SEVEN SENSOR SOLUTIONS



3S-MT-PT1000

Module Temperature Sensor

USER MANUAL

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Waste Disposal



This symbol indicates that the product is subject to European Union regulations on separate waste disposal. This applies to both the product itself and any accessories bearing the same symbol. Such products must not be disposed of as unsorted household waste.

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

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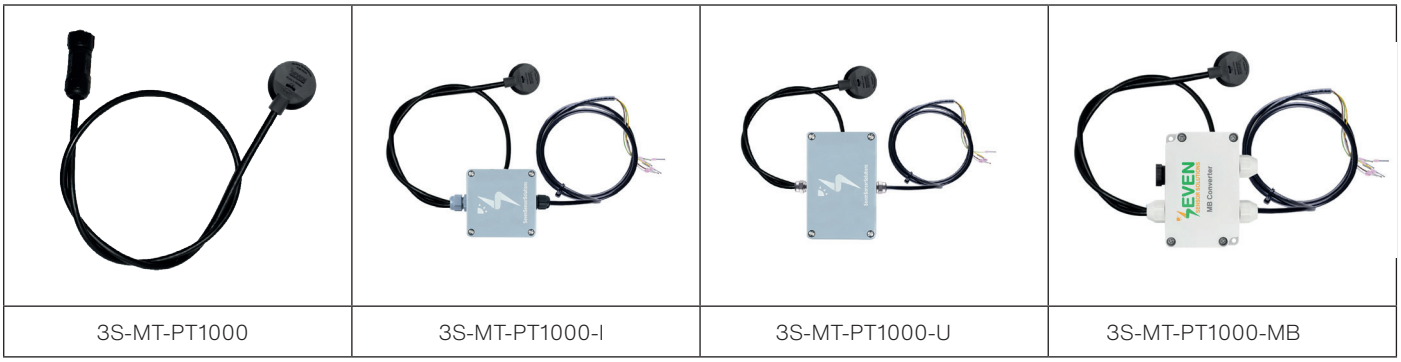
1. Introduction

The Module Temperature Sensor is part of the SEVEN meteorological sensor series which includes professional and intelligent measurement sensors with a digital or analog interface for environmental and industrial applications such as photovoltaic installations.

4 types of module temperature sensor are available. The product list with item codes is given in Table 1.

Type	Item Code	Item Name	Application Area	Output
1	**3S-MT-PT1000-MB**	PT1000 Module Temperature Sensor with Modbus RTU Output	Panel	Modbus RTU
2	**3S-MT-PT1000-U**	PT1000 Module Temperature Sensor with 0-10V Output	Panel	Analog 0-10 V
3	**3S-MT-PT1000-I**	PT1000 Module Temperature Sensor with 4-20mA Output	Panel	Analog 4-20 mA
4	**3S-MT-PT1000**	PT1000 Module Temperature Sensor	Panel	PT1000

Table 1 - Product List and Item Codes



3S-MT-PT1000	3S-MT-PT1000-I	3S-MT-PT1000-U	3S-MT-PT1000-MB

Figure 1 - Product Models

For Modbus output products, the measured module temperature data is transmitted to dataloggers and receiving units via a 3-wire RS485 bus with Modbus RTU protocol, while analog output devices transmit data as 4-20 mA or 0-10 V.

2. Module Temperature Sensor Installation

It is suggested that the system be operated at ground level to make sure that all components are working properly prior to installation. A general diagram of the progress of the installation steps is given below.

