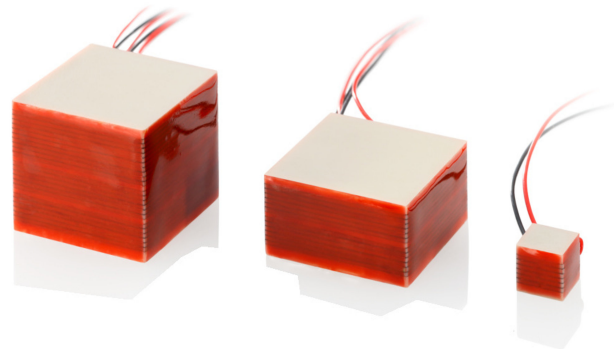


Multi-Axis Shear Actuators

Compact Multi-Axis Actuators

PICA Shear

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



Piezo shear actuators

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

Variants with inner hole or for use in cryogenic and UHV environments to 10^{-9} hPa.

Possible modifications

- Piezoceramic material
- Nonmagnetic versions
- Operating voltage range, displacement, layer thickness, cross-sectional dimension
- Load capacity, force generation
- Endpieces: flat, spherical, metal, ceramic, glass, sapphire, etc.
- Reduced length tolerances

Application fields

- Industry and research
- Scanning applications
- Microscopy
- Precision mechanics
- Switching applications

Specifications

	Travel range	Surface A × B	Length L	Max. shear load	Axial stiffness	Electrical capacitance	Axial resonant frequency
	μm	mm	mm	N	$\text{N}/\mu\text{m}$	nF	kHz
Active axis X							
P-111.01	1*	3 × 3	3.5	20	70	0.5	330
P-111.03	3*	3 × 3	5.5	20	45	1.5	210
P-111.05	5	3 × 3	7.5	20	30	2.5	155
P-121.01	1*	5 × 5	3.5	50	190	1.4	330
P-121.03	3*	5 × 5	5.5	50	120	4.2	210
P-121.05	5	5 × 5	7.5	40	90	7	155
P-141.03	3*	10 × 10	5.5	200	490	17	210
P-141.05	5	10 × 10	7.5	200	360	28	155
P-141.10	10	10 × 10	12	200	230	50	100
P-151.03	3*	16 × 16	5.5	300	1300	43	210
P-151.05	5	16 × 16	7.5	300	920	71	155
P-151.10	10	16 × 16	12	300	580	130	100
Active axes XY							
P-112.01	1 × 1*	3 × 3	5	20	50	0.5 / 0.5	230
P-112.03	3 × 3*	3 × 3	9.5	10	25	1.5 / 1.5	120
P-122.01	1 × 1*	5 × 5	5	50	140	1.4 / 1.4	230
P-122.03	3 × 3*	5 × 5	9.5	40	70	4.2 / 4.2	120
P-122.05	5 × 5	5 × 5	14	30	50	7 / 7	85
P-142.03	3 × 3*	10 × 10	9.5	200	280	17 / 17	120
P-142.05	5 × 5	10 × 10	14	100	190	28 / 28	85
P-142.10	10 × 10	10 × 10	23	50	120	50 / 50	50
P-152.03	3 × 3*	16 × 16	9.5	300	730	43 / 43	120
P-152.05	5 × 5	16 × 16	14	300	490	71 / 71	85
P-152.10	10 × 10	16 × 16	23	100	300	130 / 130	50
Active axes XYZ							
P-123.01	1 × 1 × 1*	5 × 5	7.5	40	90	1.4 / 1.4 / 2.9	155
P-123.03	3 × 3 × 3*	5 × 5	15.5	10	45	4.2 / 4.2 / 7.3	75
P-143.01	1 × 1 × 1*	10 × 10	7.5	200	360	5.6 / 5.6 / 11	155
P-143.03	3 × 3 × 3*	10 × 10	15.5	100	170	17 / 17 / 29	75
P-143.05	5 × 5 × 5	10 × 10	23	50	120	28 / 28 / 47	50

	Travel range	Surface A × B	Length L	Max. shear load	Axial stiffness	Electrical capacitance	Axial resonant frequency
P-153.03	3 × 3 × 3*	16 × 16	15.5	300	450	43 / 43 / 73	75
P-153.05	5 × 5 × 5	16 × 16	23	100	300	71 / 71 / 120	50
P-153.10	10 × 10 × 10	16 × 16	40	60	170	130 / 130 / 230	30

Travel range: at -250 to 250 V, tolerance -10/+20 %; *±30 %

Length L: tolerance ±0.3 mm

Electrical capacitance: measured at 1 V_{pp}, 1 kHz, RT, tolerance ±20 %.

Axial resonant frequency: measured at 1 V_{pp}, unloaded, unclamped. The value is halved for unilateral clamping.

