



OP710

Multichannel Optical Power Meter

Instruction Manual

(Also supports the OP710-ANX)

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MnOP710-RevF



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Overview

The **OP710** offers an economical approach for optical power measurement applications where multiple channels are needed. Unlike other systems, this instrument is built up of individual power meters allowing for unparalleled simultaneous data acquisition over all channels with a sampling rate of up to 10 samples per second.

System is available starting at 1 channel up to 24 channels and can be configured for a variety of detector and connector interfaces. With the rack mount option, multiple instruments can be combined and configured for even higher channel count.

Available detector options:

IN1	1mm InGaAs detector with 5/8" Adapter
IN3	3mm InGaAs detector with 5/8" Adapter
IN5	5mm InGaAs detector with 5/8" Adapter
IN10	10mm InGaAs detector with 5/8" Adapter
HP	2mm High Power InGaAs detector with 5/8" Adapter
SI3	3mm Silicon detector with 5/8" Adapter
R	Electrical port for Remote Head Detector
S	Digital port for Integrating Sphere

Initial Preparation

Unpacking and Inspection

The unit was carefully inspected; mechanically, electrically, and optically before shipment. When received, the shipping carton should contain the items listed in Standard Contents; account for and inspect each item. In the event of a damaged instrument, write or call OptoTest Corp, California.

Note: Be aware that accessories such as detector adapters, remote head detectors, and high performance reference cables will be located inside a small box labeled "Accessories Inside". If this box is not included with the original shipment, contact OptoTest or their nearest distributor.

Please retain the shipping container in case re-shipment is required for any reason.

Damaged In Shipment

All instruments are shipped F.O.B. Camarillo when ordered from OptoTest. If you receive a damaged instrument you should:

1. Report the damage to your shipper immediately.
2. Inform OptoTest Corporation.
3. Save all shipping cartons.

Failure to follow this procedure may affect your claim for compensation.

Standard Contents

1. Model OP710 Multichannel Optical Power Meter
2. Power Cord (U.S. Shipments only)
3. USB A-B cable
4. Certificate of Calibration
5. Instruction Manual(s)
6. CD/USB drive with applicable software and documentation (if ordered)
7. Rackmount Kit (optional)

Powering on Instrument

Prior to powering on the unit, verify that the appropriate power cord is connected. The unit has a C14 female receptacle on the AC inlet on the back panel. A power cord with a C13 male connector (see figure 2) is needed to mate to this receptacle. The other end of the power cord should have a grounded 3 prong connector that is appropriate for the outlets used in the region of operation. For more information please contact OptoTest Corporation.

Note: For customers within the United States an appropriate power cord is supplied.



Figure 2

To power the unit on, rotate the keyed switch 90 degrees from the OFF position to the ON position. The OFF position is marked “O” and the ON position is marked “I” in the image below. This positioning is standard across all OptoTest equipment, with exception of the OP940.

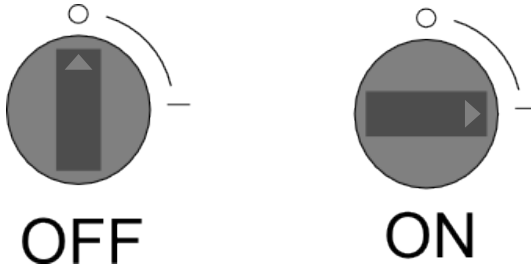


Figure 3

Note that the ON/OFF designators are not present on all OP710 units, but the switch convention is the same: KEY UP – OFF, KEY RIGHT – ON.

Definition of Specifications

Dynamic Range

The dynamic range, or measurement range, of the optical power meter spans from the maximal power level the instrument can measure, without major saturation to the detector, to the minimal power level where the thermal noise of the detector becomes greater than the current produced by the incident light. For accurate power measurements, it is NOT recommended to measure power levels at either end of the dynamic range (see Linearity). The dynamic range is measured by comparing the absolute measured power against a reference power. When the difference between the two exceeds 1dB either end of the dynamic range has been reached.

Linearity

Photodetectors are, by nature, very linear over a wide range of optical input powers, but the power meter electronics can affect the overall system linearity. The power meter linearity is characterized and specified to know the measurement accuracy and linearity over the full dynamic range. For accurate insertion loss measurements only power levels that fall within the range with the best linearity ($\pm 0.05\text{dB}$ or better) should be measured.

