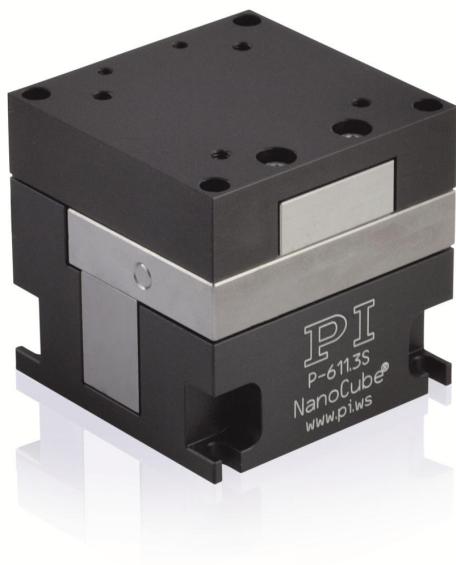


## NanoCube® XYZ Nanopositioner

Compact Multi-Axis Piezo Positioner for Nanopositioning and Fiber Alignment



### P-611.3

- Travel range up to 120  $\mu\text{m}$   $\times$  120  $\mu\text{m}$   $\times$  120  $\mu\text{m}$
- Ultracompact: 44 mm  $\times$  44 mm  $\times$  44 mm
- Resolution to 0.2 nm
- Fast response behavior
- Zero-play and highly accurate flexure guides
- Outstanding lifetime thanks to PICMA® piezo actuators
- For fast scanning
- Version with integrated fiber holder
- Particularly inexpensive systems

#### Application fields

- Photonics / integrated optics
- Micromanipulation
- Biotechnology
- Semiconductor tests
- Fiber positioning

#### Outstanding lifetime due to PICMA® piezo actuators

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

| Motion                                              | Unit | Tolerance  | P-611.3O | P-611.3OF | P-611.3S | P-611.3SF |
|-----------------------------------------------------|------|------------|----------|-----------|----------|-----------|
| Active axes                                         |      |            | X, Y, Z  | X, Y, Z   | X, Y, Z  | X, Y, Z   |
| Travel range in X                                   | μm   |            |          |           | 100      | 100       |
| Travel range in Y                                   | μm   |            |          |           | 100      | 100       |
| Travel range in Z                                   | μm   |            |          |           | 100      | 100       |
| Travel range in X, open loop, at -20 to 120 V       | μm   | +20 / -0 % | 120      | 120       | 120      | 120       |
| Travel range in Y, open loop, at -20 to +120 V      | μm   | +20 / -0 % | 120      | 120       | 120      | 120       |
| Travel range in Z, open loop, at -20 to 120 V       | μm   | +20 / -0 % | 120      | 120       | 120      | 120       |
| Linearity error                                     | %    | Typ.       |          |           | 0.1      | 0.1       |
| Pitch (Rotational crosstalk in θX with motion in Y) | μrad | Typ.       | ±5       | ±5        | ±5       | ±5        |
| Yaw (Rotational crosstalk in θX with motion in Z)   | μrad | Typ.       | ±10      | ±10       | ±10      | ±10       |
| Pitch (Rotational crosstalk in θY with motion in X) | μrad | Typ.       | ±5       | ±5        | ±5       | ±5        |
| Pitch (Rotational crosstalk in θY with motion in Z) | μrad | Typ.       | ±10      | ±10       | ±10      | ±10       |
| Yaw (Rotational crosstalk in θZ with motion in X)   | μrad | Typ.       | ±20      | ±20       | ±20      | ±20       |
| Yaw (Rotational crosstalk in θZ with motion in Y)   | μrad | Typ.       | ±10      | ±10       | ±10      | ±10       |

