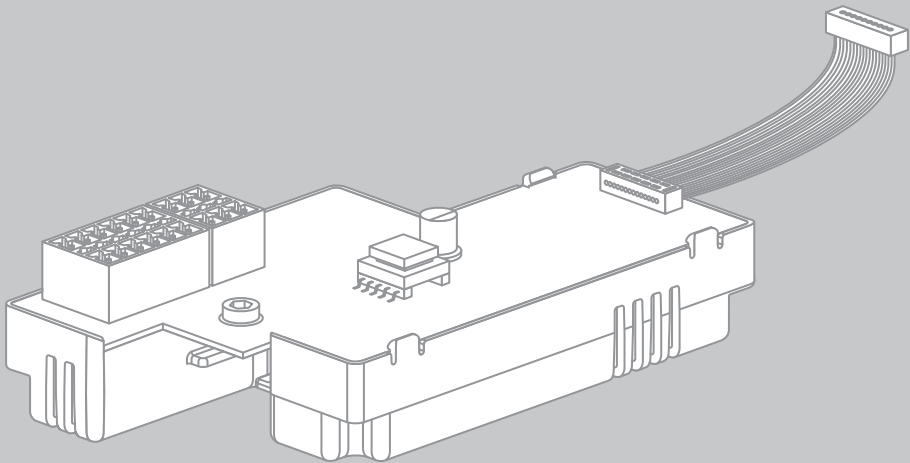Installation Manual

SMA POWER CONTROL MODULE (PWCMOD)

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Table of Contents

1 Information on this Document

1.1 Validity

This document is valid for device type "PWCMOD-10" (SMA Power Control Module) from hardware version A1.

1.2 Target Group

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

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

1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com.

Document title	Document type
Firmware Update with SD Memory Card	Technical Description
Measured Values and Parameters	Technical Description

1.4 Symbols

Symbol	Explanation
⚠ 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, can result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.5 Typographies

Typography	Usage	Example
bold	• Display texts • Elements on a user interface • Terminals • Elements to be selected • Elements to be entered	• The value can be found in the field **Energy**. • Select **Settings.** • Enter the value **10** in the field **Minutes**.
>	• Connects several elements to be selected	• Select **Settings > Date**.
[**Button/Key**]	• Button or key to be selected or pressed	• Select [**Next**].

1.6 Nomenclature

Complete designation	Designation in this document
SMA Power Control Module	Module
Sunny WebBox with BLUETOOTH® Wireless Technology	Sunny WebBox with BLUETOOTH
PV system	System

1.7 Display of Parameters

Depending on the type of communication, (e.g. RS485, BLUETOOTH or Speedwire/Webconnect) the parameters and messages are displayed differently on the communication products.
This document uses both methods of displaying parameters.

Example: Display of the parameter for setting the operating mode of the multifunction relay

- For communication via RS485: parameter **Mlt.OpMode**
- For communication via BLUETOOTH or Speedwire/Webconnect: parameter **Operating mode of multifunction relay**

1.8 Figures

The figures in this document have been created for inverters of type Sunny Tripower and may deviate slightly in some cases for inverters of type Sunny Boy.

2   Safety

2.1   Intended Use

The SMA Power Control Module is a multifunction interface which enables grid management services to be implemented for one inverter. In addition, the module is equipped with a multifunction relay.

The module is available as a retrofit kit or is pre-installed in the inverter.

The module must only be used with the supported products.

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

For safety reasons, it is not permitted to modify the product or install components that are not explicitly recommended or distributed by SMA Solar Technology AG for this product.

The enclosed documentation is an integral part of this product.

- Read and observe the documentation.
- Keep the documentation in a convenient place for future reference.

2.2   Safety Information

This section contains safety information that must be observed at all times when working on or with the product. To prevent personal injury or 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 opening the inverter

High voltages are present in the live components of the inverter. Touching live components results in death or serious injury.

- Prior to performing any work on the inverter, always disconnect the inverter from voltage sources on the AC and DC sides (see the inverter manual). Observe the waiting time to allow the capacitors to discharge.

⚠ CAUTION

Risk of burns due to hot enclosure parts

Some parts of the inverter enclosure can get hot during operation. Touching these enclosure parts can result in burn injuries.

- During operation, do not touch any parts other than the lower enclosure lid of the inverter.

NOTICE

Damage to the inverter due to electrostatic discharge

The internal components of the inverter can be irreparably damaged by electrostatic discharge.

- Ground yourself before touching any inverter component.

2.3 Supported Products

SMA Inverters

The module must only be installed in the following inverters from the indicated inverter firmware version:

Sunny Boy	From inverter firmware version
SB 2500TLST-21	2.55.23.R*
SB 3000TLST-21	
SB 3000TL-21	2.55.03.R*
SB 3600TL-21	
SB 4000TL-21	
SB 5000TL-21	
SB 6000TL-21	
SB 3600SE-10	2.4.30.R
SB 5000SE-10	
Sunny Tripower	**From inverter firmware version**
STP 8000TL-10	2.50*
STP 10000TL-10	
STP 12000TL-10	
STP 15000TL-10	
STP 17000TL-10	
STP 15000TL-30	2.83
STP 20000TL-30	2.60.03.R*
STP 25000TL-30	
STP 15000TLHE-10	2.51*
STP 20000TLHE-10	
STP 15000TLEE-10	
STP 20000TLEE-10	
STP 10000TLEE-JP-10	1.00
STP 20000TLEE-JP-11	
STP 25000TL-JP-30	

* If the firmware version of the inverter is lower than specified in the table, you must update the inverter firmware to the version indicated or higher. For information on performing the firmware update, refer to the Technical Description "Firmware Update with SD Card" at www.SMA-Solar.com.

Additional SMA Products

The module can be configured with the following communication products:

- Sunny Explorer from software version 1.06*
- Sunny WebBox with BLUETOOTH from firmware version 1.03
- Sunny WebBox from firmware version 1.0
- SMA Cluster Controller from firmware version 1.0

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* Inverters of type SB xx00SE-10 are supported from Sunny Explorer software version 1.07.03.

3   Scope of Delivery

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

> **i** | **Scope of delivery differs according to order option**
>
> If you have ordered the module separately from the inverter, the scope of delivery of the retrofit kit includes the components shown below. If you have ordered the inverter together with the module, the module will be pre-installed in the inverter upon delivery.
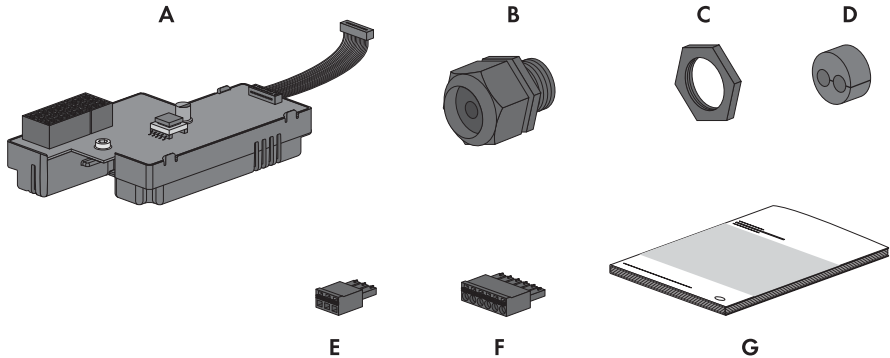
Figure 1:   Components included in the scope of delivery

Position	Quantity	Designation
A	1	SMA Power Control Module
B	2	Cable gland with single-hole seal
C	2	Counter nut
D	2	Two-hole seal
E	2	Three-pole plug
F	2	Six-pole plug
G	1	Installation manual

4 Product Description

4.1 SMA Power Control Module

The SMA Power Control Module is a multifunction interface which enables grid management services to be implemented for one inverter. In addition, the module is equipped with a multifunction relay.

