

# Digital Multi-Channel Piezo Controller

For Nanopositioning Systems with Capacitive, Piezoresistive or Strain Gauge Sensors



## E-727.x • E-727.xP

- 20 kHz control bandwidth
- Option for increased output current
- Interfaces: TCP/IP, USB and RS-232
- Optional analog inputs and outputs
- Autoloading of calibration data from stage ID chip for interchangeability of controller and mechanics
- 4th order polynomial linearization for mechanics and electronics

### Digital controller for piezo-based nanopositioning systems

Integrated low-noise power amplifiers for PICMA<sup>®</sup> piezo actuators. Output voltage -30 to +130 V. Supports nanopositioning systems with strain gauge sensors, capacitive sensors or piezoresistive sensors. P-I controller with 2 notch filters. Linearization based on 4th-order polynomials. Optional Dynamic Digital Linearization (DDL). Delivery includes wide input range power supply, USB and RS-232 cable.

### High dynamics

Increased output current (optional) for dynamic applications that require a high peak current.

### Extensive functionality

ID chip for fast startup and quick exchange of system components. Data recorder, wave generator, macros. Extensive software support, e.g., for LabVIEW, dynamic libraries for Windows and Linux.

### Interfaces

TCP/IP, USB, RS-232, SPI. 4 analog inputs and outputs each (optional) for external sensors, target values or external amplifiers. 4 digital inputs and outputs respectively.

## Specifications

	E-727
Function	Digital controller for multi-axis piezo nanopositioning systems. Additional functions: .xxxA: Analog interfaces .xxxP: Increased output current .xxxAP: Analog interfaces, increased output current
Axes	E-727.3x: 3 E-727.4x: 4
Processor	DSP 32/64-bit, floating point, 375 MHz
Sampling rate, servo control	20 kHz
Sampling rate, sensor	100 kHz

Sensor	E-727
Controller type	P-I, two notch filters Optional: Advanced piezo control
Sensor type	E-727.xCxxx: Capacitive E-727.xSxxx: Strain gauge sensors E-727.xRxxx: Piezoresistive
Sensor channels	E-727.xCxxx: 3 E-727.xSxxx, E-727.xRxxx: 4
Sensor bandwidth (-3 dB)	10 kHz
Sensor resolution (at 1 kHz oversampling)	20-bit

Amplifier	E-727.xxx, E-727.xxxA	E-727.xxxP, E-727.xxxAP
Output voltage	-30 to 130 V ( $\pm 3$ V)	-30 to 130 V ( $\pm 3$ V)
Amplifier channels	4	4
Peak power / channel	28 W max. 30 ms	270 W max. 10 ms
Average output power / channel	14 W	30 W
Peak current / channel	180 mA max. 30 ms	1500 mA max. 10 ms
Average output current / channel	75 mA	200 mA
Current limitation	Short-circuit proof	Short-circuit proof
Resolution DAC	20-bit	20-bit
Amplifier bandwidth	6.5 kHz	6.5 kHz

Communication	E-727
PC	TCP/IP, USB, RS-232
SPI	Connector for SPI master for fast serial transmission of target and current position

Interfaces	E-727.xxx, E-727.xxxP	E-727.xxxA, E-727.xxxAP
Piezo / sensor connection	E-727.xCxx: Sub-D 25W3 (f) E-727.xSxx, E-727.xRxx: Sub-D 37 (f)	E-727.xCxxx: Sub-D 25W3 (f) E-727.xSxxx, E-727.xRxxx: Sub-D 37 (f)
Analog inputs	-	Sub-D 15 (f) 4 inputs $\pm 5$ V or $\pm 10$ V 18-bit A/D converter
Analog output	-	Sub-D 15 (f) $\pm 10$ V 20-bit D/A converter