| Positioning                       | Unit | Tolerance | P-611.3O | P-611.3OF | P-611.3S                       | P-611.3SF                      |
|-----------------------------------|------|-----------|----------|-----------|--------------------------------|--------------------------------|
| Unidirectional repeatability in X | nm   | Typ.      |          |           | ±10                            | ±10                            |
| Unidirectional repeatability in Y | nm   | Typ.      |          |           | ±10                            | ±10                            |
| Unidirectional repeatability in Z | nm   | Typ.      |          |           | ±10                            | ±10                            |
| Resolution in X, open loop        | nm   | Typ.      | 0.2      | 0.2       | 0.2                            | 0.2                            |
| Resolution in Y, open loop        | nm   | Typ.      | 0.2      | 0.2       | 0.2                            | 0.2                            |
| Resolution in Z, open loop        | nm   | Typ.      | 0.2      | 0.2       | 0.2                            | 0.2                            |
| Integrated sensor                 |      |           |          |           | SGS, direct position measuring | SGS, direct position measuring |
| System resolution in X            | nm   |           |          |           | 1                              | 1                              |
| System resolution in Y            | nm   |           |          |           | 1                              | 1                              |
| System resolution in Z            | nm   |           |          |           | 1                              | 1                              |

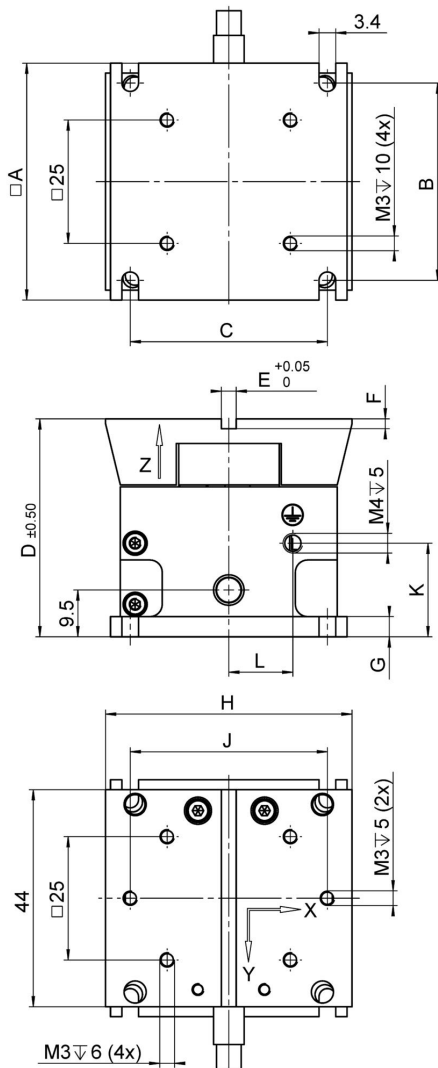
| Drive Properties       | Unit | Tolerance | P-611.3O              | P-611.3OF             | P-611.3S              | P-611.3SF             |
|------------------------|------|-----------|-----------------------|-----------------------|-----------------------|-----------------------|
| Drive type             |      |           | Piezo actuator/PICMA® | Piezo actuator/PICMA® | Piezo actuator/PICMA® | Piezo actuator/PICMA® |
| Electrical capacitance | μF   | ±20%      | 1,5                   | 1,5                   | 1,5                   | 1,5                   |

| Mechanical Properties                          | Unit | Tolerance | P-611.3O                                             | P-611.3OF                                            | P-611.3S                                             | P-611.3SF                                            |
|------------------------------------------------|------|-----------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| Stiffness                                      | N/μm | ±20%      | 0.3                                                  | 0.3                                                  | 0.3                                                  | 0.3                                                  |
| Resonant frequency in X, unloaded              | Hz   | ±20%      | 350                                                  | 350                                                  | 350                                                  | 350                                                  |
| Resonant frequency in X, under load with 30 g  | Hz   | ±20%      | 270                                                  | 270                                                  | 270                                                  | 270                                                  |
| Resonant frequency in X, under load with 100 g | Hz   | ±20%      | 180                                                  | 180                                                  | 180                                                  | 180                                                  |
| Resonant frequency in Y, unloaded              | Hz   | ±20%      | 220                                                  | 220                                                  | 220                                                  | 220                                                  |
| Resonant frequency in Y, under load with 30 g  | Hz   | ±20%      | 185                                                  | 185                                                  | 185                                                  | 185                                                  |
| Resonant frequency in Y, under load with 100 g | Hz   | ±20%      | 135                                                  | 135                                                  | 135                                                  | 135                                                  |
| Resonant frequency in Z, unloaded              | Hz   | ±20%      | 250                                                  | 250                                                  | 250                                                  | 250                                                  |
| Resonant frequency in Z, under load with 30 g  | Hz   | ±20%      | 230                                                  | 230                                                  | 230                                                  | 230                                                  |
| Resonant frequency in Z, under load with 100 g | Hz   | ±20%      | 200                                                  | 200                                                  | 200                                                  | 200                                                  |
| Permissible push force in X                    | N    | Max.      | 15                                                   | 15                                                   | 15                                                   | 15                                                   |
| Permissible push force in Y                    | N    | Max.      | 15                                                   | 15                                                   | 15                                                   | 15                                                   |
| Permissible push force in Z                    | N    | Max.      | 15                                                   | 15                                                   | 15                                                   | 15                                                   |
| Permissible pull force in X                    | N    | Max.      | 10                                                   | 10                                                   | 10                                                   | 10                                                   |
| Permissible pull force in Y                    | N    | Max.      | 10                                                   | 10                                                   | 10                                                   | 10                                                   |
| Permissible pull force in Z                    | N    | Max.      | 10                                                   | 10                                                   | 10                                                   | 10                                                   |
| Guide                                          |      |           | Flexure guide/Flexure guide with lever amplification | Flexure guide/Flexure guide with lever amplification | Flexure guide/Flexure guide with lever amplification | Flexure guide/Flexure guide with lever amplification |
| Overall mass                                   | g    | ±5%       | 320                                                  | 320                                                  | 320                                                  | 320                                                  |
| Material                                       |      |           | Aluminum, steel                                      | Aluminum, steel                                      | Aluminum, steel                                      | Aluminum, steel                                      |

