

MODEL 501 UV-Biometer

CERTIFICATION OF CALIBRATION

DATE CALIBRATED: 3/28/08 **CALIBRATION DUE DATE:** 3/28/09
INSTRUMENT: Model 501 Digital Detector **SERIAL NUMBER:** 12011

MEASUREMENT EQUIPMENT:

- Optronics Model 740 A/D, Double Grating Monochromator with 2.5nm slits
- Optronics Model 730A, Radiometer/Silicon Photodetector S/N 690
- Optronics Model OL220M NIST Traceable Standard of Spectral Irradiance, 200 watt quartz-halogen lamp
Serial number M1187b
- Ushio Model UXL-S150MO, 150W Super-Quiet Short Arc Xenon lamp S/N IL1380
- WG305 1mm Thick Filter Melt: 838918

This detector was calibrated spectroradiometrically in accordance with the calibration procedure "Calibration of the UV Radiometer- Procedure and Error Analysis".

The calibrating xenon light source was measured spectroradiometrically from 290 to 400nm in 2nm steps. The detector is calibrated to show the biological effectiveness of the solar radiation, according to the McKinlay-Diffey Erythema Action Spectrum and 21 mJ/cm² to induce minimal skin redness. The measured xenon source is corrected so the detector is calibrated for a clear sky, 30° solar zenith angle, 2.7mm ozone column thickness, zero albedo, sea level.

SCALE FACTOR: 1.000

TEMPERATURE: 25.5 °C

HUMIDITY: 22%

DATE: March 28, 2008

CALIBRATION CERTIFIED BY:

Wayne Eckman

Wayne Eckman

Project No. 9249

**Model PMA2101 Erythema Weighted Detector
Calibration Certificate**

DATE CALIBRATED: 3/23/08 **CALIBRATION DUE DATE:** 3/23/09

INSTRUMENT: Model PMA2101 SUV Detector **SERIAL NUMBER:** 12241

MEASUREMENT EQUIPMENT:

- Optronics Model 740 A/D, Double Grating Monochromator with 2.5nm slits
- Optronics Model 730A, Radiometer/Silicon Photodetector S/N 690
- Optronics Model OL220M NIST Traceable Standard of Spectral Irradiance, 200 watt quartz-halogen lamp
Serial number M1222a
- Ushio Model UXL-S150MO Super-Quiet Short Arc Xenon lamp S/N IL1380
- WG305 1mm Thick Filter Melt: 838918

CALIBRATION METHOD:

The Xenon light source was measured spectroradiometrically from 290 to 400nm in 2nm steps. The detector is calibrated to show the biological effectiveness of the solar radiation, according to the McKinlay-Diffey Erythema Action Spectrum and 21 mJ/cm² to induce minimal skin redness.

The measured xenon source is corrected so the detector is calibrated for a clear sky, 30⁰ solar zenith angle, 2.7mm ozone column thickness, zero albedo, sea level.

Temperature: 24.8 °C

Humidity: 14%

CALIBRATION UNCERTAINTY: ±5%

DATE: March 23, 2008

CALIBRATION CERTIFIED BY:



Bekim Abazoski

Project No. 9249

CERTIFICATE OF CALIBRATION

DATE CALIBRATED: 3/24/08 **CALIBRATION DUE DATE:** 3/24/09

MODEL: PMA2100 **SERIAL NUMBER:** 12794

CALIBRATION EQUIPMENT: FLUKE model 189 Multimeter
Serial number 85500008
Certification number 35046
Precision 5.0000-Volt Reference Model MAX677

CALIBRATION METHOD:

The above instrument was calibrated by transfer from the Fluke 189 Multimeter measuring the precision voltage source. Calibration is traceable to N.I.S.T., through certified standards.

The precision voltage source is applied to the left and right detector connector of the PMA2100 for calibration. The calibration factor of each connector is stored in the PMA2100. Any PMA series detector can be plugged into either connector for proper readings.

Temperature: 25.2° C

Humidity: 14%

CALIBRATION UNCERTAINTY: ±0.5%

Certified By



Date: March 24, 2008

Project No: 9249

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Regards,

Solar Light Team

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Glenside, PA 19038
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Fax: (215) 517-8747

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**Model PMA2110 UVA Detector
Calibration Certificate**

DATE CALIBRATED: 3/24/08 **CALIBRATION DUE DATE:** 3/24/09

INSTRUMENT: Model PMA2110 Detector **SERIAL NUMBER:** 12894

MEASUREMENT EQUIPMENT:

- Optronics Model 740 A/D, Double Grating Monochromator with 2.5nm slits
- Optronics Model 730A, Radiometer/Silicon Photodetector S/N 690
- Optronics Model OL220M NIST Traceable Standard of Spectral Irradiance, 200 watt quartz-halogen lamp
Serial number M1222a
- Ushio Model UXL-S150MO Super-Quiet Short Arc Xenon lamp S/N IL1380
- WG305 1mm Thick Filter Melt: 838918

CALIBRATION METHOD:

The spectral irradiance of the Xenon light source with WG305 filter was measured with an Optronics Model 740 A/D double grating monochromator with 2.5nm slits. The source is operated at 8.0 amperes and positioned 8.0 inches to the entrance slit of the monochromator. The PMA2110 detector is calibrated to the integrated spectral irradiance [$W/(cm^2 \text{ nm})$] of the source from 320 to 400nm at a distance of 8.0 inches.

Temperature: 25.5 °C

Humidity: 22%

CALIBRATION UNCERTAINTY: ±5%

DATE: March 24, 2008

CALIBRATION CERTIFIED BY:



Bekim Abazoski

Project No. 9249