

IR20 & IR20WS

Research grade pyrgeometers

IR20 is a research grade pyrgeometer suitable for high-accuracy longwave irradiance measurement in meteorological applications. Thanks to Hukseflux' technological innovation, IR20 is offered at a significantly lower price level than competing models of the same performance level. IR20 is capable of measuring during both day and night. In absence of solar radiation, model IR20WS offers even better accuracy because of its wider spectral range.



Figure 1 IR20 research grade pyrgeometer

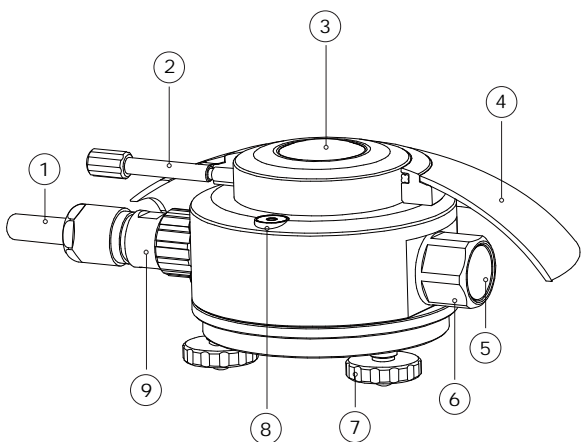


Figure 2 overview of IR20 pyrgeometer:

(1) cable, (2) fixation of sun screen, (3) dome with solar blind filter, (4) sun screen, (5) humidity indicator, (6) desiccant holder, (7) levelling feet, (8) bubble level, (9) connector

Introduction

IR20 measures the longwave or far-infra-red radiation received by a plane surface, in W/m^2 , from a 180° field of view angle.

In meteorological terms pyrgeometers are used to measure "downward and upward longwave irradiance" (WMO definition). Longwave radiation is the part of radiation that is not emitted by the sun. The spectral range of longwave radiation is not standardised. A practical cut-on is in the range of 4 to 5×10^{-6} m. IR20 has a dome with a solar blind filter with a cut-on at 4.5×10^{-6} m, making it suitable for day- and night observations.

Model IR20WS has a wide spectral range with a cut-on at 1.0×10^{-6} m. It offers a superior accuracy during night-time, when solar radiation is absent.



Figure 3 IR20 pyrgeometer being prepared for application

IR20 & IR20WS design & benefits

- breakthrough pricing for a pyrgeometer of this performance level as a result of Hukseflux' technological innovation.
- correction of temperature dependence by use of the measurement function. This is far more accurate than temperature compensation in the instrument, especially at very low and high temperatures. Every pyrgeometer is supplied with temperature coefficients to enter into the equation.
- high sensitivity. With sufficient input signal a typical datalogger no longer significantly 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 (3 s). A low response time is a benefit for measurements on moving platforms such as aircraft and buoys.
- on-board heater. Heating prevents condensation of water on the pyrgeometer dome which, when occurring, leads to very large measurement errors.
- instrument cut-on wavelength (5 %) and the two 50 % transmission points are displayed on the product certificate for individual sensors.

Options

- longer cable, in multiples of 5 metres
- blackbody calibration (ITS-90)

IR20 & IR20WS specifications

| | |
|-----------------------------------|---|
| Measurand | longwave radiation |
| Optional measurand | sky temperature |
| Optional measurand | surface temperature |
| Spectral range IR20 | $4.5^* \text{ to } 40 \times 10^{-6} \text{ m}$ |
| Spectral range IR20WS | $1.0 \text{ to } 50 \times 10^{-6} \text{ m}$ |
| IR20WS restrictions for use | only in the absence of solar radiation |
| Field of view angle | 180° |
| Response time (95 %) | 3 s |
| Sensitivity (nominal) | $17 \times 10^{-6} \text{ V/(W/m}^2\text{)}$ |
| Rated operating temperature range | $-40 \text{ to } +80^\circ \text{C}$ |
| Temperature dependence | $< \pm 0.4 \% (-30 \text{ to } +50^\circ \text{C})$ |
| Calibration traceability | to WISG |
| Optional traceability | to blackbody (ITS-90) |
| Temperature sensor | 10 k Ω thermistor |
| Heater | 12 VDC, 1.5 W |
| Standard cable length | 5 m |

*nominal, see product certificate for individual value

Suggested use

- climatological networks
- extreme climates (polar / tropical)
- moving platforms (aircraft, buoys)
- uncertainty assessment (IR20 + IR20WS)
- calibration reference (IR20WS)

See also

- [IR02](#) for lower accuracy measurements
- pyrgeometers are often used in combination with pyranometers for solar radiation (shortwave) measurement. View our complete [product range of solar sensors](#)
- [The making of IR20](#) documented