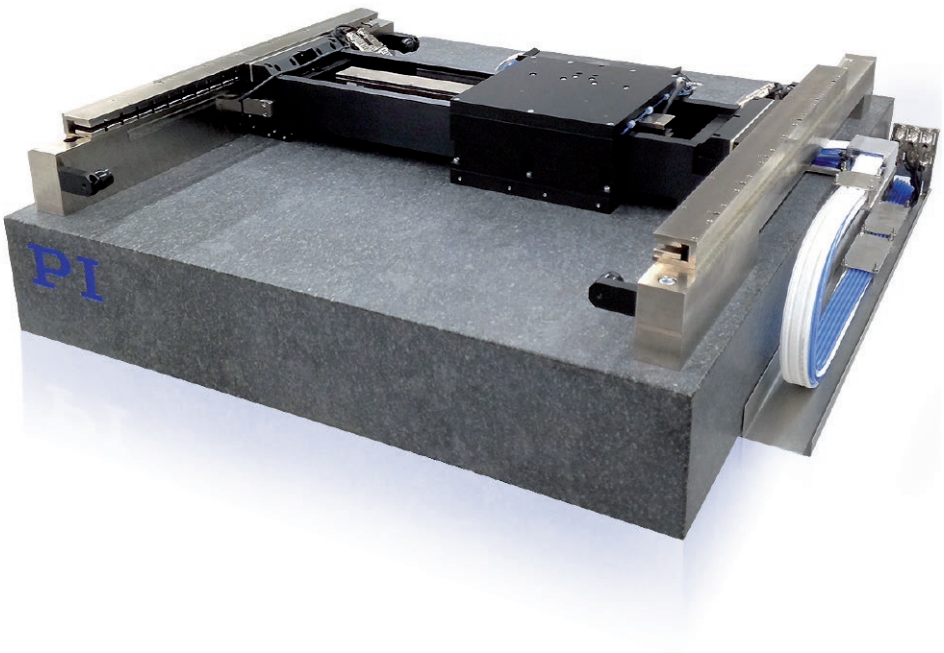


PIglide Air Bearing Technology

NANOMETER PRECISION, MULTI-AXIS MOTION,
STANDARD & CUSTOM DESIGNS

Plglide

The Step Ahead with Air Bearing Technology

Frictionless High-Precision Positioning

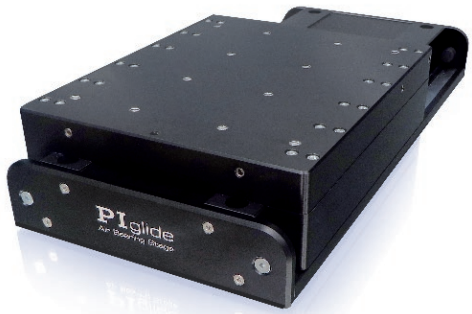
A direct-drive motor and high-resolution encoder can position a moving carriage supported by an air bearing to within nanometers in a linear application or within tenths of arc-seconds in rotational applications. The lack of friction and mechanical contact means there is minimal hysteresis or reversal error, making it highly repeatable and ideal for many inspection and manufacturing operations. Stiction is virtually eliminated, improving resolution capabilities, position repeatability can be obtained within a few fundamental encoder counts. Similar precision can be obtained by piezo flexure guided stages, however over much smaller travel ranges.

Velocity Stability and Scanning

The lack of mechanical bearing elements means there is nothing to get in the way of smooth, controlled velocity (stability to better than 0.01%). Experiments and processes like inertial sensor testing, tomography, wafer scanning, and surface profiling require continuous motion at a tightly controlled speeds are best served by air bearing systems.

High Guiding Accuracy

Linear air bearing stages have incredibly straight and flat travels, measured in the 100's or 10's of nanometers and sub-arc-second pitch, roll, and yaw errors. Rotary stages have tilt (wobble) errors less than 1 arc-second. Additionally, the angular performance of an air bearing is remarkably repeatable. This guarantees optimal part quality and measurement reliability for applications such as optics inspection, semiconductor inspection, and medical device manufacturing.



Air Bearing Technology

The Step Ahead with the Full Range of PI Technologies

Experience with Air Bearing Technology

PI is building on over 200 man-years of in-house air bearing experience and offers comprehensive precision air bearing motion control and positioning products and systems.

With 4 decades of experience in piezo nanopositioning systems design and motorized precision positioning equipment, the new air bearing systems capabilities are a natural and logical extension of PI's precision motion offerings.

Core Technology Inhouse

Having all the core technologies available in-house allows PI to design and manufacture excellent products. Optimum performance is achieved by extensive simulations of relevant components, from the magnetic field for the motor layout, the FEM simulations of stages, to the control algorithm design. Keeping the number of parts low secures high reliability of the system.

