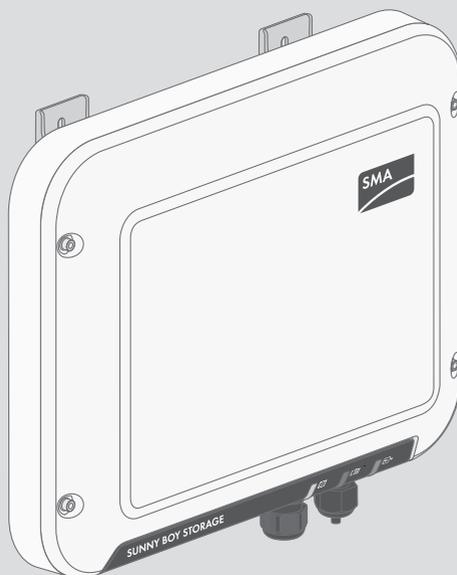


Operating manual
SUNNY BOY STORAGE 2.5



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SMA Warranty

You can download the current warranty conditions from the Internet at www.SMA-Solar.com.

Software licenses

The licenses for the installed software modules (open source) can be found in the user interface of the product.

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SMA Solar Technology AG

Sonnenallee 1

34266 Niestetal

Germany

Tel. +49 561 9522-0

Fax +49 561 9522-100

www.SMA.de

Email: info@SMA.de

As of: 9/21/2020

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1 Information on this Document

1.1 Validity

This document is valid for:

- SBS2.5-1VL-10 (Sunny Boy Storage 2.5) from firmware version 03.00.00.R

1.2 Target Group

This document is intended for qualified persons and end users. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by end users. Qualified persons must have the following skills:

- Knowledge of how batteries work and are operated
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices, batteries and installations
- Knowledge of all applicable laws, standards and directives
- Knowledge of and compliance with this document and all safety information
- Knowledge of and compliance with the documents of the battery manufacturer with all safety information

1.3 Content and Structure of this Document

This document describes the mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning of the product as well as the operation of the product user interface.

You will find the latest version of this document and further information on the product in PDF format at www.SMA-Solar.com.

Illustrations in this document are reduced to the essential information and may deviate from the real product.

1.4 Levels of Warning Messages

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

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, can result in property damage.

1.5 Symbols in the Document

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
<input type="checkbox"/>	Indicates a requirement for meeting a specific goal
<input checked="" type="checkbox"/>	Desired result
	A problem that might occur
	Example
	Sections describing activities to be performed by qualified persons only

1.6 Typographical Elements in the Document

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

1.7 Designations in the Document

Complete designation	Designation in this document
Sunny Boy Storage	Inverter, product

1.8 Additional Information

For more information, please go to www.SMA-Solar.com.

Title and information content	Type of information
"Approved batteries and battery communication connection" Overview of approved batteries	Technical Information
"Application for SMA Grid Guard Code"	Form
"SMA GRID GUARD 10.0 - Grid management services through SMA Inverter"	Technical Information
"Efficiency and Derating" Efficiency and derating behavior of the SMA inverters	Technical Information
"Parameters and Measured Values" Overview of all inverter operating parameters and their configuration options	Technical Information
"SMA and SunSpec Modbus® Interface" Information on the Modbus interface	Technical Information
"Modbus® parameters and measured values" Device-specific register HTML file	Technical Information
"SMA SPEEDWIRE FIELDBUS"	Technical information

2 Safety

2.1 Intended Use

The Sunny Boy Storage is a single-phase, AC coupled battery inverter for parallel grid operation. The Sunny Boy Storage converts the direct current supplied by a battery into grid-compliant alternating current. With a battery and an energy meter, the Sunny Boy Storage becomes a system for increased self-consumption.

The product is not intended for use in environments with ambient conditions of class 4S2 according to IEC 60721-3-4 (e.g. sand or desert environments).

The product is suitable for indoor and outdoor use.

