System Monitoring

PT100U-NR

Installation Guide
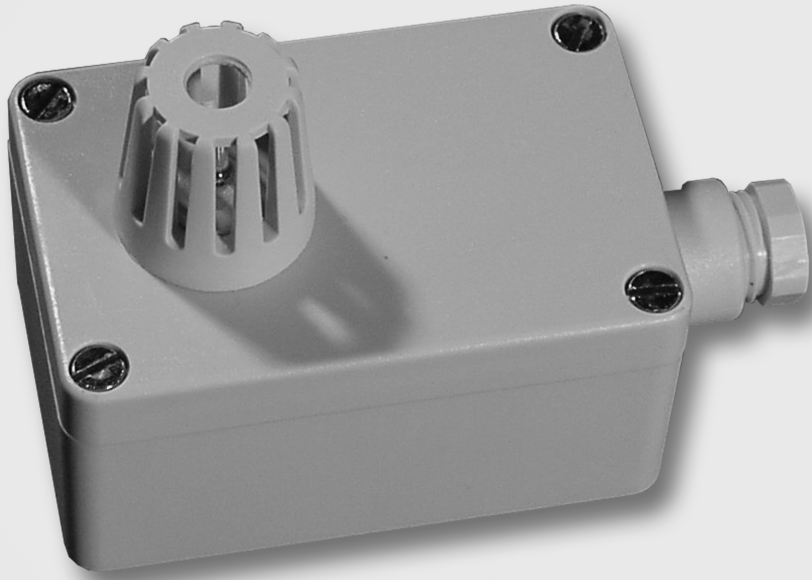
Table of Contents

1 Notes on this Manual

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

1.1 Validity

This manual is valid for the PT100U-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.

⚠ **DANGER!**	
	DANGER indicates a safety instruction which, if not followed, will result in certain death or serious injury.

⚠ **WARNING!**	
	WARNING indicates a safety instruction which, if not followed, could result in death or serious injury.

⚠ **CAUTION!**	
	CAUTION indicates a safety instruction which, if not followed, could result in minor or moderate injury.

⚠ **ATTENTION!**	
	ATTENTION indicates a safety instruction which, if not followed, could result in damage to property.

ⓘ **Information**	
	'Information' provides valuable tips for the optimal operation of your product.

2 Safety

2.1 Appropriate Usage

The PT100U ambient temperature sensor consists of a PT100 measurement resistor which is installed in a IP65 plastic enclosure. The PT100U temperature sensor enables measurements in either a 2- or 4-wire system as desired. The measuring range of the ambient temperature sensor is between -30 °C and +80 °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 Plus installation guide and the 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, the corresponding overvoltage protectors can be ordered as an option from Sunny Central.

3 Unpacking

3.1 Packing List

PT100U-NR

| A | B | C |
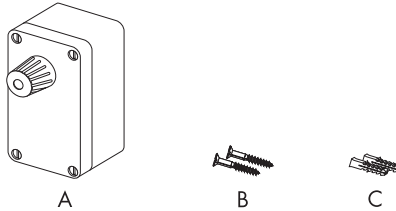
A   1   PT100U ambient temperature sensor
B   2   Screws
C   2   Wall anchor

3.2 Identifying the Ambient Temperature Sensor

You can identify the sensor using the type plate. The type plate is located on the inside of the lid.

4 Installation and Electrical Connection

The PT100U ambient temperature sensor can be connected to the Sunny Boy Control Plus or the Sunny Central Control via a 2- or 4-wire system as desired. The connection cable is not included and is routed into the enclosure interior via a cable gland.

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 3m) 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.
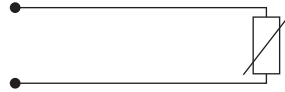
4-wire system

To offset measuring errors that occur due to 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 length of the cable must not exceed 30m.
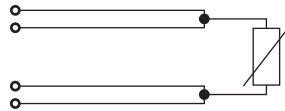
4.1 Cabling Recommendations

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 0.25mm², min. 4 x AWG 24
- External cable diameter: min. 4.5mm, max. 7mm
- UV-resistant

We recommend the following cable types:

- Lapp cable: Unitronic S-LifY11Y 4 x 0.34mm², order no.: 7038 861
- UL-listed Lapp cable: UNITRONIC S-LifY11Y 4 x 0.34mm², 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 0.5mm², order no.: 0028 504

- UL-listed Lapp cable: UNITRONIC LiYY UL/CSA 4 x AWG22/7, order no.: 0022 604

- Helukabel: TRONIC LiYY 4 x 0.5mm², order no.: 18087

4.2 Selecting Where to Install

- The ambient temperature sensor must be installed with the cable gland pointing downwards in order to prevent water from accumulating on the cable gland.

- Protect the ambient temperature sensor from severe contamination and spray.

- See image for the recommended ambient temperature sensor alignment.

- Select an installation site which is in shade throughout the entire day.

