Picometric Noise Floor Nanopositioners
CONTACT

How can we help you?

We can support you:
- by the development of complete positioning solutions
- in choosing the right products for your requirement
- in helping you to integrate the stage into your set-up.

You can contact us by phone at +33(0)478742456

Or by email at: info@piezoconcept.com

Or reach us at the following address:

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INTRODUCTION

PIEZOCONCEPT is the leading provider of nanopositioners dedicated to applications such as Super Resolution Microscopy, Optical Trapping and Atomic Force Microscopy. Our customers include many leading scientists engaged in leading edge research at world class universities and institutes. For many decades, researchers bought stages equipped with capacitive sensors. But our users wanted better stability and linearity and new powerful microscopy techniques demanded a major rethink. Something more stable was required. We decided to take a long hard look at these systems and see if there was a better, more elegant, solution to providing accurate and stable positioning. We developed a range of ultra-stable nanopositioners able to meet a wide range of microscopy applications with significant advantages over the currently available products.

As one of our biggest advantages, the sensor we use outperforms high-end capacitive sensor because of their exceptionally high signal, leading to picometric stability. Also, because of the very low-noise electronics and the flexure design stage we offer, we can ensure subnanometric (or sub-nanoradian) noise floor.

Dr. Samuel CHOBLET
CEO of PIEZOCONCEPT
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HS1 NANOPOSITIONER

The HS1 is a compact nanopositioner which can be combined to form 2 or even 3-axis nanopositioning systems. It is offered with 30, 50 or 70µm of range of motion and it can also be proposed with an aperture (see page 08).

This nanopositioner is part of our high-speed product line (High power controller available).

**Features**
- High speed, direct drive
- Stackable for XY or XYZ motion
- 30, 50 or 70µm motion
- Closed loop control
- Silicon sensor technology
- Less than 10pm noise floor

**Applications**
- Interferometry
- Nanolithography
- 3D polymerisation
- High speed focusing
- Adaptative optics
### Specifications

<table>
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<th>HS1.70</th>
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<td>0.07</td>
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<td>0.14</td>
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<td>0.02%</td>
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<td>Stiffness (N/µm)</td>
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<td>1</td>
</tr>
<tr>
<td>Maximum load (kg) - vertical use</td>
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<tr>
<td>Sensor</td>
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<td>Silicon HR sensor</td>
<td>Silicon HR sensor</td>
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<tr>
<td>Recommended Controller</td>
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<td>Standard or High Speed</td>
<td>Standard or High Speed</td>
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</table>

### Drawing

![Drawing of the product](drawing.jpg)

**Dimensions:**
- 115.50 mm
- 89.50 mm
- 62.50 mm
- 32.50 mm
- 25.50 mm

**Features:**
- 4 C-bored for M3 CHC
- 4 tapped holes M2.5 x 0.45
- Cable exit point

---

**Contact Information:**
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- Phone: +33(0)478742456
- Email: info@piezoconcept.com
HS1-APERTURE NANOPositioner

The HS1-APERTURE is a compact nanopositioner which can be combined to form 2 or even 3-axis nanopositioning systems. It is offered with 30, 50 or 70µm of range of motion and has a central aperture of 33mm, making it ideal for optical microscopy applications.

This nanopositioner is part of our high-speed product line (High power controller available).

Features
- High speed, direct drive
- Diameter of the aperture : 33mm
- Stackable for XY or XYZ motion
- 30, 50 or 70µm motion
- Closed loop control
- Silicon sensor technology
- Less than 10pm noise floor

Applications
- Interferometry
- Nanolithography
- 3D polymerisation
- High speed focusing
- Adaptative optics
# Specifications

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<td>Silicon HR sensor</td>
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<td>Recommended Controller</td>
<td>Standard or High Speed</td>
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<td>Standard or High Speed</td>
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</table>

# Drawing

![Drawing Image]

- Cable exit point
- 4 C-bored for M3 CHC
- 4 tapped holes M2,5 x 0,45
FOC NANOPositioner

The FOC are nanopositioners dedicated to microscope objective accurate positioning. They are offered with 100, 200 or 300 microns of travel. The FOC is used in a wide range of applications: Z-stack, automated focus or together with automated focus drift compensation system. It is made from aluminium and brass, and is equipped with sensor offering stability in the picometer level. The brass mounting ring can be easily exchanged so that any objective can be used with the FOC nanopositioner. The threads which are available are: RMS, M25, M26, M27 and M32.

