Microscopy Applications
The alignment of microscopes and sample holders demands precise, rapid movements. Based on the piezoelectric effect, products by piezosystem jena offer unique technical characteristics, compared to other solutions on the market. They are characterized by almost unlimited refinement of motion, while avoiding any sort of mechanical play. Thus, they are completely resistant to internal friction. Piezo positioning stages’ high stiffness results in very short response and settling times.

In combination with the flexure hinges design, piezoelectric actuators can generate high accuracy and high speed, perfect for sample adjustment, beam alignment and beam tracking.

Due to numerous advantages over conventional drives, piezoelectrical nanopositioning technology has established itself in just a few years.

New super-resolution techniques, such as stimulated emission depletion microscopy, photo-activated localization microscopy and stochastic optical reconstruction microscopy, have reduced resolution from 100–200 nm down to 20–30 nm. Piezo positioning stages are perfectly suitable for these and higher resolutions.

Due to the following features piezosystem jena products are particular suitable for microscopy applications:

- Precise and fast objective lens focusing
- Z-axis solution for focusing with nm precision
- XY nano-positioning stages enable extremely fast scanning applications
- Actuators are adaptive to upright and inverted microscopes
- Up to 500 micron travel range
- High resolution imaging
Reliability, easy handling and excellent performance are the key factors for using positioning equipment from piezosystem jena. The nanopositioning systems can easily be adapted to existing systems or implemented in newly developed applications. piezosystem jena pays special attention to the long term reliability of its products. Extensive quality control during development and production guarantees high customer satisfaction.

**Ready for super resolution microscopes**

Compared to normal light microscopes, super resolution microscopes demand highly accurate positioning equipment, which provides long term stability. Positioning solutions by piezosystem jena are able to perform with sub-nm precision.

**Compatible to the common microscope standards**

Equipment from piezosystem jena is made for flexible use. Our piezo stages fit to industry standards i.e. frame K and SBS 96 well plate. Furthermore, adapter plates are available for universal use with the most common microscopes.
**Lens Positioning Systems**

**MIPOS Series – With Flex Adapter Technology**

- Focus range up to 500 μm
- Threading size available for all standard microscopes
- Easy assembling and disassembling by Flex Adapter mechanism
- Parfocal Spacer Rings for tube extension
- Compatible to standard and inverted microscopes

**Lens Focusing Devices**

The series MIPOS actuators were developed for the fine adjustment of micro objective lenses and for the adjustment of the whole nosepieces (MIPOS N100/2 – microscope objective revolver positioner). They provide a motion range from 20 μm up to 500 μm. Position accuracy and resolution are extraordinarily high. Therefore, the MIPOS series is the perfect upgrade for modern microscopes.

**Thread Sizes Available**

MIPOS systems can be equipped with available standard micro objective thread sizes from Zeiss, Leica, Nikon, and Olympus. An exchangeable thread adapter system, called Flex Adapter, allows the easy change of microscope objectives. This makes the adjustment of the MIPOS easy to use with every single thread size from W0.8 × 1/3" up to M32 × 0.75.

**Inverted Microscopes**

MIPOS 100 and MIPOS 500 are specially designed for high dynamic use with inverted microscopes.

**Applications**

The series MIPOS is ready for modern microscopy, e.g. Auto-Focus, confocal stacked images, FRET, TIRF, PALM, FRAP, CARS, STED etc.

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<table>
<thead>
<tr>
<th>Series</th>
<th>MIPOS 20</th>
<th>MIPOS 100</th>
<th>MIPOS 100 PL</th>
<th>MIPOS 250</th>
<th>MIPOS 500</th>
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</thead>
<tbody>
<tr>
<td>Motion/scanning range</td>
<td>20 μm</td>
<td>100 μm</td>
<td>140 μm</td>
<td>250 μm</td>
<td>500 μm</td>
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<tr>
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<td>W0.8 × 1/36&quot; to M27 × 0.75</td>
<td>W0.8 × 1/36&quot; to M32 × 0.75</td>
<td>W0.8 × 1/36&quot; to M32 × 0.75</td>
<td>W0.8 × 1/36&quot; to M32 × 0.75</td>
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<td>Max. lens diameter</td>
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<td>strain gage</td>
<td>strain gage / capacitive</td>
<td>strain gage / capacitive</td>
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<tr>
<td>Version for inverted microscopes</td>
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<tr>
<td>Max lens weight without compromising accuracy</td>
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<td>300 g</td>
<td>500 g</td>
<td>500 g</td>
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</tbody>
</table>
XYZ-axes Sample Positioning and Scanning

XYZ sample positioning equipment by piezosystem jena provides the perfect scanning solution for highly precise sample alignment.

