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QGNPS-X-28C

Nanopositioning Stage

The QGNPS-X-28C was originally developed for high speed, ultra precision MR head and disk drive testing.

Its small size and millisecond response time is ideal for applications where high reliability and throughput are essential. A low moving mass and high stiffness combine to offer extremely high bandwidths.

The capacitive sensor design provides the sub-nanometer displacement measurement and closed-loop feedback over a range in excess of 28 microns.

Flexure guidance offers high purity of motion.

Combined with Queensgate's digital closed-loop controllers, the QGNPS-X-28C can achieve millisecond response and settle times.

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 eprom which allows controllers to be interchanged with minimal performance changes.

Key features

- >28µm travel with sub-nanometer resolution
- First resonant frequency >5.3KHz
- Bandwidths up to >1.5KHz
- In-situ scanning and stepping response optimization
- Robust and reliable for production test
- Plug and play facilities for low down-time

Typical applications

- MR head and disk drive testing
- Interferometry
- Metrology
- AFM Z axis

Suggested controllers

- NPC-D-6110 Single-channel digital controller

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Technical Specifications

Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Titanium				
Size		63.5 long x 42 wide x 15.5 high			mm	
Stage Mass		147			g	Note 1
		Minimum	Typical	Maximum		
*Range Open Loop	dxp·max		± 16.5		µm	
*Range Closed Loop	dxp·max	± 14			µm	
*Scale factor error (1σ)	δbx1		0.1		%	
Resonant frequency: 0g load	f0·0	5.3	5.8		KHz	
Maximum load				10	Kg	Note 2
Dynamic physical (Typical values)						
		Fast	Medium	Slow		Note 3
3dB Bandwidth	Bx·p	>1500	800	60	Hz	Typical
*Small signal settle time step 500nm	txs·s	1			ms	Note 4
*Position noise (1σ) Typical	δxp·n	0.15	0.1	0.06	nmrms	Note 5
Error terms						
		Minimum	Typical	Maximum		
*Hysteresis (peak to peak)	δxp·hyst		0.01	0.02	%	Note 6
*Linearity error (peak)	δxp·lin		<0.005	0.01	%	Note 7

Notes

*These parameters are measured and supplied with each mechanism

1. Excludes cable and connector mass.
2. This is the maximum load for gravity acting in the Z-direction to avoid damage to the stage mechanism.
3. 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 30 grams load.
4. 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. Faster bandwidth setting faster settle times
5. The actual position noise of the stage measured using an interferometer sampling 1 Hz to 25kHz.
6. Percent of the displacement. The hysteresis specification for a displacement of less than 1µm amplitude is 0.1 nm.
7. Percent error over the full range of motion.

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