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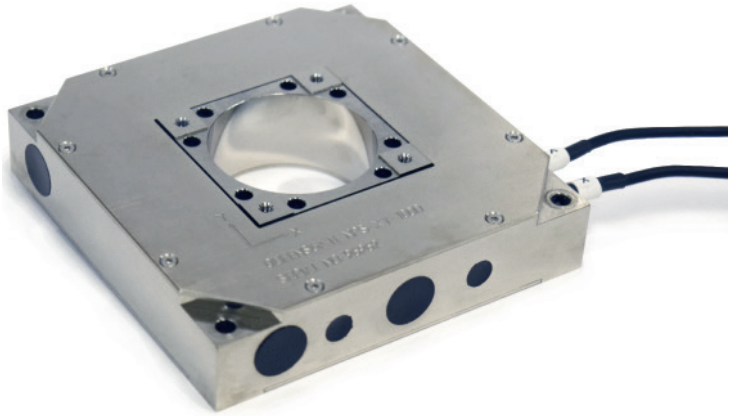
QGNPS-XY-100D

Piezo scanned flexure guided stage

The QGNPS-XY-100D NanoMechanism is a piezo scanned flexure guided stage with integrated capacitance position sensors capable of sub- nanometer resolution with market leading dynamic performance.

Finite element analysis of the flexure guidance mechanisms has guaranteed pitch and yaw of < 25 micro-radians over the full 100µm range.

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



Key Features

- >110µm travel in each axis with sub-nanometer resolution
- Capacitive positioning sensor providing unrivalled position precision and accuracy. 0.14nm Resolution and 0.5nm Repeatability
- Typically <0.01% hysteresis and <0.005% linearity error
- Dynamic performance: Unloaded resonant frequency typically 780Hz and servo loop bandwidths up to 250Hz
- In-situ scanning and step response optimization
- Plug and Play: Stage connector containing the stage calibration data and reference sensor allowing easy controller interchangeability

Typical applications

- AFM, SPM, NSOM
- High Precision Microscopy

Suggested controllers

- NPC-D-6330 Multi-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.

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

Technical specification NPS-XY-100D

Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Aluminum (Nickel plated)				
Size		100 x 100 x 23 (40mm aperture)			Mm	
		Minimum	Typical	Maximum		
*Range Open Loop		± 65	± 75			
*Range Closed Loop	dxp·max	± 50	± 55		Mm	
*Scale factor error (1σ)	δbx1		0.03	0.1	%	
Static stiffness			1		N·µm-1	
*Resonant frequency: 0g load	f0·0	650	780		Hz	
Resonant frequency: Maximum load				1	Kg	Note 1
Dynamic physical (Typical values)						
		Slow	Medium	Fast		Note 2
*3dB Bandwidth	Bx·p	4.5	90	250	Hz	Typical
*Small signal settle time	txs·s		6.0	4.0		Note 3
*Position noise (1σ) / Resolution	δxp·n	0.14	0.19	0.25	nmrms	Note 4
Repeatability (Half range)			0.5		nm	Note 5
Error terms						
		Minumum	Typical	Maximum		
*Hysteresis (peak to peak)	δxp·hyst		0.008	0.02	%	Note 6
*Linearity error (peak)	δxp·lin		0.003	0.01	%	Note 7
*Rotational error	δφx		9	25	µradians	Note 8
*Rotational error	δθx		5	10	µradians	Note 8
*Rotational error	δγx		5	10	µradians	Note 8

Notes
*These parameters are measured and supplied with each mechanism

1. Loads greater than 250g should be discussed at the point of purchase.
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 move for all masses up to the maximum allowed mass – equivalent to low noise setting.
3. Step and Settle time is the time taken to settle to within 2% of the step measured using an interferometer. The step settle time is a function of the servo loop parameters which are user controllable. .
4. The actual position noise of the stage measured using an interferometer sampling 1 Hz to 25 kHz.
5. 3 σ (99.73%).
6. Percent of the displacement.
7. Percent error over the full range of motion.
8. Angular motion over the full range of the stage. These rotational errors are rotational errors around the Z, Y and X axes respectively

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