M-451

High-Load Vertical Micropositioning Stage

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M-451.1PD elevation stage

- **3 Nanometer Design Resolution**
- **<100 nm Minimum Incremental Motion**
- **12.5 mm (1/2") Travel Range**
- **12 kg Load Capacity, High Stiffness**
- **ActiveDrive™ Motor**
- **Compatible with Leading Industrial Motion Controllers**
- **Non-Contact Origin and Limit Switches**
- **Mounting Platform for P-500 and PIMars™ Piezo-Nanopositioning Systems**
- **Self Locking**

Model M-451.1DG is equipped with a DC-motor/gearhead drive. A 3-watt DC motor with zero-backlash gearhead and shaft-mounted 2000 counts/rev. optical encoder are used. The system provides 3 nanometer encoder resolution and <100 nm minimum incremental motion.

Model M-451.12S is equipped with direct-drive, microstepped, 2-phase, stepper motor (20,000 steps/rev.) providing 0.2 µm minimum incremental motion and ultra-smooth, vibration-free positioning.

Non-Contact Limit and Origin Switches

Integrated, high-precision, non-contact Hall-effect origin and limit switches protect your equipment and increase versatility in automation applications.

Ordering Information

M-451.1PD
Vertical Stage, 12.5 mm, ActiveDrive™ DC Motor (Includes Power Supply for Servo Amplifier)

M-451.1DG
Vertical Stage, 12.5 mm, DC Motor/Gearhead

M-451.12S
Vertical Stage, 12.5 mm, 2-phase Stepper Motor

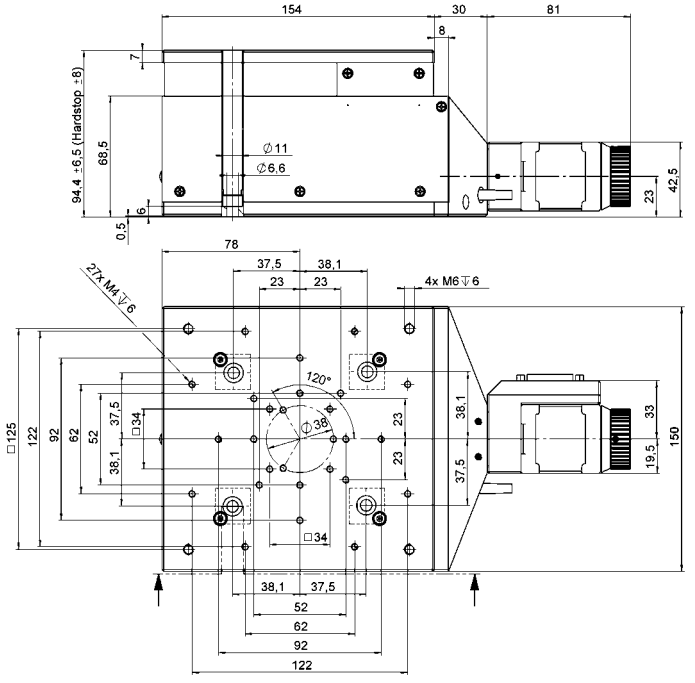
The M-451 is ideal for high-precision, high-load vertical positioning tasks. These stages feature a precision-machined base of high-density, stress-relieved aluminum for exceptional stability and minimum weight. Precision-cross-roller guided wedges and low-friction leadscrews provide maintenance-free positioning.

