

## LPSILICON-PYRA04



### LPSILICON-PYRA04 PYRANOMETER

The LPSILICON-PYRA04 pyranometer measures the global solar irradiance ( $W/m^2$ ) by using a Class C ISO 9060:2018 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 LPPYRA03 or LPPYRA02).

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.

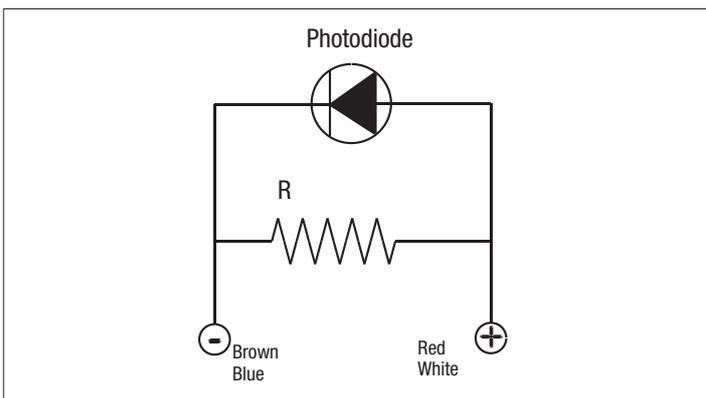


Fig. 2

The base with level LPBL (provided as an accessory) 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

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

#### Spectral properties

The 97% of solar energy that reaches above the atmosphere (WMO) is confined to 290 nm to 3000 nm 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. 4, 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.

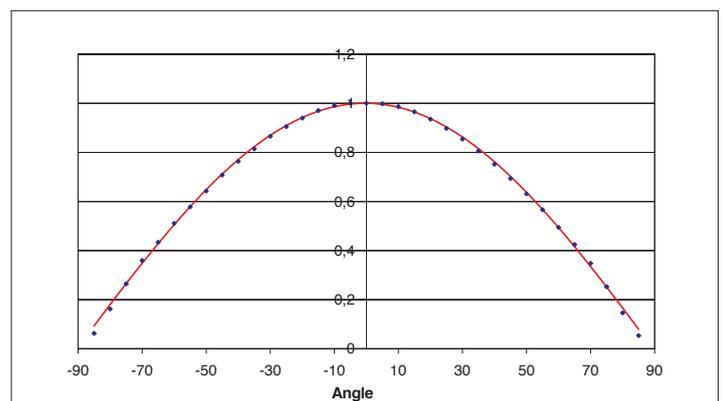


Fig. 3

## 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. 5) 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 can be mounted on the support LPBL (accessory) fitted with 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).

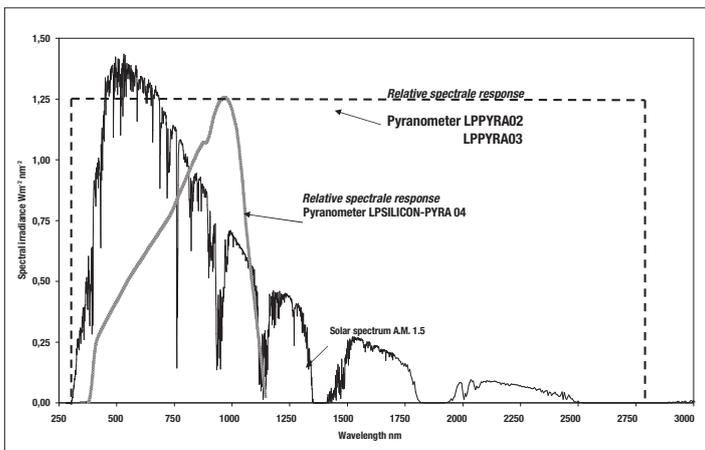


Fig. 4

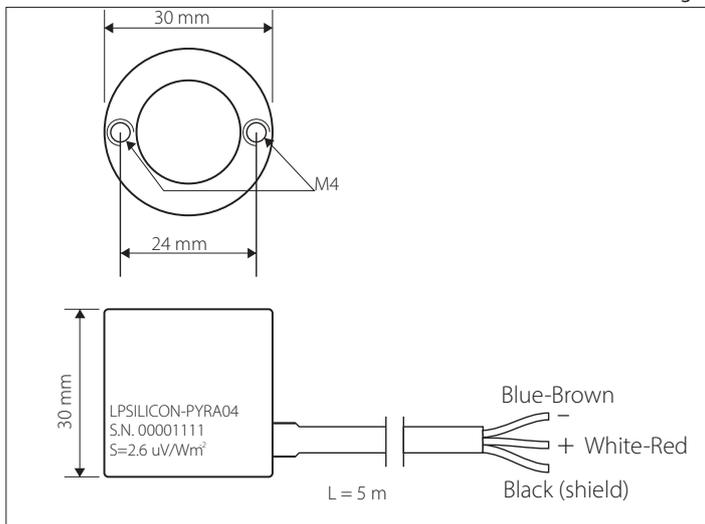


Fig. 5

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



Technical specifications	
Typical sensitivity	20 $\mu V/W/m^2$
Measuring field	0...2000 $W/m^2$
Spectral range	400...1100 nm
Response time	<0.5 s
Non-linearity	<1%
Non-stability	< $ \pm 2 $ % per year
Temperature drift	< $ \pm 0.15 $ %/°C
Calibration uncertainty	<3%
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 $\Omega$
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.  
Spectral range: 400...1100 nm.

The probe can be connected to the series of converters/amplifiers:

- HD978TR3 and 978TR5 for the 4-20 mA output.
- HD978TR4 and HD978T6 for the 0-10 Vdc output.

**LPBL:** Base with levelling device for LPSILICON-PYRA04

**LPSILICON-PYRA04BL:** Pyranometer with silicon photodiode with 5 m fixed cable and open wires on the cable end.  
Spectral range: 400...1100 nm. Supplied with base with levelling device.

