

System Monitoring  
**PT100M-NR**  
Installation Guide





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# 1 Notes on this Manual

This manual describes how to install and commission the module temperature sensor. Store this manual where it will be accessible at all times.

## 1.1 Validity






This manual is valid for the PT100M-NR upgrade kit.

## 1.2 Target Group

This manual is for qualified personnel.

## 1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

	<b>DANGER!</b>
DANGER indicates a safety instruction which, if not followed, will result in certain death or serious injury.	
	<b>WARNING!</b>
WARNING indicates a safety instruction which, if not followed, could result in death or serious injury.	
	<b>CAUTION!</b>
CAUTION indicates a safety instruction which, if not followed, could result in minor or moderate injury.	
	<b>ATTENTION!</b>
ATTENTION indicates a safety instruction which, if not followed, could result in damage to property.	
	<b>Information</b>
'Information' provides valuable tips for the optimal operation of your product.	

## 2 Safety

### 2.1 Appropriate Usage

The PT100M temperature sensor is a module temperature sensor. It consists of a PT100 measurement resistor which is embedded in a plastic pipe. The measuring range of the module temperature sensor is between -20 °C and +110 °C.

To process the ambient data, the sensor must be connected to the Sunny Boy Control Plus or the Sunny Central Control.

The sensor is only suitable for use with original SMA accessories or with accessories recommended by SMA Solar Technology AG.

Appropriate usage also includes observing all further documentation relating to this device and its components.

### 2.2 Safety Instructions

**ATTENTION!**

**Damage to the sensors as a result of incorrect connection to the Sunny Boy Control Plus or Sunny Central Control.**

The Sunny Boy Control installation guide and the Sunny Central wiring diagram provided must be used for establishing the electrical connections and connectors.

**ATTENTION!**

**Destruction of the PV system by a lightning strike.**

All devices installed on a rooftop must be integrated into the existing lightning protection of the PV system.

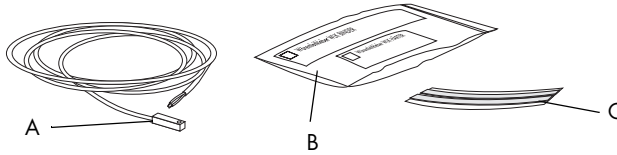
**Overvoltage protector**

Protect your PV system components against overvoltage from outside by connecting the sensors to an overvoltage protector. For using the sensors with the Sunny Central Control, the corresponding overvoltage protectors can be ordered as an option from Sunny Central.

## 3 Unpacking

### 3.1 Packing List

#### PT100M-NR



A	1	PT100M (module temperature sensor with 2.5 m cable)
B	1	Thermally conductive adhesive (protective gloves, hardener and binder)
C	2	Adhesive tape strips

### 3.2 Identifying the Module Temperature Sensor

The module temperature sensor can be identified by measuring the measurement resistance. The nominal resistance equals  $R_0 = 100 \Omega$  (at 0 degrees).

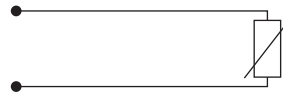
## 4 Installation and Electrical Connection

The PT100M module temperature sensor can be connected to the Sunny Boy Control Plus, the Sunny Central or the Sunny SensorBox. Take into account the prefabricated cable length of 2.5 m. If the cable length is insufficient, you can extend it using a junction box, for example over a 2 or 4-wire system.



#### 2-wire system

When connecting the temperature sensor in a 2-wire system, the cable resistance is included in the measurement. Depending on the cable length, this can lead to inaccuracies when measuring.

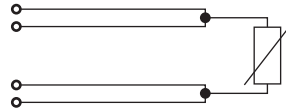


The 2-wire system should therefore only be used with short cable lengths (maximum 3 m) or where the necessary degree of measuring accuracy is not as high. In order to improve the measuring accuracy, the use of a 4-wire system is recommended.



### 4-wire system

To offset measuring errors which occur as a result of cable resistance, connect the temperature sensor via a 4-wire system. This type of connection ensures the current feed and voltage measurement are performed by separate pair cables. The cable length must not exceed 30 m.



Protect the connection interfaces against weather conditions.

When extending the sensor cable, protect the connection interface against weather conditions (e.g. by using a junction box or terminal box).

## 4.1 Cabling Recommendations

The cable length and quality will affect the signal quality. To achieve a good quality signal, observe the following cabling instructions:

### Outdoors

For outdoors, use a cable with the following basic properties.