For the implementation of grid management services, the module receives the specifications of the grid operator via a ripple control receiver. In total, there are 16 setting possibilities or entry combinations. The module can implement the following grid management services:

- Active power limitation in staged intervals of 0%, 30%, 60% and 100% of the agreed connected active power
- For systems with a maximum power output of 6 kW and only in conjunction with inverters of type SB xx00TL-21, SB xx00TLST-21, SB xx00SE-10:
    - Remote shutdown within 50 ms
    - Narrowing of the frequency limits to between 49.5 Hz and 50.5 Hz

The multifunction relay can be used for the following functions, for example:

- as fault indicator or operation signaling contact
- to control an external load or charge batteries
- to report the switching status of the grid relay (report start of grid feed-in to grid operator)

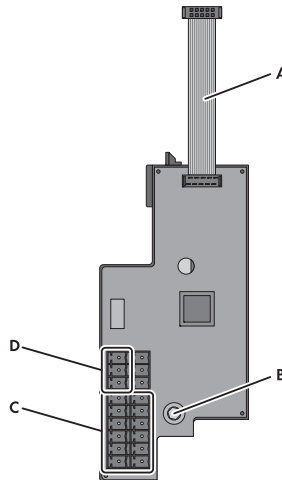Figure 2:   Design of the SMA Power Control Module

Position	Designation
A	Ribbon cable
B	Screw for attaching the module in the inverter
C	Terminals for ripple control receiver
D	Multifunction relay terminal

4.2 Type Label

The type label clearly identifies the product. The type label is located on the back of the product. You can read off the following data from the type label:

- Device type (Type)
- Serial number (Serial Number)
- Hardware version (Version)
- Device-specific characteristics

You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. The type label must remain permanently attached to the product.

4.3 Multifunction Relay

i   Error message required by standard

In some countries, signaling of errors is required by standards, e.g. IEC 62109-2. In order to meet the standard requirement, take one of the following measures:

- Operate the multifunction relay in the operating mode **Fault indication (FltInd)** and connect a display to the multifunction relay that signals an error or the undisturbed operation of the inverter.
- Activate the error alarm in Sunny Portal (see the Sunny Portal user manual at www.SunnyPortal.com for information on receiving error alarms via Sunny Portal). This requires the inverter to be registered in Sunny Portal.

You can use the multifunction relay for various purposes:

Operating mode of multifunction relay (Mlt.OpMod)	Description
Fault indication (FltInd)	The multifunction relay controls a display device which, depending on the type of connection, signals either an error or the undisturbed operation of the inverter.
	This operating mode is set by default.
Self-consumption (SelfCsmp)	The multifunction relay switches the loads on or off depending on the amount of power available from the PV array. If a battery is integrated in the system, the multifunction relay will still switch the loads on or off depending on the amount of power available from the PV array, not from the battery.
Control via communication (ComCtl)	The multifunction relay switches loads on or off according to commands transmitted by a communication product.
Battery bank (BatCha)	The multifunction relay controls the charging of external batteries depending on the amount of power available from the system.

Operating mode of multifunction relay (Mlt.OpMod)	Description
Fan control (FanCtl)	The multifunction relay controls an external fan depending on the temperature of the inverter.
	If the temperature of the inverter is 5°C higher than a specific threshold set in the inverter, the fan starts automatically. If the temperature of the inverter is 10°C below the set threshold, the fan stops automatically.
Switching status grid relay (GriSwCpy)	The multifunction relay switches simultaneously with the grid relay of the inverter and transmits a signal to the grid operator.

Depending on the intended application of the multifunction relay, the procedure for connection will vary (see Section 5.8.1 "Connection Options for the Multifunction Relay", page 26).

After commissioning, you must set the operating mode of the multifunction relay via a communication product and, if necessary, make further settings relating to the operating mode
(see Section 6.3 "Setting the Operating Mode of the Multifunction Relay", page 34).

5 Electrical Connection

5.1 Mounting Position and Cable Route

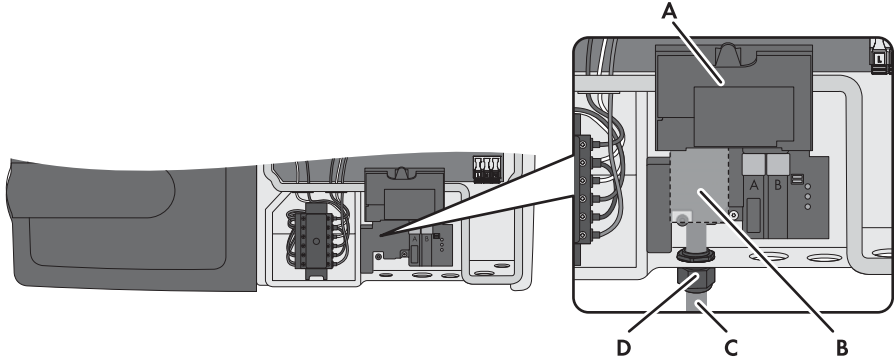**Mounting Position and Cable Route in the Sunny Boy Smart Energy**

Figure 3: Mounting position and cable route in the Sunny Boy Smart Energy with the enclosure lid open and the display flipped up

Position	Designation
A	Inverter display (flipped up)
B	Mounting position of the module
C	Cable route to the module
D	Cable gland M20 x 1.5

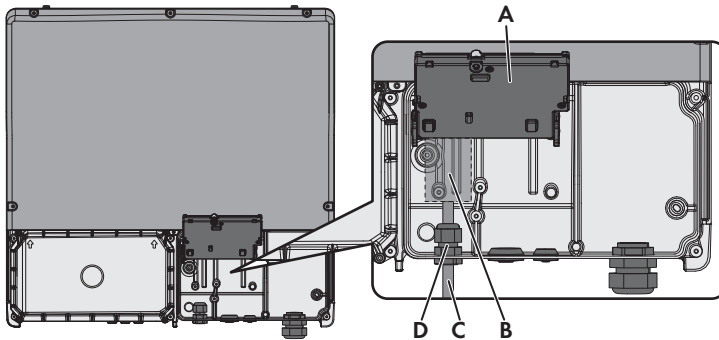### Mounting Position and Cable Route in the Sunny Tripower / Sunny Boy

Figure 4: Mounting position and cable route in the Sunny Tripower / Sunny Boy with the lower enclosure lid open and the display flipped up

Position	Designation
A	Inverter display (flipped up)
B	Mounting position of the module
C	Cable route to the module
D	Cable gland M20 x 1.5 or enclosure opening M20 (diameter: 21 mm) with filler plug (depends on device type)

5.2 Cable Requirements

☐ UV-resistant for outdoor use

☐ When using the supplied cable gland:

   – Cable diameter when using a one-hole cable seal (one cable per cable gland): 5 mm to 13 mm

   – Cable diameter when using a two-hole cable seal (two cables per cable gland): 6.0 mm

☐ Conductor cross-section: from 0.5 mm^2 to 1.5mm^2.

