

NPS-Z-15L Ultra High Load Closed Loop 15 Micron Actuator

Nanopositioning Actuators/Translators



The NPS-Z-15L is a piezo-scanned stage optimized for high load applications.

The NPS-Z-15L offers over 15 μ m of closed loop travel, with sub-nanometre resolution and stability. This stage has been specifically designed for high stiffness, which allows loads of up to 500 Kg to be carried.

Optimised mechanical design has yielded a device with an unloaded resonant frequency of greater than 8000Hz. Super Invar construction means the stage has very high thermal and environmental stability. Dynamic optimisation via closed loop PID electronics maximise in-situ stepping response and position stability of the system. Electronic configurations can offer independent control of up to 3 or up to 6 stages, ideal for alignment/levelling of large optic or wafer/mask devices.

Key features

- >15 μ m travel with sub-nanometer resolution
- Typically <0.002% hysteresis and <0.01% linearity error
- First resonant frequency >8 KHz
- 500 Kg maximum load
- Robust and reliable
- Super Invar construction

Typical applications

- Semiconductor wafer/mask positioning systems
- Large optical position systems

Suggested controllers

- NPC-D-5200 Digital Controller
- NPC-D-6110 Series Multi-channel Closed Loop Controllers

Designed specifically to control Queensgate's Nanometer Precision Mechanisms incorporating capacitive sensors. They give precise positional feedback delivering high resolution and linearity of movement. The fast update rate and Queensgate control algorithms contribute to high speed positioning accuracy for dynamic applications that require high speed movement of the stage.

The PC software facilitates user optimization of all operating parameters, including PID and notch filter set up. There are eight programmable slots, three which are populated to provide fast, medium and slow PID settings, the addition five slots are available for application specific settings.

Function playback provides user defined pre-programmed waveforms for applications such as raster scanning or constant velocity scanning. The calibration and dynamic settings are held in the stage eeprom which allows controllers to be interchanged with minimal performance changes.

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Technical specification NPS-X-5A

Parameter	Symbol	Value	Units	Comments		
Static physical						
Material		Super Invar (Bright nickel plated)				
Size		53.5 long x 60 diameter		mm		
		Minimum	Typical	Maximum		
Cable length		2000		mm		
*Range	dzp·max	± 8	± 8.0	µm		
Scale factor	B _{z1}		1	µm	Note 1	
*Scale factor error (1σ)	δb _{z1}		0.05	0.1	%	Note 2
Resonant frequency: 0g load	f ₀₋₀		8000		Hz	
Maximum load			15		kg	
Dynamic physical (Typical values)						
		Fast	Medium	Slow		
*Position noise (1σ)	δZp·n		0.3	0.2	nmrms	Note 3
Slew rate	Uzp·max		0.1		µm/ms	Note 4
Error terms						
		Minimum	Typical	Maximum		
*Hysteresis (peak to peak)	δxp·hyst		0.02	0.03	%	Note 5
*Linearity error (peak)	δzp·lin		0.01	0.02	%	Note 6

Ordering information

Product Ref	Description
QGNPS-X-5A	NPS-X-5A Ultra Compact 5 Micron Stage
Accessories or suggested controllers	
QGNPC-D-5200	NPC-D-5200 Digital Controller
QGNPC-D-6330	NPC-D-6330 Three-channel Closed Loop Controller

Owing to continuous development, we reserve the right to introduce improvements and modify specifications without prior notice. Our sales team can be contacted on: info@queensgate.com or +44 (0) 1223 881711

Notes

*These parameters are measured and supplied with each mechanism

- All position commands are given in micrometers with seven digit resolution.
- This is the difference between the measured scale factor and the desired scale factor of 1µm motion per 1µm command). For example a scale factor error of 0.003% means the actuator will move 1.00003µm when a command of 1µm is sent to the NPS3330 digital controller.
- The actual position noise of the stage.
- The highest rate of change of true position with time that can be achieved. It is limited by the closed loop parameters.
- Percent of the displacement. The hysteresis specification for a displacement of less than 1µm amplitude is 0.1 nm.
- Percent error over the full range of motion.

