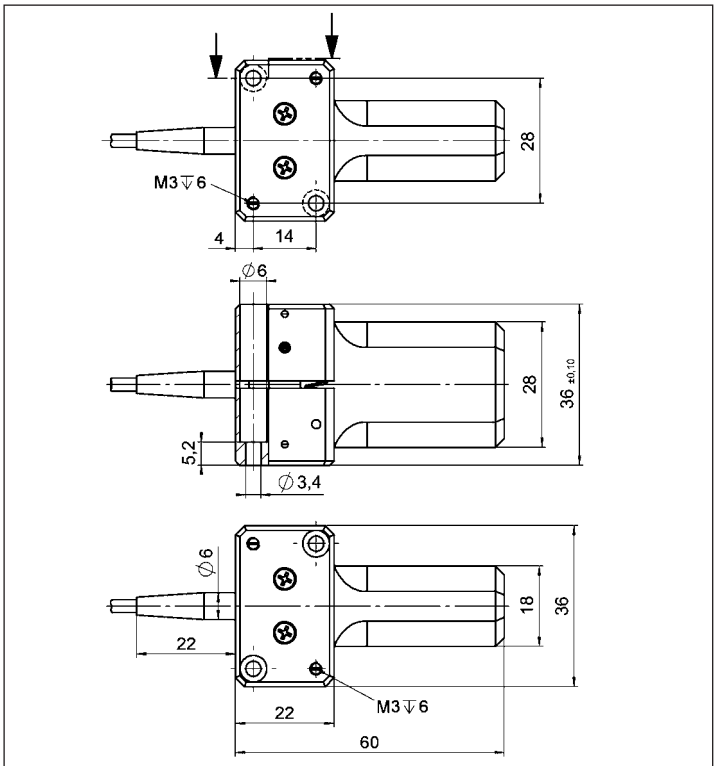
P-290

Long-Travel Piezoelectric Z-Nanopositioning Flexure Stage / Actuator

P-290 nanopositioning stage



P-290 dimensions (in mm)

- **Vertical Travel to 1000 µm**
- **Integrated Double-Flexure Motion Amplifier**
- **Non-Magnetic Stainless Steel Design**

The P-290 is a unique, piezoelectrically driven elevator stage providing a 1000 µm stroke. It is designed for high-resolution static and low-frequency dynamic positioning applications.

Working Principle

The P-290 is a vertical positioning platform based on a piezoelectric drive system. The drive system consists of two stacked piezo flexure tilt positioners (similar to P-287) machined from one solid piece of stainless steel. Each of the two tilt positioners is equipped with a high-voltage piezoelectric stack actuator (0 to -1000 V) integrated into a zero stiction, zero-friction, wire-EDM-cut flexure motion amplifier system. The positioning platform is guided by linear ball bearings to eliminate tilt.

Application Examples

- Wafer inspection
- Nanopositioning
- Medical analysis
- Biotechnology
- Optics

Ordering Information

P-290.00
Z Piezo Flexure Stage, 1000 µm

Options:

P-703.20
High-Vacuum Modification, see the "Piezo Actuators" section, p. 1-44

Ask about custom designs!

Notes

See the "Piezo Drivers & Nanopositioning Controllers" section, p. 6-8 *ff.* for our comprehensive line of low-noise control electronics.
See the "Selection Guide" on p. 2-14 *ff.* for comparison with other nanopositioning systems.