The product must only be operated in connection with an intrinsically safe lithium-ion battery approved by SMA Solar Technology AG. An updated list of batteries approved by SMA Solar Technology AG is available at www.SMA-Solar.com.

The battery must comply with the locally applicable standards and directives and must be intrinsically safe (see technical information "SMA Flexible Storage System - Detailed explanations of the safety concept" for detailed explanations regarding the safety concept of battery inverters by SMA Solar Technology AG).

The communication interface of the battery used must be compatible with the product. The entire battery voltage range must be completely within the permissible input voltage range of the product. The maximum permissible DC input voltage of the product must not be exceeded.

The product is not suitable for supplying life-sustaining medical devices. A power outage must not lead to personal injury.

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

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

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

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

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

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

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

The type label must remain permanently attached to the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

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

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

DANGER

Danger to life due to electric shock when live components or DC cables are touched

The DC cables connected to a battery may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the product and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.
- Observe all safety information of the battery manufacturer.

DANGER

Danger to life due to electric shock when live components are touched on opening the product

High voltages are present in the live parts and cables inside the product during operation. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Do not open the product.

DANGER

Danger to life due to electric shock in case of overvoltages and if surge protection is missing

Overvoltages (e. g. in the event of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cables or other data cables if there is no surge protection. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.
- The Ethernet interface of the product is classified as "TNV-1" and offers protection against overvoltages of up to 1.5 kV.

⚠ WARNING**Danger to life due to fire or explosion**

In rare cases, an explosive gas mixture can be generated inside the product under fault conditions. In this state, switching operations can cause a fire inside the product or explosion. Death or lethal injuries due to hot or flying debris can result.

- In the event of a fault, do not perform any direct actions on the product.
- Ensure that unauthorized persons have no access to the product.
- Disconnect the battery from the product via an external disconnection device.
- Disconnect the AC circuit breaker, or keep it disconnected in case it has already tripped, and secure it against reconnection.
- Only perform work on the product (e.g., troubleshooting, repair work) when wearing personal protective equipment for handling of hazardous substances (e.g., safety gloves, eye and face protection, respiratory protection).

⚠ WARNING**Danger to life due to fire or explosion when batteries are fully discharged**

A fire may occur due to incorrect charging of fully discharged batteries. This can result in death or serious injury.

- Before commissioning the system, verify that the battery is not fully discharged.
- Do not commission the system if the battery is fully discharged.
- If the battery is fully discharged, contact the battery manufacturer for further proceedings.
- Only charge fully discharged batteries as instructed by the battery manufacturer.

⚠ WARNING**Risk of injury due to toxic substances, gases and dusts.**

In rare cases, damages to electronic components can result in the formation of toxic substances, gases or dusts inside the product. Touching toxic substances and inhaling toxic gases and dusts can cause skin irritation, burns or poisoning, trouble breathing and nausea.

- Only perform work on the product (e.g., troubleshooting, repair work) when wearing personal protective equipment for handling of hazardous substances (e.g., safety gloves, eye and face protection, respiratory protection).
- Ensure that unauthorized persons have no access to the product.

⚠ WARNING**Danger to life due to burns caused by electric arcs through short-circuit currents**

Short-circuit currents in the battery can cause heat build-up and electric arcs. Heat build-up and electric arcs may result in lethal injuries due to burns.

- Disconnect the battery from all voltages sources prior to performing any work on the battery.
- Observe all safety information of the battery manufacturer.

⚠ CAUTION**Risk of burns due to hot enclosure parts**

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

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

⚠ CAUTION**Risk of injury due to weight of product**

Injuries may result if the product is lifted incorrectly or dropped while being transported or mounted.

- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.

NOTICE**High costs due to inappropriate Internet tariff**

Depending on use, the data volume of the product transferred via the Internet may vary in size. The data volume depends, for example, on the number of devices in the system, the frequency of device updates, the frequency of data transfer to Sunny Portal or the use of FTP push. High costs for the Internet connection can be the result.

- SMA Solar Technology AG recommends using an Internet flat rate.

