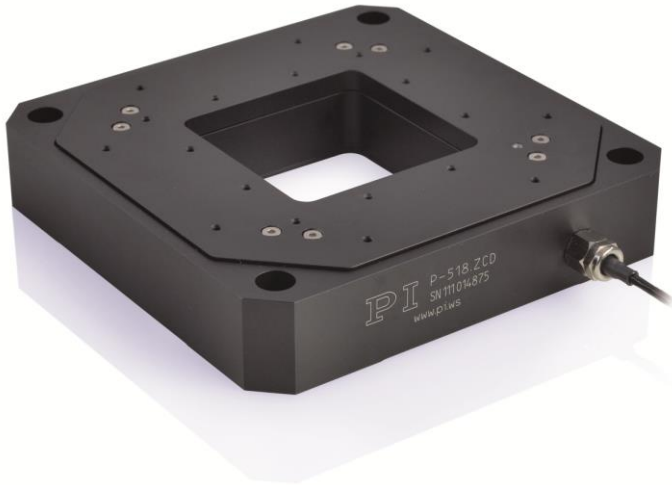


Piezo Z/Tip/Tilt Stage

High Dynamics with Large Aperture



P-518 • P-528 • P-558

- Z and tip/tilt stages with 3 axes / Z stages with 1 axis
- Vertical tip/tilt angle to 200 μm / 2 mrad, closed loop (to 240 μm / 2.4 mrad open loop)
- Parallel kinematics for faster response times and higher multi-axis accuracy
- Zero-play, high-precision flexure guide system
- Outstanding lifetime due to PICMA[®] piezo actuators
- Clear aperture 66 mm \times 66 mm
- Highest linearity due to capacitive sensors

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-558.ZCD P-558.ZCL	P-558.TCD	P-518.ZCD P-518.ZCL	P-518.TCD	P-528.ZCD P-528.ZCL	P-528.TCD	Unit	Tolerance
Active axes	Z	Z, θ_x , θ_y	Z	Z, θ_x , θ_y	Z	Z, θ_x , θ_y		
Motion and positioning								
Integrated sensor	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive		
Travel range in Z at -20 to 120 V, open loop	60	60	140	140	240	240	μm	+20 % / -0 %
Tip/tilt angle in θ_x , θ_y at -20 to 120 V, open loop	–	± 0.3	–	± 0.7	–	± 1.2	mrad	+20 % / -0 %
Travel range in Z, closed loop	50	50	100	100	200	200	μm	
Tip/tilt angle in θ_x , θ_y , closed loop	–	± 0.25	–	± 0.5	–	± 1	mrad	
Resolution in Z, open loop	0.2	0.2	0.2	0.4	0.6	0.6	nm	typ.
Resolution in θ_x , θ_y , open loop	–	0.02	–	0.04	–	0.06	μrad	typ.
Resolution in Z, closed loop	0.5	0.5	0.8	0.8	1	1	nm	typ.
Resolution in θ_x , θ_y , closed loop	–	0.05	–	0.05	–	0.1	μrad	typ.
Linearity error in θ_x , θ_y	–	0.03	–	0.03	–	0.03	%	typ.
Repeatability in Z	± 5	± 5	± 5	± 5	± 10	± 10	nm	typ.
Repeatability in θ_x , θ_y	–	± 0.03	–	± 0.05	–	± 0.1	μrad	typ.
Crosstalk θ_z (motion in Z)	<10	<10	<10	<10	<20	<20	μrad	typ.
Crosstalk θ_x , θ_y (motion in Z)	<50	<50	<50	<50	<100	<100	μrad	typ.
Mechanical properties								
Stiffness in Z	4	4	2.7	2.7	1.5	1.5	N/ μm	± 20 %
Resonant frequency in Z, no load	570	570	500	500	350	350	Hz	± 20 %
Resonant frequency in θ_x , θ_y , no load	–	610	–	530	–	390	Hz	± 20 %
Resonant frequency under load in Z, 500 g	410	410	350	350	210	210	Hz	± 20 %
Resonant frequency under load in θ_x , θ_y , 500 g	–	430	–	370	–	250	Hz	± 20 %

	P-558.ZCD P-558.ZCL	P-558.TCD	P-518.ZCD P-518.ZCL	P-518.TCD	P-528.ZCD P-528.ZCL	P-528.TCD	Unit	Tolerance
Resonant frequency under load in Z, 2500 g	245	245	200	200	130	130	Hz	±20 %
Resonant frequency under load in θ_x, θ_y , 2500 g	–	240	–	190	–	115	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	6	6	8.4	8.4	14.8	14.8	µF	±20 %
Miscellaneous								
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	°C	
Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum		
Dimensions	150 mm × 150 mm × 30 mm	150 mm × 150 mm × 30 mm	150 mm × 150 mm × 30 mm	150 mm × 150 mm × 30 mm	150 mm × 150 mm × 30 mm	150 mm × 150 mm × 30 mm		
Mass	1380	1380	1400	1400	1420	1420	g	±5 %
Cable length	1.5	1.5	1.5	1.5	1.5	1.5	m	±10 mm
Sensor/voltage connection	CL version: LEMO CD version: Sub-D 7W2 (m)	Sub-D 25W3 (m)	CL version: LEMO CD version: Sub-D 7W2 (m)	Sub-D 25W3 (m)	CL version: LEMO CD version: Sub-D 7W2 (m)	Sub-D 25W3 (m)		
Recommended electronics	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754	E-503, E-505, E-610, E-621, E-625, E-712, E-727, E-754		

