

## M-682 PLine® Linear Motor Stage

**Compact, Fast, with High-Force Piezomotor, Direct Position Measurement**



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.

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 (see p. 1-28) 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® micropositioners have a number of advantages over classical drives:

- Higher Accelerations, up to 5 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-867 motion controller (see p. 4-116) 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 and settling

### Ordering Information

**M-682.174**  
PLine® High-Speed Linear Stage with RodDrive

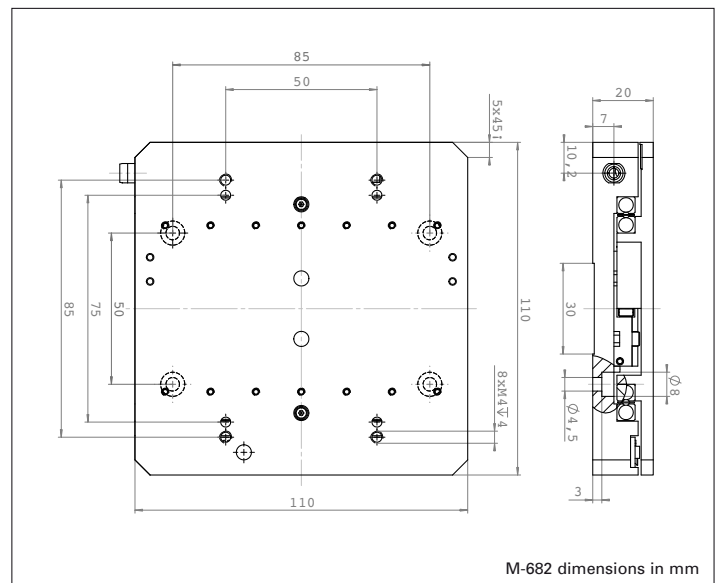
**Ask about custom designs**

behavior to take into account the motion characteristics typical of piezomotors. The broadband encoder input (50 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 (see p. 1-36, 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

### Application Examples

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

**This product family has been replaced by the following new product:**

**>> M-683 PLine® Precision Micro Translation Stage**



**Technical Data**

| Model                          | M-682.174   | Units   |
|--------------------------------|---|---------|
| Active axes                    | X   |         |
| <b>Motion and positioning</b>  |   |         |
| Travel range                   | 50 mm   |         |
| Integrated sensor              | Linear encoder  |         |
| Sensor resolution              | 0.1 µm  |         |
| Design resolution              | 0.1 µm  | typ.    |
| Min. incremental motion        | 0.1 µm  | typ.    |
| Bidirectional repeatability    | ±0.2 µm   | typ.    |
| Unidirectional repeatability   | 0.2 µm  | typ.    |
| Pitch                          | ±50 µrad  | typ.    |
| Yaw                            | ±50 µrad  | typ.    |
| Max. speed                     | 350 mm/s  |         |
| Reference switch repeatability | 1 µm  | 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 PLine® ultrasonic piezomotor                   |         |
| Operating voltage              | 200 V (Peak-Peak) *<br>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   | ±5%     |
| Cable length                   | 1.5 m   | ±10 mm  |
| Connector                      | MDR, 14-pin   |         |
| Recommended controller/driver  | C-867.D64 Single-axis Controller / Driver<br>C-185.D64 driver |         |

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

\*\*For drive electronics

Linear Actuators & Motors

Nanopositioning / Piezoelectrics

Nanometrology

**Micropositioning**

Hexapod 6-Axis Systems / Parallel Kinematics

**Linear Stages**

**Translation (X)**

Vertical (Y)

Multi-Axis

Rotary & Tilt Stages

Accessories

Servo & Stepper Motor Controllers

Single-Channel

Hybrid

Multi-Channel

Micropositioning Fundamentals

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