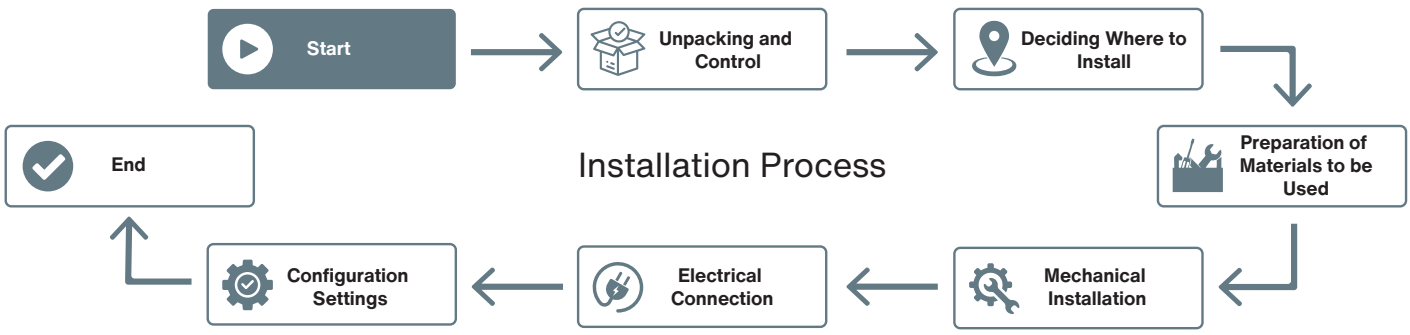


Diagram 1 - Installation Process

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2.1. Unpacking and Inspection

Upon receipt of the product, it must be carefully checked whether the package content is complete. SEVEN Sensor must be contacted if any of the components are missing, damaged or defective.

