

# PIFOC High-Precision Objective Scanner

Fast Nanopositioner and Scanner for Microscope Objectives



## P-721

- Fine positioning of objectives with subnanometer resolution
- Travel ranges to 140  $\mu\text{m}$ , millisecond settling time
- Significantly faster response and higher lifetime than motorized drives
- Minimum objective shift due to parallel flexure guiding
- Highest linearity due to direct measuring technology with capacitive sensors
- Inexpensive version with strain gauge sensors
- Compatible with MetaMorph imaging software
- Outstanding lifetime due to PICMA<sup>®</sup> piezo actuators
- QuickLock thread adapter for easy installation
- Clear aperture up to  $\varnothing$  29 mm

### Fields of application

- Super-resolution microscopy
- Light disc microscopy
- Confocal microscopy
- 3-D imaging
- Screening
- Interferometry
- Measuring technology
- Autofocus systems
- Biotechnology
- Semiconductor tests

### Outstanding lifetime thanks to PICMA<sup>®</sup> piezo actuators

The patented PICMA<sup>®</sup> piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA<sup>®</sup> actuators offer an up to ten times longer lifetime than conventional polymer-insulated actuators. 100 billion cycles without a single failure are proven.

### Subnanometer resolution with capacitive sensors

Capacitive sensors measure with subnanometer resolution without contacting. They guarantee excellent linearity of motion, long-term stability, and a bandwidth in the kHz range.

### High guiding accuracy due to zero-play flexure guides

Flexure guides are free of maintenance, friction, and wear, and do not require lubrication. Their stiffness allows high load capacity and they are insensitive to shock and vibration. They are 100 % vacuum compatible and work in a wide temperature range.

### Automatic configuration and fast component exchange

Mechanics and controllers can be combined as required and exchanged quickly. All servo and linearization parameters are stored in the ID chip of the Sub-D connector of the mechanics. The autocalibration function of the digital controllers uses this data each time the controller is switched on.

### Maximum accuracy due to direct position measuring

Motion is measured directly at the motion platform without any influence from the drive or guide elements. This allows optimum repeatability, outstanding stability, and stiff, fast-responding control.

