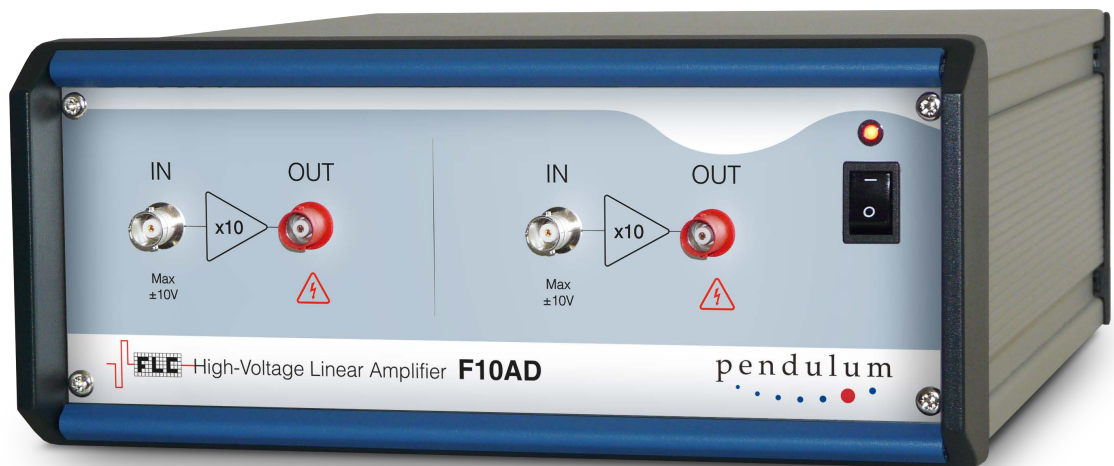


pendulum

BROADBAND LINEAR AMPLIFIER

Model F10AD



DUAL CHANNEL

HIGH VOLTAGE

$\pm 100\text{V}$ 185mA

FIXED GAIN

10x

BROADBAND

DC to ca 1 MHz

HIGH SLEW RATE

400 V/ μs

LOW OUTPUT IMPEDANCE

$< 0.1 \Omega$

GENERAL DESCRIPTION

The **F10AD** is a general purpose linear amplifier designed for laboratory use. It is based on a fast high-voltage operational amplifier with a feedback network chosen to give a voltage amplification of 10 times. Any function or arbitrary waveform generator with output voltage up to ± 10 V can be used as an input device.

This device outputs high voltage signals at high frequency. It is, thus, imperative for the safe operation that the user understands the possibilities and limitations of the instrument. Isolated BNC output connectors are used to comply with safety requirements.

The instrument contains two identical amplifiers sharing a common power supply.

INPUT AMPLITUDE

The amplitude of the input signal should normally be kept within ± 10 V. The input protection network limits the signal amplitude delivered to the power amplifier to a safe value. It also effectively cuts accidental spikes and overshoots. However, large and/or prolonged overvoltage at the input may blow the microfuse in the input protection circuit. (A spare fuse is provided inside the instrument. If possible, contact service@pendulum-instruments.com for advice before opening the instrument case.)

Keep input signals within ± 10 V range. Never connect any high voltage output to any input or output of the instrument!

TROUBLESHOOTING

Problem	Condition	Solution
No output	Power switch does not lit	Check the mains fuse located on the back
No output or very small, distorted signal	Power switch OK	Check the input microfuse located <u>inside</u> the device.
Constant high voltage output	Without any input signal	Amplifier failure. Contact service@pendulum.se

You should suspect a blown input microfuse if the output is about zero or the amplifier is producing a very low voltage, distorted copy of the input signal (due to the capacitive coupling through the blown fuse).

Spare microfuses are provided inside the instrument. They look like small metal cans and are placed in white holders. The resistance of a good fuse is in the order of 46 ohm. It is imperative to disconnect the power cable and wait at least a minute before opening the case. If possible, contact service@pendulum-instruments.com for advice.