Features

- Travel ranges up to 300µm
- Moves objectives with sub-nm resolution
- Parallel flexure guiding
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

Applications

- 3D imaging
- Interferometry
- Autofocus system
- Confocal microscopy
- Super Resolution microscopy
- Semiconductor metrology

FOC200 Nanopositioner (200µm travel range)
Specifications

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<td>Sensor</td>
<td>Silicon HR sensor</td>
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<tr>
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<tr>
<td>Recommended Controller</td>
<td>Standard</td>
<td>Standard</td>
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</tbody>
</table>

Drawing

Objective lens maximum diameter 40 mm
Tapping RMS, M25, M26 or M27
Threading RMS, M25, M26, M27 or M32
Cable exit point

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Z-INSERT NANOPositioner

The Z insert is a low profile (19mm) Z stage that can be integrated into most of the standard long-range microstages dedicated to inverted or upright microscopes.

This stage is proposed in various travel ranges: 100, 200 and 300 microns and is provided with the sample holder of your choice (35mm Petri dish, coverslip or microscope slide).

Features
- Travel ranges up to 300µm
- Low profile for easy integration
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

Applications
- Z-stack
- Autofocus system
- Confocal microscopy
- Super Resolution microscopy
- Biotechnology

Z-INSERT 300 Nanopositioner (300µm travel range)
Specifications

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<td>0,3</td>
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<td>Typical noise floor (nm)</td>
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<td>Stiffness (N/µm)</td>
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<td>0,4</td>
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<td>Silicon HR sensor</td>
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Drawing

[Drawing of the 1 axis stage with dimensions and features]
**BIO2 NANOPositioner**

The BIO 2 is a 2-axis ultra-low profile nanopositioner designed to be integrated in any kind of inverted microscopes. Microscope slides can be accommodated inside its rectangular aperture. This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - pages 34-35).

As standard, the BIO2 is made in Aluminium but for Bruker AFM upgrade, we can propose the BIO2.100 (100µm version) in Invar, which leads to higher thermal stability.

**Features**

- Low profile
- Rectangular aperture (83mm x 53mm)
- 100, 200 or 300µm motion
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

**Applications**

- Super Resolution microscopy
- Nanolithography
- Particle tracking
- Confocal microscopy
- Atomic Force Microscopy
- Bruker AFM upgrade
Specifications

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Drawing

4 C-bored for M3 CHC

12 tapped holes M2.5x0.45

Cable exit points
LT2 NANOPositioner

The LT2 is a 2-axis ultra-low profile nanopositioner designed to be integrated in any kind of inverted microscopes. This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - pages 34-35).

As standard, the LT2 is made in Aluminium but for Bruker AFM upgrade, we can propose the LT2.100 (100µm version) in Invar, which leads to higher thermal stability.

Features
- Low profile
- Square aperture (66mm x 66mm)
- 100, 200 or 300µm motion
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

Applications
- Super Resolution microscopy
- Nanolithography
- Particle tracking
- Confocal microscopy
- Atomic Force Microscopy
- Bruker AFM upgrade
## Specifications

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<tr>
<td>Recommended Controller</td>
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</tbody>
</table>

### Drawing

- 12 tapped holes M2.5x0.45
- 4 C-bored for M3 CHC
- Cable exit points

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**Tél : +33(0)478742456**
**Email : info@piezoconcept.com**
The LFHS2 is a 2-axis ultra-high speed nanopositioner, offering a motion range of 75µm along X and Y, a large 66mm x 66mm aperture and resonant frequencies higher than 2kHz on both axis. It can be also proposed with an integrated Z axis (50µm travel range) if required (see the LFHS3 - pages 28-29). This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - pages 34-35). This nanopositioner is part of our high-speed product line (High power controller available). High speed scans and step response time smaller than 2ms are then possible.

