PV Inverter

SUNNY BOY 3000TL/4000TL/5000TL

Installation Manual

SB30_50TL_21-IA-IEN114711 | IMEN-SBXTL-21 | Version 1.1

EN

Table of Contents

1 Information on this Manual

1.1 Validity

This manual covers the following devices:

- Sunny Boy 3000TL (SB 3000TL-21)
- Sunny Boy 4000TL (SB 4000TL-21)
- Sunny Boy 5000TL (SB 5000TL-21)

1.2 Target Group

This manual is intended for skilled workers. Only qualified personnel are allowed to perform the tasks set forth in this manual (see section 2.2 "Qualification of Skilled Workers" (page 11)).

1.3 Additional Information

Additional information is available at www.SMA.de/en:

Title	Document Type
Miniature Circuit Breaker	Technical information
Measured Values and Parameters	Technical description
SMA *Bluetooth* – SMA *Bluetooth*® Wireless Technology in Practice	Technical information
SMA *Bluetooth*® Wireless Technology	Technical description
Multi-function relay and OptiTrac Global Peak	Technical description
Module Technology	Technical information
Capacitive Discharge Currents	Technical information

1.4 Symbols Used

The following types of safety instructions and general information are used in this manual:

DANGER!

DANGER indicates a safety instruction, the failure to observe which will result in immediate death or serious injury.

WARNING!

WARNING indicates a safety instruction, the failure to observe which could result in death or serious injury.

CAUTION!

CAUTION indicates a safety instruction, the failure to observe which can result in minor or moderate injury.

NOTICE!

NOTICE indicates a safety instruction, the failure to observe which could result in property damage.

Information

Information provides tips that are valuable for the optimal installation and operation of your product.

☑ This symbol indicates the result of an action.

Nomenclature

The following nomenclature is used in this manual:

Complete designation	Short form in this manual
Sunny Boy 3000TL/4000TL/5000TL	Inverter
Electronic Solar Switch	ESS
SMA *Bluetooth*® Wireless Technology	*Bluetooth*

Abbreviations

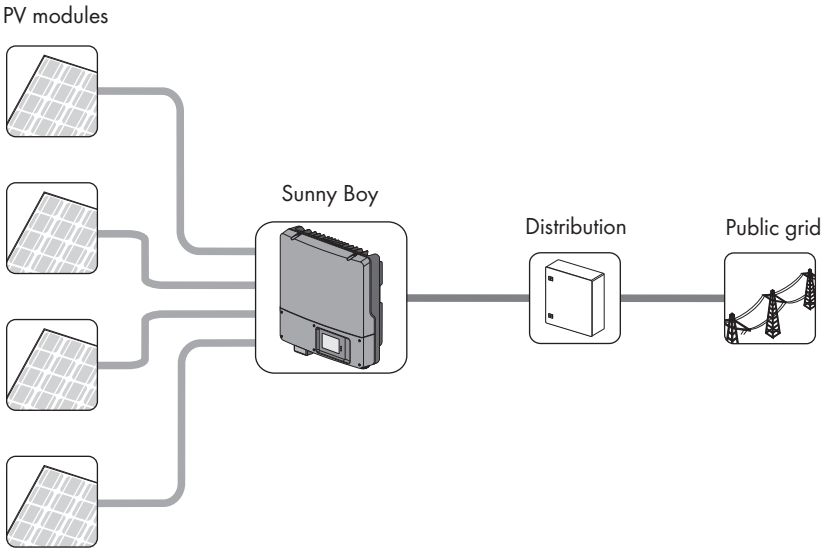
Abbreviation	Description	Explanation
AC	Alternating Current	-
DC	Direct Current	-
EC	European Community	-
LED	Light-Emitting Diode	-
MPP	Maximum Power Point	-
NetID	Network Identification	Identification number for SMA *Bluetooth* network
MSL	Mean Sea Level	-
PE	Protective Earth	Protective conductor
PV	Photovoltaics	-
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e.V.	Association for Electrical, Electronic and Information Technologies

2 Safety

2.1 Intended Use

The Sunny Boy is a PV inverter, which converts the direct current of the PV array to grid-compliant alternating current and feeds it into the power distribution grid.

Principle of a PV plant with this Sunny Boy



The Sunny Boy is suitable for indoor and outdoor use.

The Sunny Boy may only be operated with PV arrays (PV modules and cabling) of protection class II. The PV modules used have to be suitable for use with the Sunny Boy and must be released by the module manufacturer.

PV modules with large capacities relative to ground may only be used if their coupling capacity does not exceed 1 400 nF.

Alternative uses, modifications to the Sunny Boy or the installation of component parts not expressly recommended or sold by SMA Solar Technology AG are not permitted.

Persons with limited physical or mental abilities may only work with the Sunny Boy following proper instruction and under constant supervision. Children are forbidden to play with the Sunny Boy. Keep the Sunny Boy away from children.

Only use the Sunny Boy in accordance with the information provided in the enclosed documentation. Any other use can result in personal injury or property damage.

- Do not mount the inverter on flammable construction materials.
- Do not mount the inverter in areas where highly flammable materials are stored.
- Do not mount the inverter in areas with a risk of explosion.

The enclosed documentation is a part of this product.

- Read and follow the documentation for the proper and optimum use of the Sunny Boy.
- Keep the documentation in a convenient place for future reference.

2.2 Qualification of Skilled Workers

The tasks described in this manual are intended for skilled workers only. Skilled workers must have the following qualifications:

- Knowledge of how an inverter works and is operated
- Instruction in how to deal with the dangers and risks associated with installing and using electrical devices and plants
- Training in the installation and commissioning of electrical devices and plants
- Knowledge of all applicable standards and guidelines
- Knowledge and observance of this manual and all safety instructions

2.3 Safety Instructions

DANGER!

Danger to life due to high voltages in the inverter

High voltages that can result in electrical shocks are present in the conductive component parts of the inverter.

Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66)).

DANGER!

Risk of burn due to electric arc

To prevent arcing when disconnecting DC connectors in the PV array, the ESS and DC connector must be removed from the inverter before performing any work on the PV array.

- Before starting work on the PV array, always disconnect the inverter from the AC and DC side (see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66)).
- Attach the enclosed warning sticker "Risk of burns from electric arc" in a clearly visible manner on the external AC disconnection device.

CAUTION!

Danger of burns due to hot enclosure parts

Some parts of the Sunny Boy enclosure may become hot during operation.

- Only touch the lower enclosure lid of the inverter during operation.

NOTICE!

Dust and water intrusion can damage the inverter.

When closed and when the ESS is attached, the inverter's electronics comply with the degree of protection IP65. It is therefore protected from dust and water. The inverter's connection area complies with the degree of protection IP54. It is protected against dust deposits in the interior and against streams of water from all angles.

- If the ESS is not attached, the inverter must be protected against dust and water.
- Attach the ESS again after any work on the inverter.

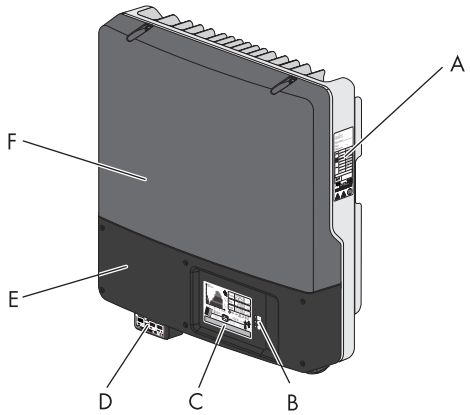
PV array grounding

Comply with local regulations when grounding the modules and the PV array. SMA Solar Technology AG recommends connecting the array frame and other electrically conductive surfaces so that there is continuous conduction and to ground them in order to ensure maximum protection for property and persons.

3 Product Description

3.1 Sunny Boy 3000TL/4000TL/5000TL

The Sunny Boy is a PV inverter, which converts the direct current of the PV array to grid-compliant alternating current and feeds it into the power distribution grid.



Position	Designation
A	Type label
B	LEDs
C	Display
D	Electronic Solar Switch
E	Lower enclosure lid
F	Upper enclosure lid

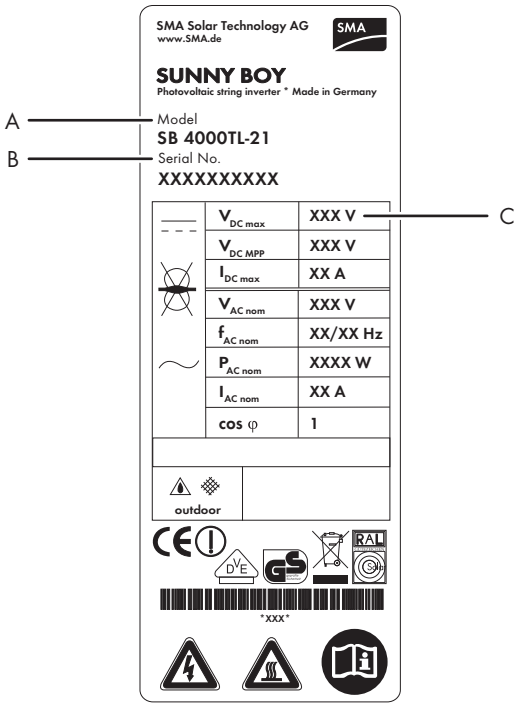
3.2 Symbols on the Inverter

Symbol	Designation	Explanation
	Inverter	This symbol defines the function of the green LED, which indicates the operating state of the inverter.
	Observe documentation.	This symbol defines the function of the red LED, which indicates a fault or interference. Read the manual to remedy the fault or interference.
	*Bluetooth*	This symbol defines the function of the blue LED, which indicates that the *Bluetooth* communication is enabled.
	QR-Code®* for SMA bonus program	You will find information on the SMA bonus program at www.SMA-Bonus.com.
	NOTICE, danger!	Observe the connection requirements for second protective conductor in section 6.3.1 "Conditions for the AC Connection" (page 31).
	Danger to life due to high voltages in the inverter	The capacitors in the inverter may be charged with high voltages. Disconnecting the inverter from voltage sources (see section 8.2) and wait 5 minutes before opening the upper lid, in order to allow time for the capacitors to discharge.

* QR-Code is a registered trademark of DENSO WAVE INCORPORATED.

3.3 Type label

The type label provides a unique identification of the inverter. The type label is on the right-hand side of the enclosure.



Position	Designation	Explanation
A	Model	Device type
B	Serial No.	Inverter serial number
C	Device-specific characteristics	–

The information on the type label is intended to help you use the inverter safely and receive better customer support at the SMA Serviceline. The type label must be permanently affixed to the inverter.

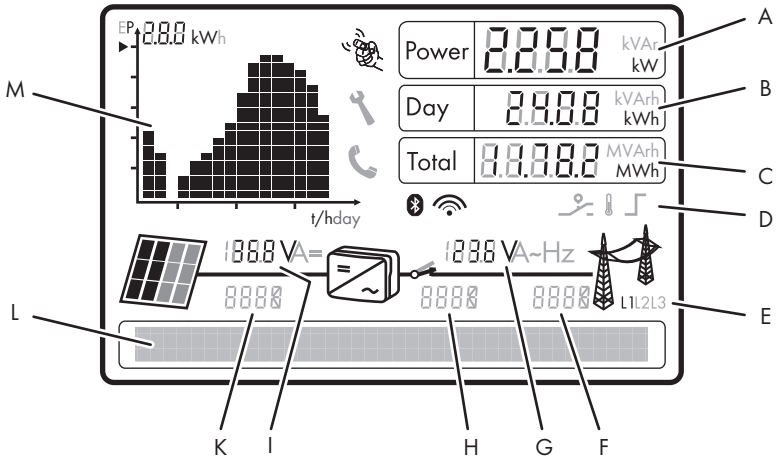
Symbols on the Type Label

Symbol	Designation	Explanation
	Danger to life due to high voltages.	The inverter operates at high voltages. All work on the inverter must be carried out by skilled workers.
	Danger of burns from hot surfaces	The inverter can become hot during operation. Avoid contact during operation. Allow the inverter to cool down sufficiently before carrying out any work. Wear personal safety protection such as safety gloves.
	Observe documentation.	Observe all documentation that is delivered with the inverter.
	Without transformer	The inverter is transformerless.
	DC	Direct current
	AC	Alternating current
 outdoor	Degree of protection IP54	The inverter is protected against dust deposits in the interior and against splashes of water from all angles. The inverter is suitable for outdoor installation.
	Proper disposal	The inverter must not be disposed of together with the household waste.
	CE mark	The inverter complies with the requirements of the applicable EC guidelines.
	Device class label	The product is equipped with a wireless component that complies with the harmonized standards.
	RAL quality mark for solar products	The inverter complies with the requirements of the German Institute for Quality Assurance and Labeling.

Symbol	Designation	Explanation
	Certified safety	The inverter complies with the requirements of the Europe Equipment and Product Safety Act.
N23114	In compliance with Australian mark	The inverter complies with the requirements of the applicable Australian guidelines.

3.4 Display

The display shows the current operating data of the inverter (e.g. status, power, input voltage) as well as the faults and interferences.



Position	Designation	Explanation
A	Power	Displays the current power
B	Day	Displays the daily energy
C	Total	Displays the total amount of energy fed in up until now
D	Active functions	The symbols indicate which communication or power regulation functions are enabled.
E	Phase assignment	The inverter's assignment to a phase. It is also used for external power limitations.
F	Event number for the power distribution grid	Event number of a fault in the power distribution grid
G	Output voltage / output current	The display alternately shows the output voltage and the output current of the inverter.

Position	Designation	Explanation
H	Inverter event number	Event number of a device disturbance
I	Input voltage / input current	The display alternately shows the input voltage and the input current at one input of the inverter.
K	PV array event number	Event number of a fault in the PV array
L	Text line	The text line shows event messages.
M	Power and yield curve	The diagram shows the changes in power over the last 16 feed-in hours or the energy yields over the last 16 days. Tap the display once to switch between views.

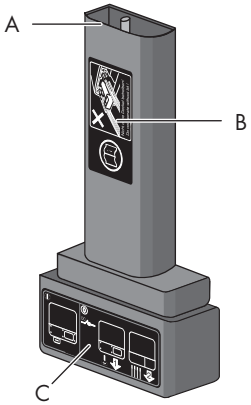
Symbols on the Display

Symbol	Designation	Explanation
	Tap symbol	You can operate the display by tapping it: • Tapping once: the background light switches on or the display scrolls one message further. • Double tapping: the display shows, in succession, the firmware version, the serial number or description of the inverter, the *Bluetooth* NetID, the set country standard and the display language.
	Telephone receiver	Device disturbance present. Contact the SMA Serviceline.
	Wrench	Signifies a fault that can be resolved on-site.
	*Bluetooth*	*Bluetooth* communication is enabled.
	*Bluetooth* connection	*Bluetooth* connection to other devices is active.
	Multi-function relay	The multi-function relay is active.
	Temperature symbol	The performance of the inverter is limited due to high temperature.

Symbol	Designation	Explanation
	Power limitation	The external active power limitation is active via the Power Reducer Box.
	PV array	This symbol indicates a PV array whose strings are connected to two inputs on the inverter. The left half of the symbol stands for input A and the other half for input B. Whichever half is darker indicates the input that the current values refer to. The display switches between the inputs every 10 seconds.
	Inverter	–
	Grid relay	If the grid relay is closed, the inverter will feed power into the grid. If the grid relay is open, the inverter is disconnected from the power distribution grid.
	Power distribution grid	–

3.5 Electronic Solar Switch

The ESS is a DC load disconnection unit. The ESS prevents electric arcs from forming when you remove the DC connector.



Position	Designation	Explanation
A	Plug	–
B	Safety instructions sticker	• Never operate the inverter without the lower enclosure lid in place. • Observe all documentation that accompanies the inverter.
C	ESS sticker	• I If the ESS is plugged in, the DC circuit remains closed. • O To interrupt the DC circuit, you first need to perform steps 1 and 2. • 1 Remove the ESS. • 2 Remove all DC connectors.

When plugged in, the ESS forms a conductive path between the PV array and the inverter. Removing the ESS will interrupt the circuit and allow you to safely disconnect the DC connectors from the inverter.

3.6 Communication

The inverter is fitted as standard with a *Bluetooth* interface, a multi-function relay and a slot for connecting an additional SMA communication interface (e.g. RS485). The inverter can communicate with special SMA communication products (e.g. data logger, software) or other inverters via the communication interfaces. You can only set the inverter's parameters using SMA communication products.

If you have ordered an off-grid inverter with a communication interface, the communication interface is built in upon delivery.

If you communicate via *Bluetooth*, you can protect the inverter with 1 plant password for the user and 1 plant password for the installer. All inverters are delivered with the same factory-installed passwords. You must change plant passwords using a communication product in order to protect the PV plant from unauthorized access.

If you do not communicate using *Bluetooth,* deactivate the *Bluetooth* communication. This protects your PV plant from unauthorized access.

