PICA Power Piezo Actuators

Preloaded High-Load Piezo Actuators (HVPZT) with Sensor Option

Fields of application
- Active vibration absorber
- Adaptive mechanics
- Precision mechanics / micromechanics
- Optics
- Measuring technology / interferometry
- Adaptive systems technology
- Switching
- Laser tuning
- Force generation / materials testing
- Nanotechnology

PICA Power piezo actuators for high loads
PICA Power high-load stack actuators are reliable and offer long travel ranges with large loads. The actuators are suitable for demanding loads with high temperatures.

Suitable for sophisticated vacuum applications
Piezo actuators do not require lubrication and do not cause abrasion. Versions are available for vacuum to $10^{-9}$ hPa and for particularly high or low operating temperatures.

P-225
- Extremely high stiffness
- Push force capacity to 12500 N
- Pull force capacity to 2000 N
- Travel range to 120 µm
- Options: Vacuum, high-temperature versions, waterproof housing
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>P-225.1S</th>
<th>P-225.2S</th>
<th>P-225.4S</th>
<th>P-225.8S</th>
<th>Unit</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage range</td>
<td>0 to 1000</td>
<td>0 to 1000</td>
<td>0 to 1000</td>
<td>0 to 1000</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td><strong>Motion and positioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel range, closed loop</td>
<td>15 µm</td>
<td>30 µm</td>
<td>60 µm</td>
<td>120 µm</td>
<td>µm</td>
<td></td>
</tr>
<tr>
<td>Resolution, closed loop</td>
<td>0.3 nm</td>
<td>0.6 nm</td>
<td>1.2 nm</td>
<td>2.4 nm</td>
<td>nm</td>
<td>typ.</td>
</tr>
<tr>
<td>Resolution, open loop</td>
<td>0.15 nm</td>
<td>0.3 nm</td>
<td>0.6 nm</td>
<td>1.2 nm</td>
<td>nm</td>
<td>typ.</td>
</tr>
<tr>
<td>Linearity error</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>%</td>
<td>typ.</td>
</tr>
<tr>
<td><strong>Mechanical properties</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static large-signal stiffness in motion direction*</td>
<td>480 N/µm</td>
<td>330 N/µm</td>
<td>200 N/µm</td>
<td>110 N/µm</td>
<td>N/µm</td>
<td>±20 %</td>
</tr>
<tr>
<td>Resonant frequency, no load</td>
<td>14 kHz</td>
<td>10 kHz</td>
<td>7 kHz</td>
<td>4 kHz</td>
<td>kHz</td>
<td>±20 %</td>
</tr>
<tr>
<td>Shear load</td>
<td>255 N</td>
<td>152 N</td>
<td>84 N</td>
<td>73 N</td>
<td>N</td>
<td>max.</td>
</tr>
<tr>
<td>Torque on tip</td>
<td>1.5 Nm</td>
<td>1.5 Nm</td>
<td>1.5 Nm</td>
<td>1.5 Nm</td>
<td>Nm</td>
<td>max.</td>
</tr>
<tr>
<td><strong>Drive properties</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piezo ceramic</td>
<td>PICA Power</td>
<td>PICA Power</td>
<td>PICA Power</td>
<td>PICA Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical capacitance</td>
<td>320 nF</td>
<td>630 nF</td>
<td>1300 nF</td>
<td>2600 nF</td>
<td>nF</td>
<td>±20 %</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 to 80°C</td>
<td>-40 to 80°C</td>
<td>-40 to 80°C</td>
<td>-40 to 80°C</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>410 g</td>
<td>470 g</td>
<td>610 g</td>
<td>900 g</td>
<td>g</td>
<td>±5 %</td>
</tr>
</tbody>
</table>

* Dynamic small-signal stiffness is approx. 50 % higher.
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.
The operating voltage should not exceed 750 V in continuous operation.
Versions without sensor are available under the P-225.x0 and P-225.x0V order numbers.
Vacuum versions are available under the P-225.xxV order numbers.
All specifications based on room temperature (22 °C ±3 °C).
Specifications for vacuum versions can differ.
Ask about customized versions.
Drawings / Images

\[
\begin{align*}
\text{L} & : 0.5 \\
\phi A & : -0.1 \\
\text{SW} & \\
\phi B & : -0.1 \\
\phi 30 & : -0.1 \\
\end{align*}
\]

Option Sensor
Piezo

<table>
<thead>
<tr>
<th></th>
<th>L [mm]</th>
<th>( \phi A ) [mm]</th>
<th>( \phi B ) [mm]</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-225.1x</td>
<td>55</td>
<td>39.8</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>P-225.2x</td>
<td>68</td>
<td>39.8</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>P-225.4x</td>
<td>94</td>
<td>39.8</td>
<td>16</td>
<td>13</td>
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<tr>
<td>P-225.8x</td>
<td>147</td>
<td>39.8</td>
<td>16</td>
<td>13</td>
</tr>
</tbody>
</table>

P-225, dimensions in mm
Ordering Information

Actuators without sensor

P-225.10
Preloaded high-load piezo actuator, 15 µm, 1000 V, 12500 N

P-225.20
Preloaded high-load piezo actuator, 30 µm, 1000 V, 12500 N

P-225.40
Preloaded high-load piezo actuator, 60 µm, 1000 V, 12500 N

P-225.80
Preloaded high-load piezo actuator, 120 µm, 1000 V, 12500 N

Actuators without sensor, vacuum compatible

P-225.10V
Preloaded high-load piezo actuator, 15 µm, 1000 V, 12500 N, high temperature / vacuum

P-225.20V
Preloaded high-load piezo actuator, 30 µm, 1000 V, 12500 N, high temperature / vacuum

P-225.40V
Preloaded high-load piezo actuator, 60 µm, 1000 V, 12500 N, high temperature / vacuum

P-225.80V
Preloaded high-load piezo actuator, 120 µm, 1000 V, 12500 N, high temperature / vacuum

Actuators with sensor

P-225.1S
Preloaded high-load piezo actuator, 15 µm, 1000 V, 12500 N, SGS

P-225.2S
Preloaded high-load piezo actuator, 30 µm, 1000 V, 12500 N, SGS

P-225.4S
Preloaded high-load piezo actuator, 60 µm, 1000 V, 12500 N, SGS

P-225.8S
Preloaded high-load piezo actuator, 120 µm, 1000 V, 12500 N, SGS

Actuators with sensor, vacuum compatible

P-225.1SV
Preloaded high-load piezo actuator, 15 µm, 1000 V, 12500 N, SGS, high temperature / vacuum

P-225.2SV
Preloaded high-load piezo actuator, 30 µm, 1000 V, 12500 N, SGS, high temperature / vacuum

P-225.4SV
Preloaded high-load piezo actuator, 60 µm, 1000 V, 12500 N, SGS, high temperature / vacuum

P-225.8SV
Preloaded high-load piezo actuator, 120 µm, 1000 V, 12500 N, SGS, high temperature / vacuum