

Digital Multi-Channel Piezo Controller with EtherCAT

Control Piezo Nanopositioning Systems via Fieldbus Interface



E-727.xF

- Integration into an automation system thanks to EtherCAT
- Operating modes: CSP, PP, homing
- Cycle time 2 ms
- 20 kHz control bandwidth
- 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 strain gauge sensors, capacitive sensors or piezoresistive sensors. Delivery includes wide input range power supply and USB cable.

EtherCAT fieldbus interface

Controller and nanopositioning system behave like an intelligent multi-axis drive according to CiA402 drive profile. Can be integrated seamlessly into automation systems in industry and research. Operating modes according to IEC 61800-7-201: Cyclic Synchronous Position (CSP), Profile Position (PP) and Homing (manufacturer-specific method: Autozero). Cycle time 2 ms.

Operation via TCP/IP or USB

Operation via TCP/IP or USB is possible without EtherCAT master. The controller then has the same functionality as an E-727 without fieldbus interface and is commanded via PI GCS. Extensive software support, e.g., for LabVIEW, dynamic libraries for Windows and Linux.

Extensive functionality

P-I controller with 2 notch filters. Linearization based on 4th-order polynomials. Optional Dynamic Digital Linearization (DDL). ID chip for fast startup and quick exchange of system components.

Further interfaces

SPI for fast serial transmission of position values to / from an SPI master. 4 analog inputs and outputs each (optional) for external sensors, target values or external amplifiers. 4 digital inputs and outputs respectively.

