



721 West 1800 North  
Logan, UT 84321

## Certificate of Calibration Apogee Instruments Pyranometer Model SP-500 Series

Serial Number :  
Calibration Date : Jul-2017  
Recommended Recalibration Date : Jul-2019  
Calibration Factor : **W m<sup>-2</sup> per mV**  
Calibration Uncertainty :  $\pm 5 \%$   
Measurement Repeatability :  $< 1 \%$   
Non-stability (Long-term Drift) :  **$< 2 \%$  per year**

### Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) Apogee transfer standard pyranometers. Apogee transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

### Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
EKO Instruments MS80 (S16088044)*	Secondary Standard	5-Jun-2017	6-Jun-2019
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	14-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	14-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	18-Jun-2017	19-Jun-2019
Apogee SP-510 (1032)	Thermopile Transfer Standard	9-Sep-2016	9-Sep-2017
Apogee SP-510 (1033)	Thermopile Transfer Standard	9-Sep-2016	9-Sep-2017
Apogee SP-510 (1034)	Thermopile Transfer Standard	9-Sep-2016	9-Sep-2017
Apogee SP-510 (1035)	Thermopile Transfer Standard	9-Sep-2016	9-Sep-2017

\*MS80 purchased new in 2017. Initial calibration conducted by EKO Instruments with traceability to the outdoor World Radiometric Reference.

Technical Manager :

Date : 26-Jul-2017

**Please keep this document for your records**