



SP-100 & SP-200 Series

DESCRIPTION

The SP-110 is a self-powered, analog sensor with a 0 to 400 mV output. The sensor incorporates a silicon-cell photodiode with a rugged, self-cleaning sensor housing design. Typical applications include shortwave radiation measurement in agricultural, ecological, and hydrological weather networks. Sensors are also used to optimize photovoltaic systems. Sensor includes IP68 marine-grade stainless-steel cable connector 30 cm from head to simplify sensor removal and replacement for maintenance and recalibration.



Features:

Output Options

- 0 to 350 mV
- 0 to 2.5 V
- 0 to 5 V
- 4 to 20 mA

Stable Measurements

Long-term non-stability determined from multiple replicate pyranometers in accelerated aging tests and field conditions is less than 2 % per year.

Unique Design

An accurate, cosine-corrected patented design sheds water and dirt for a self-cleaning performance. A heated option is available with a 0.2 W heater to minimize errors caused by dew, frost, or snow.

Typical Measurement Applications

- Solar panel arrays

- Agricultural, ecological, and hydrological weather networks

Calibration Traceability

Apogee SP sensors are calibrated through side-by-side comparison to the mean of four Apogee SP-110 transfer standard sensors under high intensity discharge metal halide lamps. The transfer standard sensors are calibrated through side-by-side comparison to the mean of at least two ISO-classified reference pyranometers under sunlight in Logan, UT. Each of four ISO-classified reference sensors is recalibrated on an alternating year schedule at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

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Cosine Response

Mean cosine response of eleven Apogee silicon-cell pyranometers (error bars represent two standard deviations above and below mean). Cosine response measurements were made during broadband outdoor radiometer calibration (BORCAL) performed during two different years at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. Cosine response was calculated as the relative difference of pyranometer sensitivity at each solar zenith angle to sensitivity at 45° solar zenith angle. The blue symbols are AM measurements; the red symbols are PM measurements

Spectral Response

estimate of Apogee silicon-cell pyranometers. Spectral response was estimated by multiplying the spectral response of the photodiode, diffuser, and adhesive. Spectral response measurements of diffuser and adhesive were made with a spectrometer, and spectral response data for the photodiode were obtained from the manufacturer.

Temperature Response

Mean temperature response of ten Apogee silicon-cell pyranometers (error bars represent two standard deviations above and below mean). Temperature response measurements were made at 10 C intervals across a temperature range of approximately -10 to 40 C in a temperature controlled chamber under a fixed, broad spectrum, electric lamp. At each temperature set point, a spectroradiometer was used to measure light intensity from the lamp and all pyranometers

	SP-110-SS	SP-212-SS	SP-214-SS	SP-215-SS	SP-230-SS
Power Supply	Self-powered	3.3 to 24 V DC; nominal current draw 300 μ A	7 to 24 V DC, maximum current draw of 22 mA (2 mA quiescent current draw)	5.5 to 24 V DC; nominal current draw 300 μ A	12 V DC for heater with a current draw of 15.4 mA
Output (sensitivity)	0.2 mV per $W m^{-2}$	1.25 mV per $W m^{-2}$	0.008 mA per $W m^{-2}$	2.5 mV per $W m^{-2}$	0.2 mV per $W m^{-2}$
Calibration Factor (reciprocal of output)	5 $W m^{-2}$ per mV	0.8 $W m^{-2}$ per mV	125 $W m^{-2}$ per mA, 4 mA offset	0.4 $W m^{-2}$ per mV	5 $W m^{-2}$ per mV
Calibration Uncertainty	$\pm 5 \%$				
Measurement Range	Less than 1 %				
Measurement Repeatability	Less than 2 % per year				
Long-term Drift	Less than 2 % per year				
Non-linearity	Less than 1 % up to 2000 $W m^{-2}$				
Response Time Less than 1 ms	Response Time Less than 1 ms				
Field of View	180°				
Spectral Range	360 to 1120 nm				
Directional (Cosine) Response	$\pm 5 \%$ at 75° zenith angle				
Temperature Response	0.04 \pm 0.04 % per C				
Operating Environment	-40 to 70 C; 0 to 100 % relative humidity; can be submerged in water up to depths of 30 m				
Dimensions	24 mm diameter, 33 mm height				
Mass (with 5 m of cable)	90 g				
Cable	5 m of shielded, twisted-pair wire; additional cable available in multiples of 5 m; TPR jacket (high water resistance, high UV stability, flexibility in cold conditions); pigtail lead wires				
Warranty	4 years against defects in materials and workmanship				

Contact info



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This Instrument is manufactured by our principle company

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