

Multi-Axis Piezo Scanner

High Dynamics Nanopositioner / Scanner with Direct Position Measuring



P-517 • P-527

- 2- and 3-axis versions (XY and XYθ_z)
- Travel ranges to 200 μm
- Subnanometer resolution

Fields of application

- Metrology
- Interferometry
- Photonics / integrated optics
- Lithography
- Nanopositioning
- Scanning microscopy
- Sample alignment
- Micromachining

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.

Specifications

	P-517.2CL P-517.2CD	P-527.2CL P-527.2CD	P-517.3CL P-517.3CD	P-527.3CL P-527.3CD	P-517.RCD	P-527.RCD	Unit	Tolerance
Active axes	X, Y	X, Y	X, Y, Z	X, Y, Z	X, Y, θ_z	X, Y, θ_z		
Motion and positioning								
Integrated sensor	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive		
Travel range at -20 to 120 V, open loop	130 μm	250 μm	X, Y: 130 μm Z: 25 μm	X, Y: 250 μm Z: 25 μm	X, Y: 130 μm θ_z : ± 1.3 mrad	X, Y: 250 μm θ_z : ± 2.5 mrad		+20 % / -0 %
Travel range, closed loop	100 μm	200 μm	X, Y: 100 μm Z: 20	X, Y: 200 μm Z: 20	X, Y: 100 μm θ_z : ± 1 mrad	X, Y: 200 μm θ_z : ± 2 mrad		
Resolution, open loop	0.3 nm	0.5 nm	X, Y: 0.3 nm Z: 0.1 nm	X, Y: 0.5 nm Z: 0.1 nm	X, Y: 0.3 nm θ_z : 0.1 μrad	X, Y: 0.5 nm θ_z : 0.1 μrad		typ.
Resolution, closed loop	1 nm	2 nm	X, Y: 1 nm Z: 0.1 nm	X, Y: 2 nm Z: 0.1 nm	X, Y: 1 nm θ_z : 0.3 μrad	X, Y: 2 nm θ_z : 0.3 μrad		typ.
Linearity error	0.03	0.03	0.03	0.03	0.03	0.03	%	typ.
Repeatability	± 5 nm	± 10 nm	X, Y: ± 5 nm Z: ± 1 nm	X, Y: ± 10 nm Z: ± 1 nm	X, Y: ± 5 nm θ_z : ± 0.5 μrad	X, Y: ± 10 nm θ_z : ± 1 μrad		typ.
Mechanical properties								
Stiffness	2	1	X, Y: 2 Z: 15	X, Y: 1 Z: 15	2	1	N/ μm	± 20 %
Resonant frequency, no load	450	350	X, Y: 450 Z: 1100	X, Y: 350 Z: 1100	X, Y: 450 θ_z : 400	X, Y: 350 θ_z : 300	Hz	± 20 %
Resonant frequency under load in X, Y, 500 g	250	190	250	190	250	190	Hz	± 20 %
Resonant frequency under load in X, Y, 2500 g	140	110	140	110	140	110	Hz	± 20 %
Load capacity*	5	5	5	5	5	5	kg	max.
Drive properties								
Piezo ceramic	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-885		
Electrical capacitance	9.2	9.2	X, Y: 9 Z: 6	X, Y: 9 Z: 6	9	9	μF	± 20 %
Miscellaneous								
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	$^{\circ}\text{C}$	
Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum		
Mass	1.4	1.4	1.45	1.45	1.4	1.4	kg	± 5 %
Sensor/voltage connection	CL version: LEMO CD version: Sub-D 25W3 (m)	CL version: LEMO CD version: Sub-D 25W3 (m)	CL version: LEMO CD version: Sub-D 25W3 (m)	CL version: LEMO CD version: Sub-D 25W3 (m)	Sub-D 25W3 (m)	Sub-D 25W3 (m)		
Recommended electronics	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727		

