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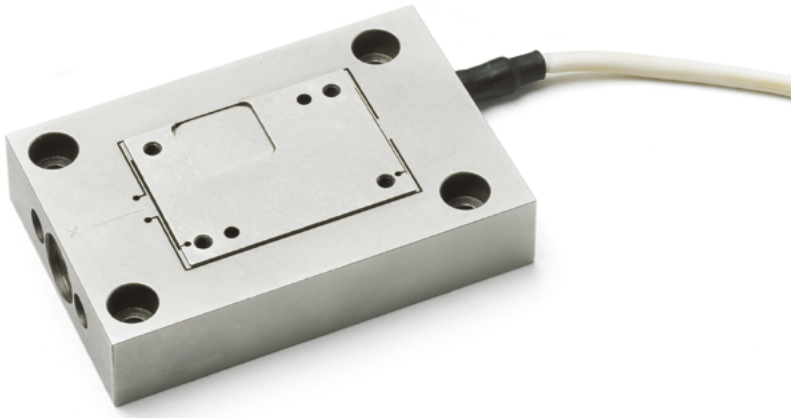
QGNPS-X-15A and QGNPS-X-15B

Low Profile Fast 15 Micron Stage

The millisecond response time and high bandwidth make the QGNPS-X-15A (Stainless Steel) and NPS-X-15B (Aluminium) ideal for applications where throughput is essential.

The capacitive sensor design provides the sub-nanometer displacement measurement and closed-loop feedback over a range in excess of 15 microns. Flexure guidance offers high purity of motion, with parasitic motion reduced to less than 5 microradians.

These stages when combined with Queensgate's digital closed-loop controllers, can achieve millisecond response and settle times



Key Features

- >15µm travel with sub-nanometre (picometre)
- resolution
- First resonant frequency >3KHz
- Millisecond response time with a load of 50g
- In-situ scanning and stepping response
- optimization
- Robust and reliable for production test
- Plug and play facilities for low down-time

Typical applications

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

Suggested controllers

- NPC-D-6110 Single-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. The calibration and dynamic settings are held in the stage eprom which allows controllers to be interchanged with minimal performance changes

Technical specification NPS-X-15A

Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Stainless steel				
Size		60 L x 40 W x 13.5 H			mm	
		Minimum	Typical	Maximum		
* Open Loop Range	dxp·max		± 10.5		µm	
*Closed Loop Range	dxp·max	± 7.5	± 8		µm	
*Scale factor error (1σ)	δbx1		0.1		%	
*Resonant frequency: 0g load	f0·0	3000	3500		Hz	
50g load	f0·50		2500		Hz	
200g load	f0·200		1500		Hz	
Maximum load				3	kg	Note 1
Dynamic physical (Typical values)						
		Fast	Medium	Slow		Note 2
*3dB Bandwidth	Bx·p	450	140	60	Hz	
*Small signal settle time	txs·s	1.7	4.3	25	ms	Note 3
*Position noise (1σ)	δxp·n	0.1	0.06	0.05	nmrms	Note 4
Error terms						
		Minumum	Typical	Maximum		
*Hysteresis (peak to peak)	δxp·hyst		0.005	0.02	%	Note 5
*Linearity error (peak)	δxp·lin		0.005	0.01	%	Note 6
Rotational error	δφx		1	5	µradians	Note 7
Rotational error	δθx		1	5	µradians	Note 7
Rotational error	δγx		1	5	µradians	Note 7

Notes

*These parameters are measured and supplied with each mechanism

1. This is the maximum load for gravity acting in the Z-direction to avoid damage to the stage mechanism.
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 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.
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 500 nm.
4. The actual position noise of the stage. As measured by laser interferometer sampling 1 Hz to 25 kHz.
5. Percent of the displacement. The hysteresis specification for a displacement of less than 1µm amplitude is 0.1 nm.
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.

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Technical specification NPS-X-15B

Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Aluminium				
Size		60 L x 40 W x 13.5 H			mm	
		Minimum	Typical	Maximum		
* Open Loop Range	dxp·max		± 13		µm	
*Closed Loop Range	dxp·max	± 7.5	± 10		µm	
*Scale factor error (1σ)	δbx1		0.1		%	
*Resonant frequency: 0g load	f0·0	5500	6500		Hz	
Maximum load				0.5	kg	Note 1
Dynamic physical (Typical values)						
		Fast	Medium	Slow		Note 2
*3dB Bandwidth	Bx·p	800	400	50	Hz	
*Small signal settle time	txs·s	1.4	1.6	8.5	ms	Note 3
*Position noise (1σ)	δxp·n	0.13	0.1	0.05	nmrms	Note 4
Error terms						
		Typical		Maximum		
*Hysteresis (peak to peak)	δxp·hyst	0.01		0.02	%	Note 5
*Linearity error (peak)	δxp·lin	0.005		0.01	%	Note 6
Rotational error	δφx	1		5	µradians	Note 7
Rotational error	δθx	1		5	µradians	Note 7
Rotational error	δγx	1		5	µradians	Note 7

Notes

*These parameters are measured and supplied with each mechanism

1. This is the maximum load for gravity acting in the Z-direction to avoid damage to the stage mechanism.
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 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.
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