

IR02-TR

Pyrgeometer with heater and 4-20 mA transmitter

IR02-TR is a pyrgeometer suitable for longwave irradiance measurement in meteorological applications. The instrument can be heated, which improves measurement accuracy as it prevents dew deposition on its window. IR02-TR houses a 4-20 mA transmitter for easy read-out by dataloggers commonly used in the industry.



Figure 1 IR02-TR pyrgeometer with heater and 4-20 mA transmitter

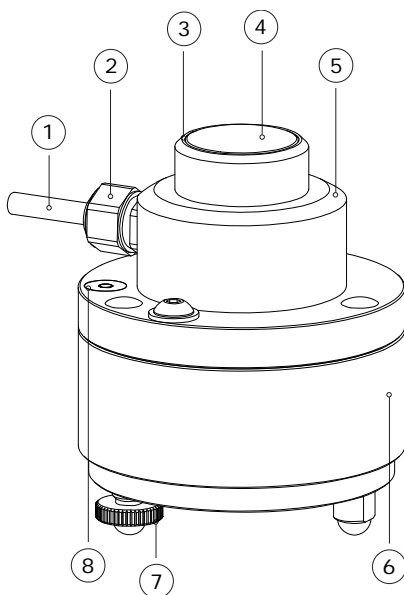


Figure 2 overview of IR02-TR:
 (1) cable, (2) cable gland, (3) window with solar blind filter, (4) sensor (below window), (5) sensor body, (6) transmitter housing (7) levelling feet, (8) bubble level

Introduction

IR02-TR 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° . Longwave radiation is the part of radiation that is not emitted by the sun.

The actual field of view angle of IR02-TR is not the ideal 180° . 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-TR has a window with a cut-on at $4.5 \times 10^{-6} m$, making it suitable for day- and night observations.

Operation

Using IR02-TR is easy. The pyrgeometer can be connected directly to commonly used data logging systems. The irradiance in W/m^2 is calculated by using the transmitter's output and the temperature reading. The final result is calculated taking into account the irradiance radiated by the sensor itself (Stefan-Boltzmann law). In IR02-TR's standard configuration, the 4 to 20 mA output corresponds to a transmitted range of -300 to $+100 W/m^2$. This range can be adjusted at the factory upon request.

Suggested use

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

IR02-TR design

IR02-TR pyrgeometer employs a thermal sensor with black coating, a flat silicon window with solar blind filter and an anodised aluminium body. IR02-TR houses an on-board heater. Heating prevents condensation of water on the pyrgeometer window which, when occurring, leads to very large measurement errors. IR02-TR has a high sensitivity. With the transmitter a typical datalogger no longer contributes to the uncertainty of the measurement.



Figure 3 IR02-TR with heater and 4-20 mA transmitter

Standards

Calibration of pyrometers 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 pyrometers facing down).

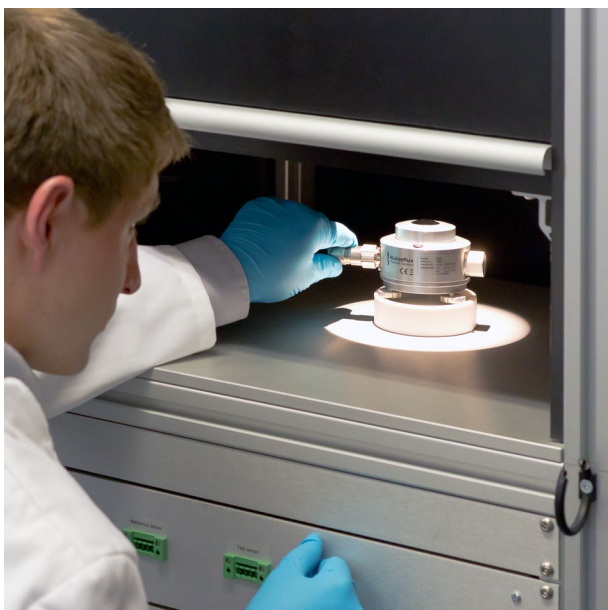


Figure 4 pyrometer during conformity assessment

IR02-TR specifications

Measurand	longwave radiation
Optional measurand	sky temperature
Optional measurand	surface temperature
Output	4 to 20 mA
Principle	2-wire current loop
Spectral range IR02-TR	4.5 to 40 x 10 ⁻⁶ m
Field of view angle	150 °
Response time (95 %)	18 s
Rated operating temperature range	-40 to +80 °C
Transmitted range	-300 to 100 W/m ²
Temperature dependence	< ±3 % (-10 to +40 °C)
Calibration traceability	to WISG
Optional traceability	to blackbody (ITS-90)
Heater	12 VDC, 1.5 W
Temperature sensor	Pt100
Standard cable length	5 m

Options

- longer cable, in multiples of 5 metres
- blackbody calibration (ITS-90)
- adapted transmitted range
- **IR02** version without transmitter

See also

- alternative instrument: research grade pyrometer model **IR20** for higher accuracy longwave radiation measurements
- pyrometers 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.

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