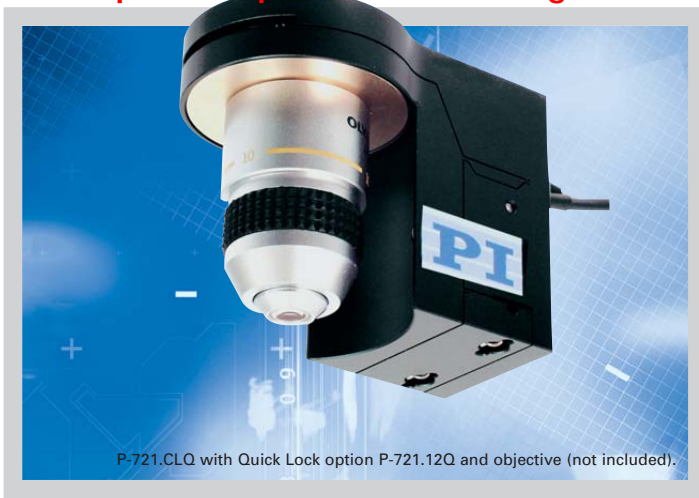


P-721

PIFOC® High-Speed Nanofocusing/Scanning Z-Drives with Direct Metrology

>> Click <http://www.pi.ws/fwd/Piezo-Stage> for the Latest Specs on these Products



P-721.CLQ with Quick Lock option P-721.12Q and objective (not included).

- Scans and Positions Objectives with Sub-nm Resolution
- High Linearity and Stability with Direct-Measuring Sensors
- Travel to 100 µm, fast Settling Time
- Very Straight Motion for Enhanced Focus Stability
- Ask about DIC Prism Holder Option
- Compatible with Metamorph™ Imaging Software
- Quick Lock Adapter for Easy Attachment

P-721 PIFOCs® are high-speed, piezo-driven microscope objective nanofocusing/scanning devices, providing a positioning and scanning range of 100 µm with sub-nanometer resolution and very high linearity. They were designed for tasks such as surface metrology or deconvolution microscopy (Z-stack acquisition). The frictionless, flexure guiding system provides enhanced precision for superior focus stability with fast response for rapid settling and scanning.

Superior Accuracy Through Direct-Motion Metrology with Capacitive Sensors

P-721.CLQ and .CDQ are equipped with direct-measuring capacitive position sensors. Unlike conventional sensors, capacitive sensors measure the actual distance between the fixed frame and the moving part of the stage. They detect errors contributed by all components in the drive train—from the actuator through the flexures to the platform. 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.

P-721.LLQ is a lower cost version, equipped with a direct-measuring LVDT sensor providing 10 nm resolution. A variety of analog and digital controllers is available to drive these units. The P-721.CDQ can be operated with the E-665

servo-controller (see page 6-30) through an analog or digital interface. The E-750 high-speed, digital NanoAutomation® controller, (p. 6-12) can also be used.

Easy Installation

Attach the objective to the PIFOC®. The new Quick Lock thread adapters allow easy attachment to any of a variety of objective thread types.

Then screw a thread adapter onto the microscope and attach the PIFOC® with the Quick Lock system. Mounting does not require rotation of the PIFOC® unit, and the optical path is extended by only 12.5 mm (infinity corrected microscope required; extension tubes are available to adjust path lengths of other objectives on a turret). Thread adapters are ordered separately.

Working Principle / Reliability

PIFOCs® are equipped with the award winning PICMA® piezo-drives, integrated into a

sophisticated 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.

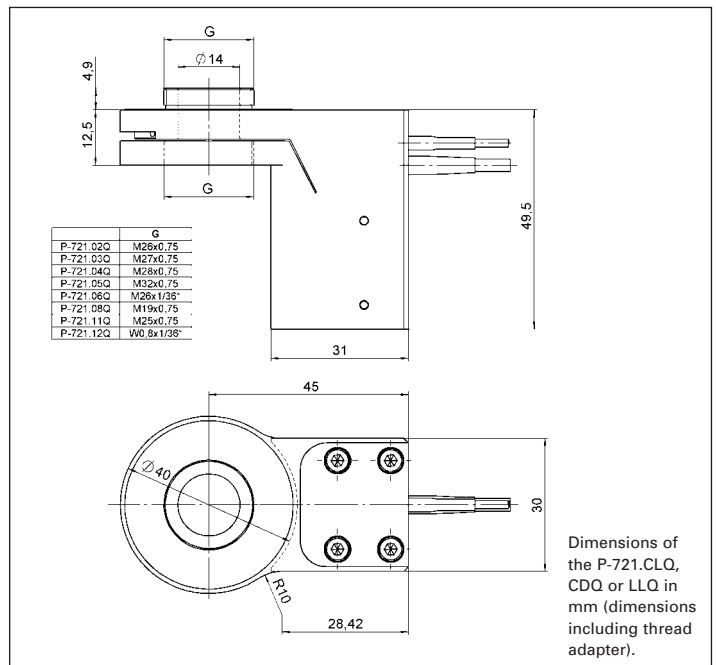
Because guidance, actuators and sensors are all frictionless and maintenance-free, these nanopositioning systems achieve outstanding levels of reliability.