Flexible Axis Configuration

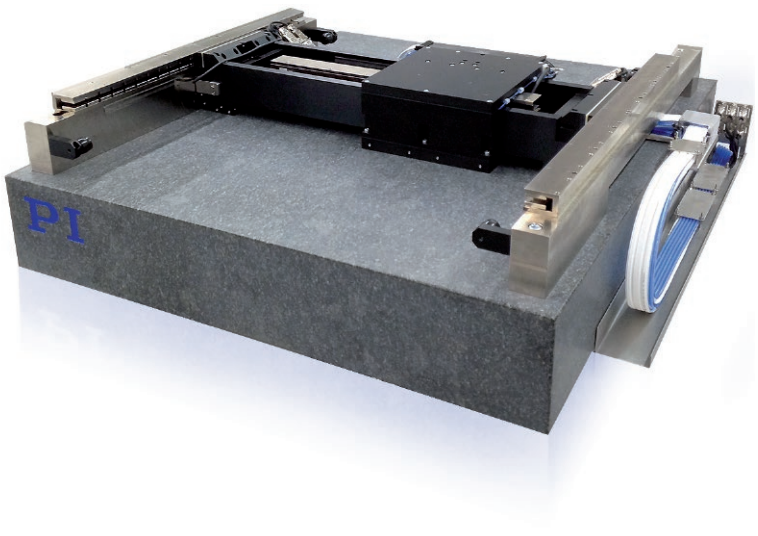
- Single axis linear stages
- Rotary stages
- XY Planar Scanners
- Non-motorized linear and rotary bearings
- Hemispherical bearings
- Rotary air bearing spindles

PI serves both the research and industrial markets.

Customization

PI is in the unique position to cover the whole motion range from finger-tip sized nano-positioners to large scale stages with long travel ranges, through a plethora of different drive and guiding systems tailored exactly to the customer's needs.

By combining extremely responsive engineering consultative support and lean manufacturing techniques, PI is able to provide the highest quality customer service. Maximum performance of precision systems is achieved thru extensive design and analysis expertise, using equipment built in-house with proprietary techniques.



PIMag®

Magnetic Direct Drive Technology

Drive technology and control know-how as well as an expertise in bearings and encoders allow for a broad range of motors for system integration. Proprietary developments also include high-resolution force sensors for manufacturing and test equipment.

Ironless Linear Motors

- High acceleration and velocity
- Linear stages, planar scanners, PIMag® 6D positioning system
- Torque motors for rotation stages

Voice Coil Drives

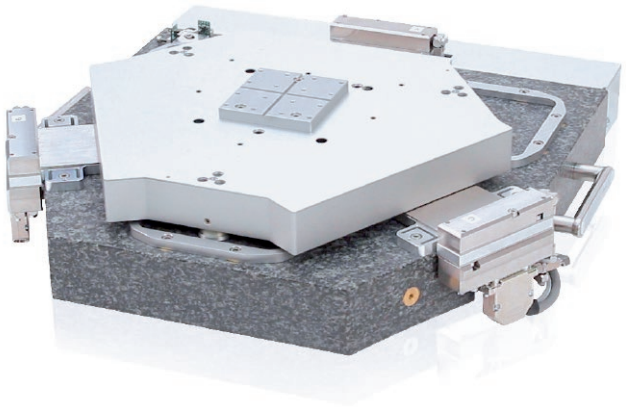
- High dynamics for fast scanning and positioning
- OEM actuators, linear scanners, Hexapods
- Optional force sensors

