M-686 Linear Slide

Low-Profile XY Open-Frame Piezomotor Stage with Linear Encoders

The M-686.164 open-frame stage (version with shifted cable exit) with closed-loop piezo motors provides 25 x 25 mm travel range

- **Integrated Closed-Loop Piezomotor Drives Provide High Speed to 100 mm/s**
- **25 x 25 mm Travel Ranges**
- **Integrated Linear Encoders with 0.1 µm Resolution**
- **Compact Design; 27 mm Profile Height, 150 x 150 mm Footprint**
- **Large Clear Aperture 78 x 78 mm, 66 x 66 mm in Extreme Position**
- **Self-Locking at Rest**
- **Compatible with PI Piezo Nanopositioning / Scanning Stages**

M-686 open-frame piezomotor stages are mainly designed for automated positioning applications in microscopy. The form factor of the M-686 is optimized for a low profile height of 27 mm, footprint and mounting pattern fit directly together with many PI standard nanopositioning systems.

Application Examples

- Biotechnology
- Microscopy
- Scanning microscopy
- Confocal microscopy
- Semiconductor testing
- Handling

Space Saving Piezomotors

Compared to conventional motorized translation stages, the M-686 provides a lower profile and smaller footprint. The compact PILine® piezoelectric linear motors and high-resolution linear encoders make both, the lead screw duct and the flanged, bulky stepper motor employed in traditional stages obsolete. In addition, the piezomotors are self-locking at rest and hold the stage in a stable position without heating up.

Compatibility to PI Nanopositioning and Scanning Stages

A number of standard PI piezo flexure stages (150 x 150 mm footprint) can be mounted directly on the M-686 open-frame stage. Depending on the application, these highly specialized, ultra-precise nanopositioning systems are available as fast, XY scanners (for fuorescence microscopy), as vertical, Z positioners (3D imaging), or with up to 6 degrees of freedom.

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.

Advantages of PILine® Micropositioning Systems

The ultrasonic piezoceramic drives used in PILine® micropositioners have a number of advantages over classical drives:

- Higher Accelerations, up to 10 g
- Speeds up to 500 mm/s
- Small Form Factor
- Self-Locking When Powered Down
- No Shafts, Gears or Other Rotating Parts
- Non-Magnetic and Vacuum Compatible Drive Principle

Ordering Information

M-686.164
XY Open-Frame Stage with Closed-Loop PILine® Piezomotor Drives, 25 x 25 mm, 4 N, 0.1 µm Linear Encoder

Ask about custom designs!

Notes

Nanopositioning stages that fit directly on the M-686:

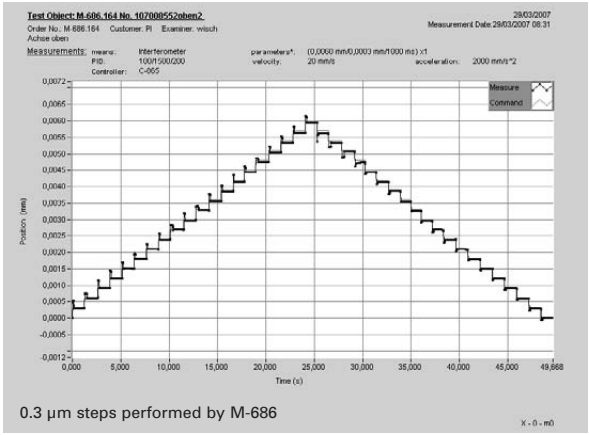
P-561 to P-563 (see p. 2-80 *ff*)
PIMars™ XYZ Nanopositiong systems with up to 300 µm travel

P-541.2 to P-542.2 (see p. 2-60 *ff*)
Low-profile microscopy XY scanners

P-541.Z (see p. 2-48 *ff*)
Low-profile Z/tip/tilt piezo nanopositioning stages for microscopy

Customized M-686 stage (left) with a bigger footprint, to sink the piezo scanner by 10 mm. The system height together with the P-541 piezo scanner is reduced to only 33 mm

M-686.164 open-frame stage (version with shifted cable exit) with P-541.2DD piezo flexure scanner on top, providing a resolution of 0.1 nm and a scanning range of 30 x 30 µm. The system height of the combination consisting of the M-686 open-frame stage and P-541 XY (or Z) piezo scanner is only 43 mm

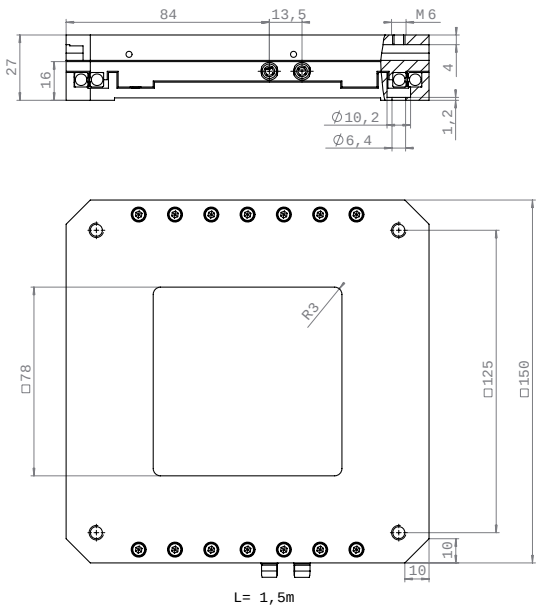


0.3 µm steps performed by M-686

Technical Data

	M-686.164	Units
Active axes	XY	
Motion and positioning		
Travel range	25 x 25	mm
Integrated sensor	Linear encoder	
Sensor resolution	0.1	µm
Design resolution	0.1	µm
Min. incremental motion	0.3	µm
Backlash	0.3	µm
Unidirectional repeatability	0.2	µm
Pitch	±50	µrad
Yaw	±50	µrad
Max. velocity	100	mm/s
Origin repeatability	1	µm
Mechanical properties		
Max. load	10*	N
Max. push/pull force	4	N
Holding force	6	N
Max. lateral force	4	N
Drive properties		
Motor type	2 x PILine® P-664	
Operating voltage	168 (peak-peak)** 60 (RMS)**	V
Electrical power	10/axis***	W
Limit and reference switches	Hall-effect	
Miscellaneous		
Operating temperature range	-20 to +50	°C
Material	Al (black anodized)	
Mass	1.2	kg
Cable length	1.35	m
Connector	2 x MDR, 14-pin	
Recommended controller/driver	2 x C-866 single-axis controller / driver 2 x C-185 single-axis drive electronics	

* For max. velocity. Max. load up to 50 N with reduced velocity
** The operating voltage for the piezomotor is supplied by the drive electronics which requires 12 V
*** For drive electronics



M-686.164, dimensions in mm. The minimum aperture is 66 x 66 mm with both axes at the maximum position