Engineered Systems Capabilities

Precision components, stable control and a great deal of experience in engineering are essential for high-precision complex motion and positioning solutions. PI is a supplier of technologically sophisticated drive components and high-precision positioners and also offers all levels of integration up to the turnkey solution. Engineering services have been a part of PI’s core business for many years. Complete systems, fitting seamlessly into existing processes, robust automation in major research installations as well as manufacturing and inspection processes for chip production or photonics packaging.

Core Competences
- Application support and consulting for motion and positioning applications
- Reliable and prompt series production even for large quantities
- Economic design
- Continuous customizing of turnkey solutions
- Comprehensive experience in drive and kinematic robotics
- Broad spectrum of technologies: Drive, guide, and sensor technologies
- In-house motion control electronics and software platforms
- Customized software integration such as Epics, LabVIEW, Tango...
- Top quality components from PI’s broad portfolio of high-end standard products

Gantries are normally equipped with linear motors. Travel ranges of up to 2 meters in XY are possible. DC or stepper motors can be used for the Z-axis. If necessary, nano-meter precision is required, piezo actuators take care of dynamic fine adjustment.
Piezo-based Deformable Mirror
With Exchangeable Actuation Modules

- Adaptable optics performance providing diffraction-limited images with angular resolutions down to 6 milliarcseconds (mas).
- Characterization of exoplanets down to the size of rocky planets by direct imaging, spectroscopy, and polarimetry.
- The systematic intensity contrast between the exoplanet and its host star is better than 10^{-8} at 30 mas and 10^{-9} beyond 100 mas angular separation.

Specifications:
- Mirror diameter: 680 mm
- Number of actuators: 11,880
- PICMA® piezo actuators with high reliability for mirror actuation.
- Actuator pitch: 0.5 mm
- Actuator stroke: ±15 µm
- Actuator resolution: ±1 nm
- Setting time: 2 ms (full stroke)
- Exchangeability of actuation modules: 4 x 4 modules with complete responsibility for modular design, adaptable to other XDM applications.
- High performance and power-density of 11,880 amplifiers in two 19” rack towers for compact on-site operation.
- Low noise: 200 µVrms (DC-100 kHz and 1 µF load)
- Small-signal bandwidth: 30 kHz
- Displacement linearity: ±1.5 % (from 1 Hz to 1 kHz)
- Nom. DAC resolution of 16 bit with an update rate of 2 kHz

Test conditions:
- 4.0 × 10^9 cycles; 16 Hz sine wave excitation
- 1.0 × 10^7 cycles per day; 15 MPa preload

ICM® (Institute for Laser, Light, and Microbeam Technologies)
Nonmagnetic NEXLINE® XY stage for 77°K
Travel XY: 200 µm
Load: 1.2 kg
Sensors: Capacitive
Material: Titanium
Dimensions: 150 x 150 x 30 mm
Motorized cardanic mirror mounts
Stroke: ±2°
Mirror: 205 x 150 x 20 mm³, 1 kg
Res. frequency: 125 Hz
Sensor: LVDT
Resolution: 0.3 µrad
Tip/tilt axis in plane with mirror surface!
Fast tip/tilt M5 for image jitter correction
SiC mirror: 230 mm diameter, 900 g
Tip/tilt travel: ±194 µrad (±40 arcsec)
Resolution: 0.07 µrad pp
Sensor: Capacitive
First resonance: 800 Hz
Bandwidth (−3dB): 150 Hz
Phase shift: <25° at 50 Hz
Housing, Interface
Plate & posts: Invar

NEXLINE® 6-DOF stage for 77°K
Travel XYZ: 200 µm
Load: 1.2 kg
Sensors: Resistive
Material: Copper
Dimensions: 150 x 150 x 30 mm
Motorized linear slide
Slide: 100 µm
Resolution: 0.15 µm
Settling time: 2 ms
Exchangeability of actuator modules: 4 x 4 modules with complete responsibility for modular design, adaptable to other XDM applications.
High performance and power-density of 11,880 amplifiers in two 19” rack towers for compact on-site operation.
Low noise: 200 µVrms (DC-100 kHz and 1 µF load)
Small-signal bandwidth: 30 kHz
Displacement linearity: ±1.5 % (from 1 Hz to 1 kHz)
Nom. DAC resolution of 16 bit with an update rate of 2 kHz

Test conditions:
- 4.0 × 10^9 cycles; 16 Hz sine wave excitation
- 1.0 × 10^7 cycles per day; 15 MPa preload

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Stroke: ±2°
Mirror: 205 x 150 x 20 mm³, 1 kg
Res. frequency: 125 Hz
Sensor: LVDT
Resolution: 0.3 µrad
Tip/tilt axis in plane with mirror surface!