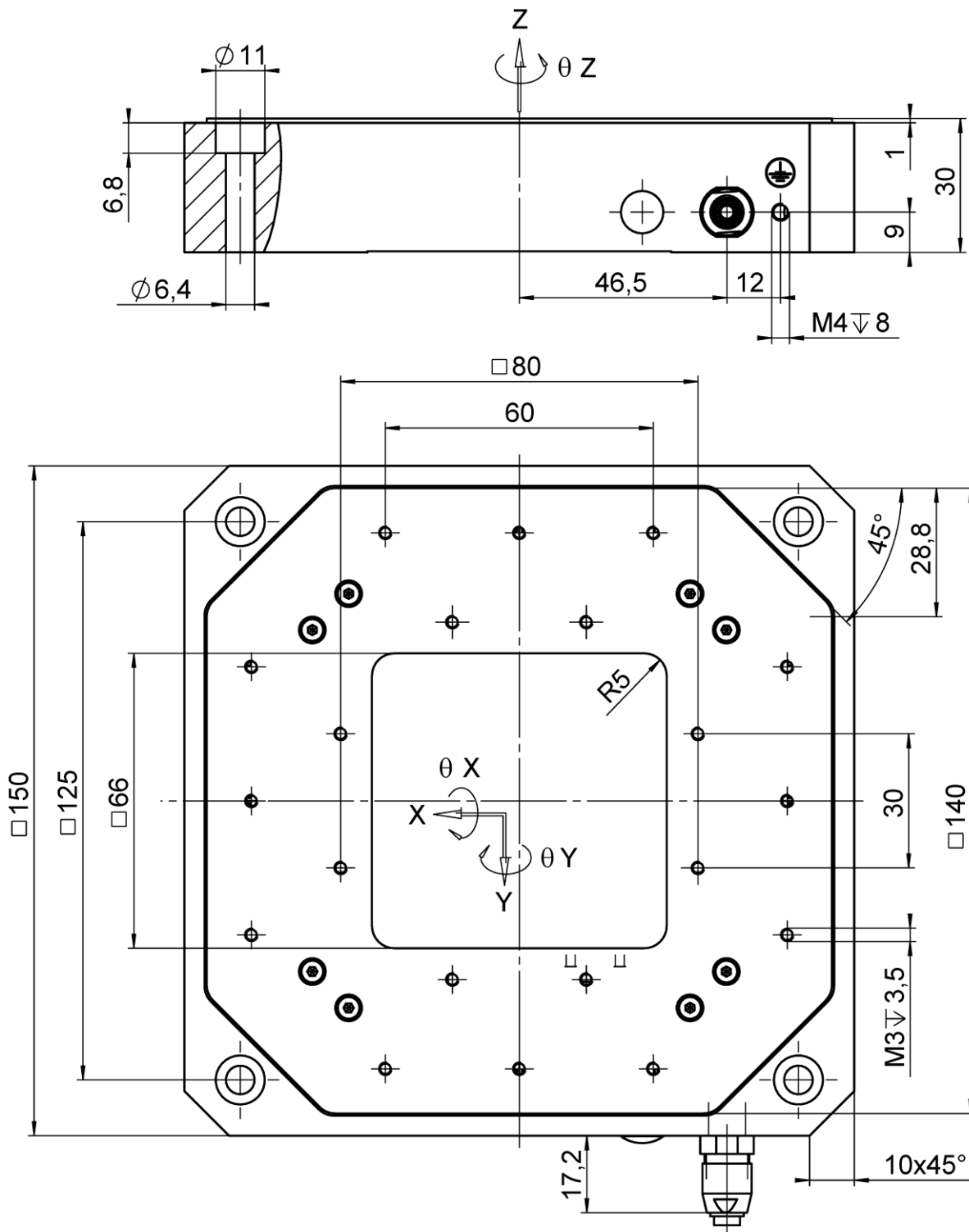
* When mounted horizontally (standing on a surface, not suspended).

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 $^{\circ}\text{C} \pm 3$ $^{\circ}\text{C}$).

Ask about customized versions.

Drawings / Images



P-517 / P-527, dimensions in mm

Ordering Information

P-517.2CL

Precision XY nan positioning system, 100 μm \times 100 μm , capacitive sensors, parallel metrology, LEMO connector(s)

P-517.2CD

Precision XY nan positioning system, 100 μm \times 100 μm , capacitive sensors, parallel metrology, Sub-D connector

P-527.2CL

Precision XY nan positioning system, 200 μm \times 200 μm , capacitive sensors, parallel metrology, LEMO connector(s)

P-527.2CD

Precision XY nan positioning system, 200 μm \times 200 μm , capacitive sensors, parallel metrology, Sub-D connector

P-517.3CL

Precision XYZ nan positioning system, 100 μm \times 100 μm \times 20 μm , capacitive sensors, parallel metrology, LEMO connector(s)

P-517.3CD

Precision XYZ nan positioning system, 100 μm \times 100 μm \times 20 μm , capacitive sensors, parallel metrology, Sub-D connector

P-527.3CL

Precision XYZ nan positioning system, 200 μm \times 200 μm \times 20 μm , capacitive sensors, parallel metrology, LEMO connector(s)

P-527.3CD

Precision XYZ nan positioning system, 200 μm \times 200 μm \times 20 μm , capacitive sensors, parallel metrology, Sub-D connector

P-517.RCD

Precision XY / rotation nan positioning system, 100 μm \times 100 μm , 2 mrad, capacitive sensors, parallel metrology, Sub-D connector

P-527.RCD

Precision XY / rotation nan positioning system, 200 μm \times 200 μm , 4 mrad, capacitive sensors, parallel metrology, Sub-D connector