

PicoCube Piezo Controllers

High Dynamics and Resolution in up to Three Axes



E-536

- For P-363 PicoCube systems
- Peak power $3 \times 100 \text{ W}$
- Extremely low noise
- Variants: High dynamics & high resolution
- Output voltage $\pm 250 \text{ V}$

PicoCube controller in two variants

The E-536 PicoCube controller has three extremely low-noise amplifier channels for high-volt shear actuators. The controller was specially designed to meet the requirements of extremely fast and high-resolution PicoCube XY(Z) piezo scanners. The E-536 is offered in two variants for voltage ranges of -250 V to $+250 \text{ V}$ and allows both static and dynamic applications. The performance-optimized E-536.3x for especially dynamic applications is able to output peak currents of 200 mA within a small signal bandwidth of 10 kHz . The E-536.3xH model variants with optimized resolution achieve a position resolution with the PicoCube lower than 0.03 nm at a peak power up to 50 W . Both variants are available for closed-loop and open-loop operation.

Highest resolution with high dynamics

Open-loop operation is ideal for applications where fast response times and very high resolutions are essential. The specification for position feedback in absolute values is either not significant or is done by external sensors, as is the case in atomic force microscopy. The P-363 PicoCube achieves a resolution of 0.05 nm and better.

Higher precision due to capacitive sensors

The E-536.3C versions have an integrated sensor / servo controller for closed-loop operation. The position is controlled, for example by the PicoCube nanopositioning system with capacitive sensors, which then achieve a resolution to 0.1 nm .

Computer Control

The optional E-518 interface module allows control and position control via digital PC interfaces.

Application fields

- Scanning probe microscopy
- Atomic force microscopy
- Scanning and screening

Specifications

	E-536.3C	E-536.3CH / E-536.30H
Function	Power amplifier / servo controller for P-363 PicoCube	High-resolution power amplifier / servo controller for P-363 PicoCube

Sensor	E-536.3C	E-536.3CH
Controller type	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

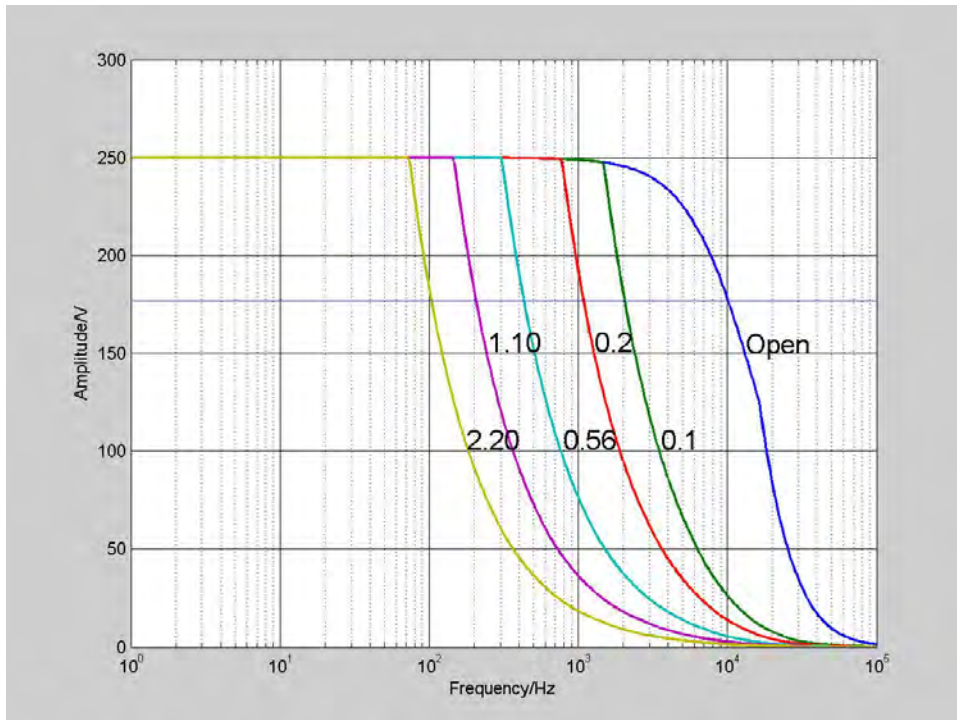
Amplifier	E-536.3C	E-536.3CH / E-536.30H
Output voltage	-250 to +250 V	-250 to +250 V
Amplifier channels	3	3
Average output power per channel	10 W, limited by temperature sensor	6 W, limited by temperature sensor
Peak power per channel, <3ms	100 W	50 W
Average output current	30 mA	15 mA
Peak current per channel, < 3 ms	200 mA	1 / -00 mA
Bandwidth, small signal	10 kHz	2 kHz
Bandwidth, large signal, @ 100 nF	0.2 kHz	0.125 kHz
Ripple, noise 0 to 100 kHz	0.8 mV _{rms} <5 mV _{pp} (100 nF)	0.5 mV _{rms} <3 mV _{pp} (100 nF)
Current limitation	Short-circuit proof	Short-circuit proof
Voltage gain	50	50
Input impedance	100 kΩ	100 kΩ

Interfaces and operation*	E-536.3C	E-536.3CH / E-536.30H
Piezo connection	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 / –
Analog input socket	SMB	SMB
Sensor monitor socket	LEMO FGG.0B.306.CLAD56	LEMO FGG.0B.306.CLAD56 / –
Control input voltage	Without servo: -5 to +5 With servo: 0 to +10 V	Without servo: -5 to +5 With servo: 0 to +10 V
DC offset setting	0 to 100 % with 10-turn potentiometer	0 to 100 % with 10-turn potentiometer