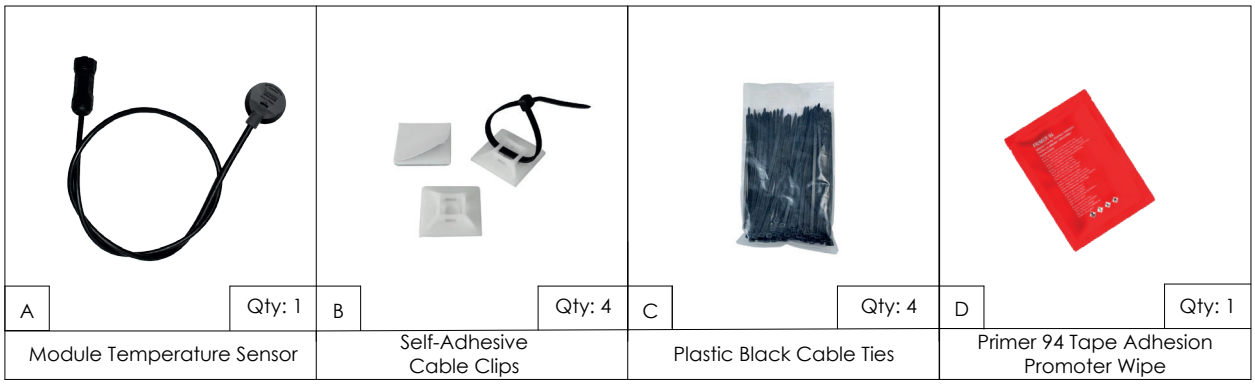


Figure 2 - 3S-MT-PT1000

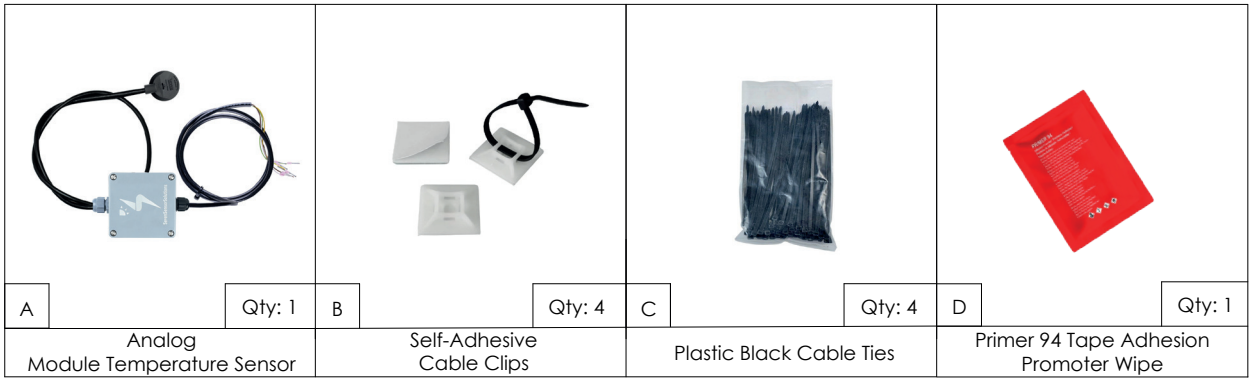


Figure 3 - 3S-MT-PT1000-I

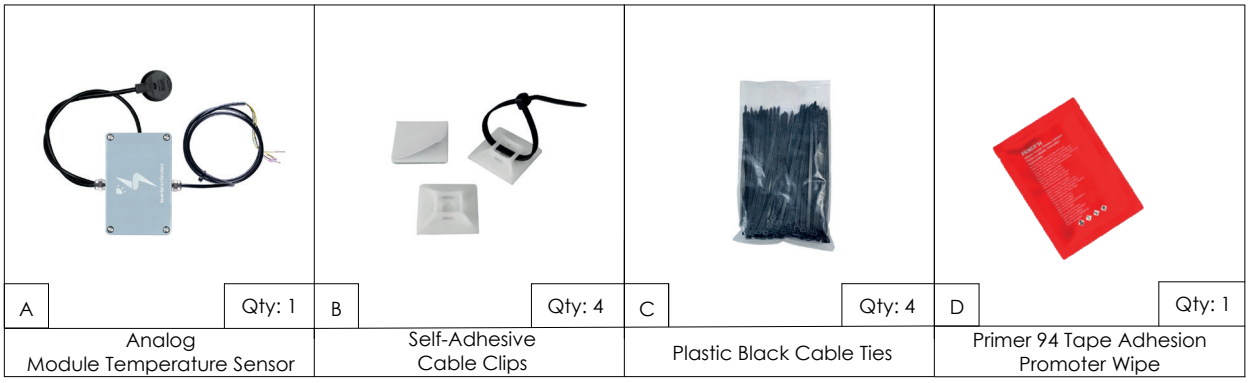


Figure 4 - 3S-MT-PT1000-U

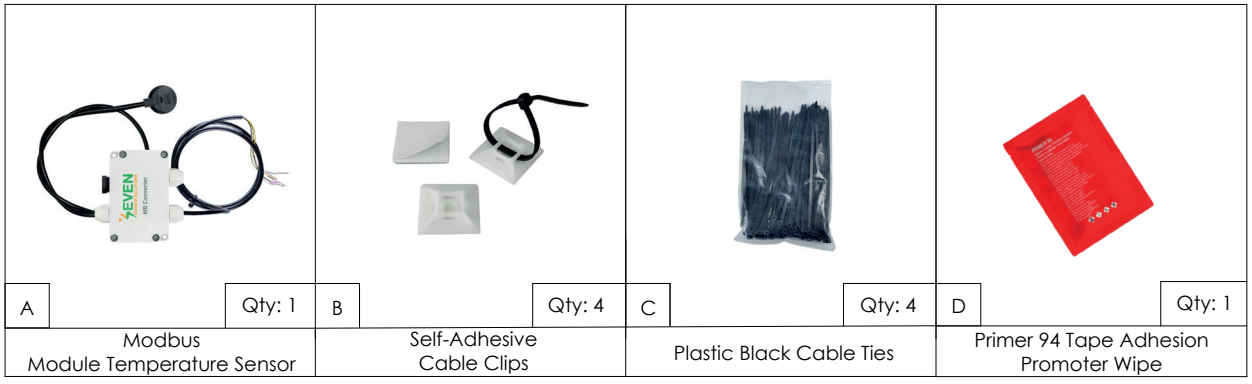


Figure 5 - 3S-MT-PT1000-MB

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2.2. Field Requirements and Considerations

Each site is different and has its unique challenges. For this reason, the product installation may differ in each site. First, it should be decided where the product will be installed.

The Module Temperature Sensor must be mounted at the exact center of the photovoltaic module. Avoiding cell boundaries, select a sensor location at the center of the cell closest to the exact center of the module.

The surface where the Module Temperature Sensor will be mounted must be completely dry and clean. In winter months, dew residue on photovoltaic modules may prevent the Module Temperature Sensor from adhering properly.

Note: *To facilitate sensor maintenance, mount the sensor in an easily accessible location, especially on rooftop installations.*

2.3. Installation

Step 1 – Determine the area on the back of the photovoltaic module where the module temperature sensor will be bonded.

Step 2 – Thoroughly clean and dry the bonding area.

Step 3 – Apply Primer 94 to the bonding area of the sensor and cable clips. Allow 3 to 5 minutes for the primer to dry, depending on weather conditions. At the same time, apply Primer 94 to the adhesive tape surfaces and allow them to dry as well.

