

PicoCube XY(Z) Piezo Scanner

High Dynamics Nanopositioning System for Scanning Probe Microscopy



P-363

- Ultra-high-performance closed-loop scanner for AFM / SPM
- Compact manipulation tool for bio- / nanotechnology
- Resonant frequency 9.8 kHz
- Capacitive sensors for highest accuracy
- Parallel measuring technology for automated compensation of guiding errors
- Resolution 50 picometers
- Travel range $5\ \mu\text{m} \times 5\ \mu\text{m} \times 5\ \mu\text{m}$
- Vacuum-compatible versions

Fields of application

- Scanning probe microscopy
- Atomic force microscopy
- Scanning and screening

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-363.3CD	P-363.2CD	Unit
Active axes	X, Y, Z	X, Y	
Motion and positioning			
Integrated sensor	Capacitive	Capacitive	
Travel range in X, Y at -250 to +250 V, open loop	±3	±3	µm
Travel range in Z at -250 to +250 V, open loop	±2.7	-	µm
Travel range in X, Y, closed loop	±2.5	±2.5	µm
Travel range in Z, closed loop	±2.5	-	µm
Resolution, open loop*	0.03	0.03	nm
Resolution, closed loop	0.1	0.1	nm
Linearity error	0.05	0.05	%
Repeatability**	1	1	nm
Pitch / yaw in X, Y	0.5	0.5	µrad
Tilt with motion in Z	0.2	-	µrad
Straightness in X, Y	3	3	nm
Flatness in X, Y	<10	<10	nm
Crosstalk in X, Y (motion in Z)	5	-	nm
Mechanical properties			
Resonant frequency in X, Y, no load	3.1	4.2	kHz
Resonant frequency in Z, no load	9.8	-	kHz
Resonant frequency under load in X, Y	1.5 (20 g)	2.1 (20 g)	kHz
Load capacity	10	10	N
Ceramic type	PICA, PICA Shear	PICA Shear	
Miscellaneous			
Operating temperature range	-20 to 80	-20 to 80	°C
Material	Titanium	Titanium	
Dimensions	30 mm × 30 mm × 40 mm	30 mm × 30 mm × 28 mm	
Mass	225	190	g
Cable length	1.5	1.5	m
Sensor/voltage connection	Sub-D 24W7 (m)	Sub-D 24W7 (m)	
Recommended electronics	E-536	E-536	

