

Hukx pyranometer selection guide

Next-level instruments for every application

As the market-leading pyranometer supplier, Hukx provides general guidelines for choosing the right **pyranometer** for your needs. Main applications include: PV system performance monitoring (according to IEC 61724-1), meteorological networks, and diffuse radiation measurement. Customers prefer Hukx pyranometers for their unsurpassed measurement accuracy and lowest total cost of ownership.



Figure 1 SR300-D1 pyranometers, our most popular solution for PV system performance monitoring, according to IEC 61724-1 Class A.



Figure 2 Example of a Hukx spectrally flat Class A pyranometer, SR300-D1. This model is recommended for PV system performance monitoring as well as research-grade diffuse radiation measurement. Digital output via Modbus RTU over RS-485.

The right instrument for your application

Choosing the right instrument for your application might seem complex, but we are here to help. First, consider these questions:

- Are there standards for my application?
- What level of accuracy do I need?
- What maintenance will be available?
- What mounting options exist?
- How much electrical power is available?
- What sensor output does my measurement/ data acquisition system require?

Your response will help us recommend the best-suited pyranometer, including:

- pyranometer class
- maintenance and calibration policy
- estimated measurement accuracy
- electrical interfacing
- power requirements
- mechanical mounting configuration





Hukx pyranometer benefits

Hukx is the world's leading pyranometer manufacturer, in both technology and market share. We offer the right pyranometer for every application and budget. With Hukx, you can rely on the best measurement accuracy in every class. Thanks to our superior instrument design, you can expect:

- unparalleled accuracy in every class
- exceptional reliability, ensuring consistent performance over time
- lowest cost of ownership, by minimizing maintenance costs and extending the product life span

Table 1 provides an overview of pyranometers and the most common considerations for choosing the right instrument for your application. More information on key criteria can be found throughout the rest of this document.

Table 1 The most common considerations when choosing a pyranometer for applications in PV system performance monitoring, meteorological networks, and diffuse solar radiation measurement.

				
	SR300-D1	SR200-D1	SR100-D1	SR05-D1A3
ISO 9060 classification	spectrally flat Class A	spectrally flat Class A	spectrally flat Class B	spectrally flat Class C
IEC 61724-1 suitability for PV monitoring system class	Class A for POA and GHI, for all locations and climatic conditions Class A for POA ^{REAR} and albedo	Class A for POA and GHI, for locations where dew and frost are expected for less than 2 % of annual GHI hours Class A for POA ^{REAR} and albedo	Class B for POA and GHI Class A for POA ^{REAR} and albedo	Class B for POA and GHI Class A for POA ^{REAR} and albedo
diagnostics in data stream: alerts	alerts for: – instrument leakage – change of tilt – change of rotation – heating and ventilation malfunction – high internal humidity	alerts for: – high internal humidity	alerts for: – high internal humidity	no alerts
heating to mitigate dew and frost/ improve data availability	heated	not heated	not heated	not heated

tilt sensor included	yes	no	no	no
surge immunity and EMC	IEC 61326-1 equipment classification: Industrial Equipment	IEC 61326-1 equipment classification: Industrial Equipment	IEC 61326-1 equipment classification: Industrial Equipment	
PV system performance monitoring	+++++	+	-	-
high-accuracy meteorological networks	+++++	++++	+++	-
agro-meteorological networks	+	+	++	++++
diffuse radiation reference (low offset)	+++++	+++	++	-
reflected radiation/albedo measurement (spectrally flat)	+++++	++++	+++	++

Highest accuracy in every class

Pyranometers are classified according to [ISO 9060](#) in 3 accuracy classes: Class A, Class B, and Class C.

At Hukx, we only supply "spectrally flat" version as they measure accurately under all conditions and can easily be calibrated. From Class C to Class B and from Class B to Class A, the achievable accuracy improves by a factor of 2.

As a general rule, the higher the required accuracy:

- the higher the cost of the instrument
- the higher the required level of maintenance (e.g., cleaning)
- the higher the required accuracy of calibration

Uncertainty evaluation

The ASTM G213-17 provides guidance and recommended practices for evaluating uncertainties when performing outdoor measurements with pyranometers. The ASTM standard follows the ISO Guide 98.

