



Digital Silicon Irradiance Sensors

Type Overview

Type	Extension
Si-RS485TC-T-MB	–
Si-RS485TC-2T-MB	Firmly connected ambient temperature sensor (3 m connection cable)
Si-RS485TC-T-Tm-MB	Firmly connected external PV module temperature sensor (3 m connection cable)
Si-RS485TC-2T-v-MB	2 connectors for one temperature sensor and one wind speed sensor: - Wind speed Vwind-Si - Ambient temperature Tamb-Si or module temperature Tmodul-Si
Si-RS485TC-3T-MB	2 connectors for two external temperature sensors: T1: Ambient temperature Tamb-Si or module temperature Tmodul-Si T2: Ambient temperature Tamb-Si or module temperature Tmodul-Si

Warranty and Liability

The irradiance sensor is designed for the measurement of the natural solar irradiance. The warranty is for 1 year from the date of the invoice for the intended use. IMT Technology does not accept any liability for possible losses or damage due to the incorrect usage of the sensor. Liability for consequential damages is excluded.

Special note: The housing for the Si sensors is not allowed to be opened by the installer or user, because, as a consequence, the housing will no longer be sealed after it is closed. If the housing is opened, the manufacturer's warranty will be rendered void.

Maintenance

Scope of the regularly check (at least once a year): Cleaning of solar cell, external damage, mechanical fastening, cable laying and any damage to the cable. In the report IEA-PVPS T13-03:2014 "Analytical Monitoring of Grid-connected Photovoltaic Systems" an interval of 1 to 2 weeks is recommended.

Should damage be found that degrades the function or safety, the sensor is to be replaced.

A recalibration is recommended by IMT Technology at least every 3 years.



Danger of death due to electrical power (medium)

On the connection of the Si sensor to an inverter, dangerous voltages are present on the inverter (disconnection, secure against switching, follow inverter manual).



The sensors are designed for **safety extra-low voltage** (SELV) operation. The maximum power of the voltage supply is 50 VA ("Class 2 limited power").

Reversing the polarity or mixing up the connections on the Si sensor may cause irreversible damage to the sensor. The **cable shield** is to be connected to PE during installation.

The installation and assembly of electrical equipment must be carried out by electrically qualified persons.

The sensor may not be used with equipment whose direct or indirect purpose is to prevent human death or injury, or whose operation poses a risk to humans, animals or property.



Si sensors used for monitoring of PV installations must be installed with the **same alignment and inclination as the PV generator**. The mounting location should be free of shading as far as possible. To facilitate maintenance and cleaning of the Si sensor, the Si sensor should be mounted in an easily accessible place.

The **mounting location** at a PV generator must be selected such that snow cannot jeopardise the Si sensor as it slides off. For this reason do not mount along the drip edge on the PV generator.

The **fixation of the sensor** has to be carried out with at least 1 screw per mounting bracket.

The **connecting cable** should always be laid separated from, e.g. main DC cables or AC cables. The connecting cable is to be laid so it is fixed. The minimum bending radius of 15 x cable diameter (\varnothing approx. 5 mm) is to be observed.

The cable gland is not allowed to be undone or tightened by the user.

It is not necessary for the installer or user to open the Si sensor. **If the housing is nevertheless opened, no liability for the sealing can be accepted.**

The **surge protection concept** must be adapted to the specific local situation. This means, for instance, that the measuring cables must be equipped with a separate surge arrester at the entry to a building. The sensor must be integrated into the **lightning protection** concept.

Should it be necessary to **clean** the Si sensor, a soft cotton cloth, water and a mild cleaning agent can be used for this purpose.

Mounting Instruction

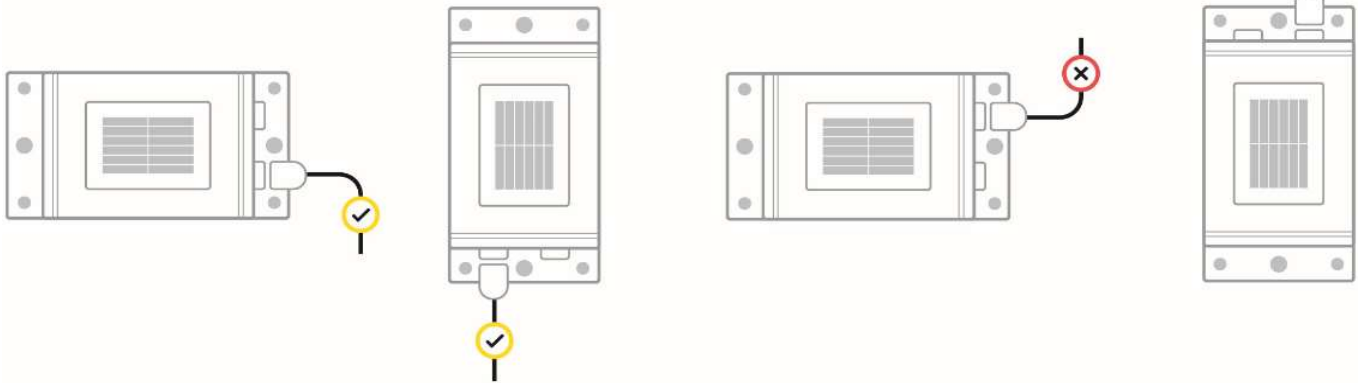
When installing the sensor, the cables must be routed downwards from the housing.



