E-536 PicoCube® Piezo Controller

High Dynamics, High Resolution, for up to 3 Axes

E-536.3C 3-channel PicoCube® Controller

- **For P-363 PicoCube® Systems**
- **Peak Power 3 x 100 W**
- **Ultra-Low Noise**
- **Output Voltage ±250 V**

The E-536 is a controller for the P-363 PicoCube® pico-positioning system providing three ultra-low-noise amplifier channels for piezo shear actuators. The controller design meets the special requirements of the high-speed, ultra-high-performance PicoCube® XY(Z) piezo stages (see p. 2-66) of ±250 V for both static and dynamic applications.

The high-performance E-536.3x can output and sink peak currents up to 200 mA featuring a small-signal bandwidth of 10 kHz. The E-536.3xH ultra-high-resolution models provide a position resolution below 0.03 nm at a peak power of 50 W. Both models are available with or without a servo module for closed-loop or open-loop operation.

Superior Resolution and High Dynamics

Open-loop operation is ideal for applications where fast response and very high resolution with maximum bandwith are essential. Here, commanding and reading the traget position in absolute values is either not important or carried out by external position sensors. Together with the P-363 PicoCube® a resolution of 0.05 nm or better is achieved.

Excellent Position Accuracy with Capacitive Sensors

The E-536.3C versions have integrated sensor electronics and servo-controllers for closed-loop position control. Position feedback is provided by capacitive sensors, like those in the PicoCube®, with resolutions down to 0.1 nm.

Computer Control

Control via PC is possible by installing the E-517, 24-bit interface/display module.

Optionally digital control via a D/A converter is possible. For several D/A boards from National Instruments PI offers a corresponding LabVIEW™ driver set which is compatible with the PI General Command Set (GCS), the command set used by all PI controllers. A further option includes the patented Hyperbit™ technology providing enhanced system resolution.

Ordering Information

E-536.3C
PicoCube® Piezo Controller, 3 Channels, Capacitive Sensors

E-536.30
PicoCube® Piezo Controller, 3 Channels, Open-Loop

E-536.3CH
PicoCube® Piezo Controller, 3 Channels, High-Resolution, Capacitive Sensors

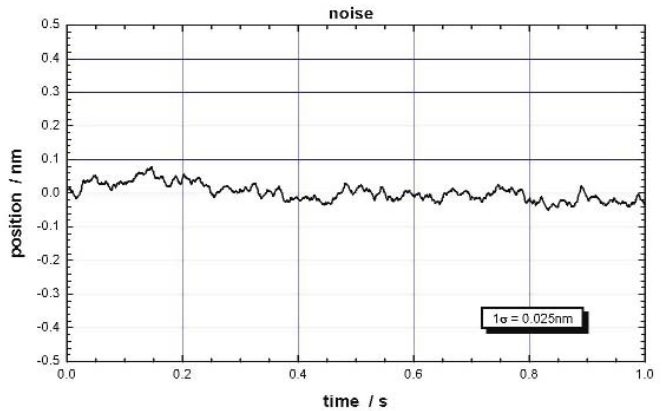
E-536.30H
PicoCube® Piezo Controller, 3 Channels, High-Resolution, Open-Loop

E-517.i3
Interface- / Display Module, 24 Bit D/A, TCP/IP, USB, RS-232, 3 Channels

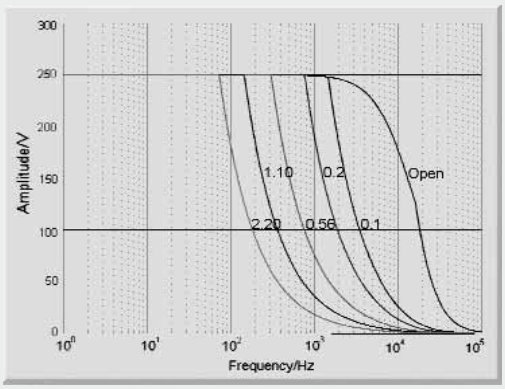
E-500.HCD
Hyperbit™ Functionality for Enhanced System Resolution

(Supports certain D/A boards.)

