

PICA Shear Actuators

Compact Multi-Axis Actuators with Inner Hole



P-15x.xxH

- Single and multi-axis versions
- Travel ranges to $10\text{ }\mu\text{m} \times 10\text{ }\mu\text{m} \times 10\text{ }\mu\text{m}$
- Extreme reliability: $>10^9$ cycles
- Picometer resolution
- Short lead times

Piezo shear actuators with inner hole

Operating voltage -250 to 250 V. Lateral displacement is based on the piezoelectric shear effect. Excellent dynamics with minimum electric power requirement.

Variants without inner hole or for use in cryogenic and UHV environments to 10^{-9} hPa.

Possible modifications

- Piezo ceramic material
- Nonmagnetic versions
- Operating voltage range, displacement, layer thickness, cross-sectional dimension
- Load capacity, force generation
- Mechanical interfaces: flat, spherical, metal, ceramic, glass, sapphire, etc.
- Extra-tight length tolerances

Application fields

- Industry and research
- Low temperature / vacuum versions to 10^{-9} hPa
- Scanning applications
- Microscopy
- Precision mechanics
- Switching applications

Motion	Unit	Tolerance	P-151.03H	P-151.05H	P-151.10H	P-153.10H
Active axes			X	X	X	X, Y, Z
Travel range in X, open loop	μm		3	5	10	10
Travel range in Y, open loop	μm					10
Travel range in Z, open loop	μm					10

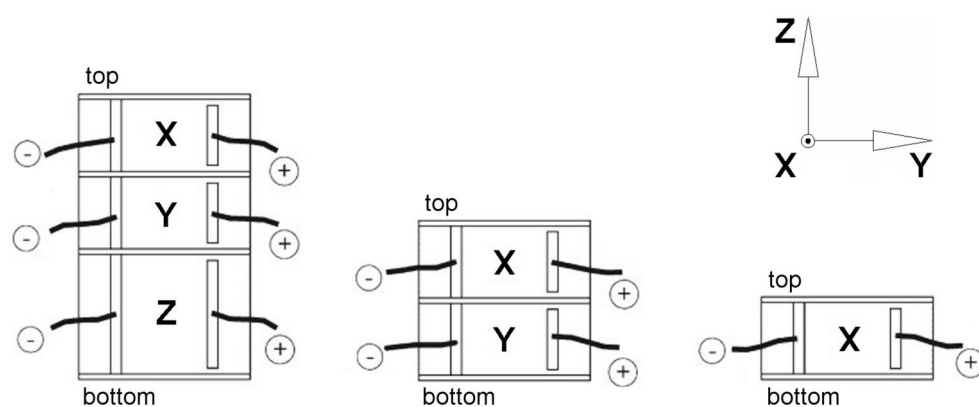
Drive Properties	Unit	Tolerance	P-151.03H	P-151.05H	P-151.10H	P-153.10H
Actuator type			Shear actuator	Shear actuator	Shear actuator	Multi-axis actuator
Drive type			Piezo actuator/PICA Shear	Piezo actuator/PICA Shear	Piezo actuator/PICA Shear	Piezo actuator/PICA Shear
Operating voltage	V		-250 to 250	-250 to 250	-250 to 250	-250 to 250
Electrical capacitance in X	nF	±20%	30	49	89	89
Electrical capacitance in Y	nF	±20%				89
Electrical capacitance in Z	nF	±20%				160

Mechanical Properties	Unit	Tolerance	P-151.03H	P-151.05H	P-151.10H	P-153.10H
Axial stiffness	N/μm		870	640	400	120
Axial resonant frequency, unloaded	kHz		210	155	100	30
Maximum shear load	N		200	200	200	20
Cross section			rectangular with inner hole	rectangular with inner hole	rectangular with inner hole	rectangular with inner hole
Material			Standard mechanical interfaces: Ceramic (passive PZT). Outer surface: Epoxy resin.	Standard mechanical interfaces: Ceramic (passive PZT). Outer surface: Epoxy resin.	Standard mechanical interfaces: Ceramic (passive PZT). Outer surface: Epoxy resin.	Standard mechanical interfaces: Ceramic (passive PZT). Outer surface: Epoxy resin.
Piezo material			PIC255	PIC255	PIC255	PIC255
Surface A × B	mm		16 × 16	16 × 16	16 × 16	16 × 16
Length L	mm	±0,3 mm	5.5	7.5	12	40
Inner diameter ID	mm		10	10	10	10