Correct!



Wrong!



For Si-RS485TC-2T-MB:

If mounted outdoors, avoid direct exposure to sunlight and rain to the sensor housing (INOX steel tube). If necessary, provide protection from the sun and rain with the optional Shield-Tamb-Si.

When installing the sensor, the cables must be routed downwards from the housing.

The sensor cable needs a cable grip close to the sensor housing.

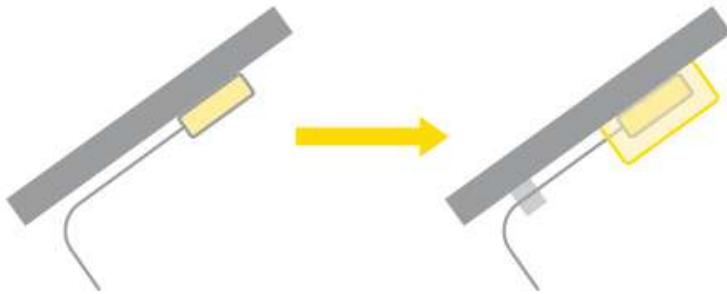
For Si-RS485TC-T-Tm-MB:

The sensor element is mounted by gluing the aluminium block directly to the measurement surface. The surface must be dry, clean and degreased. Cleaning should NOT be done with glass cleaner, as some glass cleaners contain additives to prevent soiling after cleaning and these additives also prevent adhesion. Isopropyl Alcohol or Ethanol is recommended for cleaning. Temperature sensors shall be placed in representative locations to capture the range of variation and allow determination of an effective average. For crystalline silicon modules, select the centre of the centre-most cell within the module, or, when the module is built with even numbers of rows or columns of cells, select one of the cells closest to the centre.

For bifacial modules, rear-side temperature sensors and wiring shall obscure < 10 % of the area of any cell, and wiring should be routed in between cells when possible.

It is also recommended using an extra fixing with silicone or Sikaflex, particularly for module temperature above 75°C.

The sensor cable needs a cable grip close to the sensor housing.



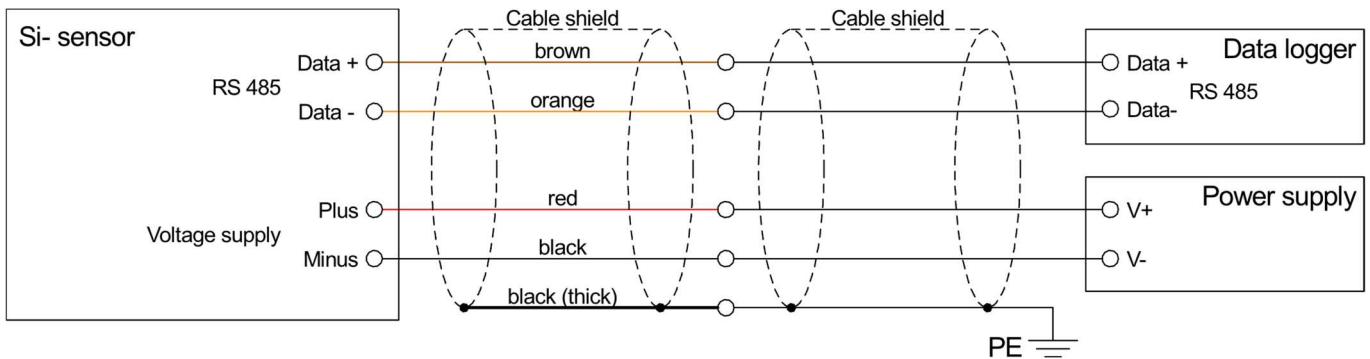
Cable Length

Supply voltage	Cable cross section						
	0.14 mm ²	0.25 mm ²	0.34 mm ²	0.5 mm ²	0.75 mm ²	1.0 mm ²	1.5 mm ²
24 V _{DC}	300 m	600 m	800 m	1000 m	1000 m	1000 m	1000 m
12 V _{DC}	50 m	100 m	150 m	200 m	300 m	400 m	650 m