Note: *Before application, clean the surface with a 50/50 Isopropyl Alcohol (IPA) and water mixture. Applying too thick a layer can weaken adhesion. A thin, single coat is sufficient.*

Step 4 – Remove the adhesive liner from the module temperature sensor and apply primer to the adhesive surface. Once dry, bond the sensor to the designated area.

Step 5 – After mounting the sensor, secure the cable to the back of the module using the self-adhesive cable clips and cable ties included in the package by SEVEN Sensor.

Note: *Before bonding the module temperature sensors to the module, in humid environments the module surface must be completely dried. This should be done during hours or days when the humidity level is low. If this is not possible, the bonding area must be dried by applying appropriate heat. The recommended application temperature for Primer 94 is above 15°C. As the temperature decreases, the effectiveness of Primer 94 diminishes. The temperature must be above 0°C during the initial application.*

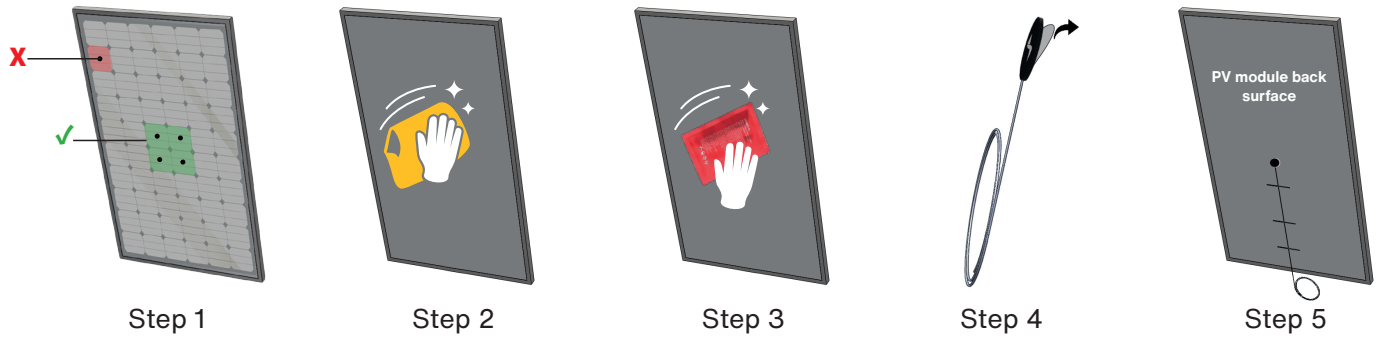


Figure 6 - Module Temperature Sensor Installation

Note: *The adhesive used to bond the Module Temperature Sensor to the photovoltaic module is a special thermally conductive adhesive. If this adhesive is damaged, a replacement can be obtained by contacting SEVEN Sensor.*

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2.4. Inspection and Maintenance

It is important to check the tightness of connection elements, the condition of cables, and for any damage, degradation, or disconnection in sensors and electrical enclosures. Additionally, observe the sensor enclosures for signs of moisture or pests and regularly inspect for potential issues such as loose cable connections or brittle connections.

According to IEC 61724-1:2021, the monitoring system should be inspected at least annually and preferably at more frequent intervals.

3. Cable Connections

The converter box used in Modbus & Analog models is equipped with waterproof and UV-resistant connectors. The minimum bending radius of the cables is 5 mm.

The voltage supply for the Module Temperature Sensor is 12 - 30 V DC. Operation with a voltage supply of 24 V is recommended.

Module Temperature Sensor with Modbus RTU Output has an electrically isolated, half-duplex, 3 wire RS485 interface for configuration, communication and the firmware update.

The communication and power cable of Module Temperature should be always laid separated from AC/ DC cables.