- Cross-section: min. 4 x 0.25 mm<sup>2</sup>, min. 4 x AWG 24
- UV-resistant

We recommend the following cable types:

- Lapp cable: Unitronic S-LiY1 1Y 4 x 0.34 mm<sup>2</sup>, order no.: 7038 861
- UL-listed Lapp cable: UNITRONIC S-LiY1 1Y 4 x 0.34 mm<sup>2</sup>, order no.: 7038 865

### Indoors

If you protect the cable against UV radiation for use outdoors by means of a suitable cable channel, you can also use a non-UV-resistant (indoor) cable with the basic properties mentioned above.

We recommend the following cable types:

- Lapp cable: Unitronic LiYY 4 x 0.25 mm<sup>2</sup>, order no.: 0028 304
- UL-listed Lapp cable: UNITRONIC LiYY UL/CSA 4 x AWG22/7, order no.: 0022 604
- Helukabel: TRONIC LiYY 4 x 0.25 mm<sup>2</sup>, order no.: 18031

## 4.2 Selecting Where to Install

Consider the following points when selecting where to install:

- Select a solar cell which is never in the shade during the day.
- The module temperature sensor is fixed to the rear.
- Take into account the prefabricated cable length of 2.5 m.



### 4.3 Installing the Sensor



**CAUTION!**

**Burns due to contact with the thermally conductive adhesive**

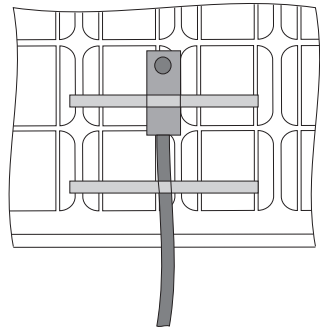
- Wear appropriate protective clothing, gloves and goggles when working on the sensor.
- Avoid contact with the skin, mucous membranes and eyes.
- Follow the safety precautions and instructions from the manufacturer of the thermally conductive adhesive.



**Thermally conductive adhesive**

Mix the thermally conductive adhesive according to the manufacturer's instructions. When processing, follow the processing and setting times specified by manufacturer.

1. Take into account the sensor cable length when determining where to install.
  2. Clean the installation site.
  3. Prepare the thermally conductive adhesive according to the manufacturer's instructions.
  4. Affix the module temperature sensor to the lower side of a solar cell using the thermally conductive adhesive provided.
  5. Affix the module temperature sensor and the cable to the lower side of the solar cell using adhesive tape strips.
  6. The adhesive tape strips can be removed once the thermally conductive adhesive has set.
- The module temperature sensor is now installed.



### 4.4 Connection Overview

Wire color	Color allocation
Red	The sensor wire can be allocated as desired. However, when using a 4-wire system, the connection allocations should be observed.
White	

### 4.5 Connecting the Sensor to the Sunny SensorBox

Refer to the Sunny SensorBox installation guide when configuring and connecting the sensor to the Sunny SensorBox. You can download the current installation guide from the download page at [www.SMA.de/en](http://www.SMA.de/en) or obtain it via the usual sales channels.

## 4.6 Connecting the Sensor to the Sunny Boy Control Plus

The sensor is connected to the analog input port (ANALOG IN) of the Sunny Boy Control Plus using a 2 or 4-wire system.



### Protect the connection interfaces against weather conditions.

When extending the sensor cable, protect the connection interface against weather conditions (e.g. by using a junction box or terminal box).



### Connecting the sensors using a connection terminal block

To connect the sensors to the Sunny Boy Control Plus, use the 25-pin connection terminal block (see section 8 "Accessories" (page 13)).

### 4-wire system

The AIN-7 and AIN-8 analog input ports have been configured for a 4-wire system with PT100 resistance. The supply currents required for this are provided by the Sunny Boy Control Plus. The sensor connection wires are duplicated in the immediate vicinity of the sensor.

Connecting the PT100 module temperature sensor to "AIN-7" in a 4-wire system	
Original wire - red	PIN 11 (PT100-I1+)
Duplicated wire - red	PIN 9 (AIN-7+)
Duplicated wire - white	PIN 20 (AIN-7-)
Original wire - white	PIN 22 (PT100-I1-)

Connecting the PT100 module temperature sensor to "AIN-8" in a 4-wire system	
Original wire - red	PIN 12 (PT100-I2+)
Duplicated wire - red	PIN 10 (AIN-8+)
Duplicated wire - white	PIN 21 (AIN-8-)
Original wire - white	PIN 23 (PT100-I2-)

### 2-wire system

Connecting the PT100 module temperature sensor to "AIN-7" in a 2-wire system	
Red	Bridge PIN 9 (AIN-7+) with PIN 11 (PT100-I1+)
White	Bridge PIN 20 (AIN-7-) and PIN 22 (PT100-I1-)

Connecting the PT100 module temperature sensor to "AIN-8" in a 2-wire system	
Red	Bridge PIN 10 (AIN-8+) with PIN 12 (PT100-I2+)
White	Bridge PIN 21 (AIN-8-) with PIN 23 (PT100-I2-)

## 4.7 Connecting the Sensor to the Sunny Central

The sensor is connected to the Sunny Central using the Z5-X5 terminal strips.