LOAD

The amplifier is intended to drive resistive and/or small capacitive loads. The maximum capacitive load depends on the slew rate of the amplifier. This is normally set at the factory to 400 V/ μ s which yields the load limit of 400 pF. This limit includes the capacitance of the connection cable (ca 100 pF/m for a standard coaxial cable). Increasing the capacitive load may cause an overshoot to appear. If this is not acceptable then the slew should be reduced accordingly. Such an adjustment may be performed by qualified personnel and the factory should be contacted for advice. Inside the cabinet exist hazardous voltage levels and the amplifier circuit is extremely sensitive to static discharge.

Pendulum Instruments recommends to monitor the output signal of the amplifier with an oscilloscope. It is then important to use a low capacitive probe with a division factor of at least 1/10.

Overloading the output may cause an overshoot which might be dangerous for connected devices.

The amplifier output is equipped with fast-recovery diodes for protection against high energy flyback and can be used to drive small (mH) inductances in series with resistance.

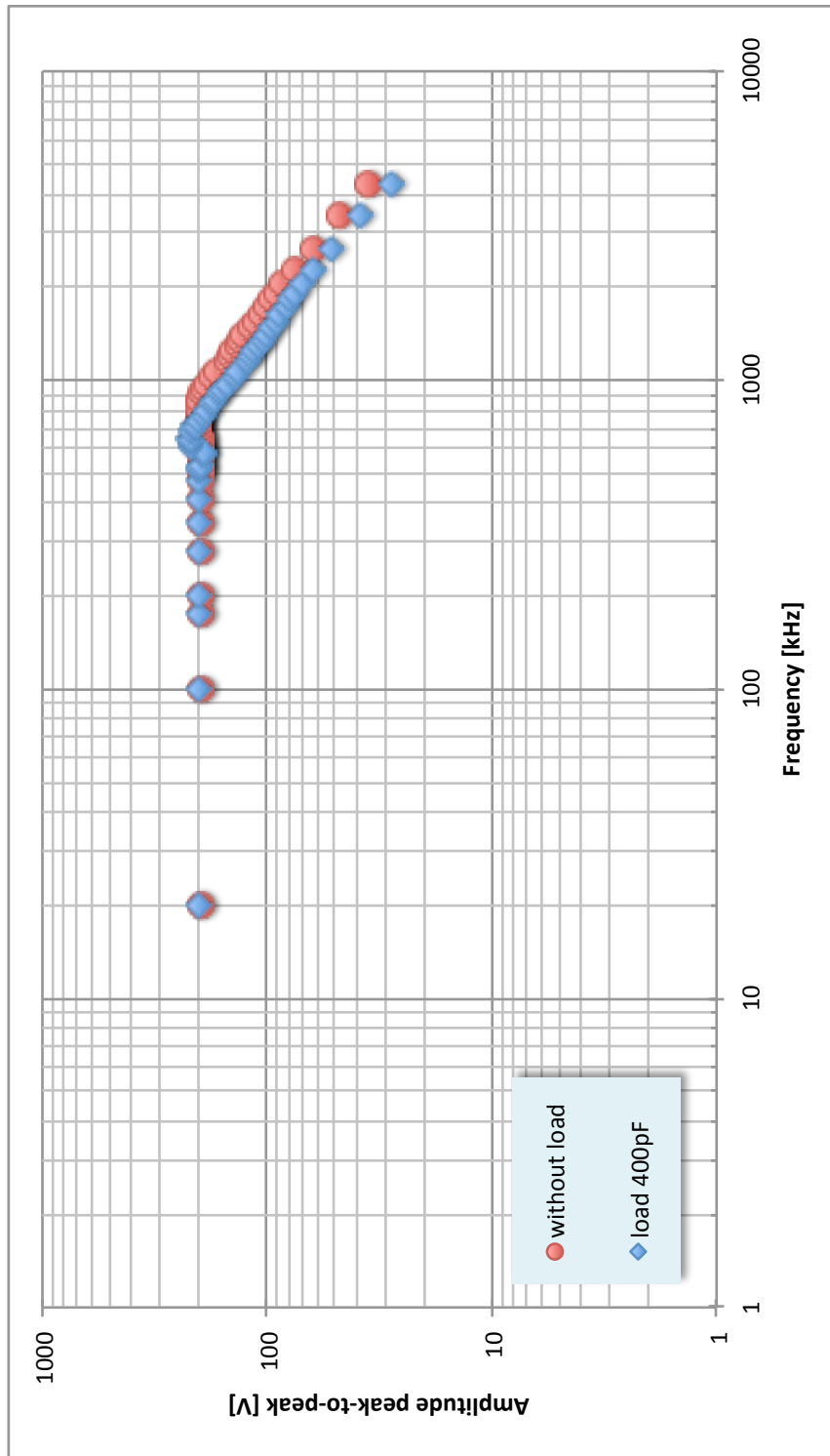
The amplifier cannot be used to drive a purely inductive load.

