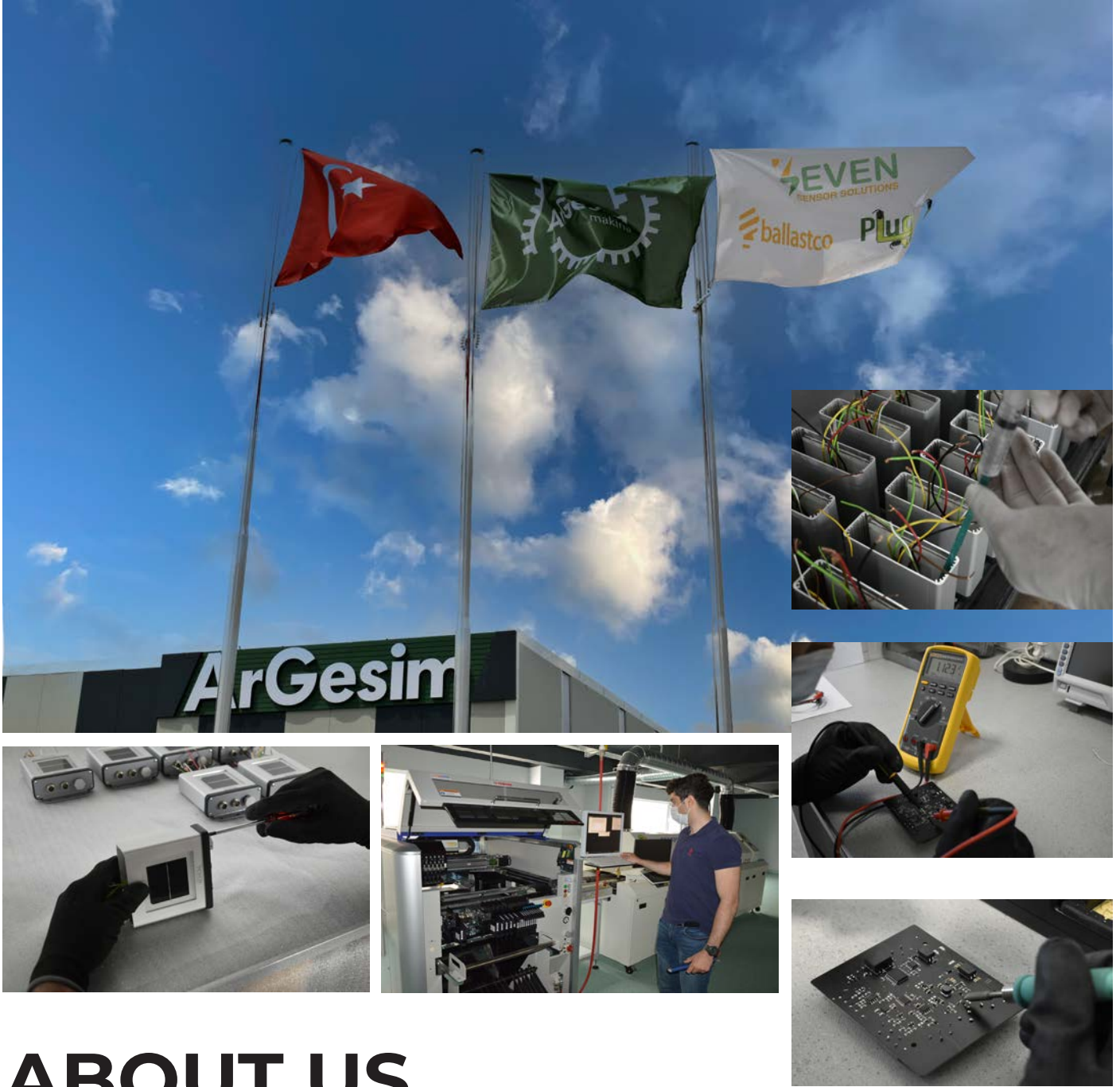# SOLAR SENSOR
SOLUTIONS

SEVEN
SENSOR SOLUTIONS

ABOUT US

Seven Sensor Solutions is a trade mark of ArGesim Makina, located in the Industrial Area of Çorum in Turkey. It is specialized in producing, installing and commissioning high-quality meteorological sensors used for monitoring solar PV plants. Seven weather stations are compatible with many well known dataloggers brands.

Our main market is European countries, and we have worldwide delivery service. Also, we offer remote setup facility for exported products and an online support available for our customers as well.

In 2018, the company moved to Corum Technopark and focused more on R&D activities. These activities were fruitful and resulted in international patents for ArGesim.

ArGesim carries out R&D activities with young engineers and continue to work in line with this mission by serving the industrialization goals of our country in the field of high technology.

