

# LP02

## Second class pyranometer

*LP02 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 pyranometer is widely used in (agro-)meteorological applications and for PV system performance monitoring.*



**Figure 1** LP02 second class pyranometer



**Figure 2** pyranometer in use with LI19 read-out unit

### Introduction

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

### Operation

Using LP02 is easy. The pyranometer can be connected directly to commonly used data logging systems.

The irradiance in  $W/m^2$  is calculated by dividing the LP02 output, a small voltage, by the sensitivity. This sensitivity is provided with LP02 on its calibration certificate.

### Uncertainty evaluation

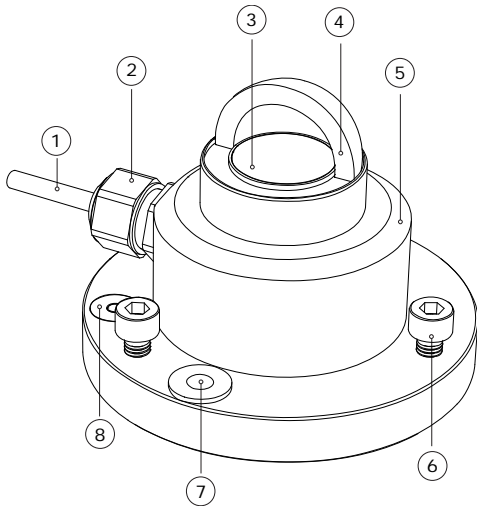
The uncertainty of a measurement under outdoor conditions depends on many factors. Guidelines for uncertainty evaluation according to the "Guide to Expression of Uncertainty in Measurement" (GUM) can be found in our manuals. We provide spreadsheets to assist in the process of uncertainty evaluation of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

### Suggested use

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

## LP02 design

LP02 pyranometer employs a thermal sensor with black coating, a single glass dome and an anodised aluminium body.



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

## 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 may be used, in combination with appropriate software, to estimate sunshine duration. This 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 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 <sup>-9</sup> m
Sensitivity (nominal)	15 x 10 <sup>-6</sup> V/(W/m <sup>2</sup> )
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
- [LP02-LI19](#), including read-out unit / datalogger [LI19](#)

## See also

- [LP02-TR](#) with 4-20 mA transmitter
- [SR03](#) fast response pyranometer
- [SR11](#), [SR12](#) and [SR20](#) pyranometers for higher accuracy measurements
- [SRA01](#) for albedo 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?  
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