

GEO-IR20 & GEO-IR20WS Research-grade pyrgeometers

IR20 and IR20WS are pyrgeometers designed for high-accuracy long-wave irradiance measurement in meteorological applications. IR20 has a solar-blind filter so that it can measure day and night. In the absence of solar radiation IR20WS offers better accuracy because it has a wide spectral range.



Figure 1 IR20 research grade pyrgeometer

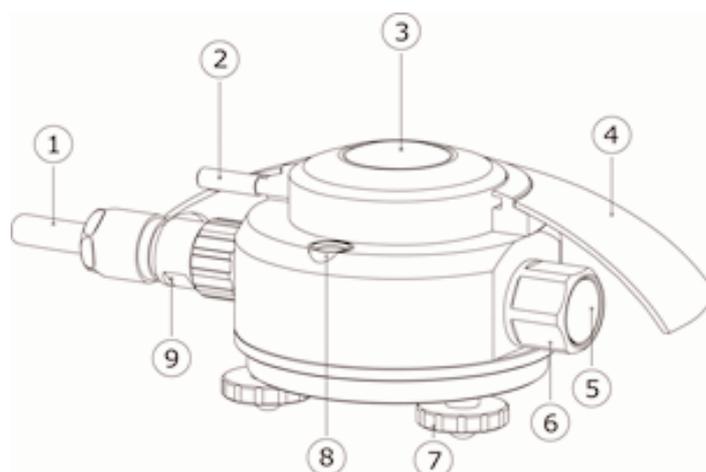


Figure 2 Overview of IR20 pyrgeometer:

(1) cable, standard length 5 metres (optionally extended), (2) fixation of sun screen, (3) dome, (4) sun screen, (5) humidity indicator, (6) desiccant holder, (7) adjustable levelling feet, (8) bubble level, (9) connector

Introduction

IR20's measure the long-wave or far-infra-red radiation received by a plane surface, in W/m^2 , from a solid angle of 2π sr. In meteorological terms pyrgeometers are used to measure "downward and upward long-wave irradiance" (WMO definition). Long-wave radiation can be interpreted as the part of the radiation budget that is not solar radiation. The spectral range of the long-wave radiation is not defined. A practical cut-on is 4.5×10^{-6} m; at this point the solar- and long -wave radiation have minimal overlap. IR20 has a solar-blind filter with a cut-on at 4.5×10^{-6} m, making it suitable for day- and night observations. IR20WS has a wide spectral range with a cut-on at 1.1×10^{-6} m. It also measures the long wave radiation between 1.1 and 4.5×10^{-6} m and offers a superior accuracy under conditions during night-time, when solar radiation is absent.

Distinguishing features

- Temperature compensation by post- processing. This is more accurate than temperature compensation in the instrument especially at very low and high temperatures. Every pyrgeometer is supplied with two constants to calculate the correction term.
- High sensitivity. With sufficient input signal a typical datalogger no longer contributes to the uncertainty of the measurement.
- Low thermal-resistance of the sensor. Competing designs need a significant correction for the difference in temperature between pyrgeometer body and sensor surface. For IR20 this is not needed.
- Fast response time. A 2 s response time is a benefit for measurements on moving platforms such as aircraft and buoys.
- On-board heater. Heating prevents condensation which, when occurring, makes reliable measurement impossible.

Suggested use

- Reference instrument for comparison
- Extreme climates (arctic / desert)
- Moving platforms (aircraft, buoys)
- Uncertainty assessment (IR20 + IR20WS)

MORE INFORMATION /OPTIONS

Data Logger Model **METEODATA-2000C/3000C**

Standards

Pygeometers are not subject to a classification standard. Calibration of pygeometers used for downward long wave radiation is traceable to the World Infrared Standard Group (WISG). This calibration takes into account the spectral properties of downward long-wave radiation. As an option, calibration can be made traceable to a blackbody and the International Temperature Scale of 1990 (ITS90). This alternative calibration is appropriate for measurements of upward long-wave radiation.

See also

- Alternative instrument: IR02 for lower accuracy measurements.
- View our complete product range of solar sensors.

Options

- Additional cable length in multiples of 5 m (add to the standard 5 m)
- Blackbody calibration

SPECIFICATION

Sensitivity (nominal)	15 $\mu\text{V}/\text{W}/\text{m}^2$
Temperature range	-40 to +80 °C
Range	-1000 - +1000 W/m^2
Linearity	Non-linearity < 1% (-250 W/m^2 to 700 W/m^2)
Response time	2 s (95% response) 0.5 s (1/e signal) 1 s (1-1/e signal)
Cosine	< 5%
Mechanical vibration	No damage under normal use
Calibration traceability	to WISG (World Infrared Standard Group). Optional to blackbody ITS 90
Expanded Calibration uncertainty	1.7% (k=2)
Orientation	Performance is not affected by orientation / tilt
Temperature dependence	1% (-30 to 50 °C) with correction in data processing
Temperature sensor	10 k Ω thermistor
Spectral range IRS20	4500 - 50000 nm
Spectral Range IR20WS	1500 - 50000 nm
Field of view	2 π sr
Irradiance range	0 to 4000 W/m^2
Window heating offset	<15 W/m^2 @ 1000 W/m^2
Heater	12VDC, 1 W
Impedance	150 - 250 Ohms
Cable	Standard length 5m (additional cable length x meters)



Model METEODATA-2000C/3000C
(Optional Data Logger)