

E-480

High-Power HVPZT Piezo Amplifier / Controller with Energy Recovery

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- 2000 W Peak Power
- Energy Recovery
- Output Voltage 0 to ± 1000 V and bipolar
- Optional Position Servo-Controller Module
- Optional Computer Interface and Display Module
- Differential Output

The E-480 high-power amplifier/controller is specifically designed to drive high-capacitance piezo actuators (e.g. the P-056.90P, p. 1-20). The E-480 is based on a novel design combining pulse width modulation and energy-recovery. Instead of dissipating the reactive power in the heat sinks, it is recovered so that only the active power used by the piezo actuator has to be supplied. During discharge of the actuator, the energy not used is returned and reused to supply the amplifier.

The E-480 can output and sink a peak current of 2000 mA and features a temperature sensor input and controller circuit to shut down the amplifier if the PZT exceeds a maximum temperature threshold.

With its high peak power rating of 2000 W, the E-480 is not recommended for operating smaller piezo actuators. It is equipped with a special 8-pin

socket. The wiring of the mating connector determines voltage range seen by the actuator. One pin carries the variable output, which always runs between -500 and +500 V relative to ground. The other pins offer controlled, fixed voltages of -500, -250, 0, +250, and +500 V. The piezo actuator is connected so as to see to the desired potential difference. This design allows bipolar operation, or operation of two actuators in a bridge.

The E-480 can be operated in two ways:

I. Open-Loop Manual Control (power-supply mode):

Output voltage can be set by a high-resolution, 10-turn, DC-offset potentiometer.

II. Open-Loop External Control (amplifier mode):

Output voltage is controlled by an analog signal at the BNC Control Input ranging over a

maximum of 10 V. The amplifier output on pin 1 then is determined by the signal on Control IN in conjunction with the gain factor of -100 (optionally +100), the DC-offset potentiometer position and the wiring of the Feed lines.

Upgrades

The E-480.00 allows installation of several upgrade options for enhanced versatility (see Ordering Information). Two additional modes are possible with versions having the E-509 Sensor & Servo-Controller Module upgrade:

III. Closed-Loop (position control mode) Manual Control:

Displacement of the PZT can be set by a 10-turn, DC-offset potentiometer in the range of zero to nominal displacement.

IV. Closed-Loop External Control:

Displacement of the PZT is controlled by the analog signal at Control IN. A unipolar system would be typically set up so that 10 V corresponds to maximum nominal displacement and 0 V corresponds to 0 displacement. The DC-offset potentiometer, which adds 0 to 10 V to Control IN, can be used to shift the input voltage range if desired.

Notes

Important calibration information: please read details on p. 6-53.

Ordering Information

E-480.00
High-Power Amplifier/Controller with Energy Recovery, 1000 V Output Range, 2000 W, 19" Case

Upgrade Modules for Closed-Loop Operation Sensor Electronics & Servo-Control Modules
(see p. 6-22)

E-509.C1A
Servo-Control Module for Capacitive Sensor

E-509.L1
Servo-Control Module for LVDT Sensor

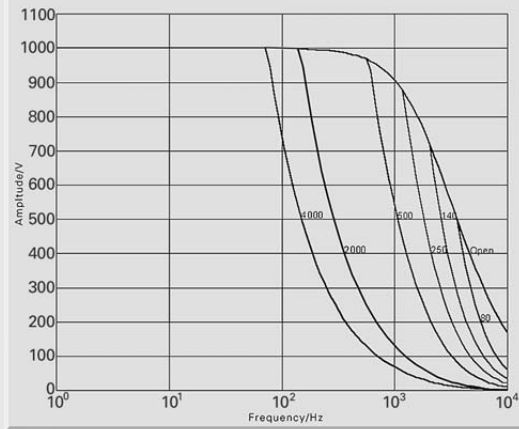
E-509.S1
Servo-Control Module for SGS Sensor

Interface and Display Modules see pp. 6-26 ff.

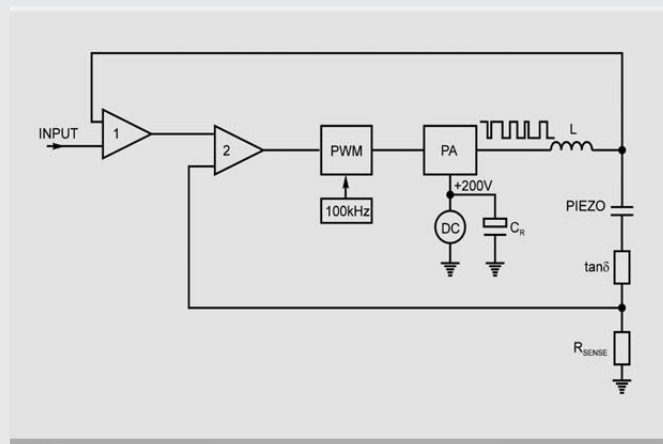
E-516.i1
Computer Interface & Display Module, 20-bit DAC, IEEE 488 (GPIB) and RS-232

E-515.01
Display Module for Piezo Voltage and Position

Ask about custom designs!



E-480, open-loop frequency with various PZT loads, capacitance in nF.



Block diagram showing the principle used for energy recovery.

Technical Data

Models	E-480.00
Function	Power Amplifier with Servo-Controller, Display and Computer Interface Options
Channels	1
Max. output power	2000 W (s. p. 6-52)
Average output power	equivalent to 630 W reactive power
Peak current <50 ms	2000 mA
Average current >50 ms	100 mA
Small-signal bandwidth	5 kHz (660 nF); 1 kHz (3.4 μ F)
Large-signal bandwidth	1.4 kHz (660 nF); 350 Hz (3.4 μ F)
Current limit	Short-circuit proof
Voltage gain magnitude	100 (polarity depends on factory settings)
Polarity	negative/positive/bipolar; differential. Depends on connector pin assignment
Input control voltage	10 V active swing, not floating but can be set/shifted to anywhere in -10 to +10 V; max. rating: \pm 12 V
Output voltage	1000-volt swing, not floating, (settable as: 0 to -1000 V; -750 to +250 V; -500 to +500 V; -250 to +750 V or 0 to +1000 V; measured on line to PZT)
Ripple	<0.3 % (depends on voltage range and piezo capacitance)
DC-offset setting	0 to 100 % of selected output range by 10 turn, front-panel potentiometer
Input impedance	100 k Ω
Control IN socket	BNC
Piezo output connection	LEMO FGG.1B.304.CLAM31
Dimensions	450 x 132 x 296 mm + handles (see p. 6-10)
Weight	8.6 kg
Operating voltage	90-120 / 210-250 VAC, 50-60 Hz
Operating temperature range:	+5 $^{\circ}$ C to +50 $^{\circ}$ C, (over 40 $^{\circ}$ C, Max. av. power derated 10 %)

Piezo Actuators

Nanopositioning & Scanning Systems

Active Optics / Steering Mirrors

Tutorial: Piezo-electrics in Positioning

Capacitive Position Sensors

Piezo Drivers & Nanopositioning Controllers

Hexapods / Micropositioning

Photonics Alignment Solutions

Motion Controllers

Ceramic Linear Motors & Stages

Index