Solarmeter Model 10.0

Global Solar Power Meter • 0-1999 W/m²

Handheld Digital PV Radiometer with Integral Sensor

Applications

- Monitoring Visible Light Intensity and Aging
- Measuring Solar PV Panel Input
- Measuring Outdoor Solar Irradiance
- Estimating PV Array Power Output

Features and Benefits

- Compact, Handheld, and Durable
- Simple Single-Button Operation
- WRR Traceable Accuracy
- LCD Display
- Made In USA

Sensor

Silicon Photodiode packaged in hermetically sealed glass window cap.

Meter Operation

To operate your Solarmeter, aim the sensor window located on the top panel of the meter directly at a UV source. Press and hold the push-button switch on the face of the meter. For best results take note of the distance the reading was taken from the UV source in order to ensure repeatable results.

Battery operation voltage is viable from 9V down to 6.5V. Below 6.5V, the numbers on the LCD display will begin to dim, indicating the need for battery replacement. Under typical service load, a standard 9V battery will last approximately 2 years.

Proper Usage of Solarmeter® Photovoltaic Radiometer

- Wear tinted eyewear or sunglasses when checking intense sunlight.
- Aim sensor directly at sun to see maximum solar irradiance as a reference.
- Aim sensor in same direction as PV panel to see irradiance striking array.
- Reorient PV panel direction if desired for best average position.
- Maximum solar noon direction will vary throughout the year.
- Do not subject the meter to extremes in temperature, humidity, shock or dust.
- Use a dry, soft cloth to clean the instrument. Keep sensor free of oil, dirt, etc.

SOLAR® LIGHT

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Proper Estimation of PV Panel Power

Before beginning, determine the following information from the manufacturer of the module array:

- Effective active area for the PV cells in square meters _____
- PV cells efficiency as percentage of input to output power_____%
- DC to AC conversion efficiency of the PV cell modules in the array _____ %
- Record the temperature near the back of the array _____°C

It is best to do this when sun is directly shining on module near noon. Angles 35° and greater from the sun will increase the % error the meter experiences for these kinds of readings.

Example calculation with PV Meter reading 1000 W/m² perpendicular to 10 m² array at 10 m² active area, 14% cells efficiency, 95% converter efficiency, 40° C:

- Effective active area for the PV cells in square meters 10 m²
- PV cells efficiency as percentage of input to output power 14 %
- DC to AC conversion efficiency of the PV cell modules in the array 95 %
- Record the temperature near the back of the array 40 °C
- Solarmeter Model 10.0 PV Reading 1000 W/m²

  (1000 W/m²) x (10 m²) = 10000 W incoming sun power

  (10000 W) x (0.14) cell efficiency = 1400 W

  (1400 W) x (0.95) conversion efficiency = 1330 W

Typical temperature coefficient loss for PV cells is -0.5%/°C above 25°C

40°C – 25°C = 15°C; (15°C) x (0.5%/°C) = 7.5% or 92.5% efficiency

(1300W) x (0.925) = 1230.25

A small wiring and component loss of ~1% reduces PV output down to ~1218 W.

Energy Production over Time

The above 1218 Watts value is an "instantaneous" number. Energy is measured in Watt-hours (Wh) or kilowatt hours (kWh) so if the solar irradiance remained constant for an hour near noon, the energy produced would be 1218 Wh.

To estimate power over the entire day take readings every hour and apply the calculations above. Then add up each hour's value x number of hours for daily Watt-hours. Expect the value to increase during the summer and decrease during the winter.

Solarmeter Specifications

Radiometer	
Model	10.0
Irradiation Range	0-1999 W/m² Visible+NIR
Peak Response	940 nm
Response	400-1100 nm Visible+NIR
Resolution	1 W/m²
Conversion Rate	3.0 Readings / Sec
Display	3.5 Digit LCD
Digit Size	0.4" / 10.2 mm
Operational Temperature	+32°-100°F / 0°-37.8°C
Operational Humidity	5% to 80% RH
Accuracy	± 5% Ref. WRR
Dimensions	4.2L x 2.4W x 0.9D in / 106.7L x 61W x 22.9D mm
Weight	4.5 oz / 128 g Including Battery
Power Source	9-Volt DC Battery
Lens	UV Glass
Diffuser	Teflon
Detector	Silicon Photodiode
Agency Approval	CE Mark

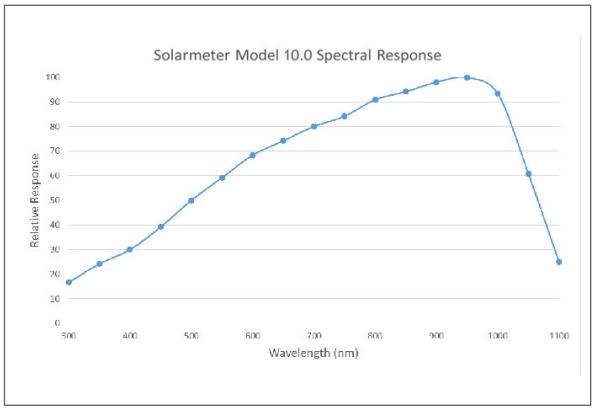

Fig. 1. Model 10.0 Spectral Response

Solar Light Company, Inc. is recognized worldwide for over 50 years as America's premier manufacturer of precision ultraviolet light sources, solar simulators, and radiometers. Our standard line of UV, visible, and IR radiometers and light meters measure laboratory, industrial, environmental, and health related light levels with NIST traceable accuracy. Column ozone, aerosol, and water vapor thickness measurements, in addition to long-term global ultraviolet radiation studies all over the world are performed using our atmospheric line of instrumentation. Solar Light also provides NIST traceable spectroradiometric analyses, calibrations for light meters and light sources, OEM instrumentation and monitors, and accelerated ultraviolet radiation degradation testing of materials.

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