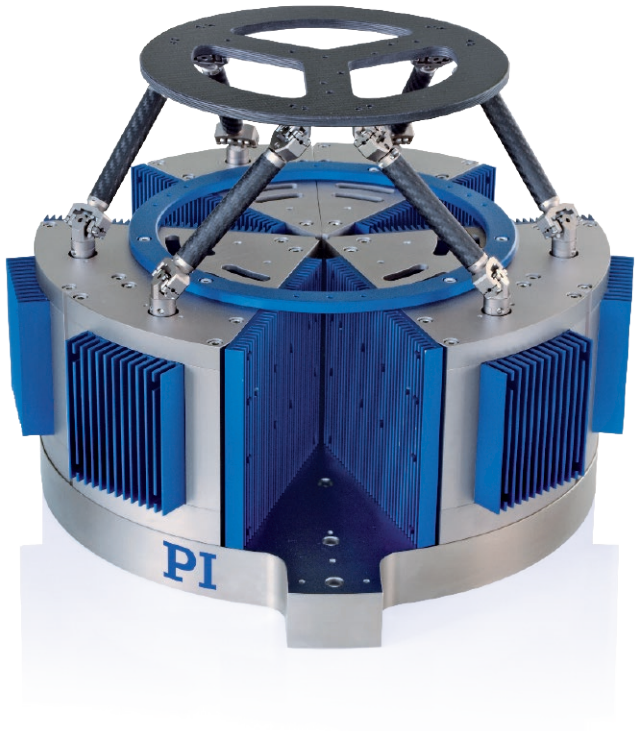
Drive Technology Beyond Standard

- Highest accelerations up to 60g with resonance motor
- Highest force density for single phase linear motors with reluctance motor and cylindrical Halbach arrays
- High force density and low weight with linear Halbach arrays

Guiding Systems

- Plglide air bearings for frictionless motion and optimum straightness and flatness
- Active magnetic guidings align flatness during motion
- Flexure guidings provide frictionless motion over short strokes
- Ball and roller bearings from the leading suppliers





