Preloaded Piezo Actuators
Compact Actuators for High Loads and Forces, with Position Sensor

P-841
- Outstanding lifetime due to PICMA® piezo actuators
- Travel range to 90 µm
- Compact housing
- Push force capacity to 1000 N
- Pull force capacity to 50 N
- µs response time
- Subnanometer resolution
- Versions with ball tip, vacuum versions

Fields of application
- Static and dynamic precision positioning
- Fiber positioning
- Laser tuning
- Nanotechnology

Outstanding lifetime thanks to PICMA® piezo actuators
The patented PICMA® piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA® actuators offer an up to ten times longer lifetime than conventional polymer-insulated actuators. 100 billion cycles without a single failure are proven.

Suitable for sophisticated vacuum applications
Piezo actuators do not require lubrication and do not cause abrasion. The all-ceramic isolated PICMA® actuators also do not require polymer isolation and are therefore ideal for vacuum applications.
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>P-841.1</th>
<th>P-841.2</th>
<th>P-841.3</th>
<th>P-841.4</th>
<th>P-841.6</th>
<th>Unit</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel range at 0 to 100 V</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>60</td>
<td>90</td>
<td>µm</td>
<td>±20 %</td>
</tr>
<tr>
<td>Sensor*</td>
<td>SGS</td>
<td>SGS</td>
<td>SGS</td>
<td>SGS</td>
<td>SGS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution, closed loop / open loop**</td>
<td>0.3 / 0.15</td>
<td>0.6 / 0.3</td>
<td>0.9 / 0.45</td>
<td>1.2 / 0.6</td>
<td>1.8 / 0.9</td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Static large-signal stiffness***</td>
<td>57</td>
<td>27</td>
<td>19</td>
<td>15</td>
<td>10</td>
<td>N/µm</td>
<td>±20 %</td>
</tr>
<tr>
<td>Push force capacity</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>N</td>
<td>max.</td>
</tr>
<tr>
<td>Pull force capacity</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>N</td>
<td>max.</td>
</tr>
<tr>
<td>Torque on tip</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>Nm</td>
<td>max.</td>
</tr>
<tr>
<td>Electrical capacitance</td>
<td>1.5</td>
<td>3.0</td>
<td>4.5</td>
<td>6.0</td>
<td>9.0</td>
<td>µF</td>
<td>±20 %</td>
</tr>
<tr>
<td>Resonant frequency f0 (no load)</td>
<td>18</td>
<td>14</td>
<td>10</td>
<td>8.5</td>
<td>6</td>
<td>kHz</td>
<td>±20 %</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20 to 80</td>
<td>-20 to 80</td>
<td>-20 to 80</td>
<td>-20 to 80</td>
<td>-20 to 80</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Mass without cable</td>
<td>20</td>
<td>28</td>
<td>46</td>
<td>54</td>
<td>62</td>
<td>g</td>
<td>±5 %</td>
</tr>
<tr>
<td>Length L</td>
<td>32</td>
<td>50</td>
<td>68</td>
<td>86</td>
<td>122</td>
<td>mm</td>
<td>±0.3 mm</td>
</tr>
</tbody>
</table>

* Versions with SGS allow closed-loop linearity up to 0.15 % and are shipped with calibration log.

** The resolution of the system is only limited by the noise of the amplifier and measuring technology because PI piezo actuators are free of friction.

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

Voltage connection: LEMO FFA.00.250. Coaxial cable RG 178, 1 m.
Sensor connection: LEMO FFA.05.304. Cable, 1 m.
Housing / tip material: Stainless steel.
Vacuum versions to $10^{-6}$ hPa are available under the order number P-841.xxV.
All specifications based on room temperature (22 °C ±3 °C).
Specifications for vacuum versions can differ.
P-840 / P-841, dimensions in mm. Sensor included only with P-841.
Response behavior of a P-841.10 to square wave control with an amplitude of 3 nm. Servo setting: 240 Hz bandwidth, 2 ms settling time.

Ordering Information

**Actuators with sensor**

**P-841.10**
Preloaded piezo actuator, 15 µm travel range, 1000 N / 50 N, strain gauge sensor

**P-841.20**
Preloaded piezo actuator, 30 µm travel range, 1000 N / 50 N, strain gauge sensor

**P-841.30**
Preloaded piezo actuator, 45 µm travel range, 1000 N / 50 N, strain gauge sensor

**P-841.40**
Preloaded piezo actuator, 60 µm travel range, 1000 N / 50 N, strain gauge sensor

**P-841.60**
Preloaded piezo actuator, 90 µm travel range, 1000 N / 50 N, strain gauge sensor

**Actuators with sensor, vacuum compatible**

**P-841.10V**
Preloaded piezo actuator, 15 µm travel range, 1000 N / 50 N, strain gauge sensor, vacuum compatible to 10⁻⁶ hPa

**P-841.20V**
Preloaded piezo actuator, 30 µm travel range, 1000 N / 50 N, strain gauge sensor, vacuum compatible to 10⁻⁶ hPa

**P-841.30V**
Preloaded piezo actuator, 45 µm travel range, 1000 N / 50 N, strain gauge sensor, vacuum compatible to 10⁻⁶ hPa

**P-841.40V**
Preloaded piezo actuator, 60 µm travel range, 1000 N / 50 N, strain gauge sensor, vacuum compatible to 10⁻⁶ hPa

**P-841.60V**
Preloaded piezo actuator, 90 µm travel range, 1000 N / 50 N, strain gauge sensor, vacuum compatible to 10⁻⁶ hPa
Actuators with sensor, with tip

P-841.1B
Preloaded piezo actuator, 15 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip

P-841.2B
Preloaded piezo actuator, 30 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip

P-841.3B
Preloaded piezo actuator, 45 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip

P-841.4B
Preloaded piezo actuator, 60 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip

P-841.6B
Preloaded piezo actuator, 90 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip

Actuators with sensor, with tip, vacuum compatible

P-841.1BV
Preloaded piezo actuator, 15 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip, vacuum compatible to 10⁻⁶ hPa

P-841.2BV
Preloaded piezo actuator, 30 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip, vacuum compatible to 10⁻⁶ hPa

P-841.3BV
Preloaded piezo actuator, 45 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip, vacuum compatible to 10⁻⁶ hPa

P-841.4BV
Preloaded piezo actuator, 60 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip, vacuum compatible to 10⁻⁶ hPa

P-841.6BV
Preloaded piezo actuator, 90 µm travel range, 1000 N / 50 N, strain gauge sensor, ball tip, vacuum compatible to 10⁻⁶ hPa