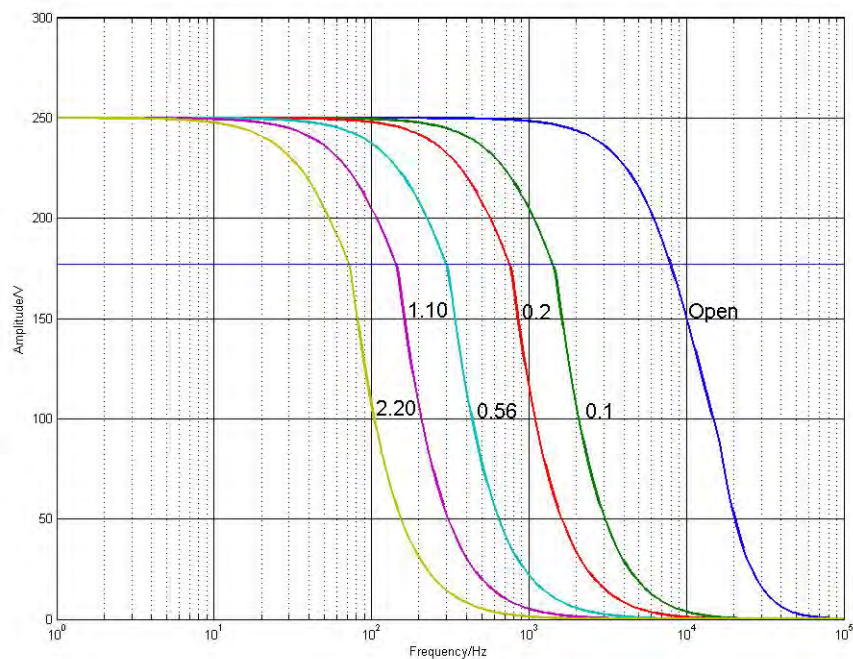
Miscellaneous	E-536.3C	E-536.3CH / E-536.30H
Operating temperature range	5 to 50 °C (above 40 °C, power derated)	5 to 50 °C (above 40 °C, power derated)
Overheat protection	Automatic disconnection of high voltage by temperature sensor (75 °C max.)	Automatic disconnection of high voltage by temperature sensor (75 °C max.)
Mass	8.1 kg / 7.8 kg (with E-518 module)	8.1 kg / 7.8 kg (with E-518 module)
Dimensions	450 mm × 132 mm × 296 mm + handles	450 mm × 132 mm × 296 mm + handles
Operating voltage	115 V AC / 50-60 Hz or 230 V AC / 50-60 Hz	115 V AC / 50-60 Hz or 230 V AC / 50-60 Hz

* Communication interfaces: RS-232, TCP/IP and USB (optional with E-518 computer interface module)
Ask about customized versions.

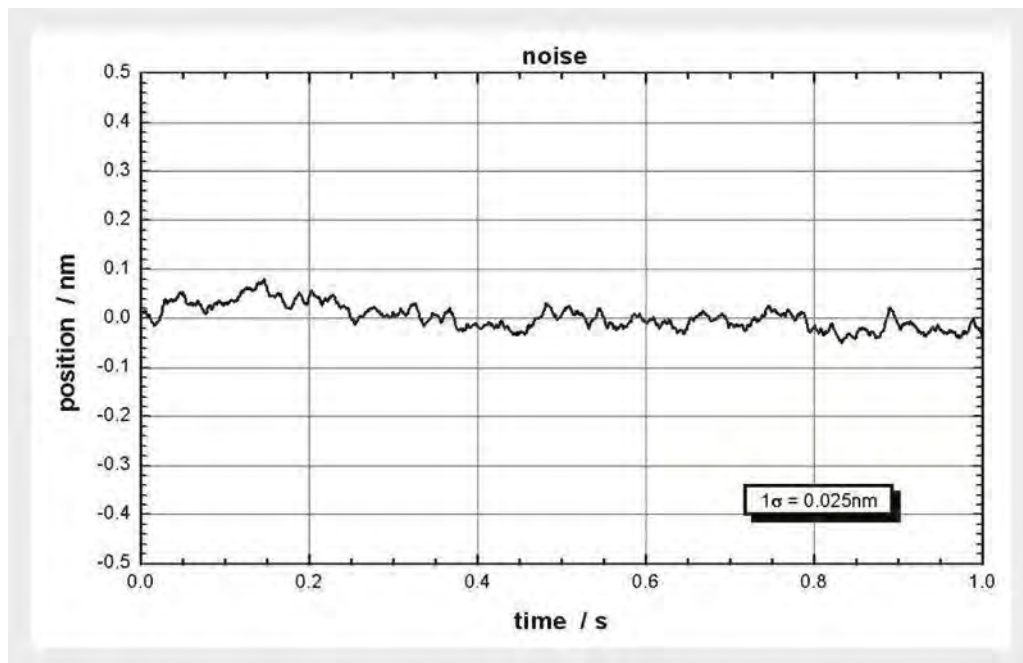
Drawings / Images



E-536.3x: Operating limits with various piezo loads, capacitance values in μ F



E-536.3xH: Operating limits with various piezo loads, capacitance values in μ F



The position measured by an ultrahigh-resolution external capacitive sensor shows that the resolution of the P-363 is under 0.05 nm with an E-536.3x (open loop)

Ordering Information

E-536.3C

PicoCube piezo controller, 3 channels, capacitive sensors

E-536.3CH

PicoCube piezo controller, 3 channels, high resolution, capacitive sensors

E-536.30H

PicoCube piezo controller, 3 channels, high resolution, open loop