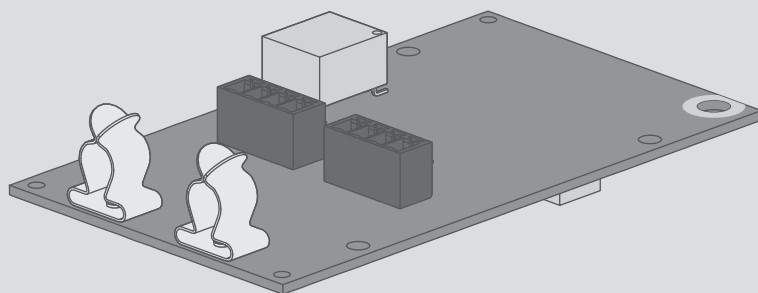


Installation Manual

SMA RS485 MODULE

MD.485-US-40 (PC-485.BG1)



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1 Information on this Document

1.1 Validity

This document is valid for:

- SMA RS485 (MD.485-US-40) with assembly designation "PC-485.BG1" from hardware version A1

1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:


- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, standards and directives
- Knowledge of and compliance with this document and all safety information


1.3 Levels of Warning Messages

The following levels of warning messages may occur when handling the product.

 DANGER
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
Indicates a situation which, if not avoided, can result in property damage.

1.4 Symbols in the Document

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
<input type="checkbox"/>	Indicates a requirement for meeting a specific goal
<input checked="" type="checkbox"/>	Desired result

Symbol	Explanation
×	A problem that might occur
	Example

1.5 Typographies in the Document

Typography	Use	Example
bold	<ul style="list-style-type: none"> • Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • Connect the insulated conductors to the terminals X703:1 to X703:6. • Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Select Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> • Button or key to be selected or pressed 	<ul style="list-style-type: none"> • Select [Enter].
#	<ul style="list-style-type: none"> • Placeholder for variable components (e.g., parameter names) 	<ul style="list-style-type: none"> • Parameter WCtHz.Hz#

1.6 Designation in the document

Complete designation	Designation in this document
PV system	PV system
SMA RS485 Module	Module, product

1.7 Additional Information

Title and information content	Type of information
"RS485 Cabling Plan"	Installation Manual

2 Safety

2.1 Intended Use

The SMA RS485 Module enables SMA inverters to establish wired RS485 communication.

The SMA RS485 Module enables SMA inverters of type "SBx.x-1SP-US-40" and "SBx.x-1SP-US-41" to establish communication between the inverter and the energy meter according to ANSI C12.20 of the SMA Revenue Grade Meter Kit. The SMA RS485 module can be used in SMA inverters of type "SBx.x-1SP-US-40" and "SBx.x-1SP-US-41" only to establish this communication. The setup of a cable-connected RS485 communication to other units is not supported.

The product must only be installed in the following SMA inverters:

- STP 50-US-40 (Sunny Tripower CORE1-US)
- STP 33-US-41 (Sunny Tripower CORE1-US)
- STP 50-US-41 (Sunny Tripower CORE1-US)
- STP 62-US-41 (Sunny Tripower CORE1-US)
- SB3.0-1SP-US-40 (Sunny Boy 3.0-US)
- SB3.8-1SP-US-40 (Sunny Boy 3.8-US)
- SB5.0-1SP-US-40 (Sunny Boy 5.0-US)
- SB6.0-1SP-US-40 (Sunny Boy 6.0-US)
- SB7.0-1SP-US-40 (Sunny Boy 7.0-US)
- SB7.7-1SP-US-40 (Sunny Boy 7.7-US)
- SB3.0-1SP-US-41 (Sunny Boy 3.0-US)
- SB3.8-1SP-US-41 (Sunny Boy 3.8-US)
- SB5.0-1SP-US-41 (Sunny Boy 5.0-US)
- SB6.0-1SP-US-41 (Sunny Boy 6.0-US)
- SB7.0-1SP-US-41 (Sunny Boy 7.0-US)
- SB7.7-1SP-US-41 (Sunny Boy 7.7-US)

The inverter still complies with the standard after the product has been installed.