5-6

Irradiance Sensor
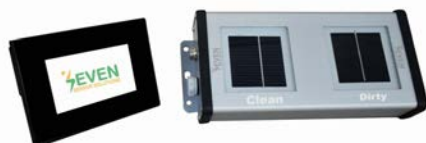*(p v   p y r a n o m e t e r)*

It is an irradiance Sensor Box for Solar PV Plants having a Modbus RTU Output or an Analog output. Besides Irradiance Sensor, it includes also an Internal cell temperature Sensor.It is compatible with all Modbus RTU Dataloggers. It is supplied along with Mounting Bracket and Cable.

7

Ambient Temperature Sensor

Maxim DS18B20 or PT1000 ambient temperature sensor for solar PV plants with One-Wire-Bus technique is compatible with Seven Sensor Box. It is supplied with radiation shield, cable and mounting facility.

7

Module Temperature Sensor

Maxim DS18B20 or PT1000 Solar Module Temperature Sensor in a plastic housing with aluminum plate with One-Wire-Bus technique is Compatible with Seven Solar Sensor Box. It is mounted on the back of solar panel.

8

Wind Speed Sensor

Wind speed sensor, also known as anemometer, is one of weather station sensors. This Sensor measures wind speed by converting it into an electrical signal. The connection of the wind speed sensor with the datalogger is provided through the Seven irradiance sensor. Analog 4-20 mA option is also available. The wind speed sensor is supplied with a 3 m cable with 5-pin connector.

9

Wind Direction Sensor

Small and economical wind direction sensor with analog output signal. Used for measuring wind direction in universal applications and PV projects. It is made of an UV resistant plastic material. It is supplied with cable.
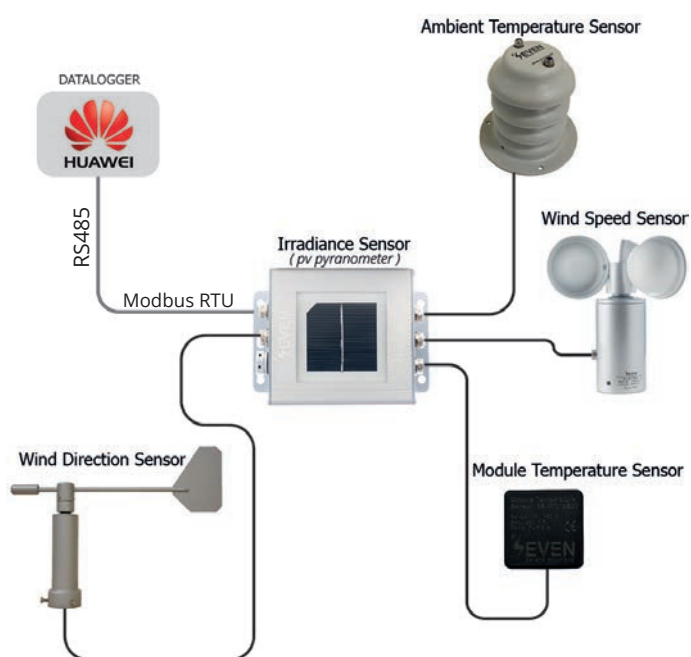
9

Relative Humidity Sensor

Humidity transmitter with Analog Output Signal. It is used to measure the relative humidity in Solar PV Plant. Modbus RTU option is also available. SEVEN provides a Solar Radiation Shield with a Mounting Bracket for it.

11-13

Soil Monitoring System

Soil Monitoring System is used to measure the soiling ratio between the two sensors as one is cleaned periodically and the other is cleaned at the same time as the PV panels. The PLC and the two sensors are communicating via Modbus RTU Protocol.

14

SEVEN Sensor Box

SEVEN Sensor Box is an UV protected aluminum box, including an electronic card where 5 different sensors can be connected and provide Output RS485 port to transfer data in Modbus RTU protocol to the datalogger or SCADA system. SEVEN provides Sunspec compliance, also.
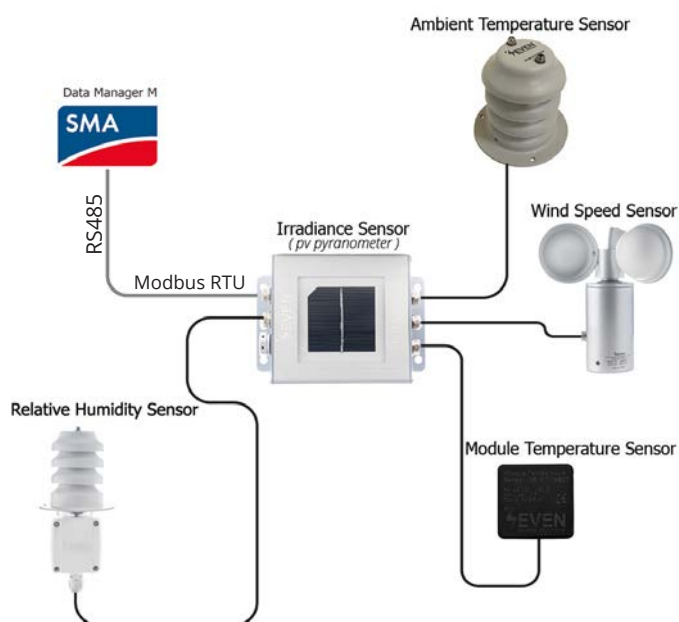
WEATHER STATIONS