NOTICE**Damage to the product due to cleaning agents**

The use of cleaning agents may cause damage to the product and its components.

- Clean the product and all its components only with a cloth moistened with clear water.

i **Change to the names and units of grid parameters to comply with the grid-connection requirements in accordance with Regulation (EU) 2016/631 (valid from April 27, 2019)**

To comply with the EU grid-connection requirements (valid from April 27, 2019) the names and units of grid parameters were changed. This change is valid from firmware version $\geq 3.00.00.R$ if a country data set for fulfilling the EU grid-connection requirements (valid from 2019-04-27) is set. Names and units of grid parameters for inverters with firmware version $\leq 2.99.99.R$ are not affected by this change and remain valid. This also applies from firmware version $\geq 3.00.00.R$ if a country data set that is valid for countries outside the EU is set.

3 Scope of Delivery

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

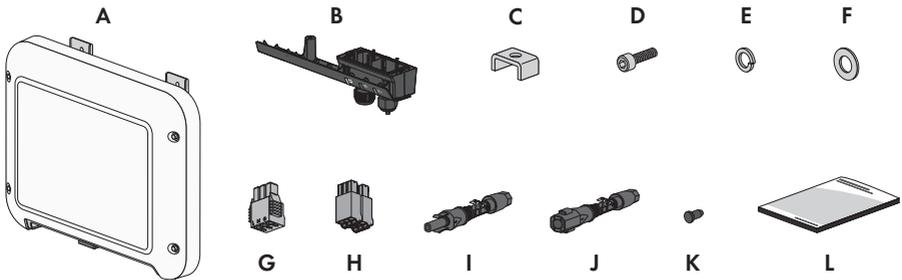


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Connection cap
C	1	Clamping bracket
D	1	Cylindrical screw M5 x 16
E	1	Spring lock washer
F	1	Washer M5
G	1	Terminal block for the AC connection
H	1	6-pole terminal block for the connection of a CAN communication cable
I	1	Positive DC connector
J	1	Negative DC connector
K	2	Sealing plug
L	1	Quick reference guide with password label on the rear side The label contains the following information: <ul style="list-style-type: none"> • PIC (Product Identification Code) identification key for registering the system in Sunny Portal • RID (Registration Identifier) registration ID for registering the system in Sunny Portal • WLAN password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the inverter via WLAN

4 Product Overview

4.1 Product Description

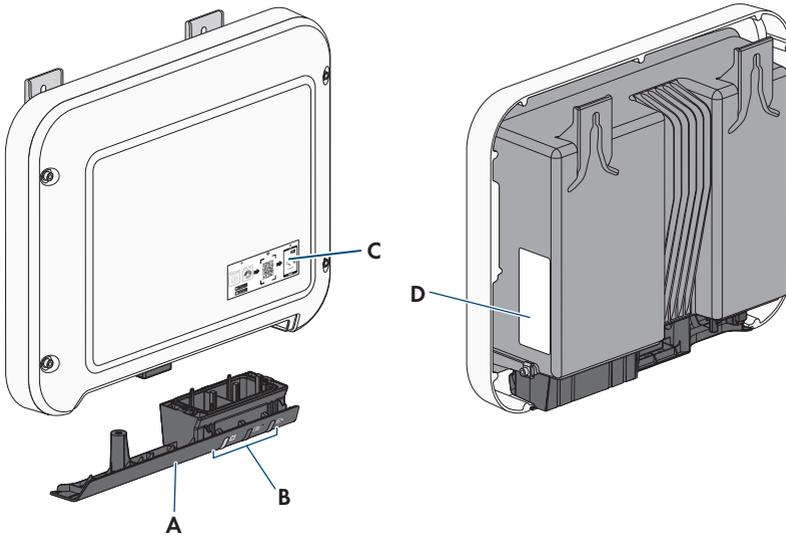


Figure 2: Design of the product

Position	Designation
A	Connection cap Connection area with cable glands for connection to the utility grid, the battery communication cable and a network cable
B	LEDs The LEDs indicate the operating state of the product.

