

P-541.2CD · P-542.2CD

Low-Profile, XY PiezoStage Linear Slide with Parallel Metrology



P-540-series nanopositioning stages feature a very low profile of 16.5 mm, a large 80 x 80 mm aperture and deliver highly accurate motion with sub-nanometer resolution.

- **Low Profile for Easy Integration: 16.5 mm**
- **Parallel Kinematics and Optional Parallel Metrology for Fast Response and Superior Multi-Axis Precision**
- **Choice of Strain Gauge (Lower Cost) or Capacitive Sensors (Higher Performance)**
- **To 200 x 200 μm Travel Range**
- **Direct Drive Version for High-Speed Positioning & Scanning**
- **80 x 80 mm Clear Aperture**
- **PICMA® High-Performance Piezo Actuators for Superior Lifetime**

Low Profile, Optimized for Microscopy Applications

P-541/P-542 nanopositioning and scanning stages are designed for easy integration into high-resolution microscopes. They feature a very low profile of 16.5 mm, a large 80 x 80 mm aperture, and offer highly accurate motion with sub-nanometer resolution.

Application Examples

- Optical trapping
- Scanning microscopy
- Mask & wafer alignment
- Scanning interferometry
- Surface metrology
- Biotechnology
- Micromanipulation

Choice of Drives: Long Range or High-Speed Direct Drive

A variety of models are offered to suit a large range of applications: lever-amplified XY systems with 100 and 200 μm travel and direct-driven XY scanners with 45 μm travel. Their high resonant frequencies of 1.5 kHz in both axes allow for faster step response and higher scanning rates, needed for example in single-molecule microscopy, or in other time-critical applications. Z stages and Z-tip/tilt stages are also available (see p. 2-50).

Higher Precision Through Parallel Kinematics/-Metrology with Capacitive Feedback Sensors

P-540-series XY piezo positioning stages feature a single-

module, parallel-kinematics design with all actuators operating on one central platform and no moving cables to cause microfriction. Advantages over serial kinematics setups are a lower profile, reduced inertia and better, axis-independent dynamics.

Capacitive sensors measure the actual distance between the fixed frame and the moving part of the stage directly and include any flex or other errors in the drive train—from the actuator through the lever and flexures to the platform—in the measurement. This results in higher motion linearity, long-term stability, phase fidelity, and—because external disturbances are seen by the sensor immediately—a stiffer, faster-responding servo-loop. See p. 2-4 *ff.* and p. 5-2 *ff.* for more information.

With parallel direct metrology, all capacitive sensors measure the position of the same moving platform against the same stationary reference (the fixed frame). This means that all motion is inside the servo-loop, no matter which actuator may have caused it, resulting in superior multi-axis precision. Advantages include: higher resolution in non-diffraction-limited imaging techniques (NSOM, etc.) and reduced blurring of edges in high-speed microscopy applications.

Dynamic Digital Control for Best Scanning Linearity

Use our new digital control electronics with DDL (Dynamic Digital Linearization) to increase linearity and effective bandwidth in scanning applications by up to 1000-fold (see catalog E-710). By virtually eliminating tracking errors,

Ordering Information

P-541.2DD
Microscopy XY Nanopositioning & Scanning Stage, High-Speed Direct Drive, 45 x 45 μm, Parallel Metrology, Capacitive Sensors

P-541.2CD
Microscopy XY Nanopositioning & Scanning Stage, 100 x 100 μm, Parallel Metrology, Capacitive Sensors

P-542.2CD
Microscopy XY Nanopositioning & Scanning Stage, 200 x 200 μm, Parallel Metrology, Capacitive Sensors

Versions with Strain Gauge Sensors see p. 2-60

P-541.2SL
Microscopy XY Nanopositioning & Scanning Stage, 100 x 100 μm, Strain Gauge Sensors

P-542.2SL
Microscopy XY Nanopositioning & Scanning Stage, 200 x 200 μm, Strain Gauge Sensors

Vacuum Versions Available.

P-540-Series Z-Tip/Tilt Stages see p. 2-50

DDL also increases the usable travel range.

Working Principle / Reliability

P-540-series stages are equipped with the award-winning PICMA® piezo drives, integrated into a sophisticated, single-module, parallel-kinematics, flexure guiding system. The wire-EDM-cut flexures are FEA modeled for zero stiction, zero friction and exceptional guiding precision. The ceramic-encapsulated PICMA® drives are more robust than conventional piezo actuators, featuring superior lifetime and performance in both dynamic and static applications. Because guidance, actuators and sensors are all frictionless and maintenance-free, these nanopositioning systems achieve outstanding levels of reliability.