The continuous output current limit is 185 mA and the output power limit is ca 30 W per channel. The output is equipped with a current limiting circuit that withstands accidental short-circuits. Prolonged short-circuiting may result in overheating the amplifier.

The amplifier may be overheated when the output is short-circuited for a long time.

FREQUENCY RESPONSE

Full scale frequency response without load and with 400 pF load, respectively, is shown in the following diagram:



SUMMARY OF TECHNICAL DATA

Bandwidth:		DC to about 1 MHz
Amplification:		10 times fixed ($10.0066 \pm 0.18\%$ at DC)
Load:	type	resistive capacitive
Impedance:	input	1 M Ω 30 pF, custom values possible
	output	<0.1 Ω in the linear mode
Voltage:	input	nominal ± 10 V
Current:	output	maximum 185 mA, each channel
Slew Rate:	output	ca 400 V/ μ s at up to 400 pF load (different adjustment available on request)
Input protection fuse		15 mA (Littelfuse, part number 272.015) one spare fuse provided inside the instrument, additional fuses available from Littelfuse resellers or from Pendulum Instruments.
Operating Ambient Temperature:		0°C to 30°C
Storage Temperature:		0°C to 60°C
Relative Humidity:		up to 90% (operation) 30% to 50% (storage)
Power Requirements:		100/110 V or 220/230 V, 50/60 Hz
Fuse:		100/110 V: 3.15 A (slow), 220/230 V: 2 A (slow)
Dimensions (H/W/L):		112 x 255 x 316 (mm)
Weight:		4 kg
Country of Origin:		Poland

Note: Specifications apply to instruments operating at $23^\circ\text{C} \pm 5^\circ\text{C}$ ambient temperature after 15 min. warm-up time. Due to ongoing product development, specifications are subject to change without notice.

WARNING It is not allowed to connect the 100...230V AC line power input of the amplifier to DC-AC converters or solid state AC generators with non-sinusoidal output.

Data sheet revision date: 15 February 2019

I M P O R T A N T



Inside the amplifier case exist dangerous voltage levels.



The instrument cannot be powered from a DC-AC converter nor from a solid-state AC generator with non-sinusoidal output.



Loads sensitive to voltage transients should be disconnected from the amplifier during power-up and power-down.



Never connect the output to the input of the amplifier!



The amplifier may be overheated if the output is short-circuited for a long time.



The maximum allowable capacitive load depend on the internal setting of the slew rate. Overloading the output is likely to cause overshoot. Slow down the amplifier to accommodate a larger load.



It is recommended to monitor the output signal of the amplifier on the oscilloscope.

WARRANTY

The Warranty Statement is part of the folder *Important Information* that is included with the shipment.

DECLARATION OF CONFORMITY

The complete text with formal statements concerning product identification, manufacturer and standards used for type testing is available on request.

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