☐ Maximum cable length: 100 m

☐ Required number of insulated conductors for connecting the ripple control receiver: at least five

☐ Required number of insulated conductors for connecting to the multifunction relay: at least two

ℹ **Common connection cable**

You can use one connection cable with at least seven insulated conductors to connect both the ripple control receiver and the multifunction relay.

5.3 Installation of the Module

5.3.1 Installing the Module in the Sunny Boy Smart Energy

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock when opening the inverter

   High voltages are present in the live components of the inverter. Touching live components results in death or serious injury.

   • Disconnect the inverter from all voltage sources on the AC and DC sides and open it (see the inverter manual). Observe the waiting time to allow the capacitors to discharge.

2. Removing the display:

   • Flip the display up.

   • Remove the plug of the display ribbon cable from the pin connector on the display assembly.

   • Flip the display down.
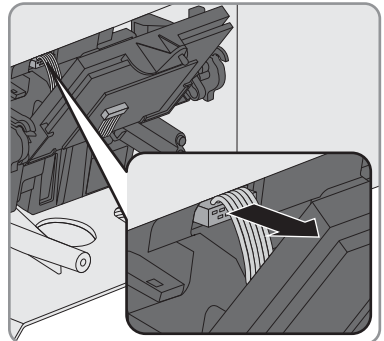
   • Press the right-hand retainer outwards.
   • Pull the display out of the right-hand retainer.
   • Pull the display out of the left-hand retainer.
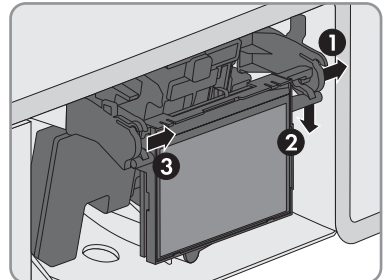
   • Set the display aside in a safe place.

3. Insert the ribbon cable of the module into the pin connector on the display assembly.
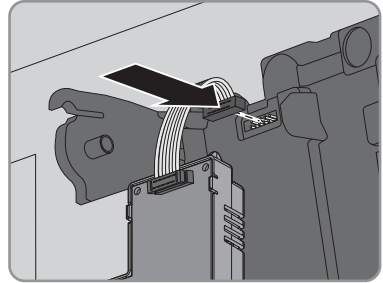
4. Insert the module into the inverter. Insert the left-hand key on the module into the hole in the plastic retainer for the display assembly.
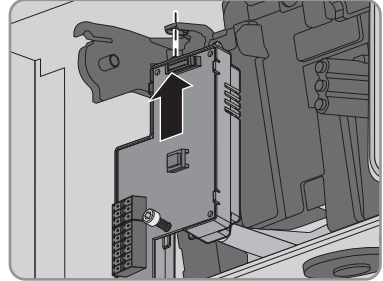
5. Use an Allen key (AF 3) to fasten the screw to the module (torque: 1.5 Nm)
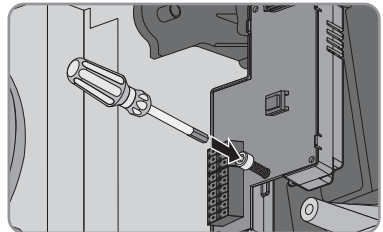
6. Install the display:
    *   (1) Plug the ribbon cable plug into the pin connector on the display assembly.
    *   (2) Push the display into the right-hand retainer.
    *   (3) Push the display into the left-hand retainer.
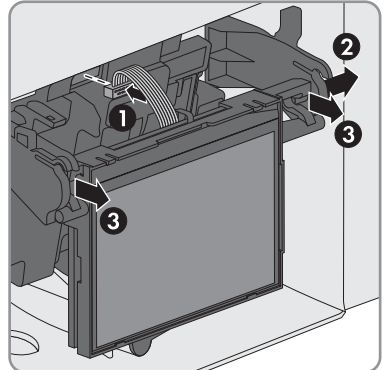
5.3.2 Installing the Module in the Sunny Tripower / Sunny Boy

ⓘ **Cables to be connected by means of cable glands**

As standard for these inverters, the cables are to be connected by means of cable glands. SMA Solar Technology AG recommends using the cable glands included in the delivery. If required, adapters for conduits can be mounted on the enclosure openings of the inverter instead of using cable glands. Thus, cables laid in the conduits can be routed into the inverter. When using conduits, all locally applicable laws, standards and directives must be observed and the conduits as well as the enclosure openings must be protected against penetrating moisture.

ⓘ **Displayed graphics**

Using example illustrations, this section shows only the preparation of the enclosure openings on the inverter Sunny Tripower. However, the same method is used to connect to the module in all inverters. Only the inverter environment is different.

Requirement:

☐ The firmware version of the inverter is supported (see Section 2.3 "Supported Products", page 8). If necessary, update the inverter firmware (see the technical description "Firmware Update with SD Card" at www.SMA-Solar.com).

Procedure:

1. **⚠ DANGER**

    Danger to life due to electric shock when opening the inverter

    High voltages are present in the live components of the inverter. Touching live components results in death or serious injury.

    • Disconnect the inverter from all voltage sources on the AC and DC sides and open it (see the inverter manual). Observe the waiting time to allow the capacitors to discharge.

2. Loosen the screw of the display and flip the display up until it snaps into place.

3. If another communication interface is installed at the mounting location of the module, disassemble it (see the installation manual of the communication interface).

4. Position the module in the inverter and lead the ribbon cable upwards behind the display. The key on the rear edge of the module must fit into the hole in the plastic retainer in the inverter.
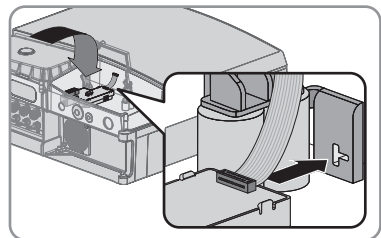
5. Use an Allen key (AF 3) to fasten the screw to the module (torque: 1.5 Nm)

6. Flip the display down.

7. Insert the ribbon cable into the left pin connector on the display of the inverter.
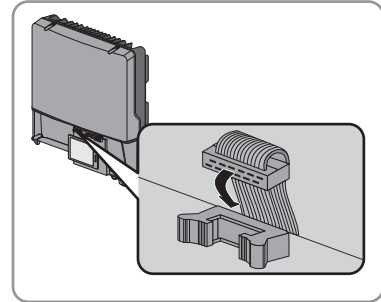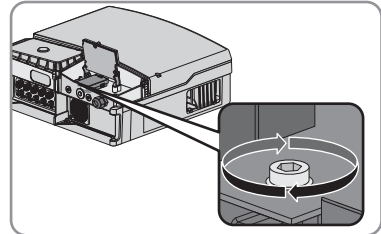
5.4   Preparing the Enclosure Opening on the Inverter (When Using the Supplied Cable Gland)

| i | **Displayed graphics**

Using example illustrations, this section shows only the preparation of the enclosure openings on the inverter Sunny Tripower. However, the same method is used to connect to the module in all inverters. Only the inverter environment is different.

