

PL112 - PL140

PICMA® Multilayer Piezo Bender Actuators (LVPZT)



- Ceramic Encapsulation
- Positioning Range up to 2 mm
- Fast Response (<10 msec)
- Nanometer-Range Resolution
- Low Operating Voltage
- Vacuum-Compatible Versions
- Available with Integrated Position Sensor
- Special OEM and Bench-Top Amplifiers/Drivers Available

PICMA®-series multilayer bender piezo actuators provide a deflection of up to 2 mm, forces up to 2 N (200 grams) and response times in the millisecond range. 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. The ben-

ders have two outer active areas and one central electrode network dividing the actuator in two segments of equal capacitance, similar to a classical parallel bimorph.

Advantages

PICMA® Bender piezo actuators offer several advantages over classic bimorph components manufactured by gluing together two ceramic plates (0.1 to 1 mm thick): faster response time and higher stiffness. The main advantage, however, is the drastically reduced (by a factor of 3 to 10) operating voltage of only 60 V. The reduced voltage allows smaller drive electronics and new applications, such as in medical equipment. Additionally, these devices offer im-

proved humidity resistance due to the ceramic encapsulation.

Long Lifetime and High Performance—Ideal for Dynamic Operation

PICMA® Bender actuators are superior to conventional actuators in high-endurance situations. They show substantially longer lifetimes both in static and dynamic operation, even in harsh environments. Diffusion of water molecules into the insulation layer is greatly reduced by the use of cofired, outer ceramic encapsulation.

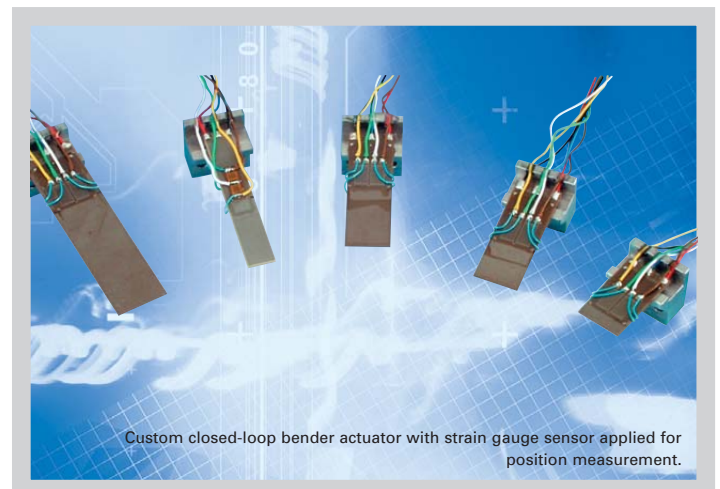
The high Curie temperature of 320 °C gives PICMA® actuators a usable temperature range extending up to 150 °C, well above the 80 °C limit of conventional multilayer actuators. At the low end, operation down to a few Kelvin is possible (with reduction in performance specifications).

Optimum UHV Compatibility—No Outgassing

The lack of polymer insulation and the high Curie temperature make for optimal ultra-high-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-650.00 and E-650.OE drivers were specifically designed to operate PICMA® Bender actuators. For closed-loop positioning applications, a variety of analog and digital controllers is available. Of course, PI also designs custom amplifiers and controllers.



Application Examples

- Wire bonding
- Pneumatic valves
- Fiber optic switches
- Beam deflection
- Micropositioning
- Acceleration sensors

