

Nanomover™ Specifications

NANOMOVER™ SPECIFICATIONS

The Nanomover™ Actuator consists of the finest micrometer leadscrew driven through a direct linkage (to minimize backlash) by a two phase, 400 steps/revolution stepper motor. Although slightly larger than a typical micrometer, the Nanomovers are designed for use as a direct replacement for a manual micrometer. Four versions of the Nanomover are available. They are the Standard (11 NCM 001), the 15 mm (11 NCM 003), the High Torque (11 NCM 005), and the Spherically Tipped (11 NCM 007).

The Standard is the most universally applicable model. The 15 mm version has a 15 mm range of travel but comes in a slightly smaller envelope. The High Torque model handles twice the load and is recommended for use with vertical stages. Finally, the Spherically Tipped model is useful for actuating stages with flat surfaces.

Melles Griot provides precision horizontal vertical stages to ensure that specified performance is satisfied. Also, a range of accessories is available for adapting the Nanomover to various applications. These products are described on pages 32–14 and 15.

The Nanomover specifications are cited in the table below. These specifications are applicable when the Nanomover actuators are

operated with Melles Griot precision stages by the Nanomover Control System II (11 NCS 101) and Nanomover™ software. The Nanomover is a precision actuator that can also be purchased on an stand alone basis. In this event, contact your local applications engineer for more information.

QUALITY ASSURANCE CERTIFICATION

To assure the customer of the validity of the Nanomover specifications, every mover is tested after fabrication to ensure that it meets the tight specifications. Copies of the actual test data for each individual actuator are then shipped with that mover.

Each Nanomover is tested by driving a precision Melles Griot stage (07 TSC 007) under various load conditions. Displacements are measured using a laser interferometer (HP 5508A) directly traceable to NIST standards. The full set of test involves driving loads of 1, 5, and 10 kg over the full range of travel, with both absolute accuracy and bidirectional repeatability being measured in each instance. Individual certification of the movers has an additional advantage in a few instances where absolute accuracy better than the routine ± 1 micron is required. Since the absolute deviations are mainly a function to the lead screw and are invariant with time,

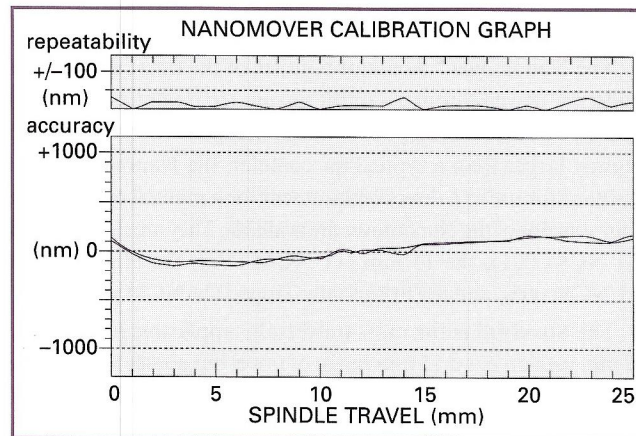
Nanomover Specifications

Parameter	PRODUCT NUMBER			
	11 NCM 001 Standard	11 NCM 003 (15 mm)	11 NCM 005 (Hi-torque)	11 NCM 007 (Spherical)
Tip Characteristic	Flat	Flat	Flat	Spherical
Resolution (nm)	10	10	10	10
Bidirectional Repeatability (nm)	± 100	± 100	± 100	± 100
Absolute Accuracy (μm)	± 1	± 1	± 1	± 1
Maximum Velocity (mm/sec)	2.5	2.5	2.5	2.5
Maximum Acceleration (m/sec^2)	1.25	1.25	1.25	1.25
Range of Travel (mm)	25	15	25	25
Maximum Load (kg)	10	10	20	10
Stepping Current (A)	0.90	0.90	1.20	0.90
Holding Current (A)	0.45	0.45	0.60	0.45
Standard Cable Length (m)	3	3	3	3
Maximum Cable Length (m)	35	35	35	35
Dimensions (mm \times mm \times mm)	44 \times 44 \times 158	44 \times 44 \times 139	44 \times 44 \times 172	44 \times 44 \times 158
Weight (grams/oz)	370/13	34/12	500/18	370/13

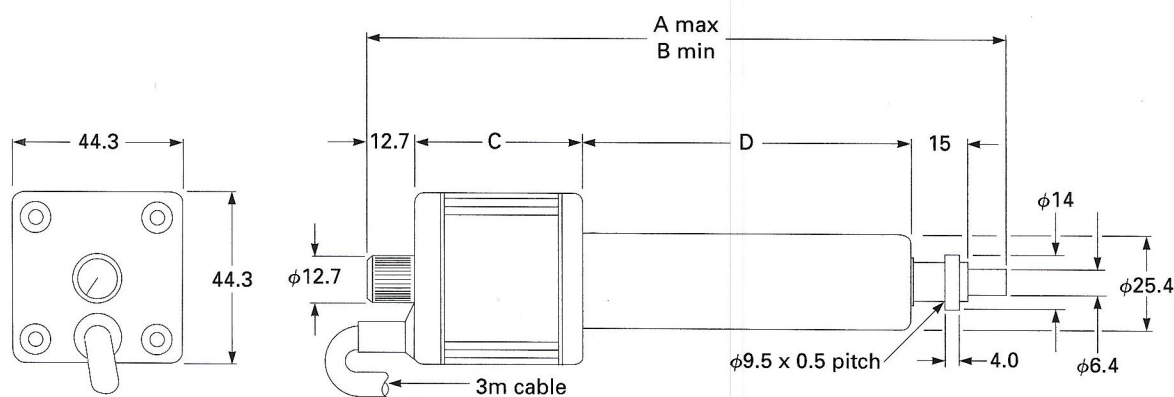
allowance for these can be made in the software. A software routine for this purpose is available from Melles Griot on special request.

TEMPERATURE

The Nanomover™, like most positioners, optical mounts, and stages, is predominantly constructed of metal. With the extremely high precision positioning available with the Nanomover, thermal expansion of stages and mounts, or the Nanomover itself, may cause measurable movement of optics. The Nanomover is constructed so that the effective thermal expansion is given by that of the short steel micrometer shaft. Normally this will result in other components in the system being performance limiting. However, for optimum positional stability of any optical system, a stable temperature environment is recommended. Nanomover performance certification is always carried out under constant temperature conditions.



TYPICAL NANOMOVER™ performance showing the bidirectional repeatability and accuracy (measured using a Hewlett Packard laser interferometer 5508A) over the range of travel.



PRODUCT NUMBER	A	B	C	D
11 NCM 001	184.9	159.9	43.8	86.9
11 NCM 003	154.1	139.1	43.8	66.6
11 NCM 005	198.9	173.9	57.8	86.9
11 NCM 007	184.9	159.9	43.8	86.9

NANOMOVER ACTUATOR OUTLINE AND MOUNTING.