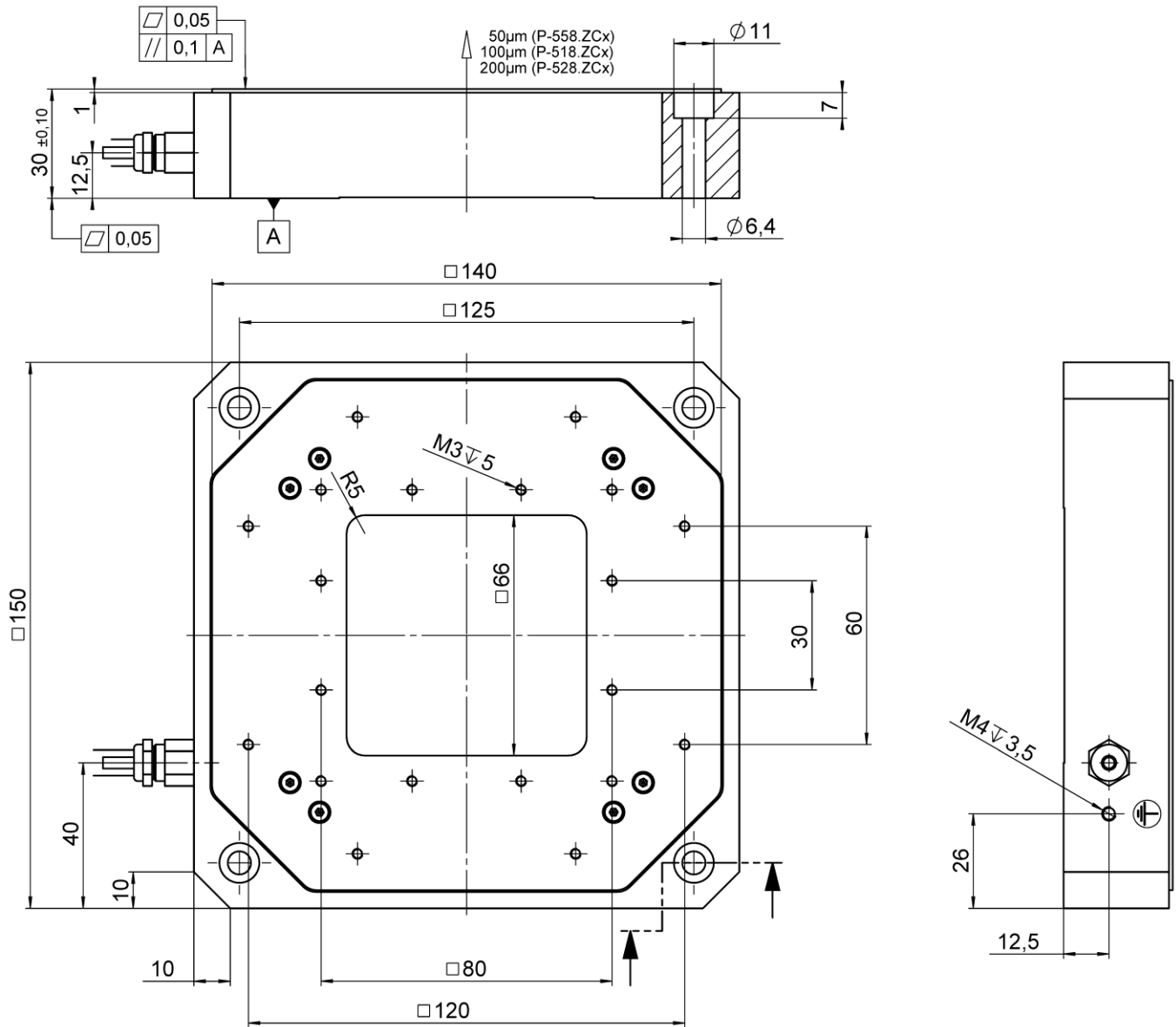
* When mounted horizontally (standing on a surface, not suspended).

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.

