



SILICON PYRANOMETER

The LPSILICON-PYRA04 pyranometer measures the global solar irradiance (W/m^2) by using a silicon photodiode.

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 (model LPS03 or LPS02).

The LPSILICON-PYRA04 pyranometer can be used in measurements of GLOBAL SOLAR IRRADIANCE in the field of renewable energies such as solar thermal and solar photovoltaic.

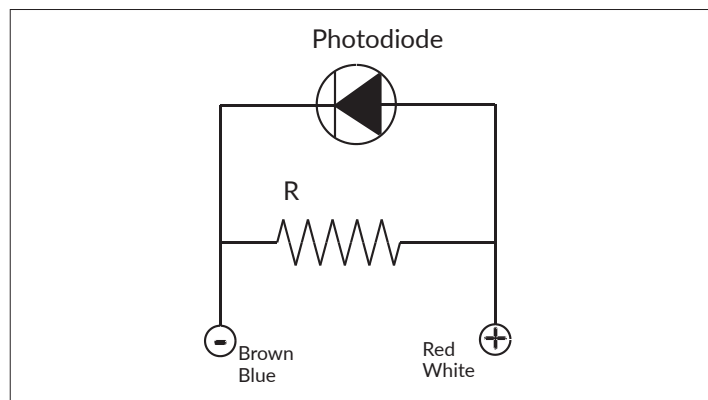


Fig. 1

The version with base with levelling device 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. 1 and Fig. 4.

Features

LPSILICON-PYRA04 with 5 m fixed cable and open wires on the cable end, typical output $20 \mu\text{V}/(\text{W}/\text{m}^2)$.

Electrical properties

The photodiode current signal is converted into voltage through the shunt resistance, according to the Fig. 1.

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. 2.

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 LPSILICON-PYRA04 pyranometer are determined primarily by the photodiode and marginally by the diffuser. The spectral response curve is shown in Fig. 3, together with a typical solar spectrum.

The spectral response of LPSILICON-PYRA04 does not cover all the solar spectrum and is not constant. Reliable measurements can be obtained only if the LPSILICON-PYRA04 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.

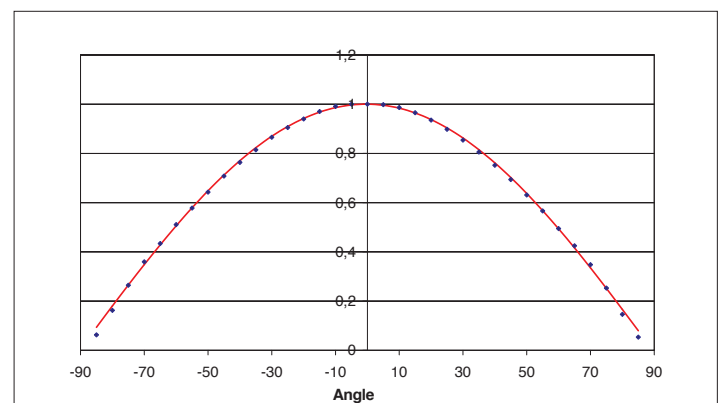


Fig. 2

Positioning

LPSILICON-PYRA04 can be used outdoor for long periods. The probe can be fixed by two M4 threaded holes that are located on the base (Fig. 4) or through the levels based LPBL.

To protect the probe from electrostatic discharges, ground the metallic housing of the pyranometer locally (**note:** the cable shield is not connected to the housing).

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 is available also with in version with levelling device 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).

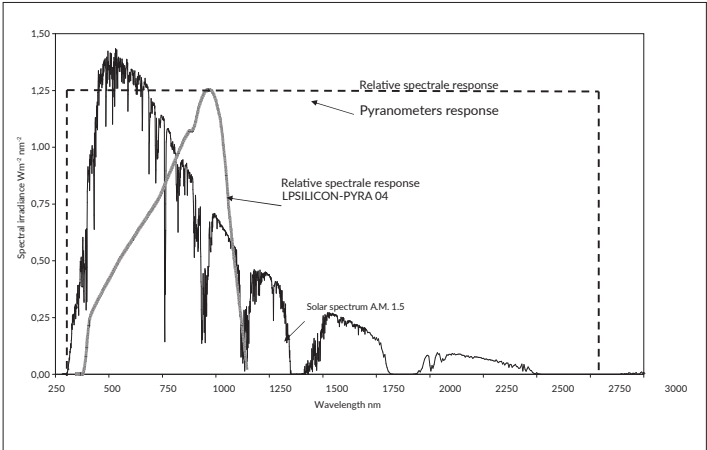


Fig. 3

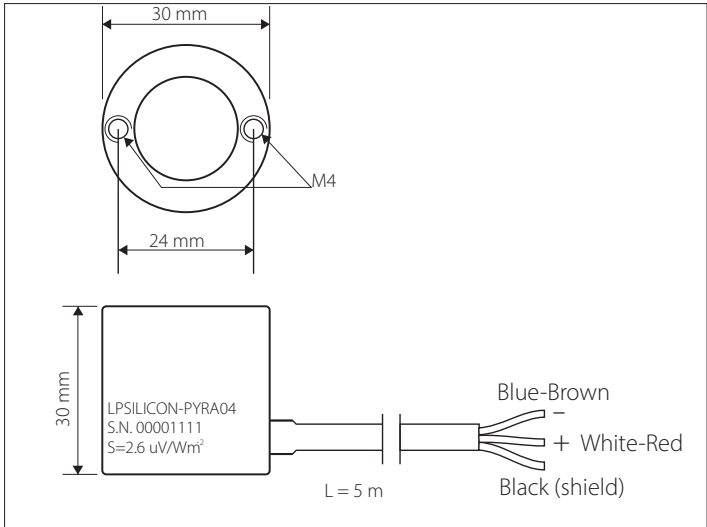


Fig. 4

Connect black (shield) and blue/brown (-) wires together to reduce signal noise.

| Technical specifications | |
|---|--------------------------------------|
| Sensor | Silicon photodiode |
| Typical sensitivity | 20 $\mu\text{V}/\text{W}/\text{m}^2$ |
| Measuring field | 0...2000 W/m^2 |
| Spectral range | 400...1100 nm |
| Response time | <0.5 s |
| Non-linearity | < $ \pm 2 $ % |
| Long-term instability (1 year) | < $ \pm 2 $ % |
| Temperature response (-10...+40 °C) | < $ \pm 3 $ % |
| Calibration uncertainty | < $ \pm 3 $ % |
| Spectral error | < $ \pm 4 $ % |
| Directional response @ 1000 W/m^2 according to the cosine law | < $ \pm 30 $ W/m^2 |
| Output | analogue voltage |
| Working temperature | -40 °C...+70 °C |
| Impedance output | 25 Ω - 50 Ω |
| Body material | anodized aluminium |
| Protection Degree | IP67 |

ORDERING CODES

LPSILICON-PYRA04: Pyranometer with silicon photodiode with 5 m fixed cable and open wires on the cable end.

LPSILICON-PYRA04BL: Pyranometer with silicon photodiode with 5 m fixed cable and open wires on the cable end. **Supplied with base with levelling device.**

