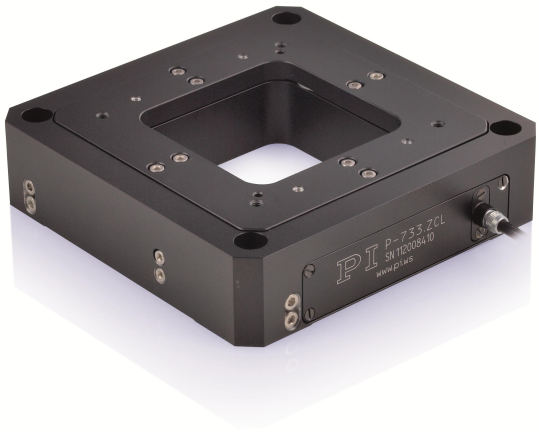
High Dynamics Z Nanopositioning Stage

Direct Position Measuring and Clear Aperture



P-733.Z

- Travel range 100 µm
- Direct position measuring with capacitive sensors
- Resolution to 0.3 nm, closed loop
- Clear aperture 50 mm × 50 mm
- Other versions available with additional degrees of freedom
- XY and XYZ versions available
- Vacuum-compatible versions on request

Application fields

- Scanning microscopy
- Confocal microscopy
- Mask/wafer positioning
- Surface measuring technology
- Nanoimprinting
- Micromanipulation
- Image processing / stabilization
- Nanopositioning with high flatness and straightness of motion

Outstanding lifetime thanks to PICMA® piezo actuators

The 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 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 D-sub connector of the mechanics. The autocalibration function of the digital controllers uses this data each time the controller is switched on.

Maximum accuracy due to direct position measuring

Motion is measured directly at the motion platform without any influence from the drive or guide elements. This allows optimum repeatability, outstanding stability, and stiff, fast-responding control.

Motion	Unit	Toleran-ce	P-733.ZCD	P-733.ZCL
Active axes			Z	Z
Travel range in Z	µm		100	100
Travel range in Z, open loop, at -20 to 120 V	µm	+20 / -0 %	115	115
Linearity error	%	Typ.	0.03	0.03
Yaw (Rotational crosstalk in θX with motion in Z)	µrad	Typ.	<5	<5
Pitch (Rotational crosstalk in θY with motion in Z)	µrad	Typ.	<5	<5
Roll (Rotational crosstalk in θZ with motion in Z)	µrad	Typ.	<10	<10

Positioning	Unit	Toleran-ce	P-733.ZCD	P-733.ZCL
Unidirectional repeatabili-ty in Z	nm	Typ.	±2	±2
Resolution, open loop	nm	Typ.	0.2	0.2
Integrated sensor			Capacitive, direct position measuring	Capacitive, direct position measuring
System resolution	nm	Typ.	0.3	0.3

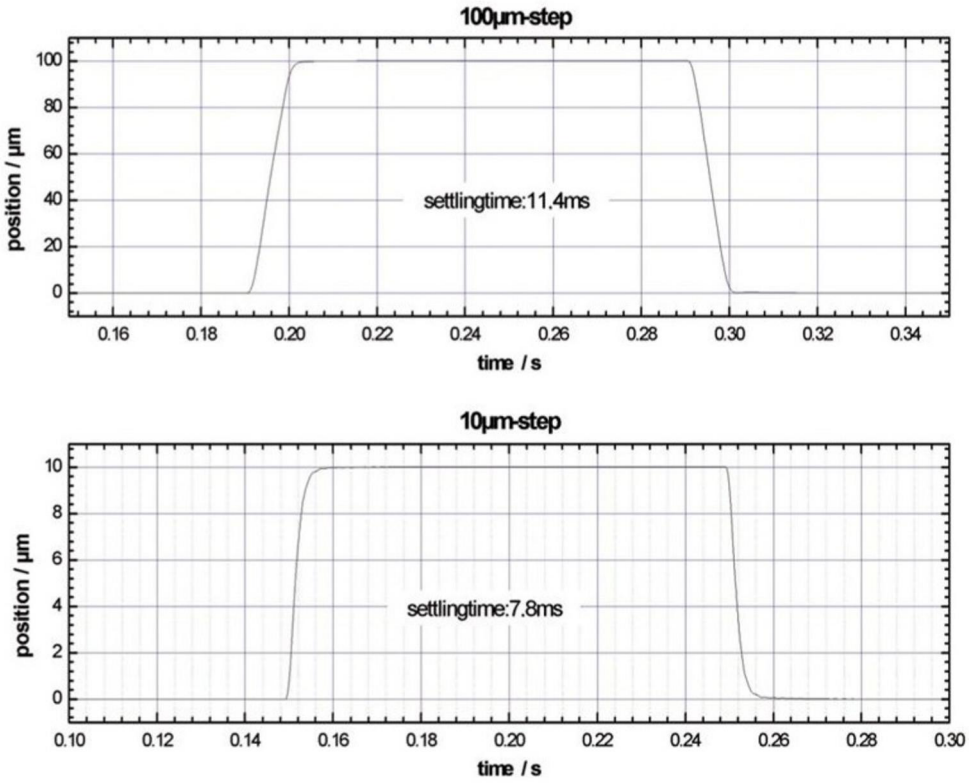
Drive Properties	Unit	Toleran-ce	P-733.ZCD	P-733.ZCL
Drive type			Piezo actuator/PICMA®	Piezo actuator/PICMA®
Electrical capacitance	µF	±20%	6	6

