

NPS-X-60D and NPS-X-100D

High-load direct-drive nanopositioning stages

Queensgate's nanopositioning stage (NPS) series are designed to provide optimal performance in the most demanding high-speed and high-precision applications.

The high-load direct-drive versions are available calibrated in either the X (horizontal) or Z (vertical) orientation for the best performance in the customer's system. Selectable calibration parameters provide optimal tuning for fast step-and-settle with different payload (up to 6 kg as standard).



Key Features

- Available in 60 and 100 μm versions
- Load capacity to 10 kg
- Flexure guided for highest precision
- Fast response from direct-drive piezo actuator
- Capacitive sensors provide direct measurement of the moving platform
- Selectable configurations for optimal performance with different loads

Typical Applications

- Optical assembly positioning in semiconductor inspection
- Microscope nose piece positioning
- Precision manufacturing

Suggested Controller

Queensgate NPC-D-6110 for single change systems as standard. Queensgate NPC-D-6330 for up to 3 piezo stages on request.

Specifications

| Parameter | | 60D | 100D | Units | Comments |
|------------------------------|--------------------|--------------------------|--------------|-------------------|--|
| Static physical | | | | | |
| Material | | Aluminum (nickel plated) | | | |
| Size (L x W x H) | | 220 X 210 X 52 | | mm | |
| Stage mass | | 5 | | kg | Excluding cable |
| Cable length | | 2 | | m | |
| Open-loop range | | 80 | 130 | μm | |
| Closed-loop range | | 60 | 100 | | |
| Static stiffness | | 40 | 30 | Nμm ⁻¹ | |
| Resonant frequency | 0 / 210 g | 950 | - | Hz | Typical - As measured in Z orientation |
| | 1 kg | 750 | 510 | | |
| | 2 kg | 650 | 485 | | |
| | 6kg | 600 | 350 | | |
| Maximum load mass | Horizontal (X) | 10 | | kg | Note 1 |
| | Vertical (Z) | 10 | | | |
| Dynamic physical | | | | | |
| 1 μm step-settle | 1 kg / 3 kg / 6 kg | 5.5 / 6.0 / 6.5 | 5.8 / 6 / 7 | ms | Note 2 Note 3 |
| 10 μm step-settle | | 10 / 12 / 13 | 14 / 14 / 14 | | |
| 40 μm step-settle | | 15 / 16 / 17.5 | 28 / 28 / 28 | | |
| Position noise (1σ) | | 0.1 | 0.15 | nm _{rms} | Note 4 |
| Unidirectional repeatability | | 0.7 | 0.9 | nm | (210 g, fast) |
| Error terms | | | | | |
| *Linearity error (peak) | Z | 0.005 | | % | Note 5 |
| Roll (Rot_X) | | 0.3 | 0.5 | μradians | Note 6 |
| Pitch (Rot_Y) | | 0.3 | 0.5 | | |
| Yaw (Rot_Z) | | 0.3 | 0.5 | | |
| Off axis motion X | | 0.3 | 0.3 | nm/μm | When Z is axis of motion |
| Off axis motion Y | | 0.1 | 0.1 | nm/μm | |

