



NPS-Z-500A

Features

- **500 μ m closed loop displacement**
- **True 200Hz unloaded resonant frequency**
- **Highly parallel motion with minimal off-axis deviation**
- **Queensgate NanoSensors[®]**
 - <3nm position noise
 - 0.01% linearity
 - 0.02% residual hysteresis
- **Removable ball tip ends**
- **Customizable packages, vacuum and low temperature versions available**



NPS-Z-500A

The NPS-Z-500A is a nanopositioning stage with integrated capacitive position sensors for operation in closed loop. Making use of Queensgate's Dual Sensor Technology™, it has been specifically designed to deliver long displacement – up to 500 μ m linear motion in the vertical axis – with a step and settle time of less than 20ms.

Capacitive position sensors and an advanced flexure design result in a highly linear device with outstanding resolution, repeatability, stiffness and stability at the nanometre level. Low off-axis errors and a high resonant frequency further enhance the performance of this advanced design.

Suggested controllers

The NPS-Z-500A can be driven by a range of analogue and digital controllers, including the newest NPC-A-1110DS analogue controller.

The NPC-A-1110DS analogue closed loop controller is a simple, cost-effective solution featuring +/-10V analogue and TTL inputs, a manual offset control and a position display. Dual Sensor Technology™ uses adaptive filtering techniques to allow higher speeds, higher stability against payload changes and higher mechanical bandwidth than conventional PID controllers.

Alternatively, the NPS-3110 digital closed loop controller is ideal for the most demanding applications in terms of linearity (4th order linearization) and resolution. All Queensgate stages feature ID-chips with calibration information to allow plug-and-play operation with any digital controller.

Applications

- Interferometry
- Nanopositioning
- Adaptive optics





NPS-Z-500A

Specification

Parameter	Symbol	Value			Units	Comments
Static physical						
		Minimum	Typical	Maximum		
Material		Titanium and Aluminium Alloy				
Size		60 x 49.5 x 30 mm				
*Range	d_{zp-max}		>500		μm	Note 1
Resonant frequency	$f_{0.0}$		200		Hz	Note 2
Actuating force			20		N	
Holding force			30		N	
Max lateral force			10		N	
Dynamic physical (typical values)						
*Small signal settle time	t_{zs-s}		15		ms	Note 3
*Position noise (1σ)	δz_{p-n}		3		nm	Note 4
Error terms						
		Minimum	Typical	Maximum		
*Hysteresis (peak to peak)	$\delta_{zp-hyst}$			0.02	%	Note 5
*Linearity error (peak)	δ_{zp-lin}		0.01	0.1	%	Note 6
*Rotational error	$\delta\phi_z$		10	50	$\mu\text{radians}$	Note 7
*Rotational error	$\delta\gamma_z$		20	100	$\mu\text{radians}$	Note 7

Notes

*These parameters are measured and supplied with each mechanism

1. This is the measured range for $\pm 250\mu\text{m}$ command input; the maximum closed loop range is greater than $500\mu\text{m}$.
2. This is the first resonant frequency for the unloaded NPS-Z-500A.
3. 2% step and settle time. Dynamic operation is a function of the servo loop parameters that are user settable via software in our digital controllers.
4. The actual position noise of the stage measured with a laser interferometer.
5. Per cent of the displacement. The hysteresis specification for a displacement of less than $1\mu\text{m}$ amplitude is 0.2nm . NPS-Z-500A requires external preload to achieve this.
6. Per cent error over the full range motion, using NPS3000 4th order linearization (typical) and using NPC-A-1110DS 2nd order linearization (maximum).
7. Angular motion over the full range of the stage. These rotational errors are rotational errors around the X and Y axes respectively.