- Make sure that heat cannot accumulate at the installation site.

- Take into account the maximum cable length of 30m (4-wire system).
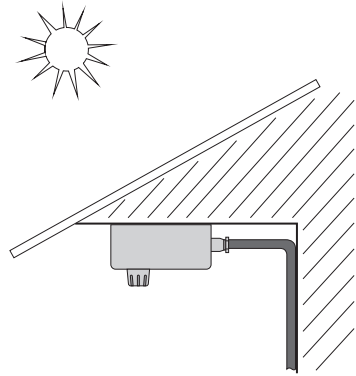
4.3 Installing the Sensor
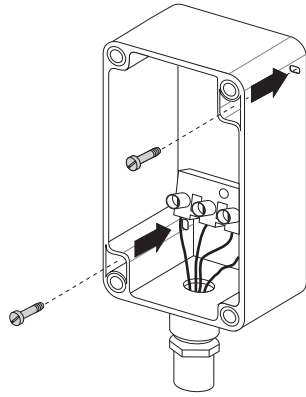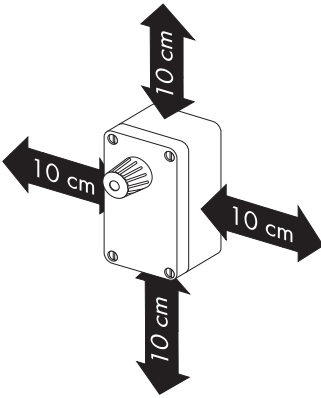
1. Unscrew the four screws on the sensor enclosure and remove the lid.
2. Determine and mark the installation site taking into account the installation space.
3. Fasten the sensor enclosure using the screws provided.
☑ The sensor is now installed.

4.4 Connecting the Sensor

1. Unscrew the screws on the sensor enclosure and remove the lid.
2. Unscrew the sensor cable gland.
3. Remove the small interior protection plates. Make sure that the interior seal does not fall out.
4. Screw the cable gland halfway onto the enclosure.
5. Thread the cable through the sensor cable gland.
6. Connect the wires to the screw terminals in a 2 or 4-wire system - see image on the right Use a 4-wire system to connect the Sunny SensorBox.
7. Write down the color of the wires:

   I+_____
   V+_____
   V-_____
   I-_____

8. Screw the sensor cable gland tightly into the sensor enclosure (torque: 0.8Nm).

2-wire system   4-wire system

9. Connect the plug from the sensor lid with the screw terminals - see image on the right. The polarity of the cables can be chosen as desired.

10. Fasten the sensor lid to the enclosure using the screws provided.

☑ The sensor is now connected.
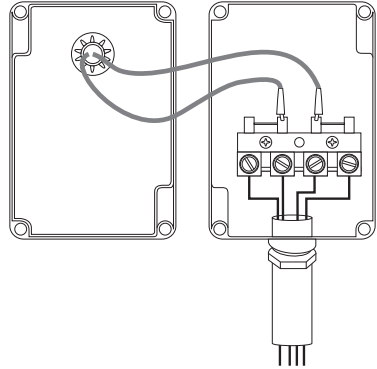
4.5 Connecting the Sensor to the Sunny SensorBox

The sensor is connected at the "F6 TmpAmp" connection in the Sunny SensorBox. Proceed as follows:

⚠ **ATTENTION!**

Damage to the Sunny SensorBox due to liquids entering in.

- When working outdoors, make sure that no liquids (e.g. rain or snow) enter the open Sunny SensorBox.

- When inserting and removing the cable through the cable gland, make sure that the grommet fits correctly into the cable gland.
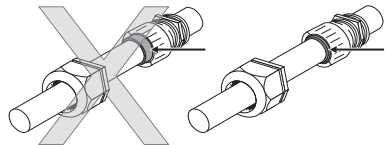
⚠ **ATTENTION!**

Damage to the Sunny SensorBox due to porous rubber seals

The rubber seal in the Sunny SensorBox lid becomes porous over time and will no longer provide a tight seal if the Sunny SensorBox is opened. If you open the Sunny SensorBox after an operating lifetime of more than 5 years, e.g. for upgrading the device, the rubber seal in the Sunny SensorBox lid must be replaced with a new one. In this instance please order a replacement seal before starting maintenance works.

---

1. Open the lateral flaps of the Sunny SensorBox using the recesses.

2. Loosen the screws in the corners of the Sunny SensorBox and open the enclosure lid towards the left. The lid is connected to the lower shell by hooks.

