Hukseflux
Thermal Sensors

instrumentos de medida

SRA11

Analogue first class albedometer

SRA11 first class albedometer is an instrument that measures global and reflected solar radiation and the solar albedo, or solar reflectance. It is composed of two SR11 first class pyranometers and one AMF02 albedometer mounting kit. AMF02 includes one glare screen, one mounting fixture with rod, mounting hardware and tools. Each pyranometer has a thermopile sensor and offers output in millivolt; the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. SRA11 complies with the latest ISO and WMO standards. The modular design facilitates maintenance and calibration.

Figure 1 *SRA11 first class albedometer*

SRA11 design

SRA11 consists of two identical pyranometers model SR11, one facing up, one facing down. The two sensors should be ordered with one AMF02 albedometer mounting kit. AMF02 includes a fixture with rod for mounting purposes and a glare screen. The user assembles these modular components into SRA11 albedometer. Mounting hardware, tools and a mounting and fixation instruction are part of the AMF02 delivery too. The modular design of SRA11 facilitates maintenance and calibration. SRA11 can be ordered optionally with longer cable.

Suggested use

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

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 SRA11 albedometer is easy. The instrument is composed of two SR11 first class 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 SRA11 product certificate.
The working principle and specifications of the pyranometers can be found in the SR11 user manual. SRA11's analogue output is in millivolt. SRA11 can be connected directly to commonly used datalogging systems.

Improved measurement accuracy

Calibration of SR11 pyranometer 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.

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.

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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

- SR11 pyranometer
- AMF02 albedometer mounting kit
- ALF01 albedometer levelling fixture
- SRA20 secondary standard albedometer for higher accuracy albedo measurements
- 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

Options

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

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SRA11 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 first class pyranometer
Output	analogue millivolt
Mounting	mounting rod with 15×10^{-3} m diameter
Calibration uncertainty	< 1.8 % (k = 2)
Calibration traceability	to WRR
Measurement range	0 to 2000 W/m^2
Spectral range	285 to 3000 x 10^{-9} m
Sensitivity (nominal)	15×10^{-6} V/(W/m^2)
Rated operating temperature range	-40 to +80 °C
Temperature response	<± 2 % (-10 to +40 °C)
Standard cable length	5 m (see options)

Sensors

(2 x) SR11 first class pyranometer

Included with AMF02

(1 x) glare screen
(1 x) fixture with rod
(2 x) o-ring
(1 x) conical positioner
(2 x) plug (pre-mounted)
(2 x) M5x12 socket head cap screw
(1 x) M6x10 socket head cap screw
(2 x) M6x12 set screw (pre-mounted)
(1 x) mounting and fixation instruction sheet

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