

E-509 Signal Conditioner / Piezo Servo Module 3-Channel Servo-Controller Module for E-500 Piezo Controller System



E-509 3-channel servo-controller module for nanopositioning systems with strain gauge sensors

Ordering Information

- E-509.C1A**
Sensor / Piezo Servo-Control Module, Capacitive Sensor, 1 Channel
- E-509.C2A**
Sensor / Piezo Servo-Control Module, Capacitive Sensors, 2 Channels
- E-509.C3A**
Sensor / Piezo Servo-Control Module, Capacitive Sensors, 3 Channels
- E-509.S1**
Sensor / Piezo Servo-Control Module, SGS Sensor, 1 Channel
- E-509.S3**
Sensor / Piezo Servo-Control Module, SGS-Sensors, 3 Channels

Ask about custom designs!

- **Position Servo-Control for Piezo Mechanics with SGS or Capacitive Sensors**
- **1-, 2- and 3-Channel Versions**
- **Improves Linearity**
- **Eliminates Drift and Hysteresis**
- **Notch Filter for Higher Bandwidth**
- **Increases Piezo Stiffness**
- **ILS Circuitry Maximizes Capacitive Sensor Linearity**
- **Plug-In Module for E-500 System**
- **Prepared for Interfaces / Display Modules (optional)**

tance sensors provide direct and non-contact position feedback (direct metrology). Strain gauge sensors (SGS) are available for cost-effective applications.

For PISeCa™ single-plate high-resolution capacitive sensors (see p. 3-8), the E-509.E3 or E-509.E03 versions are available (see p. 3-12).

The E-509 module is both a signal conditioner for high-resolution capacitive and SGS displacement sensors and a servo-controller for closed-loop piezo nanopositioning mechanics. It compensates for the drift and hysteresis inherent in PZT materials and quickly adjusts the operating voltage on the PZT as soon as a change in force or load occurs. Single- and multi-channel versions for strain gauge and capacitive sensors are available.

Nanometer-Precise Piezo Positioning

The proportional-integral (P-I) algorithm used by the E-509 servo-controller is optimized

for piezo operation. Both P and I parameters as well as the control bandwidth can be set internally. The integrated notch filters (adjustable for each axis) improve the stability and allow high-bandwidth operation closer to the piezomechanics' resonant frequency. Closed-loop piezo mechanics from PI can provide positioning accuracy and repeatability down to the nanometer range and below.

Two Types of Sensors

PI employs proprietary position sensors for fast response and optimum positioning resolution and stability in the nanometer range and below. For high-end applications, capaci-



The E-509 controller module installed in an E-501 9½-inch chassis together with E-516 digital interface and E-503 three-channel amplifier modules

Technical Data

Model	E-509.C1A/E-509.C2A/E-509.C3A	E-509.S1/E-509.S3
Function	Signal conditioner & servo-controller for piezo mechanics	Signal conditioner & servo-controller for piezo mechanics
Channels	1/2/3	1/3
Sensor		
Servo characteristics	P-I (analog), notch filter	P-I (analog), notch filter
Sensor type	Capacitive	SGS
Sensor channels	1 / 2 / 3	1 / 3
Sensor bandwidth	0.3 to 3 kHz (selectable with jumper); up to 10 kHz on request	0.3; 1; 3 kHz
Noise factor	0.115 ppm/Hz ^{1/2}	
Thermal drift	<0.3 mV / C°	<3 mV / C°
Linearity	<0.05%	<0.2%
Interfaces and operation		
Sensor connection	LEMO EPL.00.250.NTD	LEMO ERA.0S.304.CLL
Sensor monitor output	0–10 V	0–10 V
Sensor monitor socket	LEMO 6-pin FGG.0B.306.CLAD56	BNC (1-ch.) / 3-pin. LEMO (3-ch.)
Supported functionality	ILS (Integrated Linearization System)	ILS (Integrated Linearization System)
Display	Overflow LED	Overflow LED
Miscellaneous		
Operating temperature range	+5 to +50 °C	+5 to +50 °C
Dimensions	7HP/3U	7HP/3U
Mass	0.35 kg	0.35 kg
Operating Voltage	E-500 System	E-500 System
Max. power consumption	4 to 8 W	4 to 8 W

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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