

# M-664 Linear Positioning Stage

## Low-Profile High-Speed PLine® Linear Stage with Linearencoder



Fast and compact M-664 piezo translation stage with linear encoder

- Travel Range 25 mm
- Max. Velocity 400 mm/s
- Ultra-Low Profile, 15 mm
- Direct Metrology Linear Encoder with 0.1 µm Resolution
- High Guiding Accuracy with Crossed Roller Bearings
- Compact XY Combinations
- Piezo Linear Motor with 6 N Drive Force
- Self Locking at Rest

M-664 micropositioning systems are low-profile, high-accuracy translation stages with piezo linear encoders. The M-664 stage is next-larger in the series of piezomotor-driven stages of which the M-663 is the smallest.

### Application Examples

- Biotechnology
- Micromanipulation
- Microscopy
- Quality assurance testing
- Metrology
- Mass storage device testing
- R&D
- Photonics packaging

For improved guiding accuracy, the M-664 uses two crossed roller bearings mounted on ground aluminum profiles. The integrated P-664 PLine® linear motor can generate forces up to 6 N and maximum closed-loop velocities to 400 mm/s over a 25 mm travel range.

### 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 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 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

### Ordering Information

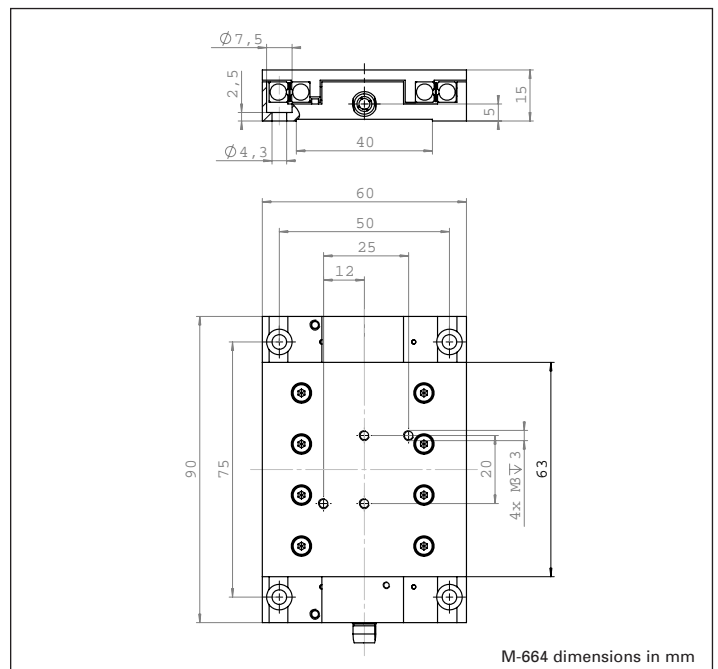
**M-664.164**  
PLine® Micro Positioning Stage with P-664 Piezo Linear Motor, 25 mm, 6 N  
**Ask about custom designs!**

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  $\pm 10$  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





PILine® Micropositioning stages: M-682, M-664 and M-663 (from left)

## Technical Data

| Models                         | M-664.164  | Tolerance           |
|--------------------------------|--|---------------------|
| Active axes                    | X  |                     |
| <b>Motion and positioning</b>  |  |                     |
| Travel range                   | 25 mm  |                     |
| Integrated sensor              | Linear encoder   |                     |
| Sensor resolution              | 0.1 $\mu\text{m}$  |                     |
| 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. velocity                  | 400 mm/s   |                     |
| Reference switch repeatability | 1 $\mu\text{m}$  | typ.                |
| <b>Mechanical properties</b>   |  |                     |
| Max. load                      | 25 N   |                     |
| Max. push/pull force           | 6 N  |                     |
| Max. holding force             | 4 N  |                     |
| <b>Drive properties</b>        |  |                     |
| Motor type                     | P-664 PLine® ultrasonic piezo drive                                    |                     |
| Operating voltage              | 168 V (peak-to-peak) *<br>60 V (RMS) *                                 |                     |
| Electrical power               | 10 W **  | nominal             |
| Current                        | 800 mA **  |                     |
| Limit and reference switches   | Hall-effect  |                     |
| <b>Miscellaneous</b>           |  |                     |
| Operating temperature range    | -20 to +50 °C  |                     |
| Material                       | Al (black anodized)  |                     |
| Dimensions                     | 90 x 60 x 15 mm  |                     |
| Mass                           | 0.190 kg   | $\pm 5 \%$          |
| Cable length                   | 1.5 m  | $\pm 10 \text{ mm}$ |
| Connector                      | MDR, 14-pin  |                     |
| Recommended controller/driver  | C-866.164 single-axis controller/driver<br>C-185.164 drive electronics |                     |

\* The stage supply power is drawn from the drive electronics, which runs on 12 V.

\*\* For drive electronics