

# M-682 Linear Positioning Stage

## Compact Closed-Loop Linear Stage with High-Force Piezomotor Drive



M-682 Translation stage

- Integration of the Powerful PLine® RodDrive
- Low Profile, Compact Dimensions
- Max. Velocity 350 mm/s
- Up to 7 N Pushing Force
- Direct Metrology Linear Encoder, 0.1 µm Resolution
- Non-Magnetic and Vacuum-Compatible Versions Available

M-682 translation stages are low-profile, high-accuracy positioning systems based on the M-674 RodDrive ultrasonic linear motor actuator.

The M-682 positioner combines the advantages of its high-performance, high-speed drive with a high-precision guiding system and the superior accuracy of a direct-metrology linear encoder providing 0.1 µm resolution.

### Application Examples

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

In addition to the standard, 50 mm model, custom M-682 versions with different travel ranges as well as vacuum-compatible and non-magnetic designs are feasible and available on request.

### RodDrive Replaces Classical Motor/Leadscrew Systems

The M-682 is an example of how an M-674 RodDrive linear motor actuator can be employed to design a very compact positioning system. The RodDrive represents a higher level of integration than OEM piezo motors such as the P-664 and significantly simplifies the stage design because preloading and alignment of motor and friction bar are taken care of inside the actuator.

### Advantages of PLine® Micropositioning Systems

The ultrasonic piezoceramic drives used in PLine® micro-positioners 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

### Optimized Controller and Drive Electronics

PLine® motors require a special drive electronics to generate the ultrasonic oscillations for piezoceramic element. For optimum performance the highly specialized C-866 motion controller is recommended. This sophisticated controller also integrates the drive electronics. Furthermore, the controller has a number of special features, including dynamic parameter switching for an optimized high-speed motion

### Ordering Information

**M-682.174**  
PLine® High-Speed Linear Stage with RodDrive, 50 mm, 6 N, 50 mm, 7 N

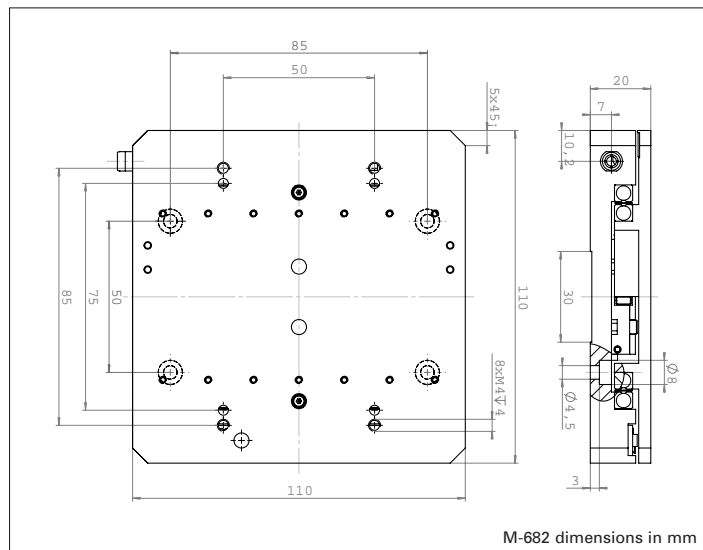
Ask about custom designs

and settling behavior to take into account the motion characteristics typical of piezomotors. The broad-band encoder input (35 MHz) supports the outstanding high accelerations and velocities of PLine® drives at high resolutions.

Optionally, for use with third party servo controllers, the C-185 analog drive electronic (stand-alone unit) is available. It controls the motor speed by an analog ±10 V signal. For optimum performance this driver must be tuned together with the stage and should be ordered at the same time as the motor/stage.

### Notes

The products described in this document are in part protected by the following patents:  
US Pat. No. 6,765,335  
German Patent No. 10154526



M-682 dimensions in mm



### Technical Data

Models	M-682.174	Units
Active axes	X	
<b>Motion and positioning</b>		
Travel range	50 mm	
Integrated sensor	Linear encoder	
Sensor resolution	0.05 $\mu\text{m}$	
Design resolution	0.05 $\mu\text{m}$	typ.
Min. incremental motion	0.1 $\mu\text{m}$	typ.
Backlash	$\pm 0.2 \mu\text{m}$	typ.
Unidirectional repeatability	0.2 $\mu\text{m}$	typ.
Pitch	$\pm 50 \mu\text{rad}$	typ.
Yaw	$\pm 50 \mu\text{rad}$	typ.
Max. speed	350 mm/s	
Reference switch repeatability	1 $\mu\text{m}$	typ.
<b>Mechanical properties</b>		
Max. load	50 N	
Max. push/pull force	7 N	
Max. Holding force	7 N	
<b>Drive properties</b>		
Motor type	M-674 RodDrive PILine® ultrasonic piezomotor	
Operating voltage	200 V (Peak-Peak) * 70 V (RMS)*	
Electrical power	15 W**	nominal
Current	1.5 A**	
Limit and reference switches	Hall-effect	
<b>Miscellaneous</b>		
Operating temperature range	-20 to +50 °C	
Material	Al (black anodized)	
Dimensions	110 x 110 x 20 mm	
Mass	0.57 kg	$\pm 5\%$
Cable length	1.5 m	$\pm 10 \text{ mm}$
Connector	MDR, 14-pin	
Recommended controller/driver	C-866.D64 Single-axis Controller / Driver C-185.D64 driver	

\* Motor power is supplied by the drive electronics, which runs on 12 VDC

\*\* For drive electronics