Miscellaneous	Unit		P-151.03H	P-151.05H	P-151.10H	P-153.10H
Operating temperature range	°C		-20 to 85	-20 to 85	-20 to 85	-20 to 85
Connector			Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm
Cable length	m		0.1	0.1	0.1	0.1
Recommended controllers / drivers			E-413.2 - E-413.6, E-413, E-508	E-413.2 - E-413.6, E-413, E-508	E-413.2 - E-413.6, E-413, E-508	E-413.2 - E-413.6, E-413, E-508

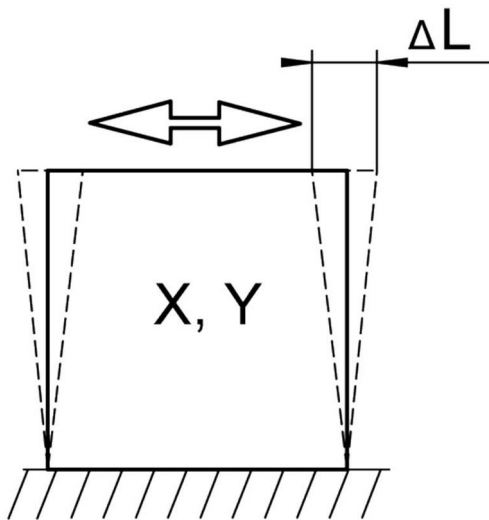
Travel range, open loop: At -250 to 250 V. Tolerance ±30 % (P-151.03H) or -10 % / 20 % (other models).
 Electrical capacitance: Measured at 1 V_{pp}, 1 kHz, RT.
 Axial resonant frequency, unloaded: Measured at 1 V_{pp}, unclamped. The value is halved for unilateral clamping.
 Customized versions and other specifications on request.

Drawings / Images

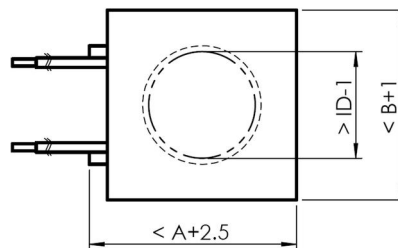
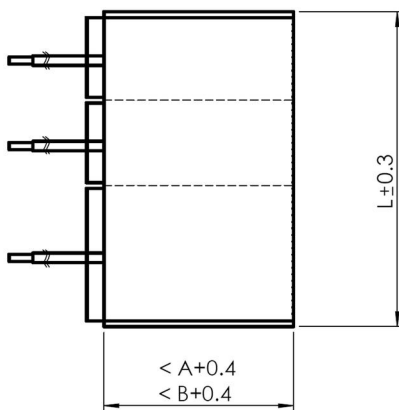


Axis and cable assignment for PICA shear actuators. GND: 0 V. +: ±250 V.

Drawings / Images



Principle of shear motion. ΔL refers to the travel range.



PICA Shear P-1xx.xxH actuator with inner hole. Surface $A \times B$, inner diameter ID, and length L, see data table. Dimensions in mm. The number of axes and wires depends on the type.

Order Information

P-151.03H

PICA Shear X piezo actuator; PICA Shear piezo actuator drive; 3 μm travel range (open loop); 16 mm $\times$ 16 mm surface; 5.5 mm length; 10 mm inner diameter; connecting wires; 0.1 m cable length

P-151.05H

PICA Shear X piezo actuator; PICA Shear piezo actuator drive; 5 μm travel range (open loop); 16 mm $\times$ 16 mm surface; 7.5 mm length; 10 mm inner diameter; connecting wires; 0.1 m cable length

Order Information

P-151.10H

PICA Shear X piezo actuator; PICA Shear piezo actuator drive; 10 μm travel range (open loop); 16 mm $\times$ 16 mm surface; 12 mm length; 10 mm inner diameter; connecting wires; 0.1 m cable length

P-153.10H

PICA Shear XYZ piezo actuator; PICA Shear piezo actuator drive; 10 μm $\times$ 10 μm $\times$ 10 μm travel range (open loop) (X $\times$ Y $\times$ Z); 16 mm $\times$ 16 mm surface; 40 mm length; 10 mm inner diameter; connecting wires; 0.1 m cable length