

Pyranometer with silicon photodiode



The LPY-SIL pyranometer measures the global solar irradiance (W/m^2) by using a silicon photodiode (400nm-1100nm).

The special geometry and the diffuser allow to have a pyranometer field of view of 180 degrees according to cosine law.

The pyranometer is suitable for the measurement of natural sunlight. Under conditions of overcast sky or measures of reflected light is recommended to use a thermopile pyranometer.

The LPY-SIL pyranometer can be used in measurements of GLOBAL SOLAR IRRADIANCE in the field of renewable energies such as solar thermal and solar photovoltaic.

The base with level can be used to facilitate the assembly and placement in plan level.

The photocurrent generated by photodiode is converted into a voltage by the shunt resistance. The wiring diagram is reported in Fig. 2 and Fig. 5.

Features

LPY-SIL with 5m fixed cable and open wires on the cable end, typical output 20 $\mu\text{V}/(\text{W/m}^2)$. Different cable lengths available upon request.

Electrical properties

The photodiode current signal is converted into voltage through the shunt resistance. According to the Fig. 2.

Directional sensor properties

The measurement of radiation across a surface is possible if the probe surface is a Lambert receiver.

The difference between theoretical and measured response is shown in Fig. 3.

The excellent concordance between the measured response and cosine law allows to use the equipment even when the sun has a very low elevation and then perform corrective actions throughout the year.

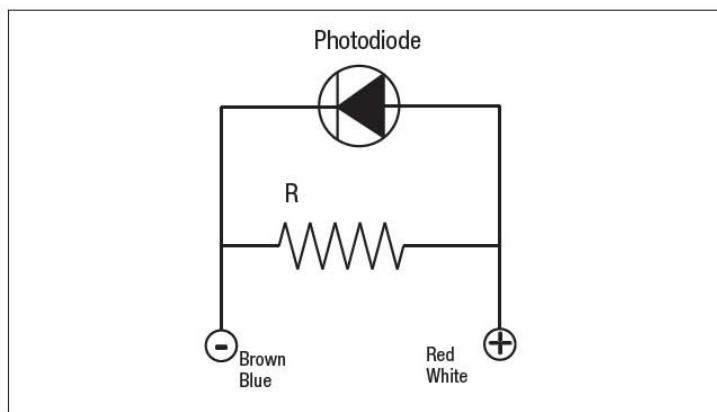


Fig. 2

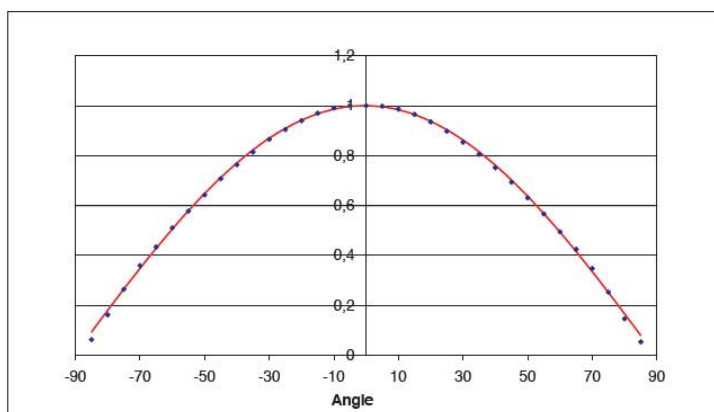


Fig. 3

Spectral properties

The 97% of solar energy that reaches above the atmosphere (WMO) is confined to 290nm to 3000nm spectral range. The ideal tool for measuring this radiation should have a flat response at least in this spectral range.

The spectral characteristics of LPY-SIL pyranometer are determined primarily by the photodiode and marginally by the diffuser.

The spectral response curve is shown in Fig. 4, together with a typical solar spectrum.

The spectral response of LPY-SIL does not cover all the solar spectrum and is not constant. Reliable measurements can be obtained only if the LPY-SIL pyranometer is calibrated with light whose spectrum is equal to the light to be measured. Under clear sky the value of radiation measured by pyranometer has uncertainty less than 3%.

In overcast conditions, at sunrise or sunset, the solar spectrum is quite different from that used to calibrate the instrument and therefore the measurement error increases.