Procedure:

1. Prepare the cable gland:
   - If the enclosure opening of the inverter is sealed with a filler plug, push the filler plug out of the enclosure opening.
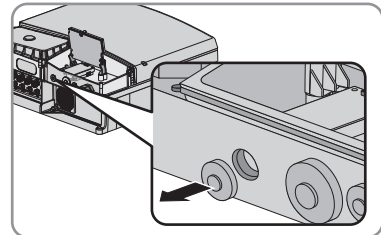
- If the enclosure opening of the inverter is sealed with a cable gland installed in reversed manner, loosen the external counter nut and remove the cable gland.
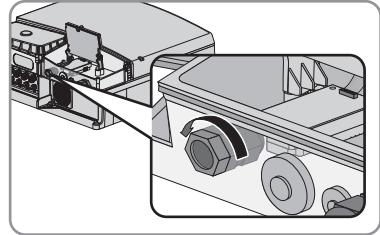
2. Insert the cable gland from the outside and tighten it with the counter nut from the inside.
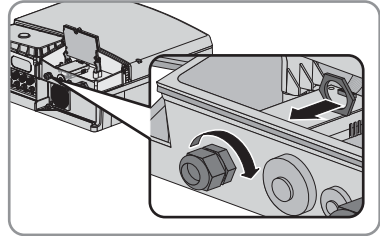
3. If two cables must to be led through the cable gland, press out the single-hole seal and replace with a two-hole seal. Make sure that the enclosure opening of the inverter is tightly sealed.

5.5 Preparing the Connection Cables for Connection to Multi-Pole Plugs

Always proceed as follows to prepare connection cables for connection to multipole plugs.

Procedure:

1. Trim 4 cm of the cable sheath at the end of the connection cable to be attached to the multi-pole plug.
2. Trim unneeded insulated conductors flush with the cable sheath.
3. Strip off the conductor insulation by 6 mm.

5.6 Connecting the Ripple Control Receiver

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

- ☐ One ripple control receiver with four outputs (see figure 5)
- ☐ One or two connection cables (see Section 5.2 "Cable Requirements", page 15)
- ☐ When using conduits:
  - – 1 conduit
  - – Adapter and counter nut for attaching the conduit to the bottom of the inverter
  - – Sealing compound

Requirements:

☐ The connection cable must have been prepared for connection to the multipole plug (see Section 5.5 "Preparing the Connection Cables for Connection to Multi-Pole Plugs", page 21).

☐ The enclosure opening on the inverter must be prepared (see Section 5.4 "Preparing the Enclosure Opening on the Inverter (When Using the Supplied Cable Gland)", page 19).

| i | **Duplicate terminals for ripple control receiver**

The ripple control receiver can be connected either to pins 1 to 5 or to pins 14 to 18.

The pins 1/18, 2/17, 3/16, 4/15 and 5/14 are each bridged so that a loop through of the ripple control receiver signals is possible.
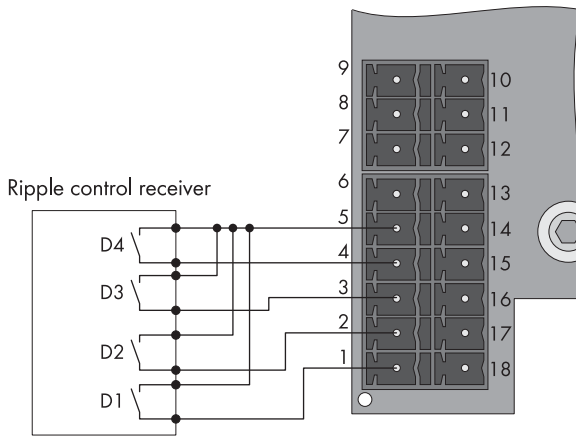
Figure 5:   Pin assignment of the module at the ripple control receiver terminals

Pin	Signal
Pin 5 / Pin 14	+ 12 V
Pin 4 / Pin 15	D4
Pin 3 / Pin 16	D3
Pin 2 / Pin 17	D2
Pin 1 / Pin 18	D1

Functions of Signals D1 to D4 in Operating Mode Remote Shutdown (Default Settings for Italy)

D1	D2	D3*	D4*	Function
Closed	Closed	Open/Closed	Open/Closed	No specification
Open	Closed	Open/Closed	Open/Closed	Remote shutdown
Closed	**Open**	Open/Closed	Open/Closed	Narrowing of frequency limits
Open	**Open**	Open/Closed	Open/Closed	Remote shutdown

* The signals D3 and D4 are not evaluated in the operating mode **Remote shutdown**.

Functions of Signals D1 to D4 in Operating Mode Active Power Limitation (Default Settings for Germany)

Digital input D1	Digital input D2	Digital input D3	Digital input D4	Display in the communication product	Value
Open	Open	Open	Open	D1: 0| D2: 0| D3: 0| D4: 0**	-1 %***
Closed	Open	Open	Open	D1: 1| D2: 0| D3: 0| D4: 0	0 %
Open	Closed	Open	Open	D1: 0| D2: 1| D3: 0| D4: 0	30 %
Closed	Closed	Open	Open	D1: 1| D2: 1| D3: 0| D4: 0	-1 %***
Open	Open	Closed	Open	D1: 0| D2: 0| D3: 1| D4: 0	60 %
Closed	Open	Closed	Open	D1: 1| D2: 0| D3: 1| D4: 0	-1 %***
Open	Closed	Closed	Open	D1: 0| D2: 1| D3: 1| D4: 0	-1 %***
Closed	Closed	Closed	Open	D1: 1| D2: 1| D3: 1| D4: 0	-1 %***
Open	Open	Open	Open/Closed*	D1: 0| D2: 0| D3: 0| D4: 1	100 %
Closed	Open	Open	Closed	D1: 1| D2: 0| D3: 0| D4: 1	-1 %***
Open	Closed	Open	Closed	D1: 0| D2: 1| D3: 0| D4: 1	-1 %***
Closed	Closed	Open	Closed	D1: 1| D2: 1| D3: 0| D4: 1	-1 %***
Open	Open	Closed	Closed	D1: 0| D2: 0| D3: 1| D4: 1	-1 %***
Closed	Open	Closed	Closed	D1: 1| D2: 0| D3: 1| D4: 1	-1 %***
Open	Closed	Closed	Closed	D1: 0| D2: 1| D3: 1| D4: 1	-1 %***
Closed	Closed	Closed	Closed	D1: 1| D2: 1| D3: 1| D4: 1	-1 %***

* Depending on the number of inputs of the ripple control receiver to be connected
** When using the Sunny WebBox with RS485 communication, observe the following: If there is no signal, the value **D0** is displayed for the parameter **PCM-DigInSt** under **Spot Values**.
*** The value "-1 %" blocks the entry combination.

