

SRA20

Secondary standard albedometer

SRA20 albedometer is an instrument that measures global and reflected solar radiation and the solar albedo, or solar reflectance, with the highest accuracy. It is composed of two SR20 secondary standard pyranometers with thermopile sensors; the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. SRA20 complies with the latest ISO and WMO standards.



Figure 1 SRA20 secondary standard albedometer

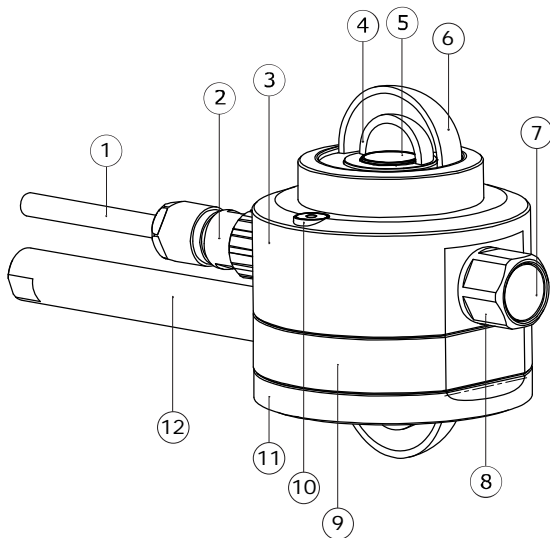


Figure 2 Overview of SRA20:

(1) cable, (2) connector, (3) upfacing pyranometer body, (4) inner dome, (5) thermal sensor with black coating, (6) outer dome, (7) humidity indicator, (8) desiccant holder, (9) albedometer body, (10) bubble level, (11) downfacing pyranometer body with glare screen, (12) mounting rod

Introduction

Albedo, also called solar reflectance, is defined as the ratio of the reflected to the global radiation. The solar albedo depends on the directional distribution of incoming radiation and on surface properties at ground level. Albedos of typical surfaces range from about 4 % for fresh asphalt, and 15 % for green grass to 90 % for fresh snow.

Using SRA20 albedometer is easy. The instrument is composed of two SR20 secondary standard pyranometers; the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. The irradiance in W/m^2 in each direction is calculated by dividing the pyranometer output, a small voltage, by the sensitivity. The sensitivity of both pyranometers is provided on the SRA20 product certificate. The working principle and specifications of the pyranometers can be found in the SRA20 user manual. We recommend to use SRA20 in particular in applications where the highest measurement accuracy is required. SRA20's analogue output is in millivolt. SRA20 can be connected directly to commonly used datalogging systems.

Demanding applications

Albedometers are used for general meteorological observations, building physics, roof reflectance studies, climate studies and solar collector testing. A common application is for outdoor solar radiation balance measurements as part of a meteorological station. This application requires horizontal levelling; a bubble level and a mounting rod are included. SRA20 is suited for use in extreme climates. The incorporated heater reduces measurement errors caused by frost and dew.

Suggested use

- high-accuracy meteorological observations
- building physics, roof reflectance studies
- extreme climates (tropical / polar)

SRA20 design

SRA20 consists of two identical pyranometers model SR20, one facing up, one facing down. The albedometer body is equipped with a 15×10^{-3} m diameter rod for mounting purposes. A sun screen is part of the delivery too. SRA20, including its sun screen fixation, connector and desiccant holder, is very robust. The albedometer has an incorporated heater and a temperature sensor. SRA20 can be ordered optionally with longer cable, and with a Pt100 temperature sensor instead of an internal heater and instead of a 10 k Ω thermistor.



Figure 3 SRA20 secondary standard albedometer, with its sun screen and mounting rod

Standards

Applicable instrument-classification standards are ISO 9060 and WMO-No. 8. Calibration is according to ISO 9847 and ASTM G207-11.

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.

See also

- **SRA01** second class albedometer for lower accuracy albedo measurements
- alternative instrument: **NR01** for solar and longwave radiation balance
- view our complete [range of solar sensors](#)

SRA20 specifications

Measurand	global solar radiation and reflected solar radiation
Optional measurand	albedo or solar reflectance
Optional measurand	net solar radiation
Included sensors	2 x identical ISO 9060 secondary standard pyranometer
Output	analogue millivolt
Temperature sensor	Pt100 or 10 k Ω thermistor
Mounting	mounting rod with 15×10^{-3} m diameter
Calibration uncertainty	< 1.2 % ($k = 2$)
Calibration traceability	to WRR
Measurement range	0 to 2000 W/m ²
Spectral range	285 to 3000 $\times 10^{-9}$ m
Sensitivity (nominal)	15×10^{-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
Temperature response test and directional response test of individual instrument	reports included
Standard cable length	5 m (see options)

Options

- SRA20 with Pt100 temperature sensor instead of internal heater and 10 k Ω thermistor
- longer cable, in multiples of 5 m, cable lengths above 20 m in multiples of 10 m

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 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 certified. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

Interested in this product?
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