Position	Designation
C	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via WLAN
D	<p>Type label</p> <p>The type label clearly identifies the product. The type label must remain permanently attached to the product. You will find the following information on the type label:</p> <ul style="list-style-type: none"> • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Identification key (PIC) for registration in Sunny Portal • Registration ID (RID) for registration in Sunny Portal • Wi-Fi password (WPA2-PSK) for the direct connection to the user interface of the product via Wi-Fi • Device-specific characteristics

4.2 Symbols on the Product

Symbol	Explanation
	<p>Beware of a danger zone</p> <p>This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.</p>
	<p>Beware of electrical voltage</p> <p>The product operates at high voltages.</p>
	<p>Beware of hot surface</p> <p>The product can get hot during operation.</p>
	<p>Danger to life due to high voltages in the inverter; observe a waiting time of 5 minutes</p> <p>High voltages that can cause lethal electric shocks are present in the live components of the inverter.</p> <p>Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document.</p>
	<p>Observe the documentation</p> <p>Observe all documentation supplied with the product.</p>

Symbol	Explanation
	Inverter Together with the green LED, this symbol indicates the operating state of the inverter.
	Observe the documentation Together with the red LED, this symbol indicates an error.
	Data transmission Together with the blue LED, this symbol indicates the status of the network connection.
	Grounding conductor This symbol indicates the position for connecting a grounding conductor.
	Alternating current
	Direct current
	The product has no galvanic isolation.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	The product is suitable for outdoor installation.
IP65	Degree of protection IP65 The product is protected against the penetration of dust and water that is directed as a jet against the enclosure from all directions.
	CE marking The product complies with the requirements of the applicable EU directives.
	RoHS labeling The product complies with the requirements of the applicable EU directives.

Symbol	Explanation
	<p>ICASA</p> <p>The product complies with the requirements of the South African standards for telecommunication.</p>
	<p>ANATEL</p> <p>The product complies with the requirements of the Brazilian standards for telecommunication.</p> <p>Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.</p>

4.3 Interfaces and Functions

The product is equipped with the following interfaces and functions:

User interface for configuration and monitoring

The product is equipped as standard with an integrated webserver, which provides a user interface for configuring and monitoring the product.

The product user interface can be called up via the web browser if there is an existing connection to an end device (e.g. computer, tablet PC or smartphone).

Smart Inverter Screen

The Smart Inverter Screen enables you to view the status display and to display the nominal energy throughput and state of charge of the battery on the user interface login page. You therefore have an overview of the most important inverter and battery data without having to log into the user interface.

The Smart Inverter Screen is deactivated by default. The Smart Inverter Screen can be activated via the user interface once the inverter has been commissioned.

SMA Speedwire

The product is equipped with SMA Speedwire as standard. SMA Speedwire is a type of communication based on the Ethernet standard. SMA Speedwire is designed for a data transfer rate of 100 Mbps and enables optimum communication between Speedwire devices within systems.

The products supports the encrypted system communication with SMA Speedwire Encrypted Communication. In order to be able to use the Speedwire encryption in the system, all Speedwire devices, except for the SMA Energy Meter, must support the function SMA Speedwire Encrypted Communication.

SMA Webconnect

The product is equipped with a Webconnect function as standard. The Webconnect function enables direct data transmission between the product and Internet portals Sunny Portal and Sunny Places without any additional communication device and for a maximum of 4 products per visualized system. In PV systems with more than 4 products, there is the option of establishing data

transmission between the products and Sunny Portal via the data logger (e.g., SMA Data Manager) or distributing the inverters over several systems. If there is an existing WLAN or Ethernet connection, you can directly access your visualized system via the web browser on your end device.

WLAN connection to SMA 360° app

The product has a QR code. By scanning the QR Code attached to the product via the SMA 360° app, access to the product is established via WLAN and the connection to the user interface is made automatically.

WLAN

The product is equipped with a WLAN interface as standard. The inverter is delivered with the WLAN interface activated as standard. If you do not want to use WLAN, you can deactivate the WLAN interface.

