

## MicroPositioners / Hexapod Systems

### (Translation Stages, Rotation Stages, Actuators, 6D Positioning Systems)

PI offers a large range of high-precision MicroPositioning devices and systems for OEM and research. Our expertise spans from manual actuators to the unique IntelliStage™ translation stage with integrated controller, and the Hexapod 6D positioning systems.



Motorized translation stages



Motorized micrometers and actuators



Motorized and manual rotation and tip/tilt stages



Variety of Hexapod 6D micropositioning systems

### MicroPositioning Solutions

- Manually driven linear stages from with 6 to 150 mm travel
- Optional piezo drives providing 1 nanometer resolution
- Motorized translation stages from 5 to 306 mm (12") travel
- Direct output metrology (integrated glass scales) for highest accuracy
- Variety of drive options: stepper motors, DC motors, brushless motors, ActiveDrive™ and IntelliStage™ options
- Manually and motor-driven rotation and tilt stages. Resolution <0.001 degrees, velocity up to 90 degrees/sec. Optional piezo drives with sub arc-second resolution.
- 6-degree-of-freedom Hexapod positioning systems
- Fast, voice-coil-driven scanning stages
- Variety of motion controllers, with 1 to 6 channels



Motorized "micro" translation stage with controller



Manual translation stages

# MicroPositioning Experience

## Why can PI Provide Superior MicroPositioning Solutions?

- 30 years experience designing Micro- and NanoPositioners
- 0.1 microns is "coarse" positioning to PI, we come to this from the nano and sub-nano world.
- 10 years experience in designing 6-degree-of-freedom Hexapod MicroPositioning systems
- State-of-the-art metrology lab: thermal, acoustic, seismic isolation for repeatable sub-nanometer measurements
- State-of-the-art equipment for simulation, manufacturing and testing
- Highly motivated team of engineers and physicists



XYZ combination of Micro- and NanoPositioning stages



3D CAD design of a Hexapod 6D robot

## Typical Applications of MicroPositioners

- Photonics Packaging and Alignment
- Micromachining
- Micromechanics
- Medical Technology
- Semiconductors
- Data Storage
- Lasers & Electro-Optics
- Cell Manipulation



3D CAD design of a custom 5D coarse/fine fiber alignment system with closed-loop PZT drives.



Dynamic vibration analysis of a voice-coil driven scanner measured with Polytec Laser Scanning Vibrometer



3D CAD design of a rotation stage



XYZ stage, 0.1  $\mu\text{m}$  resolution

In addition to the products shown in this catalog, PI has developed a range of special systems for OEM & custom applications, from fiber optics to aerospace and medical research. If the right solution is not in this catalog, talk to your local PI sales representative. We will be happy to help design a customized system.

PZT Actuators
PZT Flexure NanoPositioners
PZT Active Optics / Steering Mirrors
Tutorial: Piezoelectrics...
Capacitive Position Sensors
PZT Control Electronics
<b>MicroPositioners / Hexapod Systems</b>
Photonics Alignment & Packaging Systems
Motor Controllers
Index

# MicroPositioning Experience...(continued)

PI offers a great variety of MicroPositioning products for OEM, research and industry. The following page shows a few examples of the custom systems developed over the last years. Some of the systems cited were designed for special customer applications and are not available off the shelf; some are subject to nondisclosure agreements and cannot be shown at all.

<http://www.pi.ws>  
[info@pi.ws](mailto:info@pi.ws)



Custom Hexapod 6D robot with additional translation stage for extended travel. Application: surgery. Photo Courtesy of URS.



IntelliStage™ translation stage with integrated motion controller exposed



Custom voice-coil-driven linear scanner with controller, 2 mm stroke, 30 Hz



XY voice-coil-driven scanner with controller

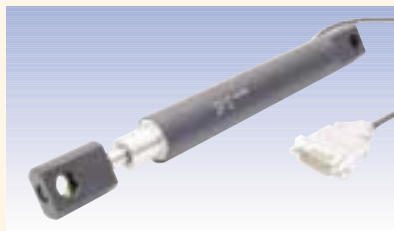
**Your custom system!\***  
**\* Talk to your local PI office**



Custom manual translation stages



Custom X,  $\theta_X$ ,  $\theta_Y$  combination for fiber alignment



Custom linear actuator with ballscrew drive



Custom Hexapod for alignment of secondary mirrors in astronomical telescopes



Custom ultra-high-resolution, linear piezo-motor-driven translation stage with piezo-motor driver/controller



XYZ MicroPositioning system with piezo motor drives



Fiber rotation stage



Custom translation stage

# MicroPositioning Experience...(continued)



Custom "micro" rotation stage



Custom "folded" linear actuator



Custom Hexapod 6D robot

**Your custom system!\***

**\* Talk to your local PI office**



Motorized XYZ fiber alignment stages, 50 nm resolution



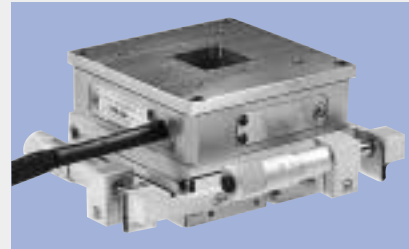
Custom Hexapod for brain surgery.  
Photo courtesy of IPA



Modular precision manual aligners



Custom stepper-motor drive with integrated motor controller



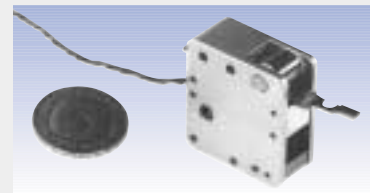
Combination of XY MicroPositioning "coarse" stage and XY NanoPositioning "fine" stage



Custom Hexapod, 6 D robot



Custom Z MicroPositioning system with integrated controller



Custom linear piezo-motor drive



Custom stainless steel translation stage