**Features**

- Ultra high speed
- Direct drive
- Square aperture (66mm x 66mm)
- 75µm XY motion
- Closed loop control
- Silicon sensor technology
- Less than 10pm noise floor

**Applications**

- Super Resolution microscopy
- Particle tracking
- Fast XY scanning
- Confocal microscopy
- Atomic Force Microscopy
- Optical tweezer

[Image of LFHS2 Nanopositioner (75µm travel range)]
Specifications

<table>
<thead>
<tr>
<th>LTFS2</th>
<th>Range of motion XY (µm)</th>
<th>75</th>
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<tbody>
<tr>
<td></td>
<td>Resolution XY (nm)</td>
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<tr>
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<td>Typical noise floor XY (nm)</td>
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<tr>
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<td>Full range repeatability XY (nm)</td>
<td>0,15</td>
</tr>
<tr>
<td></td>
<td>Linearization (typical)</td>
<td>0,02%</td>
</tr>
<tr>
<td></td>
<td>Resonant frequency X/Y (Hz)</td>
<td>3000/2000</td>
</tr>
<tr>
<td></td>
<td>Stiffness (N/µm)</td>
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<td></td>
<td>Maximum load (kg) - horizontal use</td>
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<tr>
<td></td>
<td>Maximum load (kg) - vertical use</td>
<td>0,5</td>
</tr>
<tr>
<td></td>
<td>Sensor</td>
<td>Silicon HR sensor</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Material</td>
<td>Al</td>
</tr>
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<td></td>
<td>Cable length (m)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Recommended Controller</td>
<td>High Speed</td>
</tr>
</tbody>
</table>

Drawing

4 C-bored for M3 CHC
6 tapped holes M2,5x0.45
Cable exit points
LTHS2 NANOPositioner

The LTHS2 is a 2-axis ultra-high speed nanopositioner, offering a motion range of 75µm along X and Y and a large 83mm x 66mm aperture well compatible with microscope slides. Its resonant frequencies higher than 1kHz on both axis allows high-speed XY scans. This nanopositioner is part of our high-speed product line (High power controller available). High speed scans and step response time smaller than 2ms are then possible. If a low footprint is not required, the LFHS2 can be an interesting alternative solution (See pages 18-19). This piezostage can be proposed with a coarse positioning Microstage (See pages 34-35).

Features
- Ultra high speed
- Direct drive
- Rectangular aperture (83mm x 66mm)
- 75µm XY motion
- Closed loop control
- Silicon sensor technology
- Less than 10pm noise floor

Applications
- Super Resolution microscopy
- Particle tracking
- Fast XY scanning
- Confocal microscopy
- Atomic Force Microscopy
- Optical tweezer
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>LTH52</th>
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</thead>
<tbody>
<tr>
<td>Range of motion XY (µm)</td>
<td>75</td>
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<tr>
<td>Resolution XY (nm)</td>
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<tr>
<td>Typical noise floor XY (nm)</td>
<td>0.0075</td>
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<tr>
<td>Full range repeatability XY (nm)</td>
<td>0.15</td>
</tr>
<tr>
<td>Linearization (typical)</td>
<td>0.02%</td>
</tr>
<tr>
<td>Resonant frequency X/Y (Hz)</td>
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<tr>
<td>Stiffness (N/µm)</td>
<td>2/2</td>
</tr>
<tr>
<td>Maximum load (kg) - horizontal use</td>
<td>0.5</td>
</tr>
<tr>
<td>Maximum load (kg) - vertical use</td>
<td>0.3</td>
</tr>
<tr>
<td>Sensor</td>
<td>Silicon HR sensor</td>
</tr>
<tr>
<td>Size W x L x H (mm)</td>
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</tr>
<tr>
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<tr>
<td>Cable length (m)</td>
<td>2</td>
</tr>
<tr>
<td>Recommended Controller</td>
<td>Standard or High Speed</td>
</tr>
</tbody>
</table>

## Drawing

- 4 C-bored for M3 CHC
- 6 tapped holes M2.5x0.45
- Cable exit points
The TT2 is a 2-axis tip-tilt stage with a range of motion of 5 mrad (for each axis). This piezostage is the ideal tool for applications where an optical beam steering is necessary. This makes this high-speed stage a best-seller for applications such as: particle tracking, optical tweezer, beam stabilization, and scanning microscopy. This nanopositioner is part of our high-speed product line (High power controller available). High-speed scan at 500Hz and step response time smaller than 2ms are then possible.