All components must remain within their permitted operating ranges and their installation requirements at all times.

The product is approved for the US and Canadian market.

Use SMA products only in accordance with the information provided in the enclosed documentation and with the locally applicable laws, regulations, standards and directives. Any other application may cause personal injury or property damage.

Alterations to the SMA products, e.g., changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as the intended use.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient, dry place for future reference and observe all instructions contained therein.

This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation, electrical safety and use of the product. SMA Solar Technology AG assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

The type label must remain permanently attached to the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This section contains safety information that must be observed at all times when working.

The product has been designed and tested in accordance with international safety requirements. As with all electrical or electronic devices, there are residual risks despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

DANGER

Danger to life due to electric shock when live components or cables of the inverter are touched

High voltages are present in the conductive components or cables of the inverter. Touching live parts and cables of the inverter results in death or lethal injuries due to electric shock.

- Disconnect the inverter from voltage sources and make sure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.

NOTICE

Damage to the enclosure seal in subfreezing conditions

If you open the inverter when temperatures are below freezing, the enclosure seals can be damaged. This can lead to moisture entering the inverter.

- Only open the inverter if the ambient temperature is not below -5°C (23°F).
- If a layer of ice has formed on the enclosure seal when temperatures are below freezing, remove it prior to opening the inverter (e.g. by melting the ice with warm air).

NOTICE**Damage to the product due to sand, dust and moisture ingress**

Sand, dust and moisture penetration can damage the product and impair its functionality.

- Only open the inverter if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the inverter during a dust storm or precipitation.
- Close tightly all enclosure openings.
- Only use listed rain-tight or liquid-tight conduit fittings to attach the conduits to the product.

NOTICE**Damage to the inverter or product due to electrostatic discharge**

Touching electronic components can cause damage to or destroy the inverter or the product through electrostatic discharge.

- Ground yourself before touching any component.

**Electrical installations (for North America)**

All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation (e.g. *National Electrical Code*® ANSI/NFPA 70 or *Canadian Electrical Code*® CSA-C22.1.).

- Before connecting the product to the utility grid, contact your local grid operator. The electrical connection of the product must be carried out by qualified persons only.
- Ensure that the cables or conductors used for electrical connection are not damaged.

3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

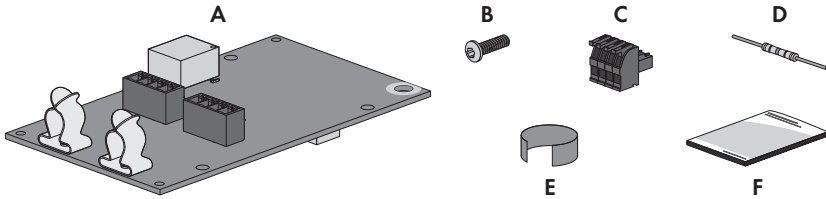


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Module
B	1	Fastening screw (M5, TX 25)
C	2	4-pole terminal block
D	1	Terminator
E	2	Copper foil
F	1	Quick Reference Guide

4 Product Overview

4.1 SMA RS485 Module

The SMA RS485 Module enables SMA inverters to establish wired RS485 communication.

Design of the Module

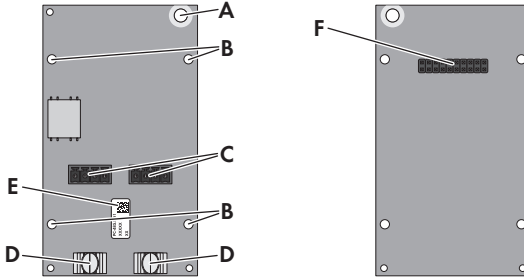


Figure 2: Design of the module

Position	Explanation
A	Opening for the fastening screw
B	Openings for the guide pins of the communication assembly
C	Jacks for connecting the 4-pole terminal blocks
D	Shield clamps
E	Type label
F	Connector strip on the back of the module for connection to the communication assembly in the inverter

4.2 Type Label

The type label clearly identifies the product. The type label is located on the front of the product.

