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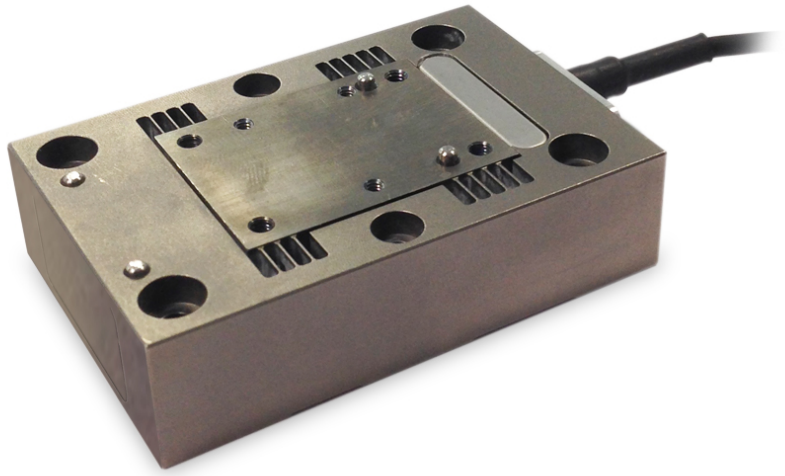
NPS-X-28C
Nanopositioning Stage



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

It's 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 NPS-X-28C can achieve millisecond response and settle times.

Key features
- >28µm travel with sub-nanometer resolution
- First resonant frequency >5.5KHz
- Bandwidths up to 2KHz
- 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-5200 Digital Controller
- NPC-D-6000 Series Multi-channel

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.

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Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Titanium				
Size		60 long x 40 wide x 15.5 high			mm	
		Minimum	Typical	Maximum		
*Range	dxp·max	± 14			µm	
Scale factor	dxp·max		1		µm	Note 1
Scale factor error (1σ)	δbx1		0.1		%	
Resonant frequency: 0g load	f0·0	5.5	5.8	6.2	KHz	
Maximum load				10	Kg	Note 2
Dynamic physical (Typical values)						
		Fast	Medium	Slow		Note 3
3dB Bandwidth	Bx·p	600	400	50	Hz	
*Small signal settle time step 500nm	txs·s	<2			ms	Note 4
*Small signal settle time step 1um	txs·s	<9			ms	Note 4
*Position noise (1σ) Typical	δxp·n	<0.093		<0.07	nmrms	Note 5
Error terms						
		Minimum	Typical	Maximum		
*Hysteresis (peak to peak)	δxp·hyst		0.005	0.01	%	Note 6
*Linearity error (peak)	δxp·lin		<0.007	0.02	%	Note 7
*Rotational error	δφx		1	5	µradians	Note 8
*Rotational error	δθx		1	5	µradians	Note 8
*Rotational error	δγx		1	5	µradians	Note 8

Notes
*These parameters are measured and supplied with each mechanism
1. All position commands are given in micrometers with seven digit resolution.
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 50 grams load. Medium means the maximum stable speed for loads up to 200 grams. Slow means the speed at which the servo loop is stable for loads up to 500 grams – equivalent to low noise setting.
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 settings up to 1000Hz will give faster settle times
5. The actual position noise of the stage measured using an interferometer.
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.
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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