

P-842 – P-845 Preloaded Piezo Actuators

For High Loads and Force Generation, Optional with Integrated Position Sensors



P-844 piezo actuators (battery for size comparison)

- Outstanding Lifetime Due to PICMA® Piezo Ceramic Stacks
- Travel Range to 90 μm
- Pushing Forces to 3000 N
- Pulling Forces to 700 N
- Sub-Millisecond Response, Sub-Nanometer Resolution
- Vacuum Version, Optional Water-Resistant Case

The P-842 / P-843 and P-844 / P-845 series piezo translators are high-resolution linear actuators for static and dynamic applications. They provide sub-millisecond response and sub-nanometer resolution.

Design

These translators are equipped with PICMA® multilayer piezo ceramic stacks protected by a non-magnetic stainless steel case with internal spring preload. The preload makes them ideal for dynamic applications (such as precision machining, active damping etc.) and for tensile loads as well.

High Accuracy in Closed-Loop Operation

P-842 and P-844 are designed for open-loop positioning or use with external feedback. Versions P-843 and P-845 are equipped with integrated high-resolution SGS-position sensors for high precision in closed-loop operation (for fur-

Application Examples

- Static and dynamic precision positioning
- Disc-drive-testing
- Optics
- Metrology / interferometry
- Smart structures / adaptronics
- Precision mechanics / machining
- Active vibration control
- Switches
- Laser tuning

ther notes see the nanopositioning tutorial, see p. 2-199).

Ceramic Insulated Piezo Actuators Provide Long Lifetime

Highest possible reliability is assured by the use of award-winning PICMA® multilayer piezo actuators. PICMA® actua-

Technical Data and Product Order Numbers

Model	Open-loop travel for 0 to 100 V [μm] $\pm 20\%$	Closed-loop travel [μm]*	Integrated feedback sensor**	Closed-loop / Open-loop resolution [nm]***	Static large-signal stiffness [$\text{N}/\mu\text{m}$] $\pm 20\%$	Push/pull force capacity [N]	Electrical capacitance [μF] $\pm 20\%$
P-842.10 (V)	15	–	–	- / 0.15	57	800 / 300	1.5
P-842.20 (V)	30	–	–	- / 0.3	27	800 / 300	3.0
P-842.30 (V)	45	–	–	- / 0.45	19	800 / 300	4.5
P-842.40 (V)	60	–	–	- / 0.6	15	800 / 300	6.0
P-842.60 (V)	90	–	–	- / 0.9	10	800 / 300	9.0
P-843.10 (V)	15	15	SGS	0.3 / 0.15	57	800 / 300	1.5
P-843.20 (V)	30	30	SGS	0.6 / 0.3	27	800 / 300	3.0
P-843.30 (V)	45	45	SGS	0.9 / 0.45	19	800 / 300	4.5
P-843.40 (V)	60	60	SGS	1.2 / 0.6	15	800 / 300	6.0
P-843.60 (V)	90	90	SGS	1.8 / 0.9	10	800 / 300	9.0
P-844.10 (V)	15	–	–	- / 0.15	225	3000 / 700	6.0
P-844.20 (V)	30	–	–	- / 0.3	107	3000 / 700	12.0
P-844.30 (V)	45	–	–	- / 0.45	75	3000 / 700	18.0
P-844.40 (V)	60	–	–	- / 0.6	57	3000 / 700	24.0
P-844.60 (V)	90	–	–	- / 0.9	38	3000 / 700	36.0
P-845.10 (V)	15	15	SGS	0.3 / 0.15	225	3000 / 700	6.0
P-845.20 (V)	30	30	SGS	0.6 / 0.3	107	3000 / 700	12.0
P-845.30 (V)	45	45	SGS	0.9 / 0.45	75	3000 / 700	18.0
P-845.40 (V)	60	60	SGS	1.2 / 0.6	57	3000 / 700	24.0
P-845.60 (V)	90	90	SGS	1.8 / 0.9	38	3000 / 700	36.0

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

Mounting

Mounting is at the foot, with push/pull forces of less than 100 N, the actuator can be held by clamping the case. Read details in Mounting and Handling Guidelines (p. 1-67).