In addition, the product has a WPS function. The WPS function is for automatically connecting the product to a network (e.g. via router) and establish a direct connection between the product and an end device.



Limited function in the event of frost

The integrated WLAN interface of the product is only designed for temperatures down to -20°C.

- Deactivate the WLAN interface at low temperatures (see Section 8.6, page 60).

Modbus

The product is equipped with a Modbus interface. The Modbus interface is deactivated by default and must be configured as needed.

The Modbus interface of the supported SMA products is designed for industrial use – via SCADA systems, for example – and has the following tasks:

- Remote query of measured values
- Remote setting of operating parameters
- Setpoint specifications for system control

Grid management services

The product is equipped with service functions for grid management.

Depending on the requirements of the grid operator, you can activate and configure the functions (e.g. active power limitation) via operating parameters.

All-pole sensitive residual-current monitoring unit

The all-pole sensitive residual-current monitoring unit detects alternating and direct differential currents. In single-phase and three-phase inverters, the integrated differential current sensor detects the current difference between the neutral conductor and the line conductor(s). If the current difference increases suddenly, the inverter disconnects from the utility grid.

4.4 LED Signals

The LEDs indicate the operating state of the product.

LED signal	Explanation
The green LED is flashing (two seconds on and two seconds off)	Waiting for feed-in conditions The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation.
The green LED flashes quickly	Update of central processing unit The central processing unit of the inverter is being updated.
The green LED is glowing	Parallel grid operation
The green LED is off	The inverter is not feeding into the utility grid.
The red LED is glowing	Event occurred If an event occurs, a distinct event message and the corresponding event number will be displayed in addition on the product user interface or in the communication product (e.g. SMA Data Manager).
The blue LED flashes slowly for approx. 1 minute	Communication connection is being established The product is establishing a connection to a local network or is establishing a direct connection to an end device via Ethernet (e.g. computer, tablet PC or smartphone).
The blue LED flashes quickly for approx. two minutes (0.25 s on and 0.25 s off).	WPS active The WPS function is active.
The blue LED is glowing	Communication active There is an active connection with a local network or there is a direct connection with an end device via Ethernet (e.g. computer, tablet PC or smartphone).

