

P-871 PICMA® Piezo Bender Actuators

Low-Voltage Multilayer Piezo Bender Actuators with Position Sensor



P-871.140, P-871.128, P-871.122 and P-871.112 closed-loop bender actuators (from left to right)

- Closed-Loop Operation for Superior Accuracy
- Nanometer-Resolution
- Displacement to 1.6 mm
- Ceramic Encapsulation for Extended Lifetime
- Ideal for Scanning Applications
- Vacuum-Compatible Versions
- Low Operating Voltage
- Mounting Hardware Included
- Special OEM- and Bench-Top Amplifiers Available

P-871 transducers are unique closed-loop piezo benders based on the open-loop PL 122 to PL 140 PICMA® -series multilayer actuators p. 1-94. Equipped with high-resolution position feedback sensors they provide better linearity, accuracy and repeatability than other piezo benders on the market. P-871 bender actuators achieve longer positioning ranges than typical piezo stack actuators,

up to 1.6 mm, while still providing fast response times in the millisecond range.

Design

These multilayer piezoelectric components are manufactured from ceramic layers of only about 50 µm thickness. They feature internal silver-palladium electrodes and ceramic insulation applied in a cofiring process. Due to the thin layers the operating voltage is significantly lower than for classical parallel bimorph bender elements. For ease of installation, the units come complete with the mounting hardware, cables and connectors.

Closed-Loop Position Control for Higher Accuracy

P-871s are ideal devices for scanning, positioning and beam deflection applications and provide much better accu-

racy, stability and repeatability than conventional open-loop actuators. The special bender design allows the direct application of a strain gauge sensor to the surface without the need for a polymer insulation layer in between. The advantages are faster response, reduced phase lag and precise position control with non-linearity of <0.5%. The settling time for a small-signal step (up to 1% nominal travel) to an accuracy of better than 1% is between 10 ms (P-871.112) and 30 ms (P-871.140).

Ceramic Insulated Piezo Actuators Provide Long Lifetime

Highest possible reliability is assured by the use of award-winning PICMA® multilayer piezo actuators. PICMA® actuators are the only actuators on the market with ceramic-only insulation, which makes them resistant to ambient humidity and leakage-current failures. They are thus far superior to conventional actuators in reliability and lifetime.

Optimum UHV Compatibility - Minimum Outgassing

The lack of polymer insulation and the high Curie temperature make for optimal ultra-high-

Ordering Information

P-871.112
PICMA® Multilayer Piezo Bender Actuator, 160 µm, 9.6 mm Width, SGS-Sensor

P-871.122
PICMA® Multilayer Piezo Bender Actuator, 400 µm, 9.6 mm Width, SGS-Sensor

P-871.127
PICMA® Multilayer Piezo Bender Actuator, 720 µm, 9.6 mm Width, SGS-Sensor

P-871.128
PICMA® Multilayer Piezo Bender Actuator, 720 µm, 6.3 mm Width, SGS-Sensor

P-871.140
PICMA® Multilayer Piezo Bender Actuator, 1600 µm, 11 mm Width, SGS-Sensor

Ask about custom designs

vacuum compatibility (no outgassing / high bakeout temperatures, up to 150 °C).

