SRA20-D2

Digital secondary standard albedometer

SRA20-D2 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-D2 secondary standard pyranometers and one AMF02 albedometer mounting kit. AMF02 includes one glare screen, one mounting fixture with rod, mounting hardware and tools. Each pyranometer offers two types of commonly used irradiance outputs: digital via Modbus RTU over RS-485 and analogue 4-20 mA (current loop). Individually tested for temperature and directional response, SRA20-D2 is the most accurate digital secondary standard albedometer available. SRA20-D2 complies with the latest ISO and WMO standards. The modular design facilitates maintenance and calibration.

Figure 1 *SRA20-D2 secondary standard albedometer*

The best albedometer for the PV industry

SRA20-D2 is the most accurate digital secondary standard albedometer available. Its benefits:

- Digital outputs: easy implementation & servicing
- Best-in-class temperature response <± 0.4 % (-30 to +50 °C), best "zero offset a" and best calibration uncertainty
- Test certificates for temperature- and directional response included as required by ISO 9060
- Re-calibration registers fully accessible to users
- Modular; can be calibrated as separate pyranometers

Suggested use

- PV monitoring with Bifacial solar modules
- 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 SRA20-D2 albedometer is easy. The instrument is composed of two SRA20-D2 digital secondary standard pyranometers; the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. SRA20-D2 offers two types of outputs commonly used in the solar PV industry: digital via Modbus RTU over RS-485 and analogue 4-20 mA (current loop). These industry standards allow for easy data acquisition, easy read-out and error-free instrument exchange when using SRA20-D2. The working principle and specifications of the pyranometers can be found in the SR20-D2 user manual. We recommend to use SRA20-D2 in particular in applications where the highest measurement accuracy is required.

SRA20-D2 design

SRA20-D2 consists of two identical pyranometers model SR20-D2, 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 SRA20-D2 albedometer. Mounting hardware, tools and a mounting and fixation instruction are part of the AMF02 delivery too. SRA20 can be ordered optionally with longer cables. SRA20-D2, including its sun screen fixation, connector and desiccant holder, is very robust. The albedometer has an incorporated temperature sensor.

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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-D2 is suited for use in extreme climates.

Standards

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

Hukseflux Sensor Manager software

For communication between a PC and SRA20-D2, the Hukseflux Sensor Manager software is included. It allows the user to plot and export data, and change the SRA20-D2 Modbus address and its communication settings.

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.

Options

- longer cables, in multiples of 5 m, cable lengths above 20 m in multiples of 10 m

See also

- SR20(-D2) pyranometer
- AMF02 albedometer mounting kit
- ALF01 albedometer levelling fixture
- SRA20 analogue secondary standard albedometer

About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

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SRA20-D2 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
Mounting	mounting rod with 15 x 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 x 10^{-9} m
Rated operating temperature range	-40 to +80 °C
Temperature response	<± 0.4 % (-30 to +50 °C)
Temperature response test and directional response test	reports included
Standard cable length	2 x 5 m (see options)

Digital output

Output	-irradiance in W/m^2 -instrument body temperature in °C
Communication protocol	Modbus over 2-wire RS-485
Transmission mode	RTU
Rated operating voltage range	5 to 30 VDC
Power consumption	< 150 x 10^{-3} W at 12 VDC (in total)

4-20 mA output

Output	irradiance in W/m^2
Transmitted range of 4-20 mA output	0 to 1600 W/m^2
Rated operating voltage range of 4-20 mA output	5.5 to 40 VDC
Power consumption	
- main supply	< 150 x 10^{-3} W at 12 VDC (in total)
- 4-20 mA current loop	< 80 x 10^{-3} W at 12 VDC, with recommended 2 x 100 Ω shunt resistors

Sensors

(2 x) SR20-D2 secondary standard 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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