3. Unscrew the cable gland sleeve nuts on the bottom center of the Sunny SensorBox and remove the filler plugs.

4. Thread the sensor cable through the sleeve nuts and tighten the cable gland of the Sunny SensorBox.
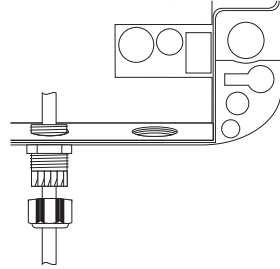
5. Remove the resistor and the bridge at the "F6 TmpAmb" connection in the Sunny SensorBox.
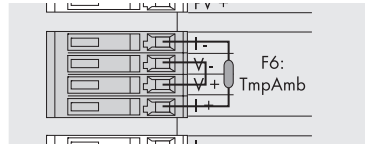
6. Connect the sensor to the "F6 TmpAmb" connection in the Sunny SensorBox. Note the indicated wire colors (see page 10).

7. Ensure that the cable gland grommet is correctly in place.

8. Screw the sleeve nuts tightly onto the cable gland to fix the cable (torque: 0.8Nm).

9. Lay the cable using suitable fastening material.

10. Install and connect further sensors.

11. Place the Sunny SensorBox enclosure lid on the lower enclosure shell.

12. Initially turn the screws of the enclosure lid a little to the left, until the screws fall into the first turn of the thread.
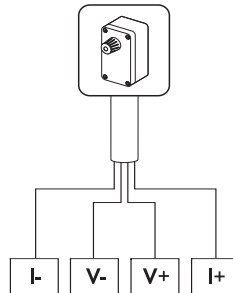
13. Turn the screws tightly (torque: 1 Nm) into the lower enclosure shell.

☑ The ambient temperature sensor is now connected.

i | **Sensor Configuration**
Refer to the Sunny SensorBox installation guide for the sensor configuration.

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.

i	**Connecting the sensors using a connection terminal block**
	To connect to the Sunny Boy Control Plus, use the 25-pin connection terminal block (see section 8 "Accessories" (page 17)).

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.

Connecting the PT100 temperature sensor to "AIN-7" in a 4-wire system	
I+ at the sensor	PIN 11 (PT100-I1+)
V+ at the sensor	PIN 9 (AIN-7+)
V- at the sensor	PIN 20 (AIN-7-)
I- at the sensor	PIN 22 (PT100-I1-)

Connecting the PT100 temperature sensor to "AIN-8" in a 4-wire system	
I+ at the sensor	PIN 12 (PT100-I2+)
V+ at the sensor	PIN 10 (AIN-8+)
V- at the sensor	PIN 21 (AIN-8-)
I- at the sensor	PIN 23 (PT100-I2-)

2-wire system

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

Connecting the PT100 temperature sensor to "AIN-8" in a 2-wire system	
V+ at the sensor	Bridge PIN 10 (AIN-8+) with PIN 12 (PT100-I2+)
V- at the sensor	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.

> **i** **Realizing the electrical connection**
>
> The wiring diagram provided must be used for establishing the electrical connections and connectors.

4-wire system

Connecting the PT100 temperature sensor to "=Z5-X5" in a 4-wire system	
I+ at the sensor	Terminal 1
V+ at the sensor	Terminal 2
I- at the sensor	Terminal 3
V- at the sensor	Terminal 4

2-wire system

Connecting the PT100 temperature sensor to "=Z5-X5" in a 2-wire system	
V+ at the sensor	**Bridge** terminal 1 **with** terminal 2
V- at the sensor	**Bridge** terminal 3 **with** terminal 4

or

Connecting the PT100 temperature sensor to "=Z5-X5" in a 2-wire system	
V+ at the sensor	Terminal 5
V- at the sensor	Terminal 6

or

Connecting the PT100 temperature sensor to "=Z5-X5" in a 2-wire system	
V+ at the sensor	Terminal 7
V- at the sensor	Terminal 8

5 Configuration

> **i**   **Configuring the Sunny Boy Control Plus or Sunny Central Control**
>
> 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 with the connected ambient 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. Temp).

☑ The sensor is now configured.

5.2 Configuring the Sensor with the Sunny Central Control

To suitably configure the Sunny Central Control with the connected ambient temperature sensor, proceed as follows:

1. Log in to the Sunny Central Control as the installer.

2. Select the menu option "Settings > Connections > Analog In" in the Sunny Central 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. Temp).

☑ The sensor is now configured. The gain and offset do not require calculating.

6 Decommissioning

6.1 Uninstalling the Sensor

1. Reset the sensor configuration in the communication device.
2. Detach the sensor cable from the communication device.
3. Unscrew the screws on the sensor enclosure and remove the lid.
4. Remove the enclosure from the wall.
☑ The sensor is now uninstalled.

6.2 Disposing of the Sensor

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

7 Technical Data

General data	
Dimensions (W/H/D) in mm	100/52/67
Measurement resistor	PT100
Installation	outdoors
Protection rating	IP65
Connection cable	
Connection cable	max 30m. (not included in delivery)
Measured values	
Tolerance	maximum ± 0.7°C (class B)
Measuring range	-30 °C to +80 °C

8 Accessories

	Description	SMA order number
Analog IN connection terminal block	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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