**Features**
- Ultra high speed
- 1 inch mirror mounting surface
- 5mrad Tip-Tilt motion
- Closed loop control
- Silicon sensor technology
- Less than 1nrad noise floor

**Applications**
- Beam stabilization
- Particle tracking
- Fast beam steering
- Confocal microscopy
- Optical tweezer
- TERS
### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Range of angular motion (mrad)</td>
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<td>Angular resolution (µrad)</td>
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<td>Typical angular noise floor (µrad)</td>
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<tr>
<td>Full range repeatability (µrad)</td>
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<tr>
<td>Linearization (typical)</td>
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<tr>
<td>Resonant frequency Tip/Tilt (Hz)</td>
<td>4000/2000</td>
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<tr>
<td>Stiffness (N/µm)</td>
<td>N/A</td>
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<tr>
<td>Maximum load (kg) - horizontal use</td>
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</tr>
<tr>
<td>Maximum load (kg) - vertical use</td>
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<td>Sensor</td>
<td>Silicon HR sensor</td>
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<tr>
<td>Size W x L x H (mm)</td>
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<tr>
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<tr>
<td>Cable length (m)</td>
<td>2</td>
</tr>
<tr>
<td>Recommended Controller</td>
<td>Standard or High Speed</td>
</tr>
</tbody>
</table>

### Drawing

- 4 C-bored for M2 CHC
- Cable exit points
- Tapped hole M3
- Φ 2.540
- 17.30
- 51
- 60.50
- 43.20
- 43.60
- 43
- 51

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**BIO3 NANOPositioner**

The BIO3 is a 3-axis ultra-low profile nanopositioner designed to be integrated in any kind of inverted microscopes. Microscope slides can be accommodated inside its rectangular aperture. This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - pages 34-35).

As standard, the BIO3 is made in Aluminium but for Bruker AFM upgrade, we can propose the BIO3.100 (100µm version) also in Invar, which leads to higher thermal stability.

**Features**

- Low profile
- Rectangular aperture (83mm x 53mm)
- 100, 200 or 300µm motion
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

**Applications**

- Super Resolution microscopy
- Nanolithography
- Particle tracking
- Confocal microscopy
- Atomic Force Microscopy
- Bruker AFM upgrade
Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>BIO3.100</th>
<th>BIO3.200</th>
<th>BIO3.300</th>
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<tbody>
<tr>
<td>Range of motion XYZ (µm)</td>
<td>100</td>
<td>200</td>
<td>300</td>
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<tr>
<td>Resolution XYZ (nm)</td>
<td>0,1</td>
<td>0,2</td>
<td>0,3</td>
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<tr>
<td>Typical noise floor XYZ (nm)</td>
<td>0,01</td>
<td>0,02</td>
<td>0,03</td>
</tr>
<tr>
<td>Full range repeatability XYZ (nm)</td>
<td>0,2</td>
<td>0,4</td>
<td>0,6</td>
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<tr>
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<td>400/350/300</td>
<td>300/250/250</td>
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<td>Stiffness X/Y/Z (N/µm)</td>
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<td>0,5/0,4/0,4</td>
<td>0,4/0,3/0,3</td>
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<tr>
<td>Maximum load (kg) - vertical use</td>
<td>0,5</td>
<td>0,5</td>
<td>0,5</td>
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<tr>
<td>Sensor</td>
<td>Silicon HR sensor</td>
<td>Silicon HR sensor</td>
<td>Silicon HR sensor</td>
</tr>
<tr>
<td>Size W x L x H (mm)</td>
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<td>152,5 x 213 x 20,45</td>
<td>152,5 x 213 x 20,45</td>
</tr>
<tr>
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<td>Al or Invar</td>
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<td>Al</td>
</tr>
<tr>
<td>Cable length (m)</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Recommended Controller</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
</tbody>
</table>

Drawing

[Diagram showing specifications and measurements]
LT3 NANOPOSITIONER

The LT3 is a 3-axis ultra-low profile nanopositioner primarily designed to be integrated in any kind of inverted microscopes. This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - page 34-35).

As standard, the LT3 is made in Aluminium but for Bruker AFM upgrade, we can propose the LT3.100 (100µm version) in Invar, which leads to higher thermal stability.

