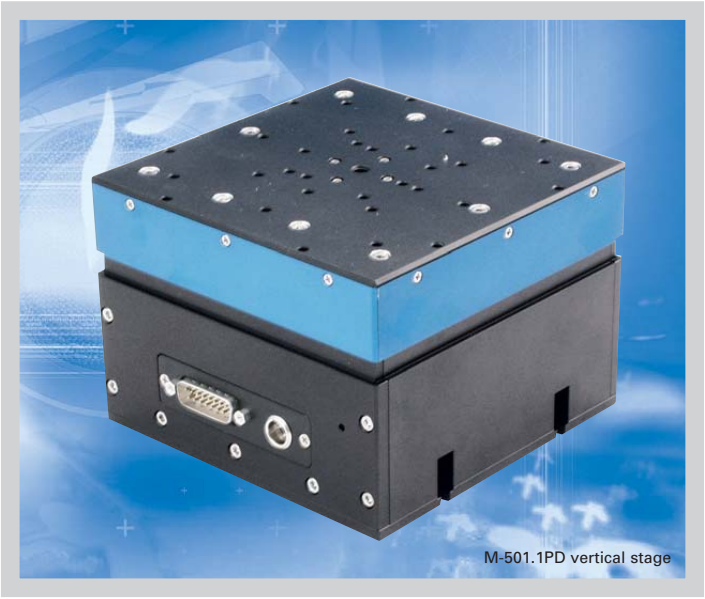
M-501

Precision Vertical Micropositioning Z-Stage


M-501.1PD vertical stage

- **Travel Range 12.5 mm (1/2")**
- **Ultra-High-Resolution Encoder**
- **ActiveDrive™ Motor**
- **Zero-Backlash Recirculating Ballscrews**
- **Non-Contact Limit and Reference Switches**
- **Stress-Relieved Aluminum Base for Highest Stability**
- **MTBF >20,000 h**
- **Self Locking to 10 kg**

The M-501 Z-stage is the latest family member of the M-500 series of translation stages. It is ideal for forming compact XYZ combinations together with the low-profile M-511, M-521 and M-531 translation stages. M-501 vertical stages feature a precision-machined base of high-density, stress-relieved aluminum for exceptional stability and minimum weight. Precision-ground recirculating ball screws with preloaded nuts provide low-friction, maintenance-free and backlash-free positioning.

Application Examples

- R&D
- Semiconductor testing
- Mass storage device testing
- Metrology
- Photonics packaging
- Quality assurance testing

Two DC-motor drives are currently available:

M-501.1PD with ActiveDrive™ for High Velocity
This model features an ultra-high-resolution ballscrew-mounted encoder (40 960 counts/rev!) and provides a minimum incremental motion of better than 100 nanometers (design resolution 24 nm).

For superior dynamic performance the ActiveDrive™ motor is integrated. The ActiveDrive™ design, developed by PI, features a high-efficiency PWM (pulse width modulation) servo-amplifier mounted side-by-side with the DC motor and offers several 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, by mounting the amplifier and motor together in a single, electrically shielded case

M-501.1DG with Gearhead
These versions feature closed-loop DC motors with shaft-mounted position encoders and precision gearheads providing a minimum incremental motion to 0.1 µm and 5 nanometer encoder resolution.

The gearhead version can hold loads to 10 kg in power-off mode.

Ordering Information

M-501.1PD
Vertical Stage, 12.5 mm, ActiveDrive™ DC Motor (includes 24 V power supply)

M-501.1DG
Vertical Stage, 12.5 mm, DC Motor Gearhead

Ask about custom designs!

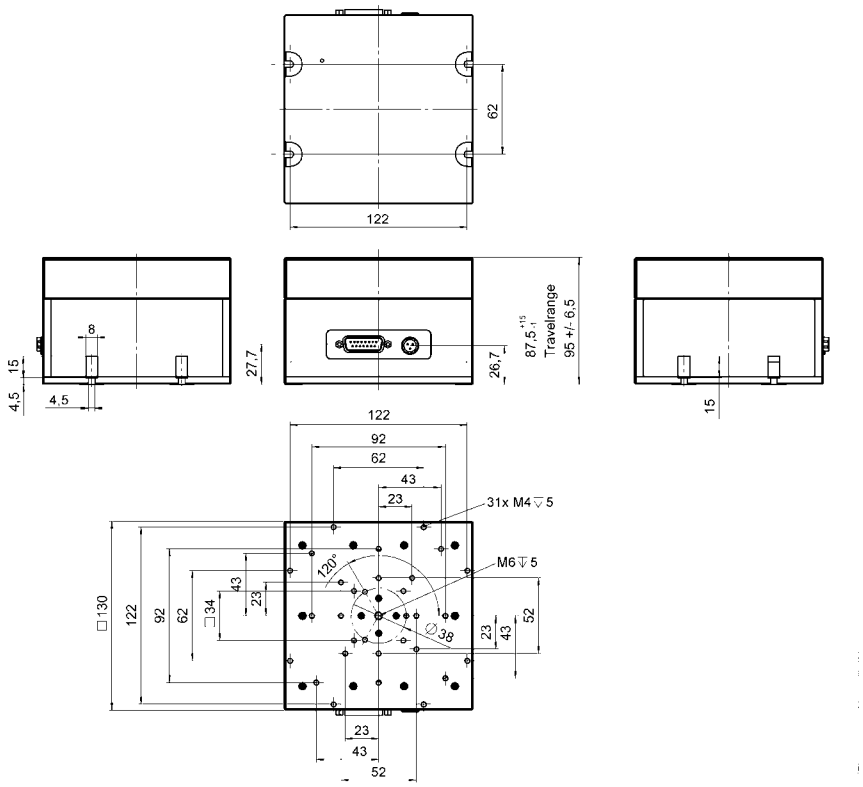
Limit and Reference Switches

For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The direction-sensing reference switch supports advanced automation applications with high precision.

Notes

For adapters, bracket, etc.


XYZ combination of M-521.DD (204 mm), M-511.DD (102 mm) and M-501.1PD vertical stage



M-501 precision elevation stage dimensions in mm.
Sub-D connector 15-pin, 3 m cable

Technical Data

	M-501.1PD	M-501.1DG	Units
Active axes	Z	Z	
Motion and positioning			
Travel range	12.5	12.5	mm
Integrated sensor	Rotary encoder	Rotary encoder	
Sensor resolution	40,960	2048	Cts./rev.
Design resolution	0.024	0.005	µm
Min. incremental motion	<0.1	<0.1	µm
Unidirectional repeatability	0.1	0.1	µm
Pitch/Yaw	±15	±15	µrad
Max. velocity	3	1	mm/s
Origin repeatability	1	1	µm
Mechanical properties			
Spindle pitch	1	1	mm
Gear ratio	80/26 (belt drive)	80/26 (belt drive); $(28/12)^4$:1 ~ 29,6:1 gearhead	
Max. Load	50	100	N
Max. Holding force	20	100	N
Drive properties			
Motor type	ActiveDrive™ DC Motor	DC Motor, gearhead	
Operating voltage	24 (PWM)	0 to ±12	V
Electrical power	17	4	W
Limit and reference switches	Hall-effect	Hall-effect	
Miscellaneous			
Operating temperature range	-20 to +50	-20 to +50	°C
Material	Al (black anodized)	Al (black anodized)	
Recommended controller/driver	C-862 (single-axis), C-843 PCI board (up to 4 axes)	C-862 (single-axis), C-843 PCI board (up to 4 axes)	