5V10 OEM - Piezo Controller

Single-Axis Piezo Controller

image: 5V10

Concept:

The OEM amplifier 5V10-OEM has been developed for bimorph and low voltage piezo elements. The design and the construction provide a flexible alternative in electronic drives and control systems. The easy adaptation of the output voltage and current to the customer's system enables a variety of applications.

Specials:

Special circuits are integrated to protect the piezo element from voltage spikes and excessive voltages.The main supply voltage is 5V DC.
A modulation input (BNC connector) is made for an external signal from 0V to +5V. The output voltage is 0V to +150V.

Design:

The 5V10 is built in a robust metal casing for easy integration into customer setups.

Product highlights:

- single-axis piezo controller
- OEM design
- permanent output current 10mA
- excellent cost effectiveness
- base for customs designed low cost solutions

Applications:

- Industriel use in OEM desing
- Microscopy
- Valve technology
- Mirro alignment

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5V10 OEM - Piezo Controller

Technical data

Single Axis Piezo Controller	5V10 OEM
part no.:	E-304-10
number of channels	1
output voltage / connector type	0…+150V / LEMO 0S.302
output current (permanent)	10mA
analog modulation input	0…+5V
voltage noise	3mV$_{RMS}$@500Hz
input impedance	10 kΩ
interfaces	bare wires
protection functions	overvoltage protection
main supply	5VDC ±10%
workspace	5°C – 35°C (41°F – 95°F)
weight	150g
dimensions (L x W x H)	80x55x20mm

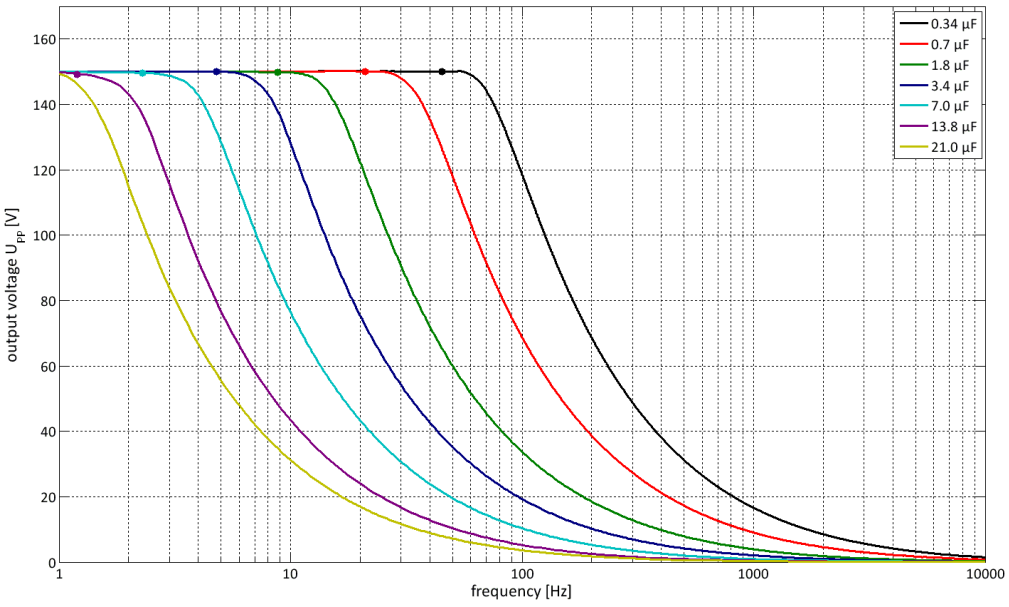

Diagram:

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 10mA.

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Bedienungsanleitung

Spannungsverstärker 5V10

Instruction manual

voltage amplifier 5V10

Bitte die Bedienungsanleitung vor dem Anschalten des Gerätes sorgfältig lesen. Beachten Sie bitte insbesondere die Sicherheitshinweise!

Read carefully before switching on the power! Please see also see instructions for safety, using piezoelectric actuators and power supplies!

Seriennummer / Serial Number: E -

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1. Introduction

This manual describes the voltage amplifier 5V10 from ***piezosystem jena***. You will also find additional information regarding piezoelectric products.

Definition:

All systems from ***piezosystem jena*** such as electronics, actuators and optical systems are called units.

2. Certification of piezosystem jena

The company ***piezosystem jena GmbH*** has been certified by DIN EN ISO 9001 since 1999.

TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body
of TÜV Thüringen e.V.

certifies in accordance with TÜV CERT
procedure that

piezosystem jena GmbH
Prüssingstraße 27
07745 Jena
Germany

has established and applies a quality system for

Development and production of
Piezo position technology and micro optical systems

An audit was performed, Report No. 3330 457 990
Proof has been furnished that the requirements according to
EN ISO 9001 (1994-08)
are fulfilled. The certificate is valid until December 2002
Certificate Registration No. 15 100 9679

TGA-ZM-19-96-00

Jena, 28.12.1999

TÜV THÜRINGEN

TÜV CERT Certification Body
of TÜV Thüringen e. V.

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3. Declaration of conformity

EU-Declaration of conformity

This certificate is issued for the system:

PC board voltage amplifier 5V10

manufactured at:

piezosystem jena GmbH

Pruessingstrasse 27

07745 Jena / Germany

The system as described above herewith complies with the requirements of the European standards as follows:

EN 50082 (DIN VDE 0875 part 11) group 1, part 2

EN 55011, class B

declaration issued by:

piezosystem jena GmbH

head of the electronic department

Jena, Feb.15th, 2001

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4. Instructions for using piezoelectrical elements and power supplies

- Piezoelectric actuators from ***piezosystem jena*** are controlled by voltages up to 150V. These values can be quite hazardous. Therefore read the installation instructions carefully and only authorized personal should handle the power supply.
- After transportation, piezoelectric actuators should be allowed to adapt for approximately 2 hours to the room temperature before being switched on
- Piezoelectric actuators are made from ceramic materials with and without metallic casings. The piezo-ceramic is a relatively brittle material. This should be noted when handling piezoelectrical actuators. All piezo-elements are sensitive to bending or shock forces.
- Due to the piezoelectric effect piezo-actuators can generate electrical charges by changing the mechanical load or the temperature or such actions described above
- Piezoelectric actuators are able to work under high compressive forces, only actuators with pre-load can be used under tensile loads (these tensile forces must be less then the pre-load, given in the data sheet)
- Please note that the acceleration of the ceramic material (e.g., caused by fall down, discharging or high dynamic application) will occur.
- After excitation of the actuators by a voltage in the upper control range, the ceramic will move and generate an opposite high voltage after disconnection.
- Heating of the ceramic material will occur during dynamic operation and is caused by structure conditional loss processes. This may cause failure if the temperature exceeds specified values cited below.
- With increasing temperature, up to the Curie temperature (usual values approx. 140°C - 250°C), the piezoelectric effect disappears.
- Piezoelectric actuators such stacks or various tables work electrically as a capacitance. These elements are able to store electrical energy over a long period (up to some days) and the stored energy may be dangerous.
- If the actuator remains connected to the drive electronics, it is unloaded within a second after shutdown and quickly reaches harmless voltage values.
- Piezo-actuators can generate voltages by warming or cooling only (caused by the longitudinal change). The discharge potential should not be ignored due to the inner capacitance. This effect is insignificant at usual room temperature.
- Piezo-actuators from ***piezosystem jena*** are adjusted and glued. Any opening of the unit will cause misalignment or possible malfunction and the guarantee will be lost.
- Please contact ***piezosystem jena*** or your local representative, if there are any problems with your actuator or power supply.

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Caution!

Shock forces may damage the built-in ceramic element. Please avoid such forces, and handle the units with care, otherwise the guarantee will be lost.

5. Safety Instruction

- Do not open the units! There are no user serviceable parts inside and opening or removing covers may expose you to dangerous shock hazards or other risks. Refer all servicing to qualified service personnel.
- Allow adequate ventilation around the units so that heat can properly dissipate. Do not block ventilated openings or place the units near a radiator, oven or other heat sources. Do not put anything on top of the units except those that are designed for that purpose (e.g. actuators).
- Do not spill any liquids into the cabinet or use the units near water.
- Do not insert objects of any kind into the cabinet slots, as they may touch dangerous voltage points, which can be harmful or fatal or may cause electric shock, fire or equipment failure.
- Do not place any heavy objects on any cables (e.g. power cords, sensor cables, actuator cables, optical cables). Damage may cause malfunction or shock or fire!
- Do not place the units on a sloping or unstable cart, stand or table as they may fall or not work accurately.
- Work with the units only in a clean and dry environment! Only specially prepared units (e.g. actuators) can work under other conditions!
- Please use only original parts from ***piezosystem jena***.
- ***piezosystem jena*** does not give any warranty for damages or malfunction caused by additional parts not supplied by ***piezosystem jena***. Additional cables or connectors will change the calibration and other specified data. This can change the specified properties of the units and cause them to malfunction.
- Piezoelements are sensitive systems capable of the highest positioning accuracy. They will demonstrate their excellent properties only if they are handled correctly! Please mount them properly only at the special mounting points.

