

# SRD100

Industrial diffusometer: sensor for measurement of diffuse solar radiation

*The new SRD100 industrial diffusometer is designed to accurately measure diffuse irradiance. When combined with a pyranometer like the SR300-D1, users can separate the direct and diffuse components of solar radiation. SRD100 will typically be part of an IEC 61724-1 Class A PV performance monitoring system.*

- *no moving parts: utilises a static sensor array and unique shadow mask with a Fibonacci lattice*
- *industry-leading accuracy: fully-compliant with IEC61724-1 requirements for Class A monitoring systems*
- *digital connectivity: includes remote diagnostics and supports MODBUS communication over an RS-485 interface*
- *built-in heating: provides dew and frost mitigation for reliable operation in all climates*
- *optimised for PV: delivers high-accuracy measurements, specifically designed for clear-sky and partly cloudy conditions that are most relevant for PV applications*
- *can be used as spectrally matched reference device measuring the PV-usable portion of solar radiation*
- *rugged surge protection: integrated industrial-grade surge protection ensures durability under extreme PV power plant conditions, with an optional SPD01 Surge Protection Device available to upgrade to 4 kV*
- *global support network: backed by our worldwide service organisation for the lowest total cost of ownership*



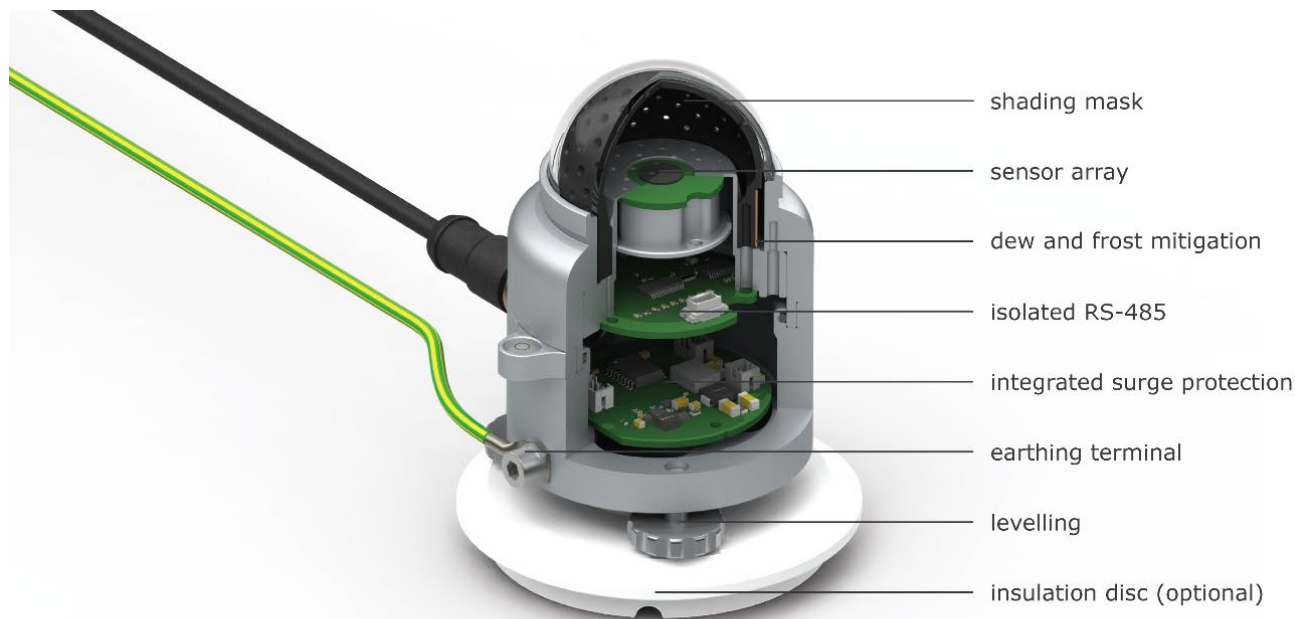
**Figure 1** SRD100 industrial diffusometer: sensor for measurement of diffuse solar radiation. Designed for PV power plants, with other applications in meteorology and building physics.

