

# Black & White Pyranometer

MODEL

**8-48**

"The Diffuse Pyranometer"

A pyranometer is used to measure the total energy from the sun. When leveled in the horizontal plane, this is called the Global Shortwave Irradiance (GLOBAL) and when positioned in a plane of a PV Array, it is called the Total Irradiance in the Plane of Array (TPA). Inverted, a pyranometer is used to measure the Reflected or Albedo Irradiance (ALBEDO). A pyranometer can also be shaded from the direct beam of the sun to measure the Diffuse Shortwave Irradiance (DIFFUSE).

The Black & White Pyranometer, Model 8-48 is most often used in the highest quality networks as a Diffuse (shaded) instrument. "All-black" pyranometers such as the SPP, GPP and PSP are preferred for Global, Reflected and TPA measurements due to their superior cosine and time responses but these factors are not significant for a shaded pyranometer. Additionally, the Black & White Pyranometer has no offset that naturally occurs in all-black pyranometers, making it more suitable for Diffuse measurements.

\* Recently, there has been much discussion on "uncertainty" and how it pertains to solar measurements. The RSS of the 9060 Secondary Standard specifications results in an uncertainty of approximately 3.5%. The typical uncertainty of Eppley's factory calibrations are less than 2%. The stated uncertainty of the WRR is 0.4%.

Evidence from comparisons of SPP measurements to component sum derived values (using an AHF and 8-48) show the 8-48 is capable of hourly averages better than 5% and daily averages better than 3%. In terms of typical diffuse value, this would equate to less than 5  $\text{Wm}^{-2}$ .



## SPECIFICATIONS

Application	Network Measurements (Global)
Traceability	World Radiation Reference (WRR)
Spectral Range	295-2800 nm
Output	0-10 mV analog
Sensitivity	approx. 8 $\mu\text{V} / \text{Wm}^{-2}$
Impedance	approx. 350 $\Omega$
95% Response Time	30 seconds
Zero Offset a)	1 $\text{Wm}^{-2}$
Zero Offset b)	2 $\text{Wm}^{-2}$
Non-Stability	1%
Non-Linearity	1%
Directional Response	30 $\text{Wm}^{-2}$
Spectral Selectivity	2%
Operating Temperature	-50°C to +80°C
Temperature Response	1.5% (-30°C to +50°C)
Tilt Response	3%
Calibration Uncertainty*	< 2%
Measurement Uncertainty*	
Single Point	< 10 $\text{Wm}^{-2}$
Hourly Average	approx. 2%
Daily Average	approx. 1%