Digital Multi-Channel Piezo Controller

For Nanopositioning Systems with Capacitive, Piezoresistive or Strain Gauge Sensors

E-727.x • E-727.xAP

- 20 kHz sampling rate control
- 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® 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 NI 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.

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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 (±3 V)	-30 to 130 V (±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 (2.0), 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 ±5 V or ±10 V 18-bit A/D converter
Analog output	-	Sub-D 15 (f) ±10 V 20-bit D/A converter
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

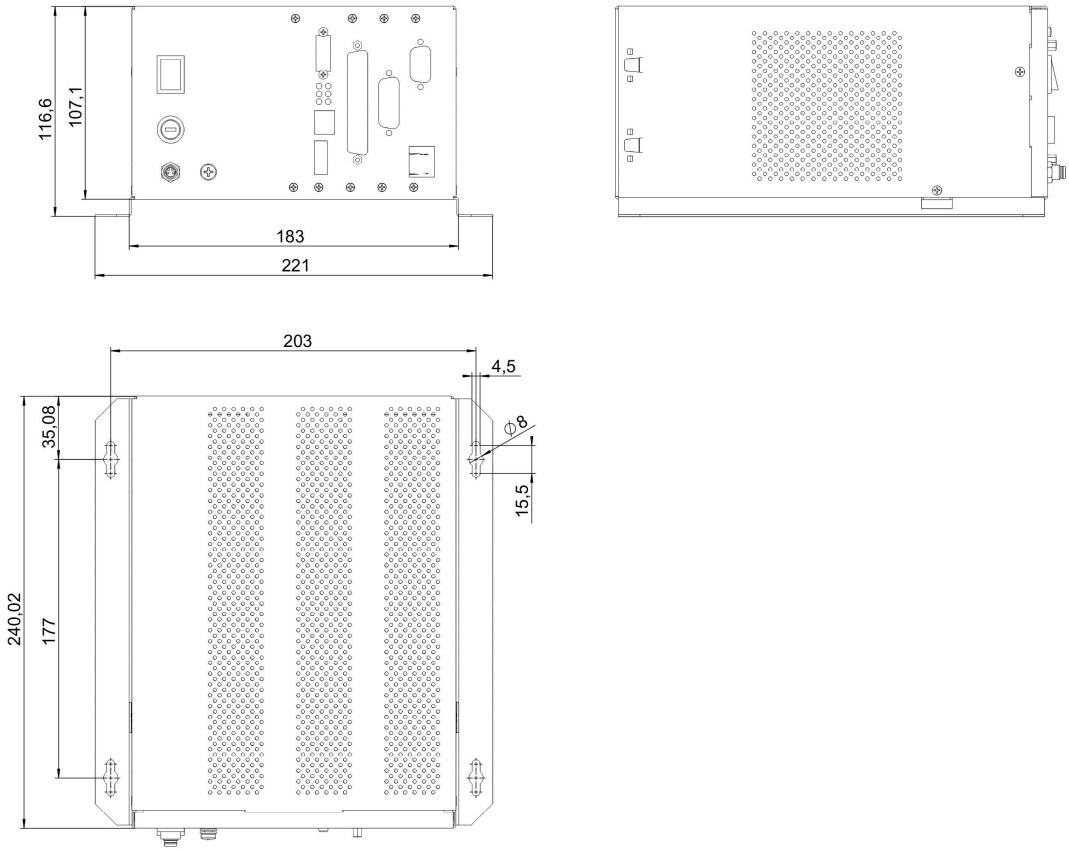
Interfaces	E-727.xxx, E-727.xxxP	E-727.xxxA, E-727.xxxAP
Separate protective earth connection	Yes	Yes

Operation	E-727
Command set	PI General Command Set (GCS)
User software	PIMikroMove
Software drivers	NI 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, optional)

