

LP02-TR

Second class pyranometer with 4-20 mA transmitter

LP02-TR is a solar radiation sensor that is applied in most common solar radiation observations. It complies with the second class specifications of the ISO 9060 standard and the WMO Guide. LP02-TR pyranometer is widely used in (agro-)meteorological applications and for PV system performance monitoring. LP02-TR houses a 4-20 mA transmitter for easy read-out by dataloggers commonly used in the industry.



Figure 1 LP02-TR second class pyranometer with 4-20 mA transmitter

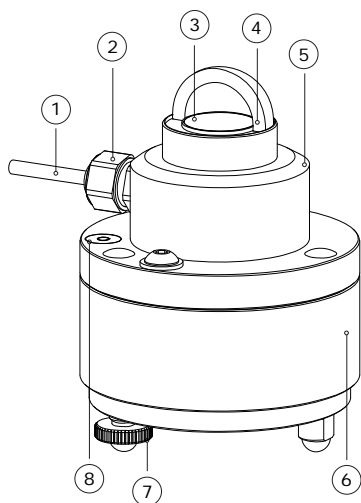


Figure 2 overview of LP02-TR:
 (1) cable, (2) cable gland, (3) thermal sensor with black coating, (4) glass dome, (5) sensor body, (6) transmitter housing, (7) levelling feet, (8) bubble level

Introduction

LP02-TR is a solar radiation sensor that is applied in general observations. It measures the solar radiation received by a plane surface from a 180° field of view angle. This quantity, expressed in W/m^2 , is called “hemispherical” solar radiation. LP02-TR pyranometer can be employed outdoors under the sun, as well as indoors with lamp-based solar simulators. Its orientation depends on the application and may be horizontal, tilted (for plane of array radiation) or inverted (for reflected radiation).

LP02-TR is a very good alternative to silicon cell (photodiode-based) pyranometers, which do not comply to the ISO 9060 standard.

Operation

Using LP02-TR is easy. The pyranometer can be connected directly to commonly used data logging systems. The irradiance in W/m^2 is calculated by using the transmitter’s output. In LP02-TR’s standard configuration, the 4 to 20 mA output corresponds to a transmitted range of 0 to 1600 W/m^2 . This range can be adjusted at the factory upon request.

Uncertainty evaluation

The uncertainty of a measurement under outdoor conditions depends on many factors. Guidelines for uncertainty evaluation according to the “Guide to Expression of Uncertainty in Measurement” (GUM) can be found in our manuals. We provide spreadsheets to assist in the process of uncertainty evaluation of your measurement.

Suggested use

- general meteorological observations
- agricultural networks
- PV system performance monitoring

LP02-TR design

LP02-TR employs a thermal sensor with black coating, a single glass dome and an anodised aluminium body, which also houses the transmitter.



Figure 3 LP02-TR front view

Use as sunshine duration sensor

WMO has approved the “pyranometric method” to calculate sunshine duration from pyranometer measurements in WMO-No. 8, Guide to Meteorological Instruments and Methods of Observation. This implies that LP02-TR may be used, in combination with appropriate software, to estimate sunshine duration. This solution is much more cost-effective than using a dedicated sunshine duration sensor. Ask for our application note.

Choosing the right instrument

Pyranometers are subject to classification in three classes according to ISO 9060. From second class to first class and from first class to secondary standard, the achievable accuracy improves by a factor 2. Measurement accuracy does not only depend on instrument properties, but also on measurement conditions. A very accurate instrument will quickly underperform without a regular schedule of maintenance. Our pyranometer [selection guide](#) assists you in choosing the right instrument. Whatever your application is: Hukseflux offers the highest accuracy in every class at the most attractive price level.

LP02-TR specifications

| | |
|-----------------------------------|----------------------------------|
| Measurand | hemispherical solar radiation |
| ISO classification | second class pyranometer |
| Calibration uncertainty | < 1.8 % (k = 2) |
| Calibration traceability | to WRR |
| Spectral range | 285 to 3000 x 10 ⁻⁹ m |
| Transmitted range | 0 to 1600 W/m ² |
| Rated operating temperature range | -40 to +80 °C |
| Temperature response | < ± 3 % (-10 to +40 °C) |
| Standard cable length | 5 m |

Options

- longer cable, in multiples of 5 metres
- sun screen
- adapted transmitted range

See also

- sensor with linear millivolt output [LP02](#)
- [SR03](#) fast response pyranometer
- [SR11](#), [SR12](#) and [SR20](#) pyranometers for higher accuracy measurements
- view our complete [product range of solar sensors](#)

Standards

Applicable instrument classification standards are ISO 9060 and WMO-No. 8. Calibration is according to ISO 9847. PV related standards are ASTM E2848 and IEC 61724.

About Hukseflux

Hukseflux Thermal Sensors, founded in 1993, aims to advance thermal measurement. We offer a complete range of sensors and systems for measuring heat flux, solar radiation and thermal conductivity. We also provide consultancy and services such as performing measurements and designing instrumentation according to customer requirements. Customers are served through the main office in Delft in the Netherlands, and locally owned representations in the USA, China and Japan.

Interested in this product?
E-mail us at: info@hukseflux.com