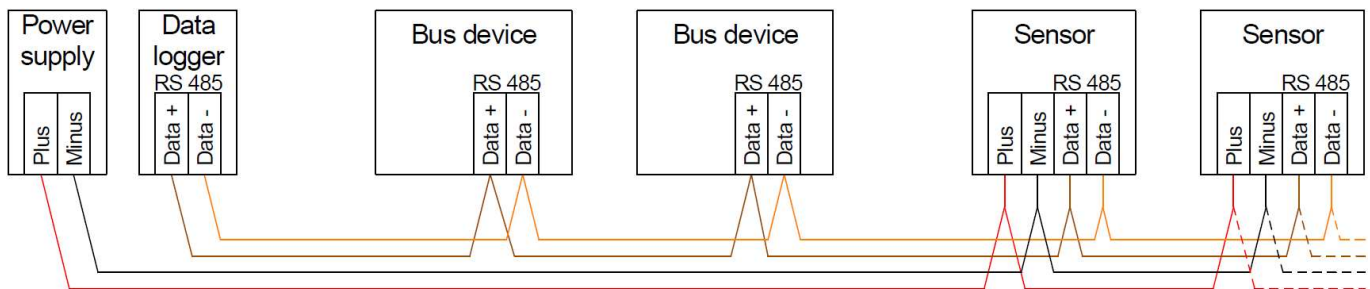
Maximum additional cable length of Si sensors with 3 m connection cable at voltage supply of 24 V_{DC} and 12 V_{DC}.

Note: If more sensors are supplied by the same voltage supply, the possible cable length is reduced accordingly.
 Example: 3 sensors at 24 V_{DC} and cable 0.14 mm²: 300 m / 3 = 100 m

Wiring Diagram



Bus Topology



All bus participants with Modbus protocol (RTU) require identical Modbus parameters but different addresses.
 Bus termination usually not required.

Technical Data

General Data

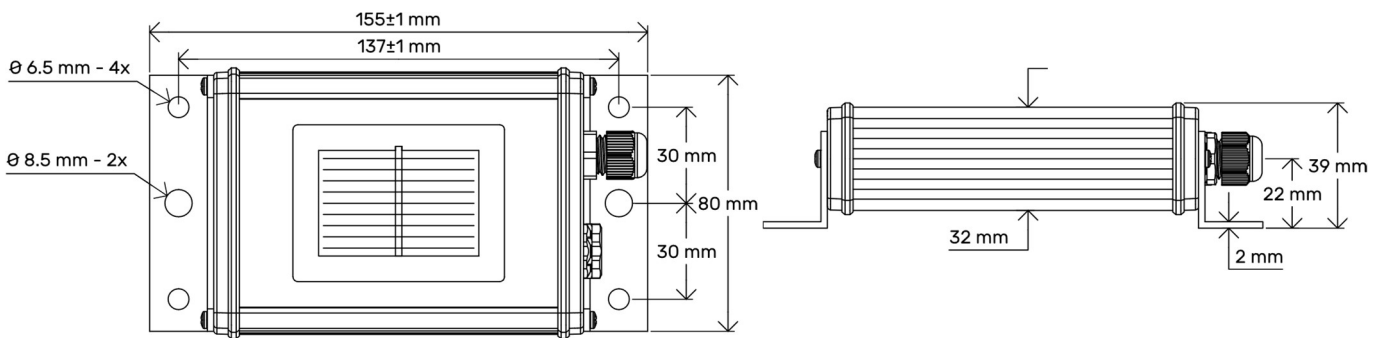
Output signal	RS485
Irradiance range	0 to 1500 W/m ²
Temperature range	-40 to +90°C
Sensor element	Monocrystalline silicon PV cell; 50 mm x 33 mm
Case: material	Powder coated aluminium
dimension / weight / degree of protection	155 mm x 85 mm x 39 mm / 350 to 470 g / IP 67
Operating temperature	-35 to +80°C
Supply voltage	24 V _{DC} (10 ... 28 V _{DC})
Current consumption	Typical 25 mA at 24 V _{DC}
Connecting cable	Length typical 3 m, PUR coated, shielded, LiYC11Y 4x0.14 mm ²
Maximum cable length	1000 m
Galvanic insulation	Up to 1000 V between supply voltage and RS485

Wire colours

Brown	Data +
Orange	Data -
Red	Supply
Black	GND
Black (thick)	Shield

Protocol	Settings (default)	Note
Modbus (RTU)	Address: 1 Baud rate: 9600 baud Format: 8N1	Settings can be changed with „Si-Modbus-Configurator“ software. Maximum baud rate: 38400 baud

Dimensions



Scope of Delivery

- Si sensor incl. pre-assembled connecting cable or suitable male connector (option)
- Calibration certificate
- Instruction sheet

Intelligent Measurement & Testing