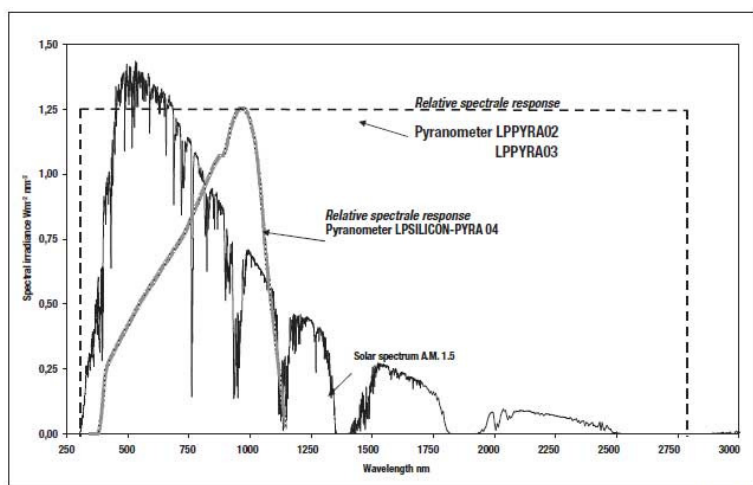


Fig. 4

Positioning

LPY-SIL can be used outdoor for long periods. The probe can be fixed by two M4 threaded holes that are located on the base (Fig. 5)

You should take care that the diffuser surface is clean and free of deposits. If necessary, the diffuser can be washed with water and a towel for cleaning optical. The probe can be mounted on the support (accessory) fitted level for proper placement on work surface.

N.B.: The probe is not designed to be submerged in water.

Calibration

The probe calibration is performed by comparison with a second class pyranometer by using a solar simulator with appropriate filters that reproduce the solar spectrum at AM 1.5 (air mass index 1.5).

Specifications:

Sensitivity	20 $\mu\text{V/W/m}^2$
Measuring field	0 to 2000 W/m^2
Spectral range	400 nm to 1100 nm
Response time	<0.5 s
Non-linearity	<1%
Stability	< $\pm 2\%$ per year
Temperature drift	< $\pm 0.15\%$ /°C
Calibration uncertainty	<3%
Response according to the cosine law	$\pm 3\%$ for angles between 0° - 75°
Working temperature	-40 °C....+65 °C
Impedance output	25 Ω
Body material	anodized aluminium

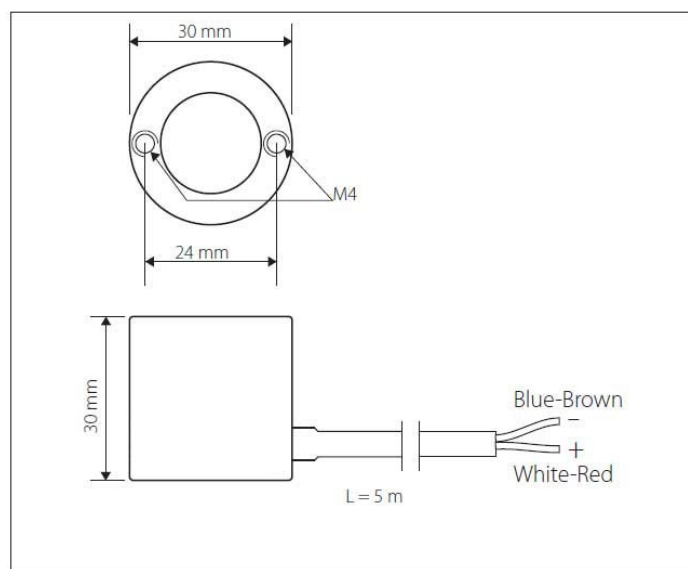


Fig. 5

LPY-SIL-SB (4...20 mA and RS485 MODBUS RTU)

Analog 4...20 mA and RS485 MODBUS RTU using SignalBox Pyranometer



This Pyranometer Transmitter features 4-20mA current loop and Modbus RTU protocol outputs, providing a wide range of applications and ensuring high accuracy and precision in solar radiation measurements.

- 4-20mA Current Loop: A reliable communication protocol used in standard industrial signaling.
- Modbus RTU Output: An ideal communication protocol for remote access and data collection.
- Precision Measurement: Ensures high accuracy in solar radiation measurements.