Procedure:

1. **⚠ DANGER**

   **Danger to life due to electric shock from faulty connection of the ripple control receiver**

   In the event of faulty connection of the connection cable to the ripple control receiver, grid voltage may be present in the module.

   - Do not connect the insulated conductors of the connection cable to the line conductors of the ripple control receiver.
   - When connecting, ensure that no bridge is being used in the ripple control receiver.

2. Connect the connection cable to the ripple control receiver (see ripple control receiver manual). Trim the unused insulated conductors up to the cable sheath and note the conductor colors.

Ripple control receiver Signal	Insulated conductor color	Module Pin-Assignment
+ 12 V		Pin 5 / Pin 14
D4		Pin 4 / Pin 15
D3		Pin 3 / Pin 16
D2		Pin 2 / Pin 17
D1		Pin 1 / Pin 18

3. Insert the connection cable through the seal and cable gland or through the conduit into the inverter.

4. Connect the connection cable to the six–pole plug as follows:
   - Release the required conductor inlets of the plug using a screwdriver.
   - Insert the insulated conductors into the conductor inlets. Make sure that the noted conductor colors correspond to the pin assignment of the module.

5. Insert the six-pole plug into the terminal of the module. Observe the pin assignment.

6. Tighten the swivel nut of the cable gland hand-tight to the cable gland. When using conduits, seal the enclosure opening from the inside of the adapter counter nut with sealing compound.
   Ensure that the cable is securely in place and that the enclosure opening of the inverter is tightly sealed.
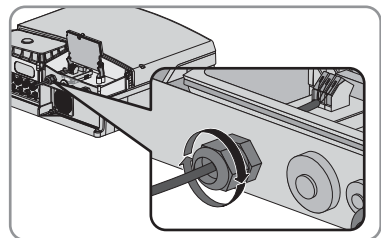
7. Flip down the display and fasten the screw hand-tight.

8. Close and commission the inverter (see inverter manual).

5.7 Using the Ripple Control Receiver Signal for Additional Inverters

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

☐ One connection cable for each additional inverter (see Section 5.2 "Cable Requirements", page 15)

Requirements:

☐ The module must be installed in all inverters (see Section 5.3 "Installation of the Module", page 16).

☐ The ripple control receiver must be connected to one of the modules (see Section 5.6 "Connecting the Ripple Control Receiver", page 21).

☐ The required enclosure openings on all inverters must be prepared (see Section 5.4 "Preparing the Enclosure Opening on the Inverter (When Using the Supplied Cable Gland)", page 19).

☐ Both ends of the connection cable must be prepared for connection to a multi-pole plug (see Section 5.5 "Preparing the Connection Cables for Connection to Multi-Pole Plugs", page 21).

i	**Possible to connect a maximum of five modules in parallel**

You can use the signal from one ripple control receiver for a maximum of five inverters with modules.
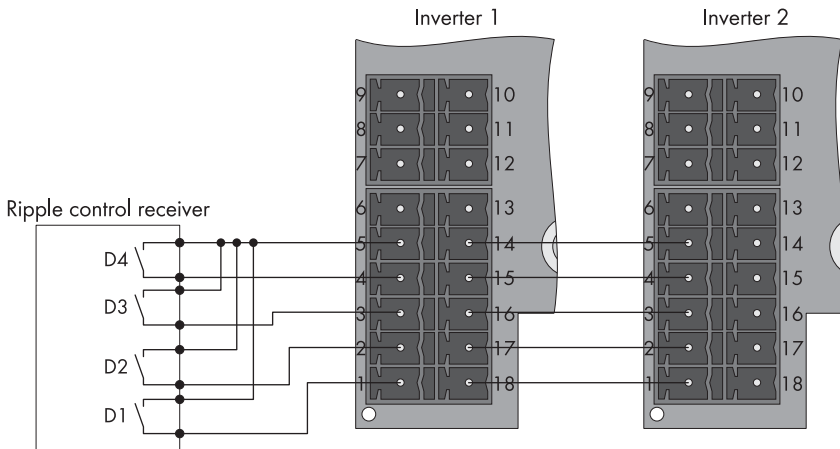

Figure 6:   Cabling for transmission of the signal from the ripple control receiver (example)

Procedure:

1. Insert one end of the cable in inverter 1 and the other end in inverter 2. Each cable must be routed through the seal and the cable gland or through the conduit of the inverter.

2. Connect a six-pole plug to each end of the cable as follows:

   - Release the required conductor inlets of the plug using a screwdriver.

   - Insert the insulated conductors into the conductor inlets. Make sure that the noted conductor colors correspond to the pin assignment of the module.

3. In inverter 1, connect the six-pole plug to the free terminal for the ripple control receiver. Observe the pin assignment.

4. In inverter 2, connect the six-pole plug to one of the terminals for the ripple control receiver. Observe the pin assignment.

5. On both inverters, tighten the swivel nut of the cable gland hand-tight to the cable gland. When using conduits, seal the enclosure opening from the inside of the adapter counter nut with sealing compound.
   Ensure that the cable is securely in place and that the enclosure opening of the inverter is tightly sealed.

6. On both inverters, flip down the display and fasten the display screw hand-tight.

7. Close and commission both inverters (see inverter manual).

5.8 Multifunction Relay Connection

5.8.1 Connection Options for the Multifunction Relay

Depending on the required purpose of the multifunction relay, you can choose between the following connection options (see Section 4.3 "Multifunction Relay", page 12):

Operating mode of multifunction relay (Mlt.OpMod)	Connection option
Fault indication (FltInd)	Using the multifunction relay as fault indicator contact
Self-consumption (SelfCsmp)	Controlling loads or charging batteries in a power-dependent way via the multifunction relay
Control via communication (ComCtl)	Controlling loads or charging batteries in a power-dependent way via the multifunction relay
Battery bank (BatCha)	Controlling loads or charging batteries in a power-dependent way via the multifunction relay
Fan control (FanCtl)	Connecting the external fan (see fan documentation)
Switching status grid relay (GriSwCpy)	Report the switching status of the grid relay

Using the Multifunction Relay as a Fault Indicator Contact or Operation Signaling Contact