Technical Data

Models	P-290.00	Units	Notes see p. 2-84
Active axes	Z		
Open-loop travel @ 0 to -1000 V	1000	µm ±20%	A4
* Open-loop resolution	20	nm	C0
Stiffness	0.07	N/µm ±20%	D1
Push / pull force capacity (in operating direction)	(50 / 10)	N	D3
Max. (±) normal load	50	N	D4
Electrical capacitance	500	nF ±20%	F1
** Dynamic operating current coefficient (DOCC)	0.63	µA/(Hz x µm)	F2
Unloaded resonant frequency	100	Hz ±20%	G2
Operating temperature range	-20 to 80	°C	H2
Weight (with cables)	280	g ±5%	
Body material	N-S, S		L
Recommended amplifier/controller (codes explained p. 2-17)	B, I		

* For further information see p. 2-8. Resolution of PI piezo nanopositioners is not limited by friction or stiction. The value given is noise equivalent motion with E-507 amplifier.
** Dynamic Operating Current Coefficient in µA per Hz and µm.
Example: Sinusoidal scan of 300 µm at 5 Hz requires approximately 1 mA drive current.

P-287

Z/Tilt Piezoelectric Flexure Stage

P-287.70 piezo nanopositioning / scanning stage

- **Frictionless Precision Flexure Guiding System**
- **Vertical Travel to 700 µm**
- **Tilt to 0.7 degrees**
- **Non-Magnetic Stainless Steel Design**

The P-287 is a high-resolution, piezoelectrically driven flexure stage providing tilt up to 12 mrad and vertical travel up to 700 µm at the tip. A ball seat is machined into the tip to decouple any rotation if the P-287 is used as a linear drive. In that case an external guiding system is recommended (e.g. frictionless diaphragm spring).

Working Principle

P-287 positioners are equipped with high-voltage piezoelectric drives (0 to -1000 V) integrated into a zero stiction/friction, ultra-high-resolution, wire-EDM-cut flexure motion amplifier system. The linear motion of the piezo translator produces an arc motion of the tip.

Application Examples

- Wafer inspection
- Nanopositioning
- Medical analysis
- Biology
- Optics

Notes

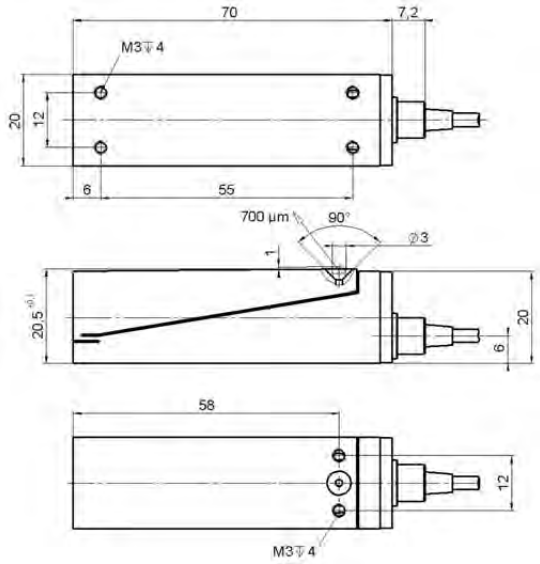
See the "Selection Guide" on p. 2-14 *ff.* for comparison with other nanopositioning systems.

Ordering Information

P-287.70
Vertical / Tilt Piezo Flexure Stage, 12 mrad, 700 µm

Options:

P-703.20
High-Vacuum Modification



P-287.70 dimensions (in mm)

Technical Data

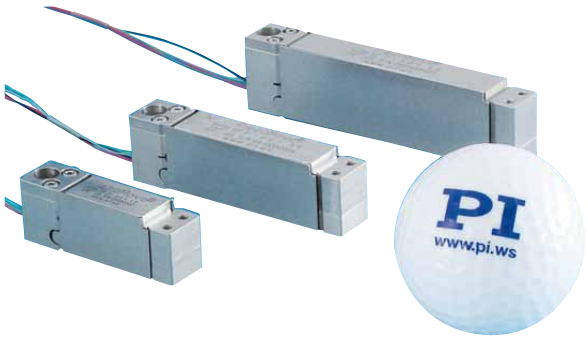
Models	P-287.70	Units	Notes see p. 2-84
Active axes	θ_x, (Z)		
Open-loop travel @ 0 to -1000 V	12 (700)	mrad, (µm at tip) ±20%	A4
* Open-loop resolution	0.2 (7)	µrad (nm at tip)	C0
Stiffness (in operating direction)	0.13 (at tip)	N/µm ±20%	D1
Push / pull force capacity (in operating direction)	80 / 10	N	D3
Electrical capacitance	290	nF ±20%	F1
** Dynamic operating current coefficient (DOCC)	30 0.5	µA/(Hz x mrad) µA/(Hz x µm at tip)	F2
Unloaded resonant frequency	380	Hz ±20%	G2
Operating temperature range	- 40 to 80	°C	H2
Voltage connection	VH		J1
Weight (with cables)	195	g ±5%	
Body material	N-S		L
Recommended amplifier/controller (codes explained p. 2-17)	B, I		