The multi-function relay is for switching on and off the fault indicators or external loads based on parameters and measured values of the inverter. You can configure the multi-function relay for various operating modes.

Various parameter displays

Depending on the type of communication, RS485 or *Bluetooth*, the parameters and messages are displayed differently on the communication products.

Example: parameter display for the country standard

- For communication with RS485: "CntrySet" parameter
- For communication with *Bluetooth*: "Set country standard" parameter

3.7 Grid Management Functions

The grid management functions allow the inverters to take part in grid management. As a result, the inverters meet the grid operator's requirement stipulating that PV plants with more than 100 kWp of installed power must be integrated into the grid management.

The inverters have the following grid management functions:

- Supply of reactive power
- Frequency-dependent active power limitation P(f)
- External active power limitation
- Soft start
- Phase assignment
- Limited dynamic grid support

You can find detailed information on the parameters of these functions in the technical description "Measured values and Parameters" at www.SMA.de/en in the "Technical description" category for the respective inverter.

3.8 Varistors

Varistors are voltage-dependent resistors that protect the inverters against overvoltage. The inverter is equipped with 3 thermally monitored varistors.

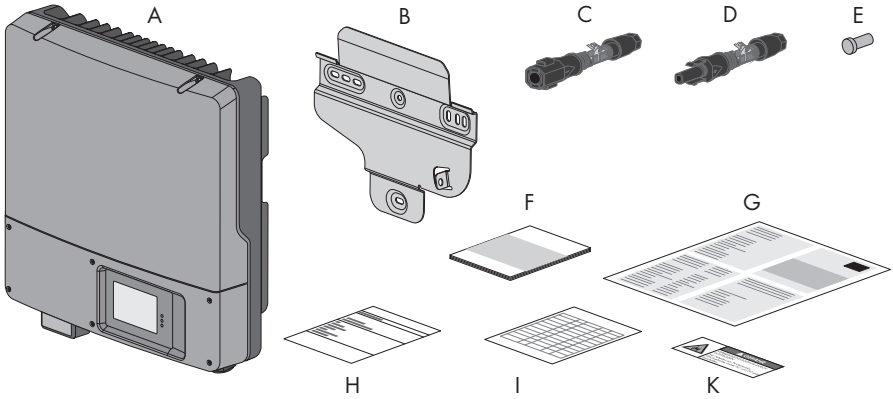
The function of the varistors can diminish with age or repeated strain as a result of overvoltage. This can cause varistor wear. The inverter detects if one of the varistors is defective and indicates a interference.

The varistors are specially manufactured for use in the inverter and are not commercially available. You must order new varistors directly from SMA Solar Technology AG.

4 Unpacking

4.1 Scope of Delivery

Check the delivery for completeness and any visible external damage. Contact your dealer if anything is damaged or missing.



Object	Quantity	Description
A	1	Sunny Boy
B	1	Wall mounting bracket
C	4	Positive DC plug connector
D	4	Negative DC plug connector
E	8	Sealing plugs for DC connectors
F	1	Installation manual
G	1	User manual
H	1	Set of documents with explanations and certificates
I	1	Supplementary sheet with inverter factory settings
K	1	Warning sticker "Risk of burns from electric arc" for the disconnection device on the AC side.

5 Mounting

5.1 Safety

DANGER!

Danger to life due to fire or explosion.

Despite careful construction, electrical devices can cause fires.

- Do not mount the inverter on flammable construction materials.
- Do not mount the inverter in areas where highly flammable materials are stored.
- Do not mount the inverter in areas with a risk of explosion.

CAUTION!

Danger of burn injuries due to hot enclosure parts.

- Mount the inverter in such a way that it cannot be touched inadvertently during operation.

CAUTION!

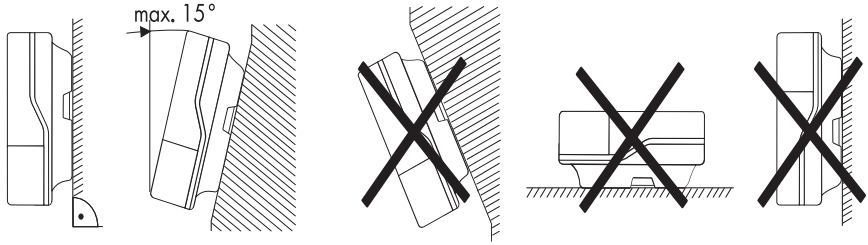
Risk of injury due to the heavy weight of the inverter.

- Take the inverter's weight of approx. 26 kg into account for mounting.

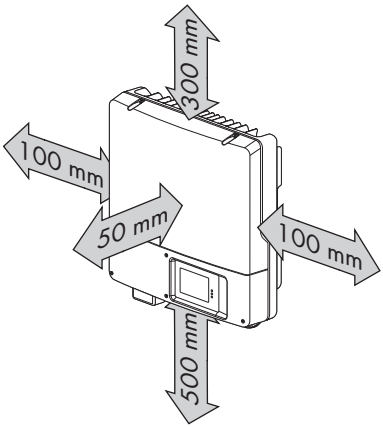
5.2 Selecting the Mounting Location

Consider the following requirements when selecting the mounting location:

- The mounting method and location must be suitable for the inverter's weight and dimensions (see section 13 "Technical Data" (page 97)).
- Mount on a solid surface.
- The mounting location must at all times be clear and safely accessible without the use of additional aids such as scaffolding or lifting platforms. Non-fulfillment of these criteria may restrict servicing.



- Mount vertically or tilted backwards by max. 15°.
- The connection area must point downward.
- Never mount the device with a forward tilt.
- Never install the device with a sideways tilt.
- Do not mount horizontally.
- Mount at eye level to allow operating states to be read at all times.
- The ambient temperature should be below 40°C to ensure optimum operation.
- Do not expose the inverter to direct sunlight, as this can cause excessive heating and thus power reduction.
- In living areas, do not mount the unit on plasterboard walls or similar to avoid audible vibrations. When in use, the inverter emits noises which may be perceived as a nuisance in a living area.
- Observe the minimum clearances to walls, other inverters, or objects as shown in the diagram in order to ensure sufficient heat dissipation and sufficient space for removing the ESS.



Multiple inverters installed in areas with high ambient temperatures

There must be sufficient clearance between the individual inverters to ensure that the cooling air of the adjacent inverter is not taken in.

If necessary, increase the clearance spaces and make sure there is enough fresh air supply to ensure sufficient cooling of the inverters. A fan is available as an accessory for connecting to the inverter (see section 14 "Accessories" (page 109)).

5.3 Mounting the Inverter

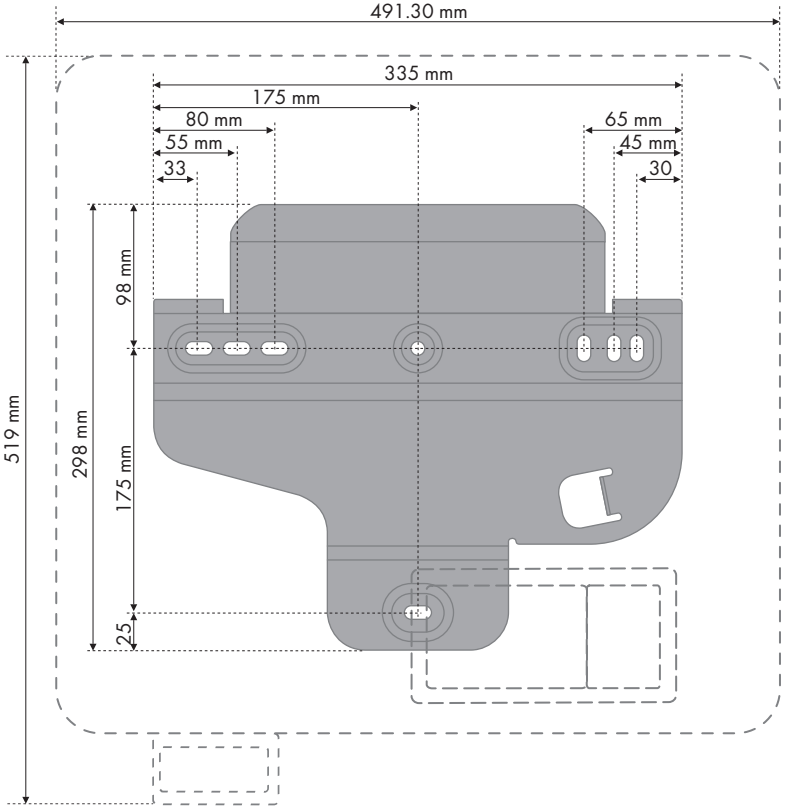
Additional required mounting material (not contained in delivery):

- 3 screws (diameter: at least 6 mm)
- 3 screw anchors
- 3 washers (external diameter: at least 18 mm)

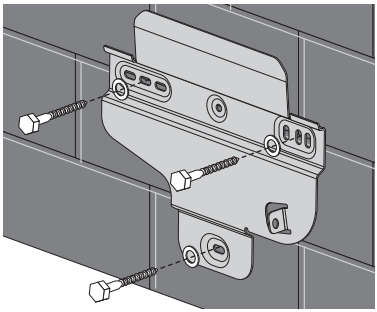
1. Use the wall mounting bracket as a drilling template and mark the positions of the drill holes.

Number of holes to use

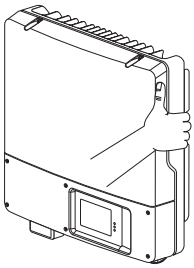
- When mounting onto the wall, use at least 2 of the horizontal holes and the lowest hole in the middle.
- Use the two holes in the center when mounting the device to a pillar.



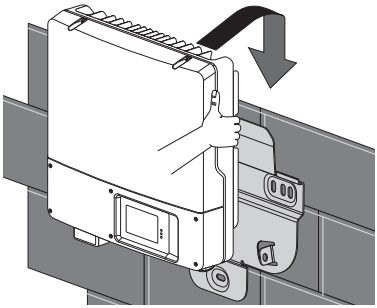
2. Drill the holes.
3. Attach the wall mounting bracket using appropriate screws (diameter min. 6 mm) and washers (outer diameter min. 18 mm).



4. Transport the inverter using the recessed grips on the sides.



5. Hang the inverter onto the mounting bracket from above.

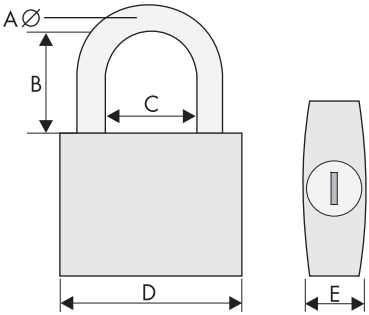


6. Check both sides of the inverter to make sure it is correctly in place.

Optional Theft Protection

To protect the inverter from theft, you can lock it to the wall mounting bracket with a padlock.

The padlock must meet the following requirements:

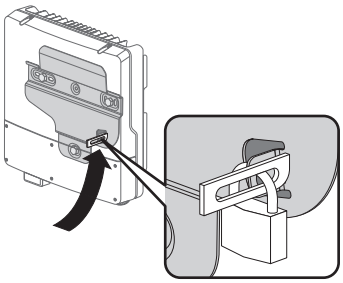


- Size:
  - A: 6 mm ... 8 mm diameter
  - B: 23 mm ... 29 mm
  - C: 23 mm ... 28 mm
  - D: 39 mm ... 50 mm
  - E: 13 mm ... 18 mm
- Stainless
- Hardened shackle
- Secured lock cylinder

Outdoor Installation

Always use a lock suitable for outdoor installation. Make sure the padlock is working properly on a regular basis.

- Route the lock shackle from the center of the device outwards through the metal clip on the wall mounting bracket and the slot on the inverter and close the lock.



Storage of the key

Store the key carefully for possible service purposes.

6 Electrical Connection

6.1 Safety

NOTICE!

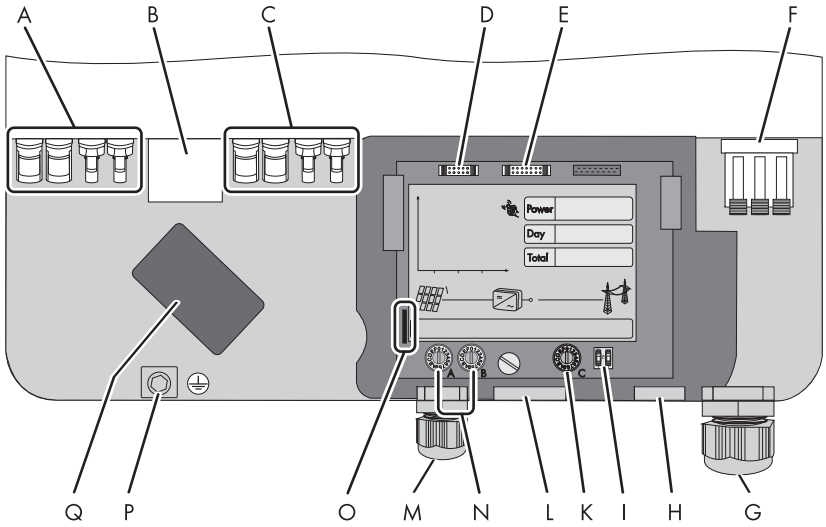
Electrostatic discharges can damage the inverter.

Internal components of the inverter can be irreparably damaged by static discharge.

- Ground yourself before touching any component parts.

6.2 Overview of the Connection Area

The following figure displays the inverter's connection area when the lower enclosure lid is open.



Position	Description
A	DC plug connectors for connecting the strings (input area A)
B	Socket for connecting the ESS
C	DC plug connectors for connecting the strings (input area B)
D	Plug for connecting the multi-function relay or additional fan kit
E	Connector for optional communication via RS485
F	Terminal for the AC cable
G	Cable gland (12 mm ... 21 mm) for routing the AC cable
H	Enclosure opening for connecting the multi-function relay or additional fan kit or optional communication via RS485
I	Switch for temporarily changing the display language to English (for service purposes)
K	Rotary switch for the configuration of *Bluetooth* communication
L	Enclosure opening for optional communication via RS485
M	Cable gland (5 mm ... 13 mm) for connecting the multi-function relay or additional fan kit
N	Rotary switches for setting the country standard and display language
O	Slot for SD Card
P	Ground terminal to additionally ground the inverter
Q	Enclosure opening for installing a fan (available as an accessory)

6.3 Connection to the Power Distribution Grid (AC)

6.3.1 Conditions for the AC Connection

- Comply with the connection requirements of your distribution grid operator.

Residual current device

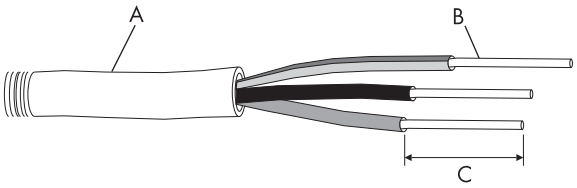
The inverter is equipped with an integrated all-pole sensitive residual current monitoring unit. The inverter can automatically distinguish between residual currents and "normal" capacitive leakage currents.

If an external RCD or residual current device is strictly required in the installation country, you must use a switch that triggers at a residual current of 100 mA or higher.

Cable design

Use "Sunny Design" version 2.0 or higher for the dimensioning of the conductor cross-sectional areas (see "Sunny Design" design program at www.SMA.de/en).

Cable requirements



Object	Description	Value
A	External diameter	12 mm ... 21 mm
B	Cable cross-section	max. 10 mm²
C	Length of insulation to be stripped off	approx. 12 mm

Connection of a second protective conductor

The inverter is equipped with a protective conductor monitoring, which discerns a failure in the installation of the inverter in case of no connected protective conductor. In some power supply line points, it may be useful to deactivate the monitoring.

To ensure an equal security according to IEC 62109, the protective earth terminal must be planed in this case, in one of the following types:

- Installation of the protective conductor on the AC terminal with a conductor cross-sectional area of at least 10 mm² Cu.

or

- Installation of a second protective conductor on the ground terminal with the same cross-sectional area as the original protective conductor on the AC terminal (see section 6.3.3 "Additional Grounding of the Enclosure" (page 37)).

In some installation countries, a second protective conductor is basically required to prevent a contact current in the event of a malfunction in the original protective conductor.

In each case, observe the applicable regulations in the installation country.

Load Disconnection Unit

Attaching the warning stickers on the load disconnection unit on the AC side

To prevent arcing, always disconnect the inverter from the AC **and** DC side before starting work on the PV array.

Attach the warning sticker "Risk of burns from electric arc" so that it is clearly visible on the external AC disconnection device.

You must install a **separate** miniature circuit-breaker for each inverter in order to ensure that the inverter can be securely disconnected under load. The maximum permissible rating can be found in section 13 "Technical Data" (page 97).

Detailed information and examples for the design of a miniature circuit-breaker can be found in the Technical Information "Miniature Circuit Breaker" at www.SMA.de/en.

DANGER!

