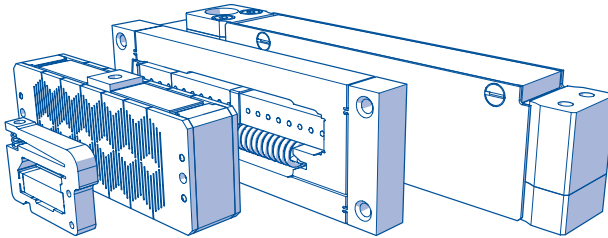


PiezoMove® Linear Actuators

PZ302EK Short Instructions

P-601, P-602, P-603, P-604



User Information

These short instructions contain an overview of the most important safety information and handling instructions for installing PiezoMove® linear actuators with the above-mentioned product numbers (hereinafter referred to as "piezo actuator").

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 These short instructions are superseded by any new release.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 for the piezo actuator and/or the electronics. 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., P-602).
3. Click the corresponding product to open the product detail page.
4. Click the **Downloads** tab.
The manuals are displayed under **Documentation**.
5. Click the **ADD TO LIST** button for the desired manual and then click **REQUEST**.
6. 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.



Safety Information

Intended Use

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

The piezo actuator is not intended for applications in areas where failure would be a considerable risk for people or the environment.

The motion of the piezo actuator is along one axis.

The intended use of the piezo actuator is only possible when completely mounted and connected. The piezo actuator must be operated with suitable electronics (refer to user manual). The electronics are not included in the scope of delivery of the piezo actuator.

The piezo actuator may not be used for purposes other than those stated in the user manual. The piezo actuator may only be used in compliance with the technical specifications and instructions in the user manual.

Electrical Dangers

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

- ▶ Do not disassemble the piezoelectric actuator.
- ▶ Do not touch any live parts (depending on the model, e.g., open piezo actuator, open ends of stranded wires, or contacts in the plug connector).
- ▶ Remove the shorting clamp or shorting plug that is in the scope of delivery only if necessary for installation or operation purposes.
- ▶ If you disconnect the piezo actuator from the electronics, discharge it and keep it short-circuited after discharging.
- ▶ Do not disconnect the piezo actuator from the electronics during operation.

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

- ▶ Operate the piezo actuator only with a properly connected protective earth conductor.
- ▶ Observe the applicable standards for mounting the protective earth conductor.

Electric flashovers can be caused by moisture, liquids, and conductive materials (e.g., metal dust) and can destroy the piezo actuator during operation. In addition, electric flashovers can also occur in certain air pressure ranges due to the increased conductivity of the air.

- ▶ Avoid operating the piezo actuator in environments that can increase the electric conductivity.
- ▶ Operate the piezo actuator only under permissible ambient conditions (refer to user manual).

Models with an open housing:

- ▶ When handling the piezo actuator, wear powder-free nitrile or latex gloves.
- ▶ Prevent the piezo actuator from coming into contact with conductive liquids (e.g., finger sweat) and conductive materials (e.g., metal dust).

Excessively high or wrongly connected operating voltages can cause damage to the piezo actuator.

- ▶ Use compatible electronics and cables from PI only.
- ▶ Pay attention to the operating voltage range of the piezo actuator (refer to user manual).
- ▶ Pay attention to the pin assignment respectively the polarity of the stranded wires (refer to user manual).

The constant application of high voltage to piezo actuators can lead to leakage currents and flashovers that will destroy the ceramic.

- ▶ If possible, limit the maximum operating voltage during continuous operation.
- ▶ Discharge the piezo actuator when it is not in use.

Mechanical Dangers

Mechanical forces can destroy the piezo actuator.

- ▶ Avoid shocks and drops.

The piezo actuator can be damaged by pull forces acting on the stranded wires or the connecting cable.

- ▶ Avoid pull forces on the stranded wires or on the connecting cable.

High torques when tightening the load and high loads can overload the movable part of the piezo actuator. Mechanical overload can cause damage to the piezo actuator and the flexures and can also lead to loss of accuracy.