## Specifications

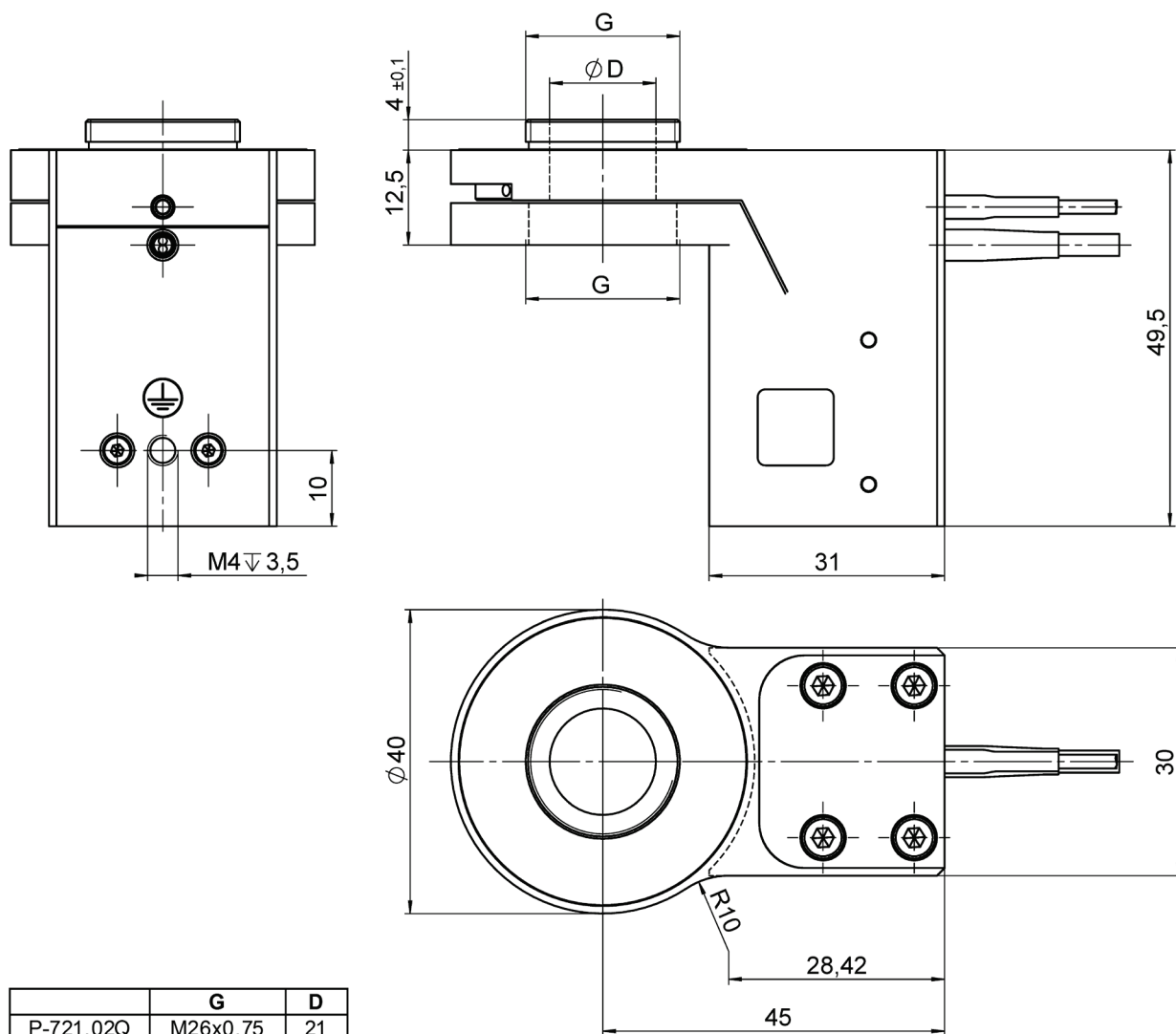
	P-721.CLQ	P-721.CDQ P-721.CDA	P-721.SL2 P-721.SDA	P-721.0LQ	Unit	Tolerance
Active axes	Z	Z	Z	Z		
<b>Motion and positioning</b>						
Integrated sensor	Capacitive	Capacitive	SGS	-		
Travel range at -20 to +120 V, open loop	140	140	140	140	µm	+20 % / -0 %
Travel range, closed loop	100	100	100	-	µm	
Resolution, open loop	0.5	0.5	0.5	0.5	nm	typ.
Resolution, closed loop	0.7	0.7	5	-	nm	typ.
Linearity error, closed loop	0.03	0.03	0.2	-	%	typ.
Repeatability	±5	±5	±10	-	nm	typ.
Tilt $\theta_x, \theta_y$	13	13	13	13	µrad	typ.
Crosstalk X, Y	100	100	100	100	nm	typ.
<b>Mechanical properties</b>						
Stiffness in motion direction	0.3	0.3	0.3	0.3	N/µm	±20 %
Resonant frequency, no load	580	580	580	550	Hz	±20 %
Resonant frequency under load, 120 g	235	235	235	235	Hz	±20 %
Resonant frequency under load, 200 g	180	180	180	180	Hz	±20 %
Push/pull force capacity in motion direction	100 / 20	100 / 20	100 / 20	100 / 20	N	max.
<b>Drive properties</b>						
Ceramic type	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-885		
Electrical capacitance	3.1	3.1	3.1	3.1	µF	±20 %
<b>Miscellaneous</b>						
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	°C	
Material	Aluminum	Aluminum	Aluminum	Aluminum		
Mass	0.24	0.24	0.22	0.22	kg	±5 %
Objective diameter	39	39	39	39	mm	max.
Cable length	1	1	1	1	m	±10 mm
Sensor/voltage connection	LEMO	Sub-D 7W2 (m)	LEMO / Sub-D 9 (m)	LEMO (no sensor)		
Recommended electronics	E-505, E-610, E-621, E-625, E-665, E-709, E-754	E-505, E-610, E-621, E-625, E-665, E-709, E-754	E-505, E-610, E-621, E-625, E-665, E-709, E-754	E-505, E-610, E-621, E-625, E-665, E-709, E-754		

The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

All specifications based on room temperature (22 °C ±3 °C).