Accessories

The flexible tips P-176.50 / P-176.60 can be applied for protection of the ceramics from shearing forces (only for versions without ball tip).

P-176.50
Flexible tip for P-842 / P-843 (see p. 1-103 ff)

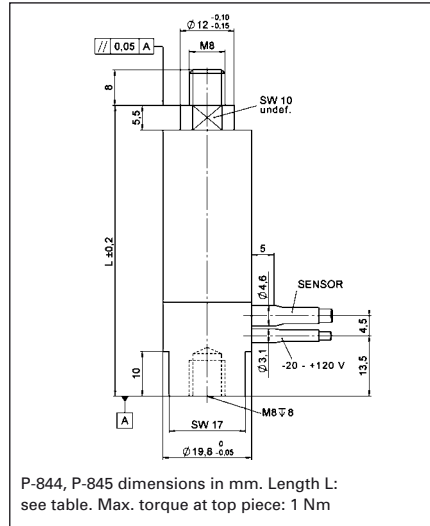
P-176.60
Flexible tip for P-844 / P-845 (see p. 1-103 ff)

For extensions, adapter cables and connectors, see “Accessories” in the Piezo Actuators & Components section (p. 2-168 ff).

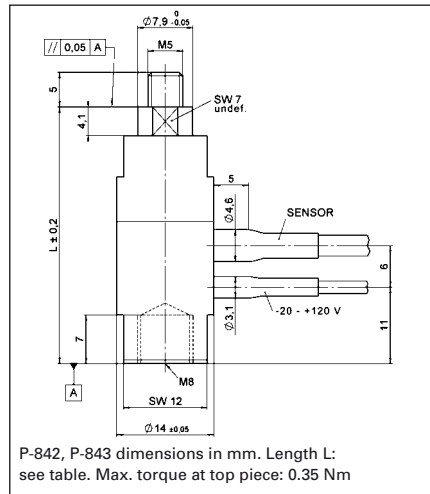
Piezo Drivers, Controllers & Amplifiers

High-resolution amplifiers and servo-control electronics, both digital and analog, are described in the “Piezo Drivers / Servo Controllers” section.

Dynamic operating current coefficient [µA / (Hz • µm)]	Resonant frequency (unloaded) [kHz] ±20%	Mass without cable [g] ±5%	Length L [mm]
12.5	18	31	37
12.5	14	42	55
12.5	10	53	73
12.5	8.5	64	91
12.5	6	86	127
12.5	18	31	37
12.5	14	42	55
12.5	10	53	73
12.5	8.5	64	91
12.5	6	86	127
50	16	84	47
50	12	108	65
50	9	132	83
500	7.5	156	0101
50	5.5	204	137
50	16	84	47
50	12	108	65
50	9	132	83
50	7.5	156	101
50	5.5	204	137



P-844, P-845 dimensions in mm. Length L: see table. Max. torque at top piece: 1 Nm



P-842, P-843 dimensions in mm. Length L: see table. Max. torque at top piece: 0.35 Nm

Voltage Connection:
LEMO FFA.00.250. Coaxial Cable, RG 178, 1 m.

Sensor Connector:
LEMO FFA.0S.304. Coaxial Cable, 1 m.

Temperature range: -40 to 80 °C; Case / end pieces: non-magnetic steel.

*Closed-loop models can attain linearity up to 0.15% and are shipped with performance reports.

**Resolution of piezo actuators is not limited by stiction or friction. Noise equivalent motion with E-503 amplifier (see p. 2-146).

***Dynamic small-signal stiffness is ~ 30% higher.

Recommended amplifiers / controllers

Single-channel: E-610 servo-controller / amplifier (p. 2-110), E-625 servo-controller, bench-top (p. 2-114), E-621 controller module (p. 2-160)

Single channel: modular piezo controller system E-500 (p. 2-142) with amplifier module E-505 (high-power) (p. 2-147) and E-509 controller (p. 2-152) (optional)

Multi-channel: modular piezo controller system E-500 (p. 2-142) with amplifier module E-503 (three channels) (p. 2-146) or E-505 (1 per axis, high-power, see p. 2-147) and E-509 controller (p. 2-152) (optional)

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