MS-80SH installed at the EKO Inashiki Solar Park, Japan

Upgrade your expectations

Any type of weather can have a detrimental effect on the efficiency of PV systems, not least dew and frost. So how can the resistance of monitoring systems to these conditions be improved while ensuring accuracy, speed and data reliability? Dmytro Podolskyy reveals the latest solution from EKO Instruments.

Why worry about dew and frost?

Similar to the effects of 'soiling'; the accumulation of material on PV panels, usually dust, leaves, or bird droppings; dew and frost can have a negative impact on energy production and optical measurements performed at PV sites and the measured irradiance values of pyranometers by reflecting, blocking or absorbing solar irradiance.

Dew and frost can become a daily problem in certain climates or at certain times of the year. Unlike dust or grime, however, dew and frost dissipate naturally over time, sometimes quite quickly. When the sensors and monitoring systems used to manage solar parks are affected too, it can become difficult to make an accurate assessment, gauge the impact on potential yields or make decisions about cleaning and maintenance.

Dew and frost form on the dome of a

pyranometer, owing to radiative cooling at night and can lead to measurement errors, particularly early in the morning. Class A monitoring solutions compliant with IEC 61724-1:2021 are required to suppress dew and frost deposition, to ensure accuracy.

EKO Instruments has introduced the MS-80SH Class A Pyranometer, a new solution with integrated dome heating and the lowest power consumption of any comparable ISO 9060:2018 Class A & IEC 61724-1:2021 Class A monitoring compliant pyranometer.

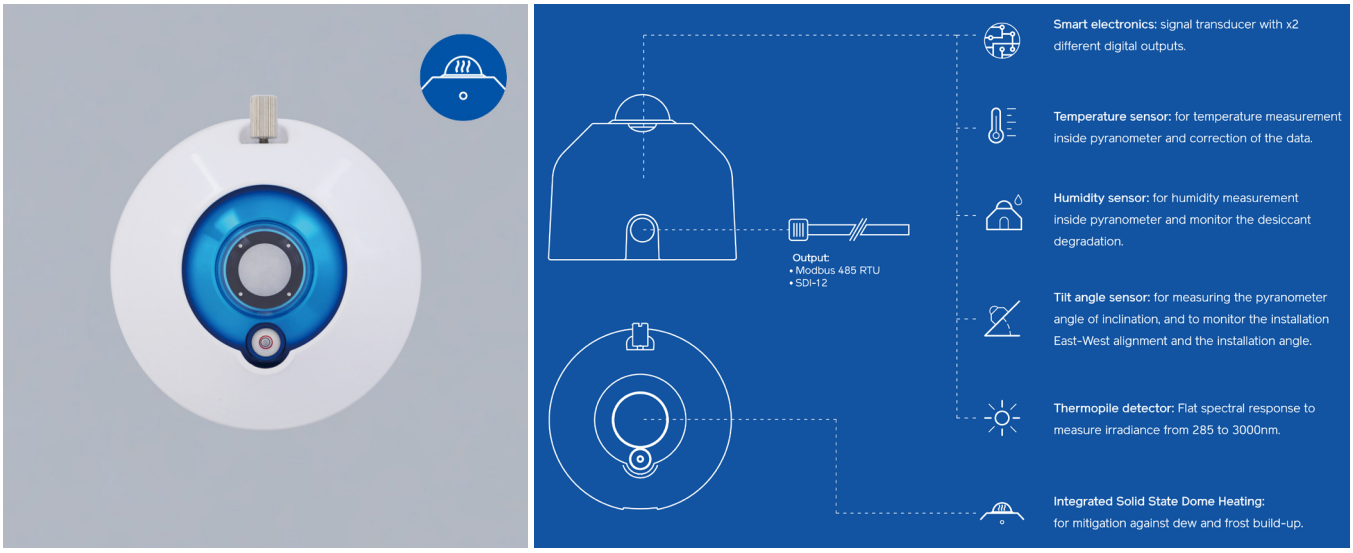
The MS-80SH is the next iteration in EKO's industry-leading MS-80 series of Class A pyranometers. Building on the revolutionary design of the MS-80, launched in 2016 and the MS-80S in 2019, the MS-80SH includes a new energy-efficient, user-controlled, integrated solid-state dome heating system for active dew and frost resistance.

