Oscilloscope Adapter for Ophir Pyroelectric Sensors

Ophir P/N 7Z11012

Introduction

Ophir Pyroelectric Energy Sensors and Photodiode Energy Sensors can measure pulse energy from pico-Joules to 10's of Joules, and up to 25kHz pulse rates. They support pulse widths from nanoseconds or below, up to 20ms. They are compatible with most Ophir Meters and PC Interfaces, including the Nova II, Vega, StarLite, StarBright, Centauri, Juno and EA-1 meters.

Most of the time, measurements in digital format are adequate, either in the form of measurements displayed on a screen, or data logged into a log file using Ophir's StarLab software. But sometimes it is necessary to use an analog voltage output for compatibility with other types of equipment in the customer's setup. Some meters do not offer Analog Output, and some of those that do support Analog Output offer low update rates.

In order to accommodate this need, Ophir offers the "Scope Adapter" for Pyroelectric sensors. The adapter is placed between the D15 plug from the sensor and the D15 socket from the meter. The analog voltage that is passed between the sensor and meter is made available by the adapter on a BNC connector. The voltage is proportional to the pulse energy measurement. For the Pyro-C family, all calculations and compensations are reflected in the analog voltage, including temperature linearity correction. The voltage is approximately 3v at the full scale of the chosen energy scale.

Using the Pyro Scope Adapter

The voltage seen on the scope adapter (i.e. the shape and width of the displayed voltage pulse) does not reflect the timing of the laser pulse on the sensor. Rather it reflects the measurement cycle of the Pyro-C internal circuit. The voltage output is updated after the measurement is available from the sensor, depending on the Pulse Width option selected by the user. The exact time the voltage is updated will normally be longer than the chosen Pulse Width, and depends on inner settings of the sensor's software.

The voltage will be held steady at the same voltage until the next pulse measurement. If the pulses are all of similar energy this may make it difficult to detect when the next measurement is updated. If the pulse energy is varying, there will be more obvious changes in voltage up and down for each pulse measured.

If the user wants to see a voltage that drops to zero after every measurement, the meter's software needs to be set to a special "Scope Mode" which puts the sensor into a special mode where it can set the voltage to zero between pulses. When set into this mode, the host meter may stop displaying measured energy, and the user will have to rely solely on the analog voltage output. Only the Nova-II, Vega and some older models support "Scope Mode"; for newer models the Scope Adapter can be used but the voltage will not drop to zero between each pulse.

Setup and Measurement

For those meters that support it, here are instructions for using the Scope Adapter in “Scope Mode”:

1. Plug the adapter into the Nova, Vega, LaserStar or Nova II meter and then plug the sensor plug into the adapter. Plug the BNC connector into a standard 1MΩ input oscilloscope.

> ***Note:*** *For the Nova meter using the special Pyro-C to Nova adapter, plug in the Scope Adapter closer to the sensor, and the Nova adapter closer to the Nova.*

2a. With a Nova meter, press the menu button twice and then press “more”. Select “scope” and press “go”. The meter will now say “in scope mode”. Select the appropriate measurement range in the usual way, pressing “range”, selecting the range and then pressing “exit” to return to the scope mode screen. You can return to the regular measurement mode by pressing “exit” from the scope mode screen. If you want the instrument to start up in “Scope Mode”, press the menu button twice and press “more”. Select “config” and press “go”. Select “display” and press “value”. It will change to “scope”. Press “exit” and “all” to save the new configuration.

2b. With a LaserStar meter, press “menu” then select “scope” with the arrow keys and press “go”. Select the appropriate measurement range in the usual way, pressing “range”, selecting the range and then pressing “exit” to return to the scope mode screen. You can return to the regular measurement mode by pressing “exit” from the scope mode screen and then pressing “esc”. If you wish for the instrument to start up in the scope mode, press “menu” select “configure”, press “go” and select “mode”. Use the value key to select “SCOPE” and then press “save”.

2c. With a Nova II or Vega meter, press “menu” then select “scope” with the arrow keys and press “enter” (round key). Select the appropriate measurement range in the usual way, entering “range” from the scope mode screen. You can return to the regular measurement mode using the “menu” in the scope mode screen. It is not possible to select “SCOPE” as the startup mode of the Nova II instrument.

3. When in scope mode, you will see the laser pulses on the oscilloscope. The pulse height is proportional to the pulse energy and is approximately 3 volts for full scale. The pulse width is not related to the actual laser pulse width but is determined by the internal electronics of the sensor.

4. The Centauri meter contains an internal mode allowing raw analog signals from the sensor to be output to its “Analog Output” connector. Using this mode is equivalent to using the Scope Adapter and the Scope Adapter is not required.

5. Other meters do not support “Scope Mode” but can still be used with the Scope Adapter as explained above. These include: Juno, StarLite, StarBright, EA-1.