## SRD100: industrial-grade diffuse solar radiation measurement

Hukseflux introduces the SRD100 diffusometer, an advanced, all-digital, heated sensor engineered for reliable and accurate measurement of diffuse solar radiation. When paired with a pyranometer, the SRD100 provides a complete picture of solar irradiance, including both the direct and diffuse components for high-accuracy PV performance monitoring.

The SRD100 diffusometer is a new instrument, tailored for use in PV monitoring systems, but is also well-suited for other applications such as general meteorological monitoring and building physics.

The diffusometer complies with Industrial-grade Immunity, Emission, Electrical, Environmental, and Safety requirements for demanding outdoor and industrial conditions, greatly improving measurement reliability. The SRD100's extended functionality and diagnostics further enhance ease of operation.



**Figure 2** Inside the SRD100 diffusometer: a detailed look at the core components responsible for performance and durability under extreme conditions.

### How it works: diffuse solar radiation

The SRD100 diffusometer features a sensor array and half-sphere shadow mask above the array with a unique Fibonacci lattice hole pattern. All sensors are centrally located under the mask, ensuring that at least one sensor remains in the shade. This shaded sensor is near-homogeneously exposed only to diffuse sky, giving an accurate estimate of diffuse solar irradiance.

### Measuring direct solar radiation

When combined with a standard pyranometer, users can estimate direct solar radiation by subtracting the two measurements and dividing by the solar zenith angle, which is typically obtained using data from a GPS sensor.

### Optimised for clear sky and partly cloudy conditions

The SRD100 is calibrated under clear-sky conditions, ensuring the highest accuracy for blue skies. It is specifically optimised for conditions most relevant to PV applications, such as clear and partly cloudy skies. Measurement accuracy may be lower under grey overcast skies.

### Spectrally-matched solar irradiance

For PV performance data analysis, the SRD100 offers a key advantage: it qualifies as a spectrally-matched reference device, according to IEC 61724-1. Its sensor array is made of the same silicon as the most common PV modules, enabling a more accurate estimate of usable solar resources. When comparing SRD100 measurements to the output of silicon-based PV modules, users can claim to measure “spectrally-matched solar irradiance”, with a spectral response of silicon.

### PV System performance monitoring: IEC 61724-1 Class A compliant

The SRD100 diffusometer fully meets IEC requirements for diffuse radiation measurements in Class A PV system performance monitoring, without the need for additional accessories. The SRD100 includes:

- onboard heating for dew and frost mitigation
- sensor output traceable to both solar irradiance and spectrally matched solar irradiance



**Figure 3** Typical installation of SRD100, next to a normal Class A pyranometer, such as the SR300-D1.

### A modern alternative to shadow rings

The SRD100 offers a hassle-free alternative to conventional solutions for diffuse radiation measurement, such as a pyranometer with a shadow ring. Unlike shadow rings, the SRD100 does not require manual adjustment every 2-3 days, offering a low-maintenance solution.



**Figure 4** A traditional method for diffuse radiation measurement: using a pyranometer with a shadow ring. SRD100 offers a low-maintenance alternative.

### SRD100 specifications

Measurand	diffuse solar radiation in [W/m <sup>2</sup> ]
Optional measurand	spectrally matched diffuse solar irradiance in [W/m <sup>2</sup> ]
Spectral response	matched to silicon PV modules
IEC 61724-1:2021 compliance	meets Class A PV monitoring system requirements for diffuse solar irradiance in all locations and climatic conditions
Instrument diagnostics	heating, internal humidity included
Heating	included
Calibration certificate	included
Standard cable length	3 m
Uncertainty of calibration	< ± 10 %
Temperature response	<± 0.4 % (-30 to +50 °C)

### Rated operating conditions

Temperature range	-40 °C to +80 °C
Ingress Protection	IP67

### Power consumption

Heated	< 2 W (adjustable)
Unheated	< 0.5 W

### 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

\* at cable length of 3 m

## A simpler solution than pyrheliometers and rotating shadow bands

Direct and diffuse radiation may also be measured using pyrheliometers, shaded pyranometers, and pyranometers with rotating shadow bands. While these systems are ideal for scientific applications, they can only attain their potentially high levels of accuracy under ideal conditions. For example, pyrheliometers must be kept very clean – more so than pyranometers – and daily cleaning is recommended.