Danger to life due to fire

When more than one inverter is connected to the same miniature circuit-breaker, the protective function of the miniature circuit-breaker is no longer guaranteed. It can result in a cable fire or destruction of the inverter.

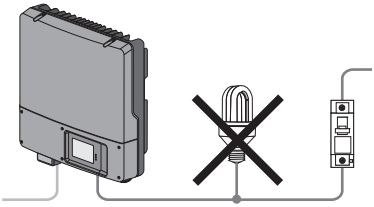
- Never connect several inverters to the same miniature circuit breaker.
- Observe the maximum permissible fuse protection of the inverter when selecting the miniature circuit-breaker.

DANGER!

Danger to life due to fire

When a generator (inverter) and a load are connected to the same miniature circuit-breaker, the protective function of the miniature circuit-breaker is no longer guaranteed. The current from the inverter and the power distribution grid can accumulate to overcurrent which is not detected by the miniature circuit-breaker.

- Never connect loads between the inverter and the miniature circuit-breaker without fuse protection.
- Always protect consumers separately.



NOTICE!

Damage to the inverter by using screw type fuses as a load disconnection unit.

A screw type fuse, e.g. D-system (DIAZED) or D0 system (NEOZED), is not a load disconnection device, and thus may **not** be used as a load disconnection unit. A screw type fuse only acts as cable protection.

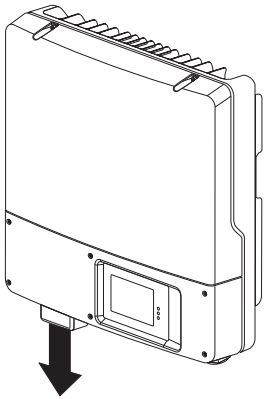
When disconnecting under load using a screw type fuse, the inverter can be damaged.

- Use only a switch-disconnector or a miniature circuit-breaker as a load disconnection unit.

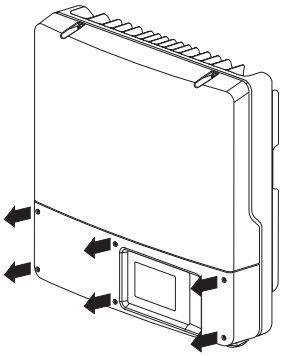
6.3.2 Connecting the Inverter to the Power Distribution Grid (AC)

1. Make sure that the grid voltage lies within the permissible voltage range.

   The exact operating range of the inverter is specified in the operation parameters. The corresponding document is located in the download area at www.SMA.de/en, in the "Technical Description" category of the respective inverter.
2. Disconnect the miniature circuit-breaker and secure against reconnection.
3. Remove the ESS.



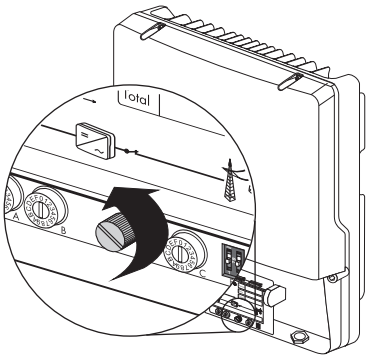
4. Loosen all six captive screws and remove the bottom enclosure lid. Use an Allen key (wrench size 3) for this.



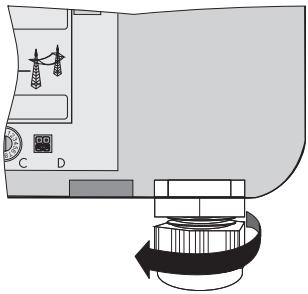
5. Check that the country setting of the inverter is correct by using the supplement provided with the factory settings.

   If the inverter is not set to the desired country standard, then adjust the country standard as described in section 6.5.2 "Setting the Country Standard and Language using Rotary Switches" (page 51).

6. For easy connection, loosen the display screws until the display raises.

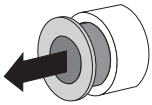


7. Flip up the display until it clicks into place.
8. Undo the lock nut of the AC cable gland and remove the filler-plug from the cable gland.



Seal in the AC cable gland

There is a two-part seal in the cable gland. Remove the internal insert if necessary, e.g. to lay a thicker cable.



The following guideline values apply:

- Cable cross-section with seal and insert: 12 mm ... 16 mm
- Cable cross-section with seal only and without insert: 15 mm ... 21 mm

9. Pull the cable through.
10. Raise all 3 terminals of the AC clamp terminal as far as they will go.

NOTICE!

Risk of fire when connecting 2 conductors to a single terminal

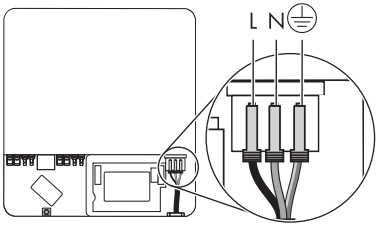
If 2 conductors are connected to one terminal, a poor electrical contact can result in overheating or a risk of fire.

- Never connect more than one conductor per terminal.

11. Connect L, N and the protective conductor (PE) to the AC terminal in accordance with the label.

    The protective conductor must be 5 mm longer than the insulated L and N conductors.

    L and N must not be swapped.



CAUTION!

Danger of crushing when terminals snap shut

The terminals close by snapping down fast and hard.

- Press the terminals down with your thumb, do not grip the entire terminal on all sides.
- Keep fingers away from the terminals.

12. Close all terminals of the AC terminal again until they snap into place.
13. Fold down the display and screw it hand-tight.
14. Hand-tighten the lock nut firmly to the cable gland.

DANGER!

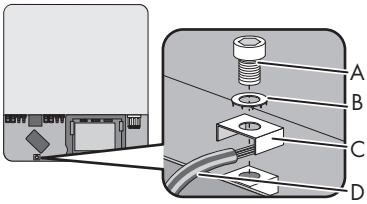
Danger to life due to high voltages in the inverter

- Do not switch on the miniature circuit-breaker until the PV array has been connected and the inverter is securely closed.

15. Attach the enclosed warning sticker "Risk of burns from electric arc" so that it is clearly visible on the disconnection device on the AC side.

6.3.3 Additional Grounding of the Enclosure

If the installation requires, you can use the ground terminal to connect a second protective conductor or as equipotential bonding on the enclosure.



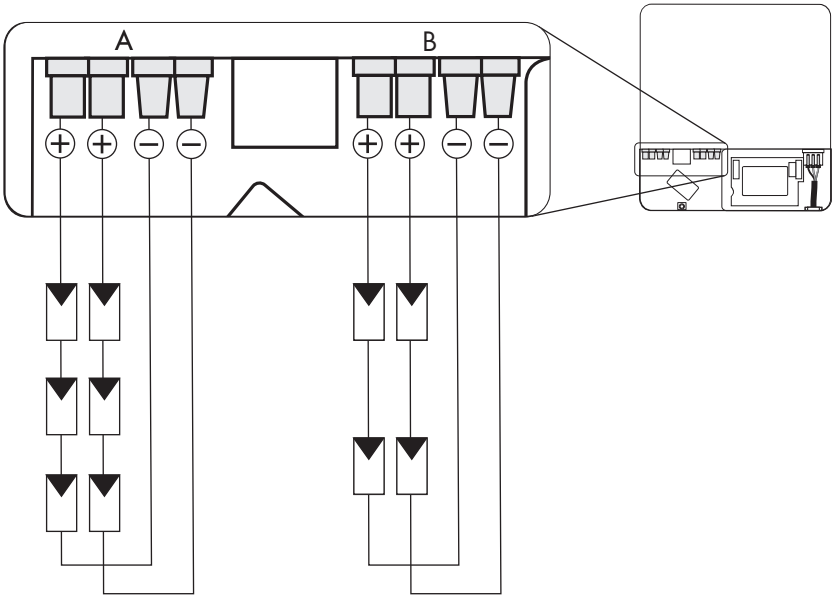
1. Undo screw (A) by half way. Use an Allen key (wrench size 4) for this.
2. Insert the stripped grounding cable (D) under the clamping clip (C) (maximum cross-section 10 mm²).
3. Fasten terminal (C):
   - Attach conical spring washer on the screw. Here, the grooved side of the conical spring washer must point to the screw head.
   - Tighten the screw (torque: 6 Nm). Use an Allen key (wrench size 4) for this.

   ☑ The teeth of the conical spring washer are pushed into the clamping clip. The conductive ground cable is conductively connected to the enclosure.

6.4 Connecting the PV Array (DC)

6.4.1 Conditions for the DC Connection

The inverter has two input areas, "A" and "B", each with its own MPP tracker. 2 strings can be connected to each input zone.



Use of Y adapters

Y adapters may not be visible within close proximity of the inverter or freely accessible.

- The DC circuit may not be interrupted by Y adapters.
- Observe the procedure for disconnecting the inverter (see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66)).

- For each input area (A or B), the following requirements apply for the PV modules of the connected strings:
  - Same type
  - Same quantity of PV modules connected in series
  - Identical alignment
  - Identical tilt

No mixed connections between input areas

For instance, if the positive pole of a string is connected at input zone A and the string's negative pole at input zone B, this is called a mixed connection.

Only connect strings at one input zone and never mix the input zones A and B!

Otherwise, the inverter no longer fulfills the requirements of the EMC Directive (Directive on the **e**lectro**m**agnetic **c**ompatibility of a device) and loses its operation license.

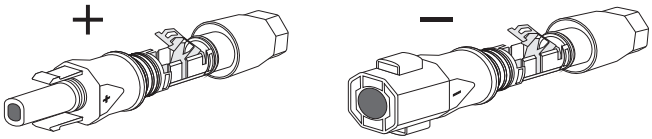
- The connection cable of the PV modules must be equipped with connectors. The DC connectors for the DC connection are included in the delivery.
- The following limiting values at the DC input of the inverter must not be exceeded:

Maximum input voltage	Maximum input current	
	Input area A	Input area B
750 V	15.0 A	15.0 A

6.4.2 Assembling the DC Connectors

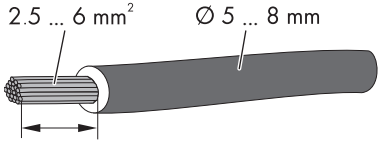
All PV module connection cables must be equipped with the included DC connectors before connecting them to the inverter.

To assemble the DC connectors, proceed as follows. Ensure the connectors have the correct polarity. The DC connectors have the symbols "+" and " − ".



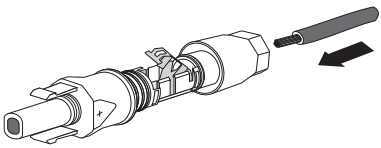
Cable Requirements

- Use a PV1-F cable.

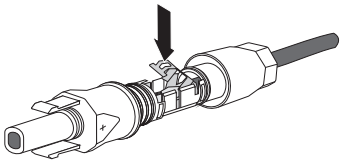


Procedure

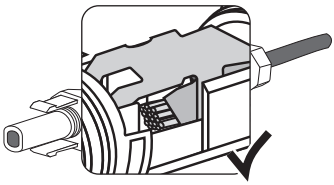
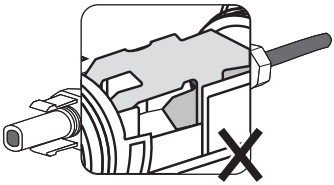
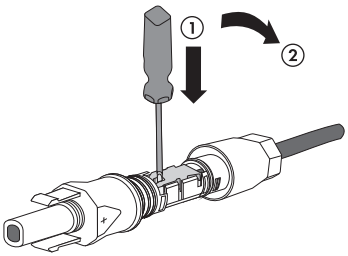
1. Lead the stripped cable all the way into the DC connector.



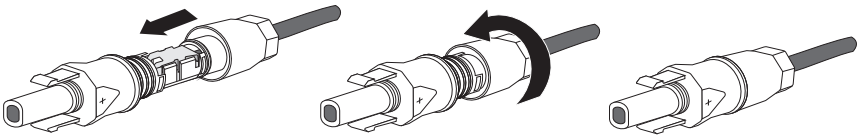
2. Press the clamping clip down until it audibly snaps into place.



3. Ensure that the cable is correctly positioned:

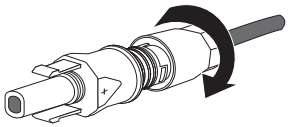
Result	Measure
☑ If the stranded wire is visible in the chamber of the clamping clip, the cable is correctly positioned. 	• Proceed to step 4.
☑ If the stranded wires are **not** visible, the cable is not correctly positioned. 	• Loosen the clamping clip. To do so, insert a 3.5 mm screwdriver into the clamping clip and lever it out.  • Remove the cable and go back to step 1.

4. Push the cable gland towards the thread and tighten it (torque: 2 Nm).

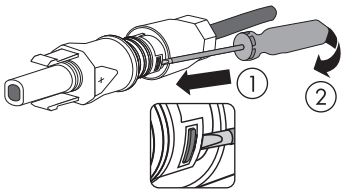


6.4.3 Opening the DC Connector

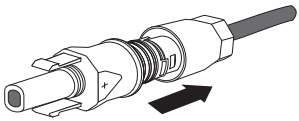
1. Unscrew the screw connection.



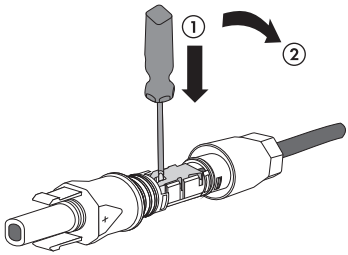
2. Unlocking the DC connector: Insert a 3.5 mm screwdriver into the snap slot on the side and lever it out.



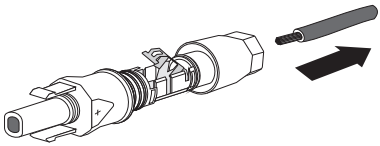
3. Carefully pull the DC connector apart.



4. Loosen the clamping clip. To do so, insert a 3.5 mm screwdriver into the clamping clip and lever it out.



5. Remove the cable.



6.4.4 Connecting the PV Array (DC)

DANGER!

Danger to life due to high voltages in the inverter

- Before connecting the PV array, switch off the miniature circuit-breaker and make sure it stays off.

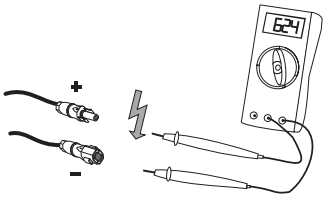
NOTICE!

Excessive voltages can destroy the measuring device.

- Only use measuring devices with a DC input voltage range up to at least 1 000 V.

1. Check the connection cable of the PV modules for correct polarity and make sure that the maximum input voltage of the inverter is not exceeded.

   At an ambient temperature above 10°C, the open-circuit voltage of the PV modules must not be more than 90% of the maximum inverter input voltage. Otherwise, check the plant design and the PV module connection. If this is not done, the maximum inverter input voltage can be exceeded at low ambient temperatures.



NOTICE!

Destruction of the inverter due to overvoltage

If the voltage of the PV modules exceeds the maximum input voltage of the inverter, it can be destroyed by the overvoltage. This will void all warranty claims.

- Do not connect strings with an open circuit voltage greater than the maximum input voltage of the inverter.
- Check the plant design.

2. Check the strings for ground faults as described in section 11.5 "Checking the PV Array for Ground Faults" (page 87).

DANGER!

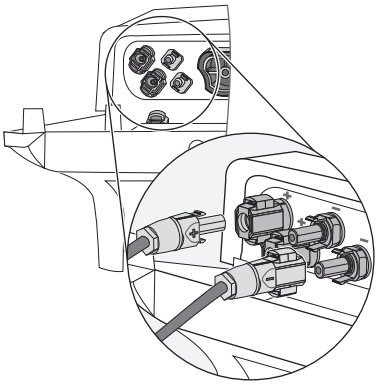
Risk of lethal electric shock.

- Do not connect strings with ground faults.
- Before connecting the DC cable, rectify the ground fault in the respective string.

3. Check the DC connectors for correct polarity and connect them.

   ☑ The DC connectors click audibly into position.

   To unlock the DC connectors, see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).

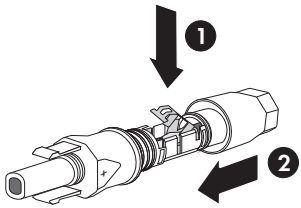


4. If you do not need all DC inputs on the inverter, seal the enclosure with DC connectors and sealing plugs:

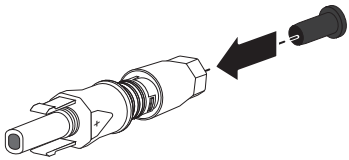
Sealing plugs

- Do not insert the sealing plugs directly into the DC inputs of the inverter.

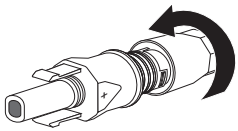
– For unused DC connectors, push down the clamping clip and push it onto the cable gland.



– Insert the sealing plug into the DC connector.