Mechanical Properties	Unit	Toleran-ce	P-733.ZCD	P-733.ZCL
Stiffness	N/µm	±20%	2.5	2.5
Resonant frequency in Z, unloaded	Hz	±20%	700	700
Resonant frequency in Z, under load with 120 g	Hz	±20%	530	530
Resonant frequency in Z, under load with 200 g	Hz	±20%	415	415
Permissible push force in Z	N	Max.	50	50
Permissible pull force in Z	N	Max.	20	20
Guide			Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification
Overall mass	g	±5%	580	580
Material			Aluminum	Aluminum

Miscellaneous	Unit	Toleran-ce	P-733.ZCD	P-733.ZCL
Operating temperature range	°C		-20 to 80	-20 to 80
Connector			D-sub 7W2 (m)	LEMO FFS.00.250.CTCE24
Sensor connector				LEMO FFA.00.250.CTLC 17
Cable length	m	±10 mm	1.5	1.5
Recommended controllers / drivers			E-503, E-505, E-610, E-621, E-625, E-754	E-503, E-505, E-610, E-621, E-625, E-754

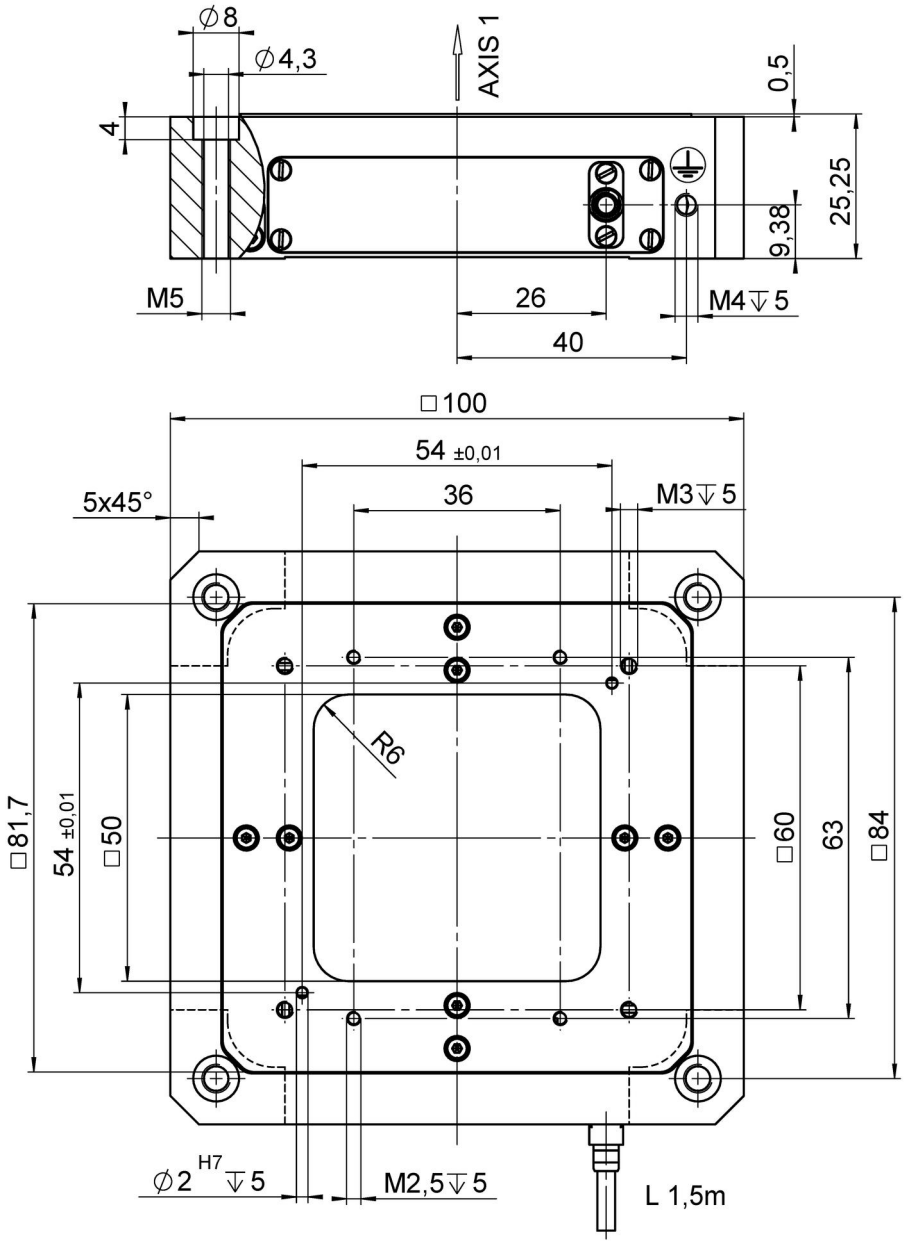
The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

Drawings / Images



Step response of the P-733.ZCD. Settling time is 10 ms.

Drawings / Images



P-733.Z, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order Information

P-733.ZCD
High dynamics Z nanopositioning stage; 100 µm travel range; capacitive, direct position measuring; D-sub 7W2 (m); 1.5 m cable length

P-733.ZCL
High dynamics Z nanopositioning stage; 100 µm travel range; capacitive, direct position measuring; LEMO connectors; 1.5 m cable length