Designed for photovoltaic system performance monitoring, scientific research, and industrial applications, the original MS-80 pyranometer with a compact single dome, isolated thermopile detector and Quartz diffuser technology, set new industry standards on launch in 2016. 'Fast-response' and 'spectrally flat', with unprecedented low zero-offset behaviour, and a five-year recalibration interval, the MS-80 remains one of the best-in-class sensors for accuracy, speed and reliability.

The MS-80S, introduced in 2019, added internal diagnostic sensors for remote visibility over internal temperature, humidity, tilt and roll angle; and Level A EMI/EMC electronic surge filters. Together, these features help ensure optimum sensor performance without regular physical checks, an ideal solution for photovoltaic systems, in hard-to-reach locations, and monitoring stations with restricted access.

The MS-80SH, building on the patented design of the MS-80 and the advanced diagnostics and features of the MS-80S, adds a high-efficiency, solid-state

A pyranometer with no heating system affected by frost deposition



MS-80SH Class A Pyranometer with integrated dome heating

integrated dome heating system that can be switched on and off via EKO's free-to-download 'Hibi' app. The new heating system uses less than <1.4W when it is switched on and is designed to actively resist the build-up of dew and frost on the compact sensor dome, compliant with IEC 61724-1:2021 Class A monitoring.

While external heating units like EKO's own MV-01 Ventilator & Heater, compatible with all MS & S-Series sensors and proven against dew, frost and snow in all conditions, are effective, they often require a lot of power. Many, set in remote locations or in large applications, are always on, creating a constant drag and drain on the power being generated.

And while the MV-01 and heating system in the MS-80SH have been carefully designed to avoid affecting the thermopile sensor in our pyranometers, the heaters used in other brand pyranometers can lead to offsets in measured values, and lower accuracy.

As PV sites have grown in size and complexity, the need for an alternative, in-built, low-power heating solution for pyranometers has grown too, especially in cases where the solar radiation monitoring system is battery powered or in a remote location.

The MS-80SH was designed to meet these challenges, giving users the class and industry-leading accuracy they have come to expect from EKO with a dome heating system that uses significantly less power than any comparable Class A pyranometer on the market.

These features make the MS-80SH ideal for complex networks, hard-to-reach locations, monitoring networks with restricted access or areas prone to dew, frost and variable weather conditions.

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ISO 9060:2018 Parameters	Class A Requirements	MS-80SH
Response Time	< 10 s	< 0.5 s
Zero Offset a	±7 W/m²	±1 W/m²
Zero Offset b	±2 W/m²	±1 W/m²
Non-Stability	±0.8 %	±0.5 % (5-Years)
Non-Linearity	±0.5 %	±0.2 %
Directional Response	±10 W/m²	±10 W/m²
Spectral Error	±0.5 %	±0.2 %
Temperature Response	±1 %	±0.5 %
Tilt Response	±0.5 %	±0.2 %
Additional Signal Processing Errors	±2 W/m²	±1 W/m²
ISO 9060:2018 Sub-Categories		
Fast Response (< 0.5 s)		✓
Spectrally Flat		✓
MS-80SH Technical Features		
Power Consumption (Heating On)		MAX 1.4W
Output		Modbus, SDI-12
Spectral Range		285 to 3000 nm
Operating Temperature Range		-40 to 80°C

Biography

Dmytro Podolskyy is Business Development Manager at EKO Instruments EU. He graduated from TU Delft with a degree in Applied Physics and Nanotechnology and has since gone on to support industrial solar initiatives and scientific research projects around the world.