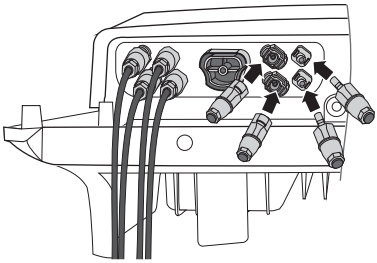


– Tighten the cable gland (torque: 2 Nm).



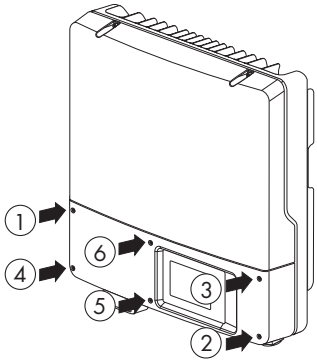
– Insert the DC connectors with sealing plugs into the corresponding DC inputs on the inverter.

☑ The DC connectors click audibly into position.



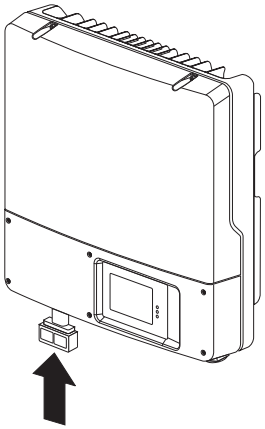
5. Ensure that all DC plug connectors are securely in place.
6. Close the lower enclosure lid again using the 6 screws.

   Tighten the screws (2 Nm torque) in the order shown on the right.



7. Check the ESS for wear, as described in section 9.3 "Checking the Electronic Solar Switch for Wear" (page 72).

8. Securely connect the ESS.



NOTICE!

ESS damage.

If it is not correctly connected, the ESS can be damaged.

- Plug the handle firmly onto the socket of the ESS.
- The handle must close flush with the enclosure.
- Make sure that the ESS is securely seated on the inverter.

Currents in DC Cabling

After connecting the ESS, DC currents may occur in the DC cabling, even when there is no AC-side supply. This is not an error but normal behavior of the inverter when in operation.

☑ The PV array is connected.

You can now commission the inverter as described in section 7 "Commissioning" (page 58). Other connection options are optional (see section 6.6 "Communication" (page 52)).

6.5 Setting the Country Standard and Display Language

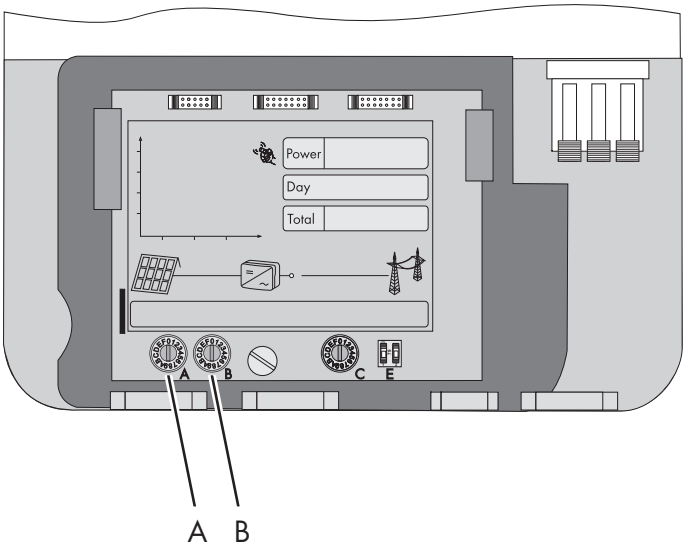
The inverter can be configured for various countries. This can be done prior to commissioning via two rotary switches on the display or after commissioning by configuring the "CntrySet" or "Set country standard" parameter using a communication product (e.g. Sunny WebBox or Sunny Explorer). For devices ordered without any specified country of installation, the default country setting is "VDE-AR-N4105-MP" and the display language is set to German.

Both rotary switches are set to 0 upon delivery. If you have ordered the inverter with specific country settings, they will have already been preset at the factory via a communication product. In this case, you will not be able to recognize the setting by the switch position.

If changes are made via the rotary switches or via a communication product, the default grid parameters are overwritten. They cannot be restored, and must be re-entered via a communication product.

The display language can be changed at any time using the rotary switches, independently of the grid parameters. This means that the default grid parameters remain unchanged, but the display messages are shown in the set language.

Changes will be accepted immediately after switching the miniature circuit-breaker on. If an unprogrammed switch setting is selected, the inverter issues an error message. The last valid setting is retained.



SMA Grid Guard Protected Country Data Sets

In some countries, the local grid connection requirements demand a mechanism which prevents the parameters for the grid feed-in from being changed. Therefore certain country data sets are protected against unauthorized changes. You can only unlock the SMA Grid Guard code with a personal access code.

SMA Grid Guard protected country data sets are automatically blocked for 10 feed-in hours after commissioning, or after the last alteration. If the country data set is changed after these 10 feed-in hours, the inverter will not accept the changes and displays the error message "Grid parameter locked". If, however, a later change to the country data set only relates to a change of the display language via the rotary switches in the inverter, this change is immediately taken on.

It is also possible to set country data sets (parameter "CntrySet" and/or "Set country standard"), and to lock or unlock these manually via a communication product. To block a data set, enter the digit sequence "54321" instead of the password into the SMA Grid Guard code field. The data set can only be unlocked by entering a personal, 10-digit SMA Grid Guard code which is valid for a maximum of 10 feed-in hours. The application form for the personal access code is available at www.SMA.de/en, in the "Certificate" category of the respective inverter.

The language can be configured without a password, regardless of the country data set.

Changing parameters in SMA Grid Guard protected country data sets

If the parameters within protected country data sets are changed, these are no longer protected and instead of the standard, "ADJ" or "Special setting" is displayed. In this case, the parameters are not changed automatically after 10 feed-in hours, but have to be manually locked. To manually lock the parameters, set the SMA Grid Guard code to "54321".

Further information on parameter settings

You will find detailed information on making adjustments and changing parameters in the corresponding user manual for your communication product.

The last change (executed via rotary switch or communication device) is always verified and activated if applicable. Consequently, the switch position may not necessarily show the actual country configuration.

6.5.1 Checking the Country Standard

Make sure that the inverter is set to the installation country.

Before commissioning:

- Check that the country setting of the inverter is correct using the supplement provided and comparing this to the factory settings of the inverter.

After commissioning:

- Check that the country standard is correct on the basis of the display message during (re-)commissioning (see section 7 "Commissioning" (page 58)).
- Check whether the country standard is correct by tapping the display twice and viewing the display messages of the startup phase again.

  or

- Check that the country standard is correct using the "SMA grid guard" measuring channel via a communication product.

Display language

Once you have set the country standard, you can always set the display language later using rotary switch B. However, you have to then set the rotary switch A to "0" in order to keep the country data set.

The settings of each country data set are specified in the operation parameters. The parameters can be read out using a communication product. The description of the operating parameters is available at www.SMA.de/en in the category "Technical Description" of the respective inverter.

(A)	(B)	Country data set	Display language	Grid Guard protection	Country
0	0	Default settings	Default settings	Dependent on parameter set	Dependent on parameter set
0	1	Retained	English	Dependent on parameter set	Dependent on parameter set
0	2	Retained	German	Dependent on parameter set	Dependent on parameter set
0	3	Retained	French	Dependent on parameter set	Dependent on parameter set
0	4	Retained	Spanish	Dependent on parameter set	Dependent on parameter set
0	5	Retained	Italian	Dependent on parameter set	Dependent on parameter set
0	6	Retained	Greek	Dependent on parameter set	Dependent on parameter set
0	7	Retained	Czech	Dependent on parameter set	Dependent on parameter set

(A)	(B)	Country data set	Display language	Grid Guard protection	Country
0	8	Retained	Korean	Dependent on parameter set	Dependent on parameter set
0	9	Retained	Portuguese	Dependent on parameter set	Dependent on parameter set
0	A	Retained	Dutch	Dependent on parameter set	Dependent on parameter set
0	B	Retained	Slovenian	Dependent on parameter set	Dependent on parameter set
0	C	Retained	Bulgarian	Dependent on parameter set	Dependent on parameter set
0	D	Retained	Polish	Dependent on parameter set	Dependent on parameter set
1	0	VDE0126-1-1	German	yes	Germany, Switzerland,
1	2	VDE-AR-N4105[a)]	German	yes	Germany
1	4	VDE-AR-N4105-MP[b)]	German	yes	Germany
1	6	VDE-AR-N4105-HP[c)]	German	yes	Germany
1	8	VDE0126-1-1	French	yes	Switzerland, France
1	9	VDE0126-1-1/UTE[d)]	French	yes	France
2	0	VDE0126-1-1	Italian	yes	Switzerland
4	0	RD1663-A	Spanish	yes	Spain
4	1	RD1663/661-A	Spanish	yes	Spain
4	8	PPC	Greek	no	Greece
4	9	PPC	English	no	Greece
5	8	G83/1-1	English	no	England
5	A	G59/2	English	no	England
6	0	EN50438	German	yes	Various EU countries
6	1	EN50438	English	yes	Various EU countries
6	2	EN50438	French	yes	Various EU countries
6	3	EN50438	Italian	yes	Various EU countries
6	4	EN50438	Spanish	yes	Various EU countries

(A)	(B)	Country data set	Display language	Grid Guard protection	Country
6	5	EN50438	Greek	yes	Various EU countries
6	6	EN50438	Czech	yes	Various EU countries
6	7	EN50438	Portuguese	yes	Various EU countries
6	8	EN50438	Bulgarian	yes	Various EU countries
6	9	EN50438	Polish	yes	Various EU countries
7	0	EN50438-CZ	Czech	yes	Czech Republic
7	1	EN50438-CZ	English	yes	Czech Republic
7	2	EN50438-CZ	German	yes	Czech Republic
7	4	PPDS	Czech	yes	Czech Republic
7	5	PPDS	English	yes	Czech Republic
7	6	PPDS	German	yes	Czech Republic
7	8	C10/11	French	yes	Belgium
7	9	C10/11	English	yes	Belgium
7	A	C10/11	German	yes	Belgium
C	0	Customer	English	no	Flexible
C	1	Customer	German	no	Flexible
C	2	Customer	French	no	Flexible
C	3	Customer	Spanish	no	Flexible
C	4	Customer	Italian	no	Flexible
C	5	Customer	Greek	no	Flexible
C	6	Customer	Czech	no	Flexible
D	0	Off-grid 60 Hz	English	no	Flexible
D	1	Off-grid 60 Hz	German	no	Flexible
D	2	Off-grid 60 Hz	French	no	Flexible
D	3	Off-grid 60 Hz	Spanish	no	Flexible
D	4	Off-grid 60 Hz	Italian	no	Flexible
D	5	Off-grid 60 Hz	Greek	no	Flexible
D	6	Off-grid 60 Hz	Czech	no	Flexible
E	0	Off-grid 50 Hz	English	no	Flexible
E	1	Off-grid 50 Hz	German	no	Flexible
E	2	Off-grid 50 Hz	French	no	Flexible
E	3	Off-grid 50 Hz	Spanish	no	Flexible

(A)	(B)	Country data set	Display language	Grid Guard protection	Country
E	4	Off-grid 50 Hz	Italian	no	Flexible
E	5	Off-grid 50 Hz	Greek	no	Flexible
E	6	Off-grid 50 Hz	Czech	no	Flexible
a)	Setting in accordance with VDE-AR-N-4105 for PV plants ≤ 3.68 kVA (Germany)				
b)	Setting in accordance with VDE-AR-N-4105 for PV plants > 3.68 kVA and < 13.8 kVA (Germany)				
c)	Setting in accordance with VDE-AR-N-4105 for PV plants > 13.8 kVA (Germany)				
d)	Special setting for France: *Bluetooth* transmission power reduced in accordance with French requirements				

If the inverter is not set to the installation country, there are several ways of configuring the required country standard.

- Setting via 2 rotary switches, as described in section 6.5.2 "Setting the Country Standard and Language using Rotary Switches" (page 51).
- Alternatively you can conduct the settings via the "CntrySet" or "Set country standard" parameters with a communication device, once you have commissioned the inverter.
- If you require adjusted parameter settings for your installation location, you can change these with the help of a communication product.

6.5.2 Setting the Country Standard and Language using Rotary Switches

1. Disconnect the inverter from voltage sources and open the inverter as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).

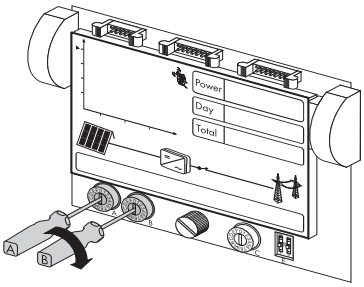
DANGER!

Danger to life due to high voltages in the event of outage of the power distribution grid.

If you set the inverter to stand-alone operation "Off-Grid 50 Hz"/"Off-Grid 60 Hz", you may not operate the inverter on the power distribution grid, but only on the stand-alone grid, because the inverter does not satisfy any country-specific standards and guidelines then. If there is a power distribution grid outage, this prevents danger of feedback.

- If the inverter is set to "Off-Grid 50 Hz" or "Off-Grid 60 Hz", never operate the inverter directly on the power distribution grid.

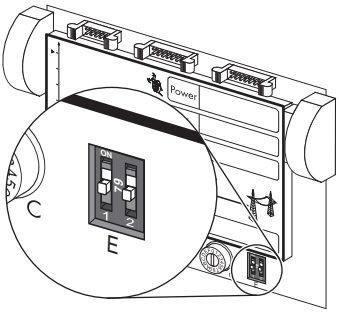
2. Set the arrows on both rotary switches (A and B) using a screwdriver to the desired positions (see table in section 6.5.1 "Checking the Country Standard" (page 48)). For this purpose, use a screwdriver with a blade width of 2.5 mm.



Temporarily Setting the Language to English

You can also temporarily set the display language to English using a switch, e.g. for service purposes. The inverter's parameter settings are not changed in the process.

- Push the left switch 1 up until it locks into place. Use an object with a small tip, e.g. a ballpoint pen, to do this.
- To reset the display language back to the original language, push the left switch 1 down until it locks into place.



3. Close the inverter as described in section 8.3 "Closing the Inverter" (page 69).

6.6 Communication

6.6.1 Interface for RS485 Communication

If you have ordered an inverter with an interface for wireless communication, the interface is built in upon delivery.

You can also subsequently order an interface for wireless communication (see section 14 "Accessories" (page 109)). You will find a detailed illustration of the cabling principle and the description for the subsequent installation in the communication interface retrofit kit.

6.6.2 Setting the *Bluetooth* NetID

Communication via *Bluetooth* with a communication product is activated as standard. Networking via *Bluetooth* with other inverters is deactivated as standard.

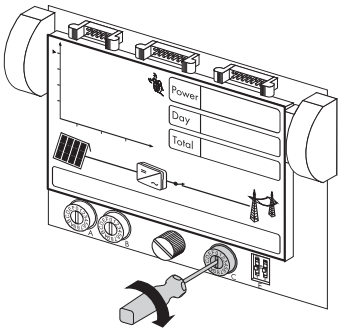
The following configuration settings are possible via a rotary switch (switch C):

Switch position (NetID)	Setting
0	Communication via *Bluetooth* is disabled.
1	Communication via *Bluetooth* is activated using a communication product and networking with other inverters is deactivated. (default setting)
2 ... F	Networking via *Bluetooth* with other inverters is activated.

In order to restrict communication via *Bluetooth* between the inverters of your PV plant and those of neighboring systems, you can assign an individual NetID to the inverters of your PV plant (switch position 2 ... F). However, this is only necessary if neighboring systems are within a radius of 500 m.

So that all inverters in your PV plant are detected by your communication product, all inverters must have the same NetID.

1. Disconnect the inverter from voltage sources and open the inverter as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).
2. Set the arrow on the rotary switch (C) to the required position using a screwdriver. Use a 2.5 mm screwdriver for this purpose.
3. Close the inverter as described in section 8.3 "Closing the Inverter" (page 69).



Acceptance of settings

The *Bluetooth* settings will first be accepted upon commissioning the inverter.

6.6.3 Connecting the Multi-function Relay

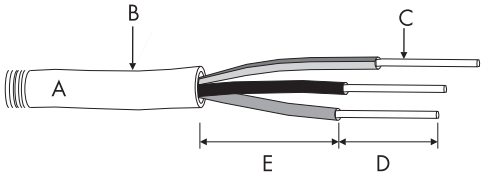
The multi-function relay is switched on and off based on parameters and measured values of the inverter.

When using it as a fault signaling contact, you have the option of connecting an individual load either in the event of a fault or for undisturbed operation. Other multi-function relay functions are outlined in the Technical Description "Multi-function relay and OptiTrac Global Peak" at www.SMA.de/en.

