

Fast Rotation Stages with Ultrasonic Motors



M-660



U-628



U-624



U-622

Miniaturized Rotation Stage

20 MM SIDE LENGTH, INTEGRATED ENCODER



U-622

- Only 20 mm edge length, height 10 mm
- Integrated, direct-measuring incremental encoder
- Rotation range $>360^\circ$
- High velocity 720 $^\circ/\text{s}$
- Drive torque 5 mNm

Precision-class miniature rotation stage

Integrated, direct-measuring incremental encoder.
Rotation range $>360^\circ$. Optical reference point switch

PILine® ultrasonic piezo motor

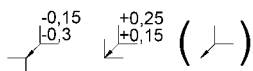
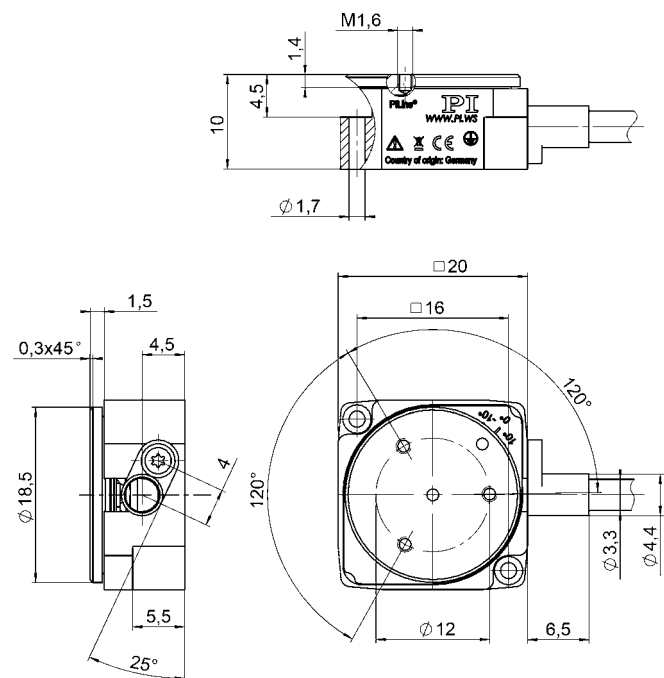
The piezoceramic ring-shaped motor acts directly on the rotating platform. Self-locking at rest, therefore no heat

generation. No drive noises. High velocity to 720 $^\circ/\text{s}$. Holding torque 5 mNm

Fields of application

Sample handling and positioning in research and industry for installations limited in space. Vacuum version for 10^{-6} hPa optional

	U-622.03	Unit	Tolerance
Active axes	θ_z		
Motion and Positioning			
Rotation range	>360	°	
Integrated sensor	Incremental encoder		
Design resolution	175	μrad	
Min. incremental motion	525	μrad	typ.
Bidirectional repeatability	± 1050	μrad	
Velocity	720	°/s	max.
Mechanical Properties			
Load capacity / axial force	0.3	N	max.
Holding torque	0.005	Nm	max.
Torque cw / ccw (θ_z)	0.005	Nm	max.
Drive Properties			
Motor Type	PILine® ultrasonic piezomotor, performance class 1		
Reference point switch	Optical		
Miscellaneous			
Operating temperature range	0 to 40	°C	
Material	Al (black anodized)		
Mass	120	g	$\pm 5\%$
Cable length	1.5	m	$\pm 10\text{ mm}$
Connector	Sub-D connector, 15-pin (m)		
Recommended controller/driver	C-877.1U11: 1 channel, affordable compact device C-877.2U12: 2 channels, affordable bench-top C-867.1U: 1 channel C-867.2U: 2 channels		



U-622, dimensions in mm

Fast Miniature Rotation Stage

WITH ULTRASONIC PIEZOMOTOR



U-624

- Only 30 mm edge length, height 12 mm
- Integrated, direct-measuring incremental encoder
- Rotation range >360°
- High velocity 720 °/s
- Drive torque 10 mNm

Small, precision-class rotation stage

Integrated, direct-measuring incremental encoder.
Rotation range >360°. Optical reference point switch

