SRA300-D1, SRA200-D1, SRA100-D1

Industrial series Class A and Class B albedometers

Hukseflux introduces "industrial-grade" albedometers. The all-digital Class A models SRA300-D1 and SRA200-D1, and Class B model SRA100-D1 albedometers are engineered to measure global and reflected solar radiation and solar albedo, also called solar reflectance, with the utmost reliability and measurement accuracy. Besides, Hukseflux offers other albedometer models with non-digital output signals and a lower – Class C – accuracy class.

- *the right albedometer for every application and budget*
- *main applications: PV system performance monitoring and meteorology*
- *integrated surge protection, designed to withstand the extreme conditions encountered on PV power plants and meteorological stations, upgradable to 4 kV with optional SPD01 Surge Protection Device*
- *complies with the latest ISO and WMO standards*
- *the modular design facilitates maintenance and calibration*

Figure 1 *Industrial albedometer model SRA300-D1.*

Albedo and albedometers

An albedometer is an instrument that measures both global and reflected solar radiation and, by calculation, the solar albedo, or solar reflectance for a particular ground surface. An albedometer is composed of two pyranometers, both installed horizontally, the downfacing one measuring reflected solar radiation.

In the open field, the solar albedo depends on the directional distribution of incoming radiation and on surface properties at ground level. It is usually expressed as a single number, determined by taking an average over a day with solar elevation > 10 °. Changes of albedo are typically slow and seasonal, except when it snows. Albedos of typical surfaces range from about 4 % for fresh asphalt and 15 % for green grass to 90 % for fresh snow.

SRA300-D1, SRA200-D1 and SRA100-D1 design

To create an albedometer, two sensors are combined with one AMF03 albedometer mounting kit. AMF03 includes a fixture with a rod for mounting purposes and a glare screen. The user assembles these modular components into an albedometer. The modular design facilitates maintenance and calibration.

Using the albedometer is easy. The instrument is composed of two pyranometers. The irradiance in W/m^2 is transmitted via the Modbus protocol over 2-wire RS-485. The working principle and specifications of the pyranometers can be found in the pyranometer user manuals. The pyranometers can be connected directly to commonly used data logging and SCADA systems.

Industrial-grade, high-accuracy and reliable

SRA300-D1 consists of two identical pyranometer models SR300-D1, one facing up, one facing down. SRA200-D1 consists of two SR200-D1's, SRA100-D1 consists of two SR100-D1's.

SR300-D1, SR200-D1 and SR100-D1 comply with – Industrial-grade – Immunity, Emission, Electrical, Environmental and Safety requirements for use in these outdoor and industrial environments, greatly improving measurement reliability. Ease of operation is further enhanced through extended functionality and diagnostics. See Table 1 for a comparison of the pyranometer properties.

Table 1: *The building blocks of SRA300-D1, SRA200-D1 and SRA100-D1 albedometers are respectively the SR300-D1, SR200-D1 and SR100-D1 pyranometers. In the table below, the main specifications are compared.*

INSTRUMENT SPECIFICATIONS			
	SR300-D1	**SR200-D1**	**SR100-D1**
ISO 9060:2018 classification	spectrally flat class A	spectrally flat class A	spectrally flat class B
IEC 61724-1:2021 compliance for solar irradiance measurement	meets Class A PV monitoring system requirements for all locations and climatic conditions	meets Class A PV monitoring system requirements for locations where dew and frost are expected for < 2 % of annual GHI hours	meets Class B PV monitoring system requirements for all locations and climatic conditions
Dew and frost mitigation	heating included	-	-
IEC 61724-1:2021 compliance for single axis tracker and pyranometer tilt angle measurement	meets Class A PV monitoring system requirements	-	-
Tilt measurement	Tilt measurement included	-	-
Manufacturer's estimate of achievable measurement accuracy for daily sums, following ASTM G213 uncertainty evaluation*	2.3 %	2.4 %	4.6 %
On-site diagnostics			
power and communication status LED	•	-	-
Remote diagnostics alerts			
instrument leakage	•	-	-
heating malfunction	•	-	-
change of tilt and rotation	•	-	-
Remote diagnostics measurements			
Internal humidity	•	•	•
Internal pressure	•	-	-
Instrument tilt and rotation	•	-	-

** in summer at mid-latitudes, instruments used under rated operating conditions, expanded measurement uncertainties k = 2*

SR300-D1

SR300-D1 is intended for deployment where the highest measurement reliability and accuracy are required. Most importantly, it is heated to mitigate dew and frost, and has an on-board tilt sensor.

Immunity to high voltages and currents - surges

SR300-D1, SR200-D1 and SR100-D1 are tested and classified for Industrial Environments according to IEC 61326-1 and IEC 61000-6-2. When designing a measuring system, pyranometer users may reach several levels of immunity. With the optional Surge Protection Device SPD01 this immunity can be increased to 4 kV.

Figure 2 *The SPD01 Surge Protection Device.*

Optional accessories

We offer accessories for use with the SRA300-D1, SRA200-D1 and SRA100-D1, including electrical and mounting hardware options.

- SPD01 Surge Protection Device to upgrade Surge Protection to level 4 (for up to 3 pyranometers) for cables longer than 3 meters
- ALF01 albedometer levelling fixture
- CMF01 crossarm mounting fixture

SRA300-D1, SRA200-D1 and SRA100-D1 specifications

Included	2 x SR300-D1 or 2 x SR200-D1 or 2 x SR100-D1 and 1 x AMF03
Measurand	global solar radiation and reflected solar radiation
Optional measurand	albedo or solar reflectance
Optional measurand	net solar radiation
Mounting	mounting rod with 15 x 10^{-3} m diameter
Rated operating temperature range	-40 to +80 °C
Standard cable length	3 m

EMC and Surge immunity *

Equipment classification	Industrial Equipment
Surge Immunity	Level 2, test level 1 kV
with optional SPD01	Level 4, test level 4 kV

Electrical Safety in the workplace

Safety compliance	EU Low Voltage Directive (2014/35/EU) USA National Electric Code (NFPA70)
Earthing terminal	included on instrument

Digital communication

Communication protocol	Modbus RTU
RS-485 isolation voltage	1.5 kV
Hardware interface	2-wire RS-485

AMF03

(1 x) glare screen
(1 x) AMF03 fixture with rod
(1 x) conical positioner
(2 x) M5x12 socket head cap screw
(1 x) M6x8 socket head cap screw
(2 x) M8x12 set screw (pre-mounted)
(1 x) mounting instruction sheet

* at standard cable length of 3 m

ALF01

ALF01 is a levelling tool that can be used with AMF03 to easily level the instrument. The ALF01 is mounted on a 1 inch outer diameter crossarm, and can be rotated around the tube axis for 360 ° as well as tilted over ± 2 °.

Figure 3 *ALF01 albedometer levelling tool.*

See also

- SR300-D1, SR200-D1 and SR100-D1 pyranometers
- SRA01 spectrally flat Class C albedometer for lower accuracy albedo measurements
- alternative instrument: NR01 for solar and longwave radiation balance
- introduction of SR300-D1 on our YouTube channel
- why ventilate and heat pyranometers
- view our complete range of solar sensors

Figure 4 *Using the SRA300-D1 albedometer is easy; the instrument is composed of one AMF03 and two SR300-D1 pyranometers.*

About Hukseflux

Hukseflux is the leading expert in measurement of energy transfer. We design and manufacture sensors and measuring systems that support the energy transition. We are market leaders in solar radiation and heat flux measurement.
Customers are served through our headquarters in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia and Japan.

Are you interested in this product?
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