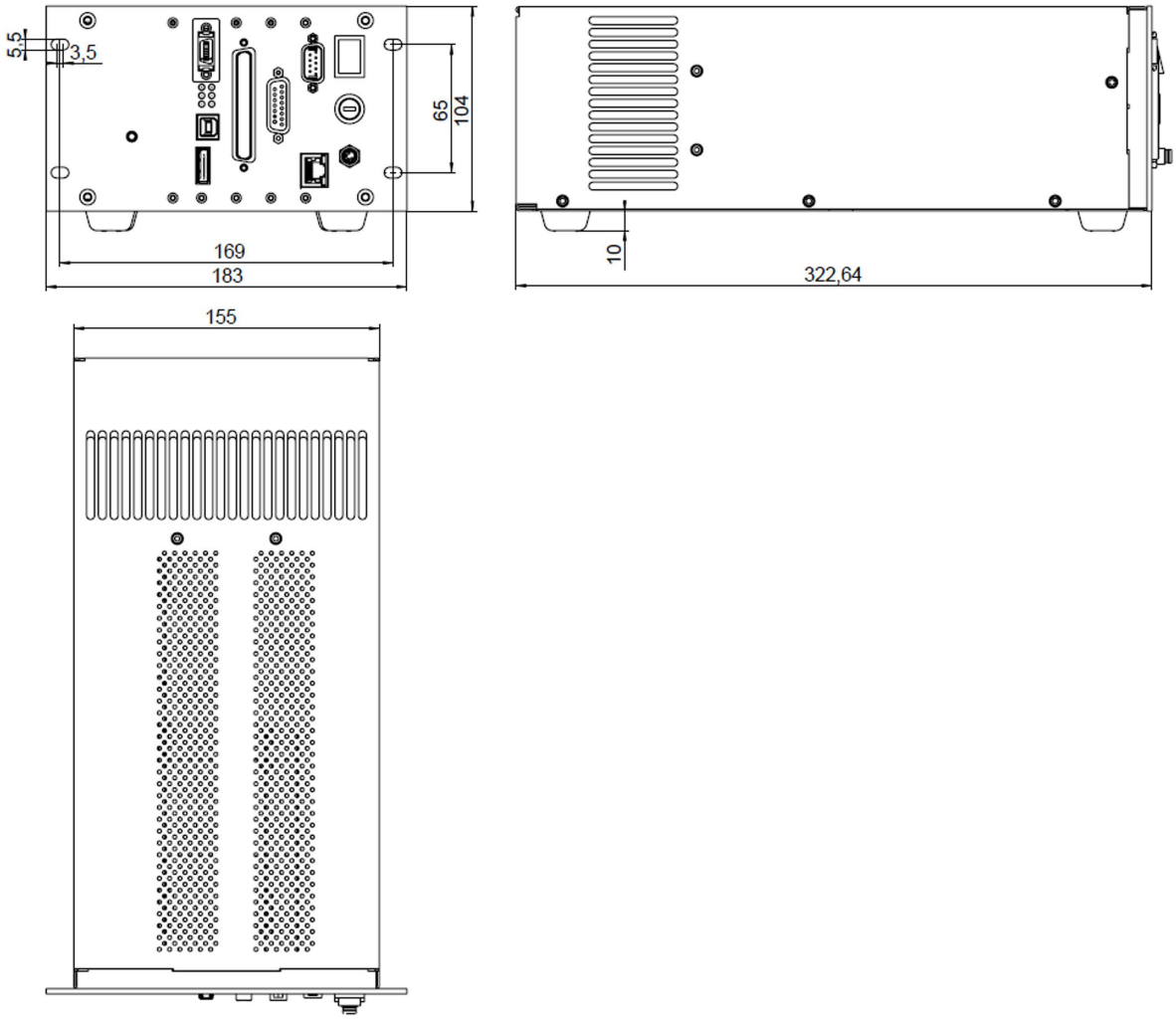
Miscellaneous	E-727.xxx, E-727.xxxA	E-727.xxxP, E-727.xxxAP
Operating temperature range	5 to 40 °C	5 to 40 °C
Overheat protection	Max. 72 °C, deactivation of the voltage output	Max. 72 °C, deactivation of the voltage output Alarm threshold at 66 °C
Mass	2.4 to 2.6 kg	3.3 kg
Fuse	1 x T3.15 AH, 5 × 20 mm	1 x T4 AH, 5 × 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 customized versions.