PILine® ultrasonic piezo motor

The piezoceramic ring-shaped motor acts directly on the rotating platform. Self-locking at rest, therefore no heat

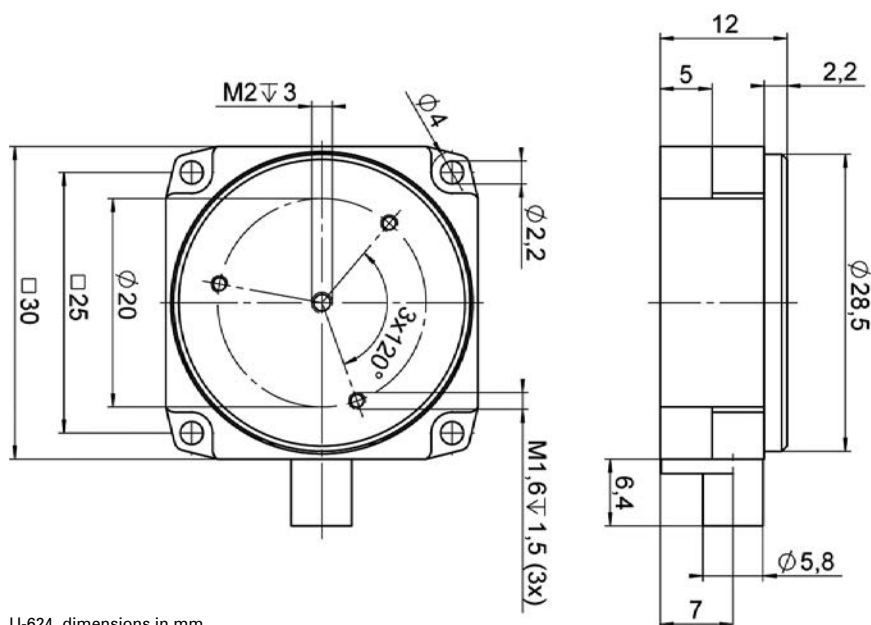
generation. No drive noises. High velocity to 720 °/s.
Holding torque 10 mNm

Fields of application

Sample handling and positioning in research and industry for installations limited in space. Vacuum version for 10⁻⁶ hPa optional

Preliminary Data	U-624.03	Unit	Tolerance
Active axes	θ_z		
Motion and Positioning			
Rotation range	>360	°	
Integrated sensor	Incremental encoder		
Design resolution	35	μrad	
Min. incremental motion	105	μrad	typ.
Bidirectional repeatability	± 210	μrad	
Velocity	720	°/s	max.
Mechanical Properties			
Load capacity / axial force	1	N	max.
Holding torque	0.01	Nm	max.
Torque cw / ccw (θ_z)	0.01	Nm	max.
Drive Properties			
Motor Type	PILine® ultrasonic piezomotor, performance class 1		
Reference point switch	Optical		
Miscellaneous			
Operating temperature range	0 to 40	°C	
Material	Al (black anodized)		
Mass	130	g	$\pm 5\%$
Cable length	1.5	m	$\pm 10\text{ mm}$
Connector	Sub-D connector, 15-pin (m)		
Recommended controller/driver	C-877.1U11: 1 channel, affordable compact device C-877.2U12: 2 channels, affordable bench-top C-867.1U: 1 channel C-867.2U: 2 channels		

Ask about custom designs!



U-624, dimensions in mm

Fast Rotation Stage with Small Footprint

WITH ULTRASONIC PIEZOMOTOR



U-628

- Edge length 50 mm, height 19 mm
- Integrated, direct-measuring incremental encoder
- Rotation range $>360^\circ$
- High velocity 720 °/s
- Drive torque to 25 mNm, center load to 5 N
- Clear aperture

Precision-class rotation stage

Integrated optical encoder for direct metrology. Rotation range $>360^\circ$. Optical reference point switch. Central clear aperture with 7 mm diameter

