

# AMPLIFIED PYRANOMETER

Models JSP-212 & 215



## Amplified Pyranometer Sensor

This sensor is calibrated to measure total shortwave radiation. The evaporation of water from soil and the transpiration of water from plant leaves are partly determined by the intensity of shortwave radiation, which is measured in Joules per meter squared per second or Watts per meter squared.

### Labels

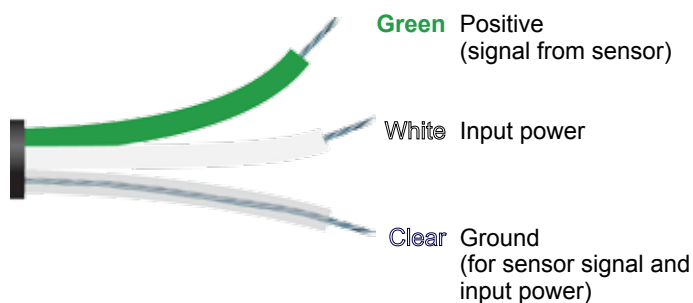
The model, serial number, production date, and calibration factor are located on the sensor cable.



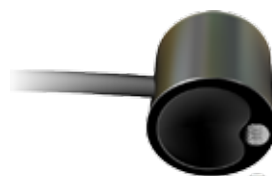
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### Connection Instructions

**Do not exceed 5.5 Volts in power supply.  
Do not connect green wire to power supply.**



### Mounting the Sensor



**Bolt: 10-32x5/8**



Mount the sensor to a solid surface with the stainless steel mounting bolt.



**Model AL-100**

The sensor should be mounted level for the most accurate measurements. We recommend using our leveling plate (AL-100). The sensor should be mounted with the cable pointing toward the nearest magnetic pole to minimize azimuth error.



**Orientation**

	<b>2.5 Option</b>	<b>5.0 Option</b>
Power Supply	2.5 to 5.5 V	5.0 to 5.5 V
Conversion Factor	0.5 W m <sup>-2</sup> per mV	0.25 W m <sup>-2</sup> per mV
Output (Volts)	0.0 to 2.5 V	0.0 to 5.0 V
Full Sunlight	2.2 V (1100 W m <sup>-2</sup> )	4.4 V (1100 W m <sup>-2</sup> )

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## Cleaning

Debris on the sensor head is a common cause of low readings. The sensor has a domed head for improved self-cleaning from rainfall, but salt deposits can accumulate from evaporation of sprinkler irrigation water and dust can accumulate during periods of low rainfall. Salt deposits should be dissolved and removed with vinegar and a soft cloth or q-tip. Dust and other organic deposits are best removed with water, rubbing alcohol or window cleaner. *Never use an abrasive cleaner on the lens.*

## Application

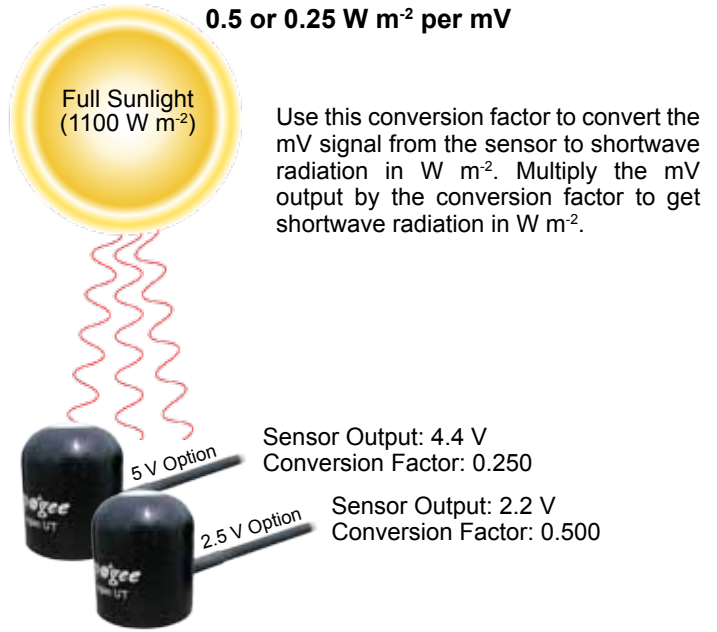
Pyranometer sensors are available with 2.5 or 5.0 V output. They are designed for use with lower resolution dataloggers. They are potted solid for use in humid environments.



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## Calibration

All Apogee quantum sensor models have a standard calibration of exactly:



$$\begin{aligned} \text{Solar radiation} &= \text{sensor output} \times \text{conversion factor} \\ &= 4.4 \text{ V} \times 0.250 \text{ W m}^{-2} \text{ per mV} = 1100 \text{ W m}^{-2} \\ &= 2.2 \text{ V} \times 0.500 \text{ W m}^{-2} \text{ per mV} = 1100 \text{ W m}^{-2} \end{aligned}$$

