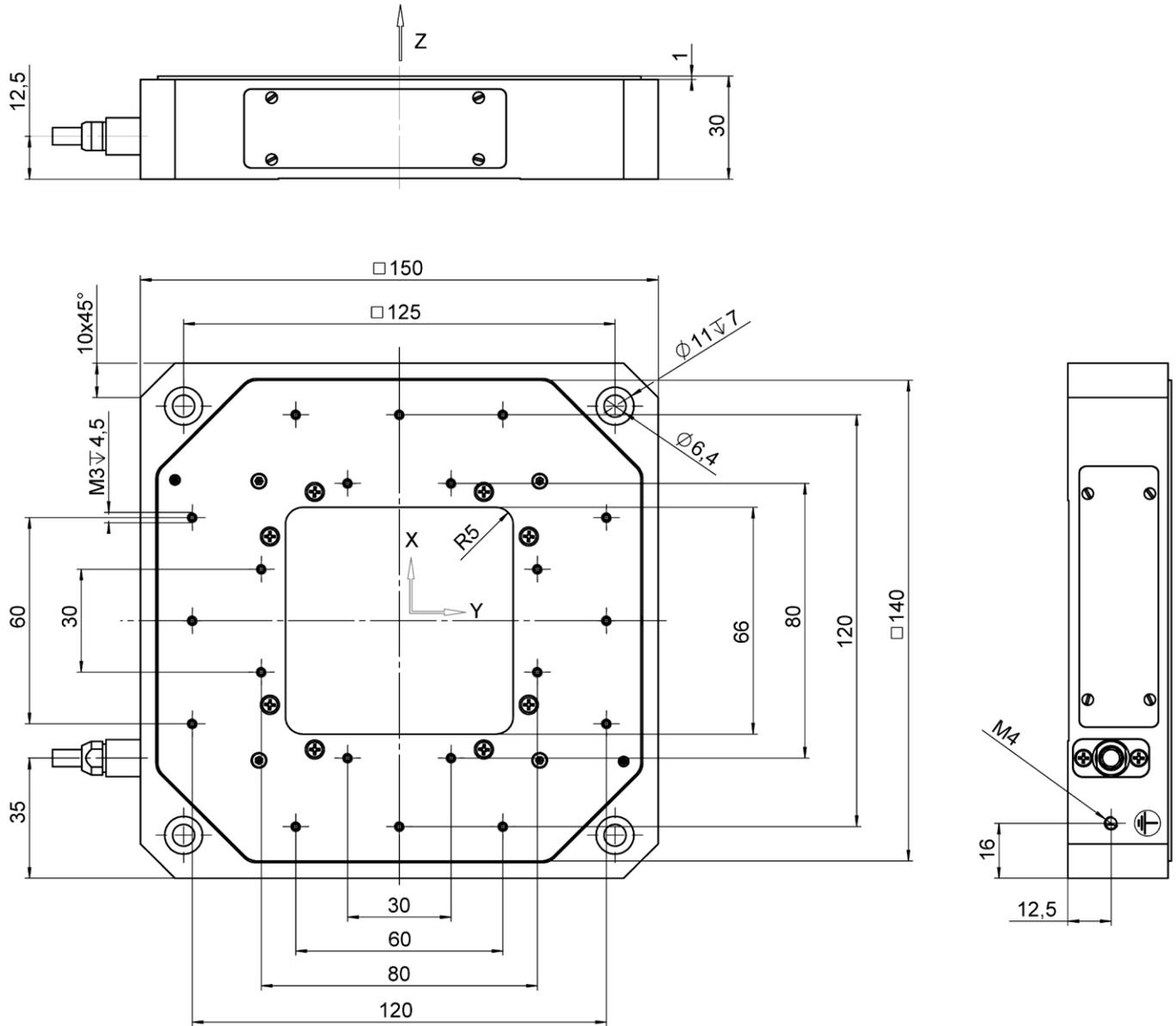
** When mounted horizontally (standing on a surface, not suspended).

