Piezomechanik GmbH

Piezoactuated Optomechanics
Piezo Mirror-shifters
Piezodriven Translation Stages
Piezo Mirror-shifters

Piezo mirror-shifters are used for ultrafine axial positioning of mirrors and other optical components without the use of heavy stages or other external guiding mechanisms. Piezo mirror-shifters are internally preloaded resulting in high resonance frequencies, outperforming hereby conventional arrangements like stages etc. with regard to dynamics and stability. Piezo mirror-shifters are mainly used in coherent optics like interferometry or holography eg. phase shift arrangements for measuring surface topographies with a resolution in the submicron range.

Mounting of piezo mirror-shifters is done by
• using an adaptorring for fitting to mirror mounts
• using the rear side tapped holes
• clamping at the circumference.

For attaching mirrors to the shifter, mirror supports or optics adaptors are used.

The mirror support ST is a flat screw-on cap where the mirrors are glued on.

The optics adaptors SA are especially for easy mounting and changing of 1/2” and 1” mirrors.

The mirror-shifters are driven by standard amplifiers described in the corresponding data sheet. In applications where not the full travel of the shifter is used, it is reasonable to use power supplies with lower output voltage. Usually such electronics show higher output currents, which results in a wider frequency range of the shifters operation.

Piezo Mirror-shifter STr-25

<table>
<thead>
<tr>
<th>Technical data</th>
<th>max. operating voltage V</th>
<th>travel µm</th>
<th>capacitance nF</th>
<th>resonance frequency kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>STr-25/150/6</td>
<td>+ 150</td>
<td>6</td>
<td>2500</td>
<td>15</td>
</tr>
</tbody>
</table>

Max. weight of optics, when mounted horizontally: 20 g

Electrical connection: 1 m coaxial cable with BNC-connector or LEMOSA (see catalog “amplifiers”)

Option: inverse polarity

Accessories: mirror support ST25 (for glueing on the mirror)
optics adaptor SA 1/2” for inserting 1/2” optics
adaptoring for mounting the shifters to mirror mounts AR 25/50
other sizes of adaptor rings on request

The mirror shifter is delivered incl. 1 mirror support ST.
# Piezo Mirror-shifter STr-35

The mirror shifter is delivered incl. 1 mirror support ST.

<table>
<thead>
<tr>
<th>Technical data</th>
<th>max. operating voltage V</th>
<th>travel µm</th>
<th>el. capacitance nF</th>
<th>resonant frequency kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>STr-35/150/6</td>
<td>+ 150</td>
<td>6</td>
<td>2800</td>
<td>10</td>
</tr>
</tbody>
</table>

Max. weight of optics, when mounted horizontally: 40 g

Electrical connection: 1 m coax cable with BNC-connector or LEMOSA (see catalog “amplifiers”)

Accessories: mirror support ST35 optics adaptor SA 1” adaptor ring AR 35/50 (other dimensions on request)
Translation stage MRL 80.25 P

with magnifying mechanism for piezo travel
compatible with former Klinger/MicroControle optical system
with NEWPORT/MicroControle optical system
with Spindler & Hoyer stage TB 80-25

Coarse adjust by micrometer: travel 25 mm
Ulrafine adjust by piezoelements FPSt 150/5/... M12x0.5
Magnification factor for piezo travel: approx. 1.5
Piezo range: depends on type of actuator
e.g. more than 150 µm for
FPSt 150/5/... M12x0.5

Positioning sensitivity
of piezoelement: approx. 10 nm
xyz arrangements available by use of standard mounting brackets

Ordering information: stage MRL 80.25 P and type of piezo-actuator FPSt 150/5/... M12x0.5
(... piezo’s elongation)
(see page 6)
Translation stage PMT with central piezoelement

The translation stage PMT shows a standard coarse adjust by micrometer for 25 mm travel together with an ultrafine piezo-positioning capability. The special feature is the implementation of the axially acting piezo to the sliding part of the stage. By the centric mounting of micrometer and piezo, any torque on the sliding part and rotational deviation during dynamic piezoaction is avoided. The PMT stages are equipped with a low voltage actuator, showing a travel of approx. 40 µm at 150 V. The PMT stages can be combined to xy and xyz arrangements.

<table>
<thead>
<tr>
<th>Micrometer range:</th>
<th>25 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrafine adjust range by piezoelement:</td>
<td>approx. 40 µm</td>
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<tr>
<td>Positioning sensitivity by piezo actuator:</td>
<td>10 nm</td>
</tr>
<tr>
<td>Driving voltage of piezo element:</td>
<td>+150 V</td>
</tr>
<tr>
<td>Electrical capacitance of actuator:</td>
<td>1.2 µF</td>
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<tr>
<td>Electrical connection:</td>
<td>1 m coaxial cable / BNC-connector</td>
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<td>Ordering code:</td>
<td>PMT 150/40</td>
</tr>
</tbody>
</table>

All threads M 4
All counterbores Inbus M 4
All dimensions in mm
Frontmount piezo cartridges FPSt 150/5/... M12 x 0.5

Stack actuators with front mounting thread offer elegant solutions for implementing piezo drives into optomechanical arrangements featuring coarse and ultrafine adjust within one single element.

(See details in catalog “Piezoelectrical and electrostrictive stack and ring actuators”)

Example: Mirror mount with two degrees of freedom

Schematic drawing of a mirror mount based on piezo cartridges for coarse adjust by mounting screw and ultrafine adjustment by piezo action.

Piezo cartridges can withstand high forces or loads, when these are constant during piezo action. This applies to a lot of applications, where a spring induced reset force is applied as in optomechanical arrangements.

To achieve maximum stiffness of the FPSt-mounting a locknut is used.

Standard configuration:
Casing: stainless steel
Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Options:
Coaxial cable RG178 with LEMOSA connectors 00250 or 0S250
Positions detection
ThermoStable

<table>
<thead>
<tr>
<th>Typ</th>
<th>max. stroke µm</th>
<th>length L mm</th>
<th>el. capacitance nF</th>
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<tbody>
<tr>
<td>FPSt 150/5/20 M12 (BD)</td>
<td>27/20</td>
<td>25</td>
<td>800</td>
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<tr>
<td>FPSt 150/5/30 M12 (BD)</td>
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<td>1200</td>
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<tr>
<td>FPSt 150/5/40 M12 (BD)</td>
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<td>1600</td>
</tr>
<tr>
<td>FPSt 150/5/60 M12 (BD)</td>
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<td>2400</td>
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<tr>
<td>FPSt 150/5/80 M12 (BD)</td>
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<td>3200</td>
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<tr>
<td>FPSt 150/5/100 M12 (BD)</td>
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<td>4000</td>
</tr>
<tr>
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<td>4800</td>
</tr>
<tr>
<td>FPSt 150/5/140 M12 (BD)</td>
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<td>133</td>
<td>5600</td>
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