The following table contains the maximum permissible voltages and currents:

	Voltage	Current
AC	Max. 240 V	maximum 1.0 A
DC	Max. 30 V	maximum 1.0 A

Cable requirements



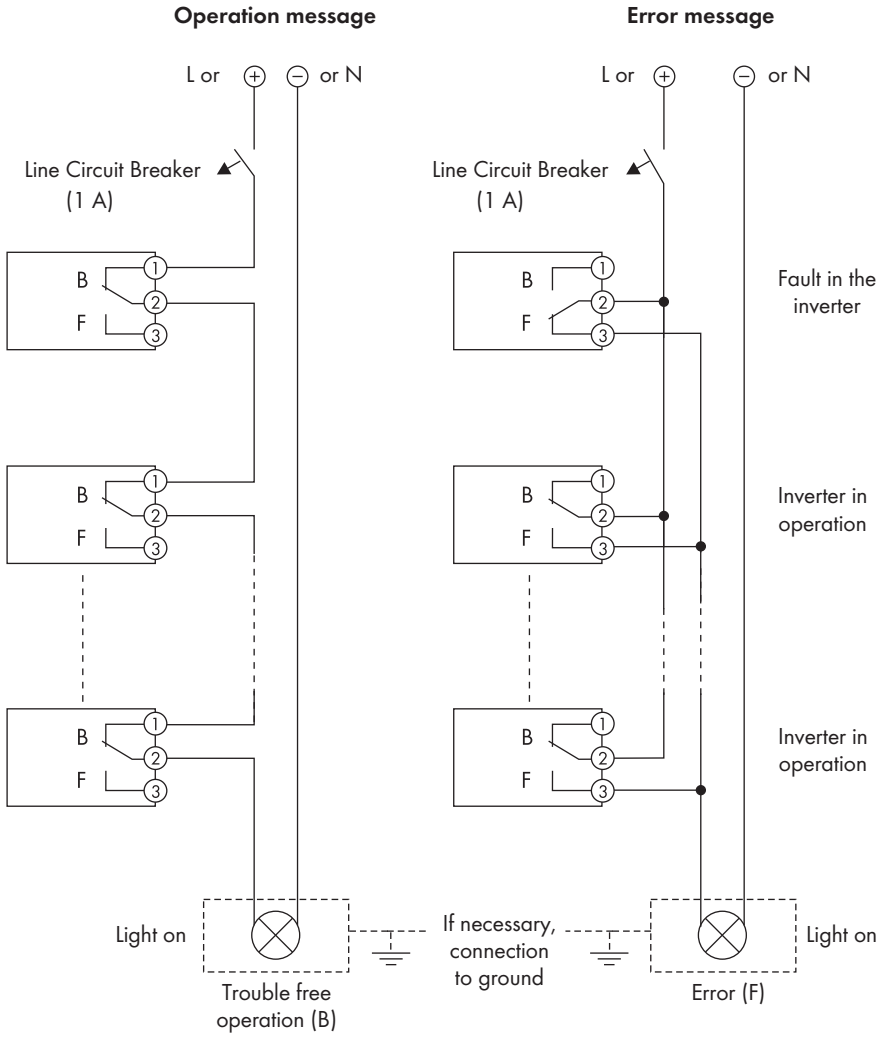
Position	Designation	Value
A	Cable type	Double insulated
B	External diameter	5 mm ... 13 mm
C	Cable cross-section	0,08 mm² ... 2,5 mm², with bootlace ferrule maximum 1.5 mm²
D	Length of insulation to be stripped off	minimum 6 mm, maximum 8 mm
E	Stripping length	15 mm at maximum

The cable type and cable-laying method must be appropriate to the application and location.

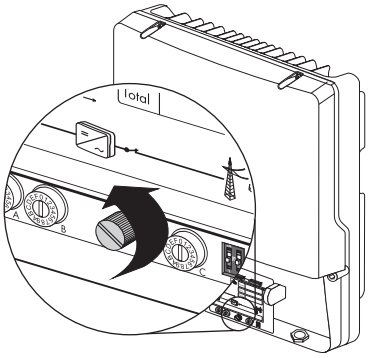
Miniature Circuit Breaker

If you are connecting the multi-function relay to the power distribution grid, it must be protected with a separate miniature circuit-breaker.

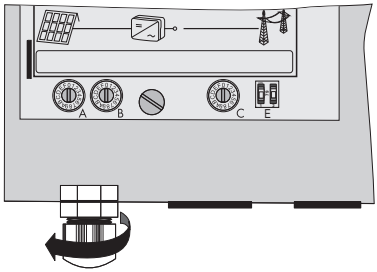
Connection plan



1. Disconnect the inverter from the power supply and open it as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).
2. Loosen the screw on the display and flip the display up until it clicks into place.

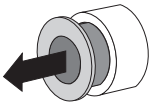


3. Loosen the cable gland's lock nut slightly and remove the filler-plug from the cable gland.



Seal in the cable gland

There is a two-part seal in the cable gland. Remove the internal insert if necessary, e.g. to lay a thicker cable.



The following guideline values apply:

- Cable diameter with seal and insert: 5 mm ... 7 mm
- Cable diameter with seal and without insert: 7 mm ...13 mm

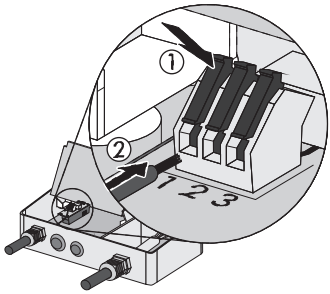
DANGER!

Danger to life due to high voltages in the inverter

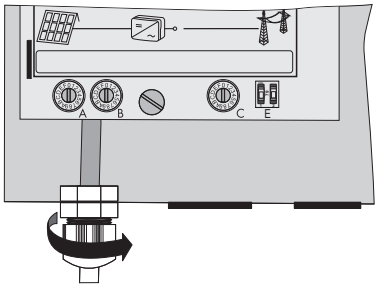
- Use at least double insulated cable.
- Strip cable to a maximum length of 15 mm.

4. Insert the cable into the inverter.
5. Strip max. 8 mm off the insulated conductors.

6. Flip up the terminals all the way and connect the insulated conductors as shown on page Page 55 in the connection plan (depending on whether you require an operating or an error message).



7. Tighten the lock nut hand-tight to the cable gland.



8. Fold down the display and tighten the screw on the display hand-tight.
9. Close the inverter as described in section 8.3 "Closing the Inverter" (page 69).

7 Commissioning

7.1 Commissioning the Inverter

1. The following conditions must be fulfilled before commissioning:
   - Correct mounting (see section 5.3)
   - Correct country configuration (see section 6.5.1)
   - AC cable is correctly connected (power distribution grid)
   - Protective conductor is correctly connected (see section 6.3.3)
   - DC cable (PV string) is completely connected
   - Unused DC inputs are closed using the corresponding DC connectors and sealing plugs
   - All enclosure openings are closed
   - The enclosure lid is securely screwed in place
   - The ESS is securely plugged in
   - The AC distribution board is correctly installed
   - The miniature circuit-breaker is correctly laid out
2. Switch on the miniature circuit breaker.
   ☑ Green LED glows: commissioning was successful.

   or

   ☑ Green LED flashes in case of insufficient irradiation: grid connection conditions have not yet been reached. Wait for sufficient irradiation.

   or

   ☑ Red LED is glowing: a fault has occurred. Localize and eliminate the fault (see section 11 "Troubleshooting" (page 74)).

Self-test in accordance with ENEL guideline during initial start-up (only for Italy)

The Italian standard prescribes that an inverter can only operate on the power distribution grid after the disconnection times for overvoltage, undervoltage, minimum frequency and maximum frequency have been checked.

If you have configured the Enel-GUIDA country data set, start the self-test as described in section 7.3 "Self-test in accordance with ENEL guideline (only for Italy)" (page 60). The test takes approx. 3 minutes.

3. If connected, switch on the multi-function relay power supply.
4. Make the following settings via communication using *Bluetooth*:
   - Change the plant time (see the communication product's manual).
   - Change the passwords (see the communication product's manual).

7.2 Display Messages during the Start Phase

Illustrated display messages

The display messages illustrated in this section serve as examples and can, depending on the country setting, differ from the display messages of your inverter.

- Firstly, the firmware version of the internal processors appears in the text lines.

- After 5 seconds, or after tapping on the display, the serial number or the description of the inverter and the NET ID for communication via *Bluetooth* will appear. The description of the inverter can be changed with a communication product.

- After a further 5 seconds, or when you tap again, the configured standard is displayed (example: "VDE-AR-N4105-MP").

- After a further 5 seconds, or when you tap again, the configured language is displayed (example: "Language German").

- During normal operation, the text line of the display will be clear. See section 11 "Troubleshooting" (page 74) for possible event messages which may be displayed in the text line and their meaning.

Show display messages again

If you want to view the display messages of the startup phase again while in normal operation, double tap the display.

7.3 Self-test in accordance with ENEL guideline (only for Italy)

7.3.1 Starting the Self-Test

You can start the self-test by tapping on the lower enclosure lid. The country configuration of the inverter must be set to Italy (Enel-GUIDA) or a reconfigured based on the Enel-GUIDA country data set before the self-test can be carried out. In addition, an undisturbed feed-in operation must be possible.

Display language during the self-test

Independent of the configured language, the display messages for the self-test will always be displayed in Italian.

Proceed as follows for checking the disconnection times:

1. Commission the inverter as described in section 7 "Commissioning" (page 58).
   ☑ The inverter is now in the start phase.
   - Firstly, the firmware version of the internal processors appears in the text lines.
   - After 5 seconds or after tapping the lower enclosure lid, the serial number or the description of the inverter appears. The description of the inverter can be changed with a communication product.
   - After a further 5 seconds, or when you tap again, the configured standard is displayed.

2. In order to start the self-test, tap on the lower enclosure cover **within 10 seconds** once.
   ☑ The message shown on the right appears in the display.

3. Now activate the self-test **within 20 seconds** by tapping on the lower enclosure lid again.

☑ Once you have started the test sequence, the inverter checks the disconnection times for overvoltage, undervoltage, maximum frequency and minimum frequency one after the other. During the tests, the inverter shows the values in the display which are described in section 7.3.2 "Test Sequence" (page 61).

7.3.2 Test Sequence

Note the values which are displayed during the test sequence. These values must be entered into a test report. The test results of the individual tests are displayed 3 times one after the other. During the test sequence, the inverter will not react to tapping.

When the inverter has carried out the 4 tests, it switches to normal operation. The original calibration values are reset.

Actual values on the display

During the self-test the actual voltage, the feed-in current and the frequency is displayed above the text rows independent of the test values.

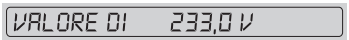
Overvoltage test

The inverter starts the overvoltage test and shows the adjacent display message for 5 seconds.

During the test sequence, the voltage limit applied is shown in the display of the inverter. The voltage limit is reduced successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

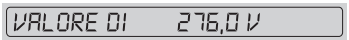
Once the inverter has disconnected from the power distribution grid, the display successively shows each of the following values one after the other for 10 seconds:

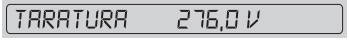
- Disconnection value,

1. 

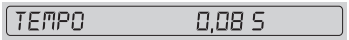
2. 

- Calibration value,

1. 

2. 

- Reaction time.

1. 

2. 

The change between the first and second display takes place every 2.5 seconds.

Undervoltage test

The undervoltage test follows the overvoltage test and the inverter issues the adjacent display message for 5 seconds.

During the test sequence, the voltage limit applied is shown in the display of the inverter. The voltage limit is increased successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

Once the inverter has disconnected from the power distribution grid, the display successively shows each of the following values one after the other for 10 seconds:

- Disconnection value,

1. 

2. 

- Calibration value,

1. 

2. 

- Reaction time.

1. 

2. 

The change between the first and second display takes place every 2.5 seconds.

Maximum frequency

The maximum frequency test follows the undervoltage test and the inverter issues the adjacent display message for 5 seconds.

During the test sequence, the frequency limit applied is shown in the display of the inverter. The frequency limit is reduced successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

Once the inverter has disconnected from the power distribution grid, the display successively shows each of the following values one after the other for 10 seconds:

- Disconnection value,

1. 

2. 

- Calibration value,

1. 

2. 

- Reaction time.

1. 

2. 

The change between the first and second display takes place every 2.5 seconds.

Minimum frequency

After the maximum frequency test, the minimum frequency test takes place and the inverter shows the adjacent display message for 5 seconds.

During the test sequence, the frequency limit applied is shown in the display of the inverter. The frequency limit is increased successively until the shut-down threshold is reached and the inverter disconnects from the power distribution grid.

Once the inverter has disconnected from the power distribution grid, the display successively shows each of the following values one after the other for 10 seconds:

- Disconnection value,

- Calibration value,

- Reaction time.

The change between the first and second display takes place every 2.5 seconds.

7.3.3 Abortion of the Self-Test

If, during the self-test, an unexpected disconnection requirement occurs, the self-test is aborted. The same applies if the DC voltage is so low that the feed-in cannot be continued.

- The inverter then shows the adjacent display message for 10 seconds.

- Restart the self-test (see section 7.3.4 "Restarting the Self-Test" (page 64)).

7.3.4 Restarting the Self-Test

In order to restart the self-test, proceed as follows:

1. Disconnect the miniature circuit-breaker and secure against reconnection.
2. If it is connected, disconnect the multi-function relay power supply.
3. Disconnect the ESS from the inverter for 5 minutes and then connect it again.
4. Commission the inverter again (see section 7 "Commissioning" (page 58)).

☑ The inverter is now in the start phase and you can restart the self-test, as described in section 7.3.1 "Starting the Self-Test" (page 60) from step 3.

8 Opening and Closing

8.1 Safety

DANGER!

Danger to life due to high voltages in the inverter

Before opening the inverter, observe the following:

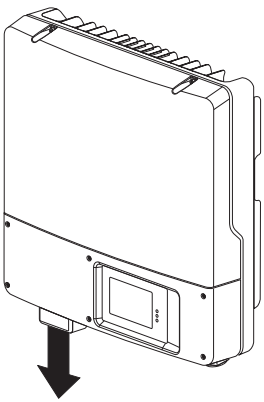
- Disconnect the miniature circuit-breaker and secure against reconnection.
- If it is connected, switch off the power supply to the multi-function relay and ensure that the device cannot be unintentionally or accidentally reconnected during technical and maintenance work.

DANGER!

Risk of lethal electric shock.

If the DC connectors are pulled out without first disconnecting the ESS, a dangerous electric arc can occur.

- First remove the ESS.
- Open the lower enclosure lid and remove the DC connectors.



NOTICE!

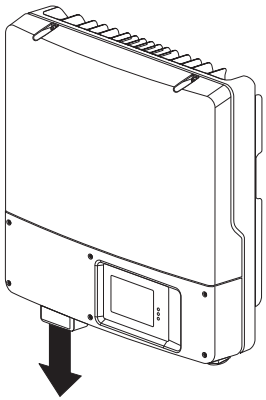
Electrostatic discharges can damage the inverter.

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

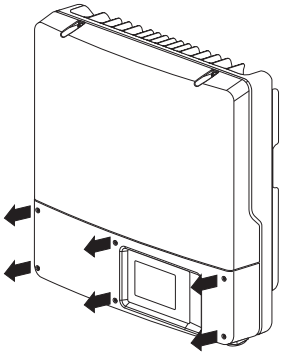
- Ground yourself before touching any component parts.

8.2 Disconnecting the Inverter from Voltage Sources

1. Disconnect the miniature circuit-breaker and secure against reconnection.
2. If it is connected, switch off the power supply to the multi-function relay and ensure that the device cannot be unintentionally or accidentally reconnected during technical and maintenance work.
3. Remove the ESS.

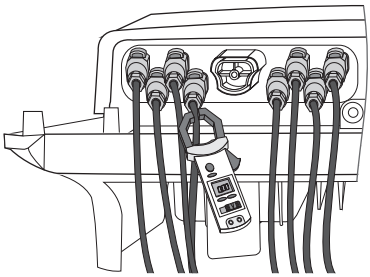


4. Loosen all six captive screws and remove the lower enclosure lid. Use an Allen key (wrench size 3) for this.

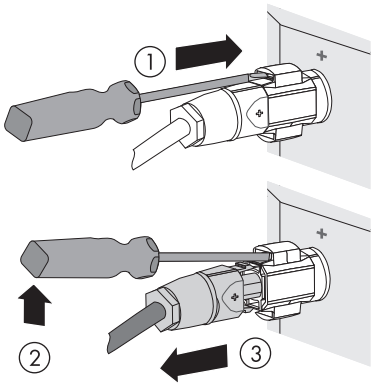


5. Use a current probe to make sure all DC cables are current free.

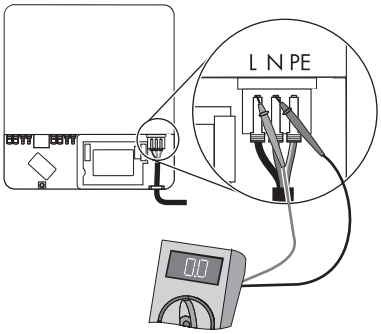
   ☑ If current is present, check the installation.