Features

- Low profile
- Square aperture (66mm x 66mm)
- 100, 200 or 300µm motion
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

Applications

- Super Resolution microscopy
- Nanolithography
- Particle tracking
- Confocal microscopy
- Atomic Force Microscopy
- Bruker AFM upgrade
Specifications

<table>
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<tr>
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<th>LT3.100</th>
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<th>LT3.300</th>
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<tr>
<td>Resolution XYZ (nm)</td>
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<td>0,2</td>
<td>0,3</td>
</tr>
<tr>
<td>Typical noise floor XYZ (nm)</td>
<td>0,01</td>
<td>0,02</td>
<td>0,03</td>
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<tr>
<td>Full range repeatability XYZ (nm)</td>
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<td>0,4</td>
<td>0,6</td>
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<tr>
<td>Linearization (typical)</td>
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<td>400/350/300</td>
<td>300/250/250</td>
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<td>0,5/0,4/0,4</td>
<td>0,4/0,3/0,3</td>
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<tr>
<td>Maximum load (kg) - vertical use</td>
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<td>0,5</td>
<td>0,5</td>
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<tr>
<td>Sensor</td>
<td>Silicon HR sensor</td>
<td>Silicon HR sensor</td>
<td>Silicon HR sensor</td>
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<td>152,5 x 193 x 20,70</td>
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<td>Al</td>
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<tr>
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<td>2</td>
</tr>
<tr>
<td>Recommended Controller</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
</tbody>
</table>

Drawing

- 4 C-bored for M3 CHC
- 12 tapped holes M2,5x0,45
- Cable exit points
The LFHS3 is a 3-axis ultra-high speed nanopositioner, offering 75µm motion along X and Y, 50µm travel along Z, a large 66mm x 66mm aperture and resonant frequencies higher than 1.5kHz on every axis. This piezostage can be proposed with a coarse positioning Microstage (See our Hybrid System - pages 34-35). This nanopositioner is part of our high-speed product line (High power controller available). High speed scans and step response time smaller than 2ms are consequently possible.

**Features**
- Ultra high speed
- Direct drive
- Square aperture (66mm x 66mm)
- 75µm XY motion, 50µm Z motion
- Closed loop control
- Silicon sensor technology
- Less than 10pm noise floor

**Applications**
- Super Resolution microscopy
- Particle tracking
- Fast XY scanning
- Confocal microscopy
- Atomic Force Microscopy
- Optical tweezer
Specifications

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<tbody>
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<td>Range of motion X/Y/Z (µm)</td>
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<td>Linearization (typical)</td>
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<tr>
<td>Maximum load (kg) - vertical use</td>
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</tr>
<tr>
<td>Sensor</td>
<td>Silicon HR sensor</td>
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<tr>
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<tr>
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<td>High Speed</td>
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</table>

Drawing

- Cable exit points
- 6 tapped holes M2,5x0.45
- 4 C-bored for M3 CHC
CUBE3 NANOPositioner

The CUBE3 is a 3-axis nanopositioner, offering either 100 or 200µm motion along X, Y and Z. Its compact design makes it the ideal tool for applications such as: optical fiber alignment, 2 photons polymerisation and laser writing.

Features

- 100µm or 200µm XYZ motion
- Compact design
- Closed loop control
- Silicon sensor technology
- Less than 30pm noise floor

Applications

- Alignment
- Laser writing
- 2 photons polymerisation
- Confocal microscopy
- 3D printer
## Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>CUBE3.100</th>
<th>CUBE3.200</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Resolution XYZ (nm)</td>
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<td>0,2</td>
</tr>
<tr>
<td>Typical noise floor XYZ (nm)</td>
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<td>0,02</td>
</tr>
<tr>
<td>Full range repeatability XYZ (nm)</td>
<td>0,2</td>
<td>0,4</td>
</tr>
<tr>
<td>Linearization (typical)</td>
<td>0,02%</td>
<td>0,02%</td>
</tr>
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<td>Resonant frequency X/Y/Z (Hz)</td>
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<td>Stiffness X/Y/Z (N/µm)</td>
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<td>0,3/0,3/0,6</td>
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<tr>
<td>Maximum load (kg) - horizontal use</td>
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<td>0,5</td>
</tr>
<tr>
<td>Maximum load (kg) - vertical use</td>
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<td>0,1</td>
</tr>
<tr>
<td>Sensor</td>
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<td>Silicon HR sensor</td>
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<td>63,5 x 63,5 x 52,45</td>
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<tr>
<td>Cable length (m)</td>
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<td>2</td>
</tr>
<tr>
<td>Recommended Controller</td>
<td>Standard</td>
<td>Standard</td>
</tr>
</tbody>
</table>