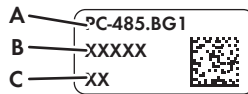


Figure 3: Design of the type label

Position	Explanation
A	Device type
B	Serial number
C	Hardware version

You will require the information on the type label to use the product safely and when seeking customer support from Service (see Section 10 "Contact", page 21).

5 Mounting

5.1 Mounting position

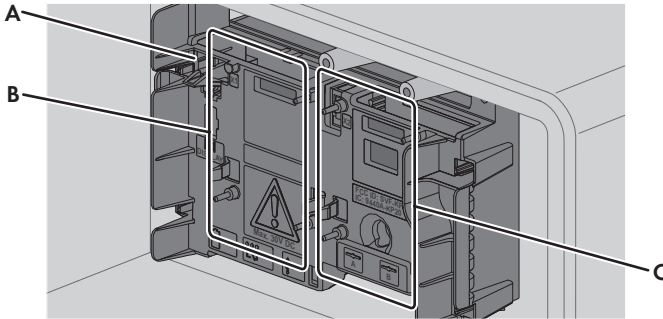


Figure 4: Communication assembly in the inverter with mounting position for the module

Position	Designation
A	Communication assembly
B	Module slot M1 *
C	Module slot M2

* Production resources SMA Solar Technology AG recommends using module slot **M1** for the module.

5.2 Installing the Module

NOTICE

Damage to the product due to sand, dust and moisture ingress

Sand, dust and moisture penetration can damage the product and impair its functionality.

- Only open the inverter if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the inverter during a dust storm or precipitation.
- Close tightly all enclosure openings.
- Only use listed rain-tight or liquid-tight conduit fittings to attach the conduits to the product.

i Maximum number of modules per inverter

You can only use a maximum of one module of the same device type per inverter.

Procedure:

1.

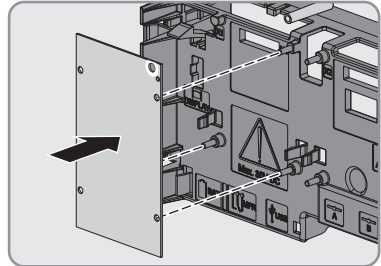
⚠ DANGER**Danger to life due to high voltages of the PV array**

When exposed to sunlight, the PV array generates dangerous DC voltage, which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks.

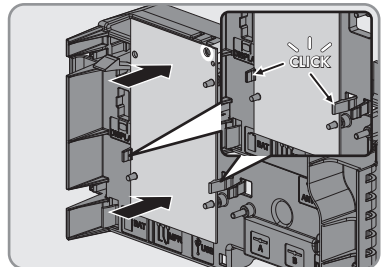
- Prior to performing any work on the inverter, always disconnect the inverter from voltage sources on the AC and DC sides as described in the inverter manual. When doing so, note that even if the DC load-break is switched off, there will be dangerous direct voltage present in the DC conductors of the inverter.

2. Remove the enclosure lid of the DC Connection Unit. Unscrew all screws with a Torx screwdriver (TX25) and remove the enclosure lid carefully forward.
3. Set the screws and the enclosure lid aside and store safely.
4. Install the module at the desired mounting location. Perform the following steps:

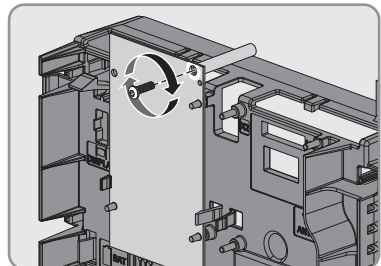
- Guide the three guide pins on the communication assembly through the holes in the module. The holes in which the guide pins must be inserted depend on the mounting location.



- Carefully push the module down on the upper edge and on the connection sockets until it audibly snaps into both side locking tabs of the communication assembly. The connector strip on the back of the module is automatically pushed into the socket terminal strip of the communication assembly.



5. Screw tight the fastening screw with a Torx screwdriver (TX25) on the module (torque: 1.5 Nm (13 in-lb)). This additionally fixes the module in place and grounds it in the inverter enclosure.