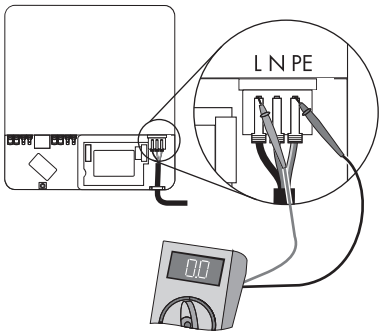
6. Unlock and disconnect all connected DC connectors. For this purpose, use a screwdriver with a blade width of 3.5 mm.
   - Insert a screwdriver into one of the side slots (1).
   - Lever the screwdriver upward (2) and pull out the DC plug connector (3).



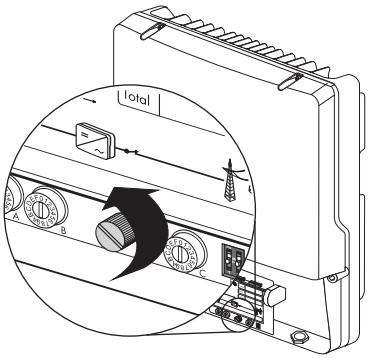
7. Wait until the LEDs, display and, if applicable, fault indicator have gone out.
8. Verify the absence of voltage L with respect to N at the AC terminal with an appropriate meter. The test probe may have a diameter of maximum 2 mm.
   ☑ If voltage is present, check the installation.



9. Verify the absence of voltage L with respect to PE at the AC terminal with an appropriate meter.
   ☑ If voltage is present, check the installation.

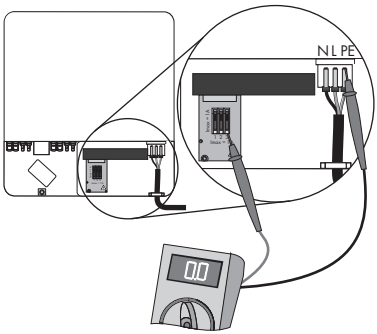


10. Loosen the screw on the display and flip the display up until it clicks into place.



11. Verify the absence of voltage of the multi-function relay with respect to the protective conductor at all terminals. The test probe may have a diameter of maximum 2 mm.

    ☑ If voltage is present, check the installation.



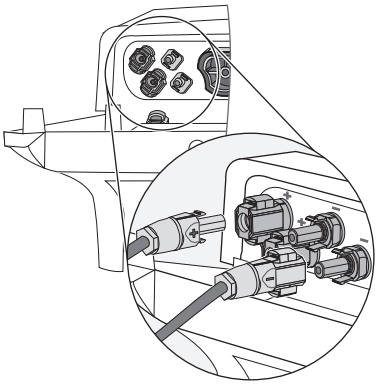
☑ The inverter is open and no voltage is present.

8.3 Closing the Inverter

1. Check the DC connectors for correct polarity and connect them to the inverter.

   ☑ The DC connectors click audibly into position.

   To unlock the DC connectors, see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).



2. Close all the DC inputs that are not needed as described in section 6.4.4 "Connecting the PV Array (DC)" (page 42) to seal the inverter.
3. Ensure that all DC plug connectors are securely in place.

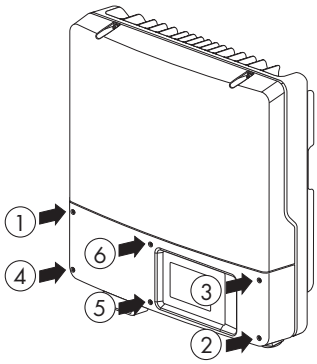
DANGER!

Risk of lethal electric shock.

When the inverter is operated without the lower enclosure lid, the DC connectors can be disconnected while under load, however, this can cause arcing.

- Insert the ESS only when the lower enclosure lid is closed.
- Only operate the inverter when the lower enclosure lid is closed so that the DC connectors can be removed immediately.

4. Attach the lower enclosure lid on the enclosure and lock it with the 6 screws. Use an Allen key (wrench size 3) and tighten the screws (2 Nm torque) in the order shown on the right.



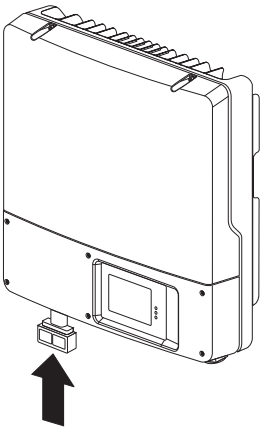
5. Check the ESS for wear, as described in section 9.3 "Checking the Electronic Solar Switch for Wear" (page 72).

NOTICE!

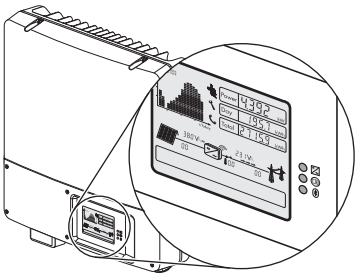
The ESS can be damaged if it is not plugged in correctly.

- Securely connect the ESS.

  The handle of the Electronic Solar Switch must be flush with the enclosure.
- Check that the ESS is securely in place.



6. If connected, switch on the multi-function relay power supply.
7. Switch on the miniature circuit breaker.
8. Check whether the display and the LEDs indicate a normal operating state (see section 7 "Commissioning" (page 58)).



☑ The inverter is now closed and in operation.

9 Maintenance and Cleaning

9.1 Cleaning the Inverter

If the display and LEDs are dirty and you find it difficult to read the inverter's operating data and operating states, clean them with a damp cloth. Do not use any corrosive substances (e.g. solvents, abrasives) for cleaning.

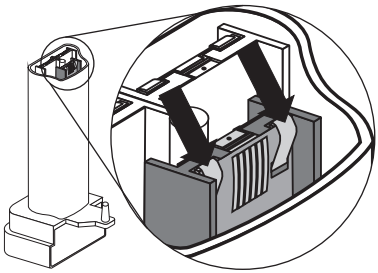
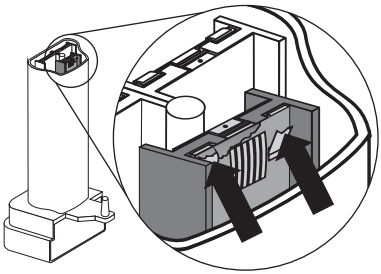
9.2 Checking Heat Dissipation

If the inverter regularly reduces its output due to excessive heat (temperature symbol on the display illuminates), this may be for one of the following reasons:

- The cooling fins on the rear side of the enclosure are clogged with dirt.
  - Clean the cooling fins with a soft brush.
- The ventilation ducts at the top are clogged with dirt.
  - Clean the ventilation ducts with a soft brush.

9.3 Checking the Electronic Solar Switch for Wear

Check the ESS for wear before plugging it in.

Result	Measure
☑ The metal tongues inside the connector are not damaged or discolored. 	1. Insert the handle of the ESS securely in the socket on the bottom of the enclosure. 2. Recommission the inverter as described in section 7 "Commissioning" (page 58).
☑ The metal tongues inside the connector have a brown discoloration or are burned out. 	The ESS can no longer safely disconnect the DC side. 1. Replace the ESS handle before attaching it again. Order the new ESS handle through the SMA Serviceline (see section 15 "Contact" (page 110)). 2. After replacing the ESS, recommission the inverter as described in section 7 "Commissioning" (page 58).

10 Slot for SD Card

The SD card is used to read in files, if, under consultation with the SMA Serviceline, a firmware update is necessary.

SMA Solar Technology AG will send you a file with the firmware update by email or on an SD card or will make the file available in the download area at www.SMA.de/en.

You will find the description of the firmware update in the download area at www.SMA.de/en.

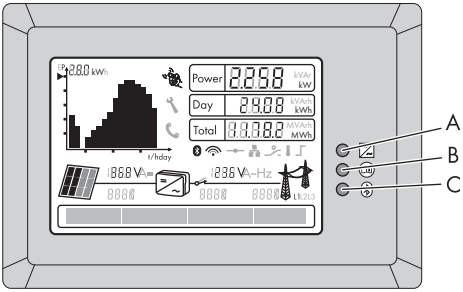
Properties of the SD Card

Use an SD card that is FAT16 or FAT32 formatted and has a maximum storage capacity of 2 GB.

Use the SD card exclusively for this inverter. Do not save any multimedia files or other unsuitable files on the SD card.

11 Troubleshooting

11.1 LED signals



Position	Designation	Status	Explanation
A	Green LED	Is glowing	Operation
		Flashes	Grid connection conditions are not yet met.
B	Red LED	Is glowing	Error
C	Blue LED	Is glowing	*Bluetooth* communication is activated.
		Flashes	The inverter was identified via Sunny Explorer by setting the "Find device" parameter.

11.2 Event Messages

No display in the event of insufficient DC voltage

Taking measurements and displaying messages is only possible when there is sufficient DC voltage.

During an update, the relevant display message is shown in the text line of the display.

Message	Description
Avvio Autotest	Only relevant for an installation in Italy: tapping on the display starts the self-test in accordance with Enel-GUIDA (see section 7.3 "Self-test in accordance with ENEL guideline (only for Italy)" (page 60)).
Inst. code valid	The SMA Grid Guard code entered is valid. The configured country data set is now unblocked and can be changed. If it is a protected Grid Guard configured country data set, the unlocking is valid for a maximum of 10 feed-in hours.
No new update SDcard	There is no update file relevant for this inverter on the SD card or the available update has already been carried out.
Grid param.unchanged	The selected switch setting is not programmed or there is no country data set available on the SD card.
Parameters set successfully	A new country data set has been configured.
SD card is read	The inverter is currently reading the SD card.
Set parameter	The inverter sets the parameters.
Update completed	The inverter has successfully completed the update.
Update Bluetooth	The inverter updates the *Bluetooth* component.
Update main CPU	The inverter updates the inverter components.
Update communication	The inverter updates the communication component.
Update RS485I module	The inverter updates the communication interface.
Upd. language table	The inverter updates the language table.
Update file OK	The update file found is valid.

11.3 Error Messages

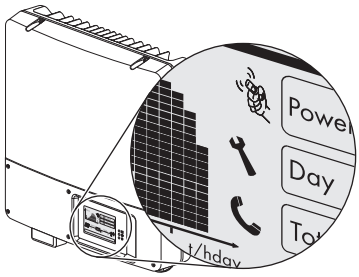
No display in the event of insufficient DC voltage

Taking measurements and displaying messages is only possible when there is sufficient DC voltage.

The text lines on the display show the relevant messages whenever an error occurs. The event numbers for the displayed error messages will appear in the text lines. If the error persists for a prolonged period, the red LED lights on and the fault signaler is activated (if connected).

In addition, depending on the severity of the fault the "wrench" or "telephone receiver" symbol on the display will light up.

- Wrench: signifies a fault that can be remedied on-site.
- Telephone receiver: signifies a fault with the device. Contact the SMA Serviceline.



Event no.	Message	Cause and Correction
101 - 103	**Grid Fault**	The grid voltage has exceeded the permissible range. This error can have the following causes: • The grid voltage at the connection point of the inverter is too high. • Grid impedance at the connection point of the inverter is too high. The inverter disconnects itself from the power distribution grid for safety reasons. **Corrective measures:** • Check the grid voltage and connection on the inverter. If the grid voltage lies outside the permissible range due to local grid conditions, ask your distribution grid operator if the voltage can be adjusted at the feeding point or if it would be acceptable to change the monitored operational limits. If the grid voltage lies within the tolerance range, yet this error is still being displayed, contact the SMA Serviceline.

Event no.	Message	Cause and Correction
202 - 205	**Grid Fault**	The grid voltage has fallen below the permissible range. This error can have the following causes: • Grid disconnected • AC cable damaged • The grid voltage at the point of connection of the inverter is too low. The inverter disconnects itself from the power distribution grid for safety reasons. **Corrective measures:** • Check for tripping of the miniature circuit-breaker. • Check the grid current and the grid connection on the inverter. If the grid voltage lies outside the permissible range due to local grid conditions, ask your distribution grid operator if the voltage can be adjusted at the feeding point or if it would be acceptable to change the monitored operational limits. If the grid voltage lies within the tolerance range, yet this error is still being displayed, contact the SMA Serviceline.

Event no.	Message	Cause and Correction
301	**Grid Fault**	The average grid voltage over 10 minutes is no longer within the permissible range. This can have the following causes: • The grid voltage at the connection point of the inverter is too high. • Grid impedance at the connection point of the inverter is too high. The inverter disconnects to assure compliance with the voltage quality of the power distribution grid. **Corrective measures:** • Check the grid voltage at the point of connection of the inverter: If, due to local grid conditions, the grid voltage exceeds the configured limiting value, ask the distribution grid operator whether the voltage can be adjusted at the feeding point, or whether it would agree to a modification of the limiting value for power quality monitoring. If the grid voltage is continually within the tolerance range, and this error is still displayed, contact the SMA Serviceline.
401 - 404	**Grid Fault**	The inverter is no longer in grid parallel operation and has stopped feed-in operation for safety reasons. **Corrective measures:** • Check the grid connection for strong, short-term frequency variations. If there are repeated frequent fluctuations and this error occurs as a result, ask your distribution grid operator if it would be acceptable to change the operating parameters. Discuss the proposed parameters with the SMA Serviceline.

Event no.	Message	Cause and Correction
501	**Grid Fault**	The power frequency is not within the permissible range. The inverter disconnects itself from the power distribution grid for safety reasons. **Corrective measures:** • If possible, check the power frequency and observe how often major deviations occur. If there are frequent fluctuations and this error occurs as a result, ask your distribution grid operator if it would be acceptable to change the operating parameters. Discuss the proposed parameters with the SMA Serviceline.
601	**Grid Fault**	The internal monitoring function of the inverter has detected an excessively high proportion of direct current in the grid current. The inverter disconnects itself from the power distribution grid. **Corrective measures:** • Check the grid connection for direct current. • If this event occurs often, check with the distribution grid operator whether it is possible to raise the limiting value of monitoring.
701	**Frq. not permitted**	The power frequency is outside the permissible range. The inverter disconnects itself from the power distribution grid for safety reasons. **Corrective measures:** • As far as possible, check the grid frequency and observe how often major fluctuations occur. If there are frequent fluctuations and this error occurs as a result, ask your distribution grid operator if it would be acceptable to change the operating parameters. Discuss the proposed parameters with the SMA Serviceline.
801	**Waiting for grid voltage** **Grid failure** **Check fuse**	There is no grid voltage at the inverter's AC output. **Corrective measures:** • Check the fuse and replace it if necessary. • Check AC installation. • Check whether there is a general power outage.

Event no.	Message	Cause and Correction
901	**PE conn. missing** **Check connection**	The PE connection is missing. Half of the grid voltage may be present on the ungrounded enclosure. The inverter does not connect to the power distribution grid. **Corrective measures:** • Check AC installation. • Connect the PE cable to the AC terminal as described in section 6.3.2 "Connecting the Inverter to the Power Distribution Grid (AC)" (page 34).
1001	**L / N swapped** **Check connection**	L and N are interchanged. The inverter does not connect to the power distribution grid. **Corrective measures:** • Adjust the connection as described in section 6.3.2 "Connecting the Inverter to the Power Distribution Grid (AC)" (page 34).
1101	**Installation fault** **Check connection**	A second phase is connected to N. **Corrective measures:** • Fix the connection as described in section 6.3.2 "Connecting the Inverter to the Power Distribution Grid (AC)" (page 34).
3301 - 3303	**Unstable operation**	There is not enough power at the DC input of the inverter for stable operation. This may be caused by snow on the PV modules or insufficient sunlight. The inverter interrupts the feed-in operation. **Corrective measures:** • Wait for more sunlight. • If this event recurs even when the amount of sunlight is average, check the design of your PV plant and make sure the PV array is wired properly.

Event no.	Message	Cause and Correction
3401 - 3402	**DC overvoltage** **Disconnect generator**	The DC input voltage connected to the inverter is too high. The inverter interrupts the feed-in operation. **Corrective measures:** • **Immediately disconnect the inverter from the PV array as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66). The inverter may otherwise be destroyed.** • Check the DC voltage of the strings for adherence to the maximum input voltage of the inverter before reconnecting the inverter to the PV array. • If the voltage is within the permissible input voltage range, the inverter may be defective. Contact the SMA Serviceline.
3501	**Insulation resist.** **Check generator**	The inverter has detected a ground fault in the PV array and does not connect to the power distribution grid for safety reasons. The damaged insulation causes a risk of electric shock. **Corrective measures:** • Check the strings for ground faults as described in section 11.5 "Checking the PV Array for Ground Faults" (page 87). • The installer of the PV array must remedy the ground faults before you reconnect the affected string.
3601	**High discharge curr.** **Check generator**	The leakage current from the inverter and the PV generator is too high. This can be caused by a sudden ground fault, a residual current or a device malfunction. The inverter interrupts grid feed-in operation immediately after exceeding a limiting value and then automatically reconnects to the grid once the fault has been remedied. **Corrective measures:** • Check the strings for ground faults as described in section 11.5 "Checking the PV Array for Ground Faults" (page 87). • The installer of the PV array must remedy the ground faults before you reconnect the affected string.