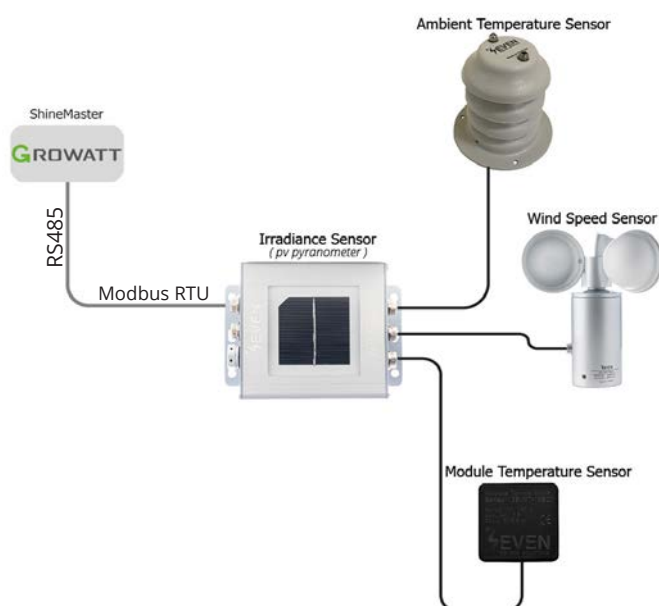## Huawei

Weather Station.
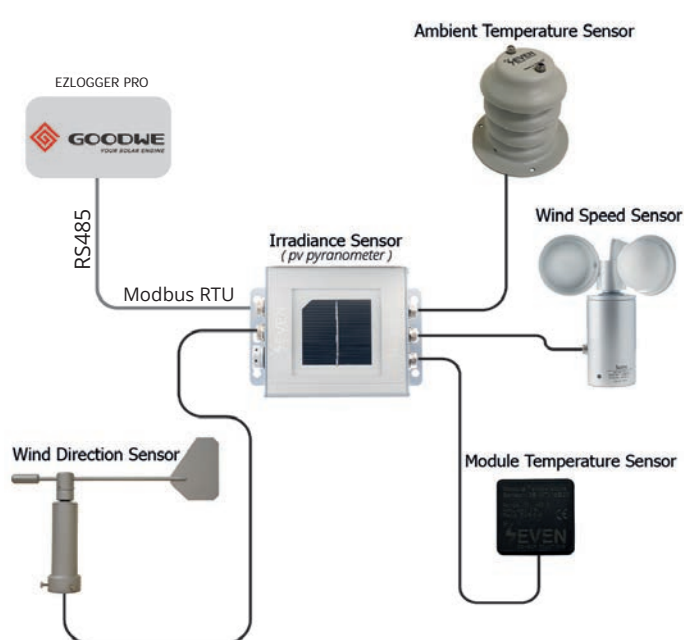
Goodwe

Weather Station.

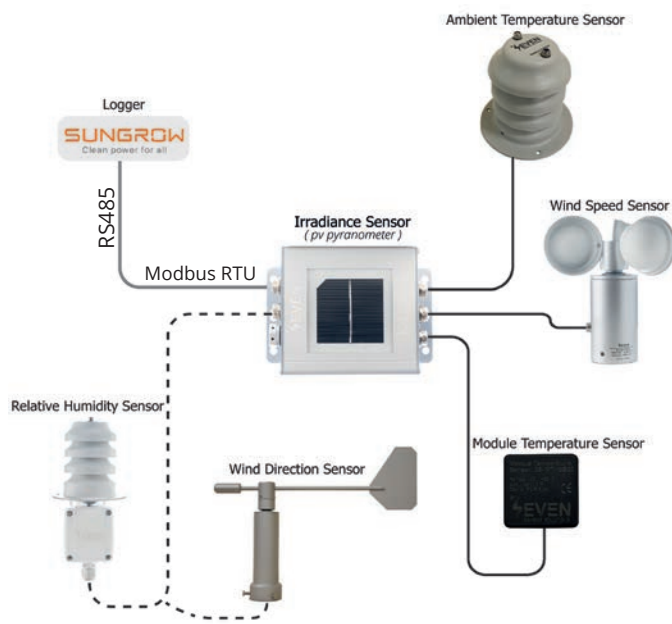## SMA

Weather Station.