Piezoceramics: PIC255

Standard connections: PTFE-insulated connecting wires, 100 mm, AWG 32, Ø 0.49 mm

Operating voltage range: -250 to 250 V

Operating temperature range: -20 to 85 °C

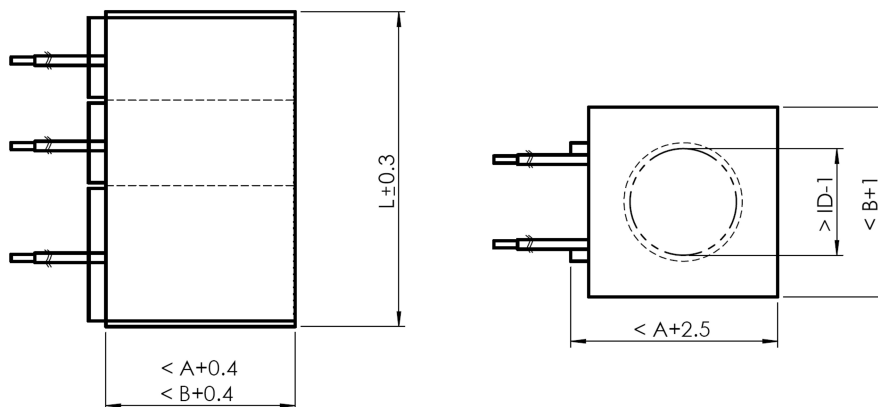
Standard endpieces: ceramic (passive PZT)

Lateral surface: epoxy resin

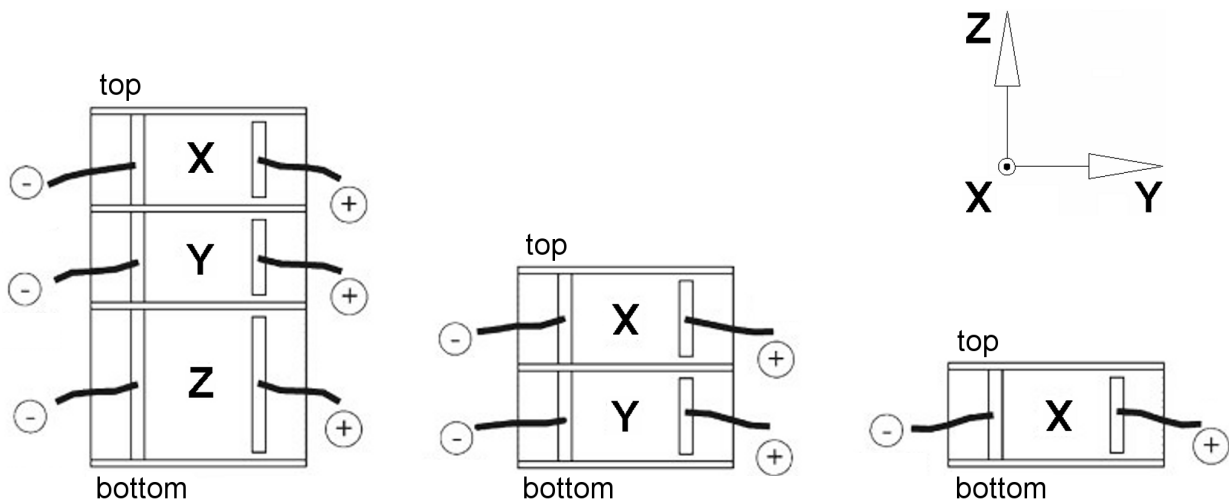
Recommended electronics: E-413, E-508 Other specifications are available on request.

Custom versions are available on request.

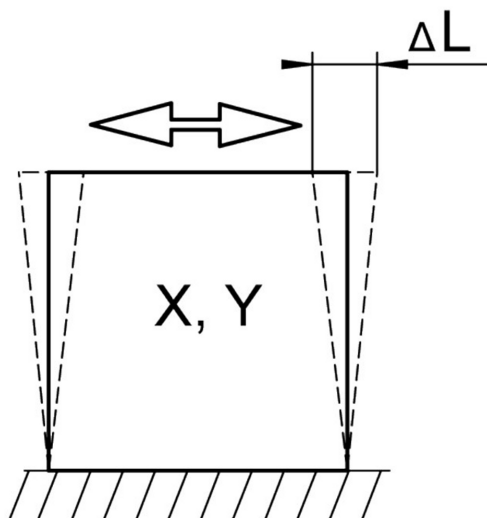
Drawings and images



P-1xx.xx and P-1xx.xxH (with inner hole) PICA Shear actuators. A, B, L, see data table. Dimensions in mm. Note that a comma is used in the drawings instead of a decimal point. The number of axes and wires depends on the type.



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



Shearing motion principle. ΔL describes the travel range.