Note: *The installation and electrical connections of SEVEN sensors should be carried out by a qualified electrician.*

3S-MT-PT1000-MB	
RS485 A / Data (+)	Green
RS485 B / Data (-)	Yellow
RS485 Signal Ground	Red
Power Supply (+)	Brown
Power Supply (-)	White
Protective Grounding	Black

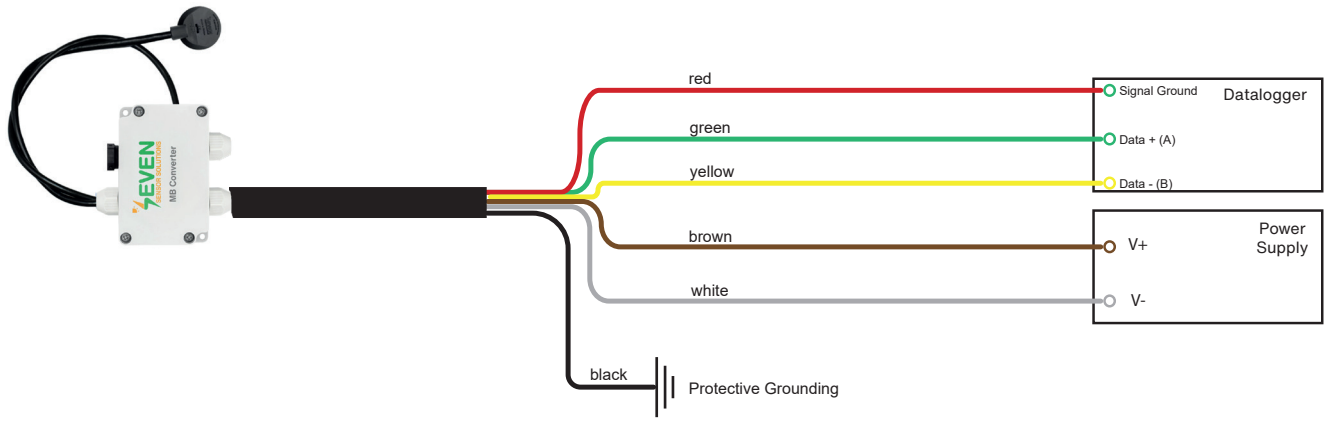


Figure 7 - 3S-MT-PT1000-MB Datalogger Connection

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3S-MT-PT1000-I	
4...20 mA Current (I+)	Green
4...20 mA Current (I-)	Yellow
Power Supply (+)	Brown
Power Supply (-)	White

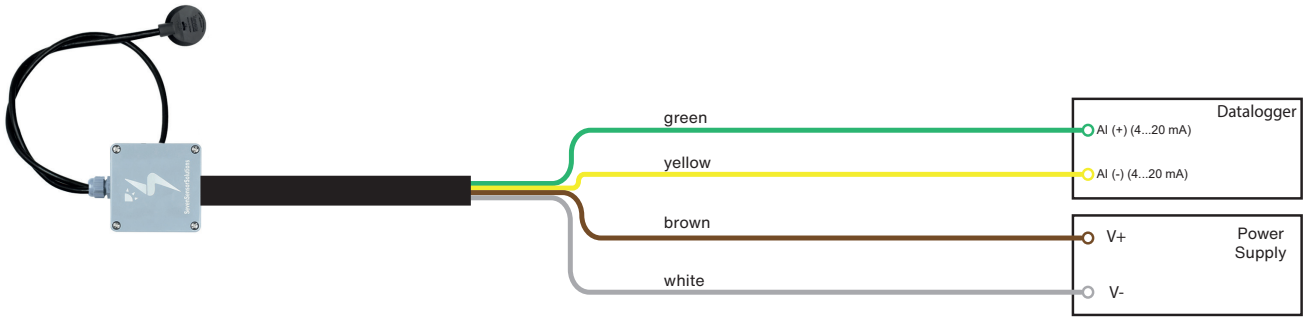


Figure 8 - 3S-MT-PT1000-I Datalogger Connection

3S-MT-PT1000-U	
0-10 V (+)	Green
0-10 V (-)	Yellow
Power Supply (+)	Brown
Power Supply (-)	White