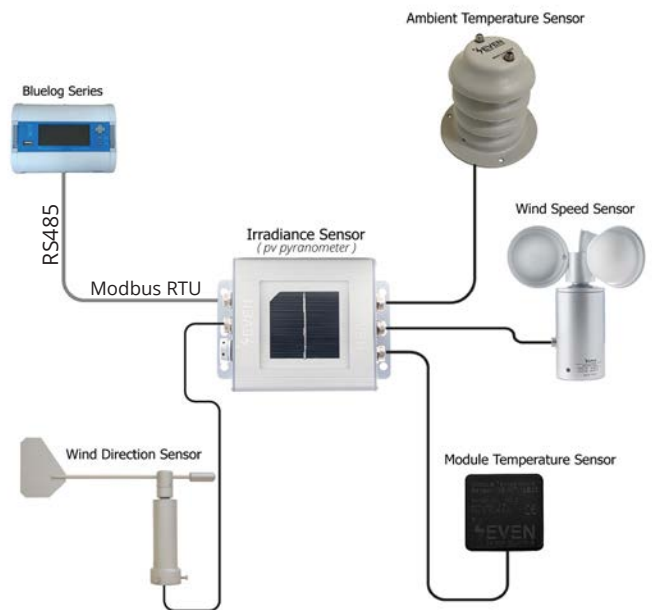## Growatt

Weather Station.

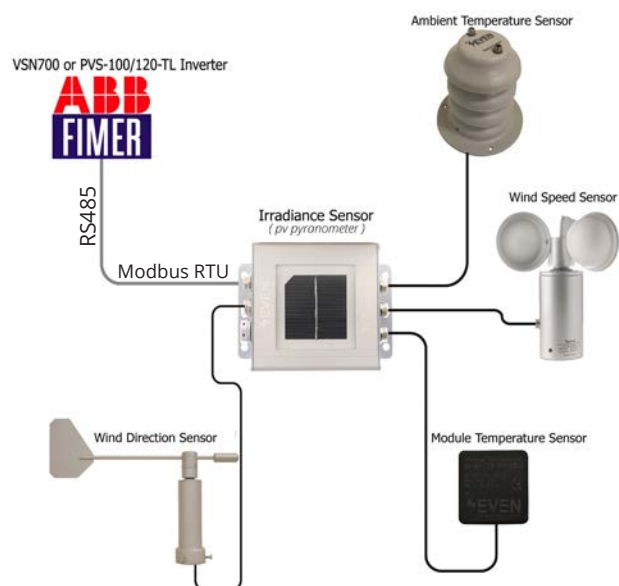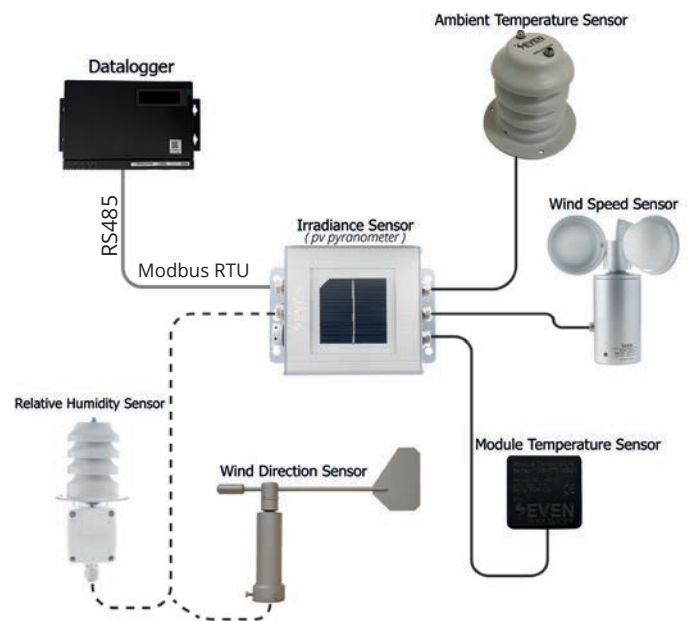# WEATHER STATIONS

Sungrow

Weather Station.

Bluelog

Weather Station.

ABB/FIMER

Weather Station.

Datalogger

Weather Station.

IRRADIANCE
SENSOR
(P V   P y r a n o m e t e r)

TECHNICAL DATA (Digital Output)