Other PIFOCs®

PIFOCs® are also available with up to 460 µm travel (P-725, see page 2-22) and for open-loop operation only (P-720, see page 2-20). Custom units for moving a whole turret are available on request.

Notes

See the “Selection Guide” on p. 2-14 ff. for comparison with other nanopositioning systems.



Dimensions of the P-721.CLQ, CDQ or LLQ in mm (dimensions including thread adapter).

Application Examples

- Scanning interferometry
- Surface structure analysis
- Disk drive testing
- Autofocus systems
- Confocal microscopy
- Biotechnology
- Semiconductor test equipment

Ordering Information

P-721.CLQ

PIFOC® Objective Positioner & Scanner, 100 µm, Capacitive Sensor, LEMO Connectors, for Quick Lock Thread Adapters

P-721.CDQ

PIFOC® Objective Positioner & Scanner, 100 µm, Capacitive Sensor, Sub-D connector, for Quick Lock Thread Adapters

P-721.LLQ

PIFOC® Objective Positioner & Scanner, 100 µm, LVDT Sensor, LEMO Connectors, for Quick Lock Thread Adapters

P-721.0LQ

PIFOC® Objective Positioner & Scanner, 100 µm, Open-Loop, LEMO Connectors, for Quick Lock Thread Adapters

Accessories: Quick Lock Adapters

P-721.11Q

Quick Lock Adapter, M25 x 0.75

P-721.12Q

Quick Lock Adapter, W0.8 x 1/36"

P-721.02Q

Quick Lock Adapter, M26 x 0.75

P-721.03Q

Quick Lock Adapter, M27 x 0.75

P-721.04Q

Quick Lock Adapter, M28 x 0.75

P-721.05Q

Quick Lock Adapter, M32 x 0.75

P-721.06Q

Quick Lock Adapter, M26 x 1/36"

P-721.08Q

Quick Lock Adapter, M19 x 0.75

Extension Tubes for Objectives

P-721.90Q

12.5 mm Extens. Tube, W0.8 x 1/36"

P-721.91Q

12.5 mm Extens. Tube, M25 x 0.75

P-721.92Q

12.5 mm Extens. Tube, M26 x 0.75

P-721.93Q

12.5 mm Extens. Tube, M27 x 0.75

P-721.94Q

12.5 mm Extens. Tube, M28 x 0.75

P-721.95Q

12.5 mm Extens. Tube, M32 x 0.75

P-721.96Q

12.5 mm Extens. Tube, M26 x 1/36"

P-721.98Q

12.5 mm Extens. Tube, M19 x 0.75

Ask about custom designs!



Quick lock thread adapter P-721.12Q exploded view with microscope objective and PIFO C® P-721.CLQ. Mounting tools are included.



Custom PIFO C® nosepiece nanopositioner for microscope turret.

Technical Data

Models	P-721.CLQ P-721.CDQ	P-721.LLQ	P-721.0LQ	Units	Notes see p. 2-84
Max. objective diameter	39	39	39	mm	
Open-loop travel @ 0 to 100 V	90	90	90	µm ±20%	A2
Closed-loop travel	100	100	-	µm	A5
Integrated feedback sensor	Capacitive	LVDT	-		B
* Closed- / open loop resolution	0.7 / 0.5	10 / 0.5	- / 0.5	nm	C1
Closed-loop linearity (typ.)	0.03	0.1	-	%	
Full-range repeatability (typ.)	±5	±20	-	nm	C3
Stiffness	0.3	0.3	0.3	N/µm ±20%	D1
Push/pull force capacity (in operating direction)	100 / 20	100 / 20	100 / 20	N	D3
Tilt (θ _X) (typ.)	0.5	0.5	0.5	µrad	E1
Tilt (θ _Y) (typ.)	13	13	13	µrad	E1
Lateral runout (Y) (typ.)	100	100	100	nm	E2
Electrical capacitance	3.0	3.0	3.0	µF ±20%	F1
** Dynamic operating current coefficient (DOCC)	4.2	4.2	4.2	µA/(Hz x µm)	F2
Unloaded resonant frequency	580	580	580	Hz ±20%	G2
Resonant frequency @ 120 g load	250	250	250	Hz ±20%	G3
Resonant frequency @ 200 g load	190	190	190	Hz ±20%	G3
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	°C	H2
Voltage connection	VL	VL	VL		J1
Sensor connection	2 x C	L	-		J2
Weight (with cables)	240	230	220	g ±5%	
Body material	Al	Al	Al		L
Recommended driver/ controller (codes explained p. 2-17)	H, M, F	H, E	G, C		

Piezo Actuators

Nanopositioning & Scanning Systems

Active Optics / Steering Mirrors

Tutorial: Piezo-electrics in Positioning

Capacitive Position Sensors

Piezo Drivers & Nanopositioning Controllers

Hexapods / Micropositioning

Photonics Alignment Solutions

Motion Controllers

Ceramic Linear Motors & Stages

Index

* For calibration information see p. 2-8. Resolution of PI piezo nanopositioners is not limited by friction or stiction. The value given is noise equivalent motion with E-503 amplifier.

** Dynamic Operating Current Coefficient in µA per Hz and µm. Example: Sinusoidal scan of 30 µm at 10 Hz requires approximately 1.2 mA drive current.