

All season pyranometer

Heater prevents snow, frost,
and dew accumulation

Overview

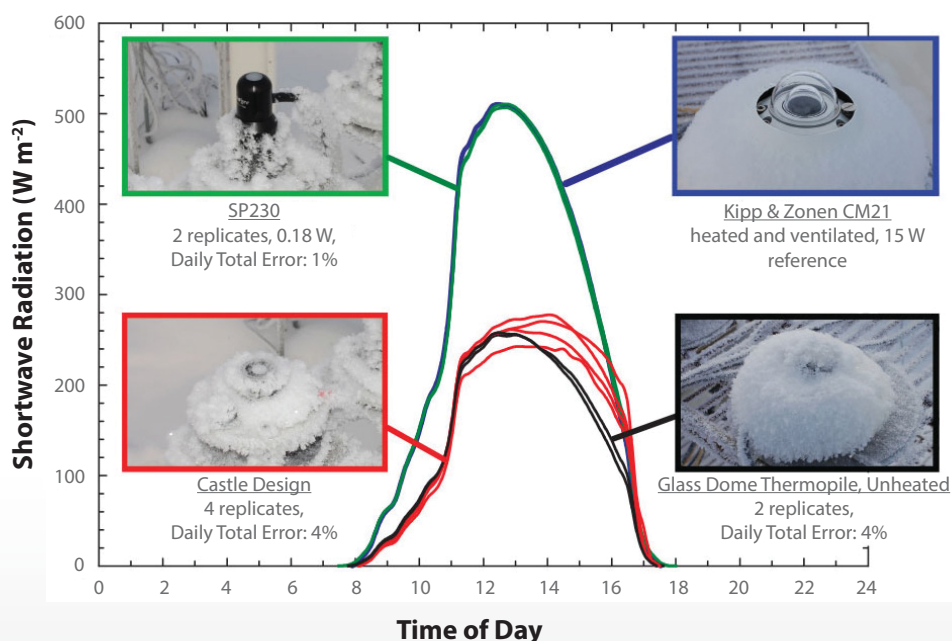
The SP230 pyranometer includes a 0.18 W internal heater and an elevated base that allow it to provide solar radiation measurements during the most severe weather. Its tiny heater draws just

15 mA of current allowing it to be powered by a small solar panel and battery, even on short days at high latitudes.

Benefits and Features

- Designed to prevent snow, frost, and dew accumulation
- Heater uses 1/80th of the power that other heated pyranometers use, making it ideal for remote battery-powered applications
- Measurement waveband: 360 to 1120 nm*
- Compatible with all Campbell Scientific dataloggers (including the CR200(X) series)
- Dome-shaped head prevents water from accumulating on the sensor head

Figure 1: Solar radiation after a January frost in Logan, Utah with overcast conditions until 11 a.m. The two replicate Apogee SP230 pyranometers were nearly identical to a heated and ventilated reference pyranometer. In spite of the bright sunlight after 11 a.m., the frost on two unheated glass dome thermopile and four replicate unheated castle design pyranometers did not melt until after 4 p.m. (1600 hours).



*Sensors calibrated to the 360 to 1120 nm spectral range should not be used under vegetation or artificial lights.



Technical Description

The SP230 uses a silicon photovoltaic detector mounted in a cosine-corrected head to provide solar radiation measurements. It is calibrated against a Kipp & Zonen CM21 thermopile py-

ranometer to accurately measure sun plus sky radiation for the spectral range of 360 to 1120 nm. The SP230 outputs a millivolt signal that all of our dataloggers can measure.

Mounting

Accurate measurements require the sensor to be leveled using a 18356 leveling fixture. This leveling fixture incorporates a bubble level and three adjusting screws. The 18356 mounts to a crossarm

using the CM225 mounting stand. The SP230 should be mounted away from all obstructions and reflective surfaces that might adversely effect the measurement.

Ordering Information

Silicon Pyranometer

SP230-L Heated silicon pyranometer with user-specified cable length; enter the cable length after the L. An 11 ft length (SP230-L11) is recommended for a 3 m mounting height. Must choose a cable termination option (see below).