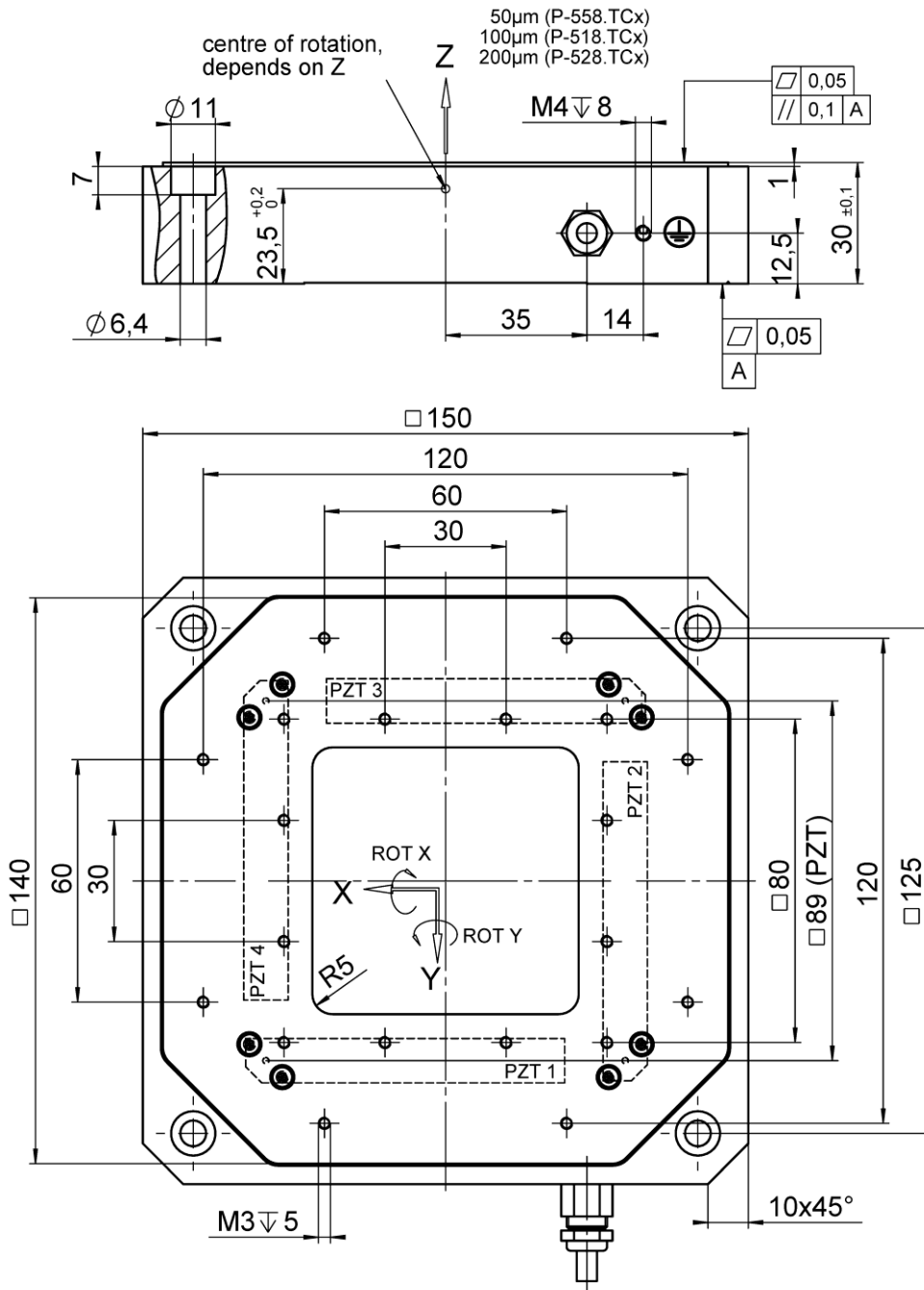
All specifications based on room temperature (22 °C ±3 °C).

Ask about customized versions.

Drawings / Images



P-518 • P-528 • P-558 Z stage, dimensions in mm



P-518 • P-528 • P-558 Z and tip/tilt stage, dimensions in mm

Ordering Information

P-558.ZCD

Precision nanopositioning Z stage, 50 μm , direct position measuring, capacitive sensors, Sub-D connector

P-558.ZCL

Precision nanopositioning Z stage, 50 μm , direct position measuring, capacitive sensors, LEMO connector(s)

P-518.ZCD

Precision nanopositioning Z stage, 100 μm , direct position measuring, capacitive sensors, Sub-D connector

P-518.ZCL

Precision nanopositioning Z stage, 100 μm , direct position measuring, capacitive sensors, LEMO connector(s)

P-528.ZCD

Precision nanopositioning Z stage, 200 μm , direct position measuring, capacitive sensors, Sub-D connector

P-528.ZCL

Precision nanopositioning Z stage, 200 μm , direct position measuring, capacitive sensors, LEMO connector(s)

P-558.TCD

Precision nanopositioning Z and tip/tilt stage, 50 μm , 0.6 mrad, parallel metrology, capacitive sensors, Sub-D connector

P-518.TCD

Precision nanopositioning Z and tip/tilt stage, 100 μm , 1.4 mrad, parallel metrology, capacitive sensors, Sub-D connector

P-528.TCD

Precision nanopositioning Z and tip/tilt stage, 200 μm , 2.4 mrad, parallel metrology, capacitive sensors, Sub-D connector