Ordering information

Active axes X

P-111.01

PICA Shear X piezo actuator, 1 μm travel range, 3 mm \times 3 mm cross section

P-111.03

PICA Shear X piezo actuator, 3 μm travel range, 3 mm \times 3 mm cross section

P-111.05

PICA Shear X piezo actuator, 5 μm travel range, 3 mm \times 3 mm cross section

P-121.01

PICA Shear X piezo actuator, 1 μm travel range, 5 mm \times 5 mm cross section

P-121.03

PICA Shear X piezo actuator, 3 μm travel range, 5 mm \times 5 mm cross section

P-121.05

PICA Shear X piezo actuator, 5 μm travel range, 5 mm \times 5 mm cross section

P-141.03

PICA Shear X piezo actuator, 3 μm travel range, 10 mm \times 10 mm cross section

P-141.05

PICA Shear X piezo actuator, 5 μm travel range, 10 mm \times 10 mm cross section

P-141.10

PICA Shear X piezo actuator, 10 μm travel range, 10 mm \times 10 mm cross section

P-151.03

PICA Shear X piezo actuator, 3 μm travel range, 16 mm \times 16 mm cross section

P-151.05

PICA Shear X piezo actuator, 5 μm travel range, 16 mm \times 16 mm cross section

P-151.10

PICA Shear X piezo actuator, 10 μm travel range, 16 mm \times 16 mm cross section

Active axes XY

P-112.01

PICA Shear XY piezo actuator, 1 μm \times 1 μm travel range, 3 mm \times 3 mm cross section

P-112.03

PICA Shear XY piezo actuator, 3 μm \times 3 μm travel range, 3 mm \times 3 mm cross section

P-122.01

PICA Shear XY piezo actuator, 1 μm \times 1 μm travel range, 5 mm \times 5 mm cross section

P-122.03

PICA Shear XY piezo actuator, 3 μm \times 3 μm travel range, 5 mm \times 5 mm cross section

P-122.05

PICA Shear XY piezo actuator, 5 μm \times 5 μm travel range, 5 mm \times 5 mm cross section

P-142.03

PICA Shear XY piezo actuator, 3 μm \times 3 μm travel range, 10 mm \times 10 mm cross section

P-142.05

PICA Shear XY piezo actuator, 5 μm \times 5 μm travel range, 10 mm \times 10 mm cross section

P-142.10

PICA Shear XY piezo actuator, 10 μm \times 10 μm travel range, 10 mm \times 10 mm cross section

P-152.03

PICA Shear XY piezo actuator, 3 μm \times 3 μm travel range, 16 mm \times 16 mm cross section

P-152.05

PICA Shear XY piezo actuator, 5 μm \times 5 μm travel range, 16 mm \times 16 mm cross section

P-152.10

PICA Shear XY piezo actuator, 10 μm \times 10 μm travel range, 16 mm \times 16 mm cross section

Active axes XYZ

P-123.01

PICA Shear XYZ piezo actuator, 1 μm \times 1 μm \times 1 μm travel range, 5 mm \times 5 mm cross section

P-123.03

PICA Shear XYZ piezo actuator, $3\ \mu\text{m} \times 3\ \mu\text{m} \times 3\ \mu\text{m}$ travel range, $5\ \text{mm} \times 5\ \text{mm}$ cross section

P-143.01

PICA Shear XYZ piezo actuator, $1\ \mu\text{m} \times 1\ \mu\text{m} \times 1\ \mu\text{m}$ travel range, $10\ \text{mm} \times 10\ \text{mm}$ cross section

P-143.03

PICA Shear XYZ piezo actuator, $3\ \mu\text{m} \times 3\ \mu\text{m} \times 3\ \mu\text{m}$ travel range, $10\ \text{mm} \times 10\ \text{mm}$ cross section

P-143.05

PICA Shear XYZ piezo actuator, $5\ \mu\text{m} \times 5\ \mu\text{m} \times 5\ \mu\text{m}$ travel range, $10\ \text{mm} \times 10\ \text{mm}$ cross section

P-153.03

PICA Shear XYZ piezo actuator, $3\ \mu\text{m} \times 3\ \mu\text{m} \times 3\ \mu\text{m}$ travel range, $16\ \text{mm} \times 16\ \text{mm}$ cross section

P-153.05

PICA Shear XYZ piezo actuator, $5\ \mu\text{m} \times 5\ \mu\text{m} \times 5\ \mu\text{m}$ travel range, $16\ \text{mm} \times 16\ \text{mm}$ cross section

P-153.10

PICA Shear XYZ piezo actuator, $10\ \mu\text{m} \times 10\ \mu\text{m} \times 10\ \mu\text{m}$ travel range, $16\ \text{mm} \times 16\ \text{mm}$ cross section