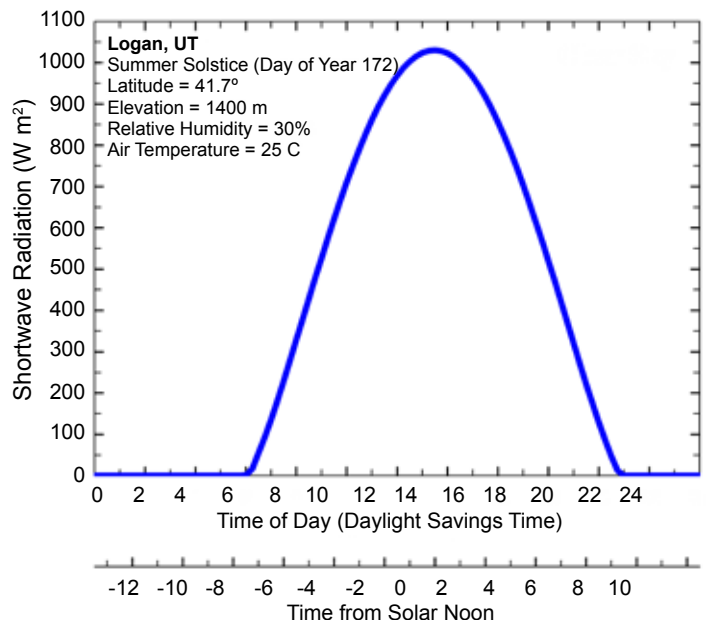
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The Clear Sky Calculator is designed to determine the need for radiation sensor recalibration. It determines the intensity of radiation falling on a horizontal surface at any time of the day in any location in the world. It is most accurate when used near solar noon in the summer months.

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## Example of Model Output

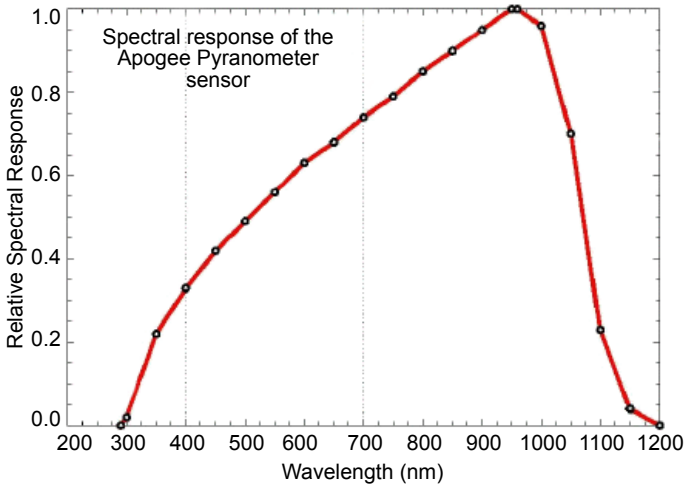


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# Spectral Response and Calibration

An ideal pyranometer measures the entire solar spectrum, 280 to 2800 nm. However, about 90% of sunlight energy is between 300 to 1100 nm.

Models SP-212 and SP-215 are calibrated to estimate the shortwave energy from sunlight. Apogee pyranometers are calibrated under sunlight over a multiple day period to a heated and ventilated Kipp & Zonen model CM21 precision reference radiometer.



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# Specifications

## Cosine Response

- 45° zenith angle: ± 1%
- 75° zenith angle: ± 5%

## Absolute Accuracy

- ± 5%

## Repeatability

- ± 1%

## 2.5 V Option

- Output: 0 to 2.5 V (2.2 V = full sunlight 1100 W m<sup>2</sup>)
- Input Power: 2.5 to 5.5 VDC
- Sensitivity: Custom calibrated to exactly 0.5 W m<sup>2</sup> per mV

## 5.0 V Option

- Output: 0 to 5 V (4.4 V = full sunlight 1100 W m<sup>2</sup>)
- Input Power: 5 to 5.5 VDC
- Sensitivity: Custom calibrated to exactly 0.25 W m<sup>2</sup> per mV

## Materials

- Anodized aluminum with cast acrylic lens

## Long-Term Drift

- Less than 3% per year

## Operating Environment

- -40 to 55° C
- 0 to 100% relative humidity
- Designed for continuous outdoor use
- Can be submerged in water

## Current Draw

- 285 µA

## Cable

- 5 meters of twisted-pair wire
- Shielded with Santoprene casing
- Ending in pigtail leads
- Additional cable is available in multiples of 5 meters

## Dimensions

- 2.4 cm diameter by 2.75 cm height

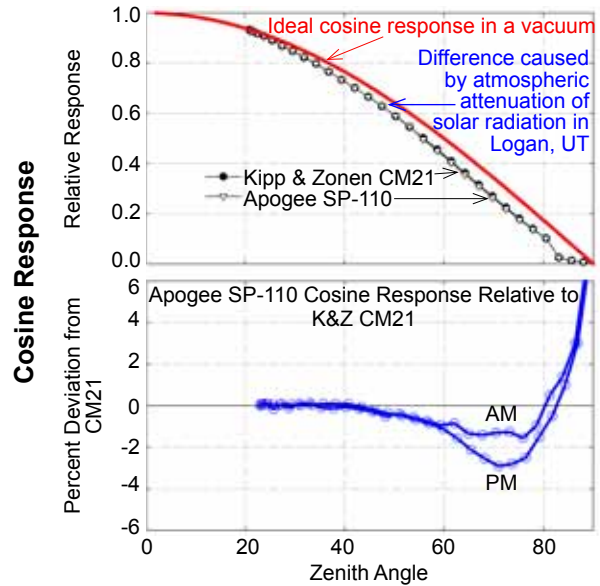
## Mass

- 70 g (with 2 meter lead wire)

## Warranty

- 1 year against defects in materials and workmanship

# Characteristics



## Temperature Response

The temperature response is less than 0.1% per degree Celsius. This temperature error is not significant in most applications.

## Long-Term Stability

Our research indicates that the output increases about 1% per year because of changes in the optical transparency of the diffusion disk. We recommend returning the sensor for recalibration every 2 years.

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