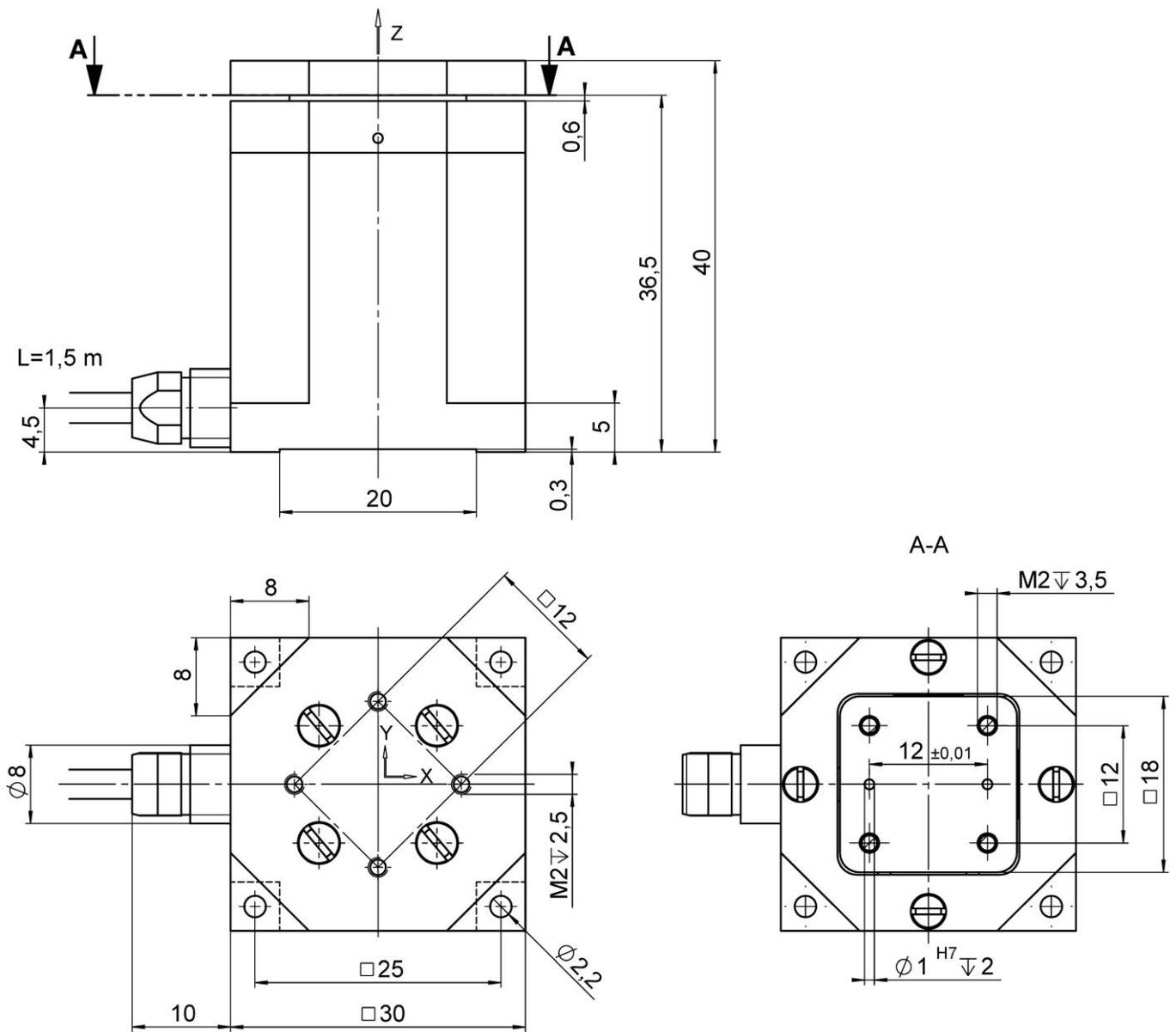
* The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

