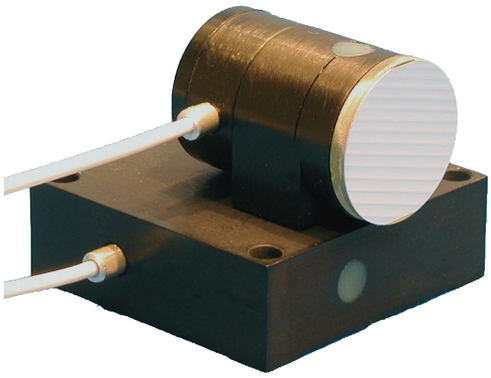
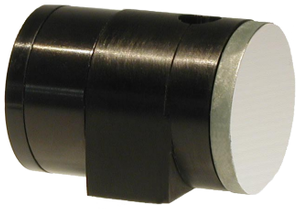
Nanopositioning Systems

Product Update - June 2007

High Precision, 1-Axis or 2-Axis Beam Steering



Nano-MTA2 two-axis scanner



Nano-MTA one-axis scanner

The Nano-MTA Series single axis and two axis mirror nanopositioners are used in laser scanning applications which require nanoradian positioning resolution and stability - better resolution and stability than any other commercially available system. With a standard range of 2 milliradians on each axis or an extended range of 5 milliradians, the Nano-MTA2 is particularly well suited to optical trapping, laser pointing error correction, and compensation for thermal drift in optical components. Test data supports the real-world experience of researchers: the Nano-MTA Series provides precise and stable positioning well beyond the capabilities of other mirror steering devices. Mad City Labs' position noise tests use the position sensors on each axis of the Nano-MTA to provide the necessary data to create an FFT plot of the complete noise spectrum. Figure 1 shows the position noise on the X-axis of the Nano-MTA2 in comparison to a 20 nanoradian sinewave input reference signal. Noise data down to 0.01 Hz (100 second period) demonstrates the high position stability of the Nano-MTA2. A rise in position noise at very low frequencies (1/f noise) is a problem common to many other types of mirror positioning devices and, experimentally, is seen as slow position drift. Position drift of this type is primarily a function of the position sensors and related circuitry and, therefore, cannot be corrected or eliminated. Figure 1 shows a virtual lack of low frequency drift in the Nano-MTA2 system.

Applications which require highly stable mirror positioning need the intrinsic stability of the Nano-MTA Series. It should also be noted in Figure 1 that the extremely low levels of position noise extend thoughout the useful bandwidth of the system. In addition to the standard aluminum construction, the Nano-MTA Series is also available made from invar for situations where temperature stability is a concern.

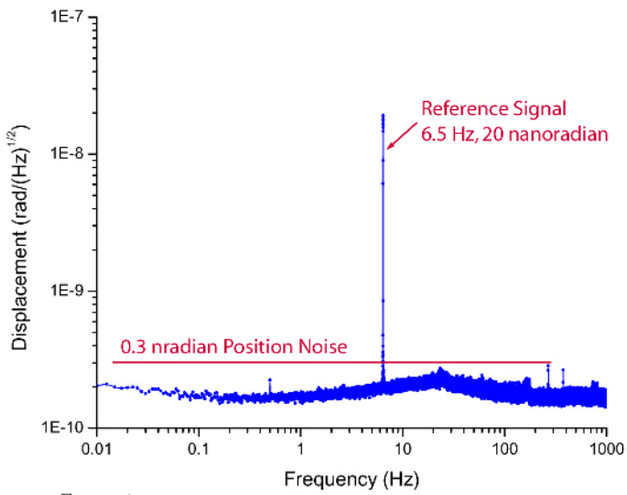
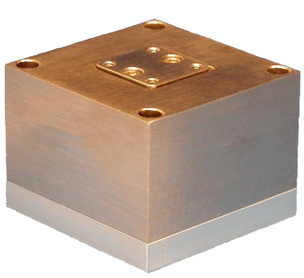


Figure 1
Position noise test showing background noise in comparison to a 20 nanoradian input reference signal.

Picometer Position Noise



Nano-HSZ

Although all of Mad City Labs' nanopositioning systems are capable of sub-nanometer positioning resolution, some systems can even reach down into the picometer realm. Nanopositioning systems such as the Nano-P10 and the Nano-HSZ, both designed for single axis, high speed positioning of lightweight samples, are capable of such performance. The Nano-P10 has a 10µm range of motion, a resonant frequency of 2.5kHz, and position noise less than 15 picometers. The 10µm range Nano-HSZ is the fastest nanopositioner produced by Mad City Labs with a resonant frequency of 7.5kHz. With a position noise of only 10 picometers the Nano-HSZ is also the high resolution leader. While applications which require picometer positioning are highly specialized even in nanotechnology, positioning systems capable of this performance are available today from Mad City Labs.

Nano-P10

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