## Drawing

- 84 tapped holes M3
- 4 C-bored for M3 CHC
- 4 tapped holes M3
- Cable exit points

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Tél : +33(0)478742456
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MANUAL MICROSTAGE

The manual Microstage we offer has been designed to be a very stable base for our nanopositioners. It offers 25mm travel along X and Y and it is proposed for any inverted microscopes (ZEISS, OLYMPUS, NIKON, LEICA). A blocking force of 20N has been implemented into this system so that it doesn't move at the nanometer level even if an high-speed piezostage oscillates on top of it. Standard Microstage are often not able to reach that performance (presence of oscillations or drifts). Optional wings or an optional breadboard (with threaded M6 holes on a 25mm pattern or 1/4-20 holes on a 1 inch pattern) can be also provided.

Features

- Low profile
- Rectangular aperture (95mm x 66mm)
- 25mm x 25mm range of motion

Applications

- Coarse positioning of standard or high speed nanopositioners
Piezostage compatibility

The manual Microstage is compatible with the following nanopositioners:
- BIO2 (see pages 14-15)
- LT2 (see pages 16-17)
- LFHS2 (see pages 18-19)
- LTHS2 (see pages 20-21)
- BIO3 (see pages 24-25)
- LT3 (see pages 26-27)
- LFHS3 (see pages 28-29).

Upon request, it can also be manufactured to be compatible with Z-INSERT (see pages 12-13).

Drawing

Mounting hole location according to the microscope
Compatible with Leica, Nikon, Olympus or Zeiss microscopes
Piezoconcept can provide fully integrated Hybrid positioning Systems for use with inverted optical microscopes (ZEISS, OLYMPUS, NIKON, LEICA). Easy to operate and affordable, our Hybrid Systems combine a manual micrometer driven, two axis, linear motion stage with either standard speed, long range or ultra-high speed, shorter range nanopositioners. A stable blocking force into each axis of the coarse positioning stage provides a secure base for precision positioning. The nanopositioning system provide sub-nanometer resolution under closed loop control.

**Features**
- Low profile
- 25mm x 25mm coarse positioning
- Standard or Ultra-High speed
- Up to 300µm XYZ travel (piezostage)

**Applications**
- Super Resolution microscopy
- Nanolithography
- Particle tracking
- Confocal microscopy
- Atomic Force Microscopy

**MANUAL MICROSTAGE**
(25mm x 25mm)
WITH LT3.100
(3 axis - 100µm motion)
AND OPTIONAL BREADBOARD
Some examples

- Hybrid System with BIO2
- Hybrid System with LFHS3
- Hybrid System with LT3
- Hybrid System with LTHS2 and optional Breadboard
- Hybrid System with BIO3 and optional Breadboard
- Hybrid System with LT3 and optional Breadboard
ACCESSORIES

Together with the piezostage, we can provide a wide range of accessories such as spacers, extension ring (for the FOC nanopositioner), breadboard, wings but also sample holders.

Sample holders for the BIO2/BIO3/LTHS2

- Sample holder for microscope coverslip
- Sample holder for 35mm Petri dish
- Sample holder for 75mm long microscope slide
Sample holders for the LT2/LT3/LFHS2/LFHS3

Re-entrant sample holder for microscope coverslip

Re-entrant sample holder for 35mm Petri dish

Top-mounted sample holder for 75mm long microscope slide and coverslip adapter
Sample holders for LTHS3/Z-INSERT

Sample holder for microscope coverslip

Sample holder for 35mm Petri dish

Sample holder for 75mm long microscope slide
CONTROLLER

The Piezoconcept controller includes ultra low noise and highly linear electronics, closed-loop control (PID) leading to a movement free of positioning errors.

Two different ways are given to the user to control the piezostage:
- an analogue input (BNC) located on the front panel of the controller
- an optional USB interface located on the back panel of the controller

As standard, the analogue input is between 0 and 10V, but it can be changed to -10V/+10V if the stage has to work with National Instrument DAC or eventually Bruker Bioscope/Nanoscope.

Our USB interface is compatible with Labview (VIs are provided) but also with most softwares dedicated to microscopy.

