

4 mm Travel, NanoMax™ with Piezos

The MAX311 and MAX312 platforms have all the same features as the MAX313 with the added benefit of internal piezoelectric actuators.

Additionally, the MAX311 has a strain gauge based displacement sensor incorporated into the piezoelectric actuator.

The internal actuators are built directly into the base and provide a 20 μm travel range in three directions. The MAX312 has a positional resolution of 20 nm, while the resolution of MAX311 is 5 nm due to the feedback from the strain gauge sensors. These resolutions were calculated based on using our BPC203 Piezo Controller. The resolution is limited by the noise characteristics of the controller, therefore use of a third party controller may result in a degradation in the positional resolution.

The strain gauge sensors improve the resolution by providing a voltage signal that is linearly proportional to the displacement of the piezoelectric element. When used with a closed-loop controller, like the BPC203, it is possible to compensate for hysteresis, creep, and thermal drift and improve the resolution.



Displacement Sensor



PIN 1: +15V
PIN 2: OSCILLATOR+
PIN 3: 0V
PIN 4: SIG OUT-
PIN 5: SIG OUT+
PIN 6: -15V
PIN 7: TRAVEL

The strain gauge displacement sensor, directly attached to the body of the piezoelectric element, provides an analog signal that is proportional to its displacement. When combined with low-noise electronics, the resolution obtained is better than 5 nm.

All 3 actuators are directly attached to the base (fixed portion of the stage body).



SMC Piezo Connector Cables Included

MAX311
Patents 6,186,016 and 6,467,762

Specifications

- **Manual Travel:** 0.16" (4 mm) in XYZ Direction
- **Thermal Stability:** 1 $\mu\text{m}/^\circ\text{C}$
- **Differential Adjusters:**
 - Coarse Adjust: 0.5 mm/rev
 - Fine Adjust: 50 $\mu\text{m}/\text{rev}$
- **Piezoelectric Travel:** 20 μm in XYZ Directions
- **Manual Drive Resolution (Calculated):** 50 nm Resolution over a 300 μm Travel Range
- **Piezo Resolution (Calculated):** 5 nm (with Internal Piezo Displacement Sensors), 20 nm (without Sensors)
- **Max Piezoelectric Drive Voltage:** 75 VDC
- **Crosstalk:** Maximum 20 $\mu\text{m}/\text{mm}$ of Travel
- **Repeatability:** 500 nm RMS Bidirectional
- **Load Capacity:** 2.2 lbs (1kg)
- **Resonant Frequency ($\pm 10\%$):** 375 Hz (No Load), 200 Hz (275 g Load), 150 Hz (575 g Load)
- **Weight:** 2.2 lbs (1 kg)
- **Deck Height:** 2.46" (62.5 mm) from the Bottom Surface of the Moving Platform. The Accessory Beam Height is 2.95" (75 mm) from the Bottom Surface of the Stage

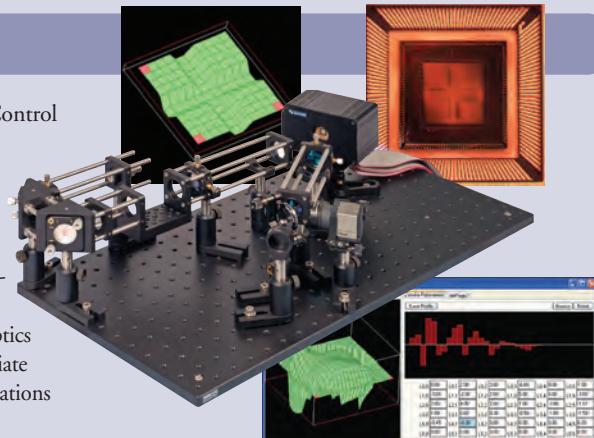
Note: All measurements related to the performance of the piezoelectric actuators are made with the Thorlabs model BPC203 Piezo Driver, which can be found on page 568.

ITEM#	METRIC ITEM#	\$	£	€	RMB	DESCRIPTION
MAX312	MAX312/M	\$ 2,020.00	£ 1,400.50	€ 1,793.50	¥ 17,057.00	NanoMax™ Stage with Piezoelectric Actuator
MAX311	MAX311/M	\$ 2,785.00	£ 1,930.50	€ 2,472.50	¥ 23,517.00	NanoMax™ Stage with Piezoelectric Actuator and Sensor

Adaptive Optics Toolkit

- Out-of-the-Box Functionality for Real-Time, High-Precision Wavefront Control
- MEMS-Based DM Achieves High Spatial Resolution
- Shack-Hartmann Wavefront Sensor

Thorlabs' new Adaptive Optics Toolkits removes the barrier for entry into adaptive optics, making this real-time wavefront-correcting technology accessible to all. The kit includes Boston Micromachines Corporation's state-of-the-art, 140-element, 3.5 micron stroke, MEMS-based deformable mirror. Also included is a Thorlabs' WFS150C Shack-Hartmann wavefront sensor, all necessary imaging optics and mounting hardware, fully functional stand-alone control software for immediate control of the system, and a low-level support library to assist with tailored applications authored by the end user.



See Pages 1408-1411 for Details