

# IR02

## Pyrgeometer with heater

*IR02 is a pyrgeometer suitable for longwave irradiance measurements in meteorological applications. The instrument can be heated, which improves measurement accuracy as it prevents dew deposition on its window. Because of features like this, IR02 is popular and often used in agricultural networks.*



**Figure 1** IR02 pyrgeometer with heater



**Figure 2** application example: solar sensor in use for greenhouse climate control; pyrgeometers are used for this application as well.

### Introduction

IR02 measures the longwave or far-infra-red radiation received by a plane surface, in  $W/m^2$ , from a field of view angle of approximately  $150^\circ$ . Longwave radiation is the part of radiation that is not emitted by the sun. The actual field of view angle of IR02 is not the ideal  $180^\circ$ . The reduction of this field of view makes it possible to offer an instrument at an attractive price level, while the accuracy loss is relatively small. IR02 has a window with a cut-on at  $4.5 \times 10^{-6} m$ , making it suitable for day- and night observations.

### Benefits

IR02 pyrgeometer has a high sensitivity. With sufficient input signal a typical datalogger no longer contributes to the uncertainty of the measurement. IR02 houses an on-board heater. Heating prevents condensation of water on the pyrgeometer window which, when occurring, leads to very large measurement errors.

### Operation

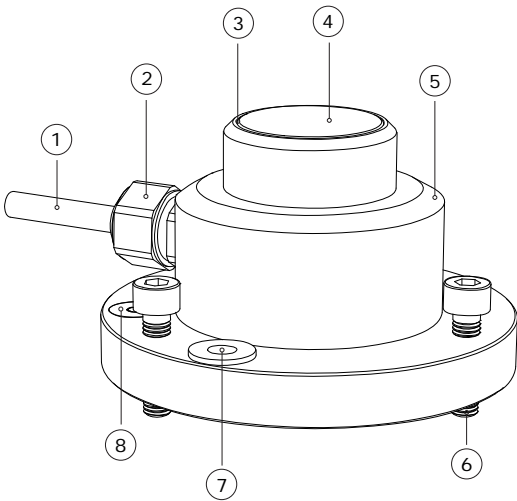
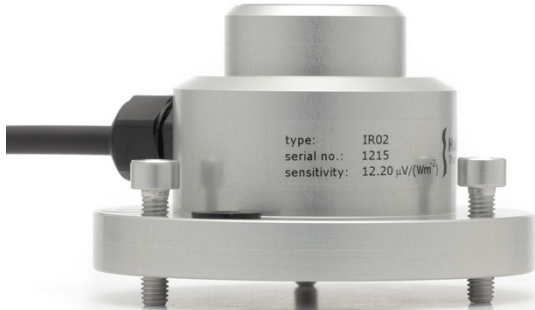
Using IR02 is easy. It can be connected directly to commonly used data logging systems. The irradiance in  $W/m^2$  is calculated by dividing the IR02 output, a small voltage, by the sensitivity and by taking into account the irradiated heat by the sensor itself (Stefan-Boltzmann law). The sensitivity is provided with IR02 on its product certificate.

### Standards

Calibration of pyrgeometers used for downward longwave radiation is traceable to the World Infrared Standard Group (WISG). This calibration takes into account the spectral properties of downward longwave radiation. As an option, calibration can be made traceable to a blackbody and the International Temperature Scale of 1990 (ITS-90). This alternative calibration is appropriate for measurements of upward longwave radiation (with IR02 pyrgeometers facing down).

## IR02 design

IR02 pyrgeometer employs a thermal sensor with black coating, a flat silicon window with solar blind filter and an anodised aluminium body.



**Figure 3** overview of IR02:

(1) cable, (2) cable gland, (3) window with solar blind filter, (4) sensor (below window), (5) sensor body, (6) levelling feet, (7) mounting hole, (8) bubble level

## Suggested use

- general meteorological observations
- climatological networks
- agricultural warning networks (frost)

## IR02 specifications

Measurand	longwave radiation
Optional measurand	sky temperature
Optional measurand	surface temperature
Spectral range IR02	4.5 to 40 x 10 <sup>-6</sup> m
Field of view angle	150 °
Response time (95 %)	18 s
Sensitivity (nominal)	15 x 10 <sup>-6</sup> V/(W/m <sup>2</sup> )
Rated operating temperature range	-40 to +80 °C
Temperature dependence	< ±3 % (-10 to +40 °C)
Calibration traceability	to WISG
Optional traceability	to blackbody (ITS-90)
Temperature sensor	Pt100
Heater	12 VDC, 1.5 W
Standard cable length	5 m

## Options

- longer cable, in multiples of 5 metres
- blackbody calibration (ITS-90)
- **IR02-TR**, with 4-20 mA output

## See also

- alternative instrument: model **IR20** for higher accuracy longwave radiation measurements
- pyrgeometers are often used in combination with pyranometers for solar radiation (shortwave) measurement. View our complete **product range of solar sensors**

## About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. We design and supply sensors as well as test & measuring systems, and offer related services such as calibration, engineering and consultancy. Our main area of expertise is measurement of heat transfer and thermal quantities such as solar radiation, heat flux and thermal conductivity. Hukseflux is ISO 9001:2008 certified. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

Interested in this product?  
E-mail us at: [info@hukseflux.com](mailto:info@hukseflux.com)