- ▶ Pay attention to the torque range specified for the screws used during installation (refer to user manual).
- ▶ Do not exceed the maximum permissible torque (refer to user manual) on the movable part of the piezo actuator.
- ▶ Do not exceed the maximum permissible load capacities according to the specifications (refer to user manual).

Excessively high operating frequencies can destroy the piezo actuator.

- ▶ Select the operating frequency according to the application.
- ▶ Pay attention to the resonant frequency and dynamic forces (refer to user manual).

Excessively steep edges in the control signal or excessively fast discharging can trigger a strong mechanical impulse and damage the piezo actuator.

- ▶ Avoid steep edges in the control signal.
- ▶ Discharge the piezo actuator before short-circuiting.
- ▶ If the connecting cable is accidentally pulled out during operation, switch off the electronics before you reconnect.

Uncontrolled oscillation can damage the piezo actuator or your application. Oscillation is indicated by a humming noise and can be caused by the following:

- A change in the load and/or dynamics requires the servo control or operating parameters to be adjusted.
- The piezo actuator is operated near to its resonant frequency.
- ▶ If oscillation occurs, switch off the servo mode of the electronics or stop the piezo actuator immediately.
- ▶ Check the servo control settings respectively the settings for the operating parameters (refer to user manual).

Models with open housing:

Touching live parts during operation can result in minor injury from electric shock.

- ▶ Do not touch the piezo actuator during operation.
- ▶ Insulate the piezo actuator electrically from the surrounding mechanics before startup to prevent direct or indirect contact with live parts. Pay attention to both the clearance and creepage distances required for the operating voltage and the standards applicable to your application.

Thermal Dangers

For models P-603 and P-604 only:

The surface of the piezo actuator and its surroundings can heat up during operation. Touching the piezo actuator and its surrounding parts can result in minor injuries from burning.

- ▶ Make sure that the hot piezo actuator and the surrounding parts cannot be touched.

All models:

The heat produced during operation of the piezo actuator can affect your application.

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



Installation

Connecting the Piezo Actuator to the Protective Earth Conductor

The piezo actuator does not have a separate protective earth connector. For this reason, the risk of electric shock must be prevented in one of the following ways:

- Installing the piezo actuator on an electrically conductive surface connected to a protective earth conductor
- Connecting the piezo actuator to a protective earth conductor via its mounting interfaces (holes)
- Electrical insulation of the piezo actuator according to protection class II

Connecting the piezo actuator to the protective earth conductor

- ▶ Pay attention to the applicable standards for connecting the protective earth conductor.
- ▶ Use electrically conductive mounting material (e.g., screws or glue)

Mounting the Piezo Actuator

Refer to the user manual for the exact mounting type of your model.

Screwing the piezo actuator on (depends on model)

Tools and accessories

- Electrically conductive surface
- Electrically conductive screws
- Screwdriver or wrench

Requirements

- ✓ Piezo actuators with stranded wires: The piezo actuator is discharged and short-circuited.
- ✓ The surface has mounting holes for fixing the piezo actuator.
- ✓ The surface is connected to a protective earth conductor with a cross section of $\geq 0.75 \text{ mm}^2$.
- ✓ The surface flatness meets the requirements (refer to user manual).

Screwing the piezo actuator on

1. Align the piezo actuator on the mounting surface so that the corresponding mounting holes in the piezo actuator and in the surface are in line.
2. Tighten the piezo actuator with the mounting hardware (for information on maximum torque, refer to the user manual).
3. Check that the piezo actuator is fixed firmly to the mounting surface.

Gluing the piezo actuator on (depends on model)

Models intended for gluing have locating holes in the base body to accommodate dowel pins.

Tools and accessories

- Electrically conductive surface
- Electrically conductive dowel pins of suitable size and length (refer to user manual)
- Electrically conductive adhesive

Requirements

- ✓ Models with stranded wires: The piezo actuator is discharged and short-circuited.
- ✓ The glued surfaces were prepared according to the specifications of the adhesive manufacturer.
- ✓ You have read and understood the user information from the manufacturer of the adhesive.
- ✓ The surface has conductive mounting holes for the dowel pins to mount the piezo actuator.
- ✓ The surface is connected to a protective earth conductor with a cross section of $\geq 0.75 \text{ mm}^2$.
- ✓ The surface flatness meets the requirements (refer to user manual).