Event no.	Message	Cause and Correction
3701	**Resid.curr.too.high** **Check generator**	The inverter has detected residual current and interrupts the feed-in operation. **Corrective measures:** • Check the strings for ground faults as described in section 11.5 "Checking the PV Array for Ground Faults" (page 87). • The installer of the PV array must remedy the ground faults before you reconnect the affected string.
3801 - 3802	**DC overcurrent** **Check generator**	The inverter switches off due to an overcurrent on the DC side. **Corrective measures:** If this event occurs frequently: • Check the design and wiring of the PV array.
3901 - 3902	**Waiting for DC start conditions** **Start cond. not met**	The input power or the voltage of the PV modules is insufficient for feeding into the grid. **Corrective measures:** • Wait for more sunlight. • If this event recurs at medium irradiation, check the PV plant design and correct the connection of the PV array.
6001 - 6438	**Self diagnosis** **Interference device**	Internal device fault. The inverter interrupts the feed-in operation. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
6501 - 6502	**Self diagnosis** **Overtemperature**	The inverter interrupts the feed-in operation due to an excessive internal temperature. **Corrective measures:** • Ensure sufficient ventilation. • Check heat dissipation, as described in section 9.2 "Checking Heat Dissipation" (page 71).
6603 - 6604	**Self diagnosis** **Overload**	The inverter has detected an internal overload and interrupts the feed-in operation. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).

Event no.	Message	Cause and Correction
6701 - 6702	**Comm. disturbed**	A fault has occurred in the internal communication of the inverter. The inverter continues feeding power into the grid. **Corrective measures:** If this event occurs frequently: • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
6801 - 6802	**Self diagnosis** **Input A defective**	Inverter input A is defective. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
6901 - 6902	**Self diagnosis** **Input B defective**	Inverter input B is defective. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7001 - 7002	**Sensor fault**	A temperature sensor in the inverter is faulty. The inverter interrupts the feed-in operation. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7008	**Disturbance sensor display temperature**	The ambient temperature sensor is faulty. The display is not switched off at temperatures under –25°C and as a result may have been destroyed. The inverter continues feeding power into the grid. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7101	**SD card defective**	The SD card is not formatted correctly or is defective. The update failed. The inverter continues feeding power into the grid. **Corrective measures:** • Reformat the SD card. • Re-save the files to the SD card.
7102	**Parameter file not found or defective**	The parameter file was not found or is defective. The update failed. The inverter continues feeding power into the grid. **Corrective measures:** • Copy the parameter file into the card drive:\PARASET directory.

Event no.	Message	Cause and Correction
7105	**Param. setting failed**	Parameters cannot be set via the SD card. The inverter continues feeding power into the grid. **Corrective measures:** • Check the parameters for valid values. • Ensure change rights via SMA Grid Guard code.
7106	**Update file defect.**	The update file is defective. The update failed. The inverter continues feeding power into the grid. **Corrective measures:** • Reformat the SD card. • Re-save the files to the SD card.
7110	**No update file found**	No new update file was found on the SD card. The update failed. The inverter continues feeding power into the grid. **Corrective measures:** • Copy the update file into the SD card drive:\UPDATE directory.
7201 - 7202	**Data stor. not poss.**	Internal device fault, the inverter continues feeding power into the grid. **Corrective measures:** • If this fault occurs often, contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7303	**Update main CPU failed**	Internal device fault. The inverter continues feeding power into the grid. In very rare cases, the firmware is damaged and the inverter interrupts the feed-in. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7305	**Update RS485I module failed**	Internal device fault, the inverter continues feeding power into the grid. **Corrective measures:** • Retry update. • If this fault occurs again, contact the SMA Serviceline (see section 15 "Contact" (page 110)).
7307	**Update BT failed**	
7311	**Update language table failed**	
7401	**Varistor defective**	At least one of the thermally monitored varistors is defective. The inverter is no longer protected against overvoltage. The inverter continues feeding power into the grid. **Corrective measures:** • Check the varistors as described in section 11.6 "Checking the Function of the Varistors" (page 89).

Event no.	Message	Cause and Correction
7508	**External fan fault** **Replace fan**	The fan is contaminated or defective. The inverter may reduce its output due to overheating. The inverter continues feeding power into the grid. **Corrective measures:** • Clean the fans. • Replace the fans.
7701 - 7703	**Self diagnosis** **Interference device**	Internal device fault. The inverter disconnects itself from the power distribution grid. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
8001	**Derating occurred**	The power supplied by the inverter was reduced to below the nominal power due to high temperature for more than 10 minutes. **Corrective measures:** If this event occurs frequently: • Ensure sufficient ventilation. • Check heat dissipation (see section 9.2 "Checking Heat Dissipation" (page 71)).
8101 - 8104	**Comm. disturbed**	A fault has occurred in the internal communication of the inverter. The inverter continues feeding power into the grid. **Corrective measures:** • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
8801 - 8803	**No display**	The display shows nothing. The inverter continues feeding power into the grid. This error can have the following causes: • The ambient temperature is so low that the display disconnects to protect itself. • The inverter cannot identify the display type. • No display is connected or the connection is defective. **Corrective measures:** • Wait until the temperature is above –25°C. • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).

Event no.	Message	Cause and Correction
9002	**Inst. code invalid**	The SMA Grid Guard code entered (personal installer password) is not valid. **Corrective measures:** • Enter a valid SMA Grid Guard code.
9003	**Grid param. locked**	The current country data set is locked. **Corrective measures:** • Enter a valid SMA Grid Guard code for changing the country data set.
9005	**Changing grid param. not possible** **Ensure DC supply**	This error can have the following causes: • The selected rotary switch setting for the country configuration is not programmed. • The parameters to be changed are protected. • DC voltage at the DC input is not sufficient to run the main CPU. **Corrective measures:** • Check the rotary switch setting (see section 6.5.1 "Checking the Country Standard" (page 48)). • Enter the SMA Grid Guard code. • Ensure sufficient DC voltage is available (green LED lights up or flashes).

11.4 DC Current after AC-side Disconnection

In spite of the AC side having been disconnected, a current is still detectable in the DC cables with a clamp meter. This is not an error but normal behavior of the inverter when in operation.

- Always disconnect the inverter on both AC and DC sides (see section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66)).

11.5 Checking the PV Array for Ground Faults

If the red LED is glowing and the inverter displays event number "3501", "3601" or "3701", then there is probably a ground fault in the PV array.

Check the strings for ground faults as described below:

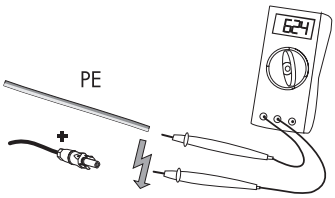
1. Disconnect the inverter from voltage sources and open the inverter as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).

Notice!

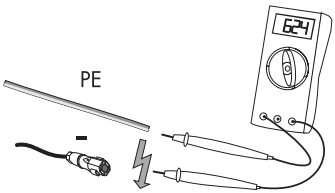
Excessive voltages can destroy the measuring device.

- Only use measuring devices with a DC input voltage range up to at least 1 000 V.

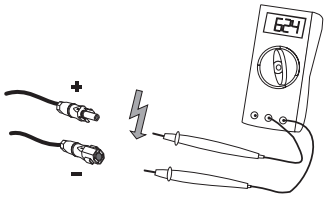
2. Measure the voltages between the positive pole of each string and the ground potential (PE).



3. Measure the voltages between the negative pole of each string and the ground potential (PE).



4. Measure the voltages between the positive and negative poles of each string.



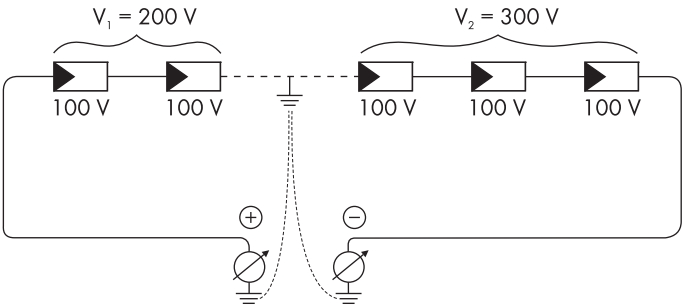
☑ A ground fault exists if the measured voltages are stable and the sum of the voltages from the positive pole to the ground potential and from the negative pole to the ground potential of a string is approximately equal to the voltage between the positive and negative poles.

Result	Measure
☑ You **have** found a ground fault.	• The installer of the PV array must remedy the ground fault in the affected string before you may reconnect the string to the inverter. The illustration below shows the location of the ground fault. • Do not reconnect the defective string. • Recommission the inverter as described in section 7.1 "Commissioning the Inverter" (page 58).
☑ You have **not** found a ground fault.	At least one of the thermally monitored varistors is probably defective. • Check the function of the varistors as described in section 11.6 "Checking the Function of the Varistors" (page 89).

Location of the ground fault

The approximate position of the ground fault can be determined from the ratio of the measured voltages between the positive pole against ground potential (PE) and the negative pole against ground potential (PE).

Example:



In this case, the ground fault is between the second and third PV modules.

☑ The ground fault check is finished.

11.6 Checking the Function of the Varistors

If the inverter displays the event number "7401", then one of the varistors is probably defective.

Varistors are wear parts. Their functional efficiency diminishes with age or following repeated responses as a result of overvoltages. It is therefore possible that one of the thermally monitored varistors has lost its protective function.

NOTICE!

Destruction of the inverter due to overvoltage

If varistors are missing or defective, the inverter is no longer protected against overvoltages.

- Do not operate the inverter without varistors in PV plants with a high risk of overvoltages.
- Functional replacement varistors should be obtained as soon as possible.

Check the varistors as described below:

1. Disconnect the inverter from voltage sources and open the inverter as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).

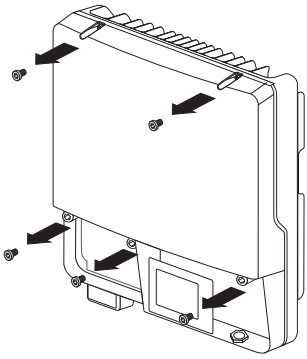
DANGER!

Danger to life due to high voltages in the inverter

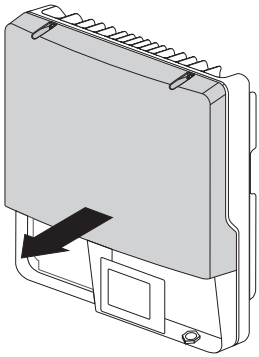
The capacitors in the inverter may be charged with very high voltages.

- Wait 5 minutes before opening the enclosure cover, in order to allow time for the capacitors to discharge.

2. Undo the screws of the top enclosure lid. Use an Allen key (wrench size 4) for this.



3. Pull the upper enclosure lid forward to remove it.



NOTICE!

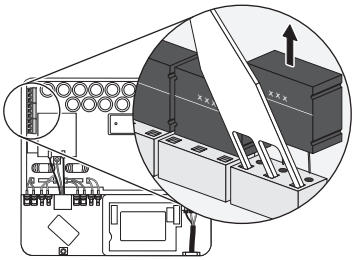
Electrostatic discharges can damage the inverter.

Component parts on the inside of the inverter may be irreparably damaged due to electrostatic discharge.

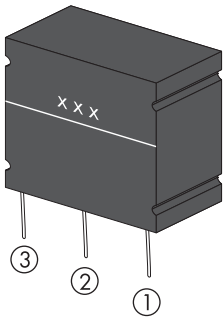
- Ground yourself before touching any component parts.

4. Remove all varistors.

   If you do not receive an insertion tool for operating the terminals with your replacement varistors, contact SMA Solar Technology AG.



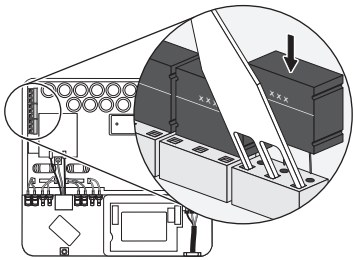
5. Use a multimeter to check each varistor to see if there is a conductive connection between terminals 2 and 3.



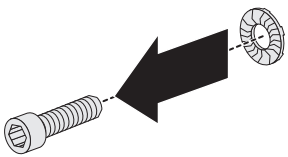
Result	Measure
☑ There is a **conducting** connection.	The varistor is functional. There is a different error in the inverter. • Contact the SMA Serviceline (see section 15 "Contact" (page 110)).
☑ There is **no conducting** connection.	The respective varistor is defective and must be replaced. Varistor failure is generally due to influences that affect all varistors similarly (temperature, age, induced overvoltage). SMA Solar Technology AG recommends replacing all varistors. The varistors are specially manufactured for use in the inverter and are not commercially available. You must order replacement varistors directly from SMA Solar Technology AG (see section 14 "Accessories" (page 109)). Only use original varistors only that are sold by SMA Solar Technology AG. • For the replacement of the varistors, proceed to step 6.

6. Insert an insertion tool into the openings of the terminal contacts.
7. Insert new varistors downwards into the slots from above (as shown in the adjacent drawing).

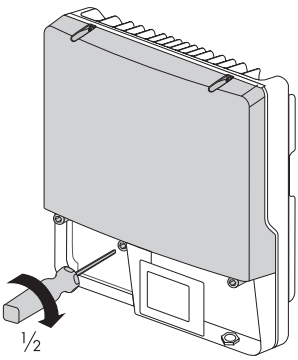
   Here, the labeling must point to the left, i.e. towards the insertion tool.



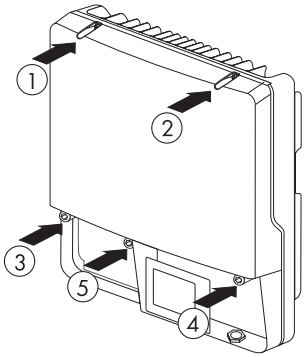
8. Close and ground the inverter:
   - Attach one conical spring washer on each screw. Here, the grooved side of the conical spring washer must point to the screw head.



   - Attach the top enclosure lid on the enclosure and tighten the center lower screw halfway. Use an Allen key (wrench size 4) for this.



   - Secure the top enclosure lid in the sequence 1 to 5 (torque: 6 Nm). Use an Allen key (wrench size 4) for this.



   ☑ The teeth of the conical spring washer are pushed into the top enclosure lid. This grounds the top enclosure lid.

9. Close the bottom enclosure lid and recommission the inverter as described in section 8.3 "Closing the Inverter" (page 69).

12 Decommissioning

12.1 Disassembling the Inverter

1. Disconnect the inverter from voltage sources and open the inverter as described in section 8.2 "Disconnecting the Inverter from Voltage Sources" (page 66).
2. Remove all communication cables from the inverter.

CAUTION!

Danger of burn injuries due to hot enclosure parts.

- Wait 30 minutes for the enclosure to cool down before disassembling.

3. If necessary, disconnect the theft protection.
4. Remove the inverter from the wall mounting bracket from above.

12.2 Replacing the Enclosure Lid

In the event of a fault, your inverter may need replacing. If this is the case, you will receive a replacement device fitted with a top and lower transport lid.

Prior to returning your inverter to SMA Solar Technology AG, you must replace the upper and lower enclosure lids of your inverter with the corresponding transport lids:

1. Disassemble the inverter as described in section 12.1 "Disassembling the Inverter" (page 93).

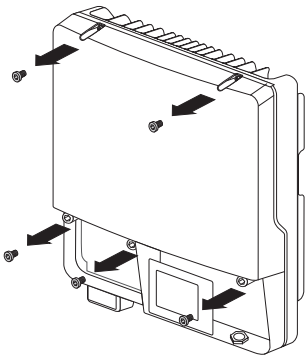
DANGER!

Danger to life due to high voltages in the inverter

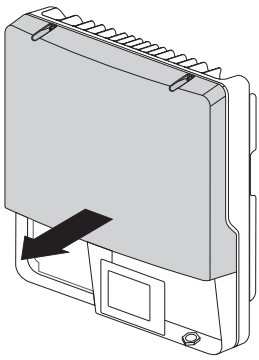
The capacitors in the inverter may be charged with very high voltages.

- Wait 5 minutes before opening the enclosure cover, in order to allow time for the capacitors to discharge.

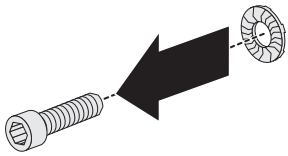
2. Undo the screws of the top enclosure lid. Use an Allen key (wrench size 4) for this.



