# SRA30-M2-D1

## Digital Class A albedometer with heating and and tilt sensor

*SRA30-D1 digital spectrally flat Class A albedometer is an instrument that measures global and reflected solar radiation and the solar albedo, or solar reflectance. SRA30-M2-D1 is the most accurate albedometer available. It is heated for the best data availability. It is composed of one AMF03 albedometer mounting kit and two SR30-M2-D1 spectrally flat Class A pyranometers. This pyranometer is compliant in its standard configuration with the requirements for Class A PV monitoring systems of the IEC 61724-1 standard. Each pyranometer has a thermopile sensor, the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. AMF03 includes one glare screen, one mounting fixture with rod, mounting hardware and tools. SRA30 complies with the latest ISO and WMO standards. The modular design facilitates maintenance and calibration.*


**Figure 1** *SRA30-M2-D1 albedometer.*

### The best albedometer for the PV industry

SRA30-M2-D1 is the most accurate albedometer available. Its benefits:

- "spectrally flat" pyranometers, essential for albedo measurement
- heating included, complying with IEC 61724-1 Class A system requirements
- 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
- modular; calibrated as separate pyranometers

### Albedo and Albedometers

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.

An albedometer is an instrument composed of two pyranometers, the upfacing one measuring global solar radiation, the downfacing one measuring reflected solar radiation. You can then derive the solar albedo, or solar reflectance and net solar radiation.

### SRA30-M2-D1 design

SRA30-M2-D1 consists of two identical pyranometers model SR30-M2-D1, one facing up, one facing down. To create an SRA30-M2-D1, the two sensors are combined with one AMF03 albedometer mounting kit. AMF03 includes a fixture with rod for mounting purposes and a glare screen. The user assembles these modular components into an SRA30 albedometer. The modular design of SRA30 facilitates maintenance and calibration.

Using the SRA30 albedometer is easy. The instrument is composed of two SR30 spectrally flat Class A 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 SR30-M2-D1 user manual. SRA30 can be connected directly to commonly used datalogging systems.

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## Suggested use

- PV monitoring with bifacial solar modules
- high-accuracy meteorological observations

extreme climates (tropical / polar)

## Spectrally flat

For the reflected solar radiation measurement, it is essential to employ spectrally flat pyranometers; the reflected solar radiation has a different spectrum compared to the global solar radiation. SRA30 has spectrally flat sensors on board, they can measure global and relected solar radiation using the same instrument with the same calibration.

## Heated for high data availability

High data availability is attained by heating of the outer dome using ventilation between the inner and outer dome. This space forms a closed circuit together with the instrument body; ventilated air is not in contact with ambient air. RVH™ - Recirculating Ventilation and Heating - technology, developed by Hukseflux, mitigates dew and frost and is as effective as traditional ventilation systems, without the maintenance hassle and large footprint. The instrument has 2 heating modes; normal at < 3 W, and medium at < 0.65 W power.


**Figure 2** *Heated to counter frost and dew deposition: clear difference between a non-heated pyranometer (back) and SR30 with RVH™ technology (front).*

## SRA30-M2-D1 specifications

| | |
|---|---|
| Included | 2 x SR30-M2-D1, 1 x AMF03 |
| Measurand | global solar radiation and reflected solar radiation |
| Optional measurand | albedo or solar reflectance |
| Optional measurand | net solar radiation |
| Measurand | sensor tilt angle |
| IEC 61724-1 compliance | meets Class A PV monitoring system requirements |
| Calibration uncertainty | < 1.2 % (k = 2) |
| Heating | included |
| Ventilation | included |
| Mounting | mounting rod with 15 x $10^{-3}$ m diameter |
| Rated operating temperature range | -40 to +80 °C |

## SR30-M2-D1

| | |
|---|---|
| Included sensors | 2 x identical ISO 9060 spectrally flat Class A pyranometer SR30-M2-D1 |
| Output | digital Modbus RTU over RS-485 |
| Temperature response | < ± 0.4 % (-30 to +50 °C) |
| Temperature response test and directional response test | reports included |
| Standard cable length | 5 m (see options) |
| Power consumption | < 3 W at 12 VDC |
| Rated operating voltage range | 8 to 30 VDC |

## Digital communication

| | |
|---|---|
| Digital output | - irradiance in W/m²<br>- instrument body temperature in °C<br>- tilt angle in °<br>- internal humidity in %<br>- ventilator speed in RPM |
| Communication protocol | Modbus |
| Hardware interface | 2-wire (half duplex) RS-485 |

## AMF03

(1 x) glare screen
(1 x) 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 and fixation instruction sheet

- low power consumption:
  SR30-M2-D1 requires less than 3 W, compared to 10 W for traditional ventilation systems
- low maintenance:
  SR30 does not require filter cleaning or replacement

The dome of the SR30 pyranometer is heated by ventilating the area between the inner and outer dome. RVH™ is much more efficient than traditional ventilation, where most of the heat is carried away with the ventilation air. Recirculating ventilation is as effective in suppressing dew and frost deposition at less than 3 W as traditional ventilation is at 10 W. RVH™ technology keeps domes and sensor in perfect thermal equilibrium, which also leads to a reduction of zero offsets.

## Options

- longer cables, in multiples of 5 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 °.

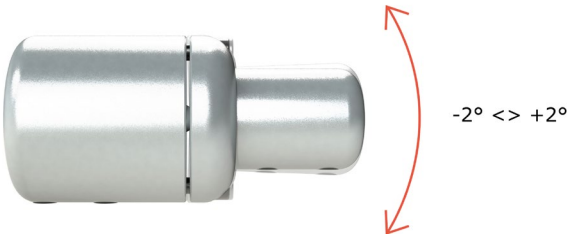


**Figure 3** *ALF01 albedometer levelling tool.*

## See also

- AMF03 albedometer mounting kit
- ALF01 albedometer levelling fixture
- CMF01 crossarm mounting fixture for albedometers
- SRA15-series Spectrally Flat Class B albedometer for lower accuracy albedo measurements
- SRA01 Spectrally Flat Class C albedometer for lower accuracy albedo measurements
- alternative instrument: NR01 for solar and longwave radiation balance

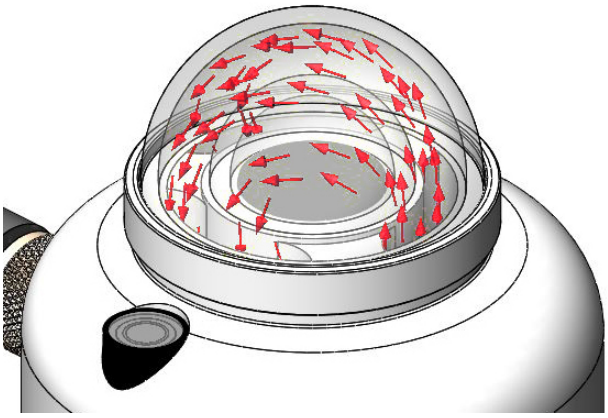

**Figure 4** *Heating, how it's done: recirculating ventilation and heating between the inner- and outer dome forming a closed circuit with the body is much more power-efficient than traditional ventilation systems.*

**Figure 5** *Using the SRA30 albedometer is easy; the instrument is composed of AMF03 and two SR30-M2-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 the main office in the Netherlands, and locally owned representations in the USA, Brazil, India, China, Southeast Asia and Japan.

Are you interested in this product?
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