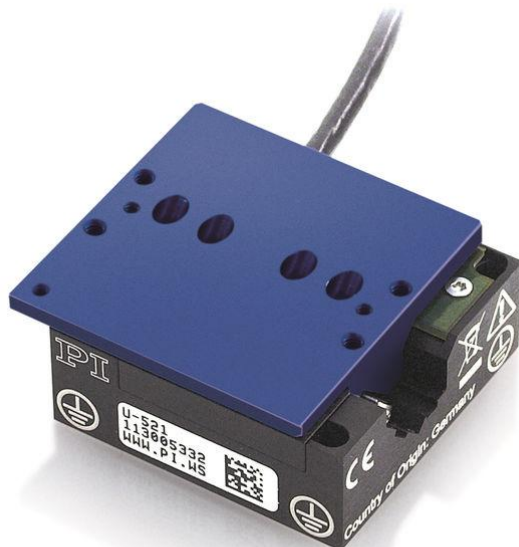


PILine® Linear Positioning Stage

COMPACT STAGE WITH ULTRASONIC PIEZOMOTOR

U-521

- + Positions small loads quickly and with precision: Velocity to 200 mm/ s, minimum incremental motion to 0.3 µm
- + Space- saving: Only 35 mm in width and 15 mm in height
- + Self- locking when switched off: Saves energy and reduces generation of heat
- + Light and low noise
- + Vacuum versions available



Precision- class linear positioning 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 is 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 is 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.

Direct position measurement with incremental encoder

Noncontact optical encoders measure the actual position directly at the motion platform with the greatest accuracy so that nonlinearity, mechanical play or elastic deformation have no influence on position measuring.

Valid patents

US patent no. 6,765,335B2

European patent no. 1267425B1

Fields of application

Micromanipulation, automation, biotechnology, sample manipulation, sample positioning, applications with limited space, vacuum applications to 10⁻⁶ hPa (optional)

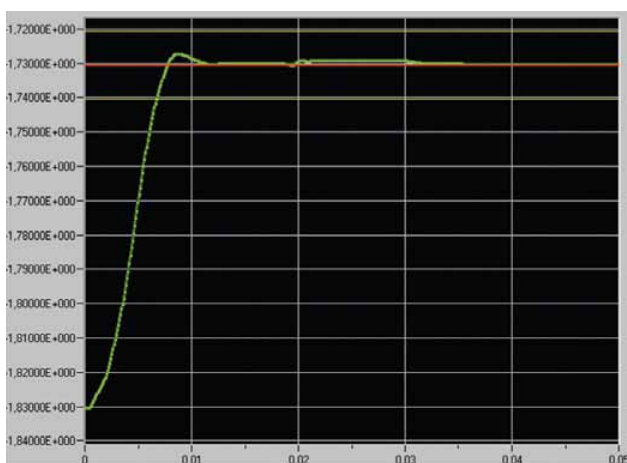


XY combination of two U-521s

Specifications

| | U-521.23 | U-521.24 | Unit | Tolerance |
|--|--|--|------|-----------|
| Motion and Positioning | | | | |
| Active axes | x | x | | |
| Travel range | 18 | 18 | mm | |
| Velocity, closed-loop | 200 | 200 | mm/s | max. |
| Minimum incremental motion | 2 | 0.3 | µm | typ. |
| System resolution | 0.4 | 0.1 | µm | |
| Bidirectional repeatability | ±2 | ±0.2 | µm | |
| Linearity error (over the entire travel range) | 8 | 4 | µm | |
| Pitch | ±300 | ±300 | µrad | |
| Yaw | ±300 | ±300 | µrad | |
| Sensor | | | | |
| Sensor type | Incremental encoder | Incremental encoder | | |
| Measurement principle | Optical | Optical | | |
| Measuring method | Direct measuring | Direct measuring | | |
| Sensor resolution | 0.4 | 0.1 | µm | typ. |
| Mechanical Load Capacity | | | | |
| Push force capacity | 2 | 2 | N | max. |
| Pull force capacity | 2 | 2 | N | max. |
| Drive Properties | | | | |
| Motor type | PILine® ultrasonic piezomotor, performance class 1 | PILine® ultrasonic piezomotor, performance class 1 | | |
| Drive force | 2 | 2 | N | max. |
| Holding force | 2 | 2 | N | max. |
| Connectors | | | | |
| Motor/ Sensor | 1 × Sub- D, 15- pin (m) | 1 × Sub- D, 15- pin (m) | | |
| Miscellaneous | | | | |
| Reference point switch | Optical | Optical | | |
| Operating temperature | 0 to 40 | 0 to 40 | °C | |
| Material | Aluminum, anodized | Aluminum, anodized | | |
| Mass (stage without cable and connector (m)) | 40 | 40 | g | |
| Mass (stage with cable and connector (m)) | 160 | 160 | g | |
| Cable length | 1.5 | 1.5 | m | typ. |

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.
 Ask about custom designs!

