



# THE EPPLEY LABORATORY, INC.

12 Sheffield Avenue, PO Box 419, Newport, Rhode Island USA 02840  
Phone: 401.847.1020 Fax: 401.847.1031 Email: info@eppleylab.com

## GLOBAL PRECISION PYRANOMETER MODEL GPP



### MODEL GPP SPECIFICATIONS

**Application** PV/CSP Performance Testing  
**Classification** Secondary Standard / High Quality  
**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. 700  $\Omega$

**95% Response Time** 5 seconds  
**Zero Offset a)** 5  $\text{Wm}^{-2}$   
**Zero Offset b)** 2  $\text{Wm}^{-2}$   
**Non-Stability** 0.5%  
**Non-Linearity** 0.5%  
**Directional Response** 10  $\text{Wm}^{-2}$   
**Spectral Selectivity** 2%  
**Operating Temperature** -50°C to +80°C  
**Temperature Response** 0.5% (-30°C to +50°C)  
**Tilt Response** 0.5%

**Calibration Uncertainty\*** < 1%  
**Measurement Uncertainty\***  
**Single Point** < 10  $\text{Wm}^{-2}$   
**Hourly Average** approx. 2%  
**Daily Average** approx. 1%

\* 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 1%. The stated uncertainty of the WRR is 0.4%. Evidence from comparisons of GPP measurements to component sum derived values (using an AHF and 8-48) show the GPP is capable of hourly averages better than 2% and daily averages better than 1%.

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).

In 2013, Eppley introduced the ISO 9060 Secondary Standard SPP Pyranometer to replace the venerable PSP. For 2014, the design team was tasked with making a pyranometer targeted for the PV/CSP Industry that was “as good or better at a lower cost” and the GPP was introduced in 2015.

Since the dawn of time, man has studied the sun...

...and Eppley has been providing the best instruments since 1917!