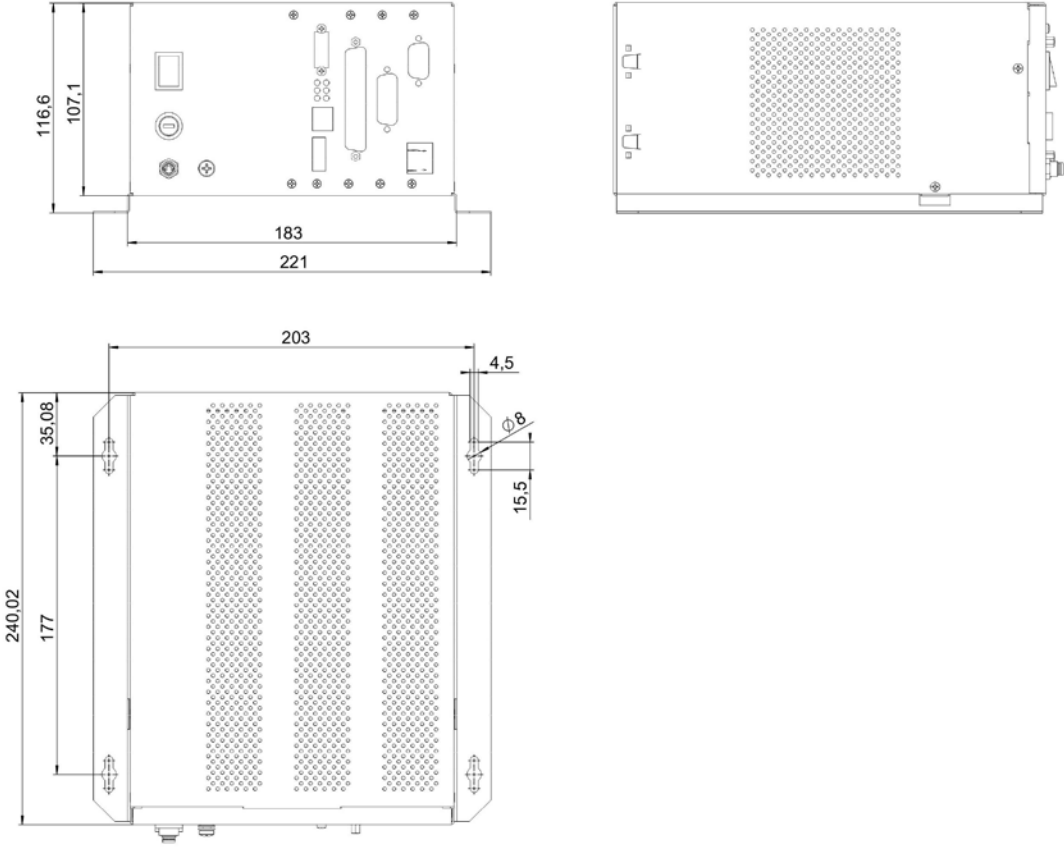
Interfaces	E-727.xxx, E-727.xxxP	E-727.xxxA, E-727.xxxAP
Sensor monitor output	-	Sub-D 15 (f) Sensor channels 1 to 3
Digital input/output	MDR14; 4 inputs, 4 outputs	MDR14; 4 inputs, 4 outputs
Separate protective earth connection	Yes	Yes

Operation	E-727
Command set	PI General Command Set (GCS)
User software	PIMikroMove
Software drivers	LabVIEW and MATLAB driver, shared libraries for Windows and Linux; extensive example code
Supported functions	Wave generator, data recorder, macros, autozero, ID chip detection
Display and indicators	LEDs for Power, Servo, Error, Overflow
Linearization	4th-order polynomials, DDL (Dynamic Digital Linearization)

