

NPS-Z-15A

Ultra Low Drift 15 Micron Stage

The NPS-Z-15A is a piezo-scanned flexure guided stage with integrated capacitance position sensors.

It is capable of sub-nanometer resolution and reproducibility.

This stage has been designed to have extremely low angular deviation from the axis of travel; it is ideal for use in scanning probe microscope tips and other applications where sideways motion is not tolerable.



Key Features

- >15µm travel with sub-nanometer resolution
- Typically <0.005% hysteresis and <0.01% linearity error
- First resonant frequency >3.5KHz typical
- High bandwidths (>300Hz) and fast response times
- In-situ scanning and stepping response optimization
- Robust and reliable
- Super Invar construction

Typical Applications

- Scanning Probe Microscopy
- NSOM
- Atomic Force Microscopy
- Precision Engineering
- Interferometry
- Metrology

Suggested Controller

NPC-D-6110 Single-channel Closed Loop Controller

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 optimisation 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.

The calibration and dynamic settings are held in the stage eeprom which allows controllers to be interchanged with minimal performance changes.

Specifications

Parameter	Value			Units	Comments
Static physical					
	Minimum	Typical	Maximum		
Material	Super Invar (Bright nickel plated)				
Size	51 long x 37 diameter			mm	
Range	± 7.5	± 8.0		µm	Note 1
*Scale factor error (1σ)		0.05	0.1	%	
Static stiffness		20		N·µm ⁻¹	
Resonant frequency: 0g load		3500		Hz	
20g load		2800		Hz	
100g load		1650		Hz	
Maximum Load			0.2	Kg	Note 1
Dynamic physical (Typical values)					
	Fast	Medium	Slow		Note 2
*3dB Bandwidth	340	240	36	Hz	
*Small signal settle time	1.5	2.5	21	ms	Note 3
*Position noise (1σ)	0.2	0.15	0.05	nmrms	Note 4
Error terms					
	Minimum	Typical	Maximum		
*Hysteresis (peak to peak)		0.005	0.01	%	Note 5
*Linearity error (peak)		0.01	0.02	%	Note 6
Rotational error		2	10	µradians	Note 7
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Notes

*These parameters are measured and supplied with each mechanism

1. Max load 200g when a suitable pre-set speed is set for load mass.
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 20 grams load. Medium means the maximum stable speed for loads up to 100 grams. Slow means the speed at which the servo loop is stable for all masses up to the maximum allowed mass – equivalent to low noise setting.
3. This is the 2% settle time. It is a function of the servo loop parameters which are user controllable. The test step size is 500 nm.
4. The actual position noise of the stage.
5. Percent of the displacement. The hysteresis specification for a displacement of less than 1µm amplitude is 0.1 nm.
6. Percent error over the full range of motion.
7. Angular motion over the full range of the stage. These rotational errors are rotational errors around the X and Y axes respectively.

UNITED KINGDOM

Prior Scientific Instruments Ltd.
Units 3-4 Fielding Industrial Estate
Wilbraham Road, Fulbourn
Cambridge, CB21 5ET
United Kingdom
Email: inquiries@prior.com
Phone: +44 (0)1223 881711

U.S.A.

Prior Scientific, Inc.
80 Reservoir Park Drive
Rockland, MA. 02370
U.S.A.
Email: info@prior.com
Phone: +1 781.878.8442

GERMANY

Prior Scientific Instruments GmbH
Maria-Pawlowna-Str. 4
D-07743, Jena, Germany
Email: jena@prior.com
Phone: +49 (0) 3641 24 20 10

JAPAN

Kayabacho 3rd Nagaoka Bldg 10F,
2-7-10, Nihonbashi Kayabacho, Chuo-Ku,
Tokyo103-0025, Japan
Email: info-japan@prior.com
Phone: 03-5652-8831

CHINA

Prior Scientific Instruments (Suzhou) Ltd.
Room 1812, Honghai Building,
72 Xingdu Street, Suzhou Industrial Park,
Suzhou, 215000 China
Email: info-china@prior.com
Phone: +86 (0)512 6617 5866

