

**Instruction for using piezoelectrical elements and power supplies from piezosystem jena GmbH**

**1. Safety notices**

**(Read carefully before switching on the power!)**

Some remarks for piezoelectrical actuators, one and more dimensional elements, mirror mounts, and other piezoelectrical products:

Actuators are capacitive loads. Do not discharge actuators by short-circuiting the leads. Ensure that the dielectric strength of your power supplies, wiring and connectors are sufficient to prevent accidental arcing.

Abrupt discharging may cause damage to the stacks.

Attention has to be paid during highly dynamic operation. Piezoceramic stacks are sensitive to tensile forces. Depending on amplitude and frequency, internal stress may be induced without external load.

Piezoelectrical actuators such as stacks or various tables work electrically as a capacitor. These elements are able to store electrical energy over a long time and the stored energy may be dangerous.

Connect and disconnect the elements only when the power supply is switched off.

Because of the piezoelectrical effect, piezoactuators can generate electrical charges by changing the mechanical load or the temperature of the actuator.

Heating of the ceramic can occur during dynamical use. Heating up to near the Curie-Temperature (150°C/302F) can lead to de-soldering problems. Temperature control is necessary. Please also consider length changes caused by temperature changes of the ceramics. This also affects the pre-load of elements.

**Power supplies**

Power supplies for low voltage actuators produce voltages up to 150 volts.

These values can cause danger to your life! Therefore read the installation instructions carefully and handle the power supply only by authorized personal.

Switch off the power supply and discharge the actuator properly by setting the supplies to zero. If the actuator is disconnected use a resistor for discharging. Do not switch on the power supply, when the actuators are disconnected. Be sure that electrical contact of persons to the output connectors of the power supply is not possible when the supply is switched on!

Power supplies for piezoelements are developed for these elements. Do not use these supplies for other applications!

**Be sure that contact to the inner line of the output connector is not possible!**

**2. Avoid mechanical damage of piezoelectrical actuators**

**Read carefully before handling the elements!**

Piezoelectrical actuators are made from ceramic materials with and without metallic cases.

Piezoceramics are relatively brittle materials and should be handled accordingly. All piezoelements (also elements with preload) are sensitive to hard vibration or shock forces!

Piezoelements without preload (e.g. series P; some elements with lever transmission) cannot be used under tensile forces.

Only preloaded elements should be used in applications in which tensile forces or shear forces occur. On request we can optimize the integrated or external preloads for special applications.

For dynamical uses, internal tensile forces can occur due to the acceleration of the ceramic element itself.

Preloaded piezoelements have a top plate with threads. Please note the depth of the threads. Do not apply large forces when mounting screws into the piezoelements!

**Special notice for using piezoelectrical elements series PX, PZ, PXY, TRITOR, PSH and PZS from piezosystem jena**

These elements have integrated solid-state flexure hinges for motion transmission. Depending on the special performance, the element can be preloaded and can work dynamically. Elements, especially mirror mounts of the series- PSH, are suited for dynamical applications and will not be damaged if handled correctly.

**But please note:**

The mounting and handling of these elements should be done very carefully to avoid plastic bending of the hinges which will damage the elements. Most of these elements consist of a ground or bottom plate that will be attached by screws. The top plate of the elements makes the motion. Mirrors or other elements to be moved can be mounted on the top plate. The mounting can be accomplished using screws or adhesives (depending on the element and on the application). However, avoid forces between the top plate, the middle part and the bottom element (tensile, shear, strain or torque forces). These forces can cause damage to the elements. Do not open the elements or remove the bottom and top plates. Elements for dynamical applications are fixed using adhesives and when opening the elements forces occur which will bend the hinges and damage the element.

If it is necessary to use forces for mounting be sure that these forces can not occur between the parts of the piezoelement (e.g. by clamping).

If it is necessary to remove a plate, please contact us.

If the element is handled incorrectly or if the element has been opened, the warranty will be lost.

**Please note:**

**Keep the actuator away from a humid environment. After receiving please store the actuator in a dry room (an air conditioned room is preferable) for at least 24 hours or put it in a desiccator for at least two hours before use.**

**After long storage a depolarization of the piezoactuator might happen.**

**Therefore a slow increasing of the voltage is recommended. Under no circumstances should the actuator be operated with 130V immediately. piezosystem jena recommends an increase to maximum voltage in not less than 10 seconds.**