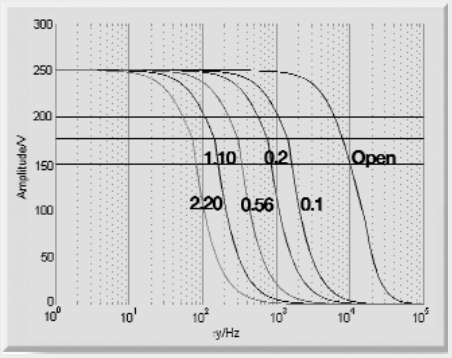
E-536 controller with P-363 PicoCube® pico-positioning system



Positional noise measurement of E-536 amplifier driving a P-363 pico-positioning system in open loop shows 1-sigma resolution of 25 picometers (0.025 nm). Measured with ultra-high-resolution capacitive sensor



E-536.3x: operating limits with various PZT loads, capacitance is measured in µF



E-536.3xH: operating limits with various PZT loads, capacitance is measured in µF

Technical Data

Model	E-536.3C / E-536.30	E-536.3CH / E-536.30H
Function	Power amplifier & servo-controller for P-363 PicoCube®	Power amplifier & servo-controller for P-363 PicoCube®
Amplifier		
Output voltage	-250 to +250 V	-250 to +250 V
Amplifier channels	3	3
Average output power per channel	10 W, limited by temperature sensor	6 W, limited by temperature sensor
Peak output power per channel, <3 ms	100 W	50 W
Average current	30 mA	15 mA
Peak current per channel, <3 ms	200 mA	100 mA
Amplifier bandwidth, small signal	10 kHz	2 kHz
Amplifier bandwidth, large signal, @ 100 nF	0.2 kHz	0.125 kHz
Ripple, noise, 0 to 100 kHz	0.8 mV_{RMS}, <5 mV_{P-P} (100 nF)	0.5 mV_{RMS}, <3 mV_{P-P} (100 nF)
Current limitation	Short-circuit proof	Short-circuit proof
Voltage gain	+50	+50
Input impedance	100 kΩ	100 kΩ
Sensor*		
Servo characteristics	Analog proportional-integral (P-I) algorithm with notch filter	Analog proportional-integral (P-I) algorithm with notch filter
Sensor type	capacitive sensors	capacitive sensors
Sensor channels	3 / -	3 / -
Sensor bandwidth	1.5 kHz	1.5 kHz
Sensor Monitor output	0 to +10 V	0 to +10 V
Interfaces and operation		
PZT output sockets	LEMO EGG.0B.701.CJL.1173	LEMO EGG.0B.701.CJL.1173
Sensor target and probe sockets	LEMO EPL.00.250.NTD	LEMO EPL.00.250.NTD
Control Input sockets	SMB	SMB
Sensor Monitor socket	LEMO FGG.0B.306.CLAD56	LEMO FGG.0B.306.CLAD56
Control Input voltage	Servo off: -5 to +5 V, Servo on: 0 to +10 V	Servo off: -5 to +5 V, Servo on: 0 to +10 V
DC Offset	10-turn pot., adds 0 to +10 V to Control IN	10-turn pot., adds 0 to +10 V to Control IN
Miscellaneous		
Operating voltage	115 VAC / 50-60 Hz or 230 VAC / 50-60 Hz	115 VAC / 50-60 Hz or 230 VAC / 50-60 Hz
Mass	8.1 kg / 7.8 kg (with E-516 module)	8.1 kg / 7.8 kg (with E-516 module)
Dimensions	450 x 132 x 296 mm + handles	450 x 132 x 296 mm + handles

*only E-536.3Cx with capacitive sensors
Interfaces / communication: RS-232, TCP/IP, USB (with optional E-517 computer interface and display module only)
Operating temperature range: +5 °C to +50 °C (over 40 °C, max. av. power derated 10 %), high-voltage output is automatically deactivated if temperature is too high by internal temperature sensor (75 °C max.)