

# M-272 Linear Shaft Motor, Ultrasonic Drive

## Fast and Self-Locking with PLine® Piezomotors

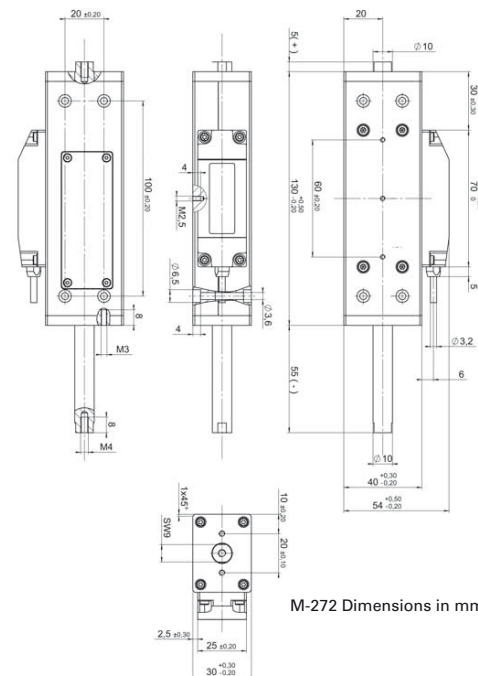


The M-272 linear shaft motor shown with OEM controller

- Force Generation up to 8 N
- Self Locking at Rest
- Velocity up to 200 mm/s
- 5 μm Encoder Resolution
- Linear Guiding

### Ordering Information

**M-272**  
PLine® Linear Actuator with Ultrasonic Motor and Linear Encoder, 50 mm, 8 N



PLine® piezoceramic ultrasonic drives offer an affordable alternative to motor-leadscrew combinations and electromagnetic linear motors when small dimensions and/or high speed are important. With velocities of up to 200 mm/s, these drives are fast, compact, and are readily integrated. In addition, PLine® motors are self-locking when at rest with zero heat generation, and doing away with the need for an additional motor brake.

The novel M-272 closed-loop linear drive combines motor, actuator, linear encoder, guiding system and brake functionality in a very compact package. Due to the integrated guiding system a payload can be easily attached to the drive rod of the M-272 drive. The drive can also function as a drop-in-replacement for motor-leadscrew drives facilitating assembly and reducing the number of components significantly. Due to the integrated linear encoder, positioning can be done precisely and repeatably.

### Self-locking Instead of Quiescent Current

PLine® piezo motors are based on a new, patented, ultrasonic drive principle developed by PI. The core piece of the system is a piezoceramic plate, which is excited with high-frequency eigenmode oscillations. A friction tip attached to the plate moves along an inclined linear path at the eigenmode frequency. Through its contact with the friction bar, the moving part of the mechanics drives forward or backwards. With each oscillatory cycle, the mechanics executes a step of a few nanometers; the macroscopic result is smooth motion with a virtually unlimited travel range. The ceramic plate is preloaded against the runner and thus ge-

### Technical Data (Preliminary Data)

Model	M-272	Tolerance
Active axes	X	
<b>Motion and positioning</b>		
Travel range	50 mm	
Integrated sensor	Linearencoder	
Sensor resolution	5 μm	
Design resolution	5 μm	typ.
Min. incremental motion	10 μm	typ.
Backlash	5 μm	typ.
Unidirectional repeatability	10 μm	typ.
Velocity	200 mm/s	max.
<b>Mechanical properties</b>		
Guiding	Ball bearings	
Push/pull force	8 N	max.
Holding force	8 N	max.
Lateral force	5 N	max.
<b>Drive properties</b>		
Motor type	U-164 PLine® piezomotor	
Current	800 mA	
Reference switch	Hall-effect	
<b>Miscellaneous</b>		
Operating temperature range	-20 to +50 °C	
Material	Aluminum	
<b>Dimensions</b>		
Mass	0.5 kg	± 5%
Cable length	0.5 m	± 10 mm
Connector	MDR, 14-pin	

Recommended controller/driver: C-867.OE

\* Power for the motor is supplied by the drive electronics, which requires 12 VDC.

\*\* For drive electronics