The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

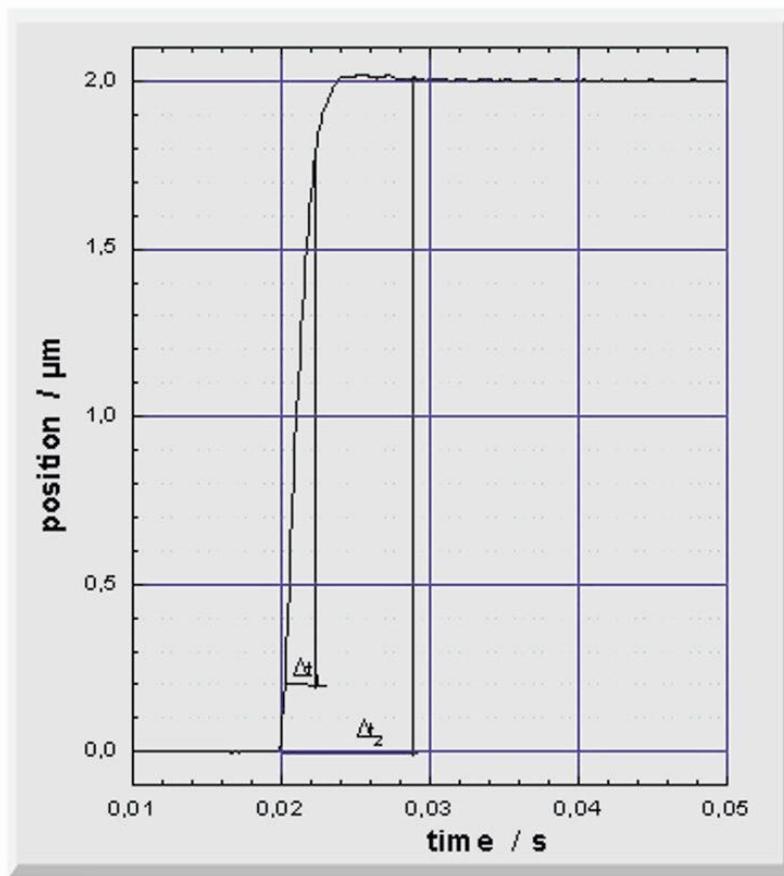
All specifications based on room temperature (22 °C ±3 °C).

Super-invar and titanium versions available.

Ask about customized versions.



P-561.3DD, dimensions in mm



Response behavior of the P-562.3CD: Step-and-settle in less than 10 ms in X, Y, and Z.

Ordering Information

P-561.3CD

PIMars XYZ nanopositioning system with long travel range, 100 μm × 100 μm × 100 μm, capacitive sensors, parallel metrology, Sub-D connector

P-561.3CL

PIMars XYZ nanopositioning system with long travel range, 100 μm × 100 μm × 100 μm, capacitive sensors, parallel metrology, LEMO connector(s)

P-561.3DD

PIMars high dynamics XYZ nanopositioning system, 45 μm × 45 μm × 15 μm, capacitive sensors, parallel metrology, Sub-D connector, direct drive

P-562.3CD

PIMars XYZ nanopositioning system with long travel range, 200 μm × 200 μm × 200 μm, capacitive sensors, parallel metrology, Sub-D connector

P-562.3CL

PIMars XYZ nanopositioning system with long travel range, 200 μm × 200 μm × 200 μm, capacitive sensors, parallel metrology, LEMO connector(s)

P-563.3CD

PIMars XYZ nan positioning system with long travel range, 300 μm \times 300 μm \times 300 μm , capacitive sensors, parallel metrology, Sub-D connector

P-563.3CL

PIMars XYZ nan positioning system with long travel range, 300 μm \times 300 μm \times 300 μm , capacitive sensors, parallel metrology, LEMO connector(s)