



Microscopy Applications

piezosystem jena: **Experts in Precision**

piezosystem jena can rely on more than 20 years of experience in the research and development of piezoelectrical elements and translation stages for microscopy applications.

The product development and production departments, as well as the worldwide sales and marketing departments, are located at the corporate headquarters in Jena. From here we service our subsidiary in the U.S. and our representatives in China, Japan, France, Great Britain, Korea, Israel, Italy, Spain, and Taiwan, as well as our customers in over 40 other countries.

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



Products for Microscopy and Scanning Application

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.

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 particularly 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 \times 1/3" up to M32 \times 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.

Series	MIPOS 20	MIPOS 100	MIPOS 100 PL	MIPOS 250	MIPOS 500
Motion/scanning range	20 μm	100 μm	140 μm	250 μm	500 μm
Available threading type from...to	W0.8 \times 1/36" to M27 \times 0.75	W0.8 \times 1/36" to M27 \times 0.75	W0.8 \times 1/36" to M32 \times 0.75	W0.8 \times 1/36" to M32 \times 0.75	W0.8 \times 1/36" to M32 \times 0.75
Max. lens diameter	30 mm	30 mm	40 mm	40 mm	40 mm
Integrated measurement system available	strain gage	strain gage	strain gage/ capacitive	strain gage/ capacitive	strain gage
Version for inverted microscopes	no	yes	no	no	yes
Max lens weight without compromising accuracy	300 g	300 g	500 g	500 g	500 g

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 μm per axis
- Mountable direct on microscopy stage
- Easy control via PC interface
- Wide range of sample holders

Series	PXY AP	PZ 300 AP
Axes	x, y	z
Motion/scanning range	24, 100, 200, 300 or 500 μm	300 μm
Integrated measurement system available	capacitive	capacitive
Max. scan frequency under load	200 Hz	50 Hz
Inside space	100 mm \times 100 mm	86.5 mm \times 128.5 (multiwell size)
Outside mounting size	175 mm \times 175 mm	160 mm \times 110 mm (K frame opening)

PXY AP Series – XY Sample Scanning Stage With Nanometer Accuracy

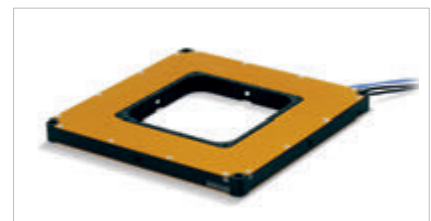
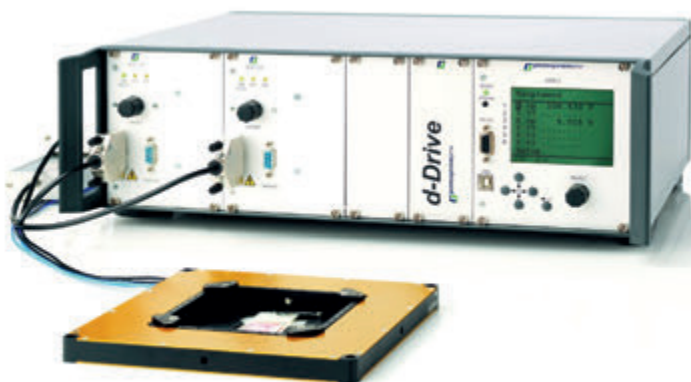
Applications

The stage series PXY AP is especially suited for all kind 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 \times 100 mm) offers space for sample mounting. The motion can be adjusted within a range from 24 μm up to 700 μm according to the requirements.



PXY AP series

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

Compatible microscopes / microscope stages* for...

...Märzhäuser SCAN IM:

- Leica DMI 3000–5000
- Leica DMI 5000M
- Nikon Eclipse MA100
- Nikon Eclipse MA200
- Olympus BX45/BX51/BX61
- Olympus WI/GX51/GX71
- Olympus IX51/IX71/IX81
- Zeiss AxioObserver
- Zeiss AxioVert 200

...Prior ProScan H117:

- Leica DMI4000/5000/6000
- Leica DMIRB
- Nikon TE2000/TI
- Olympus IX51/71/81
- Zeiss AxioObserver
- Zeiss AxioVert 200

...Prior ProScan H101a:

- Leica DM - range
- Nikon Eclipse - range
- Olympus BX - range
- Olympus IX51/71/81
- Zeiss AxioImager
- Zeiss Axioplan
- Zeiss AxioSkop

* with stage adapter T-113-15

PZ 300 AP without microscope platform

Platform with M2 threaded holes for sample mounting



PZ 300 AP without microscope platform

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 microscope platform

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



PZ 300 AP with Zeiss microscope platform

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.



Inserts for various sample holders, such as slides, dishes, and SBS, are available.

- Flexible microscope stage
- 25 mm manual XY-axes adjustment
- Sub nanometer adjustment with piezo actuating system
- Fits most major brand microscopes

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®

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