For stage capable of fast movement, a high speed controller is also available. With its 500mA output current, this controller can be used especially for high frequencies applications.
Absolute accuracy

Deviation between the actual position and the desired one. If a stage has to move 100µm but it moves only 99.99µm (measured through an ideal scale), then the inaccuracy is 10nm. The permanent positioning error along an axis is designated as accuracy. Absolute accuracy is affected by calibration errors, linearity errors, hysteresis, Abbe errors and positioning noise.

Backlash

Backlash is a positioning error occurring upon change of direction. Backlash can be caused by insufficiently preloaded thrust or inaccurate meshing of drive components, for example gear teeth. Piezoconcept’s flexure motion translation mechanism and piezo actuator designs are inherently backlash free.

Bandwidth

The frequency range to which the amplitude of the stage’s motion is dropped by 3dB. It reflects how fast the stage can follow the driving signal.

Drift

A position change over time, which includes the effects of temperature change and other environmental effects. The drift may be introduced from both the mechanical system and electronics.

Friction

Friction is defined as resistance between contacting surfaces during movement. Friction may be constant or speed dependant. Because they use flexure, the nanopositioners from Piezoconcept are friction free.

Hysteresis

The positioning error between forward scan and backward scan. A closed-loop control is an ideal solution for this problem and is done by using a network of High Resolution silicon sensor to provide feedback signals.

Linearity error

The error between the actual position and the first-order best fit line (straight line). Our nanopositioning products are calibrated with laser interferometry and the non linearity errors are compensated down to 0.02% of the full travel.
**Orthogonality error**

The angular offset of two defined motion axes from being orthogonal to each other. It can be interpreted as a part of crosstalk.

**Position noise**

The amplitude of the stage shaking when it is on a static command. It is usually measured and specified with Peak-To-Peak value. It is a combination of the sensor noise, driver electronics noise and command noise, etc. The position noise of our stages is very limited due to the very high Signal-To-Noise ratio of the Silicon HR sensors we use.

**Range of motion**

The maximum displacement of the nanopositioners.

**Resolution**

The minimum step size the stage can move. It is mainly defined by the DAC resolution.

**Resonant frequency**

Piezostage are oscillating mechanical systems characterized by a resonant frequency. The resonant frequency that we give is the lowest resonant frequency that can be seen on a nanopositioner. In general, the higher the resonant frequency of a system, the higher the stability and the wider working bandwidth the system will have. The resonant frequency of a piezostage is determined by the square root of the ratio of stiffness and mass.

**Silicon HR sensor**

Piezoconcept use temperature compensated High-Resolution silicon sensors network for reaching highest long-term stability. This measuring device is capable of measuring position noise in the picometer range and its response is not dependent of the presence of pollutants, air pressure changes like other high-end sensors can be.

**Step response time**

The step response time is the time needed by the nanopositioner to do the travel from 10% of the commanded value to 90% of the commanded value. The step response time reflects the dynamic characteristics of the system and is relatively independent of the step size.
1. Definition: In this document the following words shall have the following meanings:

"Goods" means the articles to be supplied to the Buyer by the Seller;
"Buyer" means the organisation or person who buys Goods;
"Intellectual Property Rights" means all patents, registered and unregistered designs, copyright, trade marks, know-how.

2. General: These Terms and Conditions shall apply to sales of Goods by the Seller to the Buyer to the exclusion of all other terms and conditions referred to, offered or relied on by the Buyer whether in negotiation or at any stage in the dealings between the parties, including any standard or printed terms tendered by the Buyer, unless the Buyer specifically states in writing, separately from such terms, that it wishes such terms to apply and this has been acknowledged by the Seller in writing. Any variation to these Terms and Conditions (including any special terms and conditions agreed between the parties) shall be inapplicable unless agreed in writing by the Seller.

3. Price and Payment: The price shall be the Recommended Retail Price less agreed discount, unless otherwise agreed in writing between the parties. The price is exclusive of VAT or any other applicable costs. Credit terms may be offered subject to satisfactory credit vetting of the Buyer by the Seller. The offer of credit will be at the sole discretion of the Seller. Where credit is offered payment of the price and any other applicable costs shall be due within 30 days of the date of the invoice supplied by the Seller, unless otherwise agreed in writing. In cases where credit is not offered payment will be required before release of goods by the Seller. The Seller shall be entitled to charge interest on overdue invoices from the date when payment becomes due from day to day until the date of payment at a maximum rate of 10 per cent per annum (but in no event more than the amount permitted by the applicable law). If payment of the price or any part thereof is not made by the due date, the Seller shall be entitled to require payment in advance of delivery in relation to any Goods not previously delivered and to refuse to make delivery of any undelivered Goods without incurring any liability whatever to the Buyer for non-delivery or any delay in delivery.

