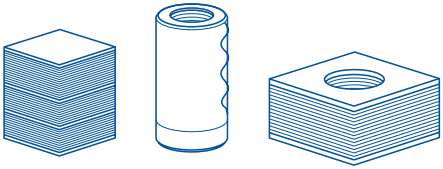
PICA Piezo Actuators up to 1000 V

Short Instructions

P-0xx / P-1xx / P-405

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



User Information

These short instructions contain an overview of the most important safety instructions for piezo actuators without case with the product codes given above (x: arbitrary number) and custom products of the product lines given above.

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 These short instructions are superseded by any new release.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, start-up and maintenance require additional information from the manuals of the piezo actuator and/or the electronics used.

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

Downloading manuals from the website:

1. Identify the product:
   - Standard product: See product code on the product (e.g., P-056.51).
   - Custom product: See product family (e.g., PICA Stack) on the delivery note.
2. Open the website **www.pi.ws**.
3. Search the website for the product number (e.g., P-056.51) or the product family (e.g., PICA Stack).
4. Click the corresponding product to open the product detail page.
5. Click **Downloads**.
   The manuals are shown under **Documentation**.
6. Click the desired manual and fill out the enquiry form.
   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 info@piceramic.com

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Safety Instructions

Intended Use

The piezo actuator is intended to be used in interior spaces and in an environment which is free of dirt, oil and lubricants.

In accordance with its design, the piezo actuator is intended to be integrated into a mechanical system for positioning of loads, vibration damping and force generation. The operator is responsible for a standards compliant integration of the piezo actuator into the overall system. The intended use of the piezo actuator is only possible in combination with suitable electronics that is available from PI.

The piezo actuator may only be installed, started-up, operated, maintained and cleaned by authorized and appropriately qualified personnel.

Electrical Dangers

Temperature changes and compressive stresses can induce charges in the piezo actuator. After being disconnected from the electronics, the piezo actuator can stay charged for several hours. 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 into 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 can lead to death from electric shock or to serious injury in the case of a malfunction.

- Only operate the piezo actuator 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.

During operation, the piezo actuator carries voltages of up to 1000 V. The shrink tubing of the piezo actuator and 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.
- Before start-up, electrically insulate the piezo actuator from the surrounding mechanical system. Observe the clearances and creepage distances required for the operating voltage, and observe the standards applicable to your application.

Humidity, liquids and impurities on the surface can result in the piezo actuator being destroyed.

- When handling the piezo actuator, wear powder-free nitrile or latex gloves.
- Prevent the piezo actuator from being exposed to liquids (e.g. finger sweat) and conductive materials (e.g. metal dust).
- Only operate the piezo actuator within the permissible ambient conditions (see manual).
- If necessary: Protect the piezo actuator from moisture by means of hermetic sealing or supplying 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 the PI customer service department.

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.

- For operation between 1 hPa and 500 hPa: Operate the piezo actuator only at reduced voltage (max. 200 V).
- For operation below 0.1 hPa: Do not operate the piezo actuator during evacuation.

Operating voltages that are too high or incorrectly connected can cause damage to the piezo actuator.

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

If the piezo actuator is not connected to the electronics, the stranded wires must be short-circuited in order to prevent the piezo actuator from charging during temperature changes and compressive stresses. Discharging too quickly can 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 in a suitable manner 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 in a suitable manner when it is not in use (see „Discharging and Short-Circuiting the Piezo Actuator“).

Mechanical Dangers

Mechanical forces can destroy the piezo actuator.

- Avoid shocks and drops.
- Observe the maximum permissible forces (see manual).
- Prevent torques and bending forces from acting 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 out the connection cable of the piezo actuator from the electronics during operation.
- If the connection cable is 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 if the piezo actuator has a low preload.

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

- Do not use metal tools during the installation of the piezo actuator.
- Install the piezo actuator so that no scratches can occur on the surface of the piezo actuator during installation and operation.

An operating frequency that is too high can destroy the piezo actuator.

- Select the operating frequency as required for your application (see manual):
  - Operation when not clamped on both sides: Maximally ⅓ of the resonance frequency.
  - Operation when clamped on one side: Maximally ⅙ of the resonance frequency.
- Observe the dynamic forces (see manual).

Uncontrolled oscillations can damage your application or the piezo actuator.

- If oscillations occur, immediately switch off the servo mode or stop the piezo actuator.
- If necessary: Check the settings of the servo-control parameters.

During dynamic operation, dynamic forces can occur that cancel the preload of the piezo actuator. Operation without a preload can destroy the actuator.

- Observe the maximum permissible forces (see manual).
- 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 can destroy the piezo actuator.

- If possible: Cool the piezo actuator.
- Monitor the temperature of the piezo actuator with a temperature sensor.
- Adjust the operating time, operating frequency and operating voltage so that the maximum operating temperature is not exceeded.

Cooling down too quickly can destroy the piezo actuator.

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

Heat produced during operation can affect your application.

- Install the piezo actuator so that your application is not affected by the dissipating heat.

Installing the Piezo Actuator

DANGER!

Temperature changes and compressive stresses can induce charges in the piezo actuator. After being disconnected from the electronics, the piezo actuator can stay charged for several hours. 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.

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

- Remove the shrink tubing only if the piezo actuator is installed in the location where it is to be operated.
- Avoid scratching the surface of the piezo actuator.
- Do not touch the outer surface and the contact strips of the piezo actuator.

Operating the Piezo Actuator

DANGER!

During operation, the piezo actuator carries voltages of up to 1000 V. The shrink tubing of the piezo actuator and 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.
- Before start-up, electrically insulate the piezo actuator from the surrounding mechanical system.

DANGER!

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

- Only operate the system with a properly connected protective earth conductor.
- Do not remove the protective earth conductor during operation.

Discharging and Short-Circuiting the Piezo Actuator

Discharging a piezo actuator that is not connected to the electronics

- **Piezo actuators without connector:** For discharging, short-circuit the piezo actuator for at least a few seconds using a 10 kΩ discharge resistor.
- **Piezo actuators with connector:** For discharging, connect the piezo actuator to the switched-off electronics from PI.

Discharging a piezo actuator that is connected to the electronics

- For discharging, set the piezo voltage to 0 V on the electronics.

Short-circuiting the discharged piezo actuator

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