You can use the multifunction relay as a fault indicator contact for displaying or reporting inverter errors. This requires a parallel connection. Alternatively, you can choose to have the undisturbed operation displayed or reported. This requires a series connection. You can connect several inverters to one fault indicator or operation indicator. You must connect the multifunction relays of several inverters in parallel.
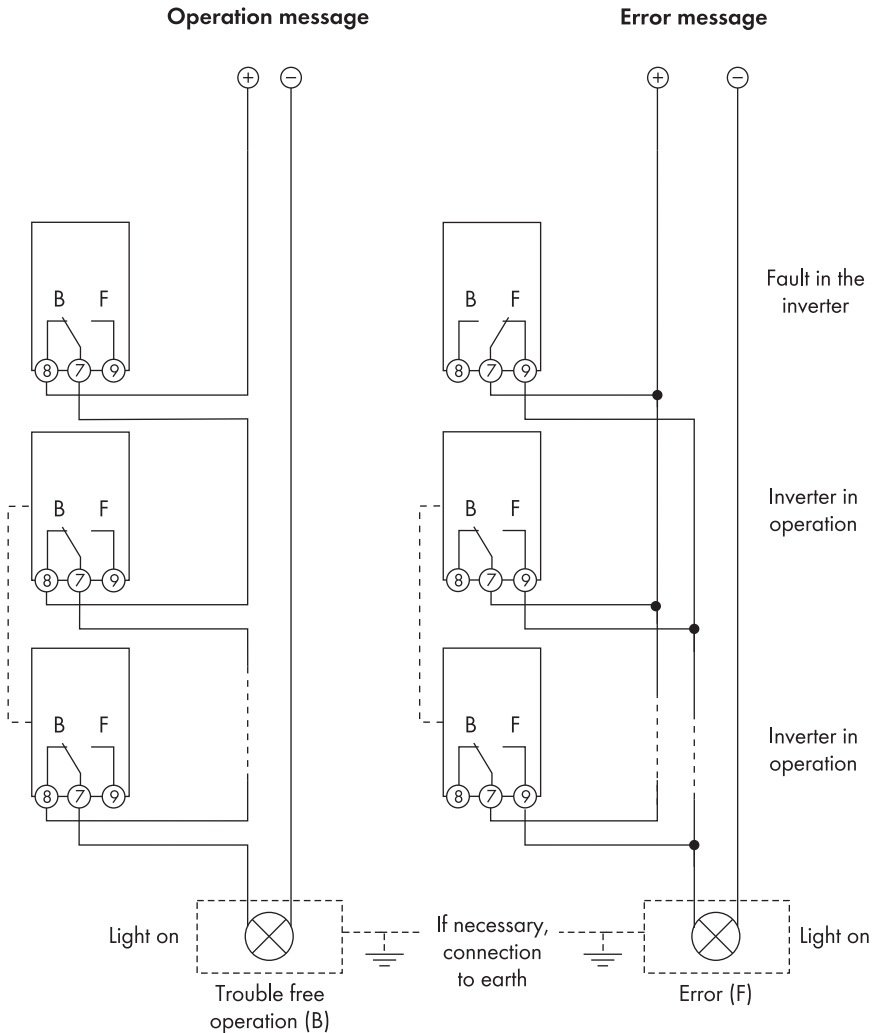
Figure 7:   Wiring diagram with several inverters for connection of an operation signaling contact and wiring diagram for connection of a fault indicator contact (example)

Controlling Loads or Charging External Batteries in a Power-Dependent Way via the Multifunction Relay

Loads can be controlled and external batteries charged in a power-dependent way via the multifunction relay. To enable this function, a contactor (K1) must be connected to the multifunction relay. The contactor (K1) switches the operating current for the load on or off. If you want external batteries to be charged depending on the available power, the contactor serves to activate or deactivate the charging of the batteries.
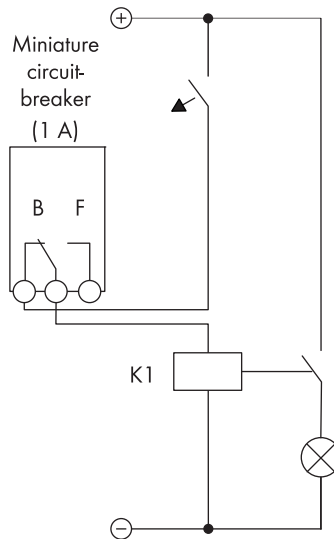
Figure 8:   Wiring diagram for connection to control a load or for the power-dependent charging of the batteries

Reporting the Switching Status of the Grid Relay

The multifunction relay can trip a signal to the grid operator as soon as the first inverter connects to the utility grid. To enable this function, you must switch the multifunction relays of all connected inverters in parallel.

Figure 9:   Wiring diagram for reporting the switching status of the grid relay (example)

5.8.2 Connecting the Remote Terminal to the Multifunction Relay

Requirements:

☐ You must select the connection option depending on the desired function of the multifunction relay (see Section 5.8.1 "Connection Options for the Multifunction Relay", page 26).

☐ The technical requirements of the multifunction relay must be met (see Section 9 "Technical Data", page 40).

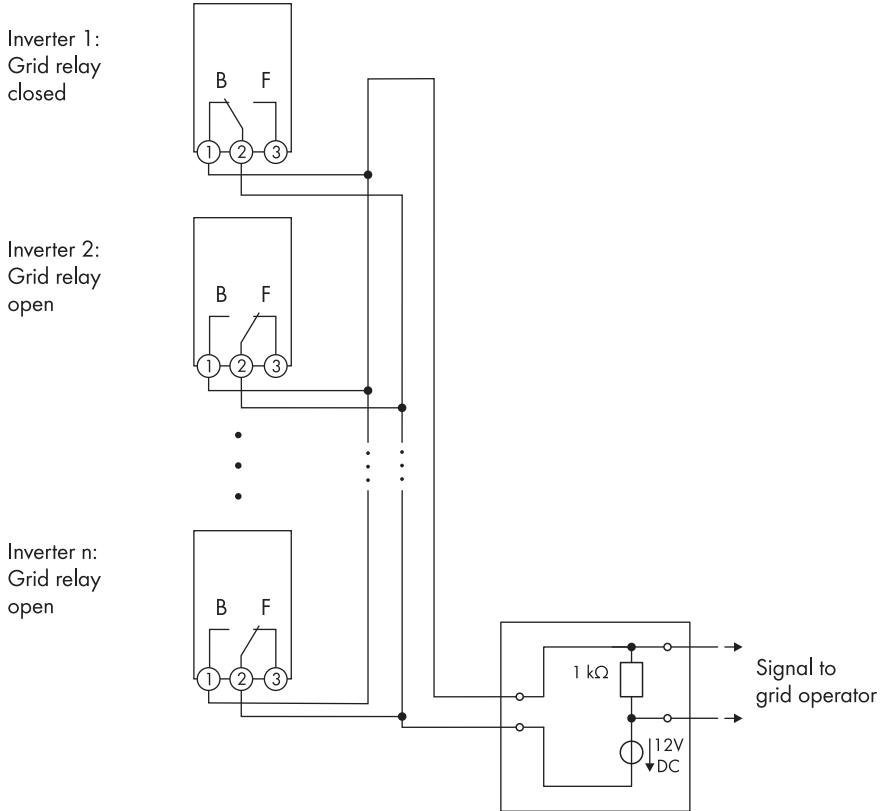☐ The enclosure opening on the inverter must be prepared (see Section 5.4, page 19).

☐ The connection cable must have been prepared for connection to the multipole plug (see Section 5.5, page 21).

☐ Only use contactors which meet the connection requirements of the multifunction relay (see Section 9 "Technical Data", page 40).

