

## QGNPS-TG-7A

### High Performance Tip Tilt Stage



The Queensgate NPS-TG-7A tip tilt mechanism is designed for applications requiring high speed, ultra-high precision positioning of mirrors.

Unique positioning performance due to closed loop operation with capacitive positioning sensors.

Leading dynamic performance high servo loop bandwidths in excess of 1KHz

### Applications

- Laser scanning,
- Laser pointing,
- Atmospheric compensation
- Image processing and stabilization
- Scanning microscopy
- Laser communication point ahead devices
- Optical filters/switches

### Key Features

- 7mrad range in each axis with sub micro-radian resolutions at > 1.2KHz
- Capacitance positioning sensors providing unrivalled precision and accuracy
- Dynamic performance: high loaded resonant frequencies as well as very high servo loop bandwidths in excess of 1KHz
- Invar 36 construction, its low thermal expansion closely matches most optics minimising any thermal distortion..
- Enclosed mechanism for high stability and reliability
- Step settle times <2ms
- Plug and Play: Stage connector containing stage
- Calibration data and reference sensor allowing easy controller interchangeability

# QGNPS-TG-7A

## High Performance Tip Tilt Stage

### Suggested controllers

- NPC-D-6330 Multi-channel Closed Loop Controller

Designed to control Queensgate's Nanometer Precision Mechanisms incorporating capacitance positioning sensors.

- Low noise, Low drift, High power, High Resolution and High position update rates (20usec).
- Optimized acceleration/deceleration contributing to high speed positioning applications by reducing overshooting and settle time. •
- User optimisation of all operating parameters available through Nanobench PC Software
- Eight programmable slots including PID and notch filter set up, three are factory set to provide fast, medium and slow PID settings. The additional five slots are available for application specific settings.
- The calibration and dynamic settings are held in the actuator EEPROM which allows controllers (plug and play) to be interchanged with minimal performance changes.

### Technical specification

Parameter	Symbol	Value			Units	Comments
Static physical						
Material		Invar 36				
Size		95 high x 40 diameter			mm	
		Minimum	Typical	Specified		
*Closed Loop Range	$d_{ep-max}$	7	7		mrad	
* Open Loop Range	$d_{ep-max}$	7.7	8.8		mrad	
*Scale factor error (1 $\sigma$ )	$\delta b\theta 1$		0.002	0.1	%	
*Resonant frequency: 0g load	$f_{0-0}$		2600		Hz	
15g load	$f_{0.015}$		2300		Hz	
Dynamic physical (Typical values)						
Loop setting		Extra fast	Fast	Slow		Note 1
*3dB Bandwidth	$B_{ep}$	1200	800	50	Hz	
*Small signal settle time	$t_{es,s}$		1.5		ms	Note 2
*Position noise (1 $\sigma$ )	$\delta\theta_{p-n}$	0.5	0.36	0.08	urads	Note 3
Repeatability				0.2	urads	
Error terms						
Variant			Typical	Specified		
*Hysteresis (peak to peak)	$\delta_{p-hyst}$		0.05	0.15	%	Note 4
*Linearity error (peak)	$\delta_{p-lin}$		0.03	0.1	%	Note 5
Distance of pivot point to platform surface			7		mm	X and Y axis

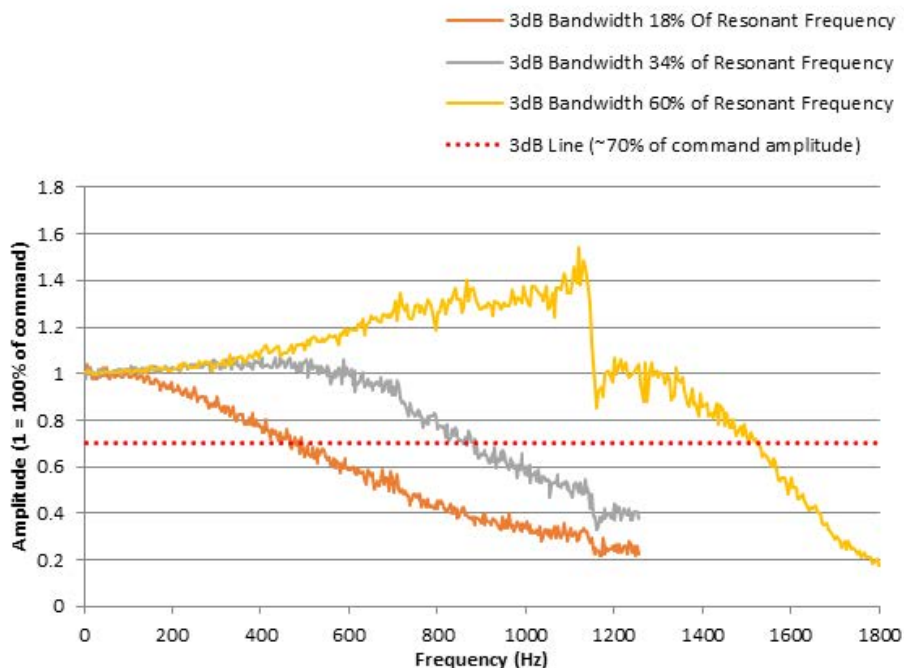
#### Notes

\*These parameters are measured and supplied with each mechanism

1. For dynamic operation the servo loop parameters are preset for different performances; the parameters are user settable via software control. Extra Fast means the fastest the stage can stably move with less than 20g load. Slower settings allow higher loads or higher resolution.
2. This is the 5% settle time. It is a function of the servo loop parameters which are user controllable.
3. The actual physical position noise of the stage.
4. Percent of the displacement.
5. Percent error over the full range of motion.

## QGNPS-TG-7A High Performance Tip Tilt Stage

### Frequency response for 7mrad with a 2500Hz first natural resonant frequency



### Ordering information

Product Ref	Description
QGNPS-TG-7A	QGNPS-TG-7A High Performance Tip Tilt
QGNPC-D-6330	NanoScan NPC-D-6330 Multi-Channel Closed Loop Controller

Owing to continuous development, we reserve the right to introduce improvements and modify specifications without prior notice.

### Custom Options

Covering shorter ranges with shorter lengths on application.

