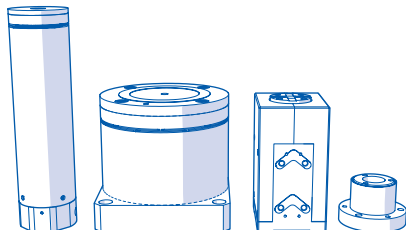


# Piezo Tip/Tilt Platforms

## Short Instructions



S-3xx



### User information

These short instructions contain an overview of the most important safety and handling instructions for piezo tip/tilt stages (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 These short instructions are superseded by any new release.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, operation, and maintenance require additional information from the manuals of your product. Manuals can be titled as follows: "User Manual", "Technical Note".

#### Downloading the manuals from the website

1. Open the website [www.pi.ws](http://www.pi.ws).
2. Search the website for the product number (e.g., S-331).
3. Select the corresponding product to open the product page.
4. Select the **Downloads** tab.  
→ The manuals are shown under **Documentation**.
5. Select **ADD TO LIST** for the desired manual and then select **REQUEST**.
6. Fill out the request form and select **SEND REQUEST**. The download link will then be sent to the entered e-mail address.

If you cannot find the manual you are looking for or if you have any questions: Contact our customer service via [service@pi.de](mailto:service@pi.de).



## Safety

### Intended use

This product is a laboratory device as defined by DIN EN 61010-1. The product 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 where failure would be a considerable risk for people or the environment.

It is only possible to use the product as intended when completely installed and connected, and in conjunction with suitable electronics.

The product may only be installed, operated, maintained, and cleaned by authorized and appropriately qualified personnel.

### General safety instructions

**NOTICE!** The positioner is built according to state-of-the-art technology and recognized safety standards. Improper use of the positioner might result in personal injury and/or damage to the positioner. The operator is responsible for the 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.

**NOTICE!** 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 instructions

**NOTICE!** 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.

**NOTICE!** 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.

**NOTICE!** 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.

**NOTICE!** Unsuitable mounting could warp the positioner and reduce the accuracy.

- Mount the positioner on an even surface with similar thermal expansion properties (for recommended flatness, see manual).

**NOTICE!** Mirrors not fixed centrally can damage the positioner.

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

**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.

**NOTICE!** Excessively high or wrongly connected operating voltages can cause damage to the positioner.

- Pay attention to the operating voltage range of the positioner (see manual).
- Pay attention to the correct pin assignment.

**NOTICE!** Excessively fast discharging can destroy the piezo actuators of the positioner.

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

## Startup instructions

**NOTICE!** 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.

**NOTICE!** 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.

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

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

**NOTICE!** 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 of the electronics).

## Operation instructions

**NOTICE!** 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.

## Handling of vacuum-compatible products

**NOTICE!** If the piezo actuator is vacuum-compatible, attention must be paid to cleanliness.

- Only touch the piezo actuator with powder-free gloves.
- If necessary, wipe the piezo actuator clean.



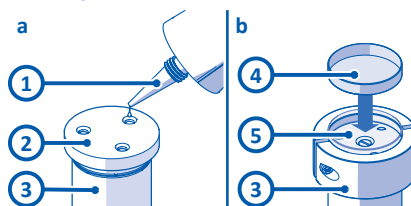
## Installing

### Mounting the mirror

#### 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)

### Mounting the mirror



- 1 Adhesive
- 2 Template
- 3 Positioner
- 4 Mirror
- 5 Centering aid

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.

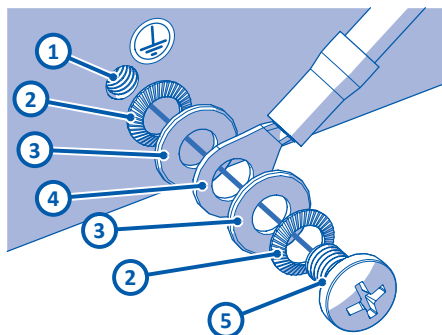
### Mounting the positioner and connecting the protective earth conductor

#### 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 mm<sup>2</sup>.
- The contact resistance at all protective earth connections is <0.1 Ω at 25 A.

#### Connecting the positioner via a separate protective earth connection

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



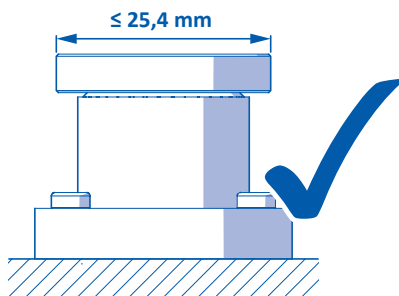
- 1 Protective earth connector on the product
- 2 Safety washer
- 3 Flat washer
- 4 Cable lug of the protective earth conductor
- 5 M4 screw

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 to 1.5 Nm.

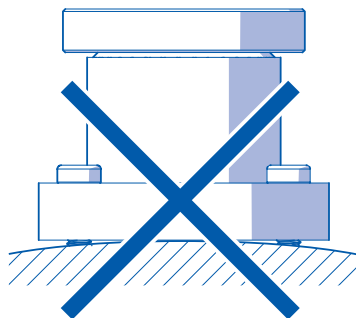
## Mounting the positioner

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.

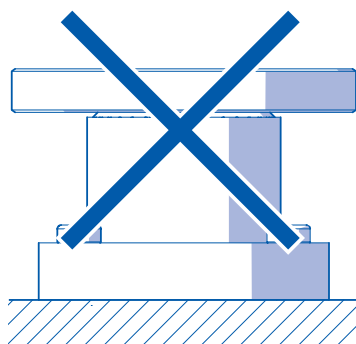
## Correct mounting



## Uneven surface



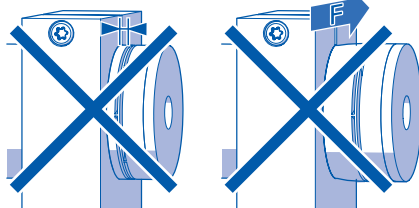
## Mirror too big



## Mounting with a clamp

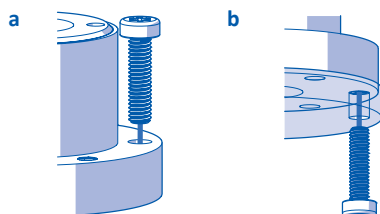
$d < 5 \text{ mm}$

$F > 100 \text{ N}$



1. Allow a gap of at least 5 mm between the holder and the flexures.
2. Clamp the positioner with a maximum of 100 N clamping force.
3. Check that the positioner is affixed firmly.

## Mounting with screw



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



## Startup

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

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