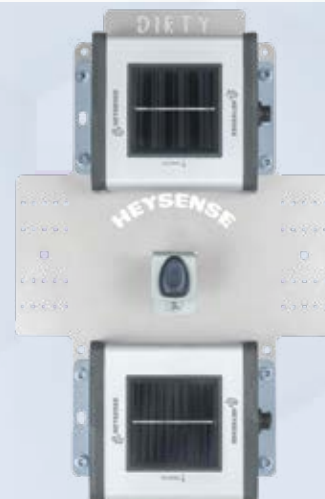




The Automatic Soiling Sensor

MODEL NO: HS-SMS009



OVERVIEW

The Soiling station HS-SMS009 is a useful device for maintaining solar panel efficiency! By detecting and quantifying the amount of dust accumulation, the Automatic Soiling Sensor helps ensure that solar panels are operating at their peak performance. It's especially valuable for large-scale commercial and industrial solar installations, where even small losses in efficiency can add up over time.

The 10% soiling rate represents a significant energy loss, so this kind of monitoring can help businesses decide when cleaning or maintenance is needed. It not only saves energy but also prolongs the life of the panels by preventing potential long-term damage from dirt buildup.

WORKING PRINCIPLE

The two irradiance sensors—one for “clean” and one for “dirty” panels—seem to serve as a direct comparison mechanism. The clean sensor would measure the amount of sunlight hitting the panels when they are free from dirt, while the dirty sensor measures the irradiance when dust has accumulated. By comparing the two, the system can estimate the degree of energy loss due to soiling.

This approach of using a clean and dirty irradiance sensor is quite clever and aligns with best practices for monitoring and assessing solar panel performance. The fact that the clean sensor is maintained with daily cleaning, while the dirty sensor accumulates dust under actual field conditions, ensures that the data comparison is as close to real-world conditions as possible.

The use of specialized software to filter and compare data between the two sensors is key to obtaining accurate measurements. By excluding low irradiance values and unstable weather conditions, the system can more reliably calculate the soiling rate according to the IEC 61724 standard. This standard is well-regarded in the solar industry for evaluating the performance of PV systems, ensuring that the soiling rate reflects actual energy losses without being skewed by variables like weather fluctuations.

The automatic calculation of a daily average soiling rate within a ± 2 -hour window from local noon is another excellent touch. It makes the measurement period consistent and reduces the impact of shadows or angle variations that could affect irradiance outside those hours.

The data storage feature for up to one year is also quite valuable. This allows for historical tracking of soiling trends, which can help with maintenance scheduling, performance forecasting, and identifying long-term patterns in dust accumulation based on environmental factors.



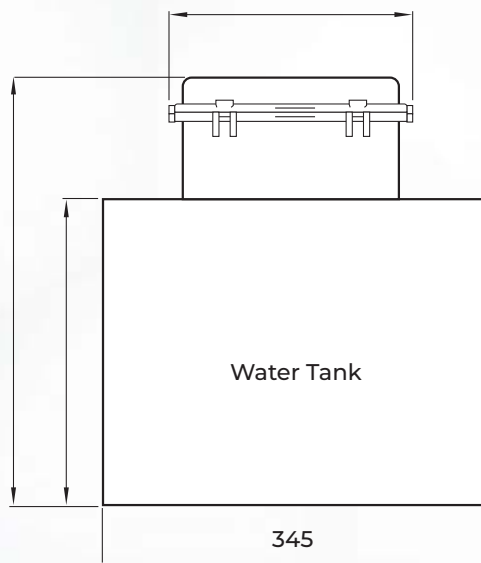
AUTOMATIC CLEANING SYSTEM

The water tank with the pump that performs cleaning adds an automated aspect to the process, ensuring that the panels are periodically cleaned based on the soiling levels detected. This can greatly reduce manual labor and minimize the downtime of the system.

The electronic panel housing the sensors likely acts as the brain of the system, processing the data from the sensors and controlling the cleaning process based on the detected soiling levels. This allows for precise energy-saving actions, helping optimize the solar panel's efficiency.

The Automatic Soiling Sensor includes two irradiance sensors, one defined as 'clean' and the other as 'dirty', a water tank with a pump that performs the cleaning process, and an electronic panel housing the sensor's electronic components.

According to the sensor's measurement principle, the dirty irradiance sensor is left to accumulate dust under the same conditions as the solar panels in the field, while the clean irradiance sensor is cleaned daily by an automatic cleaning system. The sensor, utilizing its specialized software, filters and compares data received from the dirty and clean irradiance sensors to calculate a soiling rate in compliance with the IEC 61724 standard. According to this standard, the soiling rate should be calculated as a single daily average value within the time range of ± 2 hours from local noon, excluding low irradiance values and unstable weather conditions. Additionally, the Automatic Soiling Sensor stores the collected data for one year, allowing the user to get the backup of this data at any time.



INTEGRATION

The Automatic Soiling Sensor to interface with existing systems like dataloggers, SCADA, and PLCs that use the Modbus protocol, the system becomes highly adaptable and can fit seamlessly into a wide variety of existing solar infrastructure.

This makes it easier for businesses and facilities to incorporate the sensor into their current monitoring and control frameworks without needing to make significant changes or invest in new technologies.

The use of Gateway models in cases where no existing system is available or a specific monitoring solution is needed is a smart move. These Gateway models can essentially act as standalone solutions, making the sensor system more versatile. This ensures that users can still benefit from soiling monitoring and data analysis, even if their existing infrastructure doesn't support Modbus directly.



The integration with the V-Sensor monitoring system provides a user-friendly way to track the data remotely over the internet. This is ideal for commercial and industrial setups where the ability to monitor solar panel performance from a central location or on-the-go can significantly enhance operational efficiency. The monitoring page built into the V-Sensor system likely provides a detailed view of the soiling rate, energy losses, and possibly even maintenance suggestions based on the collected data.

The option for different power supply models adds another level of flexibility, ensuring that the system can be adapted to different operational environments and power requirements.

Overall, it seems like the Automatic Soiling Sensor, with its integration options, provides a comprehensive and adaptable solution for monitoring and maintaining the efficiency of solar panel systems. Are there any additional monitoring or alerting features in the V-Sensor system, such as notifications or thresholds for cleaning interventions.



Model Number	HS-SMS009
Soiling Ratio	0% - 100%
Resolution	0.10%
Uncertainty	≤ 1%
Data Output	RS485 up to 38400 Baud
Communication Protocol	Modbus RTU
Output Rate	1 s
Operating Temperature Range	-20°C - 85°C
Operating Humidity Range	0% - 100% RH
Power Supply	24V 5A DC
Power Consumption	Pump Passive: Max. 20 mA @ 24V DC Pump Active: Max. 3 A @ 24V DC
Communication Cable	3 m LI2Y(st)C11Y PUR Cable (UV and weather-resistant)
Enclosure box	360x250x152 mm
Galvanic Isolation	1000 V between power supply and RS485 bus
Water Tank Capacity	18 Liters
Water Consumption	36 Liters/year (Refilling required twice a year)



Washing Liquid	Pure Water: 100% (Should be used when the ambient temperature is above 0°C) Pure Water: 65% + Antifreeze: 35% (Should be used when the ambient temperature is below 0°C)
Water Hose Length	5 m (on request up to 20m)
Max. Water Line Height	5 m
Protection Class	IP54 (Optional IP65)
Weight	10.5 kg
Standard	IEC61724-1 (Annex C)



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