The diffuse and direct measurement with rotating shadow bands relies on post-processing of data. For example, a correction factor dependent on the solar zenith angle, to attain the best accuracy. With post-processing, the data lose their traceability, and thus, their bankability. Measurement with the SRD100 diffusometer and a standard pyranometer, is a less complicated, low-maintenance and a 100 % traceable alternative.



**Figure 5** A traditional solution for diffuse and direct solar radiation measurement: an automated, motor-driven dual-axis solar tracker equipped with a pyrheliometer and shaded pyranometer. SRD100 offers a low-maintenance and more robust (no-moving parts) alternative.

## Immunity to high voltages and currents – surge protection

The SRD100 diffuse solar radiation sensor is tested and certified for Industrial Environments per IEC 61326-1 and IEC 61000-6-2 standards. When designing a measuring system, SRD100 users can achieve several levels of immunity.

For enhanced protection, the optional Surge Protection Device (SPD01) increases immunity to 4 kV, protecting up to three pyranometers and diffusometers with a single unit. Alternatively, a third-party SPD with similar specifications may also be used.

## RS-485 isolation

The SRD100's RS-485 interface is galvanically isolated from both the internal electronics and the instrument body, with isolation barriers rated at 1.5 kV. This ensures reliable operation, greater flexibility in system design, and reduced integration costs for all industrial pyranometers and diffusometers.

## Remote diagnostics

In addition to solar irradiance, SRD100 provides several alerts and measurements for remote use, most importantly:

- alert: heating malfunction
- internal humidity

These remote diagnostics minimise the need for (un)scheduled field inspections.

## Optional accessories

We offer a range of accessories for the SRD100, including electrical and mounting hardware options. The SRD100's compact design and small footprint allow the device to be conveniently installed on standard pyranometer mounting plates.

- **SPD01** Surge Protection Device, (for 1 to 3 instruments) for cables longer than 3 meters and to upgrade Surge Protection to level 4
- **PID01** Pyranometer Insulation Disk, electrically insulates the instrument from the mounting platform with a spring-loaded design for easy levelling
- **LM01** spring-loaded levelling mount, simplifies installation with easy mounting, levelling, and instrument exchange on flat surfaces
- **TLM01** tube levelling mount with a set of bolts for secure mounting
- calibration certificate; customised with the customer's name and contact information
- **PMF01** and **PFM02** mounting fixtures, practical pyranometer mounting fixtures for easy installation in all climates and weather conditions

### See also

- [Pyranometer selection guide](#), find the right instrument for your needs
- [Market leading solar radiation sensors](#), explore our full selection of solar measurement solutions



**Figure 6** *Optional spring-loaded LM01 levelling mount (one part) and TLM01 tube mount (two parts) for the SRD100. Spring-loaded levelling is a major time-saver during installation.*

### 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 worldwide 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?  
E-mail us at: [info@hukseflux.com](mailto:info@hukseflux.com)



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### Industrial diffusometer: sensor for measurement of diffuse solar radiation

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#### No moving parts

- static sensor array
- unique shadow mask with a Fibonacci lattice

#### Best compliance with industrial standards

- designed to accurately measure diffuse irradiance as part of an IEC62724-1 Class A PV performance monitoring system
- equipment classification IEC 61000 series: industrial equipment
  - surge immunity IEC 61000-4-5 Level 2
- meets compliance with local (US, EU) electrical safety regulations



#### Best accuracy and data availability

- reliable isolated RS-485 interface
- mitigates dew and frost
- accuracy optimised for clear-sky and partly cloudy conditions, most relevant to PV applications
- enhanced accuracy when used as spectrally matched reference device



#### Best diagnostics

- remote diagnostics
  - MODBUS communication protocol over RS-485 interface



#### Easy levelling

- easily visible bubble level
- optional spring-loaded levelling mount
- simple mounting, levelling, and instrument exchange



#### Lowest total cost of ownership

- supported by our worldwide service organisation
  - engineered to minimise risk of damage
- user-friendly diagnostics and levelling save valuable O & M time

