

Cloud Sensor



SEVEN Cloud Sensor is a specialized sensor developed to measure the cloud coverage ratio in the sky for use in commercial and industrial photovoltaic (PV) facilities. By detecting the proportion of cloud cover, it enables analysis on whether the solar panels should remain in a fixed position or be adjusted according to the sun's position. This allows users to take the necessary actions based on cloudiness levels to improve energy efficiency.

The SEVEN Cloud Sensor consists of two Irradiance Sensors — one placed permanently in the shade and the other fully exposed to sunlight — along with a shading band, a mounting plate, and a mounting profile.

According to the sensor's measurement principle, one Irradiance Sensor is continuously shaded by the shading band to measure Diffuse Irradiance in accordance with IEC 61724 standards, while the other sensor is installed in a way that it is never shaded, thereby measuring the Plane of Array Irradiance (POA). Based on the ratio of these two irradiance values, the cloud coverage percentage (Cloudiness Ratio) over the sky is calculated.

The measured irradiance and cloud coverage data are transmitted to data loggers and receiving units via a serial RS485 interface using the Modbus RTU protocol.

Definition of Measured Data

- 1) Plane of Array Irradiance (POA):** It is the sum of direct, diffuse, and reflected irradiance received on the plane of photovoltaic panels.
- 2) Diffuse Irradiance:** It is the irradiance that reaches the plane of photovoltaic panels indirectly, as sunlight is scattered by obstacles in the atmosphere such as clouds.
- 3) Direct Irradiance:** These are the irradiance components that reach the plane of photovoltaic panels directly from the sun.
- 4) Cloudiness Ratio:** It is the ratio of Diffuse Irradiance to Plane of Array Irradiance (POA). Instantaneous and daily average cloudiness ratios are calculated based on this ratio.

Advantages and Features

- | | |
|------------------------------------|-------------------------------------|
| • Cloud Coverage Ratio Calculation | • SunSpec Compliance |
| • Class A Compliance | • SEVEN Remote Installation Service |
| • Quick and Easy Installation | • SEVEN Customer Support |
| • Free Software Update | • 2-Year Warranty |

3S-CS-MB Cloud Sensor

Cloud Sensor



Technical Specifications

Measurable Data	Plane of Array (POA) Irradiance, Diffuse Irradiance on Panel Tilt, Direct Irradiance on Panel Tilt, Cloud Cover Ratio
Cloud Cover Ratio Range	0 ... 100 %
Cloud Cover Ratio Resolution	5 %
Output Rate	1/s
Data Output	RS485 up to 38400 baud
Communication Protocol	Modbus RTU
Power Supply	12 ... 30 V DC
Power Consumption	25 mA max @ 24 V DC
Cable Length & Features	3 meters* 3x2x0.22mm, 24 AWG (UV and Weather Resistant)
Galvanic Isolation	1000 V Between Power Supply and RS485 Data Bus
Operating Temperature Range	-40°C ... +85°C
Operating Humidity Range	0 ... 100 %RH
Dimensions	550 mm x 500 mm x 310 mm (W x L x H)
Sensor Weight	4.2 kg
IP Rating	IP54 (Optional IP 65, IP 68)
Sensor Housing Material	Aluminum
Shading Band	FBE Epoxy Coated Steel
Standard	IEC 61724-1:2021 and IEC 60904
Calibration	Each sensor is calibrated under an AAA Class Solar Simulator according to IEC 60904-2 and IEC 60904-4 standards using a reference cell calibrated by the ISFH Institute in Germany.
Origin	TÜRKİYE

*According to RS485 connection requirements, splicing or extending the communication cable is not recommended. The communication cable should be used as a single, continuous piece. The required cable length can be provided by SEVEN Sensor.