* For further information see p. 2-8. Resolution of PI piezo nanopositioners is not limited by friction or stiction. The value given is noise equivalent motion with E-507 amplifier.

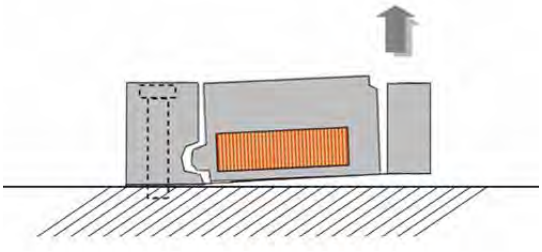
** Dynamic Operating Current Coefficient in µA per Hz and mrad (µm).
Example: Sinusoidal scan of 10 mrad at 10 Hz requires approximately 3 mA drive current.

P-601 PiezoMove™ Z-Actuator

Flexure-Guided OEM Piezo Actuator with Long Stroke to 400 µm

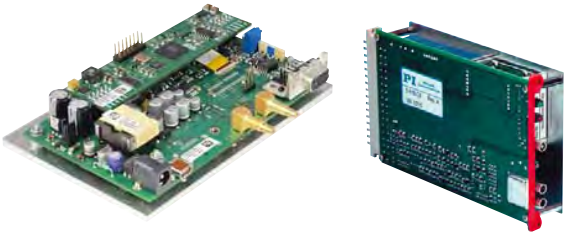


PiezoMove™ Lever-amplified piezo actuators of the P-601 series



The flexure guiding system prevents tip and tilt at the drive head

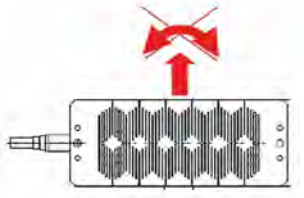
- **Flexure Guidance for Frictionless, Ultra-Straight Motion**
- **Travel Ranges to 400 µm**
- **Resolution to 0.2 nm**
- **High Dynamics and Stiffness**
- **Custom Designs with Longer Travel or Faster Response and Non-Magnetic Versions Feasible**
- **Outstanding Lifetime Due to PICMA® Piezo Actuators**
- **Choice of Closed-Loop and Open-Loop Models**
- **Ideal OEM Actuator for Precision Motion Control in Optics, Medical, Biotech and Microfluidics Applications**



The E-610 analog controller OEM module left or the E-609 digital OEM controller are available for closed-loop versions with position sensor

P-602 PiezoMove Flexure Actuator with High Stiffness

Integrated Guiding System, High Force and Large Travel Ranges



P-602: Flexure guides provide straight motion with no tip and minimum tilt

- **Frictionless Flexure Guiding System for Straight Motion**
- **Integrated Motion Amplifier for Travel Ranges to 1 mm**
- **High Dynamics and Stiffness, Forces to 400 N, Backlash-Free Construction**
- **Outstanding Lifetime Due to PICMA® Piezo Actuators**
- **Available with Integrated Position Sensor**
- **Custom Designs with Larger Travel or Faster Response and Non-Magnetic Versions Feasible**
- **Ideal for OEM-Applications in Adaptronics, Biotechnology or Microfluidics**