** For 10 % travel; 50 nm for full travel.

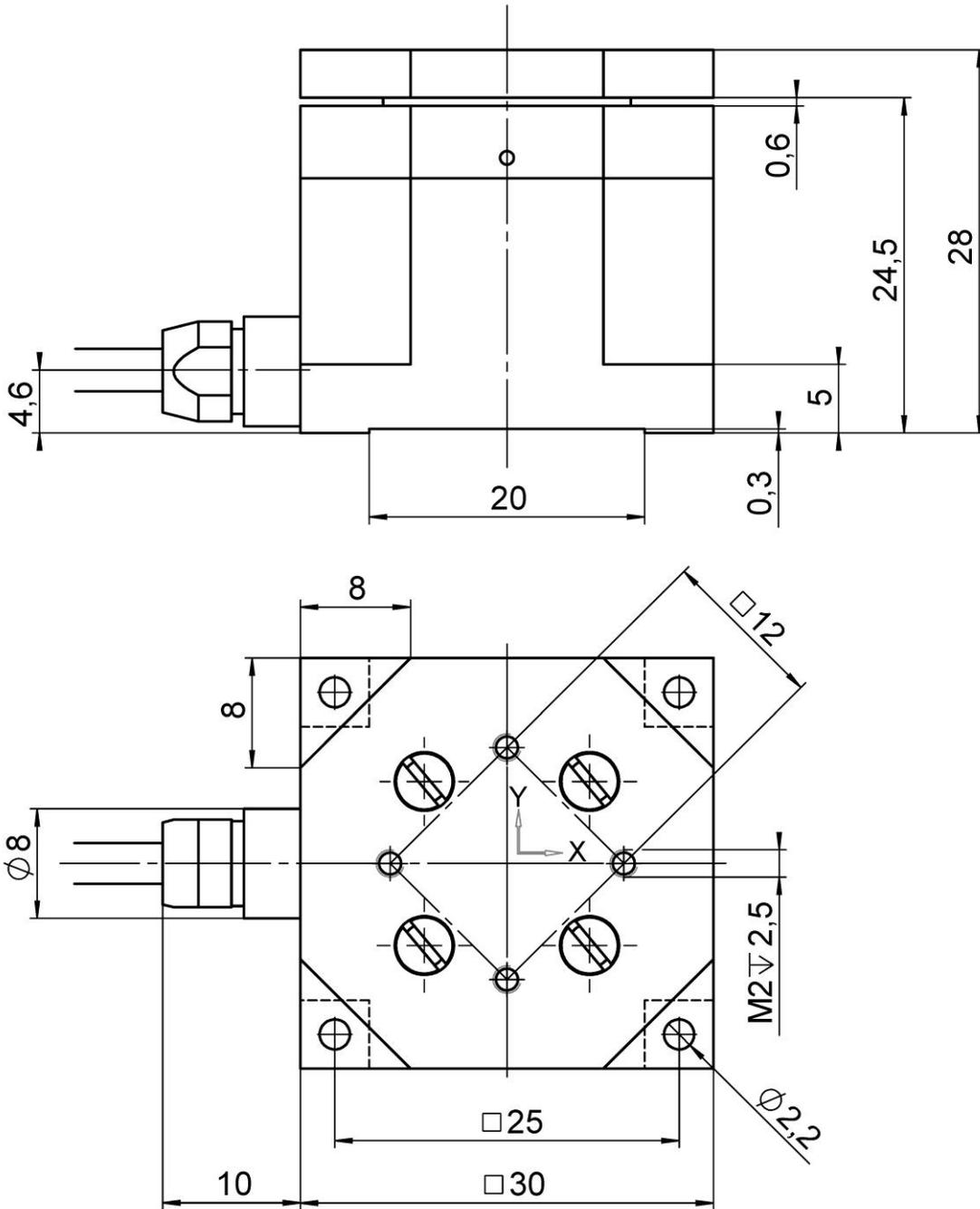
All specifications based on room temperature (22 °C ±3 °C).

Ask about customized versions.