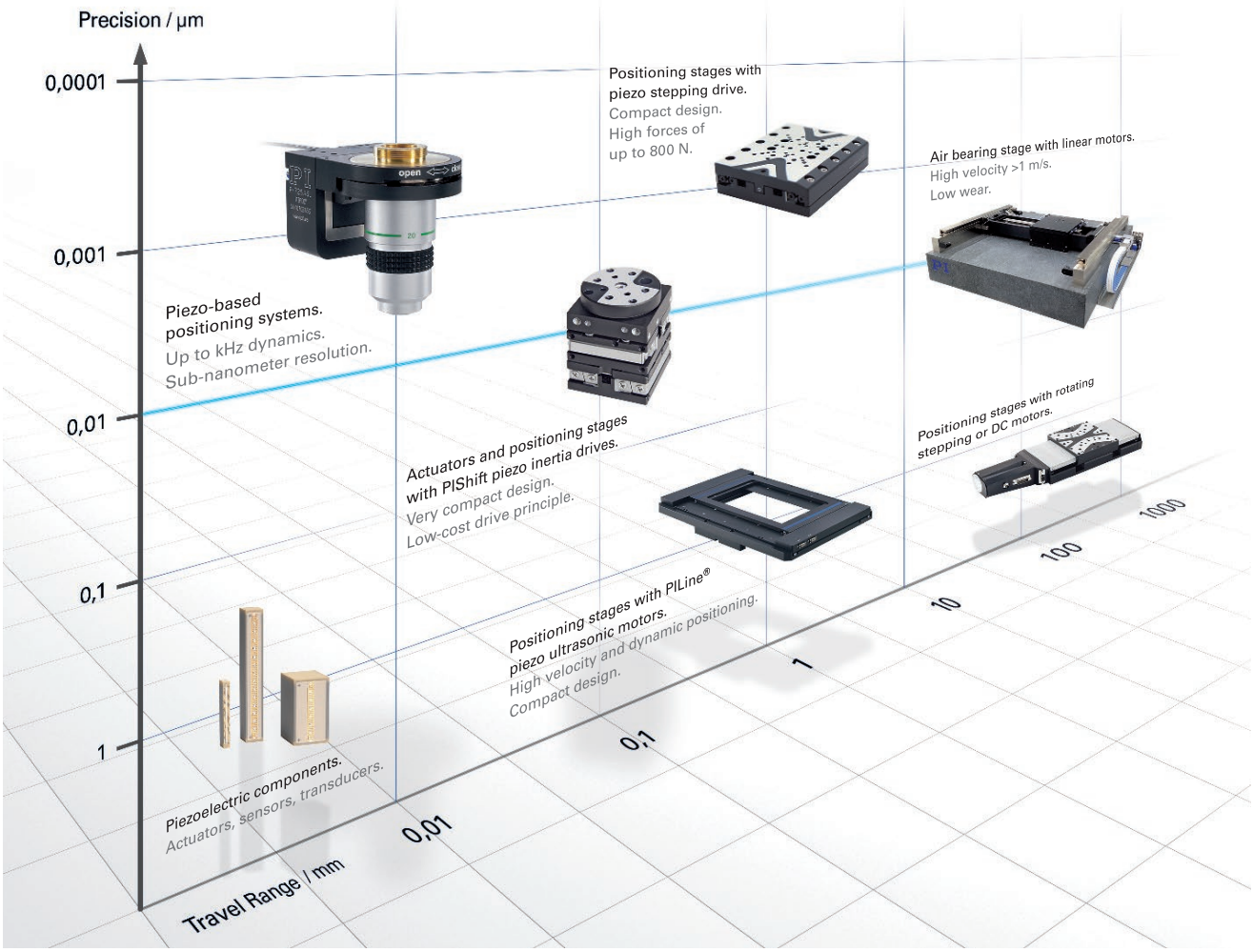
Technology

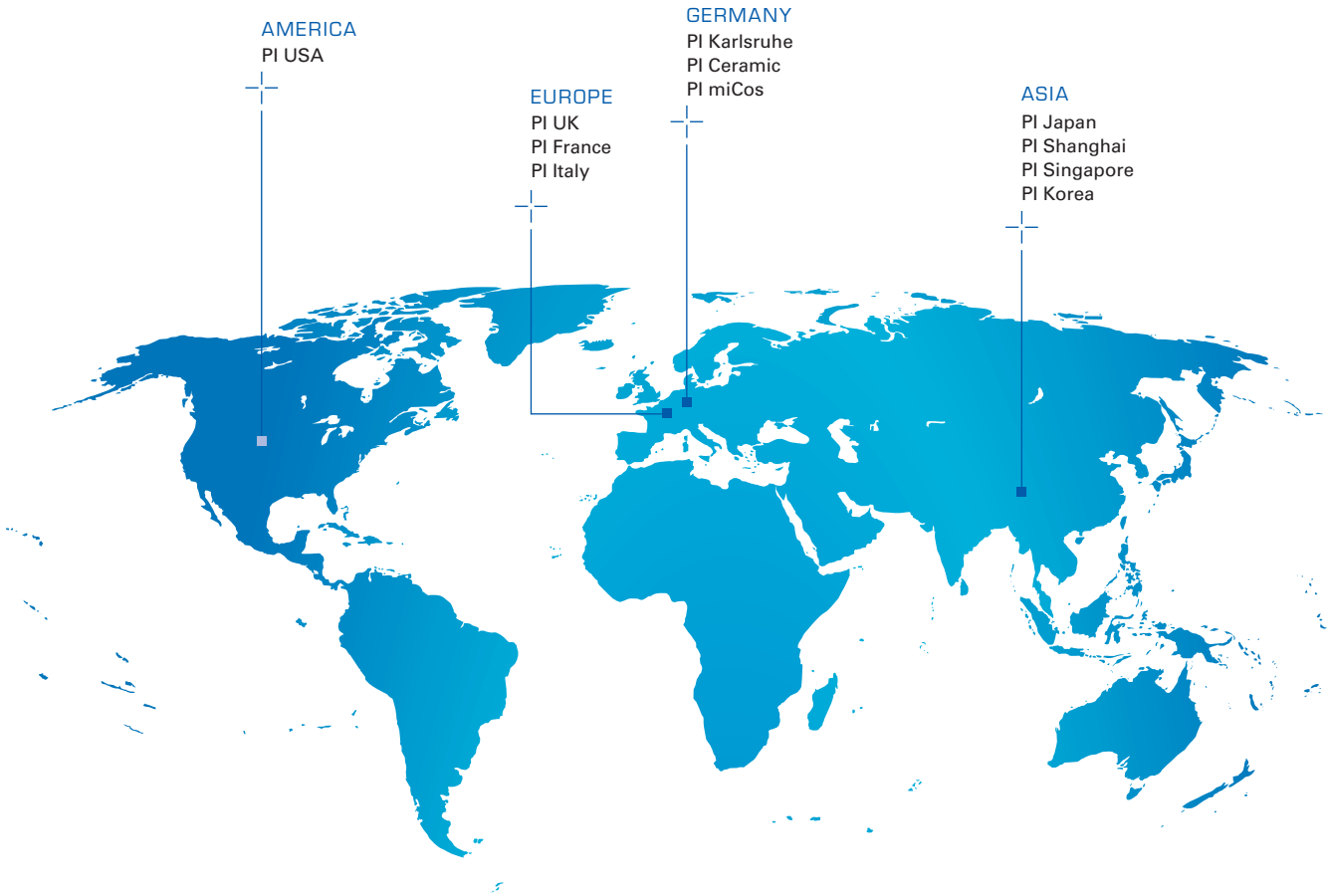
The Broadest and Deepest Portfolio

The technological scope of the PI Group is unique worldwide. PI develops, manufactures and qualifies all its core technologies itself. Thus PI is independent of components available on the market and offers individual solutions that go beyond the state of the art. Through its high measure of flexibility, PI plays a pioneering role in precision positioning and enables PI customers to benefit from distinct competitive advantages.

Core Technologies

- Piezo components, actuators and motors
- Magnetic drives
- Air bearing technology
- Guiding systems
- Nanometrology sensors
- Electronic amplifiers
- Digital controllers
- Software





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