4.5 System Overview

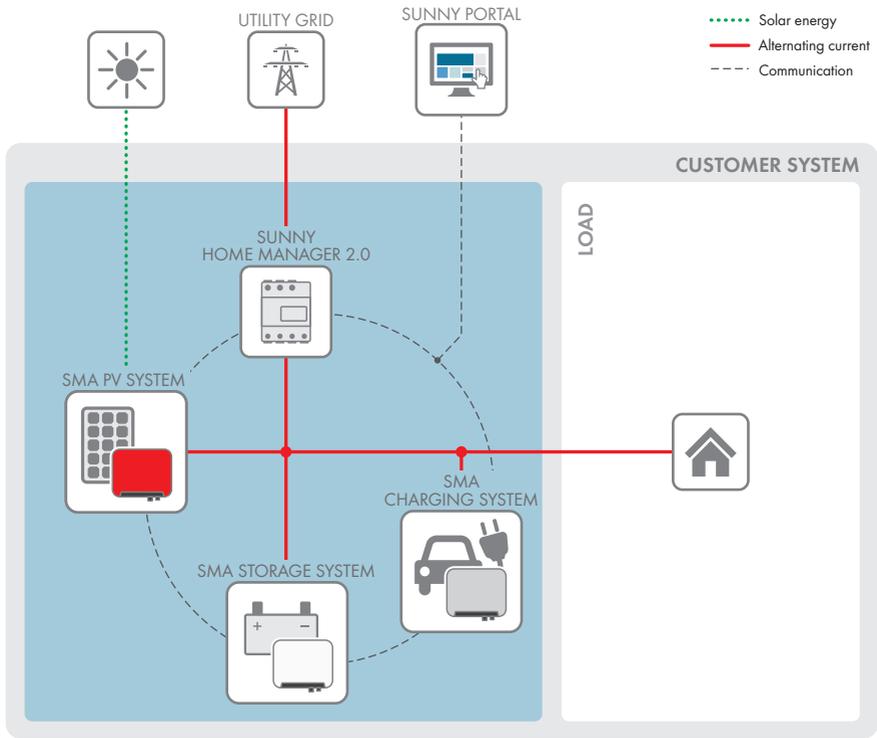


Figure 3: Design of the system

4.5.1 Circuitry Overview

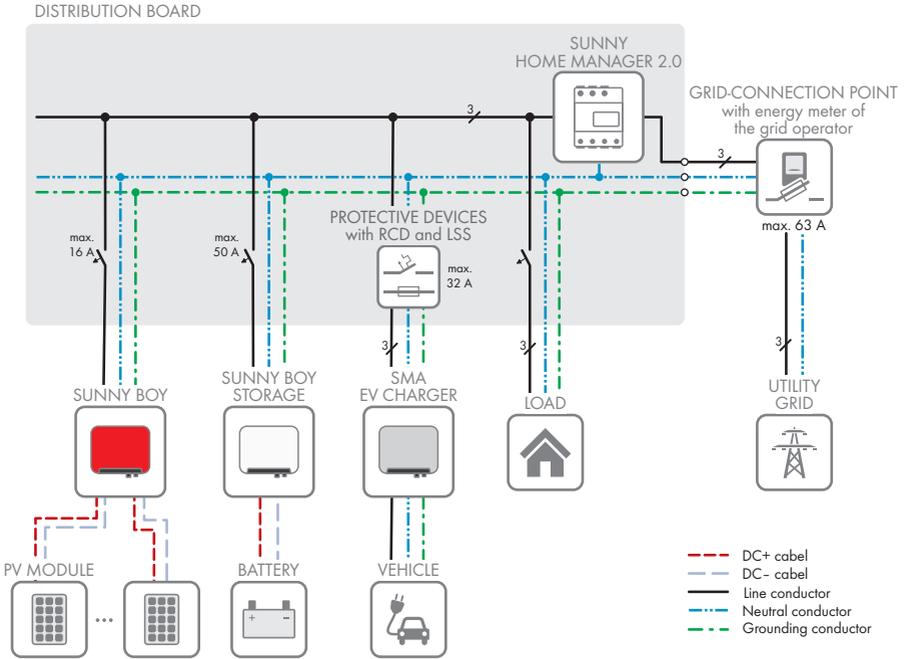


Figure 4: Circuitry overview (example with EVC22-3AC-10)

