

SR25

Analogue Class A pyranometer with heating and sapphire dome

SR25 takes solar radiation measurement to the next level. Using a sapphire outer dome, it has negligible zero offsets. SR25 is heated for dew and frost mitigation, maintaining its measurement accuracy. When heating SR25, the data availability and accuracy are higher than when using externally ventilated traditional pyranometers. SR25 needs very low power. SR25 is an excellent reference for diffuse radiation.



Figure 2 Frost deposition: clear difference between SR25 (left), versus a non-heated pyranometer without sapphire dome (right).

Introduction

SR25 represents the next level in solar radiation measurement. Using a sapphire outer dome, it has negligible zero offsets. SR25 is heated in order to mitigate dew and frost, maintaining its high measurement accuracy.

When heating SR25, the data availability and accuracy are higher than when using external ventilation with traditional pyranometers. In addition, SR25 needs very low power; it only consumes 1.5 W compared to the usual 10 W for external ventilation.

The low thermal offsets make SR25 very suitable for measuring diffuse radiation. SR25 is available with analogue millivolt output.

Best data availability

By keeping the SR25 outer dome free of dew and frost with help of the internal heater, data availability is highly increased over traditional pyranometers, whether these are ventilated or not.

Best measurement accuracy

SR25 measures the solar radiation received by a plane surface, in W/m^2 , from a 180° field of view angle. SR25 offers the best measurement accuracy: the specification limits of two major sources of measurement uncertainty have been greatly improved over competing pyranometers: "zero offset a" and temperature response.



SR25 design

SR25 has a sapphire outer dome, glass inner dome and an internal heater. It employs a state-of-the-art thermopile sensor with black coated surface and an anodised aluminium body. The connector, desiccant holder and sun screen fixation are very robust and designed for long term use.



Figure 4 SR25 accelerating sublimation of snow, here shortly after snowfall.

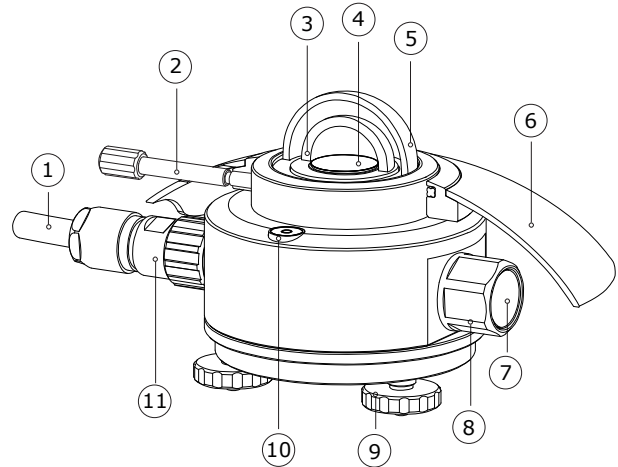


Figure 5 Overview of SR25:

(1) cable, (2) fixation of sun screen, (3) glass inner dome, (4) thermal sensor with black coating, (5) sapphire outer dome, (6) sun screen, (7) humidity indicator, (8) desiccant holder, (9) levelling feet, (10) bubble level, (11) connector.

Spectrally flat

Last but not least, for compliance with WMO and for the diffuse solar radiation measurement, it is essential to employ spectrally flat pyranometers; the diffuse solar radiation has a different spectrum compared to the global solar radiation. SR25 has a spectrally flat sensor on board, it can measure global and diffuse solar radiation using the same instrument with the same calibration.

Standards

Applicable instrument classification standards are ISO 9060 and WMO-No. 8. Calibration is according to ISO 9847. PV related standards are IEC 61724 and ASTM E2848.

Reference for diffuse radiation

SR25's excellent performance was recently confirmed in an independent test* at NREL: Ibrahim Reda, A. Andreas, 2017, *Technical Report NREL/TP-1900-68999, Calibration procedure of Hukseflux SR25 to Establish the Diffuse Reference for the Outdoor Broadband Radiometer Calibration*. In this calibration experiment, the NREL lab attributed a 0.5 W/m² zero offset to the unheated SR25, and was able to determine its sensitivity with an accuracy of around 0.9 %.

See the application note on this subject.

* NOTE: the fact that a sensor is used or tested does not constitute a formal endorsement by the user or test institute.

Suggested use

- diffuse measurements
- all situations where ventilated pyranometers are employed
- PV system performance monitoring
- indoor PV testing with solar simulators
- airborne measurements
- environments with dew
- environments with frost

SR25 features and benefits

- sapphire outer dome: negligible zero offsets
- internal heater: dew and frost mitigation by heating, better data availability and accuracy than ventilated instruments
- 1.5 W: low power consumption
- test certificates for temperature response and directional response included: all sensors tested individually for ISO 9060 compliance



Figure 6 SR25's sapphire outer dome takes solar radiation measurement to the next level.

See also

- the making of SR25 [documented](#)
- [SR30](#) digital spectrally flat Class A pyranometer with heating and tilt sensor
- [SR20](#) spectrally flat Class A pyranometer with analogue output, [SR20-D2](#) with digital output
- view our complete [range of solar sensors](#)

SR25 specifications

Measurand	hemispherical solar radiation
ISO classification	
ISO 9060:2018	spectrally flat Class A pyranometer
ISO 9060:1990	secondary standard pyranometer
IEC 61724-1 compliance	meets Class A PV monitoring system requirements
Zero offset a	1 W/m ² unventilated to WRR
Calibration traceability	
Spectral range	285 to 3000 x 10 ⁻⁹ m
Sensitivity (nominal)	15 x 10 ⁻⁶ V/(W/m ²)
Rated operating temperature range	-40 to +80 °C
Temperature response	<± 1 % (-10 to +40 °C) <± 0.4 % (-30 to +50 °C) with correction in dataprocessing report included
Temperature response test of individual instrument	
Directional response test of individual instrument	report included to 95 °
Temperature sensor	Pt100 or 10 kΩ thermistor
Heater	1.5 W at 12 VDC
Standard cable length	5 m



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This overview summarises the main features and benefits of SR25. Customers prefer Hukseflux pyranometers for their unsurpassed measurement accuracy and their lowest total cost of ownership.



Diffuse radiation reference

- Spectrally flat
- lowest zero offsets
- best temperature dependence



Best data availability

- sapphire dome combined with internal heating
 - dew and frost mitigation
 - very low power consumption
- heated: compliant with IEC 61724



Best connector

- interchangeable cables
- IP67 grade
- for industrial use



Best desiccant cartridge

- visible indicator of instrument health
 - rugged aluminium design
 - serviceable by user



Best sun screen

- sealed
- corrosion protection of body
- no dry-cooking of bubble level



Best paperwork

- full directional response testing
- temperature response testing from -30 to 50 °C