Piezo Actuators

Nanopositioning & Scanning Systems

Active Optics / Steering Mirrors

Tutorial: Piezo-electrics in Positioning

Capacitive Position Sensors

Piezo Drivers & Nanopositioning Controllers

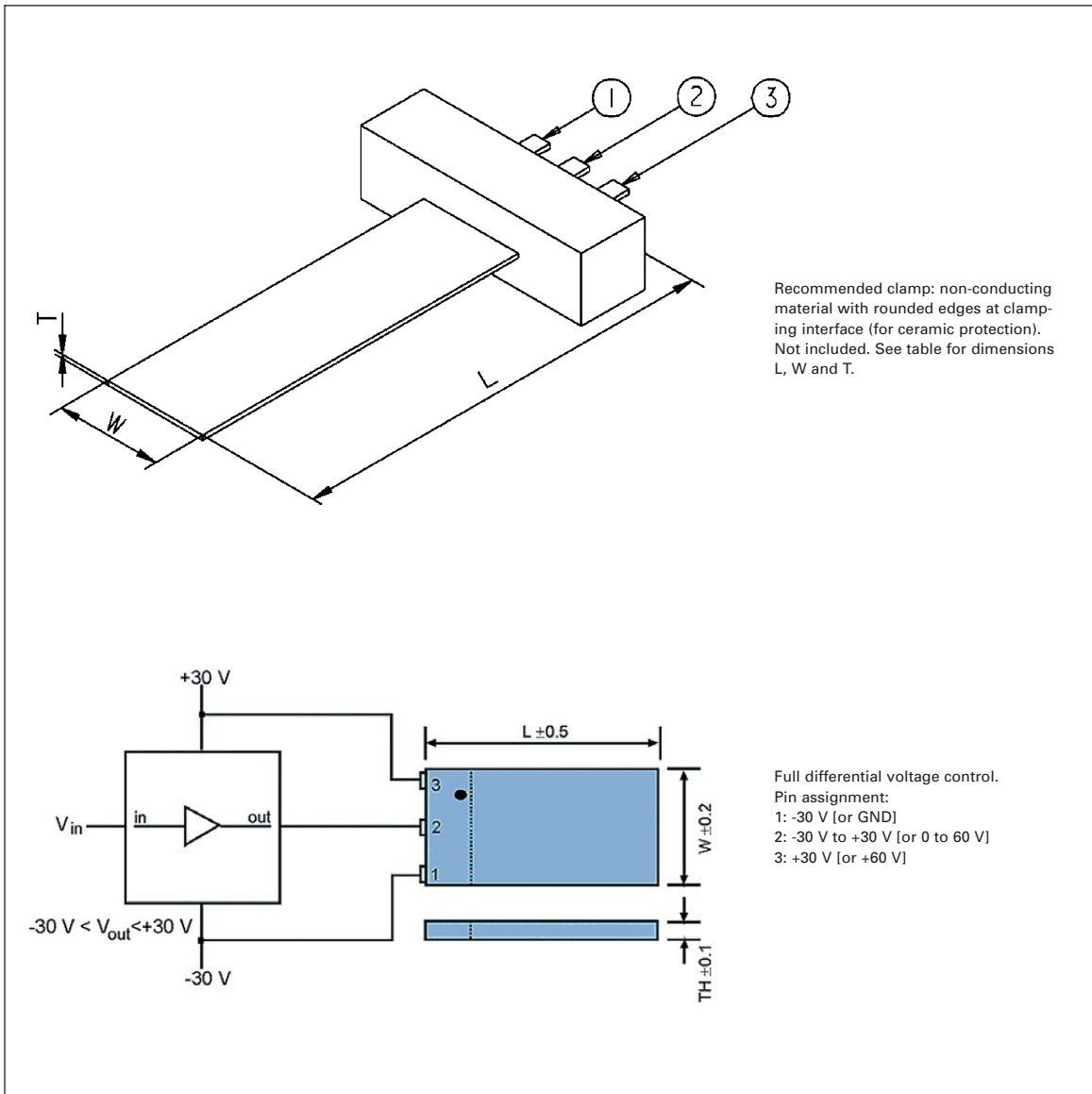
Hexapods / Micropositioning

Photonics Alignment Solutions

Motion Controllers

Ceramic Linear Motors & Stages

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Technical Data / Product Order Numbers

Order number*	Operating voltage [V]	Nominal *** displacement [μm] $\pm 20\%$	Free *** length [mm]	Dimensions L x W x T [mm]	Blocking force [N]	Electric capacitance [μF] $\pm 20\%$	Resonant frequency [Hz]
PL112.10**	0 - 60	160	12	17.8 x 9.6 x 0.65	2.0	2 x 1.1	1000
PL122.10	0 - 60	500	22	25.0 x 9.6 x 0.65	1.1	2 x 2.4	660
PL127.10	0 - 60	900	27	31.0 x 9.6 x 0.65	1.0	2 x 3.4	380
PL128.10**	0 - 60	900	28	35.5 x 6.3 x 0.75	0.5	2 x 1.2	360
PL140.10	0 - 60	2000	40	45.0 x 11.0 x 0.60	0.5	2 x 4.0	160

* For optional 100 mm wire leads change order number extension to .x1 (e.g. PL 112.11).

*** All parameters depend on actual clamping conditions and applied load.

Operating temperature: -20 °C to +85 °C (** max. 150 °C)
Low temperature option available

Closed-loop option on request (strain-gauge-sensor)

Other specifications on request. Specifications subject to change without notice.

Capacitance measured at 1 V_{pp}, 1 kHz. Unloaded ("free bending") resonant frequency measured at 1 V_{pp}.