NOTICE

Destruction of the multifunction relay as a result of excessive contact load

- Observe the maximum switching voltage and maximum switching current (see Section 9 "Technical Data", page 40).

- Only use suitable contactors (see Section 9 "Technical Data", page 40).
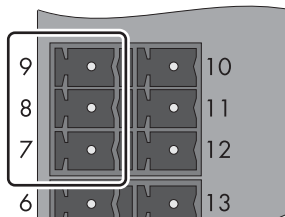

Figure 10: Pin assignment of the module at the multifunction relay terminal

Pin	Signal	Explanation
9	NC	Back contact
8	NO	Front contact
7	CO	Change-over contact

Procedure:

1. Connect the connection cable to the remote terminal (see the remote terminal manual). Trim the unused insulated conductors up to the cable sheath and write down the conductor colors.

2. Insert the connection cable through the seal and cable gland or through the conduit into the inverter.

3. Connect the connection cable to the three-pole plug as follows:

   • Release the required conductor inlets of the plug using a screwdriver.

   • Insert the insulated conductors into the conductor inlets. Make sure that the noted conductor colors correspond to the pin assignment of the module.

4. Connect the three-pole plug to the multifunction relay terminal of the module. Observe the pin assignment.

5. Tighten the swivel nut of the cable gland hand-tight to the cable gland. When using conduits, seal the enclosure opening from the inside of the adapter counter nut with sealing compound.
   Ensure that the cable is securely in place and that the enclosure opening of the inverter is tightly sealed.
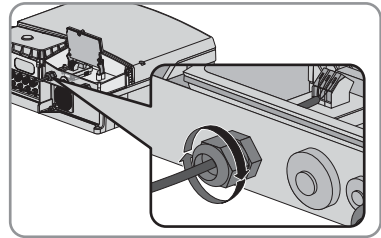
6. Flip down the display and fasten the screw hand-tight.

7. Close and commission the inverter (see inverter manual).

8. Use a communication product to set the operating mode of the multifunction relay (see communication product manual).

9. If available, switch on the external supply voltage of the multifunction relay.

6 Configuring the Module

6.1 Information on Module Configuration

Active power reduction to one of the 16 values set is realized within 11 seconds in the inverter. Grid disconnection is possible within two seconds. In order to block an entry combination, the value -1% must be set in the communication product (see table on page 23). This enables unassigned entry combinations to be blocked.

If the grid operator does not permit the inverter to still feed in a low amount of active power when limited to 0%, you must set the following parameter for grid disconnection. Setting this parameter additionally opens the grid relays at a command of 0%. As a result, the inverter disconnects from the utility grid and grid feed-in is no longer possible. Depending on the type of communication and the communication product used, the parameter name may vary:

Type of communication	Parameter name	Setting
BLUETOOTH, Speedwire/ Webconnect	**Equipment and device control system > Configuration of feed-in management > Grid disconn. at 0% specif. by feeding management, Configuration of feed-in management**	**Yes/No**
RS485	**P-GriSwOpnZerW**	**Yes/No**

When the parameter is activated (**Yes**), the inverter disconnects from the utility grid when the signal "0%" is issued. When the parameter is deactivated (**No**), the inverter continues to feed in with minimum power when the signal "0%" is issued.

You can set the operating mode of the multifunction relay by means of a communication product (for a detailed description of the operating parameters, see the technical description "Measured Values and Parameters" at www.SMA-Solar.com).

6.2   Setting the Operating Mode Active Power Limitation or Remote Shutdown

Depending on the ordered country option, the operating mode **Active power limitation** or **Remote shutdown** is activated by default.

Procedure:

- If you wish to use the operating mode **Active power limitation**, select the parameter **Operating mode of Power Control Module/PCM-OpMode** and set it to the value **Active power limitation/ModWMax**.

- If you wish to use the operating mode **Remote shutdown**, select the **Operating mode of Power Control Module/PCM-OpMode** and set it to the value **Remote shutdown/ModRemOff**.

6.3   Setting the Operating Mode of the Multifunction Relay

Procedure:

- Set the operating mode of the multifunction relay.
- If one of the following operating modes is used, you will need to carry out further settings for the operating mode:
    - **Self-consumption/SelfCsmp**
    - **Control via communication/ComCtl**
    - **Battery bank/BatCha**

Setting the Operating Mode of the Multifunction Relay

By default, the multifunction relay is set to activate a fault indicator if an error occurs. If you wish to use the multifunction relay for another purpose, you will need to set the operating mode.

- Select the parameter **Operating mode of multifunction relay/Mlt.OpMode** and set the desired operating mode (see Section 4.3 "Multifunction Relay", page 12).

Settings for Operating Mode Self-Consumption/SelfCsmp

- Set the power threshold from which a load is to be switched on. Select the parameter **Minimum On time for MFR self-consumption/Mlt.MinOnPwr** and set the desired power.

- Set the minimum time for which the power must exceed the set threshold in order to switch on the load. Select the parameter **Minimum On power for MFR self-consumption/ Mlt.MinOnPwr** and set the desired minimum time.

- Set the minimum duration for which the load remains switched on. Select the parameter **Minimum On time for MFR self-consumption/Mlt.MinOnTmm** and set the minimum duration.

Settings for Operating Mode Control via Communication/ComCtl

- Set the status of the multifunction relay where it is to be controlled via a communication product. Select the parameter **Status of MFR with control via communication**/**MltComCtl.Sw** and set the status.

Settings for Operating Mode Battery Bank/BatCha

- Set the power threshold from which the battery is to be charged. Select the parameter **Minimum On time for MFR battery bank**/**Mlt.BatCha.Pwr** and set the desired power.
- Set the minimum time which must elapse after charging the battery before it can be charged again. Select the parameter **Minimum On power for MFR battery bank**/ **Mlt.BatCha.Tmm** and set the minimum time.

7 Troubleshooting

Problem	Cause and corrective measures
The inverter with module is not displayed in Sunny Explorer.	The inverter with module has not been commissioned. **Corrective measures:** • Commission the inverter with module (see inverter manual).
	The module is not properly connected. **Corrective measures:** • Ensure that the module is correctly connected (see Section 5 "Electrical Connection", page 14).
	The firmware version of the inverter is not supported (see Section 2.3 "Supported Products", page 8). **Corrective measures:** • Update the inverter firmware (see inverter manual).
	The software version of Sunny Explorer is older than version 1.06. **Corrective measures:** • Download Sunny Explorer from software version 1.06 at www.SMA-Solar.com.