Amplifiers, Drivers & Controllers

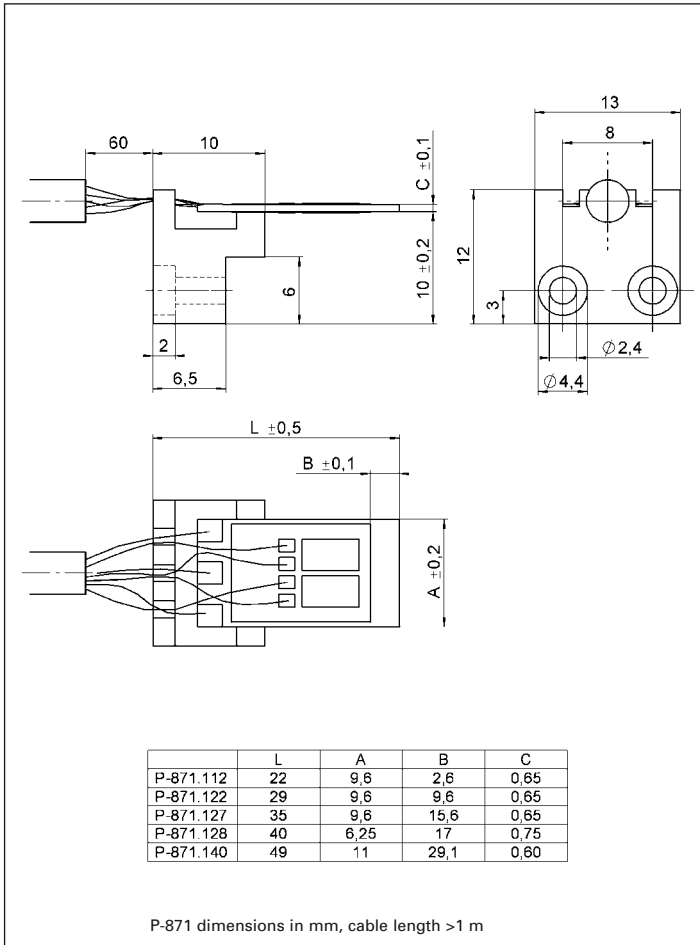
PI offers a wide range of standard amplifiers and controllers for piezo actuators. The E-651.1S and E-651.2S desktop controllers and the OEM board E-614.2BS (see p. 2-123) are specifically designed to operate P-871 bender actuators.

Application Examples

- Wire bonders
- Pneumatic valves
- Fiber optic positioning & switches
- (Laser)- Beam steering
- Micropositioning
- Acceleration sensors
- Nanotechnology



E-651 2-channel and 1-channel controllers with P-871 bender actuators



Linear Actuators & Motors

PiezoWalk® Motors / Actuators

PILine® Ultrasonic Motors

DC-Servo & Stepper Actuators

Piezo Actuators & Components

Guided / Preloaded Actuators

Unpackaged Stack Actuators

Patches/Benders/Tubes/Shear..

Nanopositioning / Piezoelectrics

Nanometrology

Micropositioning

Index

Technical Data

| Model | P-871.112* | P-871.122 | P-871.127 | P-871.128* | P-871.140 | Units |
|---------------------------------|------------|-----------|-----------|------------|-----------|---------|
| Closed-loop travel | ±80 | ±200 | ±360 | ±360 | ±800 | µm |
| Integrated feedback sensor | SGS | SGS | SGS | SGS | SGS | |
| Closed-loop linearity | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | % |
| Static large-signal stiffness | 0.02 | 0.01 | 0.003 | 0.002 | 0.0007 | N/µm |
| Blocking force | ±2.0 | ±1.1 | ±1.0 | ±0.5 | ±0.5 | N ±20% |
| Electrical capacitance | 2 x 1.1 | 2 x 2.4 | 2 x 3.4 | 2 x 1.2 | 2 x 4.0 | µF ±20% |
| Unloaded resonant frequency | 2540 | 1010 | 560 | 340 | 195 | Hz ±20% |
| Resonant frequency @ 6.5 g load | 480 | 220 | 145 | 100 | 60 | Hz ±20% |

Operating voltage: 0 to 60 V (±30 V)

Recommended driver / controller: E-651 bench top / E-614 PCI card (p. 2-123)

Connector: 1 LEMO connector for both sensor and voltage supply

Operating temperature range: -20 to +85 °C; ** to +150 °C

Resonant frequency at 1 Vpp, capacitance at 1 Vpp, 1 kHz

All specifications depend on the real clamping conditions and on the applied mechanical load.

Other specifications on request.