6 Connection

6.1 Preparing the Connection Cable

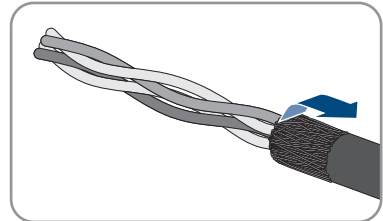
Depending on whether the module is located at the end or in the middle of the communication bus, prepare one or two connection cables as described in the following.

Requirements:

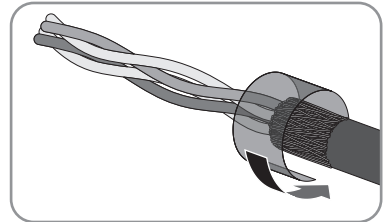
- The cable requirements must be complied with (see Installation Instructions "RS485 Cabling Plan" at www.SMA-Solar.com).
- Diameter of the cable when using the cable support sleeve with one hole: at maximum 17 mm (0.67 in)
- Diameter of the cable when using the cable support sleeve with two holes: at maximum 6.5 mm (0.26 in)

Procedure:

1. Strip 40 mm (1.57 in) of cable sheath from the end of the connection cable to which the terminal block is to be attached. Make sure that no pieces of cable are dropped into the inverter.
2. Trim the cable shield to a length of 15 mm (0.59 in) and fold it over the cable sheath.



3. Wrap the cable shield with copper foil.



4. Strip the insulation on the three insulated conductors each by 6 mm (0.24 in). The two insulated conductors used for communication must be a twisted pair.
5. Trim unneeded insulated conductors of the connection cable flush with the cable sheath.

6.2 Inserting the Cables

Additionally required material (not included in the scope of delivery):


- Connection cable (see Section 6.1, page 14)

Procedure:

1. Make sure that the inverter has been disconnected and is secured against reconnection (see the inverter manual).
2. Remove the swivel nut from the cable gland for the communication cable.
3. Thread the swivel nut over the cable.
4. Press the two-hole cable support sleeve out of the cable gland.
5. Remove the sealing plug from one of the enclosure openings of the two-hole cable support sleeve and insert the cable into the enclosure opening.
6. Press the two-hole cable support sleeve with the cable into the cable gland and guide the cable to the communication assembly in the DC Connection Unit. Ensure that any unused enclosure openings of the two-hole cable support sleeve are sealed with sealing plugs.
7. Tighten the swivel nut on the cable gland hand-tight. This will secure the cable.

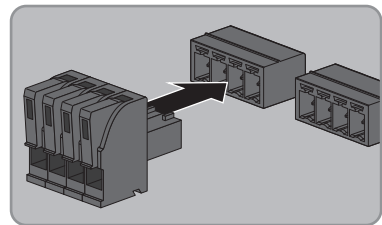
6.3 Connecting the Cable

Assignment of the terminal block:

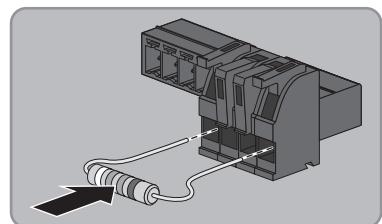
Terminal block	Clamping position	Assignment
	2	Data+ (D+)
	3	Not assigned
	5	Ground (GND)
	7	Data- (D-)

Procedure:

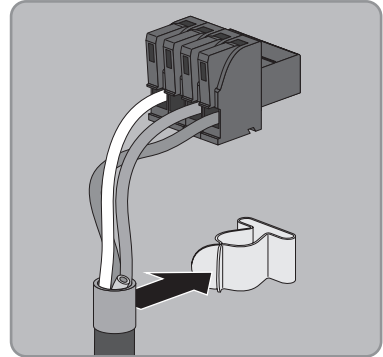
1. Plug a terminal block each into the jack on the module.



2. If one connection cable is to be connected, attach the terminator:
 - Push the levers of the terminals 2 and 7 of a terminal block upwards.
 - Bend the ends of the terminator downwards and plug the terminator into the open terminals.
 - Close the levers of the terminals.



