

queensgate

Nanopositioning Stage: NPS-XY-100D Two Axis 100 μ m x 100 μ m Stage Aluminium

The NPS-XY-100D NanoMechanism is a piezo scanned flexure guided stage with integrated capacitance position sensors capable of sub-nanometer resolution and reproducibility.

Finite element analysis of the flexure guidance mechanisms has reduced parasitic angular motions to less than 25 micro-radians over the full 100 μ m range.

The NPS-XY-100D is made from Aluminum and offers a cost-effective faster alternative to the Super Invar XY stage (NPS-XY-100A).



Key features

- >100 μ m travel in each axis with sub-nanometer resolution
- Capacitive positioning sensor providing unrivalled position precision and accuracy. 0.25nm Resolution and 0.5nm Repeatability
- Typically <0.02% hysteresis and <0.02% linearity error
- Dynamic performance 780Hz unloaded resonant frequency and servo loop bandwidths of up to 250Hz
- Faster response times.
- In-situ scanning and step response optimization
- Plug and Play: Stage connector containing stage calibration data and reference sensor allowing easy controller interchangeability
- Aluminum construction
- Four corner mounting for dynamic best stability
- Robust and reliable
- Used with Queensgate's high performance electronics giving: Low noise, Low drift electronics, High power, High Resolution and High position update rates.

Applications

- High Precision Microscopy
- AFM, SPM, NSOM

Suggested controllers

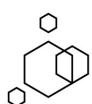
- NPC-D-6000 Series Controllers

Designed to control Queensgate's Nanometer Precision Mechanisms using modern DSP techniques combining piezo drive amplifiers, capacitance position sensing circuitry and servo control capability.

Use of PID (proportional integral differential) feedback greatly improves settle times and minimizes the effect of mechanical resonances. The system can be tuned using twin notch filters, per channel, reducing the effect of first and second resonances thereby improving dynamic positioning.

The high power rating allows stages and actuators to be driven at higher maximum speeds delivering the best dynamic performance. A special algorithm minimises overshoot allowing higher bandwidths to be achieved compared to conventional PID control.

The virtual front panel software facilitates user control of all operating parameters, including PID loop set up.



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technology**

A brand of Elektron Technology

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NPS-XY-100D 2017 v1

Nanopositioning Stage: NPS-XY-100D Two Axis 100µm x 100µm Stage

Technical specification

Parameter	Symbol	Value			Units	Comments
Static physical						
		Minimum	Typical	Maximum		
Material		Aluminum (Nickel plated)				
Size		100 x 100 x 23 (40mm aperture)			Mm	
*Open Loop range		± 55	± 75			
*Range	d_{xp-max}	± 50	± 55		Mm	
*Scale factor error (1σ)	δb_{x1}		0.03	0.1	%	
Static stiffness	k_z		1		N·µm ⁻¹	
Resonant frequency:						
0g load	f_{0-0}	650	780		Hz	
Maximum load				1	Kg	Note 1
Dynamic physical (Typical values)						
		Fast (F)	Extra Fast (C1)	Extra Extra Fast (C2)		Note 2
3dB Bandwidth	B_{x-p}	90	135	250	Hz	
*Small signal settle time	t_{xs-s}	6.0	3.3	2.7		Note 3
*Position noise (1σ)	δx_{p-n}	0.22	0.24	0.25	nm _{rms}	Note 4
Repeatability (Half range)		0.5			nm _{rms}	
Error terms						
		Minimum	Typical	Maximum		
*Hysteresis (peak to peak)	δx_{p-hyst}		0.012	0.02	%	Note 5
*Linearity error (peak)	δx_{p-lin}		0.005	0.02	%	Note 6
*Rotational error	$\delta \phi_x$		9	25	µradians	Note 7
*Rotational error	$\delta \theta_x$		5	10	µradians	Note 7
*Rotational error	$\delta \gamma_x$		5	10	µradians	Note 7

Notes

*These parameters are measured and supplied with each mechanism

1. Depends on orientation. 1 kg is the maximum load for gravity acting in the Z direction. 0.5 kg is the maximum load for gravity acting in the X or Y axes.
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 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 2000 nm.
4. The actual position noise of the stage.
5. Percent of the displacement.
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 Z, Y and X axes respectively

Nanopositioning Stage: **NPS-XY-100D Two Axis 100µm x 100µm Stage**

Ordering information

Product Ref	Description
QGNPS-XY-100D	NPS-XY-100D Two Axis 100µm x 100µm Stage Aluminium
	Accessories or suggested controllers
QGNPC-D-6000	NPC-D-6000 Multi-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 371000**