

SR12

First class pyranometer for solar energy test applications

SR12 is a high accuracy solar radiation sensor that meets and exceeds the ISO 9060 standard performance mandate for first class pyranometers for “solar energy test applications”. It is the preferred instrument for PV system performance monitoring. An internal temperature sensor and a heater are features of SR12 pyranometer; its directional response is tested and reported for every individual instrument.



Figure 1 SR12 first class pyranometer for solar energy test applications



Figure 2 PV system performance monitoring pyranometers

Introduction

SR12 is a solar radiation sensor that is applied in high accuracy observations. It measures the solar radiation received by a plane surface from a 180° field of view angle. This quantity, expressed in W/m^2 , is called “hemispherical” solar radiation. SR12 pyranometer has two unique features: a heater and a temperature sensor for additional quality assurance. The incorporated heater reduces measurement errors caused by early-morning dew deposition. Finally, all sensors have individually been tested on directional response; a report is included with SR12’s calibration certificate.

PV system performance testing

The ASTM E2848 “Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance” (issued end 2011) confirms that a pyranometer is the preferred instrument for outdoor PV testing. SR12 pyranometer complies with the requirements of this standard. SR12 is also the first pyranometer of its kind meeting the ISO 9060 mandate for first class pyranometers for “solar energy test applications”.

Improved measurement accuracy

Calibration of SR12 has been improved; our latest calibration method results in an uncertainty of the sensitivity of 1.8 %, compared to typical uncertainties of higher than 2.8 % for this pyranometer class.

Uncertainty evaluation

The uncertainty of a measurement under outdoor conditions depends on many factors. Guidelines for uncertainty evaluation according to the “Guide to Expression of Uncertainty in Measurement” (GUM) can be found in our manuals. We provide spreadsheets to assist in the process of uncertainty evaluation of your measurement.

SR12 design

SR12 pyranometer employs a thermal sensor with black coating, two glass domes and an anodised aluminium body.

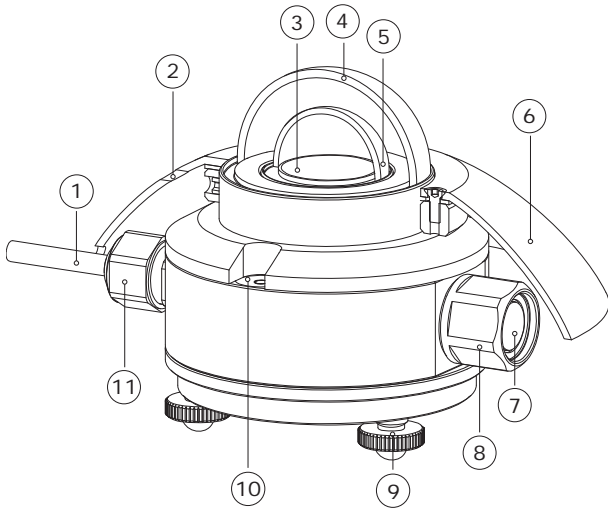


Figure 3 overview of SR12:

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

Suggested use

- PV system performance monitoring
- general solar resource monitoring
- indoor simulated solar testing

Choosing the right instrument

Pyranometers are subject to classification in three classes according to ISO 9060.

From second class to first class and from first class to secondary standard, the achievable accuracy improves by a factor 2.

Measurement accuracy does not only depend on instrument properties, but also on measurement conditions. A very accurate instrument will quickly underperform without a regular schedule of maintenance.

Our pyranometer [selection guide](#) assists you in choosing the right instrument.

Whatever your application is: Hukseflux offers the highest accuracy in every class at the most attractive price level.

SR12 specifications

Measurand	hemispherical solar radiation
ISO classification	first class pyranometer for solar energy test applications
Directional response	report included
Calibration uncertainty	1.8 % (k = 2)
Calibration traceability	to WRR
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	< ± 2 % (-10 to +40 °C)
Temperature sensor	Pt100
	or 10 kΩ thermistor
Standard cable length	5 m
Heater	1.5 W at 12 VDC

Options

- longer cable, in multiples of 5 metres

See also

- [SR12-TR](#) first class pyranometer with 4-20 mA transmitter
- [SR11](#) first class pyranometer
- [SR20](#) secondary standard pyranometer for higher accuracy measurements
- view our complete [product range of solar sensors](#)

Standards

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

About Hukseflux

Hukseflux Thermal Sensors, founded in 1993, aims to advance thermal measurement. We offer a complete range of sensors and systems for measuring heat flux, solar radiation and thermal conductivity. We also provide consultancy and services such as performing measurements and designing instrumentation according to customer requirements. Customers are served through the main office in Delft in the Netherlands, and locally owned representations in the USA, China and Japan.