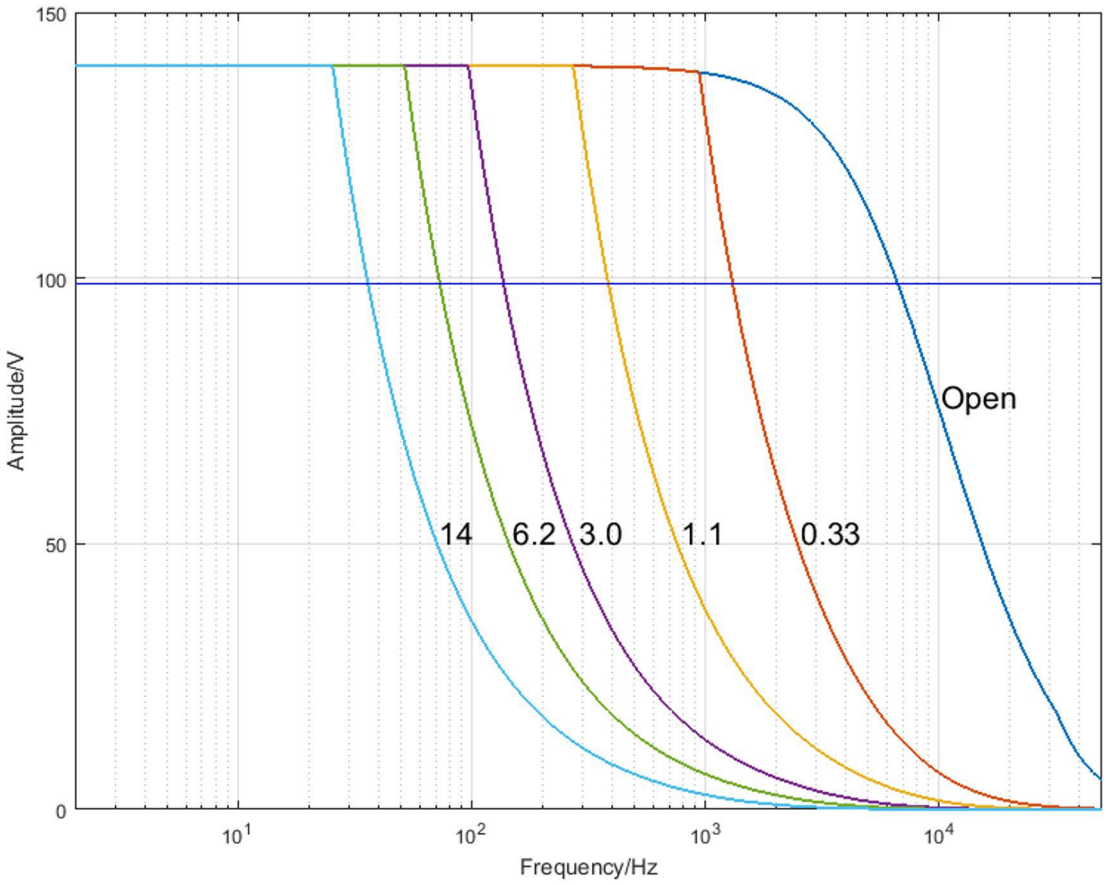
Drawings / Images



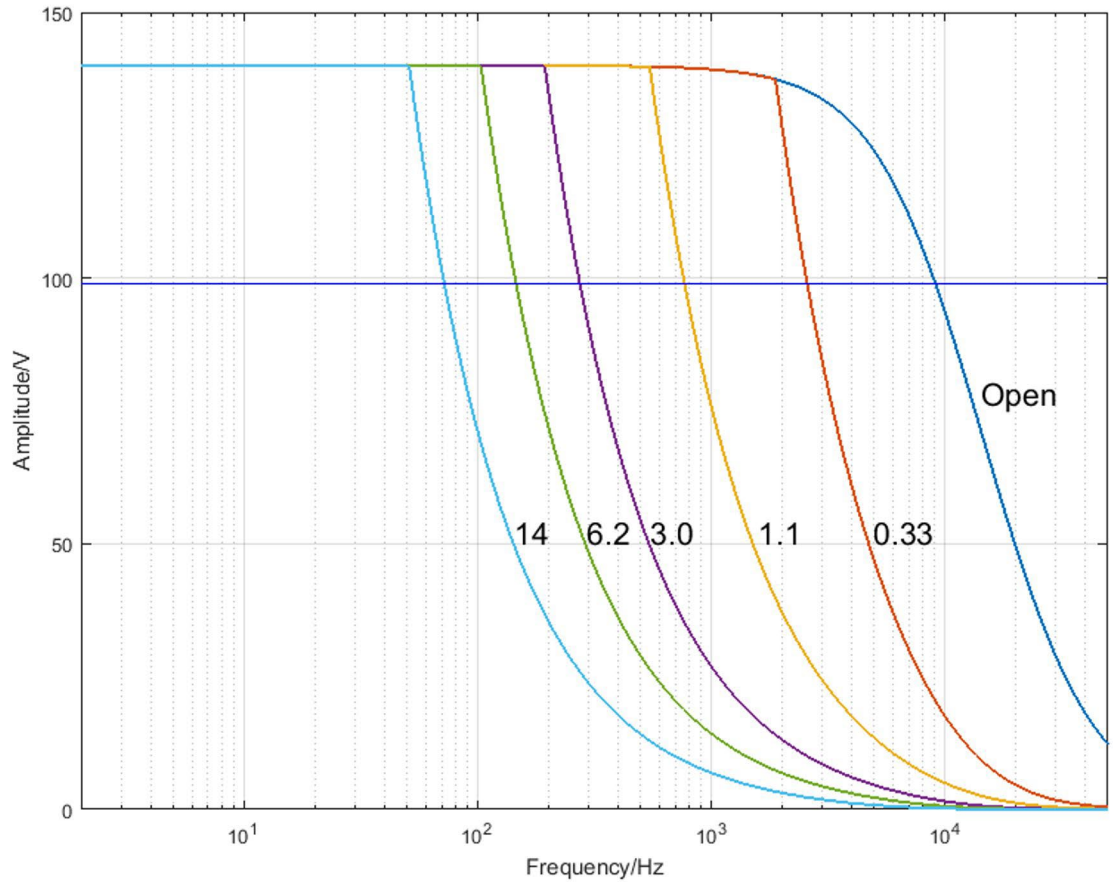
E-727.xxx, E-727.xxxA: dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



E-727.xxxP, E-727.xxxAP: dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



E-727.xxx, E-727.xxxA: Operating limits (open loop) with various piezo loads, capacitance values in µF



E-727.xxxP, E-727.xxxAP: Operating limits (open loop) with various piezo loads, capacitance values in µF

Ordering Information

E-727.3CD
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket

E-727.3CDA
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket, analog inputs

E-727.3CDP
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket, 1.5 A peak output current

E-727.3CDAP
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 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, D-sub 37 socket

E-727.3SDA
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, D-sub 37 socket, analog inputs

E-727.3SDP
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, strain gauge sensors, D-sub 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, D-sub 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, D-sub 37 socket

E-727.3RDA
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, D-sub 37 socket, analog inputs

E-727.3RDP
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, D-sub 37 socket, 1.5 A peak output current

E-727.3RDAP
Digital multi-channel piezo controller, 3 axes, -30 to 130 V, piezoresistive sensors, D-sub 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, D-sub 37 socket

E-727.4RD
Digital multi-channel piezo controller, 4 axes, -30 to 130 V, piezoresistive sensors, D-sub 37 socket

Accessories

E-710.SCN
Firmware extension DDL (Dynamic Digital Linearization)