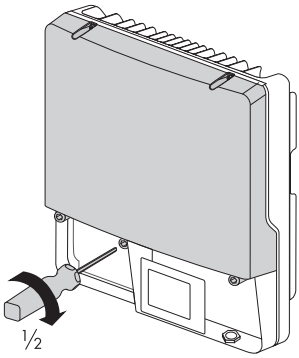
3. Pull the top enclosure lid forward to remove it.



4. Remove the transport lid from the replacement device in the same manner.
5. Close and ground the replacement device:
   - Attach one conical spring washer on each screw. Here, the grooved side of the conical spring washer must point to the screw head.

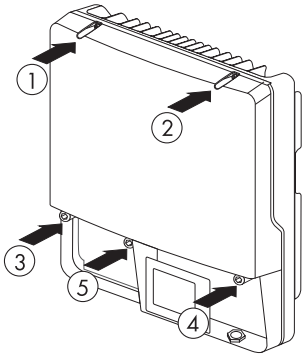


– Attach the top enclosure lid on the enclosure and tighten the center lower screw halfway. Use an Allen key (wrench size 4) for this.



– Secure the top enclosure lid in the sequence 1 to 5 (torque: 6 Nm). Use an Allen key (wrench size 4) for this.

☑ The teeth of the conical spring washer are pushed into the top enclosure lid. This grounds the top enclosure lid.



6. Mount the replacement device (see section 5 "Mounting" (page 24)).
7. Connect the replacement device (see section 6 "Electrical Connection" (page 29)).
8. Commission the replacement device (see section 7 "Commissioning" (page 58)).
9. Now mount the two transport lids of the replacement device onto the defective inverter.

   ☑ You can now send the defective inverter back to SMA Solar Technology AG.

12.3 Packing the Inverter

- If available, use the original packaging of the inverter.
- If the original packaging is not available, use a cardboard box suitable for the weight and size of the inverter.

12.4 Storing the Inverter

Store the inverter in a dry place where ambient temperatures are always between –25°C and +60°C.

12.5 Disposing of the Inverter

Dispose of the inverter at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation location at that time. Alternatively, send it back to SMA Solar Technology AG with shipping paid by sender, and labeled "ZUR ENTSORGUNG" ("for disposal") (for contact, see Page 110).

13 Technical Data

13.1 Sunny Boy 3000TL

DC Input

Maximum DC power at cos φ = 1	3 200 W
Maximum input voltage*	750 V
MPP voltage range	175 V ... 500 V
Rated input voltage	400 V
Minimum input voltage	125 V
Start input voltage	150 V
Maximum input current	2 x 15 A
Maximum input current per string	15 A
Number of independent MPP inputs	2
Strings per MPP input	2

* The maximum open-circuit voltage that can occur with –10°C cell temperature may not exceed the maximum input voltage.

AC output

Rated output power at 230 V, 50 Hz	3 000 W
Maximum apparent AC power	3 000 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range*	180 V ... 280 V
Nominal AC current at 220 V	13.6 A
Nominal AC current at 230 V	13.0 A
Nominal AC current at 240 V	12.5 A
Maximum output current	16 A
Total harmonic distortion of output current at AC THD voltage < 2%, AC power > 0.5 nominal AC power	≤ 4%
Rated power frequency	50 Hz
AC power frequency*	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45 Hz ... 55 Hz
Operating range at AC power frequency 60 Hz	55 Hz ... 65 Hz
Displacement power factor, adjustable	$0.8_{overexcited}$ ... $0.8_{underexcited}$

Feed-in phases	1
Connection phases	1
Overvoltage category as per IEC 60644-1	III

* Depending on country configuration

Protective devices

DC reverse-polarity protection	Short-circuit diode
Input-side disconnection device	Electronic Solar Switch
DC overvoltage protection	thermally monitored varistors
AC short-circuit current capability	Current control
Grid Monitoring	SMA Grid Guard 3
Maximum permissible fuse protections	25 A
Ground fault monitoring	Insulation monitoring R_{iso} > 625 k Ω
All-pole sensitive residual current monitoring unit	Available

General Data

Width x height x depth with Electronic Solar Switch	490 mm x 519 mm x 185 mm
Weight	26 kg
Length x width x height of packaging	597 mm x 617 mm x 266 mm
Transport weight	30 kg
Climatic category according to IEC 60721-2-1	4K4H
Operating temperature range	– 25°C ... +60°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above MSL	2 000 m
Noise emission (typical)	≤ 25 dB(A)
Power loss in night operation	< 1 W
Topology	Transformerless
Cooling concept	Convection
Electronics degree of protection according to IEC 60529	IP65
Connection area degree of protection according to IEC 60529	IP54
Protection class according to IEC 62103	I

Country standards, as of 09/2011*	VDE 0126-1-1 C10/C11 PPDS UTE C15-712-1 PPC EN 50438 RD 1663/2000 RD 661/2007 G83/1-1 G 59/2 VDE-AR-N 4105

* C10/11 (05/2009): Only possible when the phase voltage is 230 V.
EN 50438: Does not apply to all country standard deviations of EN 50438.
RD 1663/2000 and RD 661/2007: Contact the SMA Serviceline for restrictions in specific regions.

Climatic conditions in accordance with IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	– 25°C ... +60°C
Extended humidity range	0% ... 100%
Extended air pressure range	79.5 kPa ... 106 kPa

Climatic conditions in accordance with IEC 60721-3-4, transport type E, class 2K3

Temperature range	– 25°C ... +70°C

Features

DC terminal	SUNCLIX DC connector
AC connection	Spring terminal
Display	LC graphic display
Bluetooth	As standard
RS485, galvanically isolated	Optional
Multi-function relay	As standard

Electronic Solar Switch

Electrical service life in the event of a short circuit, with a nominal current of 35 A	Min. 50 switching processes
Maximum switching current	35 A
Maximum switching voltage	800 V
Maximum PV power	12 kW
Degree of protection when plugged in	IP65
Degree of protection when unplugged	IP21

Torque

Upper enclosure lid screws	6.0 Nm
Lower enclosure lid screws	2.0 Nm
Additional ground terminal	6.0 Nm
SUNCLIX lock nut	2.0 Nm
RS485 interface fastening screw	1.5 Nm
Multi-function relay fastening screw	1.5 Nm

Grid forms

TN-C	Suitable
TN-S	Suitable
TN-C-S	Suitable
TT, if U_{N_PE} < 15 V	Suitable

Data storage capacity

Daily energy yield	63 days
Daily yields	30 years
Event messages for users	250 events
Event messages for installers	250 events

Efficiency

Maximum efficiency, η_{max}	97.0%
European weighted efficiency, η_{EU}	96.0%

13.2 Sunny Boy 4000TL

DC Input

Maximum DC power at cos φ = 1	4 200 W
Maximum input voltage*	750 V
MPP voltage range	175 V ... 500 V
Rated input voltage	400 V
Minimum input voltage	125 V
Start input voltage	150 V
Maximum input current	2 x 15 A
Maximum input current per string	15 A
Number of independent MPP inputs	2
Strings per MPP input	2

* The maximum open-circuit voltage that can occur with –10°C cell temperature may not exceed the maximum input voltage.

AC output

Rated output power at 230 V, 50 Hz	4 000 W
Maximum apparent AC power	4 000 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range*	180 V ... 280 V
Nominal AC current at 220 V	18.2 A
Nominal AC current at 230 V	17.4 A
Nominal AC current at 240 V	16.7 A
Maximum output current	22 A
Total harmonic distortion of output current at AC THD voltage < 2%, AC power > 0.5 nominal AC power	≤ 4%
Rated power frequency	50 Hz
AC power frequency*	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45 Hz ... 55 Hz
Operating range at AC power frequency 60 Hz	55 Hz ... 65 Hz
Displacement power factor, adjustable	$0.8_{overexcited}$ ... $0.8_{underexcited}$
Feed-in phases	1
Connection phases	1
Overvoltage category as per IEC 60644-1	III

* Depending on country configuration

Protective devices

DC reverse-polarity protection	Short-circuit diode
Input-side disconnection device	Electronic Solar Switch
DC overvoltage protection	thermally monitored varistors
AC short-circuit current capability	Current control
Grid Monitoring	SMA Grid Guard 3
Maximum permissible fuse protections	32 A
Ground fault monitoring	Insulation monitoring R_{iso} > 500 k Ω
All-pole sensitive residual current monitoring unit	Available

General Data

Width x height x depth with Electronic Solar Switch	490 mm x 519 mm x 185 mm
Weight	26 kg
Length x width x height of packaging	597 mm x 617 mm x 266 mm
Transport weight	30 kg
Climatic category according to IEC 60721-2-1	4K4H
Operating temperature range	– 25°C ... +60°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above MSL	2 000 m
Noise emission (typical)	≤ 29 dB(A)
Power loss in night operation	< 1 W
Topology	Transformerless
Cooling concept	Convection
Electronics degree of protection according to IEC 60529	IP65
Connection area degree of protection according to IEC 60529	IP54
Protection class according to IEC 62103	I

Country standards, as of 09/2011*	VDE 0126-1-1 C10/C11 PPDS UTE C15-712-1 PPC EN 50438 RD 1663/2000 RD 661/2007 IEC 61727 (PEA) G 59/2 VDE-AR-N 4105

* C10/11 (05/2009): Only possible when the phase voltage is 230 V.
EN 50438: Does not apply to all country standard deviations of EN 50438.
RD 1663/2000 and RD 661/2007: Contact the SMA Serviceline for restrictions in specific regions.

Climatic conditions in accordance with IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	– 25°C ... +60°C
Extended humidity range	0% ... 100%
Extended air pressure range	79.5 kPa ... 106 kPa

Climatic conditions in accordance with IEC 60721-3-4, transport type E, class 2K3

Temperature range	– 25°C ... +70°C

Features

DC terminal	SUNCLIX DC connector
AC connection	Spring terminal
Display	LC graphic display
Bluetooth	As standard
RS485, galvanically isolated	Optional
Multi-function relay	As standard

Electronic Solar Switch

Electrical service life in the event of a short circuit, with a nominal current of 35 A	Min. 50 switching processes
Maximum switching current	35 A
Maximum switching voltage	800 V
Maximum PV power	12 kW
Degree of protection when plugged in	IP65
Degree of protection when unplugged	IP21

Torque

Upper enclosure lid screws	6.0 Nm
Lower enclosure lid screws	2.0 Nm
Additional ground terminal	6.0 Nm
SUNCLIX lock nut	2.0 Nm
RS485 interface fastening screw	1.5 Nm
Multi-function relay fastening screw	1.5 Nm

Grid forms

TN-C	Suitable
TN-S	Suitable
TN-C-S	Suitable
TT, if U_{N_PE} < 15 V	Suitable

Data storage capacity

Daily energy yield	63 days
Daily yields	30 years
Event messages for users	250 events
Event messages for installers	250 events

Efficiency

Maximum efficiency, η_{max}	97.0%
European weighted efficiency, η_{EU}	96.4%

13.3 Sunny Boy 5000TL

DC Input

Maximum DC power at cos φ = 1	5 200 W
Maximum input voltage*	750 V
MPP voltage range	175 V ... 500 V
Rated input voltage	400 V
Minimum input voltage	125 V
Start input voltage	150 V
Maximum input current	2 x 15 A
Maximum input current per string	15 A
Number of independent MPP inputs	2
Strings per MPP input	2

* The maximum open circuit voltage, that can occur with –10°C cell temperature may not exceed the maximum input voltage.

AC output

Rated output power at 230 V, 50 Hz	4 600 W
Maximum AC apparent power*	5 000 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range**	180 V ... 280 V
Nominal AC current at 220 V	20.9 A
Nominal AC current at 230 V	20.0 A
Nominal AC current at 240 V	19.2 A
Maximum output current	22 A
Total harmonic distortion of output current at AC THD voltage < 2%, AC power > 0.5 nominal AC power	≤ 4%
Rated power frequency	50 Hz
AC power frequency**	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45 Hz ... 55 Hz
Operating range at AC power frequency 60 Hz	55 Hz ... 65 Hz
Displacement power factor, adjustable	$0.8_{overexcited}$ ... $0.8_{underexcited}$
Feed-in phases	1
Connection phases	1
Overvoltage category as per IEC 60644-1	III

** for country configuration VDE-AR-N-4105: 4 600 VA
** depending on country configuration

Protective devices

DC reverse-polarity protection	Short-circuit diode
Input-side disconnection device	Electronic Solar Switch
DC overvoltage protection	thermally monitored varistors
AC short-circuit current capability	Current control
Grid Monitoring	SMA Grid Guard 3
Maximum permissible fuse protections	32 A
Ground fault monitoring	Insulation monitoring: R_{iso} > 400 k Ω
All-pole sensitive residual current monitoring unit	Available

General Data

Width x height x depth with Electronic Solar Switch	490 mm x 519 mm x 185 mm
Weight	26 kg
Length x width x height of packaging	597 mm x 617 mm x 266 mm
Transport weight	30 kg
Climatic category according to IEC 60721-2-1	4K4H
Operating temperature range	– 25°C ... +60°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above MSL	2 000 m
Noise emission (typical)	≤ 29 dB(A)
Power loss in night operation	< 1 W
Topology	Transformerless
Cooling concept	Convection
Electronics degree of protection according to IEC 60529	IP65
Connection area degree of protection according to IEC 60529	IP54
Protection class according to IEC 62103	I

Country standards, as of 09/2011*	VDE 0126-1-1 C10/C11 PPDS UTE C15-712-1 PPC EN 50438 RD 1663/2000 RD 661/2007 IEC 61727 (PEA) G 59/2 VDE-AR-N 4105

* C10/11 (05/2009): Only possible when the phase voltage is 230 V.
EN 50438: Does not apply to all country standard deviations of EN 50438.
RD 1663/2000 and RD 661/2007: Contact the SMA Serviceline for restrictions in specific regions.

Climatic conditions in accordance with IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	– 25°C ... +60°C
Extended humidity range	0% ... 100%
Extended air pressure range	79.5 kPa ... 106 kPa

Climatic conditions in accordance with IEC 60721-3-4, transport type E, class 2K3

Temperature range	– 25°C ... +70°C

Features

DC terminal	SUNCLIX DC connector
AC connection	Spring terminal
Display	LC graphic display
Bluetooth	As standard
RS485, galvanically isolated	Optional
Multi-function relay	As standard

Electronic Solar Switch

Electrical service life in the event of a short circuit, with a nominal current of 35 A	Min. 50 switching processes
Maximum switching current	35 A
Maximum switching voltage	800 V
Maximum PV power	12 kW
Degree of protection when plugged	IP65
Degree of protection when unplugged	IP21

Torque

Upper enclosure lid screws	6.0 Nm
Lower enclosure lid screws	2.0 Nm
Additional ground terminal	6.0 Nm
SUNCLIX lock nut	2.0 Nm
RS485 interface fastening screw	1.5 Nm
Multi-function relay fastening screw	1.5 Nm

Grid forms

TN-C	Suitable
TN-S	Suitable
TN-C-S	Suitable
TT, if U_{N_PE} < 15 V	Suitable

Data storage capacity

Daily energy yield	63 days
Daily yields	30 years
Event messages for users	250 events
Event messages for installers	250 events

Efficiency

Maximum efficiency, η_{max}	97.0%
European weighted efficiency, η_{EU}	96.5%

14 Accessories

You will find the corresponding accessories and replacement parts for your product in the following overview. If required, you can order these at SMA Solar Technology AG or your retailer.

Designation	Brief Description	SMA order number
Replacement varistors	Set of thermally monitored varistors	MSWR-TV9
Electronic Solar Switch	ESS handle spare part	Order the new ESS handle through the SMA Serviceline (see section 15 "Contact" (page 110)).
RS485 upgrade kit	RS485 interface	DM-485CB-10
SUNCLIX DC plug connector	Field plug for conductor cross-sections of 2.5 mm² ... 6 mm²	SUNCLIX-FC6-SET
Additional fan kit	Fan for installing in the inverter	FANKIT01-10

15 Contact

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

- Inverter type
- Inverter serial number
- Type and number of the PV modules connected
- Event number and display message on the inverter
- Optional equipment (e.g. communication products)
- Type of external wiring of the multi-function relay

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Exclusion of liability

The general terms and conditions of delivery of SMA Solar Technology AG shall apply.

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Guarantee or liability claims for damages of any kind are excluded if they are caused by one or more of the following:

- Damages during transportation
- Improper or inappropriate use of the product
- Operating the product in an unintended environment
- Operating the product whilst ignoring relevant, statutory safety regulations in the deployment location
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
- In case of unforeseen calamity or force majeure

The use of supplied software produced by SMA Solar Technology AG is subject to the following conditions:

- SMA Solar Technology AG rejects any liability for direct or indirect damages arising from the use of software developed by SMA Solar Technology AG. This also applies to the provision or non-provision of support activities.
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SMA Factory Warranty

The current guarantee conditions come enclosed with your device. These are also available online at www.SMA.de and can be downloaded or are available on paper from the usual sales channels if required.

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