General Information	
Reference Cell	*Monocrystalline Silicon (52 mm x 52 mm)*
Current Shunt	*High precision shunt resistor directly soldered to the terminals of the cell*
Irradiance Range	*0...1600 w/m²*
Operating Temperature	*-40 °C to +85 °C*
Electrical Connection	*3 m LIYYC11Y Cable , UV and weather resistant*
Power Supply	*12 to 30 VDC (30 mA typically at 20 VDC)*
Interface	*RS485 up to 19200 Baud*
Protocol	*The sensor is connected via a 2-wire RS485 bus with open vendor-independent Modbus RTU Protocol , Sunspec compliant*
Galvanic Isolation	*1000 V between power supply and RS485 bus*
Sensor Box	*Advanced weatherproof junction box made of UV resistant material*
Dimensions , Weight	*140 mm x 108 mm x 42 mm (Width x Length x Height),approx 300 g*
Protection	*IP 68*
Standard and Classification	
Uncertainty	*≤3% as per IEC61724-1 Class A , Secondary Standard*
Drift	*Very small drift of <0.3%/ year*
Response Time	*0,5 sec. , less than 3 sec. as per IEC61724-1 Class A standard*
Field of View	*171° , Larger than 160° as per IEC61724-1 Class A standard*
Resolution	*≤ 1W/m² as per IEC61724-1 Class A standard*
Tilt-Azimuthal Angle	*0°- 0° , ≤ 1° as per IEC61724-1 Class A standard*
Electrical Connection	
Input#1	*3S-AT-18B20, Ambient temperature sensor, 2 pin connector*
Input#2	*3S-MT-18B20, Module temperature sensor, 3 pin connector*
Input#3	*Wind direction or Relative humidity sensor, 4 pin connector*
Input#4	*3S-WS-PLS, Wind speed sensor, 5 pin connector*
Output	*Power and Communication, 6 pin connector*
Others	
Calibration	*Each sensor is calibrated under the natural sunlight at AM5 spectrum by using a compatible calibrated reference cell by Fraunhofer.ISE.*
Warranty	*5 years Limited warranty against manufacturer defects. Opening of the sensor box by the user or installation staff is not accepted. Opening of the sensor box is one of the reason of terminating the warranty conditions.*
Modbus Specification	
Baud Rate	*1200 , 2400 , 9600 , 19200 , 38400*
Parity	*No, even, odd*
Stop Bit	*1, 2 (only at no parity)*
Factory Default	*9600 Baud, 8N1, address: 1*

IRRADIANCE
SENSOR
(P V   P y r a n o m e t e r)

TECHNICAL DATA (Analog Output)

General Information	
Reference Cell	Monocrystalline Silicon (52 mm x 52 mm)
Current Shunt	High precision shunt resistor directly soldered to the terminals of the cell
Irradiance Range	0...1400 w/m²
Operating Temperature	-40 °C to +85 °C
Electrical Connection	3 m LIYYC11Y Cable , UV and weather resistant
Power Supply	12 to 30 VDC
Sensor Box	Advanced weatherproof junction box made of UV resistant material
Dimensions , Weight	140 mm x 108 mm x 42 mm (Width x Length x Height),approx 300 g
Protection	IP 68
Standard and Classification	
Uncertainty	≤5%
Drift	Very small drift of <0.3%/ year
Electrical Connection	
Green	Output Irradiance
Brown	Power supply Irradiance (+)
Yellow	Output Temperature
White	Power supply Temperature (+)
Others	
Calibration	Each sensor is calibrated under the natural sunlight at AM 1,5 spectrum by using a compatible calibrated reference cell by Fraunhofer.ISE.
Warranty	5 years Limited warranty against manufacturer defects. Opening of the sensor box by the user or installation staff is not accepted. Opening of the sensor box is one of the reason of terminating the warranty conditions.
Output Signal	
Model I	4...20 mA

AMBIENT TEMPERATURE SENSOR

TECHNICAL DATA

General Information	
Sensor Type	DS18B20 digital temperature probe (PT1000 optional)
Measuring Range	-55 °C to +125 °C
Accuracy	± 0.5 °C
Sensor Housing	Stainless steel tube , UV resistant , Plastic component
Dimensions	105 mm x 97 mm
Cable	1.5 m PUR cable , UV and weather resistant
Protection	IP 68
Connection	One- Wire-Bus Technique , Connection to the irradiance sensor box with a 2-pin connector

MODULE TEMPERATURE SENSOR

TECHNICAL DATA

General Information	
Sensor Type	DS18B20 digital temperature probe (PT1000 optional)
Measuring Range	-55 °C to +125 °C
Accuracy	± 0.5 °C
Sensor Housing	Aluminum plated Plastic Box
Dimension	12 mm x 50 mm x 50 mm
Cable	5 m PUR cable , UV and weather resistant
Protection	IP 68
Connection	One- Wire-Bus Technique , Connection to the irradiance sensor box with a 3-pin connector

WIND
SPEED
SENSOR

TECHNICAL DATA (Pulse Output)

General Information	
Sensor Type	Anemometer made of UV resistant plastic materials
Output Signal	Reed relays, 2,5 hz / (m/s) pulse
Measuring Range	0,9 ... 60 m/s
Accuracy	± 0,2 m/s or ± 2% of measuring value
Resolution	0,4 m/s wind run
Frequency	0 ... 150 hz
Contact Load	10 W , max. 42 V DC , max. 0,4 A
Ambient Temperature	-25 °C ... +60 °C ,ice-free
Cable	3 m LIYY cable, UV resistant
Protection	IP54 or IP67
Failure Speed	Over 80 m/s
Dimensions	76 mm x 176 mm
Weight	0,4 kg
Mounting Method	Pipe Mounted or Ground Mounted
Cable Connection	Connection to the irradiance sensor box with a 5-pin connector

