E-610 Piezo Amplifier / Controller

1-Channel OEM Piezo Driver Module with Optional Position Servo-Control

E-610 Single-channel OEM module with optional position servo control

- **Cost-Effective 1-Channel OEM Solution**
- **Closed-Loop and Open-Loop Versions**
- **Notch Filter for Higher Bandwidth**
- **Position Control with Strain Gauge or Capacitive Sensor**
- **180 mA Peak Current**

The E-610 is an OEM amplifier & position servo-control board for low-voltage piezo actuators and positioning systems. It integrates a low-noise piezo amplifier which can output and sink peak currents of 180 mA in a voltage range of -20 to +120 V. Three versions are available: E-610.00 (only amplifier) and closed-loop versions E-610.S0 and E-610.C0 with additional components for position measurement and servo control.

Closed-Loop and Open-Loop Piezo Positioning

The units are designed to provide high-resolution operation of piezo actuators and positioning systems in voltage-controlled mode (open-loop) and in position-controlled mode (closed-loop).

In closed-loop position control mode, displacement of the piezo is highly linear and proportional to the analog signal. The servo modifies the amplifier output voltage based on the position sensor signal. Thus, positioning accuracy and repeatability down to the sub-nanometer range is possible, depending on the piezo mechanics and on the sensor type.

PI employs proprietary position sensors for fast response and optimum positioning resolution and stability in the nanometer range and below. For high-end applications, capacitance sensors provide direct and non-contact position feedback (direct metrology). Strain gauge sensors (SGS) are available for cost-effective applications. The integrated notch filters (adjustable for each axis) improve the stability and allow high-bandwidth operation closer to the resonant frequency of t mechanics.

In open-loop (voltage-controlled) operation the output voltage is determined by an external analog signal. Open-loop operation is ideal for applications where fast response and very high resolution with maximum bandwidth are essential. Here, commanding and reading the target position in absolute values is either not important or carried out by external position sensors (see p. 2-104).

Remote Control via Computer Interface

For digital-interface computer control, consider the E-621 (see p. 2-160) and E-625 (see p. 2-114) instead.

Alternatively control via PC using a D/A board is possible. PI offers a LabVIEW driver set which can be used with certain D/A boards from National Instruments.

Operation / Contents of Delivery

A single stabilized voltage in the range of 12 to 30 V is sufficient to operate the E-610. An integrated DC/DC converter generates the piezo operating voltage and all other voltages used internally. All inputs and outputs (except capacitive sensor lines) are available on the male 32-pin rear connector. A matching female 32-pin connector is included in the contents of delivery to interface with your circuitry.

Ordering Information

E-610.00
Piezo Amplifier, 1 Channel, OEM Module, -30 to 130 V

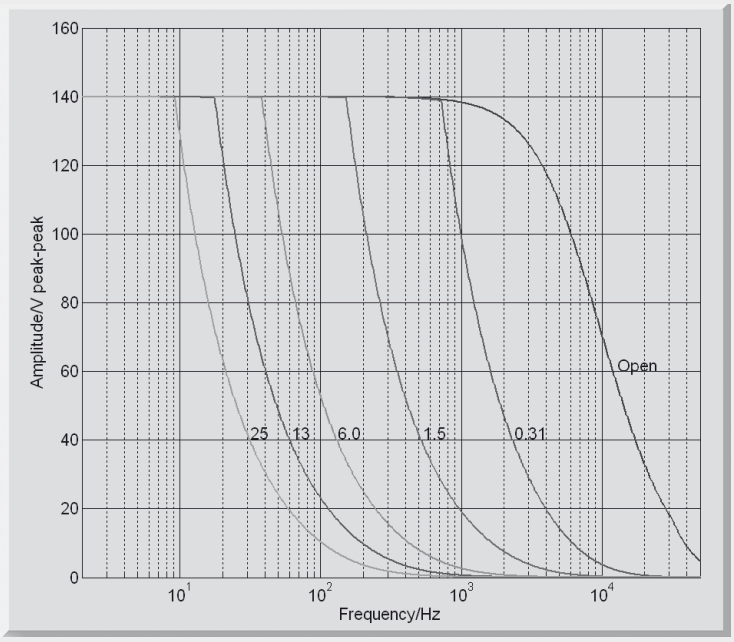
E-610.C0
Piezo Amplifier / Servo-Controller, 1 Channel, OEM Module, -30 to 130 V, Capacitive Sensor

E-610.S0
Piezo Amplifier / Servo-Controller, 1 Channel, OEM Module, -30 to 130 V, SGS-Sensor

E-500.ACD
LabVIEW Driver Set for Analog Controllers

E-500.HCD
HyperBit Functionality for Enhanced System Resolution (Supports Certain D/A Boards)

An OEM version with a digital controller is available – the E-609



E-610: Operating limits with various PZT loads (open-loop), capacitance is measured in µF

Technical Data

Model	E-610.00	E-610.C0	E-610.S0
Function	Piezo Amplifier, 1 Channel, OEM Module	Piezo Amplifier / Servo-Controller, OEM Module	Piezo Amplifier / Servo-Controller, OEM Module
Sensor			
Servo characteristics	–	P-I (analog) + notch filter	P-I (analog) + notch filter
Sensor type	–	Capacitive	SGS
Amplifier			
Control input voltage range	-2 to +12 V	-2 to +12 V	-2 to +12 V
Output voltage	-30 to 130 V	-30 to 130 V	-30 to 130 V
Peak current	180 mA (< 15 ms)	180 mA (< 50 ms)	180 mA (<15 ms)
Average current	100 mA	100 mA	100 mA
Current limitation	Short-circuit proof	Short-circuit proof	Short-circuit proof
Noise, 0 to 100 kHz	1.6 mV_{rms}	0.5 mV_{rms}	1.6 mV_{rms}
Voltage gain	10 ±0.1	10 ±0.1	10 ±0.1
Input independence	100 kΩ	100 kΩ	100 kΩ
Interfaces and operation			
Input / Output	32-pin (male) on rear panel (DIN 41612 / D)	32-pin (male) on rear panel (DIN 41612 / D)	32-pin (male) on rear panel (DIN 41612 / D)
Piezo connector	LEMO	LEMO	LEMO
Sensor connection	–	LEMO	LEMO
DC Offset	External potentiometer (not included), adds 0 to 10 V to Control In	External potentiometer (not included), adds 0 to 10 V to Control In	External potentiometer (not included), adds 0 to 10 V to Control In
Miscellaneous			
Operating temperature range	+5° to +50° C	+5° to +50° C	+5° to +50° C
Dimensions	7HP/3U	7HP/3U	7HP/3U
Mass	0.3 kg	0.35 kg	0.35 kg
Operating Voltage	12 to 30 V DC, stabilized	12 to 30 V DC, stabilized	12 to 30 V DC, stabilized
Current consumption, max.	2 A	2 A	2 A