PILine® ultrasonic piezo motor

Oscillating piezoceramic actuators act directly on the

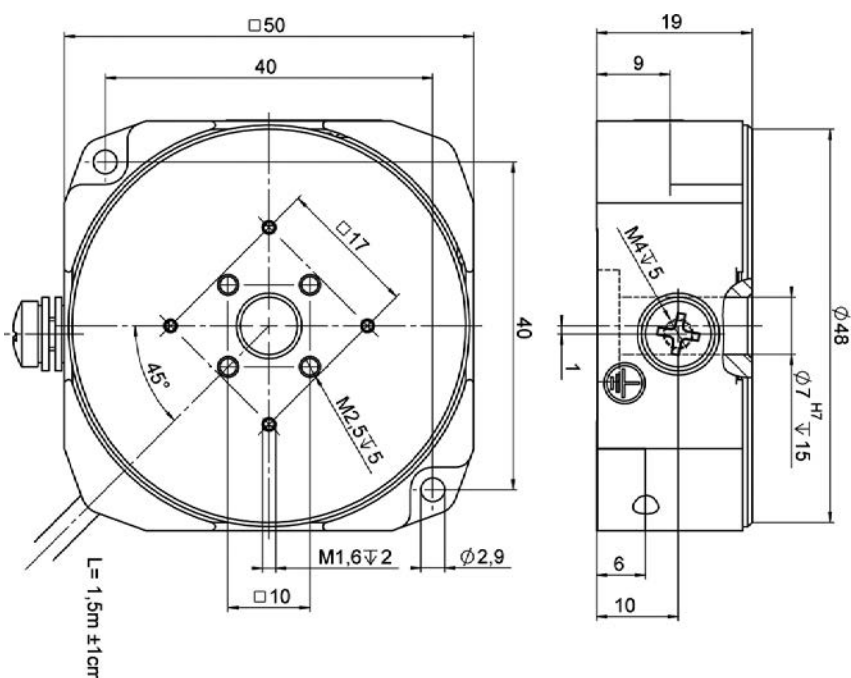
ring-shaped runner. Self-locking at rest, thus no heat generation. High velocity to 720 °/s. Holding torque 25 mNm

Fields of application

Sample handling and positioning in research and industry for installations limited in space. Vacuum version for 10^{-6} hPa optional

	U-628.03	Unit	Tolerance
Active axes	θ_z		
Motion and Positioning			
Rotation range	>360	°	
Integrated sensor	Incremental encoder		
Design resolution	17	μrad	
Min. incremental motion	51	μrad	typ.
Bidirectional repeatability	± 102	μrad	
Velocity	720	°/s	max.
Mechanical Properties			
Load capacity / axial force	5	N	max.
Holding torque	0.03	Nm	max.
Torque cw / ccw (θ_z)	0.025	Nm	max.
Drive Properties			
Motor Type	PILine® ultrasonic piezomotor, performance class 1		
Reference point switch	Optical		
Miscellaneous			
Operating temperature range	0 to 40	°C	
Material	Al (black anodized)		
Mass	300	g	$\pm 5\%$
Cable length	1.5	m	$\pm 10\text{ mm}$
Connector	Sub-D connector, 15-pin (m)		
Recommended controller/driver	C-877.1U11: 1 channel, affordable compact device C-867.1U: 1 channel C-867.2U: 2 channels, C-877.2U12: 2 channels, affordable bench-top		

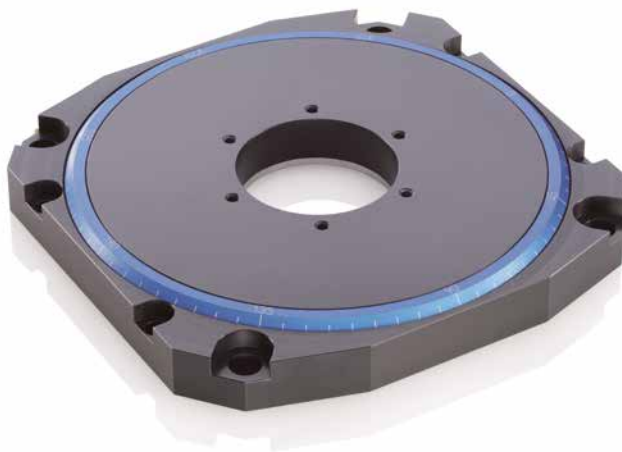
Ask about custom designs!