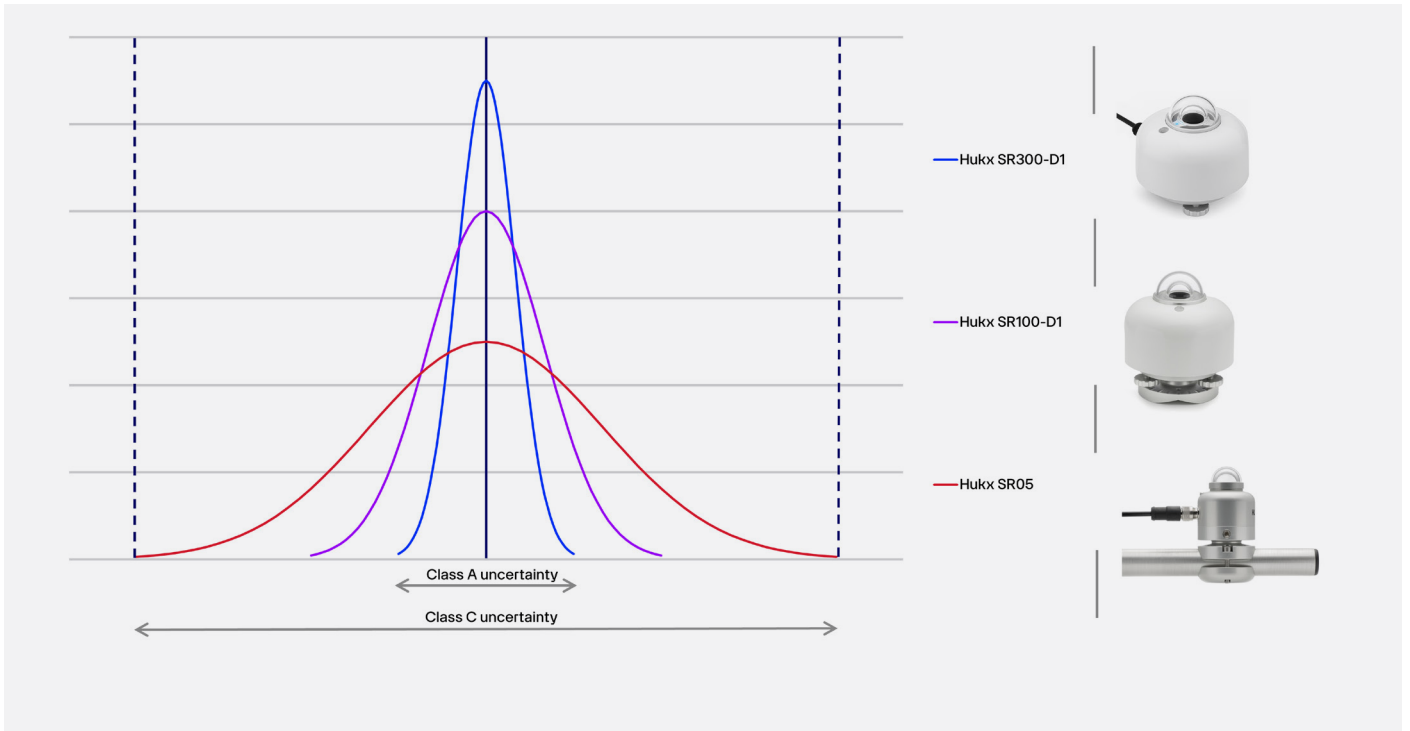


Figure 3 Impression of measurement uncertainty for well-maintained pyranometers of different ISO 9060:2018 classes. From Class C to Class B and from Class B to Class A, the achievable accuracy improves by a factor of 2.

Highest reliability: immunity to high impulse voltages and currents; surges

SR300-D1, SR200-D1, and SR100-D1 are classified for use in 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. Up to 3 pyranometers can be protected with a single SPD01. A third-party SPD with similar specifications may also be used.

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 4 The SPD01 Surge Protection Device.

Lowest total cost of ownership

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

- **fewer external components:** Internal protection and isolation reduce the requirements and costs for added external protection devices.
- **minimize risk of damage:** Preventive measures, such as surge protection and dome protection, lower the risk of accidental damage.
- **worldwide calibration organization:** Pyranometers must be calibrated every 2 years. Our worldwide calibration organization reduces calibration costs by simplifying return logistics and turnaround times. Learn more about [pyranometer calibration services](#).

- **efficient O&M:** Minimize inspection with built-in remote sensor diagnostics and quickly install using spring-loaded levelling and (for SR300-D1) on-site status-LED diagnostics

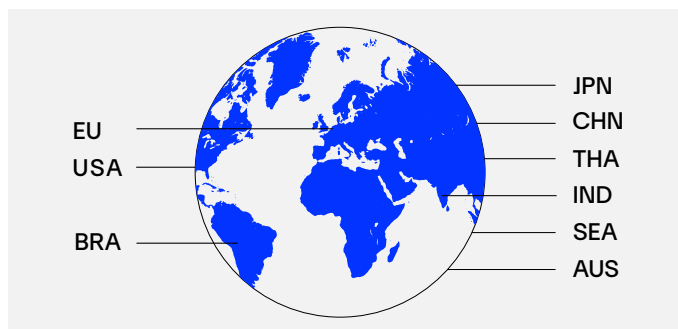


Figure 5 Lowest cost of ownership: make use of Hukx's worldwide calibration organization to reduce calibration costs.