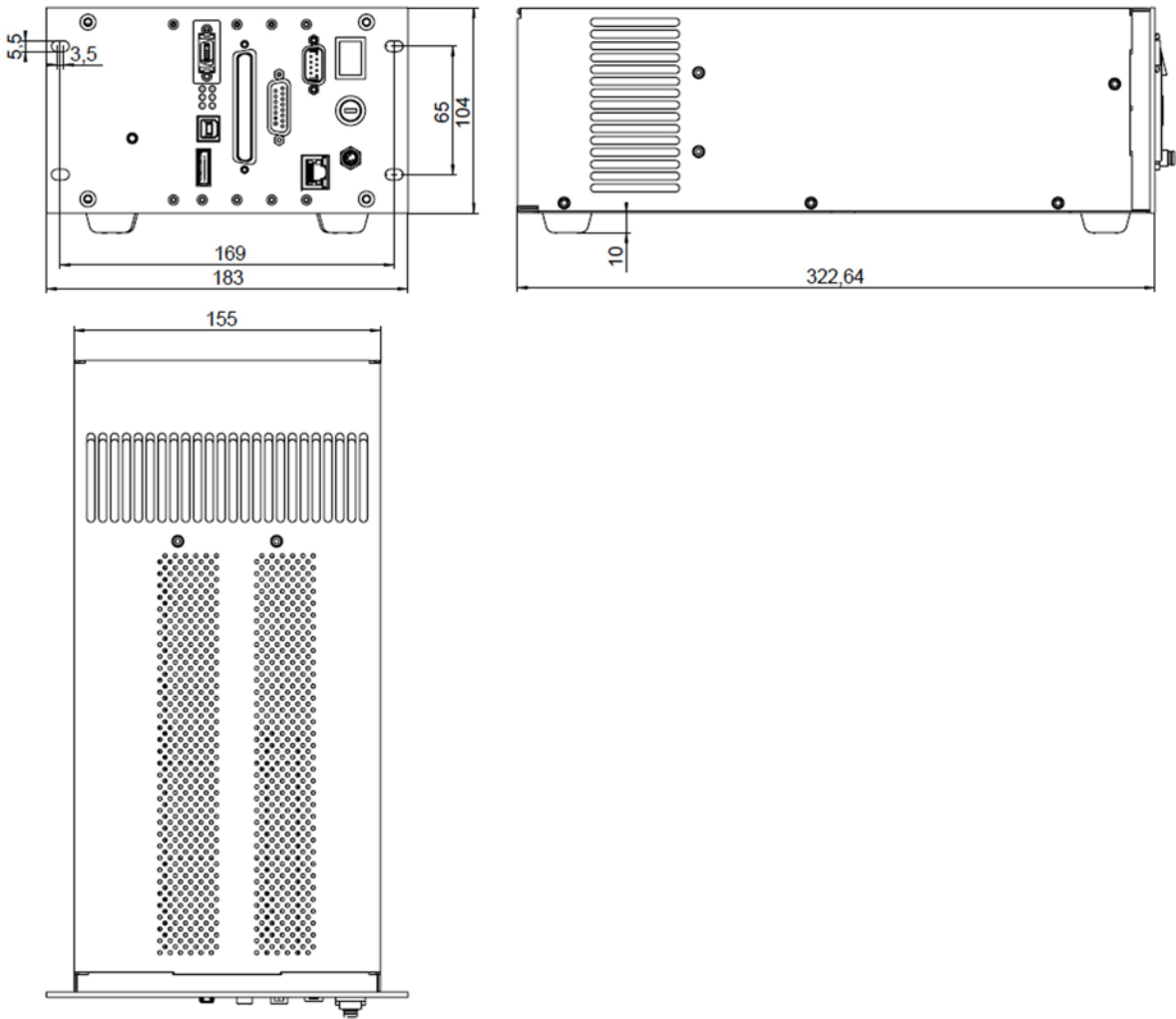
Miscellaneous	E-727.xxx, E-727.xxxA	E-727.xxxP, E-727.xxxAP
Operating temperature range	5 to 40 °C	5 to 40 °C
Overheat protection	Max. 72 °C, deactivation of the voltage output	Max. 72 °C, deactivation of the voltage output Alarm threshold at 66 °C
Mass	2.4 to 2.6 kg	3.3 kg
Fuse	1 x T3.15 AH, 5 x 20 mm	1 x T4 AH, 5 x 20 mm
Max. power consumption	80 W	84 W
Max. power consumption without load	24 W	40 W
Operating voltage	24 V DC (external power adapter in the scope of delivery)	24 V DC (external power adapter in the scope of delivery)

Ask about custom designs!