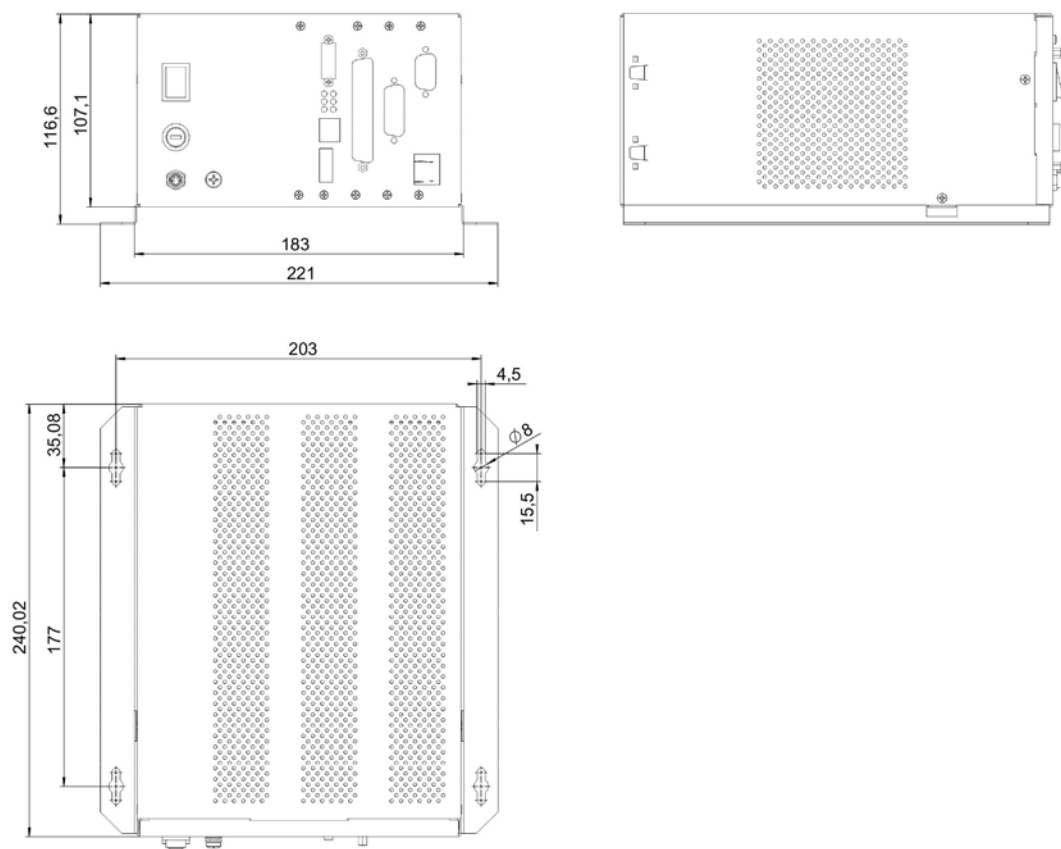
Specifications

	E-727.3xDf, E-727.3xDaf
Function	Digital controller for multi-axis piezo nanopositioning systems. Fieldbus integration via EtherCAT interface. Additional functions with .3xDaf: Analog interfaces
Axes	3
Processor	DSP 32/64-bit, floating point, 375 MHz
Sampling rate, servo control	20 kHz
Sampling rate, sensor	100 kHz
Sensor	
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	
Output voltage	-30 to 130 V (± 3 V)
Amplifier channels	4
Peak power / channel	28 W max. 30 ms
Average output power / channel	14 W
Peak current / channel	180 mA max. 30 ms
Average output current / channel	75 mA
Current limitation	Short-circuit proof
Resolution DAC	20-bit
Amplifier bandwidth	6.5 kHz
Communication	
PC	TCP/IP, USB
SPI	Connector for SPI master for fast serial transmission of target and current position
Fieldbus	EtherCAT (CoE = CANopen over EtherCAT)
Interfaces	
Piezo / sensor connection	E-727.xCxxx: Sub-D 25W3 (f) E-727.xSxxx, E-727.xRxxx: Sub-D 37 (f) E-727.3xDaf only: Sub-D 15 (f)
Analog inputs	4 inputs ± 5 V or ± 10 V 18-bit A/D converter
Analog output	E-727.3xDaf only: Sub-D 15 (f) ± 10 V 20-bit D/A converter
Sensor monitor output	E-727.3xDaf only: Sub-D 15 (f) Sensor channels 1 to 3
Digital input/output	MDR14; 4 inputs, 4 outputs
Separate protective earth connection	Yes

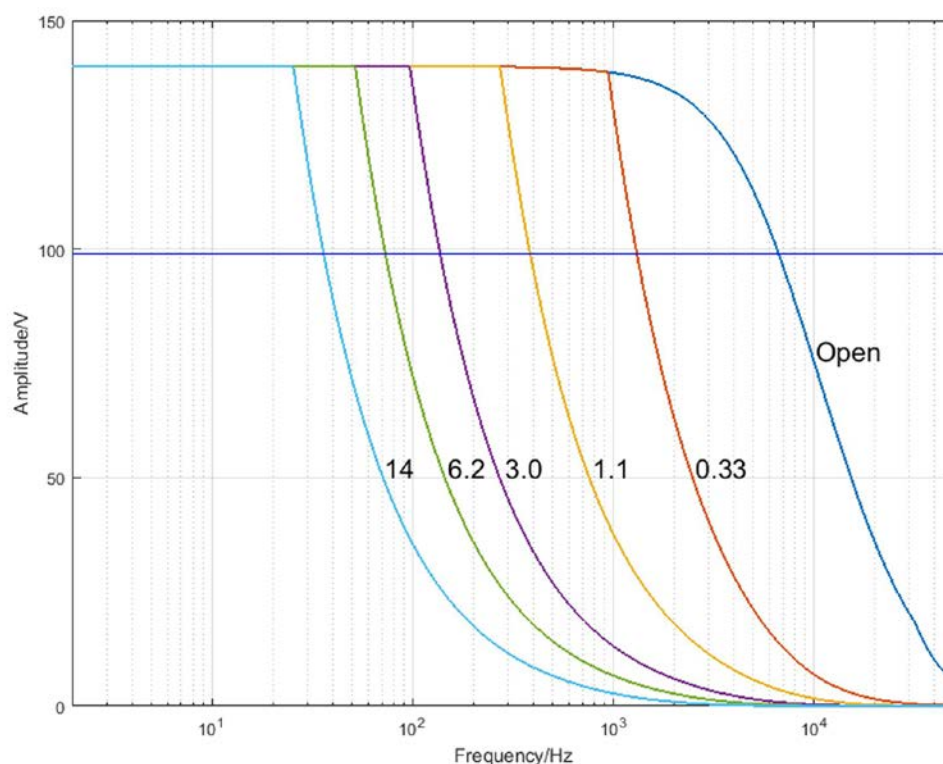
Operation	
Communication via PC	Command set: PI General Command Set (GCS) User software: PIMikroMove Software drivers: LabVIEW and MATLAB driver, shared libraries for Windows and Linux, extensive example code
Communication via fieldbus (EtherCAT)	Drive profile CiA402 (IEC 61800-7-201) Operating modes: Cyclic Synchronous Position (CSP), Profile Position (PP), Homing Min. cycle time: 2 ms
Supported functions	Autozero, ID chip detection
Display and indicators	Addressable with GCS commands only: Wave generator, data recorder, macros LEDs for Power, Servo, Error, Overflow, EtherCAT communication
Linearization	4th-order polynomials, DDL (Dynamic Digital Linearization)
Miscellaneous	
Operating temperature range	5 to 40 °C
Overheat protection	Max. 72 °C, deactivation of the voltage output
Mass	2.4 to 2.6 kg
Fuse	1 x T3.15 AH, 5 x 20 mm
Max. power consumption	80 W
Max. power consumption without load	24 W
Operating voltage	24 V DC (external power adapter in the scope of delivery)

Ask about custom designs!

Drawings / Images



E-727.xxxF, E-727.xxxAF: dimensions in mm



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

Ordering Information

E-727.3CDF

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

E-727.3CDAF

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

E-727.3SDF

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

E-727.3SDAF

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

E-727.3RDF

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

E-727.3RDAF

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

Accessories

E-710.SCN

Firmware extension DDL (Dynamic Digital Linearization)