TECHNICAL DATA (Analog Output)

General Information	
Sensor Type	Anemometer made of UV resistant plastic materials
Output Signal	4-20 mA
Measuring Range	0,9 ... 35 m/s
Protection	IP54 or IP67
Failure Speed	Over 50 m/s
Dimensions	76 mm x 176 mm
Weight	0,4 kg
Mounting Method	Pipe Mounted or Ground Mounted
Electrical Connection	
Black-1	Output (-) 4...20 mA
Black-2	Output (+) 4...20 mA
Black-3	Power (-)
Black-4	Power (+)

WIND DIRECTION SENSOR

TECHNICAL DATA

General Information	
Power	12...30 VDC
Power Consumption	60 mA +/- 10 %
Start Speed	1 m/s
Measuring Range	0 ... 360 °C
Cable	3 m - 4 x 0,5 mm²
Max. Wind Load	80 m/s
Height	220 mm
Mast Holder	Diamerer : max. 45 mm
Weather Vane	350 mm
Protection	IP 65
Output Signal	
Model I	4 ... 20 mA
Electrical Connection	
Yellow	Output (-) 4 ... 20 mA
Green	Output (+) 4... 20 mA
White	Power (-)
Brown	Power (+)

RELATIVE HUMIDITY SENSOR

TECHNICAL DATA

General Information	
Power Supply	12 ... 30 VDC
Measuring Range	0 ... 100 %
Tolerance	25°C : ±2% r.h (20...80%)+2% f.s
Sensor Housing	Stainless-steel tube, 14 mm diameter, 68 mm length
Dimensions	105 mm x 105 mm x 170 mm
Cable	3 m PUR cable , UV and weather resistant
Output Signal	
Model I	4 ... 20 mA
Electrical Connection	
Brown	Power (+)
White	Power (-)
Green	Output (+) 4... 20 mA
Yellow	Output (-) 4 ... 20 mA

MODEL SELECTION TABLE

Sensor Box Model	Irradiance Sensor	Cell Temperature Sensor	Connections: Following External sensors can be connected to sensor box	Communication / Protocol
3S-IS-mV	✓	✗	NA	mV Signal
3S-IS-T-I	✓	✓	NA	4-20 mA
3S-IS	✓	✓	NA	RS485 - Modbus RTU
3S-IS-1	✓	✓	Module Temperature Sensor **or** Ambient Temperature Sensor	RS485 - Modbus RTU
3S-IS-2	✓	✓	(Module Temperature Sensor **or** Ambient Temperature Sensor) **+** Wind Speed Sensor	RS485 - Modbus RTU
3S-IS-2T	✓	✓	Module Temperature Sensor **+** Ambient Temperature Sensor	RS485 - Modbus RTU
3S-IS-3	✓	✓	Module Temperature Sensor **+** Ambient Temperature Sensor **+** Wind Speed Sensor	RS485 - Modbus RTU
3S-IS-4	✓	✓	Module Temperature Sensor **+** Ambient Temperature Sensor **+** Wind Speed Sensor **+** (Wind Direction Sensor **or** Relative Humidity Sensor)	RS485 - Modbus RTU
3S-2IS	✓	✓	Irradiance Sensor (additional) **+** Module Temperature Sensor **+** Ambient Temperature Sensor **+** Wind Speed Sensor	RS485 - Modbus RTU
3S-C2-1	✗	✗	One sensor can be connected	RS485 - Modbus RTU
3S-C2-2	✗	✗	Two sensors can be connected	RS485 - Modbus RTU
3S-C2-3	✗	✗	Three sensors can be connected	RS485 - Modbus RTU
3S-C2-4	✗	✗	Four sensors can be connected	RS485 - Modbus RTU
3S-C2-5	✗	✗	Five sensors can be connected	RS485 - Modbus RTU

SOILMONITORING SYSTEM

| General Information	
Soiling Ratio	*Percentage (0% - 100%) (As per IEC 61724)*
Display Device	*HMI PLC Screen (55 mm x 96 mm)*
Resolution	*% 1*
Operation Method	*Manual Cleaning of Dirty Cell periodically*
Recording and Display	*Excel/PDF/Chart*
Sensor Box	*Advanced weatherproof junction box made of UV resistant material*
Protection Class	*IP 68*
Dimensions , Weight	*244 mm x 104 mm x 42 mm (Width x Length x Height),approx 450 g*
Electrical Connection	*3 m LIYYC11Y Cable , UV and weather resistant*
Power Supply	*12 to 30 VDC*
Operating Temperature	*-40 °C to +85 °C*
Others	
Warranty	*5 years Limited warranty against manufacturer defects. Opening of the sensor box by the user or installation staff is not accepted. Opening of the sensor box is one of the reason of terminating the warranty conditions.*