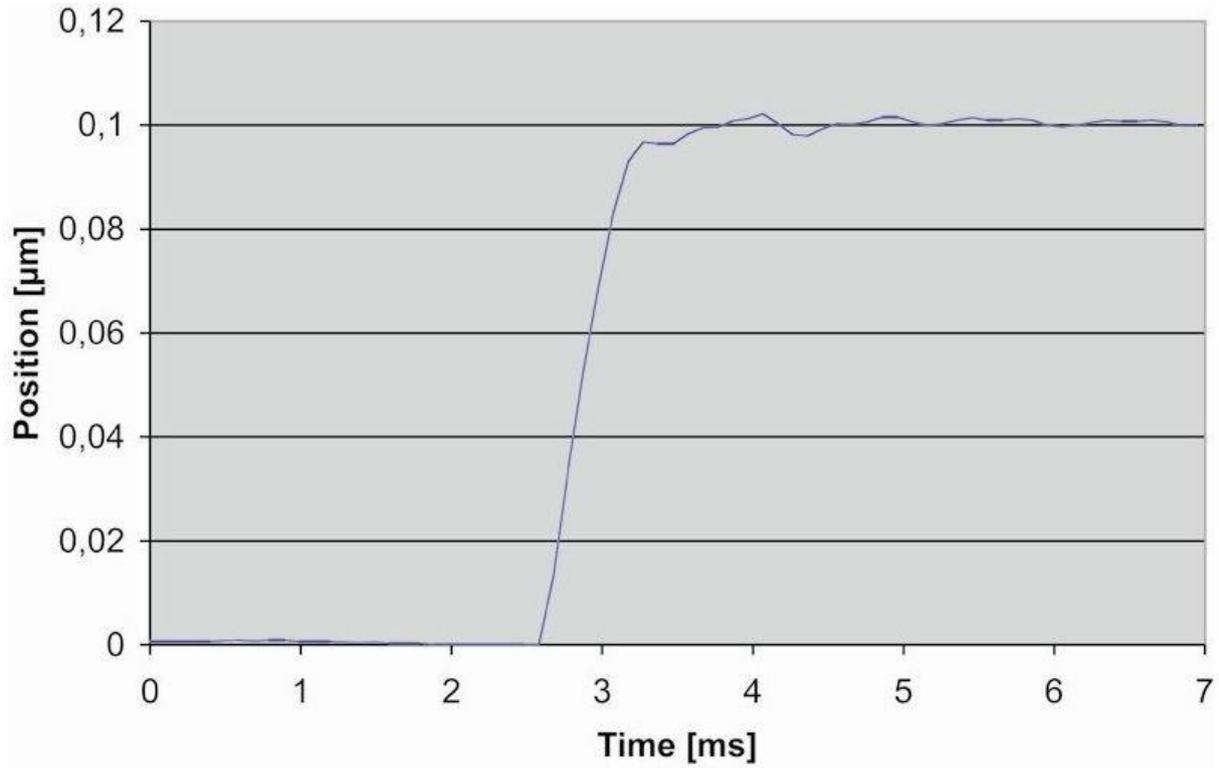
Drawings / Images



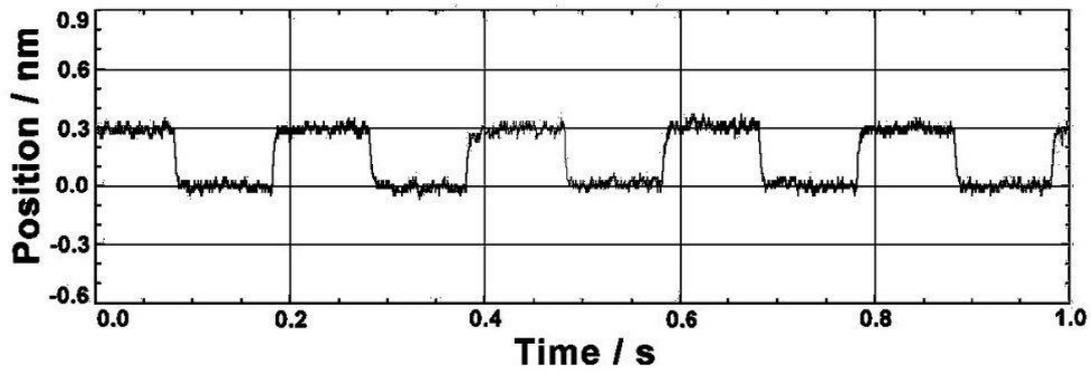
P-363.3Cx, dimensions in mm. Removable top plate.



P-363.2Cx, dimensions in mm. Removable top plate.



The P-363 is already in a position to achieve an accuracy of 1 nm after 1 ms (100-nm step in X respectively Y; faster reaction in Z).



300-picometer steps (0.3 nm) with the P-363; measured with external high-resolution capacitive measuring system.

Ordering Information

P-363.2CD

PicoCube high-precision XY nanopositioning system, 5 μm \times 5 μm , parallel metrology, capacitive sensors, Sub-D connector

P-363.2CL

PicoCube high-precision XY nanopositioning system, 5 μm \times 5 μm , parallel metrology, capacitive sensors, LEMO connector(s)

P-363.3CD

PicoCube high-precision XYZ nanopositioning system, 5 μm \times 5 μm \times 5 μm , parallel metrology, capacitive sensors, Sub-D connector

P-363.3CL

PicoCube high-precision XYZ nanopositioning system, 5 μm \times 5 μm \times 5 μm , parallel metrology, capacitive sensors, LEMO connector(s)