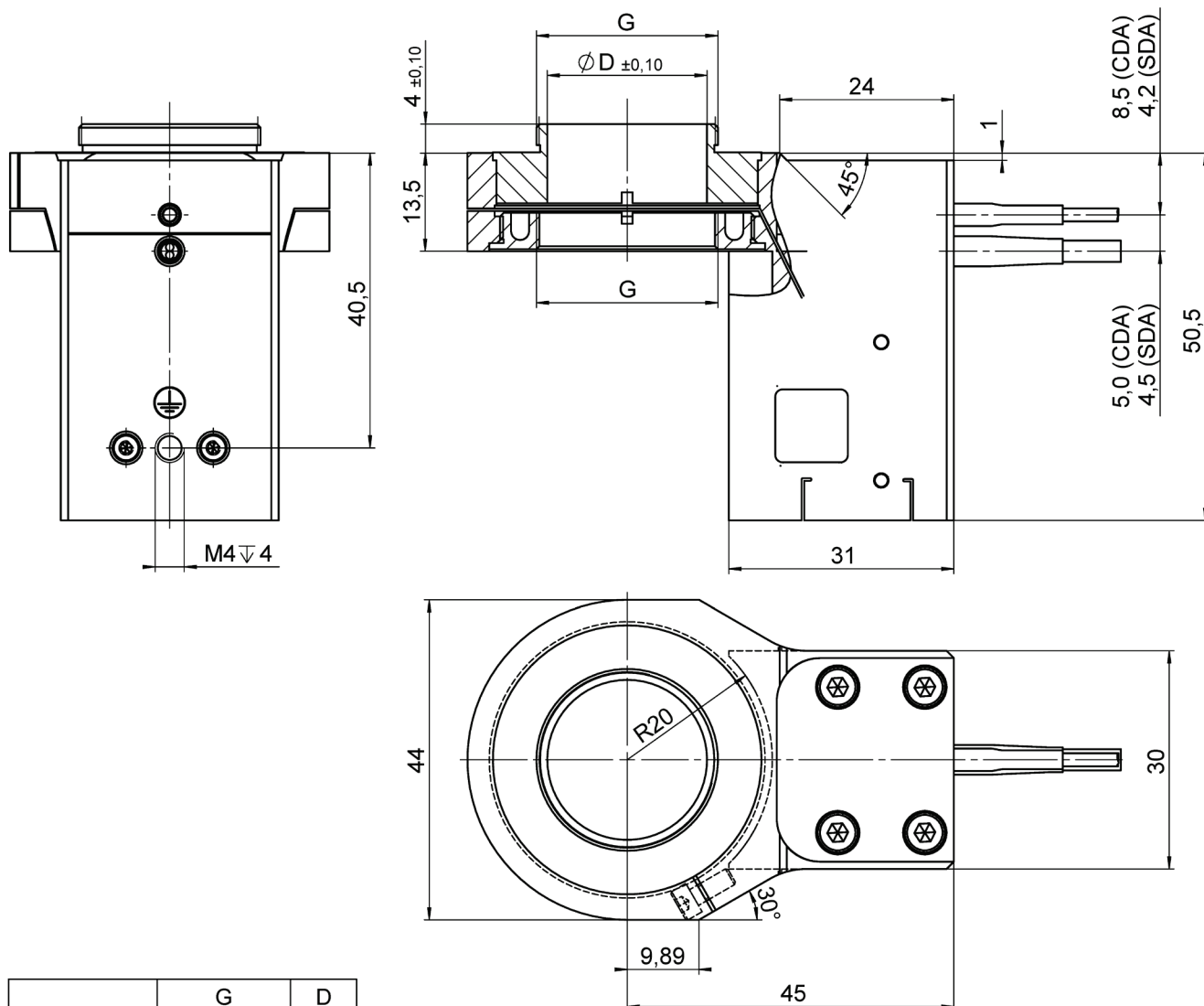
Ask about customized versions.

## Drawings / Images



	G	D
P-721.02Q	M26x0,75	21
P-721.03Q	M27x0,75	21
P-721.04Q	M28x0,75	21
P-721.05Q	M32x0,75	21
P-721.06Q	M26x1/36"	21
P-721.08Q	M19x0,75	14
P-721.11Q	M25x0,75	21
P-721.12Q	W0,8x1/36"	14

*P-721.xxQ, .SL2, dimensions in mm (please order adapter separately)*



	G	D
P-721.02A	M26x0,75	23
P-721.03A	M27x0,75	24
P-721.04A	M28x0,75	25
P-721.05A	M32x0,75	29
P-721.06A	M26x1/36"	23
P-721.11A	M25x0,75	22

*P-721.CDA, .SDA, dimensions in mm (please order adapter separately)*

## Ordering Information

### P-721.CLQ

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , direct position measuring, capacitive sensor, LEMO connector(s), for QuickLock adapter

### P-721.CDQ

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , direct position measuring, capacitive sensor, Sub-D connector, for QuickLock adapter

**P-721.CDA**

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , direct position measuring, capacitive sensor, Sub-D connector, for QuickLock thread adapter with large aperture

**P-721.SL2**

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , strain gauge sensor, LEMO connector(s), for QuickLock adapter

**P-721.SDA**

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , strain gauge sensor, Sub-D connector, for QuickLock thread adapter with large aperture

**P-721.OLQ**

Fast PIFOC piezo nanofocusing system, 100  $\mu\text{m}$ , without sensor, LEMO connector(s), for QuickLock adapter