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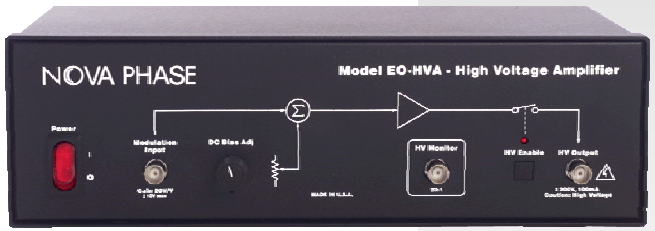
EO-HVA

Electro-Optic Amplifier

Operating Manual



15960-D02 Rev C, 09/08/08

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Part 1. Description

1.1. Important Safety Notice

Danger High Voltage

The EO-HVA can produce hazardous voltages and currents which may be harmful or even lethal. Use caution and exercise preventative safety measures to prevent contact between these high voltages and any personnel.

The EO-HVA has no user-serviceable parts. Service should only be performed by trained service personnel.

The Thorlabs EO-HVA High Voltage Amplifier is designed to directly drive the Thorlabs Electro-Optic modulators. Highlights include a large output span (±200V), 200mA pulsed output current (100mA continuous), wide power bandwidth (1MHz) and low noise. A voltage gain of 20 boosts the input up to the high voltages needed to drive our lithium niobate broadband modulators. A 10-turn adjustable bias allows for precise DC offset control. Other applications include piezo actuators and magnetic deflection coil drive.

The EO-HVA uses a high voltage, wideband, high slew rate output amplifier to achieve an output range of ±200V at a bandwidth up to 1MHz. The input amplifier includes a summing junction which allows an adjustable DC bias to be added to the input modulation. This composite signal is then boosted by a fixed voltage gain of 20 by the output amplifier. For added safety, a front panel HV Enable button must be pressed to connect the HV output to the output BNC. The output is automatically disabled each time the EO-HVA is powered up.

The DC Bias control consists of a 10-turn potentiometer with a digital readout turns counting knob allowing for precise control and repeatability. The bias adjustment is typically used to shift the DC level of the output as needed by the application.

A voltage monitor output is provided to allow real-time monitoring of the high voltage output. The monitor has a scaling of 20:1 so that a 200V out results in a 10V monitor voltage.

Warranty Exclusions

The stated warranty does not apply to Products which are (a) specials, modifications, or customized items (including custom patch cables) meeting the specifications you provide; (b) ESD sensitive items whose static protection packaging has been opened; (c) items repaired, modified or altered by any party other than Thorlabs; (d) items used in conjunction with equipment not provided by, or acknowledged as compatible by, Thorlabs; (e) subjected to unusual physical, thermal, or electrical stress; (f) damaged due to improper installation, misuse, abuse, or storage; (g) damaged due to accident or negligence in use, storage, transportation or handling.

Part 4. Warranty Information

General Product Warranty

Thorlabs warrants that all products sold will be free from defects in material and workmanship, and will conform to the published specifications under normal use and service when correctly installed and maintained.

Opto-Mechanics

Lifetime Warranty: Thorlabs offers a lifetime warranty on all opto-mechanical components. Thorlabs will repair or replace any opto-mechanical product which after evaluation has failed to perform in the above conditions.

Optical Tables and Breadboards

Lifetime Warranty: We provide a lifetime guarantee that all of our passively damped optical tables and breadboards will meet all originally stated performance specifications under normal use and proper handling. We additionally guarantee that all our table tops and breadboards, both active and passive, will be free from defects in workmanship, including de-lamination of the skins under normal use and handling.

Lasers and Imaging Systems

Thorlabs offers a one year warranty on all lasers and imaging systems, with the exceptions of laser diodes. Some products are warranted for the number of hours specified in the operating manual of each laser.

Opto-Electronics, Control Electronics, Optics, and Nano-Positioning Product Lines

Thorlabs offers a two year warranty on the above mentioned product lines, provided normal use and maintenance of the products and when properly handled and correctly installed.

Thorlabs shall repair or replace any defective or nonconforming product as detailed above. We ask that buyer contact Thorlabs for a Return Material Authorization number (RMA #) from our Customer Service/Returns department in order to most efficiently process the return and/or repair.

Products returned for repair that are not covered under warranty, a Thorlabs standard repair charge shall be applicable in addition to all shipping expenses. This repair charge will be quoted to the customer before the work is performed.

1.2. Features

- ±200V Bipolar Output
- 200mA Pulsed Output Current (100 mA continuous)
- 1 MHz Bandwidth
- 400 V/us Slew Rate
- -20 Gain
- 10-Turn Adjustable DC Bias
- Stable with Capacitive Loads
- Scaled Monitor Output
- Output Enable Button
- 115V 50-60Hz

1.3. EO-HVA Specifications

Specification	Description
Physical Features	
Input Connector	BNC
Output Connector	BNC
HV Monitor Connector	BNC
Bias Adjustment	10-Turn Potentiometer with Turns Counting Dial
Output Enable	Front Panel Pushbutton
Output HV Indicator	Bright LED
Power Switch	Illuminated Rocker Switch
Dimensions	12-1/4 inches x 3-3/4 inches x 8 inches
Weight	12.8 lbs.
Other	Tilting Rubber-Padded Feet
Max Ratings:	
Max. Output Current	100mA DC, 200mA pulsed
Max. Input Voltage Range	–10V to +10V
Fuse Rating	500 mA @ 115Vac (5x20mm SLO-BLO)

Part 3. Appendix A — Maintenance

Under normal operating conditions, the EO-HVA amplifier needs very little, if any, maintenance.