- Z-axis, XY-axes and 3D scanning stage solution for highly precise sample alignment
- Motion range up to 700 \( \mu \text{m} \) per axis
- Mountable direct on microscopy stage
- Easy control via PC interface
- Wide range of sample holders

<table>
<thead>
<tr>
<th>Series</th>
<th>PXY AP</th>
<th>PZ 300 AP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axes</td>
<td>x, y</td>
<td>z</td>
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<tr>
<td>Motion/scanning range</td>
<td>24, 100, 200, 300 or 500 ( \mu \text{m} )</td>
<td>300 ( \mu \text{m} )</td>
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<td>capacitive</td>
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<td>Max. scan frequency under load</td>
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<td>50 Hz</td>
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<td>Inside space</td>
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<td>86.5 mm × 128.5 (multiwell size)</td>
</tr>
<tr>
<td>Outside mounting size</td>
<td>175 mm × 175 mm</td>
<td>160 mm × 110 mm (K frame opening)</td>
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</table>

PXY AP Series – XY Sample Scanning Stage With Nanometer Accuracy

Applications
The stage series PXY AP is especially suited for all kinds of high resolution microscopy application, like two photon microscopy or laser scanning and confocal microscopy setups.

Design
Series PXY AP is designed for the fast XY positioning of samples with nanometer accuracy. The positioning stage can be mounted on top of microscope stages or by using an inverted microscope on the stand itself. A large inside aperture (100 × 100 mm) offers space for sample mounting. The motion can be adjusted within a range from 24 \( \mu \text{m} \) up to 700 \( \mu \text{m} \) according to the requirements.
**PZ 300 AP – Z-axis Microscope Stage for Confocal, Fluorescence and Laser Scanning Applications**

The PZ 300 AP from piezosystem jena is a Z-axis elevator stage with a motion range of 300 μm. The stage fits into microscope stage openings by the dimensions of 160 × 110 mm. As a result the stage can be used with nearly all standard microscopes of the major brands.

**Key Features**
Due to FEA optimization its dynamic behavior allows "step-by-step" scanning at working frequencies up to 50 Hz.

**Compatibility**
The PZ 300 is set up for smooth integration into most popular commercial motorized stages (to install in upright and inverse microscopy assemblies). The stage opening supports sample holders and inserts according to the multi-well standard e.g. multi-well and microtitre plates, slides, petri dishes, chambers, mini incubators. The sample plane is coincident to the illumination focus of inverted stages, i.e. no condenser extender is needed.

- Low profile piezoelectrical microscope Z-stage
- Travel range of 300 μm
- Typical working frequency of 50 Hz
- Settling time in millisecond range
- Inside frame supports standard multi-well size
- Additional sample adapter available

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**Compatible microscopes / microscope stages**

* with stage adapter T-113-15

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**PZ 300 AP without microscope platform**
Platform with M2 threaded holes for sample mounting

**PZ 300 AP with microscope platform**
Stage insert with 128.5 × 86.5 mm² Multiwell standard opening. Adapter plates available from PECON®

- Petri dish 35 mm up to 60 mm
- POC-R + POC-R2 Cell Cultivation System, POCmini
- Microscope slides (max. length 120 mm)
- Ibidi® chambers

**PZ 300 AP with Zeiss microscope platform**
For stage insert with 116 × 80 mm² frame. Opening for:

- Petri dish 35 up to 60 mm
- Microscope slides (max. length 120 mm)
- Lab-Tek™ and chambered slides
XY-axes Sample Positioner

KMI53-Semprex Kit – 2 in 1 Positioning Solution

- Combining the advantages of manual and automated positioning

The KMI53 is a result of the cooperation between piezosystem jena and Semprex® Corp. By combining the advantages of manual and automated positioning, the microscope stage KMI53 enables a highly flexible alignment. The digital Vernier Micrometer provides a travel range of 25 mm. In addition, the special piezo-driven micrometer holder MICI guarantees precise automated motion up to 200 μm.

3D Sample Positioning Stage

TRITOR 102 CAP – Designed for Sample Alignment

The TRITOR 102 CAP perfectly meets the requirements for sample alignment applications. The large central opening of 40 mm allows the placement of the objective lens directly underneath the sample. Integrated closed loop feedback sensors guarantee long term high precision sample adjustment with nanometer accuracy.

- 3D piezo based sample positioner
- Free central hole (40 mm)
- Sample positioning without mechanical play
- Motion range up to 100 μm
- Lowest settling time for fastest scan behavior

Accessories

Equipment for piezosystem jena Nano-positioning Stages

Together with our partner Bioptechs®, piezosystem jena has developed specially adapted tables for sample environmental control. This combination enables sample heating, thermal insulation and an effective CO₂ control mechanism under the scope. Live cell microscopy is just one of many applications where these characteristic represent an exceptional advancement.

- Plate, incubate, and observe without the need to transfer your cells
- Ambient to 50°C temperature range
- Perfusion available

piezosystem jena positioning stages can be equipped with sample holders and accessories from Bioptechs®, PeCon GmbH®, W.Reichert-LABTEC®, and Tokai Hit CO.,Ltd®