E-481 PICA™ Piezo High-Power Amplifier/Controller

2000 W and Energy Recovery for High Efficiency

E-481.00 high-power amplifier, optionally available with E-509 servo-controller and E-517 interface and display module

- **Peak Power 2000 W**
- **Energy Recovery**
- **Output Voltage 0 to ±1000 V or Bipolar**
- **Overheat Protection for Piezo Actuators with Temperature Sensor**
- **Optional Position Servo-Control Modules**
- **Computer Interface & Display Modules**

The E-481 high-power piezo amplifier/controller is specifically designed for dynamic operation of high-capacitance PICA™ PZT actuators.

The E-481 is based on a novel design combining pulse width modulation and energy recovery. Instead of dissipating the reactive power in heat sinks, this energy is temporarily stored in inductive elements. Only the active power used by the piezo actuator has to be delivered. The energy not used by the actuator is returned to the amplifier and reused as supply voltage via a step-up transforming process. A peak sink and source current of up to 2000 mA is possible.

Selectable Output Range

The output range can be set to positive, negative or bipolar, and provides a voltage swing of 1100 V in open-loop operation.

Open-Loop and Closed-Loop Operation

E-481 amplifiers can be used to drive open- and closed-loop piezo positioning systems.

For open-loop piezo operation the amplifier output voltage is determined by the analog signal at the Control Input combined with the DC-offset potentiometer setting. Open-loop operation is ideal for applications where the fastest response and the highest bandwidth are essential. Here, commanding and reading the target position in absolute values is either not important or carried out by an external feedback loop. The Control In signal can be adjusted by various settings.

Optional Servo Controller Upgrade

The E-481.00 allows easy installation of an optional E-509 (see p. 2-152) sensor- / servo-controller module for closed-loop piezo position control. In this mode the amplifier is slaved to the E-509 servo controller. Depending on the attached piezo mechanics and feedback sensor, positioning accuracy and repeatability in the nanometer range and below are feasible.

Computer Control

The E-517 computer interface/display module can also be installed in the E-481.

Optionally digital control via a D/A converter is possible. For several D/A boards from National Instruments PI offers a corresponding LabVIEW™ driver set which is compatible with the PI General Command Set (GCS), the command set used by all PI controllers. A further option includes the patented Hyperbit™ technology providing enhanced system resolution.

Thermal Piezo Protection Circuit

The E-481 features a temperature sensor input and control circuit to shut down the amplifier if the connected piezo ceramic exceeds a maximum temperature threshold.

Ordering Information

E-481.00
HVPZT Piezo Amplifier / Controller, Energy Recovery, 1100 V, 2000 W, 19"

Note
Requires Piezo Actuators with Option P-177.50, Temperature Sensor and Protective Air

Upgrades
Sensor / Servo-Control Modules

E-509.C1A
Sensor / Servo-Controller Module, Capacitive Sensor

E-509.S1
Sensor / Servo-Controller Module, SGS-Sensor

Interface / Display Modules

E-517.i1
Interface-/Display Module, 24 Bit D/A Ethernet, USB, RS-232, 1 Channel

E-515.01
Display Module for PZT Voltage and Position

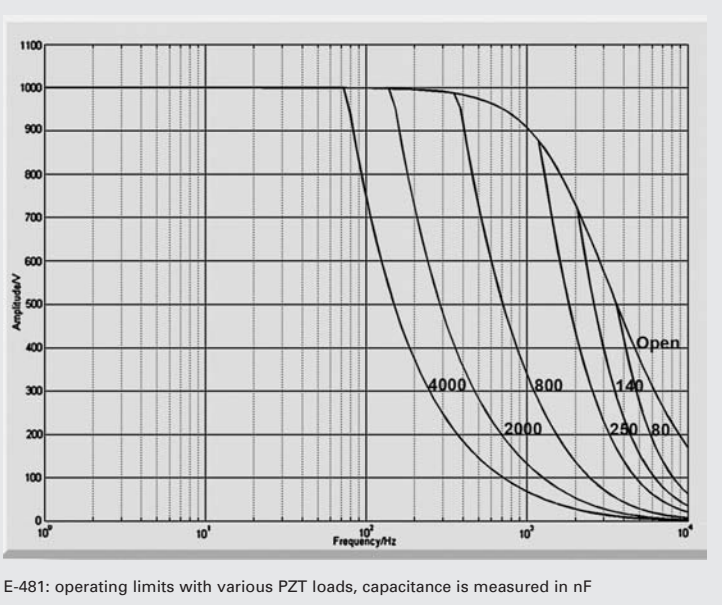
E-500.ACD
LabView with Driver Set for Analog Controllers

E-500.HCD
Hyperbit™ Functionality for Enhanced System Resolution

Supports Certain D/A Boards.

Extension cables, adapters & connectors: see in "Accessories" in the "Piezo Drivers / Servo Controllers" section, (p. 2-168 *ff*).

Ask about custom designs!



E-481: operating limits with various PZT loads, capacitance is measured in nF

Technical Data

Model	E-481.00
Function	Power amplifier for PICA™ high-voltage PZTs
Amplifier	
Output voltage	0 to 1100 V (default) (Selectable -260 to +780 V -550 to +550 V +260 to -780 V 0 to -1100 V)
Amplifier channels	1
Average output power	equivalent to 630 VA reactive power
Peak output power <5 ms	2000 VA
Average current	>600 mA
Peak current <5 ms	2000 mA
Amplifier bandwidth, small signal	5 kHz (660 nF), 1 Hz (3.4 µF)
Amplifier bandwidth, large signal	1.4 kHz (660 nF), 350 Hz (3.4 µF)
Ripple, noise 0 to 100 kHz	150 mV_{RMS} 2000 mV_{P-P} (100 nF)
Current limitation	Short-circuit-proof
Voltage gain	+100
Control input voltage	Servo off: ±1/100 of selected output range Servo on: 0 to 10 V
Input impedance	100 kΩ
Interface and operation	
PZT voltage output socket	LEMO EGG.0B.701.CJL1173
Control input socket	BNC
PZT temperature sensor	Max 85 °C, high voltage output is automatically deactivated if PZT temperature out of range
DC Offset	10-turn pot., adds 0 to +10 V to Control IN
Miscellaneous	
Operating voltage	100–120 or 220–240 VAC, 50–60 Hz (fuse change required)
Operating temperature range	+5 to +50 °C (over 40 °C, max. av. power derated 10 %)
Weight	8.6 kg
Dimensions	288 x 450 x 158 mm