### Protect the connection interfaces against weather conditions.

When extending the sensor cable, protect the connection interface against weather conditions (e.g. by using a junction box or terminal box).



### Realizing the electrical connection

The Sunny Central wiring diagram provided must be used for establishing the electrical connections and connectors.

### 4-wire system

The sensor connection wires are duplicated in the immediate vicinity of the sensor.

Connecting the PT100 module temperature sensor to "Z5-X5" in a 4-wire system	
Original wire - white	Terminal 1
Duplicated wire - white	Terminal 2
Original wire - red	Terminal 3
Duplicated wire - red	Terminal 4

### 2-wire system

Connecting the PT100 module temperature sensor to "Z5-X5" in a 2-wire system	
Red	Bridge terminal 1 with terminal 2
White	Bridge terminal 3 with terminal 4

or

Connecting the PT100 module temperature sensor to "Z5-X5" in a 2-wire system	
Red	Terminal 5
White	Terminal 6

or

Connecting the PT100 module temperature sensor to "Z5-X5" in a 2-wire system	
Red	Terminal 7
White	Terminal 8

## 5 Configuration



### Configuring the Sunny Boy Control Plus or Sunny Central Control

Please refer to the Sunny Boy Control Plus user manual for the configuration. In the case of the Sunny Central Control, the configuration is described in the Sunny Central user manual.

### 5.1 Configuring the Sensor with the Sunny Boy Control Plus

To suitably configure the Sunny Boy Control Plus for the connected module temperature sensor, proceed as follows:

1. Log in to the Sunny Boy Control Plus as the installer.
  2. Select the "Settings > Plus I/O > Analog In" menu option in the Sunny Boy Control Plus.
  3. Select the input port that is to be configured:  
AIN-7 (PT100)  
**or**  
AIN-8 (PT100)
  4. Under "Function", select the desired temperature unit (e.g. °C).
  5. Under "Name", enter the desired sensor name (e.g. ModSens).
- The sensor is now configured.

### 5.2 Configuring the Sensor with the Sunny Central Control

To suitably configure the Sunny Central Control for the connected temperature sensor module, proceed as follows:

1. Log in to the Sunny Central Control as the installer.
  2. Select the "Settings > Connections > Analog In" menu option in the Sunny Boy Control.
  3. Select the input port that is to be configured.
  4. Under "Function", select the desired temperature unit (e.g. °C).
  5. Under "Name", enter the desired sensor name (e.g. module temperature sensor ).
- The sensor is now configured. The gain and offset do not require calculating.

## 6 Decommissioning

### 6.1 Uninstalling the Sensor

1. Reset the configuration of the sensor in the communication device.
2. Detach the sensor cable from the communication device.



#### ATTENTION!

#### Damage to the solar cell due to detaching the module temperature sensor

Sensors should not be removed once affixed as this could cause damage to the solar cell. The sensor cannot be reused.

- Cut the sensor cable directly from the sensor.

- The sensor is now uninstalled.

### 6.2 Disposing of the Sensor

At the end of the service life of the PV system, dispose of the sensor in accordance with the disposal regulations for electronic waste applicable at the installation site at that time. Alternatively, send it back to SMA Solar Technology with shipping costs paid by sender, and labeled "ZUR ENTSORGUNG" ("for disposal")

## 7 Technical Data

General data	
Measurement resistor	PT100
Installing the Device	outdoors
Protection rating	IP62
Connection cable	
Connection cable	pre-configured cable length of 2.5 m.
Measured values	
Tolerance	maximum $\pm 0.7$ °C (class B)
Measuring range	-20 °C to +110 °C
Warranty, Certificates and Permits	
Warranty	2 years

## 8 Accessories

	Description	SMA order number
<b>Analog IN connection terminal block</b>	25-pin, D-Sub plug for Sunny Boy Control Plus (incl. 1:1 cable, 25-pin D-Sub, bushing/plug, length 0.5m)	SBCOP-ANA-KIT

## 9 Contact

If you have technical problems concerning our products, contact our Service Line. We need the following information to provide you with the necessary assistance:

- Sensor model
- Communication device
- Measured values

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