IRRADIANCE
SENSOR
BOX

Model: 3S-IS-mV

Datalogger

mV
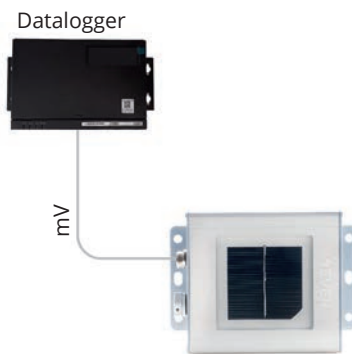
mV output for Irradiance Value

Model: 3S-IS-T-I
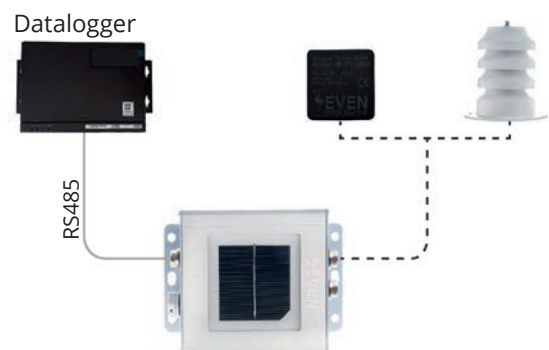
Datalogger
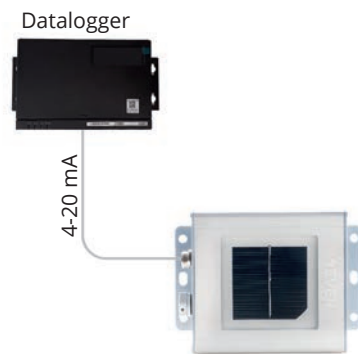
4-20 mA

4-20 mA analog output for Irradiance Value

Model: 3S-IS

Datalogger

RS485
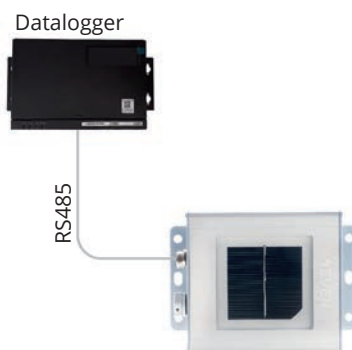
*Modbus RTU output for Irradiance Value
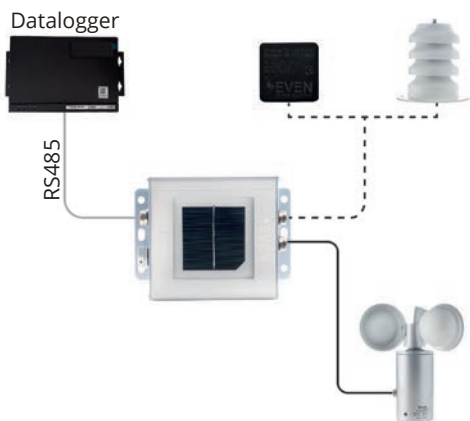Cell Temperature Sensor Included*

Model: 3S-IS-1

Datalogger

RS485

*Irradiance Sensor with an external temperature sensor
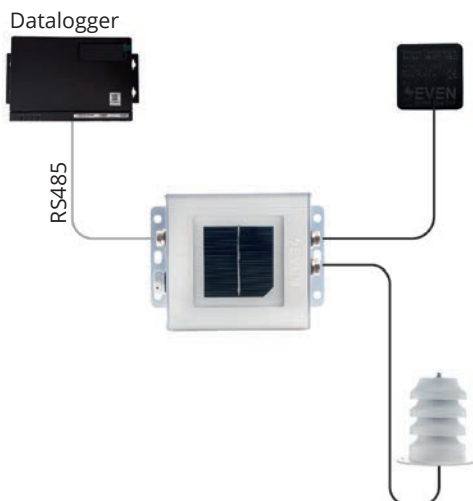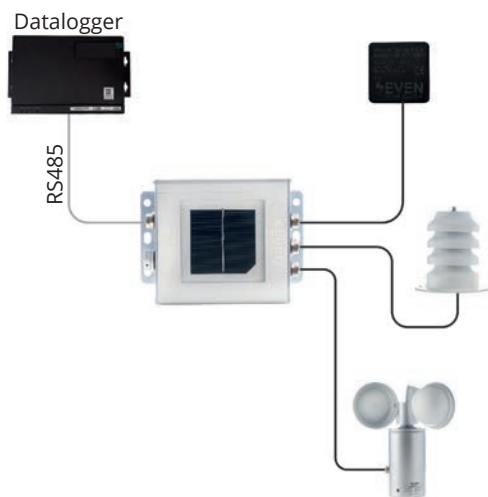(Module Temperature Sensor or Ambient Temperature Sensor)*