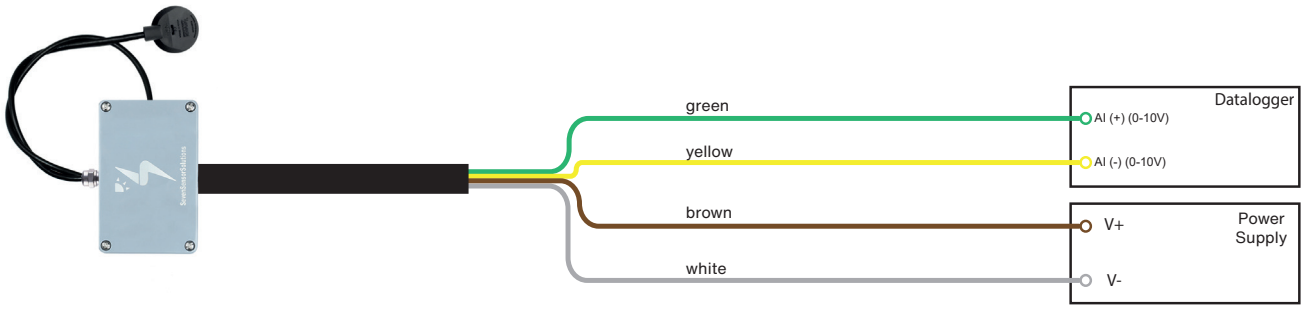


Figure 9 - 3S-MT-PT1000-U Datalogger Connection



Figure 10 - 3S-MT-PT1000 Irradiance Sensor Connection

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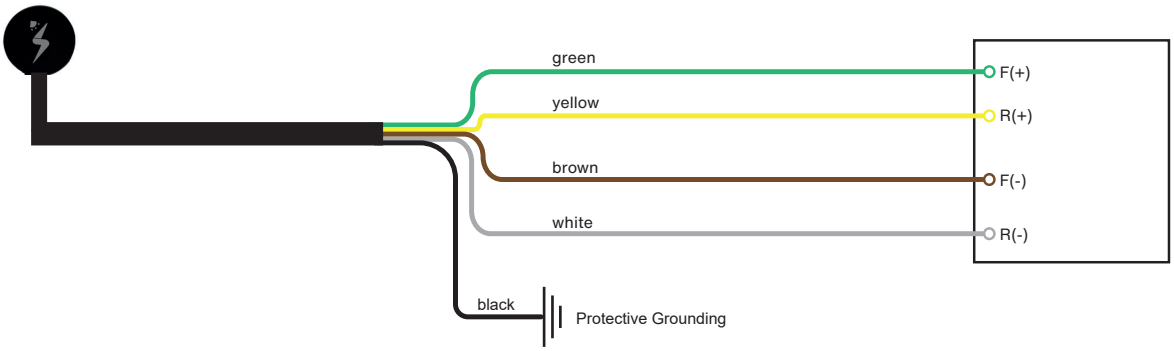


Figure 11 - 3S-MT-PT1000 Datalogger Connection

4. 3S-MT-PT1000 Configuration and Communication

Once the Modbus Module Temperature Sensor with Modbus output is installed and connected as shown in Figure 7, it starts taking measurements automatically.

The following points should be noted:

- A measurement test must be performed on the Module Temperature Sensor using the 3S-MT-PT1000-MB Configuration Tool, and its proper operation in the field must be verified.
- If multiple Modbus devices are operated on the same network, a unique device ID must be assigned to each device, and the Baud Rate and Parity must be the same.

4.1. 3S-MT-PT1000 Configuration Tool

The Configuration Tool is a software tool used to test the communication of the Module Temperature Sensor with Modbus output (3S-MT-PT1000-MB) and to configure the Modbus communication parameters.

For configuration and testing, a Windows® PC, a serial bus interface set as a serial COM port, 3S-MT-PT1000-MB Configuration Tool software and a USB-to-RS485 converter are required.

To use the Configuration Tool, follow the instructions in the relevant User Interface Manual:
https://www.sevensensor.com/files/d/en/MB-CONVERTER_Sensor-MB-Converter_GUI.pdf

4.2. Modbus RTU Technical Specifications

The Modbus addresses and features required for the Module Temperature Sensor to communicate with systems such as data loggers are given in the table below.

ID-Dec	ID-Hex	Parameter	Range	Resolution	Description
30021	0x15	Module Temperature	-40 ... +85 °C	0,1 °C	The module temperature value measured by the temperature sensor attached to the rear surface of the PV module in PV power plants.
30022	0x16				

Note: *The table above lists the addresses that need to be monitored by the user for the Module Temperature Sensor with Modbus output Hardware (HW) 5.0-1.0 and Software (SW) 1.0 version. If additional Modbus and SunSpec addresses or the software-specific features of these addresses are required, or if you have a different software version, you can download the detailed Modbus map from the link below.*

https://www.sevensensor.com/download

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5. Contact Details

Please feel free to contact us if you face any difficulties during installation or configuration.

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