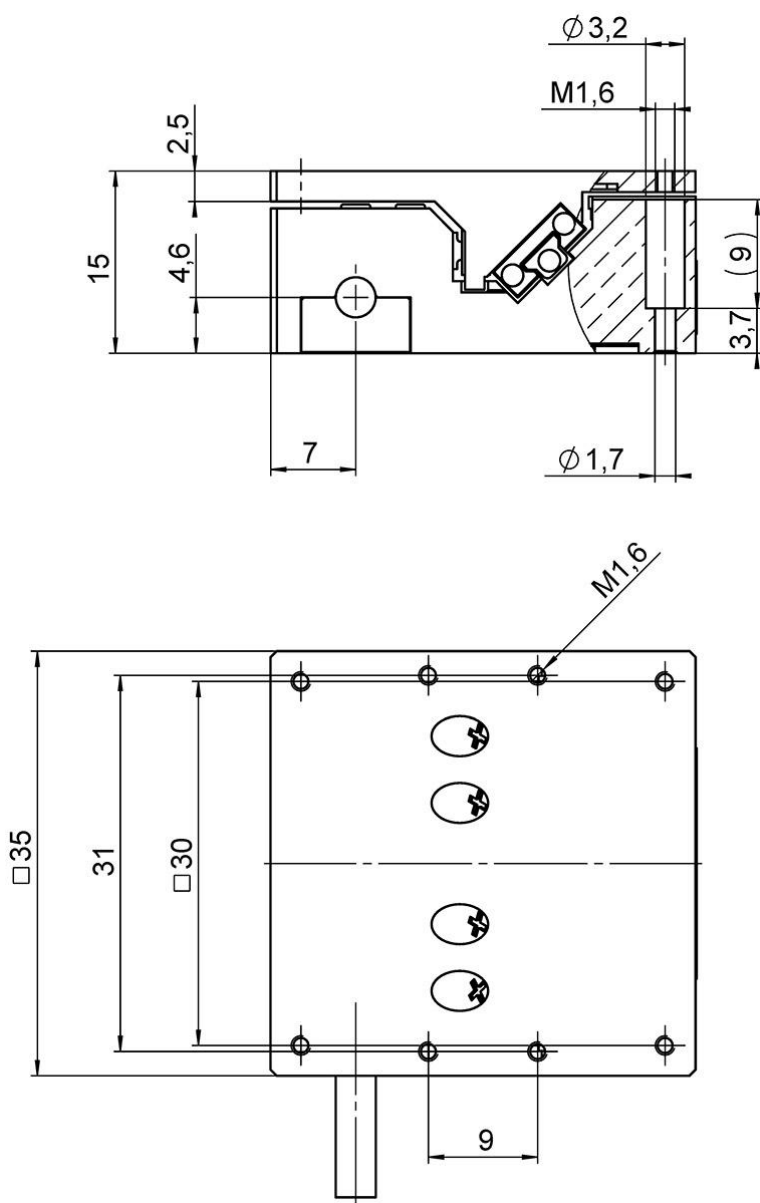


A U-521 with 100g load settles to 0.1µm accuracy in 10ms after a 100µm step, measured with C-867 controller/driver.



C-877 miniature controller

U-521, dimensions in mm



Order Information

U-521.24

Small Linear Stage with PILine® Ultrasonic Motors, 35 mm Wide, 2 N Driving Force, 18 mm Travel Range. Direct Position Measurement with Incremental Encoder, 0.1 µm Resolution, Sub- D Connector(s)

U-521.23

Small Linear Stage with PILine® Ultrasonic Motors, 35 mm Wide, 2 N Driving Force, 18 mm Travel Range. Direct Position Measurement with Incremental Encoder, 0.4 µm Resolution, Sub- D Connector(s)

U-521.24V*

Small Linear Stage with PILine® Ultrasonic Motors, 35 mm Wide, 2 N Driving Force, 18 mm Travel Range. Direct Position Measurement with Incremental Encoder, 0.1 µm Resolution, Sub- D Connector(s), Vacuum- Compatible to 10⁻⁶ hPa

U-521.23V*

Small Linear Stage with PILine® Ultrasonic Motors, 35 mm Wide, 2 N Driving Force, 18 mm Travel Range. Direct Position Measurement with Incremental Encoder, 0.4 µm Resolution, Sub- D Connector(s), Vacuum- Compatible to 10⁻⁶ hPa

*Vacuum versions and special designs available on request.

Controllers / Drivers / Amplifiers

- [C-867.U PILine® Motion Controller](#)
- [C-867.10C885 PILine® Controller Module](#)
- [C-877 PILine® Motion Controller](#)

Related Products

- [U-622 PILine® Rotation Stage](#)
- [U-624 PILine® Rotation Stage](#)
- [U-628 PILine® Rotation Stage](#)
- [U-651 Rotation Stage with Low- Profile Design](#)

Technology

[PILine® Ultrasonic Piezomotors | Ultrasonic piezomotors dispense with the mechanical complexity of classical rotary motor/ gear/ leadscrew combinations in favor of costs and reliability. Learn more ...](#)