8 Decommissioning

8.1 Removing the Module from the Sunny Boy Smart Energy

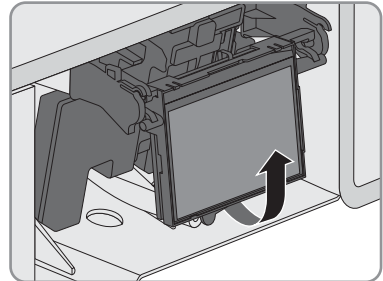**Procedure:**

1. **⚠ DANGER**

   Danger to life due to electric shock when opening the inverter

   High voltages are present in the live components of the inverter. Touching live components results in death or serious injury.
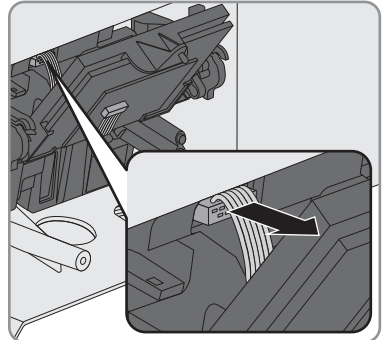
   - Disconnect the inverter from all voltage sources on the AC and DC sides and open it (see the inverter manual). Observe the waiting time to allow the capacitors to discharge.
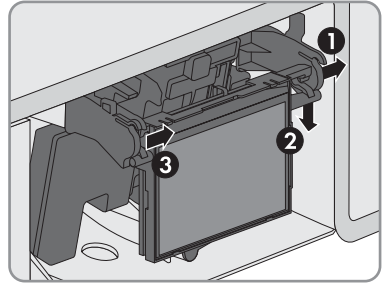
2. Removing the display:

   - Flip the display up.

   - Remove the plug of the display ribbon cable from the pin connector on the display assembly.
   - Flip the display down.

- (1) Press the right-hand retainer outwards.
- (2) Pull the display out of the right-hand retainer.
- (3) Pull the display out of the left-hand retainer.

- Set the display aside in a safe place.

3. Remove the plug of the module ribbon cable from the pin connector on the display assembly.
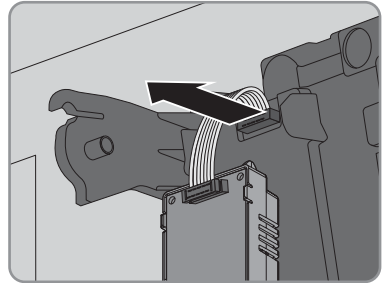
4. Loosen the screw on the module and remove the module from the inverter.

5. Install the display:
    - (1) Plug the ribbon cable plug into the pin connector on the display assembly.
    - (2) Push the display into the right-hand retainer.
    - (3) Push the display into the left-hand retainer.
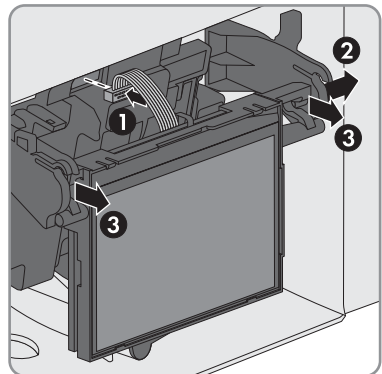
6. Close the inverter (see the inverter manual).

8.2 Removing the Module from the Sunny Tripower / Sunny Boy

ℹ️ **Displayed graphics**

Using example illustrations, this section shows only the remove of the module from the inverter Sunny Tripower. However, the same method is used to remove the module from all inverters. Only the inverter environment is different.

Procedure:

1. ⚠️ **DANGER**

   Danger to life due to electric shock when opening the inverter

   High voltages are present in the live components of the inverter. Touching live components results in death or serious injury.

   • Disconnect the inverter from all voltage sources on the AC and DC sides and open it (see the inverter manual). Observe the waiting time to allow the capacitors to discharge.

2. Press the left-hand and right-hand lock hooks outwards and remove the ribbon cable plug from the left-hand pin connector on the inverter display.
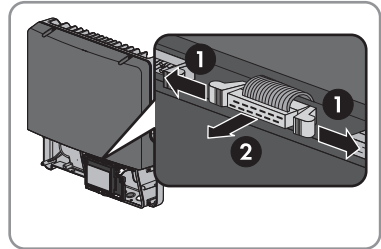
3. Loosen the display screw and flip the display up.

4. Remove the plug for the ripple control receiver and/or multifunction relay from the module.

5. For inverters with cable gland, open the cable gland(s).

6. Remove the connection cables for the ripple control receiver and/or multifunction relay from the inverter.

7. Seal the enclosure opening of the inverter using a filler plug. Make sure that the enclosure opening of the inverter is tightly sealed.

8. Remove the module from the interface slot.

9. Flip down the display and fasten the screw hand-tight.

10. Close the inverter (see the inverter manual).

8.3 Disposing of the Module

• Dispose of the module in accordance with the disposal regulations for electronic waste applicable at the installation site.

9   Technical Data

Terminals	
Ripple control receiver	4 digital inputs
Multifunction relay	Relay output

Voltage supply	
Voltage supply	via inverter

Ambient Conditions during Operation	
Ambient temperature	-25°C to +85°C
Relative humidity, non-condensing	4% to 100 %
Maximum height above mean sea level	3000 m

Ambient Conditions for Storage/Transport	
Ambient temperature	− 40°C to +70°C
Relative humidity, non-condensing	10% to 95 %
Maximum height above mean sea level	3000 m

General Data	
Dimensions (width x height x depth)	58 mm x115 mm x 31 mm
Weight	49 g
Mounting location	in the inverter
Degree of protection*	IP20
Required degree of protection of the inverter	IP54
Maximum number of modules switched in parallel	5

*   in accordance with IEC 60529

Multifunction Relay	
Maximum DC switching voltage	30 V
Maximum DC switching current	1.0 A
Terminal	Three-pole plug
Minimum electrical endurance when the maximum switching voltage and maximum switching current are complied with	100000 switching cycles

10 Contact

If you have technical problems with our products, please contact the SMA Service Line.
We require the following information in order to provide you with the necessary assistance:

- Inverter
  - Serial number
  - Firmware version (tap the inverter display twice or see Sunny Portal or Sunny Explorer)
  - Special country-specific settings (if applicable)
- Module
  - Serial number
  - Hardware version
  - Application of the multifunction relay
- Communication product (e.g. Sunny Explorer)
  - Type
  - Serial number or software version
- Detailed description of the problem

Danmark Deutschland Österreich Schweiz	SMA Solar Technology AG Niestetal SMA Online Service Center: www.SMA-Service.com Sunny Boy, Sunny Mini Central, Sunny Tripower: +49 561 9522-1499 Monitoring Systems (Kommunikationsprodukte): +49 561 9522-2499 Fuel Save Controller (PV-Diesel Hybridsysteme): +49 561 9522-3199 Sunny Island, Sunny Backup, Hydro Boy: +49 561 9522-399 Sunny Central: +49 561 9522-299	Belgien Belgique België Luxemburg Luxembourg Nederland	SMA Benelux BVBA/SPRL Mechelen +32 15 286 730
		Česko Magyarország Slovensko	SMA Service Partner TERMS a.s. +420 387 6 85 111
		Polska	SMA Polska +48 12 283 06 66
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United Arab Emirates	SMA Middle East LLC Abu Dhabi +971 2234 6177	India	SMA Solar India Pvt. Ltd. Mumbai +91 22 61713888
대한민국	SMA Technology Korea Co., Ltd. 서울 +82-2-520-2666	ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ +66 2 670 6999
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Australia	SMA Australia Pty Ltd. Sydney Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200	Other countries	International SMA Service Line Niestetal 00800 SMA SERVICE (+800 762 7378423)