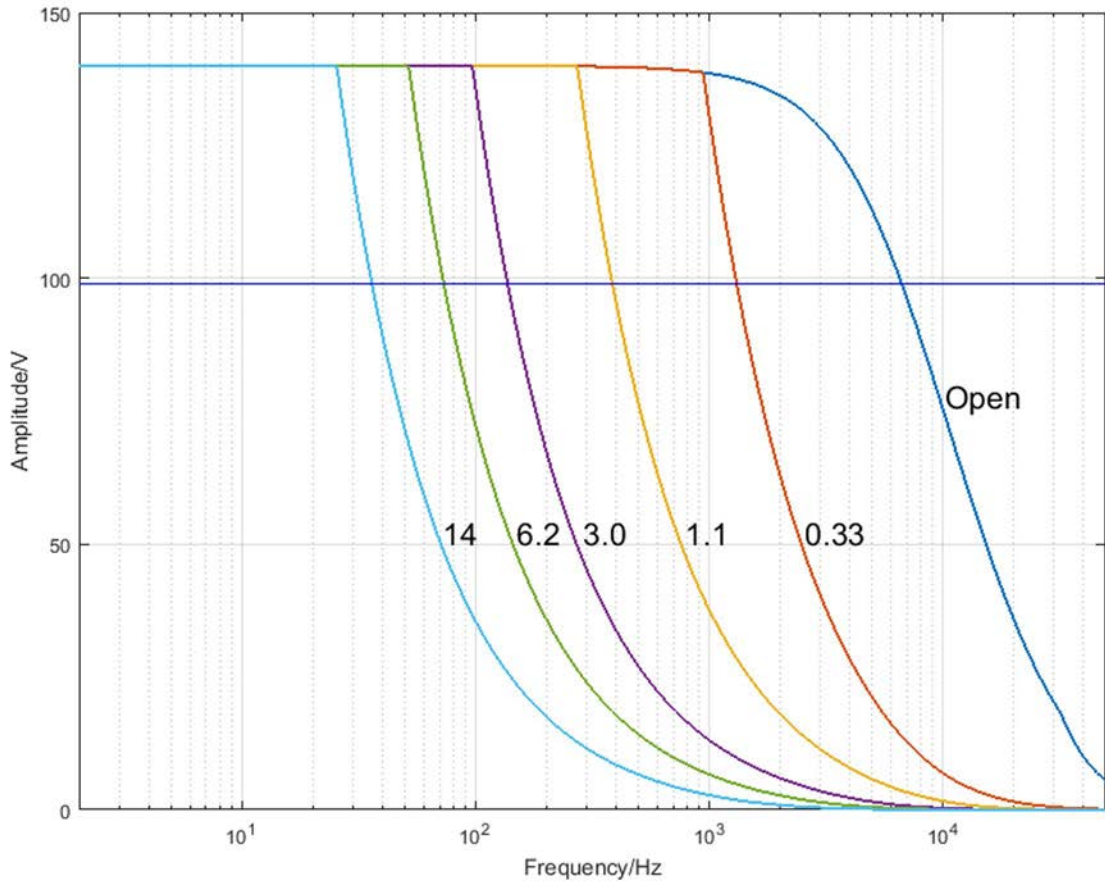
## Drawings / Images



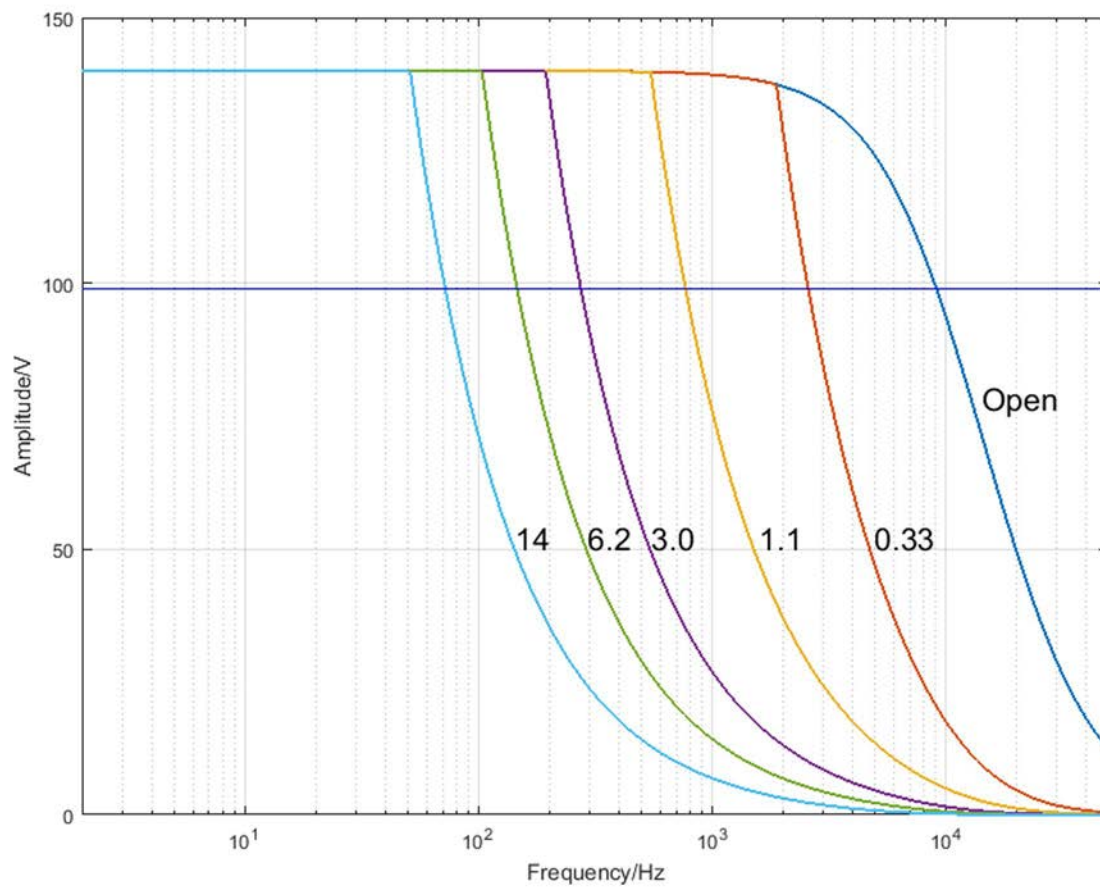
E-727.xxx, E-727.xxxA: dimensions in mm



E-727.xxxP, E-727.xxxAP: dimensions in mm



*E-727.xxx, E-727.xxxA: Operating limits (open loop) with various piezo loads, capacitance values in  $\mu\text{F}$*



*E-727.xxxP, E-727.xxxAP: Operating limits (open loop) with various piezo loads, capacitance values in  $\mu\text{F}$*

## Ordering Information

### **E-727.3CD**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, Sub-D 25W3 socket

### **E-727.3CDA**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, Sub-D 25W3 socket, analog inputs

### **E-727.3CDP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, Sub-D 25W3 socket, 1.5 A Peak output current

### **E-727.3CDAP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, Sub-D 25W3 socket, 1.5 A Peak output current, analog inputs

### **E-727.3SD**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, Sub-D 37 socket

### **E-727.3SDA**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, Sub-D 37 socket, analog inputs

### **E-727.3SDP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, Sub-D 37 socket, 1.5 A Peak output current

### **E-727.3SDAP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, Sub-D 37 socket, 1.5 A Peak output current, analog inputs

### **E-727.3RD**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, Sub-D 37 socket

### **E-727.3RDA**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, Sub-D 37 socket, analog inputs

### **E-727.3RDP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, Sub-D 37 socket, 1.5 A Peak output current

### **E-727.3RDAP**

Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, Sub-D 37 socket, 1.5 A Peak output current, analog inputs

### **E-727.4SD**

Digital multi-channel piezo controller, 4 axes, -30 to 130 V, strain gauge sensors, Sub-D 37 socket

### **E-727.4RD**

Digital multi-channel piezo controller, 4 axes, -30 to 130 V, piezoresistive sensors, Sub-D 37 socket

## Accessories

### **E-710.SCN**

Firmware extension DDL (Dynamic Digital Linearization)