4. Description: Any description given or applied to the Goods is given by way of identification only and the use of such description shall not constitute a sale by description. For the avoidance of doubt, the Buyer hereby affirms that it does not in any way rely on any description when entering into the contract.

5. Sample: Where a sample of the Goods is shown to and inspected by the Buyer, the parties hereto accept that such a sample is representative in nature and the bulk of the order may differ slightly as a result of the manufacturing process.

6. Delivery: Unless otherwise agreed in writing, delivery of the Goods shall take place at the address specified by the Buyer on, or as close as possible to the date required by the Buyer. The Buyer shall make all arrangements necessary to take delivery of the Goods whenever they are tendered for delivery. If the Seller is unable to deliver the Goods because of actions or circumstances under the control of the Buyer, then the Seller shall be entitled to place the Goods in storage until such times as delivery may be effected and the Buyer shall be liable for any expense associated with such storage. Any damages, shortages, over deliveries and duplicated orders should be reported by registered letter to the Seller within 5 days of signed receipt to enable replacement or refund.

7. Risk: Risk in the Goods shall pass to the Buyer upon receipt of the goods. Where the Buyer chooses to collect the Goods itself, risk will pass when the Goods are entrusted to it or set aside for its collection, whichever happens first.

8. Title: Title in the Goods shall not pass to the Buyer until the Seller has been paid in full for the Goods.

9. Return of unused goods: All goods are sold on a firm sale basis, i.e. the Seller will not take back any goods not required or sold by the Buyer, unless otherwise agreed, in which case the following terms apply. Any returns must be authorised by a representative of the Seller before any credit will be given. Where the Seller agrees to accept the return of goods that are not damaged the Buyer will be responsible for the cost of carriage and will ensure that they are carefully packaged to avoid any damage in transit. The Seller will not be obliged to accept any goods that are damaged in any way. The Seller will only accept returns that appear in the Sellers current Publication List. Credit of amounts due or paid in will only be given for goods that are in saleable condition.

10. Limitation of liability: The Seller shall not be liable for any all loss or damage suffered by the Buyer in excess of the contract price. Nothing contained in these Terms and Conditions shall be construed so as to limit or exclude the liability of the Seller for death or personal injury as a result of the Seller's negligence or that of its employees or agents.

11. Intellectual property rights: All Intellectual Property Rights produced from or arising as a result of the performance of this Agreement shall, so far as not already vested, become the absolute property of the Seller, and the Buyer shall do all that is reasonably necessary to ensure that such rights vest in the Seller by the execution of appropriate instruments or the making of agreements with third parties.

12. Force majeure: The Seller shall not be liable for any delay or failure to perform any of its obligations if the delay or failure results from events or circumstances outside its reasonable control, including but not limited to acts of God, strikes, lock outs, accidents, war, fire, breakdown of plant or machinery or shortage or unavailability of raw materials from a natural source of supply, and the Seller shall be entitled to a reasonable extension of its obligations. If the delay persists for such time as the Seller considers unreasonable, it may, without liability on its part, terminate the contract.

13. Relationship of parties: Nothing contained in these Terms and Conditions shall be construed as establishing or implying any partnership or joint venture between the parties and nothing in these Terms and Conditions shall be deemed to construe either of the parties as the agent of the other.

14. Assignment and subcontracting: The contract between the Buyer and Seller for the sale of Goods shall not be assigned or transferred, nor the performance of any obligation sub-contracted, in either case by the Buyer, without the prior written consent of the Seller.

15. Waiver: The failure by either party to enforce at any time or for any period any one or more of the Terms and Conditions herein shall not be a waiver of them or of the right at any time subsequently to enforce all Terms and Conditions of this Agreement.

16. Governing law and jurisdiction: This Agreement shall be governed by and construed in accordance with the laws of France and the parties hereby submit to the exclusive jurisdiction of the French courts.

The PIEZOCONCEPT Company

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