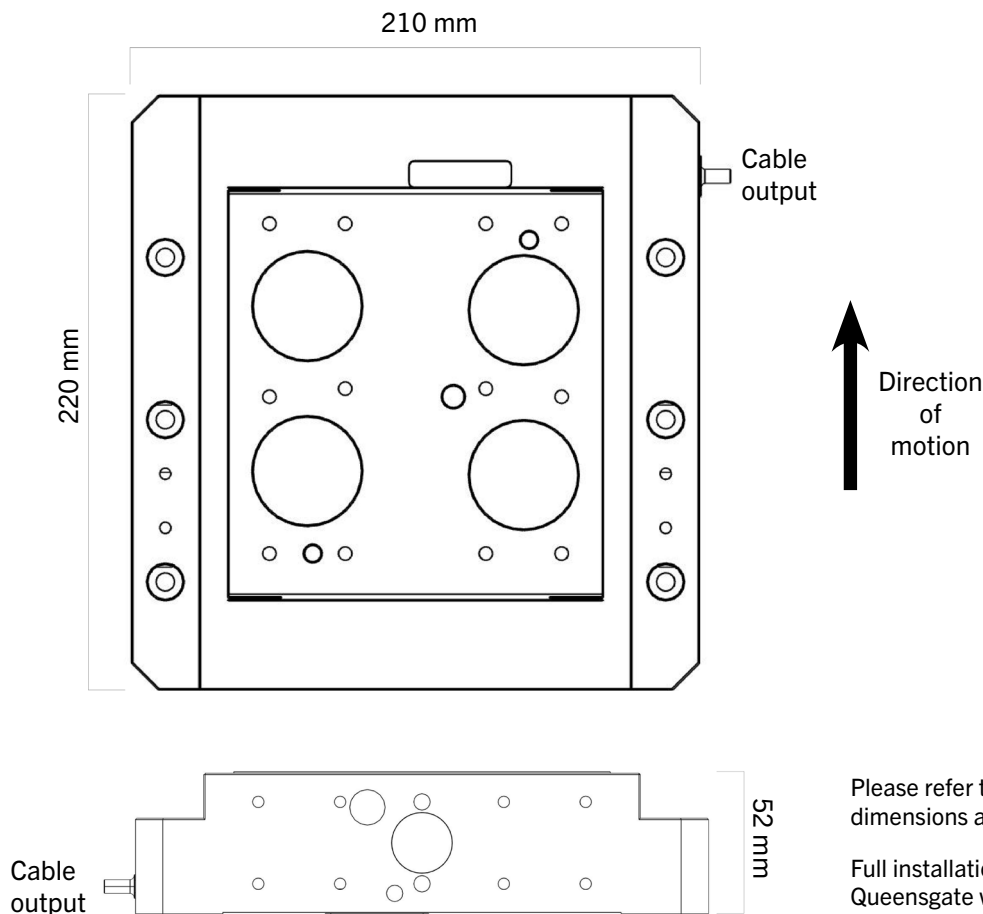
Preliminary specifications. Subject to change without notification.

Notes:

* These parameters are measured and supplied with each mechanism.

1. Depends on load mass geometry and centre of mass/gravity. For loads greater than >6 kg please contact Queensgate to discuss customised tuning
2. For dynamic operation the servo-loop parameters are preset for different performances; the parameters are user settable via software control. Fast means the fastest the stage can stably move with less than 1 kg load. Medium means the maximum stable speed for loads up to 2 kg. Slow means the speed at which the servo loop is stable for all masses up to 6 kg.
3. This is the 2 % settle time. It is a function of the servo loop parameters which are user controllable.
4. The actual position noise of the stage as measure with a laser interferometer.
5. Percent error over the closed-loop range.
6. Angular motion over the full closed-loop range of the stage.

Dimensions



Please refer to the [Installation Drawing](#) for complete dimensions and install guide.

Full installation drawings are also available on the Queensgate website. 3D CAD available on request.

Ordering Information

| Part Number | Description |
|-----------------|--|
| QGNPS-X-60D-D1 | High-load direct-drive piezo nan positioning system with controller – 60 µm travel, horizontal mounting, closed-loop cap. Sensor, including NPC-D-6110 digital controller. |
| QGNPS-X-100D-D1 | High-load direct-drive piezo nan positioning system with controller – 100 µm travel, horizontal mounting, closed-loop cap. sensor including NPC-D-6110 digital controller including NPC-D-6110 digital controller. |
| QGNPS-Z-60D-D1 | High-load direct-drive piezo nan positioning system with controller – 60 µm travel, vertical mounting, closed-loop cap. sensor including NPC-D-6110 digital controller. |
| QGNPS-Z-100D-D1 | High-load direct-drive piezo nan positioning system with controller – 100 µm travel, vertical mounting, closed-loop cap. sensor including NPC-D-6110 digital controller. |

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