| Miscellaneous                     | Unit | Tolerance | P-611.3O                          | P-611.3OF                         | P-611.3S                          | P-611.3SF                         |
|-----------------------------------|------|-----------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Operating temperature range       | °C   |           | -20 to 80                         | -20 to 80                         | -20 to 80                         | -20 to 80                         |
| Connector                         |      |           | D-sub 25-pin (m)                  | D-sub 25-pin (m)                  | D-sub 25-pin (m)                  | D-sub 25-pin (m)                  |
| Sensor connector                  |      |           |                                   |                                   | D-sub 25-pin (m)                  | D-sub 25-pin (m)                  |
| Cable length                      | m    | ±10 mm    | 1.5                               | 1.5                               | 1.5                               | 1.5                               |
| Recommended controllers / drivers |      |           | E-503, E-505, E-663, E-664, E-727 | E-503, E-505, E-663, E-664, E-727 | E-503, E-505, E-663, E-664, E-727 | E-503, E-505, E-663, E-664, E-727 |

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. Adapter cables with LEMO connectors for sensor and operating voltage available.

## Drawings / Images



|           | A  | B    | C    | D    | E | F | G   | H  | J  | K   | L  |
|-----------|----|------|------|------|---|---|-----|----|----|-----|----|
| P-611.3O  | 44 | 38.2 | 37.8 | 43.2 | - | - | 3.5 | 44 | -  | 3.5 | 10 |
| P-611.3S  | 44 | 38.2 | 37.8 | 43.2 | - | - | 3.5 | 44 | -  | 3.5 | 10 |
| P-611.3OF | 44 | 38.2 | 37.8 | 44.2 | 3 | 2 | 3.5 | 50 | 40 | 3.5 | 10 |
| P-611.3SF | 48 | 40   | 40   | 44.2 | 3 | 2 | 4.1 | 50 | 40 | 19  | 13 |

P-611.3, dimensions in mm

## Order Information

### P-611.3O

NanoCube® XYZ nanopositioner; 120 µm × 120 µm × 120 µm travel range (open loop) (X × Y × Z); without sensor; D-sub 25 (m) connector; 1.5 m cable length

### P-611.3OF

NanoCube® XYZ nanopositioner; 120 µm × 120 µm × 120 µm travel range (open loop) (X × Y × Z); without sensor; integrated fiber holder; D-sub 25 (m) connector; 1.5 m cable length

## Order Information

### **P-611.3S**

NanoCube® XYZ nanopositioner; 100 µm × 100 µm × 100 µm travel range (X × Y × Z); SGS, direct position measuring; D-sub 25 (m) connector; 1.5 m cable length

### **P-611.3SF**

NanoCube® XYZ nanopositioner; 100 µm × 100 µm × 100 µm travel range (X × Y × Z); SGS, direct position measuring; integrated fiber holder; D-sub 25 (m) connector; 1.5 m cable length