SR300-D1

Industrial Class A pyranometer with heating and tilt sensor

Hukseflux is proud to introduce SR300-D1. Succeeding our market-leading SR30 model, SR300-D1 is further optimised for use on PV power plants. The sensor complies with the industrial-grade requirements for sensor surge immunity and installation safety. SR300-D1 is intended for deployment where the highest measurement reliability and accuracy are required.

- *designed for IEC 61724-1 Class A compliant PV system performance monitoring*
- *internal heating for dew and frost mitigation in all climates*
- *integrated surge protection, designed to withstand the extreme conditions encountered on PV power, plants upgradable to 4 kV with optional SPD01 Surge Protection Device*
- *RS-485 isolation: Galvanic isolation, for reliable operation and flexibility in system design*
- *compliant with IEC 61326-1 "Industrial equipment" – rated for Industrial Electromagnetic Environments*
- *enables system designers to comply with local safety regulations*
- *supported by a worldwide calibration organisation for the lowest total cost of ownership*

Figure 1 *SR300-D1: Industrial Class A pyranometer. Designed for use on PV power plants.*

SR300-D1

Hukseflux introduces "industrial-grade" solar radiation monitoring! The all-digital heated SR300-D1 pyranometer is engineered to measure solar radiation with the utmost reliability and measurement accuracy. SR300-D1 is the successor to our SR30-M2-D1 pyranometer, renowned worldwide as the ideal instrument for use in PV system performance monitoring.

SR300-D1 continues to provide the measurement accuracy of the SR30. It may look like it as well, but in many ways the SR300-D1 is a completely new instrument, tailored for use in PV monitoring systems.

SR300-D1 complies with – Industrial-grade – Immunity, Emission, Electrical, Environmental and Safety requirements for use in outdoor industrial environments, greatly improving measurement reliability.
Ease of operation is further enhanced through extended functionality and diagnostics.

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

SR300-D1 complies with IEC requirements for "Class A" PV system performance monitoring, without the need for additional accessories. It includes:

- onboard heating for dew and frost mitigation
- accredited pyranometer calibration within the required uncertainty limit
- calibrated tilt sensor accurate within ± 1 ° as required for single axis tracker fault detection and pyranometer tilt measurement

Figure 2 *Two SR300-D1 pyranometers, one tilted for Plane of Array (POA) measurement, and another mounted horizontally for Global Horizontal Irradiance (GHI) measurement.*

Immunity to high voltages and currents - surges

SR300-D1 is tested and classified for Industrial Environments according to IEC 61326-1 and IEC 61000-6-2. When designing a measuring system, SR300-D1 users may reach several levels of immunity.

With the optional Surge Protection Device SPD01 this immunity can be increased to 4 kV. Up to 3 pyranometers can be protected with a single SPD01. A third-party SPD with similar specifications may be used instead.

To attain the required level of immunity for a given installation, some general system components should be included, such as:

- lightning protection system
- earthing and grounding network
- external surge protection in addition to the native on-board sensor protection

Figure 3 *The SPD01 Surge Protection Device.*

RS-485 isolation

The RS-485 interface of the industrial pyranometers is galvanically isolated from the internal electronics as well as from the instrument body. Both isolation barriers are rated at 1.5 kV. This contributes to reliable operation, flexibility in system design and reduced integration costs for all industrial pyranometers.

Electrical safety in the workplace

A PV power plant is a potentially hazardous workplace environment. To comply with safety regulations, SR300-D1 features a dedicated earthing terminal for connection to protective earth. When the pyranometer is isolated from the mounting platform, it should still be properly earthed via this terminal. SR300-D1 allows system designers to comply with safety regulations. These are often based on EU and US electrical safety standards such as:

- EN-50110 Operation of Electrical Installations
- NFPA 70 National Electrical Code (NEC)

Figure 4 *Lowest cost of ownership: make use of the worldwide Hukseflux calibration organisation.*

Hukseflux
Thermal Sensors

Lowest total cost of ownership

Customers prefer Hukseflux pyranometers for their unsurpassed measurement accuracy and lowest cost of ownership. Total ownership costs are primarily determined by installation, on-site inspection, accidental damage, and calibration.

- coordinating internal and external protection and isolation reduces the requirements and costs for added protection devices
- preventive measures such as surge protection and dome protection help reduce the risk of accidental damage
- pyranometers must be calibrated every 2 years. Our worldwide calibration organisation helps reduce calibration costs by simplifying return logistics and turnaround times. Learn more about pyranometer calibration services
- O & M saves time using built-in remote and on-site sensor diagnostics and spring-loaded levelling

Tilt angle measurement

For PV systems with single-axis trackers, IEC 61724-1:2021 Class A systems also require a tilt angle measurement. The sensor used for this is an accelerometer. Every SR300-D1 accelerometer is individually calibrated, and temperature compensated from -30 to +50 °C, resulting in a high accuracy measurement in compliance with the required accuracy of ± 1 °. The acceleration components x, y and z can separately be read out to provide additional information about the instrument orientation.

Heated for high data availability, operation in 3 power modes

SR300-D1 includes a heater. Heating mitigates dew and frost, leading to high data availability.