Immediately unplug your unit from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- When the power supply cord or plug is damaged
- If liquid has been spilled or objects have fallen into the unit.
- If the unit has been exposed to rain or water.
- If the unit has been dropped or the housing is damaged.
- If the unit is not working properly.

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6. Instructions for checking the function of the system / quick start

When you open the package, please check to make sure all the necessary parts are complete (see packing list) and nothing is damaged.

Check the electronics and the actuator for any visible damage:

- The top and bottom plate of the actuator (if it does not have another shape) should be parallel each to each other, without scratches.
- If there is any damage to the system please contact our local representative immediately!
- If the packaging material is damaged please confirm this with the shipping company.

Before you switch on the system, please check:

- The main voltage supplied in your country is the same as installed for the external power supply (not included in the shipment!).
- The secondary voltage (DC) matches with the amplifier (+5V).

Connect the power cable.

Connect the piezo-element by using the LEMO connector.

Offset is accomplished by the external offset (e.g. a load)

Because of the fast motion of the actuator a noise, crack can be heard. This is normal and not a malfunction.

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7. How to operate the 5V10

7.1. Common introduction

The voltage amplifier 5V10 was especially developed for one channel positioning tasks in optics, laser physics, microbiology, machining. With an output noise less then 3mV it is well suited for positioning in the sub-nm range. It is well suited for OEM applications.

7.2. Technical data

Power supply:	+5V DC
no-load current [mA]	<100
Dimensions wxdxh [mm]:	80x55x20
Mass [g]:	200
Channels:	1
Power [W]:	1.5
Output current [mA]:	10
Output voltage (OUT):	1 ... +150V (adjustable by external modulation)
Output connector (OUT):	LEMO 0S.302
Inner resistance	10kΩ
Noise:	typical <0,3 mV_{RMS}

table 1: technical data 5V10

7.3. Initiation

Please connect the device with the wall outlet by using an external power supply. The actuators are driven by voltages up to +150V. Please pay attention to shock hazard protection.

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7.4. Service

The actuator is connected to the power supply by a LEMO socket. The rest position of the actuator is adjusted, if the external triggering signal (range of 0...+5V) at the MOD input connector (BNC) = 0.To avoid damage to the actuators, it is recommended to adjust triggering signal in this way before switching on the amplifier. We recommend to switch on the amplifier approx. 2 hours before the measurement in the sub-µm range takes place to guarantee stable temperature circumstances. A constant temperature environment is necessary for precise positioning tasks. Please note, that a temperature change of ΔT = 5K will cause a 13µm increase in length of a 20cm steel rod. The special qualities of piezo-ceramics like hysteresis and creep can cause inaccuracies in the case of nonobservance. These basic qualities of piezo-elements are described in the "piezoline" tutorial in our catalog. Do not hesitate to contact our staff, if you need further information. By increasing the external triggering voltage the motion of the actuator will be done. The motion depends on the actuator specs, please refer the hysteresis data curve for details.

7.5. *BNC Modulation input: MOD*

The motion of the actuator may be remote controlled by using this input. The control signal must be in the range of 0 ... +5V. Switching signals are suitable as well as signals, generated by a function generator.

7.6. *Actuator-socket:* OUT

Please connect the piezo actuator by using this LEMO socket.

7.7. *Cable configuration of the external power supply*

Pin	Synonym	Description
White	**PVR**	+ Operating voltage +5V
Brown	**GND**	Ground
Green		Not used
Shield		Connected with the Ground

table 2: pin wiring of the external power supply

The equipment concept makes adaptations to customer preferences possible concerning the technical threshold values such as the main voltage or the output voltage. Please, contact our technical service department in order to discover the possibilities for your specific problem.

Adaptations are always to be paid by the customer.

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8. Your notes

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