Piezo Tip/Tilt Platforms



Short instructions S-3xx





User Information

These short instructions contain an overview of the most important safety and handling instructions for installing and operating piezo tip/tilt stages with (hereinafter referred to as "positioner") with the product codes given above (x: any number).

Subject to change. These short instructions are superseded by any new release. The latest respective release is available for download on our website.



Downloading and Reading the Manual

The actions during installation, startup, and maintenance require additional information from the manuals of the positioner and/or the electronics used.

Manuals may be titled as follows: "User Manual", "Technical Note".

Downloading the Manuals from the Website

- 1. Open the website www.pi.ws.
- 2. Search the website for the product number (e.g., S-331).
- 3. Click the corresponding product to open the product detail page.
- Click the Downloads tab. The manuals are displayed under Documentation.
- Click the ADD TO LIST button for the desired manual and then click REQUEST.
- Fill out the request form and click SEND REQUEST.

The download link will then be sent to the email address entered.

If you cannot find the manual you are looking for or if you have any questions:

Contact our customer service department via service@pi.de.

Physik Instrumente (PI) GmbH & Co. KG, Auf der Römerstr. 1, 76228 Karlsruhe, Germany Phone +49 721 4846-0, Fax +49 721 4846-1019, Email info@pi.de, www.pi.de



Intended Use

The positioner is a laboratory device as defined by DIN EN 61010-1. It is intended for indoor use and use in an environment that is free of dirt, oil, and lubricants.

In accordance with its design, the positioner is intended for precision positioning and alignment of a mirror in two orthogonal axes with a common center of rotation (parallel kinematics). Some models provide additional vertical motion. The positioner is **not** intended for applications in areas, in which a failure would present severe risks to human beings or the environment.

The intended use of the positioner is only possible when completely installed and connected, and in conjunction with suitable electronics. The positioner may only be installed, operated, maintained, and cleaned by authorized and appropriately qualified personnel.

General Safety Instructions

The positioner is built according to state-ofthe-art technology and recognized safety standards. Improper use of the positioner may result in personal injury and/or damage to the positioner. The operator is responsible for correct installation and operation of the positioner.

- Only use the positioner for its intended purpose, and only use it if it is in perfect condition.
- Read the user manual.
- Immediately eliminate any faults and malfunctions that are likely to affect safety.

The positioner is maintenance-free and achieves its positioning accuracy as a result of the optimum alignment of mechanical components and piezo actuators. Loosened screws cause a loss in positioning accuracy.

- Only loosen screws according to the instructions in the manual.
- Do not open the positioner.

Installation

Temperature changes and compressive stress can induce charges in the positioner. After disconnection from the electronics, the piezo actuators can remain charged for several hours. Touching charged parts can result in minor injuries from electric shock.

- Do **not** touch the contacts in the connector.
- Before mounting, connect the positioner to the switched-off electronics for a few seconds to discharge it.
- If possible: Secure the connectors with screws against being pulled out.
- Do not pull connectors out of the electronics during operation.
- If the connecting cable is accidentally pulled out of the positioner during operation: Switch off the electronics before you reconnect the positioner.

Mechanical forces can damage or misalign the positioner.

- Avoid shocks and drops.
- Observe the maximum permissible forces and torques (see manual).
- If a mirror holder is to be used: Clamp the mirror holder above the flexure only.
- Do not allow adhesive to get into the positioner.
- Only ship the positioner in the original packaging.

If the positioner is vacuum-compatible, attention must be paid to cleanliness.

- Only touch the positioner with powder-free gloves.
- If necessary: Wipe the positioner to clean it. Incorrectly fitted screws can cause damage.
- Select the screw length according to the depth of the mounting holes.
- S-325 only: Do not use the holes in the motion platform.

Unsuitable mounting can warp the positioner and reduce the accuracy.

Mount the positioner on an even surface with similar thermal expansion properties (for recommended flatness, see manual). Mirrors not fixed centrically can damage the positioner.

- For dynamic applications, mount the mirror as near to the center as possible to prevent uneven loading of the flexures and, as a whole, the positioner.
- Recommended eccentricity: 0.25 mm

Operating voltages that are excessively high or incorrectly connected can cause damage to the positioner.

- Observe the operating voltage range of the positioner (see manual).
- Observe the correct pin assignment.

Excessively fast discharging can destroy the piezo actuators of the positioner.

 Discharge the positioner only according to the instructions in the manual.

Startup

If a protective earth conductor is not properly connected, touching the positioner in the case of malfunction can result in minor injuries from electric shock.

- Only operate the positioner with a properly connected protective earth conductor.
- Do not remove the protective earth conductor from the positioner during operation.
- Observe the applicable standards for attaching the protective earth conductor .
- If there is any vibration in your application, secure the screw connection for the protective earth conductor in a suitable manner (e.g., with liquid adhesive) to prevent it from unscrewing by itself.

The surface of the positioner and the surrounding area can heat up during operation. Touching the positioner and surrounding parts can result in minor injuries from burning. The heat produced during operation can affect your application.