Calibration Wavelength

The calibration wavelengths are the nominal wavelengths of the instrument's calibration points. The exact wavelength of each particular calibration is stated in the Certificate of Calibration.

Calibration Traceability

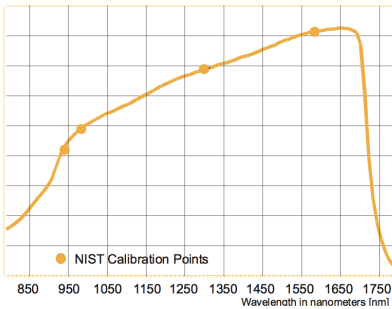
The detector's absolute calibration data is directly traceable to N.I.S.T. at the specified calibration wavelength and the specified power level, typically -10dBm .

Definition of Specifications

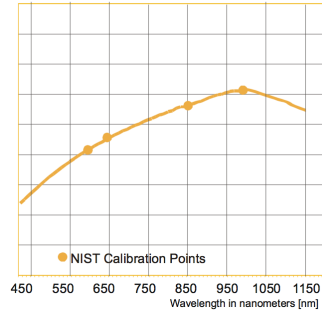
Spectral Responsivity

Depending on the detector type, InGaAs (Indium Gallium Arsenide) or Silicon the spectral responsivity, the efficiency of the detector to convert optical power into electrical current, changes with wavelength.

Responsivity of InGaAs Detectors



Responsivity of Silicon Detectors



Note that other detector types are available such as IN5 (5mm InGaAs) IN10 (10mm InGaAs) as well as WSR (wide spectral range) and might exhibit a different spectral responsivity.

Absolute Accuracy

The absolute accuracy specification includes the total measurement uncertainties involved in the calibration process including the transfer of the absolute power standard from N.I.S.T. (Contact OptoTest for the detailed chain of uncertainties)

Optical Power Meter, Channel Performance

For multichannel instruments, the power meter circuit converts and digitizes the optical power level with the given sampling interval. Changes in light levels such as modulation will be averaged within that sampling interval.

Instrument, Warm-up Time

Optical power meters, in general, do not need any warm-up time unless the instrument has to acclimate to a changing environment. In order to calibrate the instrument or to perform stable measurements, the instrument should be acclimated for 15 minutes for each 5°C of temperature differential. For example, if the instrument was stored at 18°C and brought into an environment of 28°C the instrument should be allowed to warm-up for 30 minutes.

Definition of Specifications

Recommended Recalibration Period

This is the recommended time period for re-calibration in order to maintain accuracy specifications. The recommendation is made based upon statistics on detector aging. However, it is up to the metrology policies and procedures within each company to define the calibration cycles on optical power meters.

Optical Power Meter, Fiber Compatibility

The amount of areal coverage of the detector, or the portion of the light emitted from the fiber being measured, depends on the mechanical features of the optical interface, the active area of the detector and the numerical aperture (NA) of the fiber. A fiber with a large NA, for example 100/140 multimode fiber, may not under fill a small area detector hence the absolute power reading will be less than actual.

Return Loss Range

The lower end of the return loss (low return loss = high reflection) defines the level where the instrument is saturated by large reflections. The higher end of the return loss (high return loss = very weak reflections) is given by capability of the instrument to amplify and resolve reflection out of the noise floor.

Return Loss Accuracy

The Return Loss Accuracy is measured using an optical variable attenuator connected to a >98% reflector. The insertion loss of the attenuator is initially quantified against a reference optical power meter. The actual attenuation is then used to calculate the generated reflection, where the resulting reflection = $2 \times (\text{variable attenuation} + \text{insertion loss of attenuator}) + \text{reflector coefficient}$. Accuracy of return loss measurements can also be affected by the reference cable and any excessive losses at the front panel interface.

Definition of Specifications

Reference Cable

The reference cable is the cable with which the DUTs will be measured against. Typically reference cables are required to be of a defined quality with a specified connector/endface polish.