U-628, dimensions in mm

Rotation Stage with Low-Profile Design

FAST PILINE® DIRECT DRIVE



U-651

- Low profile: Only 14 mm height
- Integrated, direct-measuring incremental encoder with up to 4 μ rad resolution
- Rotation range $>360^\circ$
- High velocity of 720 $^\circ/s$
- Drive torque to 0.3 Nm in both directions of rotation
- Clear aperture with 36 mm diameter

Precision-class rotation stage

Integrated, direct-measuring incremental encoder.
Rotation range $>360^\circ$. Optical reference point switch.
High guiding accuracy due to crossed roller bearings.
Clear aperture center load capacity to 20 kg

PILine® ultrasonic piezo motor

Oscillating piezoceramic actuators act directly on the ring-shaped runner. Self-locking at rest, therefore no heat

generation. No drive noises. High velocity up to 720 $^\circ/s$.
Dynamic start / stop dynamics. Holding torque 0.3 Nm

Valid patents

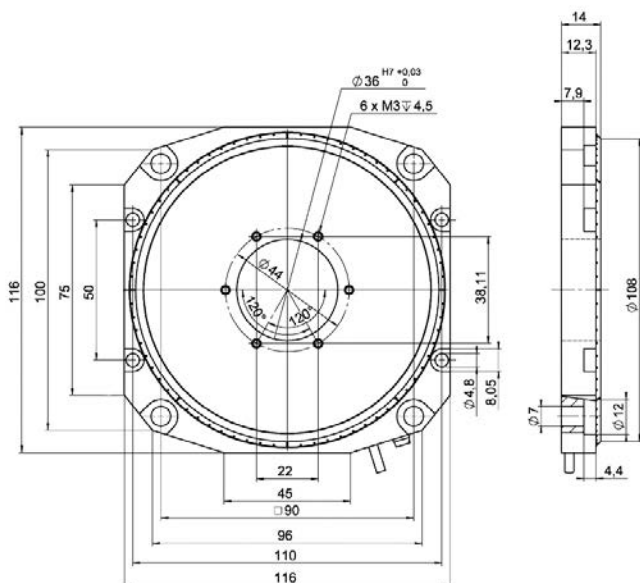
US patent no. 6,765,335B2
European patent no. 1267425B1

Fields of application

Industry and research. For micromanipulation, automation, optical metrology

Preliminary Data	U-651.03	U-651.04	Unit	Tolerance
Active axes	θ_z	θ_z		
Motion and Positioning				
Rotation range	>360	>360	°	
Integrated sensor	Incremental encoder	Incremental encoder		
Design resolution	9	4	μrad	
Min. incremental motion	27	12	μrad	typ.
Bidirectional repeatability	± 54	± 24	μrad	
Velocity	720	720	°/s	max.
Mechanical Properties				
Load capacity / axial force	20	20	N	max.
Holding torque	0.3	0.3	Nm	max.
Torque cw / ccw (θ_z)	0.3	0.3	Nm	max.
Drive Properties				
Motor Type	PILine® ultrasonic piezomotor, performance class 2	PILine® ultrasonic piezomotor, performance class 2		
Reference point switch	Optical	Optical		
Miscellaneous				
Operating temperature range	0 to 40	0 to 40	°C	
Material	Al (black anodized)	Al (black anodized)		
Mass	500	500	g	$\pm 5\%$
Cable length	1.5	1.5	m	$\pm 10\text{ mm}$
Connector	Sub-D connector, 15-pin (m)	Sub-D connector, 15-pin (m)		
Recommended controller/driver	C-867.1U: 1 channel C-867.2U: 2 channels C-877.2U12: 2 channels, affordable bench-top	C-867.1U: 1 channel C-867.2U: 2 channels, C-877.2U12: 2 channels, affordable bench-top		

Ask about custom designs!
The U-651 stage series replace the M-660 series



U-651, dimensions in mm