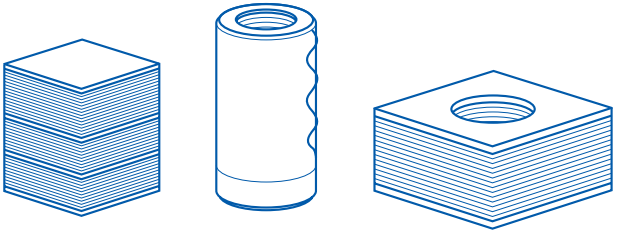
PICA Piezo Actuators up to 1000 V

Short Instructions

PICA Stack / PICA Power / PICA Thru / PICA Shear / Picoactuator®



User information

These short instructions contain an overview of the most important safety and handling instructions for piezo actuators without cases with the product codes given above.

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 These short instructions are superseded by any new release.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

1. Open the website www.pi.ws.
2. Search the website for the product number (e.g., PICA Stack).
3. Select the corresponding product to open the product webpage.
4. Select the **Downloads** tab.
   → Manuals are shown under **Documentation**.
5. For the desired manual, select **ADD TO LIST** and then **REQUEST**.
6. Fill out the request form and select **SEND REQUEST**. The download link will be sent to the email address entered in the form.

If you cannot find the manual you are looking for or if you have any questions: Contact PI customer service at service@pi.de.

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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.

According to its design, the piezo actuator is intended for integration into a mechanical system for the positioning of loads, vibration absorption, and force generation. The operator is responsible for a standards-compliant integration into the overall system.

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.

Electrical dangers

Temperature changes and compressive stress can induce charges in the piezo actuator. The piezo actuator can remain charged for several hours after disconnecting the electronics. Touching the live parts of the piezo actuator can result in serious injury or death from electric shock.

- Do not touch the piezo actuator unless it is discharged.
- Keep the piezo actuator short-circuited when it is not connected to the electronics.
- Do not disassemble the piezo actuator.

The system in which the piezo actuator is integrated must be connected to a protective earth conductor. If a protective earth conductor is not or not properly connected, touching the system could lead to death from electric shock or to serious injury in the case of a malfunction.

- Operate the piezo actuator only with a properly connected protective earth conductor.
- Do not remove the protective earth conductor during operation.
- Observe the applicable standards for mounting the protective earth conductor.

The piezo actuator is subject to voltages up to 1000 V during operation. The shrink tubing of the piezo actuator and the protective polymer layer beneath do not provide contact protection against electric shock. Touching the piezo actuator can result in serious injury or death from electric shock.

- Do not touch the piezo actuator during operation.
- Insulate the piezo actuator electrically from the surrounding mechanical unit before startup. Observe the clearances and creepage distances required for the operating voltage as well as the standards applicable to your application.

Humidity, liquids, and contamination on the surface could destroy the piezo actuator.

- Wear powder-free nitrile or latex gloves when handling the piezo actuator.
- Prevent the piezo actuator from coming into contact with liquids (e.g., finger sweat) and conductive materials (e.g., metal dust).
- Operate the piezo actuator only under permissible ambient conditions (refer to user manual).
- If necessary: Protect the piezo actuator from moisture by means of hermetic sealing or the supply of dry air.
- Do not operate a vacuum-compatible piezo actuator during evacuation.
- If the piezo actuator is to be operated in a special gas atmosphere, contact PI customer service.

If the piezo actuator is used in a vacuum, there is a risk that the piezo actuator may be damaged due to the increased conductivity of the surroundings.

- *When using between 1 hPa and 500 hPa:* Only operate the piezo actuator at a reduced voltage (max. 200 V).
- *When using below 0.1 hPa:* Do not operate the piezo actuator during evacuation.

Excessively high or incorrectly connected operating voltages can damage the piezo actuator.

- Observe the operating voltage range of the piezo actuator (refer to user manual).
- Observe the correct pinout.

If the piezo actuator is not connected to the electronics, the connecting wires must be short-circuited to prevent the piezo actuator from charging during temperature fluctuations and compressive stress. Discharging too quickly could destroy the piezo actuator.

- Remove the shorting clamp from the voltage connection of the piezo actuator only when this is necessary for operation.
- Discharge the piezo actuator appropriately before reconnecting the shorting clamp (see ▸Discharging and short-circuiting the piezo actuator).

Continuously high voltages can reduce the lifetime of the piezo actuator.

- If possible: Limit the maximum operating voltage during continuous operation.
- Discharge the piezo actuator appropriately when not in use (see ▸Discharging and short-circuiting the piezo actuator).

