

# E-621 Piezo Servo-Controller & Driver

## Modules with Fast 24-Bit Interface



E-621.CR module

- **Integrated 24-Bit USB Interface**
- **Network Capability with up to 12 Channels**
- **Up to 120 mA Peak Current**
- **Position Control with Strain Gauge or Capacitive Sensor**
- **Notch Filter for Higher Bandwidth**
- **Additional Analog Interface**
- **Table for User-Defined Curves**

The E-621 is equipped with an RS-232 and USB interface and precision 24-bit converters for exceptional positional stability and resolution. It integrates a low-noise piezo amplifier which can output and sink peak currents of 120 mA for low-voltage piezoelectric actuators. Servo-controller versions for position sensing with capacitive or SGS sensors are available.

### Closed-Loop and Open-Loop Piezo Positioning

The E-621 controller module provides precision control of piezo actuators and positioning systems both in closed-loop and open-loop operation. The piezo controllers comprise additional circuitry for position sensing and servo-control. Displacement of the piezo is controlled by an analog signal. Positioning accuracy and

repeatability down to the sub-nanometer range is possible, depending on the piezo mechanics and sensor type. High-resolution position sensors provide optimum positional stability and fast response in the nanometer range. Capacitive sensors measure position directly and without physical contact (direct metrology). Alternatively compact cost-effective strain gauge sensors (SGS) are available. The integrated notch filters (adjustable for each axis) improve stability and allow high-bandwidth operation closer to the resonant frequency of the mechanics.

In open-loop 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.

### High-Resolution Digital Interface

The digital interface includes high-precision 24-bit A/D converters for optimum position stability and resolution and supports fast communication with the host-computer.

### Multi-Axis Network for up to 12 Channels

Up to twelve E-621s for capacitive or SGS sensors can be networked and controlled over a single PC interface. The different modules are connected in parallel (not daisy-chained) over the link. Only an additional 10 ms internal bus communications time is required to reach any of the units behind the one actually connected to the host PC.

### Waveform Memory

The built-in wave table can store user-defined data points internally. These values can then be output automatically (or under the control of an external signal) and programmed for point-by-point or full-scan triggering. Thus,

### Ordering Information

**E-621.CR**  
Piezo Amplifier / Servo-Controller Module, 1 Channel, -30 to 130 V, Capacitive Sensor, USB, RS-232

**E-621.SR**  
Piezo Amplifier / Servo-Controller Module, 1 Channel, -30 to 130 V, SGS-Sensor, USB, RS-232

**E-500.621**  
19"-Chassis for up to twelve E-621 Modules, Power Supply

**E-501.621**  
9,5"-Chassis for up to four E-621 Modules, Power Supply

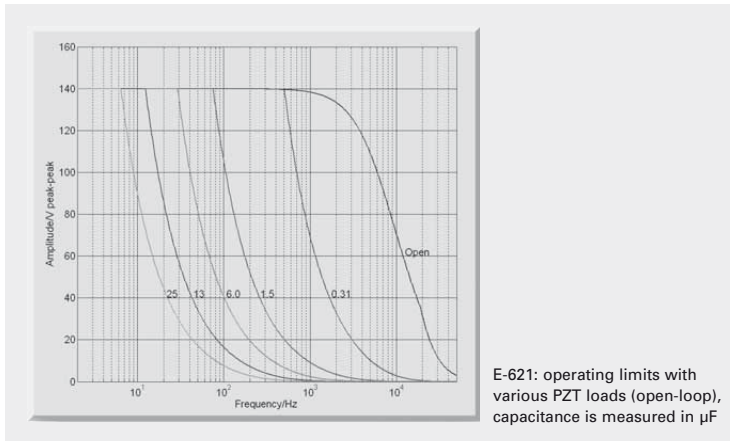
trajectory profiles can be repeated reliably and commanded easily.

### Software / GCS Command Set

The E-621 controller comes with Windows installation software, DLLs and LabVIEW drivers. The extensive command set is based on the hardware-independent General Command Set (GCS), which is common to all current PI controllers for both nano- and micropositioning systems. GCS reduces the programming effort in the face of complex multi-axis positioning tasks or when upgrading a system with a different PI controller.



E-625 (top), E-665 and 12 x E-621 in an E-500 chassis (bottom)



### Technical Data

<b>Model</b>	<b>E-621.SR / E-621.CR</b>
Function	Power amplifier & piezo controller
<b>Sensor</b>	
Servo characteristics	P-I (analog), notch filter
Sensor type	SGS (.S) / capacitive (.C)
<b>Amplifier</b>	
Control input voltage range	-2 to 12 V
Output voltage	-30 to 130 V
Peak current, <50 ms	120 mA
Average current	60 mA
Current limitation	Short-circuit-proof
Noise, 0 to 100 kHz	0.8 mV <sub>rms</sub>
Voltage gain	10 $\pm$ 0.1
Input impedance	100 k $\Omega$
<b>Interfaces and operation</b>	
Interface / communication	USB, RS-232 (9-pin Sub-D connector, 9.6–115.2 kBaud), 24-bit A/D, 20-bit D/A
Piezo connector	LEMO ERA.00.250.CTL (.SR) / Sub-D special (.CR)
Sensor connection	LEMO EPL.0S.304.HLN (.SR) / Sub-D special (.CR)
Analog input	SMB
Sensor monitor output	SMB
Controller network	up to 12 channels, parallel
Command set	PI General Command Set (GCS)
User software	PIMikroMove™
Software drivers	LabVIEW drivers, DLLs
Supported functionality	Wave table, 256 data points, external trigger, 16 macros
DC Offset	External potentiometer (not included), adds 0 to + 10 V to Control In
<b>Miscellaneous</b>	
Operating temperature range	+5 °C to +50 °C (above 40 °C, power derated)
Overheat protection	Deactivation at 75 °C
Dimensions	7HP/3U
Mass	0.6 kg
Operating Voltage	12 to 30 V DC, stabilized
Current consumption, max.	2 A

### Linear Actuators & Motors

#### Nanopositioning / Piezoelectrics

Piezo Flexure Stages / High-Speed Scanning Systems

Linear

Vertical & Tip/Tilt

2- and 3-Axis

6-Axis

Fast Steering Mirrors / Active Optics

#### Piezo Drivers / Servo Controllers

Single-Channel

Multi-Channel

**Modular**

Accessories

Piezoelectrics in Positioning

### Nanometrology

### Micropositioning

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