Irradiance Sensor Technical Specifications

Cell Type	Silicon Reference Cell (31 x 31 mm)
Irradiance Range	0 ... 1600 W/m ²
Uncertainty	≤1.2% (less than 2%; Class A according to IEC 61724-1 standard)
Resolution	0.1 W/m ² (less than 1 W/m ² ; Class A according to IEC 61724-1 standard)
Response Time	1 sc (less than 3 sc; Class A according to IEC 61724-1 standard)
Drift	<%0,3 / Year
Field of View	170° (more than 160°; Class A according to IEC 61724-1 standard)
Tilt-Azimuth Angle	0°- 0° (less than 1°; Class A according to IEC 61724-1 standard)

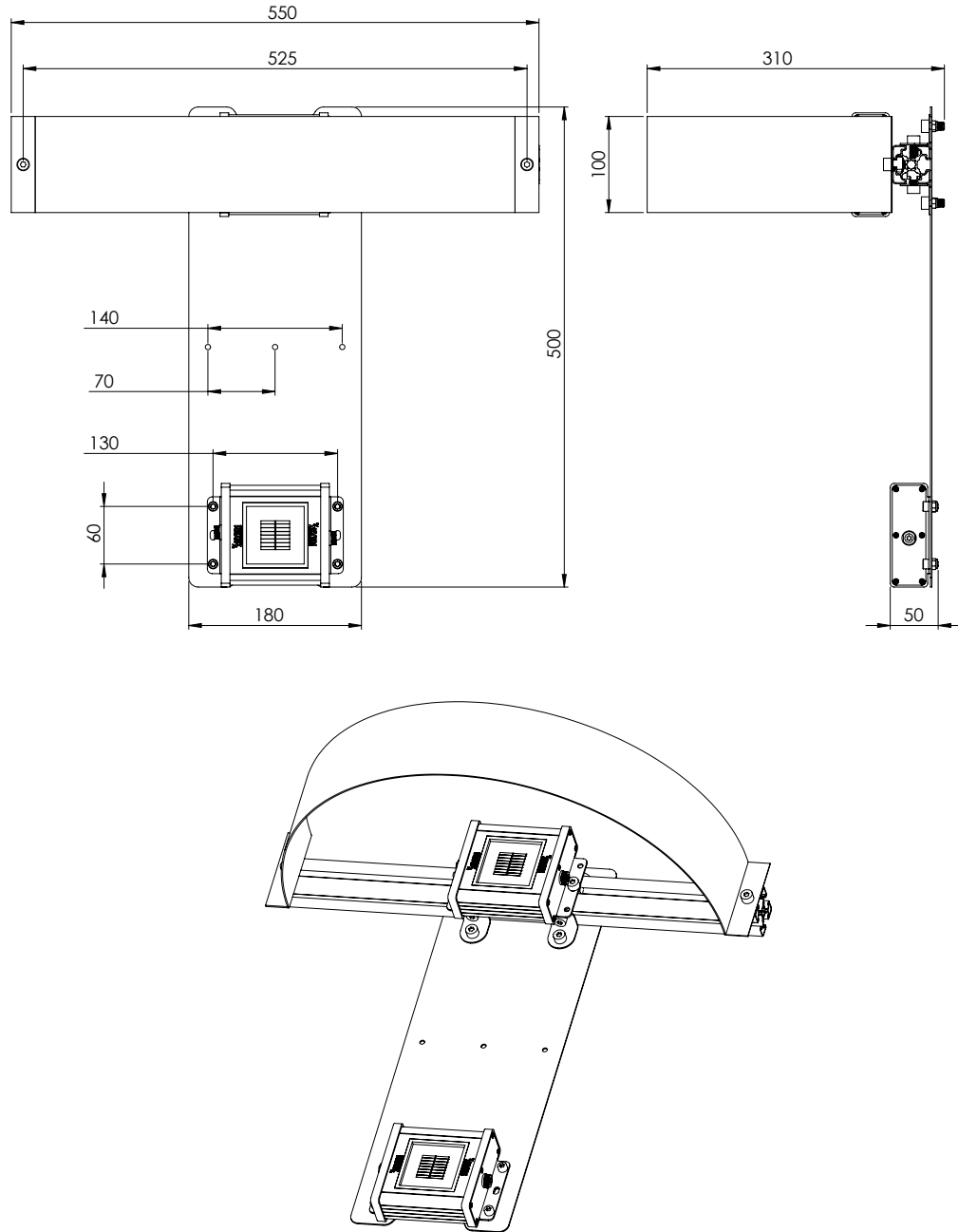
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Technical Drawings

Cloud Sensor Technical Drawings



Note: All dimensions are given in millimeters (mm).

***SEVEN reserves the right to make changes to this document without prior notice.