Mechanical dangers

Mechanical forces could destroy the piezo actuator.

- Avoid impact and dropping.
- Observe the maximum permissible forces (see manual).
- Avoid torques and bending forces on the piezo actuator.
- Apply a preload of at least 15 MPa to longitudinal actuators.
- Only apply preloads that are just as high as necessary. Do not exceed the maximum preload (see manual).
- Do not pull the pigtail of the piezo actuator out of the electronics during operation.
- If the pigtail was accidentally pulled out of the electronics during operation: Switch off the electronics before you reconnect the piezo actuator.
- Avoid steep edges in the control signal on low preload.

Scratches on the surface of the piezo actuator can damage the piezo actuator.

- Do not use metallic tools during installation.
- Install the piezo actuator so that the surface of the piezo actuator is not scratched during installation and operation.

Excessively high operating frequenciesmay destroy the piezo actuator.

- Select the operating frequency according to the application (see manual).
- Operation when not clamped on both sides: Maximally ⅓ of the resonant frequency.
- Operation when clamped on one side: no more than ⅙ of the resonant frequency.
- Observe the dynamic forces (see manual). Uncontrolled vibration can damage your application or the piezo actuator.
- When vibrations occur: Switch off the servo mode or stop the piezo actuator immediately.
- If necessary: Check the settings of the servo control parameters.

Dynamic forces can be generated during dynamic operation that cancel out the preload of the piezo actuator. Operating without a preload could destroy the actuator.

- Observe the maximum permissible forces.

➢ Determine the operating parameters (see manual).

Thermal dangers

The surface of the piezo actuator can heat up during operation. Touching the piezo actuator can result in minor injuries from burning.

➢ Cool the piezo actuator or install touch protection.

Overheating could destroy the piezo actuator.

➢ *If possible:* Cool the piezo actuator.

➢ Monitor the temperature of the piezo actuator with a temperature sensor.

➢ Select the operating time, operating frequency, and operating voltage so that the maximum operating temperature is not exceeded.

Cooling down too quickly could destroy the piezo actuator.

➢ Let the piezo actuator cool down to room temperature before connecting any cooling systems.

Heat produced during operation can impair your application.

➢ Install the piezo actuator so that the application is not impaired by dissipating heat.

Installation

If the shrink tubing of the piezo actuator has to be removed:

1. Remove the shrink tubing only if the piezo actuator is installed in the location where it is to be operated.
2. Avoid scratches to the surface of the piezo actuator.
3. Do not touch the lateral surface or contact strips of the piezo actuator.

Startup

DANGER

The piezo actuator is subject to voltages up to 1000 V during operation. The shrink tubing of the piezo actuator and the protective polymer layer beneath do not provide contact protection against electric shock. Touching the piezo actuator can result in serious injury or death from electric shock.

➢ Do not touch the piezo actuator during operation.

➢ Insulate the piezo actuator electrically from the surrounding mechanical unit before startup.

DANGER

Risk of electric shock if the protective earth conductor is not connected

If a protective earth conductor is not or not properly connected, touching the system in which the product was integrated could lead to death from electric shock or to serious injury in the case of a malfunction.

➢ Operate the system only with a properly connected protective earth conductor.

➢ Do **not** remove the protective earth conductor during operation.

Discharging and short-circuiting the piezo actuator

The piezo actuator must be discharged in the following cases:

- Before short-circuiting
- When not in use
- Before reconnecting if the pigtail was accidentally pulled out of the electronics during operation
- Before assembly work

Requirements

- You have ensured adequate protection against touching live parts.

Discharging the piezo actuator not connected to the electronics

1. **Piezo actuator without plug connector**: Short-circuit the piezo actuator for at least a few seconds with a 10 kΩ discharge resistor.
2. **Piezo actuator with plug connector**: Connect the piezo actuator to the switched-off PI electronics.

Discharging the piezo actuator connected to the electronics

➢ Set the piezo voltage to 0 V.

Short-circuiting a discharged piezo actuator

1. *If necessary:* Disconnect the piezo actuator from the electronics.
2. Short-curcuit the piezo actuator using the supplied shorting clamp or a suitable shorting plug.

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. This refers to devices which are labeled with the symbol for the separate collection of waste electrical and electronic equipment.

If you are established in a member state of the European Union and have an old device from PI Ceramic, PI Ceramic GmbH will take care of the environmentally friendly disposal of this old device free of charge. You can send the old PI Ceramic device free of charge to the following address:

PI Ceramic GmbH
Lindenstraße
07589 Lederhose
Germany

If you are not established in a member state of the European Union: Dispose of your old device according to the national and local rules and regulations.

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