Gluing the piezo actuator on

1. Glue the dowel pins into the locating holes of the piezo actuator's base body or into the equipment intended for mounting the piezo actuator.
2. Align the piezo actuator and the equipment so that each dowel pin fits in the corresponding locating hole.
3. Glue the piezo actuator to the equipment.
4. Wait until the adhesive has hardened completely.
5. Check for firm seating of the piezo actuator in the equipment.

Checking the Connection of the Protective Earth Conductor

- ▶ Make sure that the contact resistance at all protective earth connections is $<0.1 \Omega$ at 25 A.
- ▶ If ground loops occur, contact the PI customer service department.

Screwing the Load

Tools and accessories

- Suitable fixing screw(s) (depending on the model; refer to user manual)
- Suitable tool to hold the movable part firmly
- Screwdriver or wrench

Requirements

- ✓ You have fixed the piezo actuator properly.
- ✓ The piezo actuator is not connected to the electronics.
- ✓ Models with stranded wires: The piezo actuator is discharged and short-circuited.
- ✓ The distance between the center of gravity of the load and the center of the movable part is as small as possible in all directions.

Screwing the load

1. Align the load so that the mounting holes (or mounting hole) in the movable part of the piezo actuator can be used to fix the load.
2. Hold the movable part of the piezo actuator firmly.
3. Fix the load to the movable part of the piezo actuator. Do not exceed the respective maximum permissible torque for the movable part and the screws used (refer to user manual).

4. Loosen the movable part of the piezo actuator that was held firmly so it can move freely again.



Starting and Operating the Piezo Actuator

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



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 connecting cable is accidentally pulled out of the electronics during operation
- Before assembly work

Discharging the Piezo Actuator Connected to the Electronics

- ▶ Set the piezo voltage on the electronics to 0 V.

Discharging the Piezo Actuator Not Connected to the Electronics

Piezo actuator without connector:

1. Ensure adequate protection against touching live parts.
2. Short-circuit the piezo actuator for at least a few seconds with a suitable 10 k Ω discharge resistor.

Piezo actuator with connector:

- ▶ Connect the piezo actuator's voltage plug to the switched-off electronics from PI for at least a few seconds.

Short-Circuiting a Discharged Piezo Actuator

1. Disconnect the piezo actuator from the electronics if it is still connected.
2. Short-circuit the piezo actuator by twisting the stranded wires, using a suitable shorting clamp or a suitable shorting plug.



Maintenance

The piezo actuator is maintenance-free.



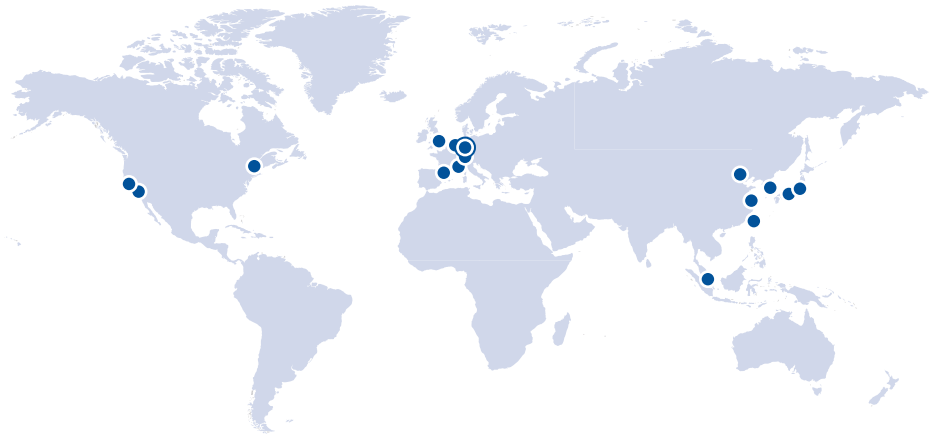
Old Equipment Disposal

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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