SR300-D1 specifications

Measurand	hemispherical solar radiation
Measurand	sensor tilt angle (3 components x, y, z)
ISO 9060:2018 classification	spectrally flat Class A
IEC 61724-1:2021 Compliance	meets class A PV monitoring system requirements - for solar irradiance for all locations and climatic conditions - for single axis tracker and pyranometer tilt angle measurement
Dome protector	included (model DP01)
Status LED	power & communication
Instrument diagnostics	leakage, tilt, rotation, heating, internal humidity
Heating	included
Calibration certificate	included (content limited according to ISO/IEC 17025, section 7.8.1.3)
Temperature response test of individual instrument	report included
Temperature response	< ± 0.4 % (-30 to +50 °C)
Directional response test of individual instrument	report included to 95 °
Accelerometer test of individual instrument	report included
Tilt measurement uncertainty	± 1 ° (0 to 180 °) (-30 to +50 °C)
Available cable lengths	3, 5, 10 or 20 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

Operation in 3 power modes **

Normal -heated, ventilated	< 3 W
Medium -unheated, ventilated	< 1 W
Low -unheated, unventilated	< 0.5 W

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, ** @ 24 VDC

Figure 5 *Heating counters frost and dew deposition: clear difference between a heated and non-heated pyranometer.*

SR300-D1 can be operated in 3 power modes. Overall performance in all 3 modes complies with ISO 9060 Class A classification criteria. This allows users to conserve power and continue the measurement, also when the system operating power is limited.

- normal, < 3 W heated / ventilated for optimal dew and frost mitigation
- medium, < 1 W unheated / ventilated for high accuracy measurement, when dew and frost are not an issue
- low, < 0.5 W unheated / unventilated to save power

Remote diagnostics

In addition to solar irradiance, SR300-D1 outputs several alerts and measurements for remote use, most importantly:

- alert: instrument leakage
- alert: change of tilt and rotation
- alert: heating malfunction
- internal humidity
- internal pressure
- instrument tilt and rotation

Remote diagnostics reduces the need for (un)scheduled field inspection.

On-site diagnostics: status LED

The status LED provides visual feedback to a local operator. On-site, users have immediate information on instrument power and data traffic. This is especially useful during installation and field inspections.

Optional accessories

We offer accessories for use with the SR300-D1, including electrical and mounting hardware options.

- 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 Isolation Disc, electrically insulating the instrument from the mounting platform, spring-loaded for easy levelling
- LM01 spring-loaded levelling mount; a practical mount for easy mounting, levelling, and instrument exchange on flat surfaces
- TLM01 tube levelling mount with a set of bolts
- calibration certificate including customer name and contact information
- DP01 dome protector, set of 5 pieces
- AMF03 albedometer fixture
- PMF01 and PFM02 mounting fixtures

Figure 6 *Optional spring-loaded levelling and tube mount for SR300-D1. LM01 levelling mount (one part), TLM01 tube mounted (2 parts). Spring-loaded levelling is a major time-saver during installation.*

Figure 7 *Two SR300-D1 pyranometers that are connected to the SPD01 Surge Protection Device. With the optional SPD01, you can upgrade surge immunity to Level 4.*

See also

- SRA300 albedometer consisting of two SR300-D1 pyranometers and one AMF03 mounting kit
- consult our pyranometer selection guide
- introduction of SR300-D1 on our YouTube channel
- why ventilate and heat pyranometers
- view our complete range of solar sensors

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?
E-mail us at: info@hukseflux.com

Hukseflux Thermal Sensors

30 YEARS OF INNOVATION

SR300-D1

Industrial Class A pyranometer with heating and tilt sensor

Successor to the market-leading SR30 model, our latest SR300 pyranometer is ideally suited for use in PV system performance testing and in research-grade meteorological monitoring. SR300 is suitable for use in these outdoor and industrial environments, and complies with relevant surge immunity and EMC specifications. Customers prefer Hukseflux pyranometers for their unsurpassed measurement accuracy and lowest total cost of ownership.

Best compliance with industrial standards

- complies with IEC 61724-1 Class A requirements for all locations and climatic conditions
- Equipment classification IEC 61000 series: industrial equipment
- Surge immunity IEC 61000-4-5 Level 2
- allows compliance local (US, EU) electrical safety regulations
- calibrated tilt measurement, compliant with IEC 61724-1

Best paperwork

- all ISO 9060-required reports with every individual sensor
- temperature response testing from -30 to 50 °C
- full directional response testing from 0 to 95°
- tilt sensor calibration (0 to 180 ° tilt, -30 to + 50 °C)

Best accuracy and data availability

- ISO 9060 Class A
- spectrally flat
- reliable isolated RS-485 interface
- mitigates dew and frost
- lowest zero offsets
- no external ventilator required

Best diagnostics

- status LED
- tilt measurement
- alert: instrument leakage
- alert: heating malfunction
- alert: change of tilt and rotation

Tilt sensor and levelling

- remote check using on-board tilt sensor
- window for visible bubble level
- with optional spring-loaded levelling mount
- easy mounting, levelling, and instrument exchange

Lowest total cost of ownership

- efficient worldwide calibration services
- reduced cost of system integration
- designed to minimise risk of damage
- practical diagnostics and levelling save O & M time