

P-611.3S · P-611.30

NanoCube® XYZ Piezo Nanopositioning Systems

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NanoCube®, XYZ Compact Nanopositioning System, 100 x 100 x 100 µm travel range, 1 nm resolution.

- 100 x 100 x 100 µm Travel Range
- Very Compact: 44 x 44 x 44 mm
- 1 nm Resolution
- Ideal for Fiber-Alignment and Photonics Packaging Applications
- Optional E-760 Controller Card Features Built-In Optical Metrology
- Closed- and Open-Loop Versions
- Flexure-Guided Precision Trajectory Control
- Fast Scanning and Settling
- Large Variety of Controllers

The P-611 NanoCube® is a versatile, multi-axis piezo-nanopositioning system. Its 100 x 100 x 100 µm positioning and scanning range comes in an extremely compact package of only 44 x 44 x 44 mm. Equipped with a zero-stiction, zero-friction guiding system, this NanoCube® provides motion

with ultra-high resolution and settling times of only a few milliseconds. Open- and closed-loop versions are offered to fit your application.

Open and Closed-Loop Operation

The open-loop models are ideal for high-resolution positioning and scanning tasks where an external sensor is used or the absolute position is not important, for example in tracking or fiber-alignment applications. In open-loop operation, the platform's position is roughly proportional to the drive voltage (see p. 4-15 ff. in the "Tutorial" section for behavior of open-loop piezos).

The closed-loop version allows absolute position control, high

linearity, and repeatability based on the internal ultra-high-resolution feedback sensors.

Versatility: Hybrid Systems, Photonics Alignment

NanoCubes® can be easily combined with a variety of automated or manual PI micropositioning systems to form compact hybrid positioning systems, from single-axis stages to 6-degree-of-freedom micro-manipulators. A special P-611 version is available for fiber alignment and photonics packaging (see page 8-16).

Working Principle / Reliability

NanoCube® systems 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.

Ordering Information

P-611.3S
NanoCube® XYZ Piezo Nanopositioning Stage, 100 x 100 x 100 µm, Closed-Loop

P-611.30
NanoCube® XYZ Piezo Nanopositioning Stage, 100 x 100 x 100 µm, Open-Loop

A special version is available for fiber alignment and photonics packaging (see page 8-16)

Ask about custom designs!

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

Notes

See the "Piezo Drivers & Nanopositioning Controllers" section, p. 6-8 ff. for our comprehensive line of low-noise control electronics.

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

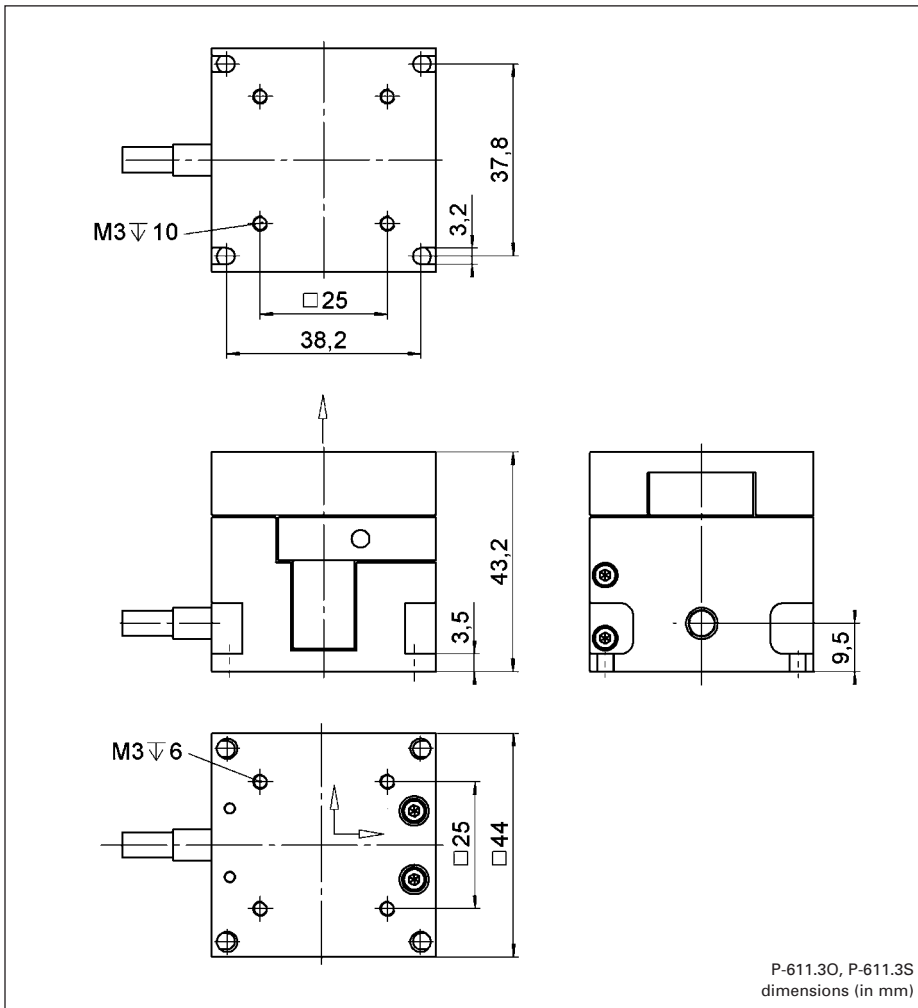


F-131, Combination of NanoCube® XYZ Nanopositioning System, 100 x 100 x 100 µm and M-111 XYZ MicroPositioner 15 x 15 x 15 mm (see the "Photonics Alignment" section for details).

Application Examples

- Photonics packaging
- Micromachining
- Micromanipulation (life sciences)
- Semiconductor test systems

For fiber optics applications, see P-611.3SF, page 8-16



Technical Data

Models	P-611.3S	P-611.30	Units	Notes see p. 2-84
Active axes	X, Y, Z	X, Y, Z		
Open-loop travel @ 0 to 100 V	100 / axis	100 / axis	$\mu\text{m} \pm 20\%$	A2
Closed-loop travel	100 / axis	-	μm	A5
Integrated feedback sensor	SGS	-		B
* Closed- / open-loop resolution	2 / 1	- / 1	nm	C1
Repeatability	25	25	nm	
Stiffness	0.3	0.3	$\text{N}/\mu\text{m} \pm 20\%$	D1
Max. normal load	+15/-5	+15/-5	N	D4
Electrical capacitance	1.5 / Axis	1.5 / Axis	$\mu\text{F} \pm 20\%$	F1
** Dynamic operating current coefficient (DOCC)	1.7 / axis	1.7 / axis	$\mu\text{A}/(\text{Hz} \times \mu\text{m})$	F2
Unloaded resonant frequency (X/Y/Z)	350/220/250	350/220/250	$\text{Hz} \pm 20\%$	G2
Operating temperature range	-20 to 80	-20 to 80	$^{\circ}\text{C}$	H2
*** Voltage connection	D	D		J1
*** Sensor connection	D	-		J2
Weight (w/o cables)	250	250	$\text{g} \pm 5\%$	
Body material	S/Al	S/Al		L
Recommended amplifier/controller (codes explained p. 2-17)	N, D, H	G, H		

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

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* 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 $50 \mu\text{m}$ at 10 Hz requires approximately 0.8 mA drive current.

*** Adapter cable with LEMO connectors for sensor and operating voltage available.