

## PILine® Rotation Stage

Miniature Stage with Ultrasonic Piezo Motor



### U-622

- Extremely space-saving: Edge length only 20 mm, height 10 mm
- Positions small loads quickly and with precision: Velocity to 720 °/s, minimum incremental motion to 525 µrad
- Unlimited rotation range >360°
- Drive torque 5 mNm
- Self-locking when switched off: Saves energy and reduces generation of heat
- Light and low noise

#### Precision-class rotation stage

PILine® stages are particularly suitable for applications that require fast precision positioning. When switched off, the self-locking drive holds the position of the stage mechanically stable. Energy consumption and heat generation are therefore considerably reduced. Applications with a low duty cycle that are battery-powered or heat-sensitive benefit from these characteristics. The position of the axis is measured by an encoder and an optical reference switch allows reliable repeatable motion. The piezomotor drive principle and its electrical operation are inexpensive and can be customized.

#### PILine® ultrasonic piezomotor

An integral part of a PILine® ultrasonic piezomotor is a piezo actuator that is preloaded against a movable, guided runner via a coupling element. The piezoceramic actuator is excited to ultrasonic oscillation by a high-frequency AC voltage between 100 and 200 kHz. Deformation of the actuator leads to periodic diagonal motion of the coupling element relative to the runner. The feed created is a few nanometers per cycle; the high frequencies lead to the high velocities. Preloading the piezoceramic actuator against the runner ensures self-locking of the drive when at rest and switched off.

#### Highly accurate position measuring with incremental encoder

Noncontact optical encoders measure the position directly at the platform with the greatest accuracy. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement.

#### Fields of application

Micromanipulation, Automation, Biotechnology, Sample manipulation, Sample positioning, optical metrology

## Specifications

Motion	U-622.03	Unit	Tolerance
Active axes	$\theta_z$		
Rotation range	>360	°	
Velocity, closed loop	720	°/s	max.
Minimum incremental motion	525	$\mu\text{rad}$	typ.
Bidirectional repeatability	$\pm 1050$	$\mu\text{rad}$	

  

Positioning	U-622.03	Unit	Tolerance
Sensor type	Incremental encoder		
Sensor resolution	175	$\mu\text{rad}$	

  

Mechanical properties	U-622.03	Unit	Tolerance
Load capacity / axial force	0.3	N	max.
Holding force	0.005	Nm	max.

  

Drive properties	U-622.03	Unit	Tolerance
Motor type	PILine® ultrasonic piezo motor, performance class 1		
Drive torque clockwise / counterclockwise ( $\theta_z$ )	0.005	Nm	max.

  

Connectors	U-622.03	Unit	Tolerance
Motor / sensor	1 × Sub-D 15 (m)		

  

Miscellaneous	U-622.03	Unit	Tolerance
Reference point switch	Optical		
Operating temperature	0 to 40	°C	
Material	Anodized aluminum		
Mass	120	g	$\pm 5\%$
Cable length	1.5	m	typ.
Recommended electronics	C-867.1U		

All specifications based on room temperature (22 °C  $\pm$ 3 °C).

## Ordering Information

### **U-622.03**

PILine® miniature rotation stage, >360° rotation range, velocity 720°/s, incremental encoder, 175 µrad resolution, 18.5 mm diameter, piezoelectric ultrasonic motor

### **Accessories**

#### **U-600.A01**

Extension cable for PLine®, Sub-D 15-pin, 1 m

#### **U-600.A03**

Extension cable for PLine®, Sub-D 15-pin, 3 m

#### **U-600.A05**

Extension cable for PLine®, Sub-D 15-pin, 5 m