Cable Termination Options (choose one)

- PT** Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.
- PW** Cable terminates in connector for attachment to a prewired enclosure.

Accessories

- 18356** Base and leveling fixture required to level the sensor.
- CM225** Mount for attaching the 18356 and sensor to a crossarm.

Specifications

- Light Spectrum Waveband: 360 to 1120 nm (wavelengths where response is 10 % of maximum)
- Measurement Range: 0 to 1750 W m⁻² (full sunlight ≈1000 W m⁻²)
- Heater: 780 Ω, 15.4 mA current drain, 185 mW power at 12 Vdc
- Absolute Accuracy: ±5% for daily total radiation
- Sensitivity: 5 W m⁻² mV⁻¹ (0.2 mV W⁻¹ m⁻²)
- Cosine Response: ±5% at 75° zenith angle; ±1% at 45° zenith angle
- Temperature Response: -0.04 ±0.04 % per °C
- Long-term Stability: < 2% per year
- Operating Temperature Range: -40° to +70°C
- Relative Humidity Range: 0 to 100%
- Diameter: 3.15 cm (1.24 in)
- Height: 12.75 cm (5.02 in)
- Weight with 2 m cable: 142.0 g (5.01 oz)

January 2013 Error

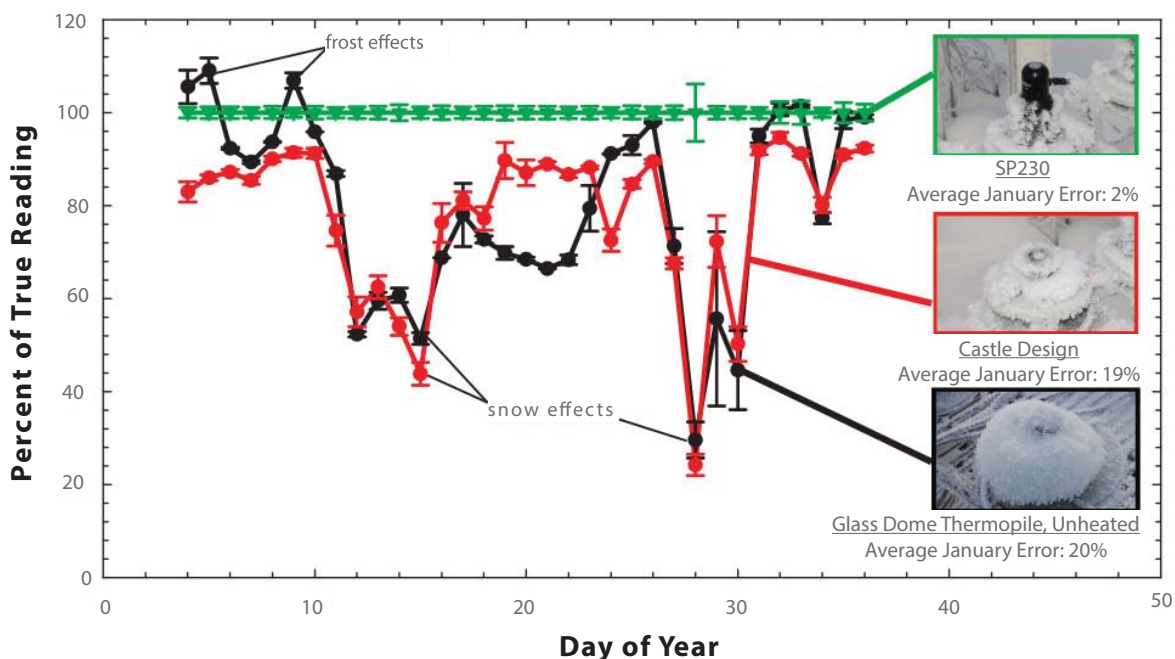


Figure 2. The effect of frost and snow accumulation for three groups of pyranometers in Logan UT, expressed as a percentage of true reading. Castle design and unheated thermopile sensors averaged a 20% error for the month with a maximum error of 80%. Data for Figure 1 is from day 12.

