

Rotation Stage with Low-Profile Design

Fast PLine® Direct Drive and Central Opening



U-651

- Low profile of only 14 mm
- Positions larger loads quickly and with precision
- Unlimited rotation range >360°
- Drive torque to 0.3 Nm in both directions of rotation
- Self-locking when switched off: Saves energy and reduces generation of heat
- Central aperture for more fields of application

Precision-class rotation stage

PLine® 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.

PLine® ultrasonic piezomotors

An integral part of a PLine® 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.

Crossed roller guide

With crossed roller guides, the point contact of the balls in ball guides is replaced by line contact of the hardened rollers. Consequently, they are considerably stiffer and need less preload, which reduces friction and allows smoother running. Crossed roller guides are also distinguished by high guiding accuracy and load capacity. Force-guided rolling element cages prevent cage creep.

Fields of application

Micromanipulation, automation, biotechnology, sample manipulation, sample positioning, optical metrology, vacuum applications to 10^{-6} hPa (optional)

Specifications

| Motion | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|-----------------------------|-------------------------|-------------------------|-----------|-----------|
| Active axes | θ_z | θ_z | | |
| Rotation range | >360 | >360 | ° | |
| Velocity, closed loop | 540 | 540 | °/s | max. |
| Minimum incremental motion | 27 | 12 | μ rad | typ. |
| Bidirectional repeatability | ± 54 | ± 24 | μ rad | |

| Motion | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|-------------------|-------------------------|-------------------------|-----------|-----------|
| Sensor type | Incremental encoder | Incremental encoder | | |
| Sensor resolution | 9 | 4 | μ rad | |

| Mechanical properties | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|-----------------------------|-------------------------|-------------------------|------|-----------|
| Load capacity / axial force | 20 | 20 | N | max. |
| Holding force | 0.3 | 0.3 | Nm | max. |

| Drive properties | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|---|--|--|------|-----------|
| Motor type | PILine® ultrasonic piezo motor, performance class 2 | PILine® ultrasonic piezo motor, performance class 2 | | |
| Drive torque clockwise / counterclockwise (θ_z) | 0.3 | 0.3 | Nm | max. |

| Connectors | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|----------------|-------------------------|-------------------------|------|-----------|
| Motor / sensor | 1 × D-sub 15 (m) | 1 × D-sub 15 (m) | | |

| Miscellaneous | U-651.03 / U-651.03V | U-651.04 / U-651.04V | Unit | Tolerance |
|-------------------------|-------------------------------------|-------------------------------------|------|------------|
| Reference switch | Optical | Optical | | |
| Operating temperature | 0 to 40 | 0 to 40 | °C | |
| Material | Anodized aluminum | Anodized aluminum | | |
| Mass | 500 | 500 | g | ± 5 % |
| Cable length | 1.5 (model .03) 1.0 (model .03V) | 1.5 (model .04) 1.0 (model .04V) | m | ± 10 % |
| Recommended electronics | C-867.1U | C-867.1U | | |

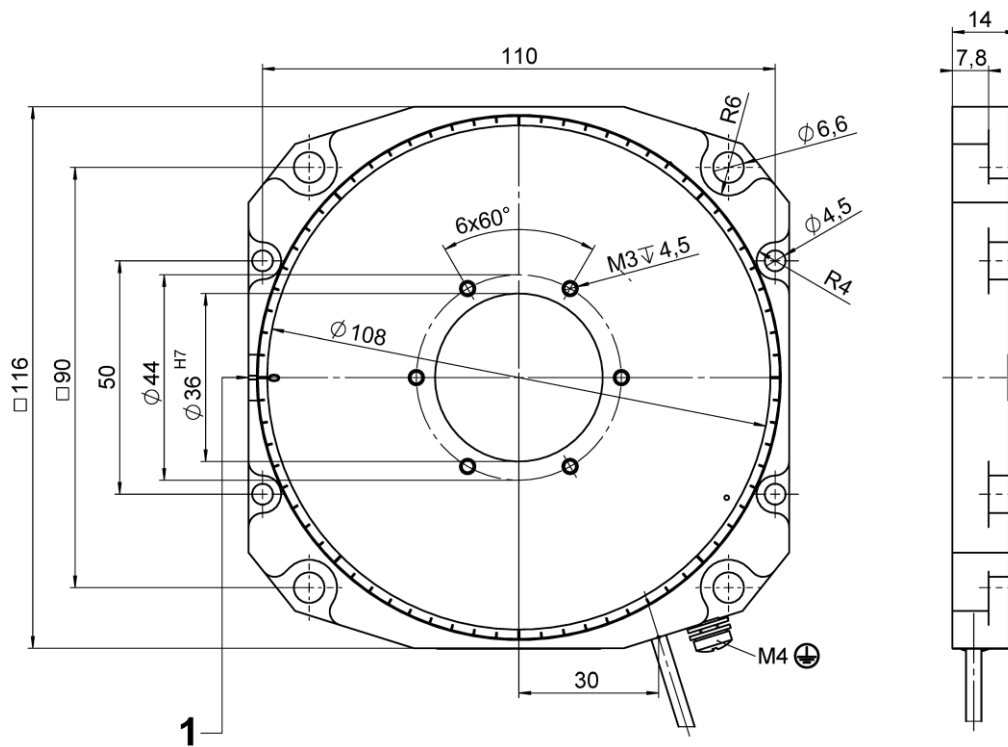
All specifications based on room temperature (22 °C ± 3 °C).

Vacuum versions to 10^{-6} hPa available on request. Specifications for vacuum versions can differ.

The U-651 series replaces the M-660 series.

Ask about customized versions.

Drawings / Images



U-651: Dimensions and position of the 0° mark [1] after the reference point definition. Dimensions in mm. Note that the decimal points are separated by a comma in the drawings.

Ordering Information

U-651.03

rotation stage with low Profile and PLine® ultrasonic piezo motors, >360° rotation range, velocity 540 °/s. direct position measurement with incremental encoder, 9 μ rad resolution, D-sub connector

U-651.04

rotation stage with low Profile and PLine® ultrasonic piezo motors, >360° rotation range, velocity 540 °/s. direct position measurement with incremental encoder, 4 μ rad resolution, D-sub connector

Accessories

U-600.A01

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

U-600.A03

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

U-600.A05

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