

ARES Soiling Measurement System



Comparisons with other soiling measurement products

Competitive Matrix

The table below compares the cost and features of Fracsun's ARES CS4 device with the competition.

Features	Manufacturer & Model			
	Fracsun ARES CS4	Atonometrics MARS	Campbell Scientific SMP100	Kipp & Zonen Dust IQ
Installation + Calibration Time	<1 hour	6 - 8 hours	8 - 10 hours	6 - 8 hours
Installation costs (\$90 / hour)	\$90	\$720 - \$960	\$960 - \$1200	\$720 - \$960
Direct soiling measurement	✓	✗	✓	✗
Technology	Large area reference cell comparison	Camera image sensor / processor	Manually-cleaned Solar module comparison	LED Optical Reflectivity
Matching spectral response of array modules	✓	✗	✓	✗
Soiling collection surface area	246 cm ²	33 cm ²	1925 cm ²	44 cm ²
Irradiance measurement	✓	✗	✓	✗
Self-powered	✓	✗	✗	✗
Integrated cellular connection (3G/LTE)	✓	✗	✗	✗
IoT ready	✓	✗	✗	✗
Web Portal and API integration	✓	✗	✗	✗

Analytical Tools for Wash Optimization and Savings	✓	✗	✗	✗
Size (L x W x H)	62 x 27 x 5.8cm	21 x 12 x 8cm	120 x 100 x 200cm	99 x 16 x 3.5cm
Weight	4.5 kg	1.3 kg	34 kg	4.0 kg
External wiring required?	Only for Modbus RTU Connection	Yes	Yes	Yes
Modbus RTU support	Yes	Yes	Yes	Yes
Mounts to array structure	✓	✓	✗	✓

Key Advantages

- **Installation time** – ARES installs in one hour or less and can be physically installed anywhere on the array that has cellular signal. Competitors’ installation time varies between 6 to 10 hours due to wire runs, conduit installation, datalogger connection, and SCADA setup.
- **Self-powered** – ARES has no external power requirements and does not need to connect to any power infrastructure. Competitors require dedicated power through an external DC power supply or additional solar UPS.
- **Cellular connectivity** – The ARES unit is an IoT-enabled cellular device with integrated 3G or LTE CAT M1 modem, requiring no external connection to the overall plant SCADA system.
- **Spectral response and calibration** – Optical soiling stations generally need to be tuned to the spectral effects of soiling. Fracsun utilizes (pre)calibrated reference cells made of c-Si, matching plant response very closely without categorizing a soiling type. Optical products have high soiling rate error when the array experiences varying types of soiling (dust, pollen, soot, etc.) that are characterized the same.
- **Fracsun web portal** – Our portal gives detailed information beyond a simple soiling loss number. We provide irradiance, insolation, daily soiling loss, device health parameters, and water level alerts for the washing reservoir.
- **Wash date optimization** – Fracsun generates actionable data with the soiling loss values. Competitors only provide a soiling loss number, leaving you to figure out the best time to wash the array. The Fracsun portal calculates the optimal wash frequency and schedule based on measured soiling loss, solar energy \$/kWh value, washing cost, and expected rainfall. This maximizes annual cash flow, minimizes LCOE, and simplifies data analysis for the plant.
- **Self-cleaning** – Fracsun provides daily soiling measurements by comparing a “dirty” solar cell that is washed when the entire array is cleaned against a “clean” cell that is sprayed down each day by the integrated wash extension. By comparison, the Campbell Scientific SMP100 requires manual cleaning, and optical sensors do not provide a clean component for visual comparison.

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