Model: 3S-IS-2

Irradiance Sensor with an external Temperature Sensor (Module Temperature Sensor or Ambient Temperature Sensor) and , Wind Speed Sensor
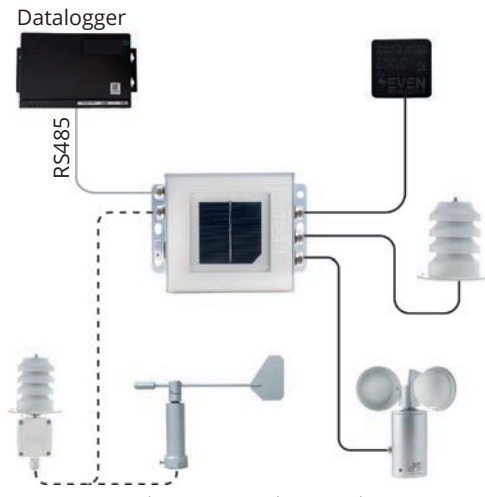
Model: 3S-IS-2T

Irradiance Sensor with external two temperature sensors Module Temperature Sensor and Ambient Temperature Sensor
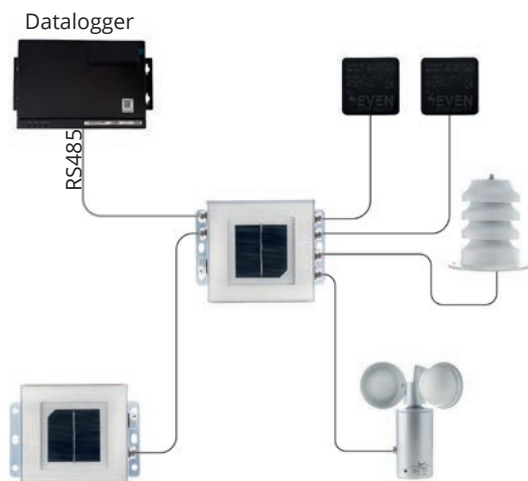
Model: 3S-IS-3

Following sensors can be connected to Irradiance Sensor; Module Temperature Sensor, Ambient Temperature Sensor and Wind Speed Sensor

Model: 3S-IS-4

Following sensors can be connected to Irradiance Sensor; Module Temperature Sensor, Ambient Temperature Sensor, Wind Speed Sensor and Wind Direction Sensor or Relative Humidity Sensor
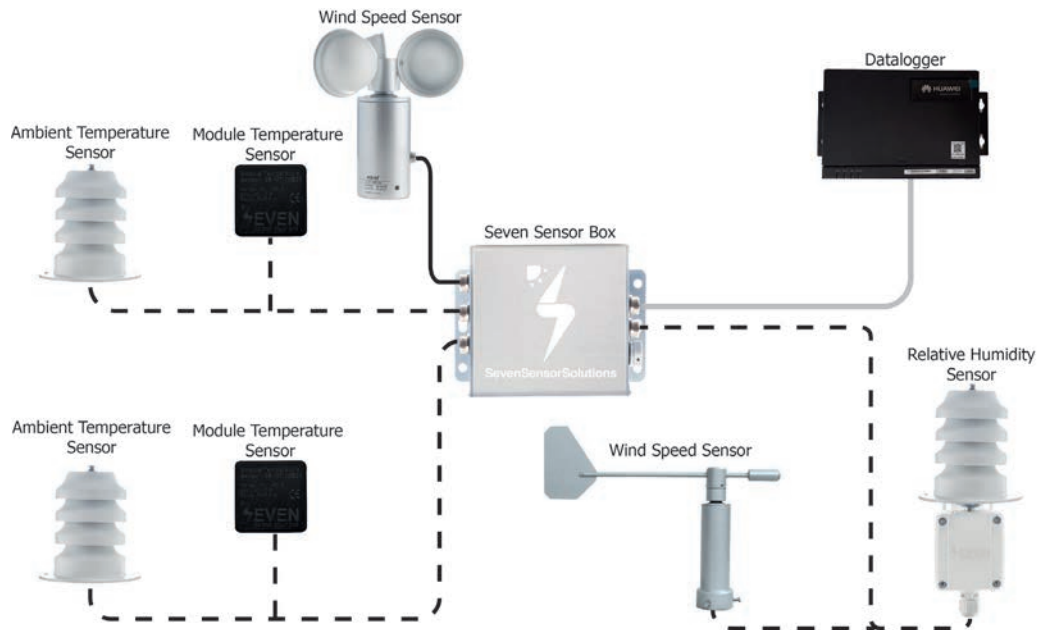
Model: 3S-2IS

Two Irradiance Sensors, Two Module Temperature Sensors, Ambient Temperature Sensor and Wind Speed Sensor can be connected

3S-C2

SELECTION OF SENSOR BOX

Model: 3S-C2-1   Model: 3S-C2-2   Model: 3S-C2-3

Sensor Box with one sensor connection   *Sensor Box with two sensor connections*   *Sensor Box with three sensor connections*

Model: 3S-C2-4   Model: 3S-C2-5

Sensor Box with four sensor connections   *Sensor Box with five sensor connections*

SOLAR
SENSOR
SOLUTIONS

SCAN ME !

ꟽEVEN