Use in PV monitoring: IEC 61724-1

For high-accuracy PV system performance monitoring, IEC 61724-1:2021 *Photovoltaic System Performance Monitoring—Guidelines for Measurement, Data Exchange and Analysis* requires dew and frost mitigation.

SR300-D1 complies, for both Plane of Array (POA) and Global Horizontal Irradiance (GHI), without the need for additional accessories. For Reflected Horizontal Irradiance (RHI) and Rear-side Plane of Array irradiance (POA^{REAR}), lower class instruments may be used.

Read more about PV monitoring according to IEC 61724-1 in our application note: [The IEC 61724-1:2021 standard for PV monitoring systems: a quick explanation](#).

Use in meteorological networks

In WMO-No. 8, [Guide to Meteorological Instruments and Methods of Observation](#), WMO recommends the use of spectrally flat Class B or “good quality” pyranometers, such as the Hukx model SR100-D1 for network operation. Modern networks often use one level higher: spectrally flat Class A, for example our models [SR300-D1](#) and [SR200-D1](#).

Hukx's sensors have passed validation and acceptance testing for many National Meteorological Networks. Here are our references* from 2013 to 2025:

- India: National Institute of Wind Energy (NIWE) solar resource assessment network
- USA: National Ecological Observatory Network (NEON), observation network
- UK: Centre for Ecology & Hydrology (CEH), measurement / monitoring network
- India: India Meteorological Department (IMD), national measurement network
- Japan: Japan Meteorological Agency (JMA), national measurement network
- China: China Meteorological Administration (CMA), national measurement network, through a technology transfer project.
- Ecuador: National Meteorological and Hydrological Institute (INAMHI), national measurement network
- USA: The Atmospheric Radiation Measurement (ARM) multi-laboratory network of the U.S. Department of Energy (DOE)
- India: Defence Geo-Informatics Research Establishment (DGRE) climate observation network in the Indian Himalayas

*NOTE: A sensor being tested or used in a network does not constitute a formal endorsement by the test institute or network owner.

Use for diffuse radiation measurement

Diffuse solar radiation can be measured by **diffusometers**, such as our **SRD100-D1** (Figure 6) or shaded pyranometers. For the latter, the dominant measurement error is the zero offset A.

SR300-D1, equipped with internal ventilation, has very low offsets. It outperforms the quartz dome instruments, traditionally used for this purpose, at a much lower cost level.



Instrument cleaning and calibration

The performance of high-class instruments heavily depends on cleaning. At a low maintenance level, the achievable accuracy will not be reliably attained. Consider using multiple instruments as the use of redundant instruments allows for remote checks of one instrument using the other as a reference, leading to a higher measurement reliability.

For lower-class instruments, the relative loss of accuracy at a low maintenance level is less significant. At low maintenance intervals, the use of multiple low-class instruments is a good alternative to using a single high-class instrument.

Electrical interfacing

We can assist you in optimizing the interfacing of the pyranometer to your data collection platform. Solutions vary from using a data logger as a local connection point for several different sensors to using transmitters incorporated in the pyranometer.

For the solar PV industry and meteorological networks, the ideal solution is the SR300-D1 pyranometer. Key features of this model include digital output and sensor communication using the industry-standard Modbus RTU protocol over 2-wire RS-485.

Mounting accessories

Hukx offers a full range of practical brackets for mounting, leveling, and electrically insulating pyranometers that make installation and leveling easy.

The most common mounting accessories:

- spring-loaded or ball pyranometer leveling; time saver for the OEM crew
- a mounting fixture that electrically insulates the pyranometer body from the mounting structure
- mounting brackets for vertical masts, horizontal crossarms, and flat walls
- mounting fixtures to construct albedometers from 2 pyranometers

See also

Hukx offers a complete range of pyranometers. Take a look at our **solar radiation sensors**, accessories, and related services.

Figure 6 SRD100 industrial diffusometer: sensor for the measurement of diffuse solar radiation. Designed for PV power plants, with other applications in meteorology and building physics.

About Hukx

Hukx is the leading innovator in solar radiation and heat flux sensor technology. We are proud to set the standard in high-accuracy measurement, and to be working at the heart of the energy transition.

Customers worldwide rely on our bestselling pyranometers and heat flux sensors. From sensor design and selection to supply and recalibration, we support you across the entire lifecycle.

Hukx is headquartered in the Netherlands, with locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia, and Japan.

Let us help you select the best sensor for your application. Get in touch with our experts today via: info@hukx.com

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