Application Examples

- Wafer alignment (with Nanopositioning systems)
- Semiconductor adjustment
- Metrology
- Disk drive test assemblies
- R&D

Model M-451.1PD with Active Drive™ includes a high-efficiency PWM servo-amplifier mounted side-by-side with the motor. This design provides several decisive advantages:

- Increased efficiency, by eliminating power losses between the amplifier and motor
- Reduced cost of ownership and improved reliability because no external driver is required
- Elimination of PWM amplifier noise radiation, because amplifier and motor are mounted together in the same electrically shielded case

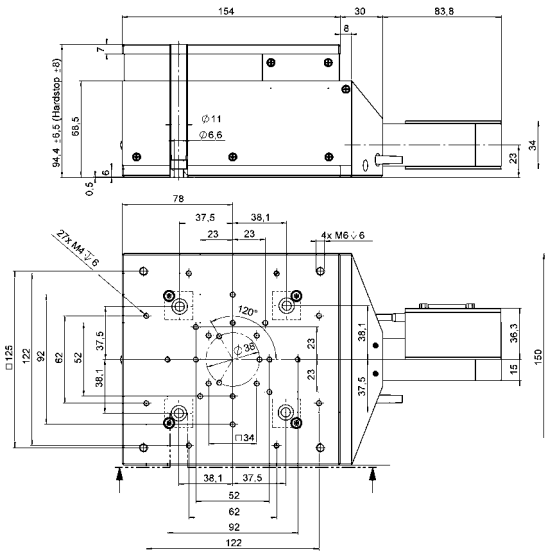


Dimensions of the M-451.12S elevation stage, in mm.

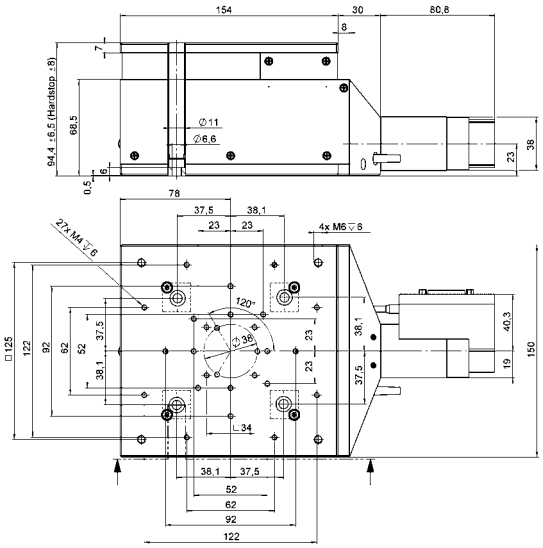
Nanopositioning

M-451 is designed to work with a variety of PI piezo nanopositioning stages such as the P-500 series and P-560 PIMars series. These piezo-driven positioning and scanning stages provide sub-nanometer resolution and accuracy and very high scanning speed.

P-562.3CD PIMars XYZ piezo nanopositioning & scanning system (200 µm x 200 µm x 200 µm) mounted on an M-451.1PD elevation stage.



Dimensions of the M-451.1DG elevation stage, in mm.



Dimensions of the M-451.1PD elevation stage, in mm

Technical Data

Models	M-451.1PD	M-451.1DG	M-451.12S	Units	Notes see page 7-106
Travel range	12.5 mm	12.5 mm	12.5 mm	mm	
Design resolution	0.042	0.0028	0.0084	µm	A3
Min. incremental motion	0.2	0.1	0.2	µm	A4
Unidirectional repeatability	0.3	0.3	0.3	µm	
Backlash	1	1	1	µm	
Max. velocity	3	0.5	0.8	mm/s	
Max. load	120	120	120	N	B1
Encoder resolution	4000	2000	-	counts/rev.	
Motor Resolution*	-	-	20,000	steps/rev.	
Leadscrew pitch	0.5	0.5	0.5	mm/rev.	
Gear ratio	-	29.6:1	-		
Wedge ratio	3:1	3:1	3:1		
Nominal motor power	30	3	-*	W	
Motor voltage	24	12	24*	V	
Body material	Al	Al	Al		L
Recommended controller	C-843, C-848, C-862	C-843, C-848, C-862	C-600, C-630		D2

C-815.38 motor cable included: 3 m, sub-D, 15/15 pin (m/f).
* 2-phase stepper, 24 V chopper voltage, max. 0.8 A / phase, 20,000 microsteps with C-600, C-630 controllers.