3. Push the levers of the terminals 2, 5 and 7 of a terminal block upwards.
4. Connect the insulated conductors to the terminals 2, 5 and 7 and note the insulated conductor colors (see Installation Instructions "RS485 Cabling Plan" at www.SMA-Solar.com).
5. Close the levers of the terminals.
6. Press each connection cable with the cable shield into the shield clamp on the module.



7. If no further connections are required on the module, close the inverter and commission it (see the inverter manual).

7 Decommissioning

7.1 Removing the Module

NOTICE

Damage to the product due to sand, dust and moisture ingress

Sand, dust and moisture penetration can damage the product and impair its functionality.

- Only open the inverter if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the inverter during a dust storm or precipitation.
- Close tightly all enclosure openings.
- Only use listed rain-tight or liquid-tight conduit fittings to attach the conduits to the product.

Procedure:

1.

DANGER

Danger to life due to high voltages of the PV array

When exposed to sunlight, the PV array generates dangerous DC voltage, which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks.

- Prior to performing any work on the inverter, always disconnect the inverter from voltage sources on the AC and DC sides as described in the inverter manual. When doing so, note that even if the DC load-break is switched off, there will be dangerous direct voltage present in the DC conductors of the inverter.

2. Remove the enclosure lid of the DC Connection Unit. Unscrew all screws with a Torx screwdriver (TX25) and remove the enclosure lid carefully forward.
3. Set the screws and the enclosure lid aside and store safely.
4. Remove all connecting terminal plates from the used connection sockets of the module.
5. Unscrew the fastening screw on the module using a Torx screwdriver (TX 25).
6. Remove the module:
 - Press the right or left locking tab of the communication assembly slightly outwards and pull the module slightly forwards holding the lower end until the module is released from the interlock of the locking tab.
 - Grab the module by the upper and lower edge with one hand.
 - Slightly press the second locking tab outwards using the other hand and pull the module slightly forwards on the lower end until the module is released from the interlock of the locking tab.
 - Remove the module from its slot by pulling it forwards.
7. Lead the connection cable out of the two-hole cable support sleeve.
8. Lead the connection cable out of the swivel nut.
9. Close the inverter and, if necessary, recommission it (see inverter manual).

7.2 Packing the Product for Shipment

- Pack the product for shipping. Use the original packaging or packaging that is suitable for the weight and size of the product.

7.3 Disposing of the Product

- Dispose of the product in accordance with the locally applicable disposal regulations for electronic waste.

8 Technical Data

General Data

Mounting location	In the inverter
Voltage supply	Via the inverter

Mechanical Data

Width x height x depth	60 mm x 105 mm x 33 mm (2.4 in x 4.1 in x 1.3 in)
------------------------	--

Ambient Conditions for Storage/Transport

Ambient temperature	-40°C to +70°C (-40°F to +158°F)
Relative humidity, non-condensing	10% to 100%
Maximum height above mean sea level	3000 m (9842 ft)

Communication

Interface	RS485
Maximum cable length	1200 m (3937 ft)

Terminals

Type of plug	4-pole spring-cage terminal
Number of RS485 connections	2

9 Compliance Information

FCC Compliance

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications made to this equipment not expressly approved by SMA Solar Technology AG may void the FCC authorization to operate this equipment.

10 Contact

If you have technical problems with our products, please contact the SMA Service Line. The following data is required in order to provide you with the necessary assistance:

- Inverters:
 - Serial number
 - Firmware version
 - Special country-specific settings (if available)
- Detailed description of the problem
- Module:
 - Serial number
 - Hardware version

United States	SMA Solar Technology America LLC Rocklin, CA	Toll free for USA and US Territories +1 877-MY-SMATech (+1 877-697-6283) International: +1 916 625-0870
Canada	SMA Solar Technology Canada Inc. Mississauga	Toll free for Canada / Sans frais pour le Canada : +1 877-MY-SMATech (+1 877-697-6283)