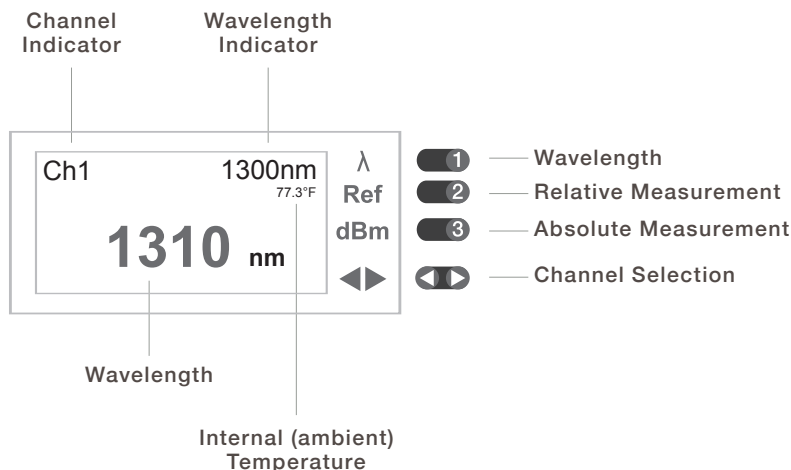
Instrument, Environmental

Operating Temperature: This is the temperature range in which the instrument will conform to the specifications after the specified warm-up time.

Storage Temperature: This is the temperature range at which the instrument can be stored with the power off without any damage or any loss of specification to the instrument. It is required that the instrument be brought back to within the operating temperature range before it is turned on.

Humidity: The relative non-condensing humidity levels allowed in the operating temperature range.

Front Panel Operation



1 Wavelength

The **wavelength** button toggles through the available calibration wavelength. Typically, for power meters with InGaAs this is 850nm, 980nm, 1300nm, 1310nm, 1490nm, 1550nm, and 1625nm; and for Silicon Power Meters the wavelengths are 650nm, 850nm, and 980nm.

2 Relative Measurement

The **Ref** button switches the power meter into relative measurement mode. It also stores the current absolute power reading as the reference, the reference power is displayed above the relative power reading (see illustration of Display on page 10). If the instrument is already in relative measurement mode, pressing the dB button stores the current power level as the new reference.

For each wavelength and for each channel a reference reading can be stored.

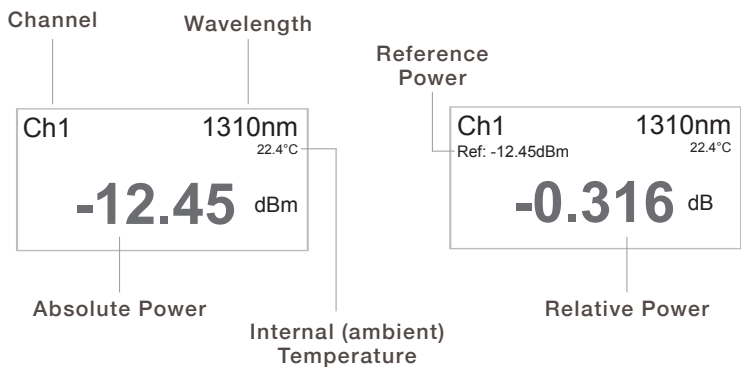
3 Absolute Measurement

The **dBm** button switches the power meter into absolute measurement mode.

Channel Selection

By pressing the right button the instrument display switches to the next channel, it will stop at the last channel. Similarly the left button switches the instrument to the previous channel. Each channel retains the calibration wavelength, absolute or relative measurement mode, and the corresponding reference power levels.

Display Operation



Channel Display

Shows the current selected channel.

Wavelength

Displays the currently selected calibration wavelength.

Absolute Power

The absolute power is displayed in dBm.

Relative Power

The relative power is displayed in dB. It is the difference between the reference power and the measured absolute power.

Internal Temperature

The internal, ambient temperature is displayed in either °F (Fahrenheit) or °C (Celsius), that selection is performed with a USB command.

USB

When communicating with the instrument via software, the unit should be placed into Remote Mode to preserve the integrity of the data being transferred. The screen will look like this:



Warranty Information

See our [Terms and Conditions](http://www.optotest.com/terms-and-conditions) at www.optotest.com for warranty information.

NOTE: Do not send instruments for any reason without contacting OptoTest headquarters first. To request an RMA contact OptoTest at +1.805.987.1700 or customerservice@optotest.com.

For Application Notes, more detailed Testing Instructions, and the most up-to-date OptoTest News go to www.optobuzz.com





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