- ▶ If possible: Cool the positioner sufficiently.
- ▶ If necessary: Install touch protection.
- If sufficient cooling and protection against contact are not possible: Mark the danger zone in accordance with the legal regulations.
- Install the positioner so that your application is not affected by the dissipating heat.

Moisture, liquids, and electrically conductive materials (e.g., metal dust) that penetrates the positioner, as well as surroundings with increased conductivity, can destroy the piezo actuators of the positioner.

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- Only operate the positioner within the permissible ambient conditions (see manual).
- Do not operate a vacuum-compatible positioner during evacuation.

Uncontrolled oscillation can damage your application or the positioner.

- If oscillation occurs, switch off the servo mode or stop the positioner immediately.
- Check the settings of the servo-control parameters (see the manual for the electronics).

Operation

Continuously high voltages can reduce the lifetime of the positioner.

- Keep the maximum operating voltage as low as possible during operation.
- Discharge the positioner appropriately when it is not in use.



Mounting the Mirror

NOTICE!

Incorrect mounting of a mirror or mirror holder can damage the positioner and reduce the positioning accuracy.

- Clamp the mirror holder above the flexure only.
- Use a suitable mirror and adhesive.
- Do not allow adhesive to get into the positioner.
- S-325 only: Do not use the holes in the motion platform.

Tools and Accessories

- Suitable adhesive, e.g., two-component epoxy resin that hardens at room temperature and is insensitive to shear forces
- Suitable mirror with thermal expansion properties as similar as possible to the motion platform, maximum 25.4 mm or 1" diameter
- If necessary: Suitable mirror holder with thermal expansion properties as similar to the motion platform as possible
- Suitable template for applying the adhesive (not standard accessory)
- Suitable centering aid for aligning the mirror (not standard accessory)



- Adhesive a.
- b. Template
- Mirror Centering aid e.

C

d.

- с. Positioner
- 1. Align the template on the positioner.
- 2. Apply the adhesive to the motion platform.
- 3. Attach the centering aid to the positioner.
- 4. Attach the mirror.



Mounting the Positioner and the Protective Earth Conductor

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Requirements

- The positioner is not connected to the electronics.
- ✓ You have provided a suitable mechanical mounting (see manual).
- If the protective earth conductor is connected via the mechanical mounting: The mechanical mounting and the screws used are sufficiently conductive and the mechanical mounting is connected to the protective earth conductor.
- ✓ The cross section of the protective earth conductor is at least 0.75 mm².
- The contact resistance at all protective earth connections is $< 0.1 \Omega$ at 25 A.

Connecting the Positioner via a Separate Protective Earth Connection

If a separate protective earth connection is available, it must be used.



- a. Protective earth connection in the base body of the positioner
- b. Safety washer
- Flat washer C.
- d. Cable lug of the protective earth conductor
- e. M4 screw
- 1. Fasten a suitable cable lug to the protective earth conductor.
- 2. Affix the cable lug of the protective earth conductor to the protective earth connection using the screw set supplied.
- 3. Tighten the screw with at least three turns and a torque of 1.2 Nm to 1.5 Nm.

Mounting the Positioner

If there is no separate protective earth connection, the positioner must be mounted on a surface or a mounting that is electrically conductive and connected to protective earth conductor.



NOTICE!

Despite its solid and robust appearance, the positioner is a highly sensitive and fragile system.

- Avoid subjecting the positioner to force and torque.
- Do not allow the positioner to fall or tip over.

Correct Mounting



Uneven Surface



Mirror too Big



Mounting with a Clamp





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- 2. Clamp the positioner with maximum of 100 N clamping force.
- 3. Check that the positioner is affixed firmly.

Mounting with Screws





- Mount the positioner from above (a, certain models only) or from below (b) using all mounting holes provided.
- 2. Tighten the screws with at least three turns.
- 3. Check that the positioner is affixed firmly.



CAUTION!

If a protective earth conductor is not properly connected, touching the positioner in the case of malfunction can result in minor injuries from electric shock.

- Only operate the positioner with a properly connected protective earth conductor.
- Observe the applicable standards for attaching the protective earth conductor.

The instructions required for startup and operation are in the manual of the electronics used.



Old Equipment Disposal

In accordance with EU law, electrical and electronic equipment may not be disposed of in EU member states via the municipal residual waste.

Dispose of your old equipment according to international, national, and local rules and regulations.

PI undertakes environmentally correct and free disposal of all old PI equipment made available to the market after 13 August 2005.

If you have an old device from PI, you can send it to PI free of charge.



Companies

Physik Instrumente (PI) GmbH & Co. KG Auf der Römerstraße 1 76228 Karlsruhe, Germany Germany Phone +49 721 4846-0 Fax +49 721 4846-1019 info@pi.de www.pi.ws

PI miCos GmbH

Freiburger Straße 30 79427 Eschbach, Germany Germany Phone +49 7634 5057-0 Fax +49 7634 5057-99 info@pimicos.com www.pi.ws PI Ceramic GmbH Lindenstraße 07589 Lederhose, Germany Germany Phone +49 36604 882-0 Fax +49 36604 882-4109 info@piceramic.com www.piceramic.com