3.1. Fuse Replacement

The AC input is protected by a fuse located in a pull out compartment draw on the rear panel AC connector. Refer to Figure 2: (7). If replacement is needed, disconnect the power cord from the back of the amplifier and pull the fuse compartment draw out to expose the fuse. A small screwdriver may be used to pry the drawer open.

Replace the fuse with the correct rating. Do not use a fuse with a current rating higher than the unit is rated for. The fuse ratings are as follows:

- 115V Unit: 500 mA 5x20mm SLO-BLO

3.2. Ventilation

For proper operation and protection for the output amplifier, it is important that the ventilation passages located on the sides and rear of the unit not be obstructed from free air flow.

Specification	Description
Electrical Characteristics	
Max. Input Voltage Range	–10V to +10V
Input Impedance	10kΩ
Output Voltage	–200V to + 200V
Output Impedance	50Ω
Slew Rate	400V/µs (typ.)
Output Noise	30mVRMS
Voltage Gain1*	–20
DC Bias Adjust	–200V to + 200V
HV Monitor to Output Ratio	1:20
HV Monitor Output Impedance	1KΩ
AC Power	110-120V, 50-60Hz, 25W

[1] *NOTE: The voltage gain is inverting to preserve the high slew rate of the output amplifier (i.e., a –1V input results in +20V output).*

1.4. EO-HVA Controls and Features

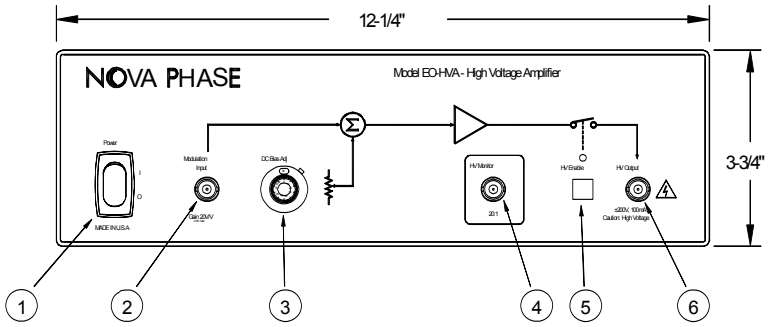

Figure 1: EO-HVA Front Panel Features

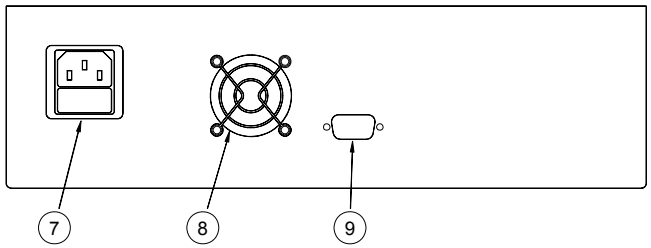

Figure 2: EO-HVA Rear Panel Features

Legend	Description
1	Main Power Switch
2	Modulation Input Signal - BNC
3	DC Bias Adjust Knob & Indicator Dial
4	HV Output Monitor
5	HV Enable Switch and Enable LED
6	HV Output – BNC (Danger, High Voltage)
7	AC Input Connector – IEC
8	Cooling Fan
9	DB9 Connector (reserved)

Part 2. Setup

The EO-HVA amplifier is shipped from the factory ready to be used.

ATTENTION

Before plugging the amplifier into the AC outlet check that the AC voltage rating on the rear panel matches your AC outlet. If the voltage does not match, do not operate the amplifier. Contact Thorlabs to arrange for a replacement unit.

To setup the unit refer to Figure 1:, Figure 2:, and the Legend table on the preceding page and perform the following steps:

- Attach the supplied AC power cord to the AC connector on the rear panel and plug into a suitable AC outlet.
- Connect modulator RF Input modulator to the HV Output (6) connector on the front panel.
- If a modulating signal is to be used, connect it to the Modulation Input (2) on the front panel. This signal will be amplified by a fixed voltage gain of 20.
- Turn the power switch (1) on. At this point the amplifier is powered up but the HV Output is disabled. The power switch should be illuminated. If not, check the AC fuse (see Appendix A). Confirm that the HV Enable LED (5) is off.
- After confirming that all connections are correct, the amplifier output can be enabled by pressing the HV Enable button on the front panel (5).
- Adjust the amplitude of the provided modulation signal as needed.
- The DC level of the output can be shifted by adjusting the DC Bias Adjust control (3).