4.5.2 Communication Overview

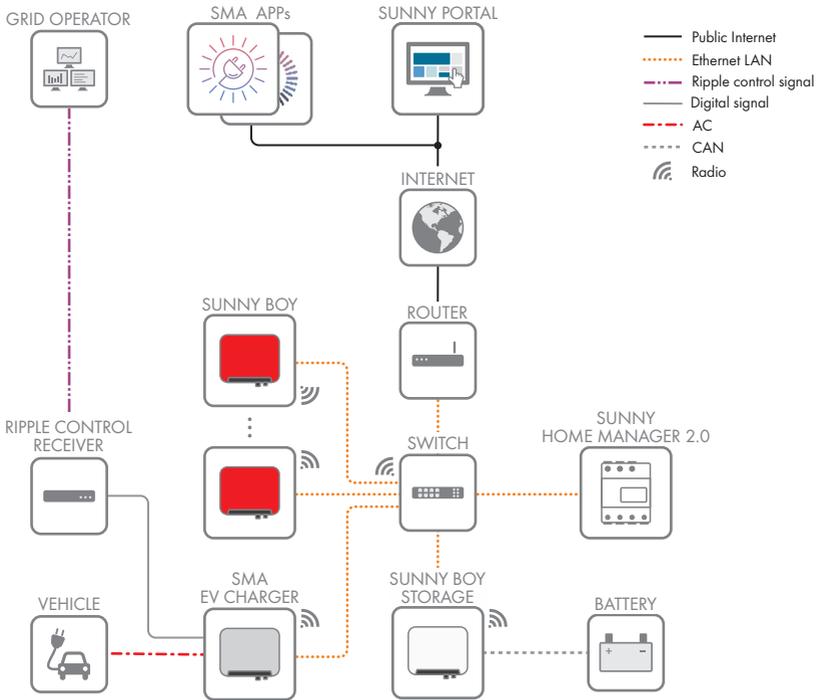


Figure 5: Design of system communication

4.6 "Battery Management"

4.6.1 Battery Use by Systems for Increased Self-Consumption

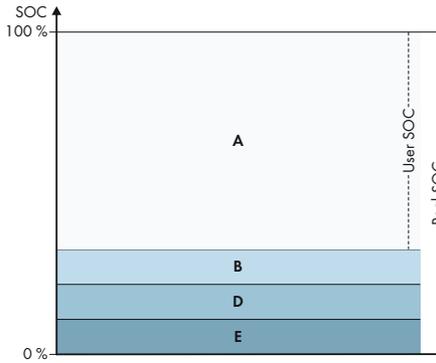


Figure 6: State of charge ranges of the battery in systems for increased self-consumption without battery backup

Range	Parameter	Battery inverter behavior
A	Self-consumption range (SlfCsmP)	The battery inverter uses the batteries within this range for increased self-consumption.
B	Range for maintaining battery state of charge (PVRes)	The battery inverter checks the current SOC every 24 hours. If the SOC is in range D, the battery is recharged from the utility grid until the upper limit of range B is reached. If the utility grid is not available, the batteries cannot be recharged.
D	Minimum width of deep-discharge protection range (BatRes)	The battery inverter recharges the connected batteries. The recharging process does not stop until range A is reached. If the utility grid is not available, the battery inverter cannot be switched on to check the SOC of the battery. The battery inverter and the battery are switched off.
E	Lower limit of the deep-discharge protection range for disconnection (ProtRes)	When this range is reached and the utility grid is available, the battery inverter charges the battery from the utility grid until range A is reached.

5 Mounting

5.1 Requirements for Mounting

Requirements for mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires. This can result in death or serious injury.

- Do not mount the product in areas containing highly flammable materials or gases.
 - Do not mount the product in potentially explosive atmospheres.
- Do not mount the inverter on a pillar.
 - A solid, flat support surface, e.g. concrete or masonry, must be available for mounting. The difference between the outer anchoring points must not exceed 5 mm.
 - The mounting location must be inaccessible to children.
 - The mounting location must be suitable for the weight and dimensions of the product (see Section 14, page 100).
 - The mounting location must not be exposed to direct solar irradiation. If the product is exposed to direct solar irradiation, the exterior plastic parts might age prematurely and overheating might occur. When becoming too hot, the product reduces its power output to avoid overheating.
 - The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.
 - All ambient conditions must be met (see Section 14, page 100).
 - To ensure optimum operation, the ambient temperature should be between -20°C and $+40^{\circ}\text{C}$.

Permitted and prohibited mounting positions:

- The product may only be mounted in a permitted position. This will ensure that no moisture can penetrate the product.
- The product should be mounted such that the LED signals can be read off without difficulty.

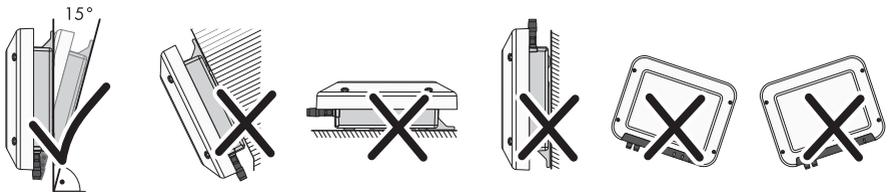


Figure 7: Permitted and prohibited mounting positions

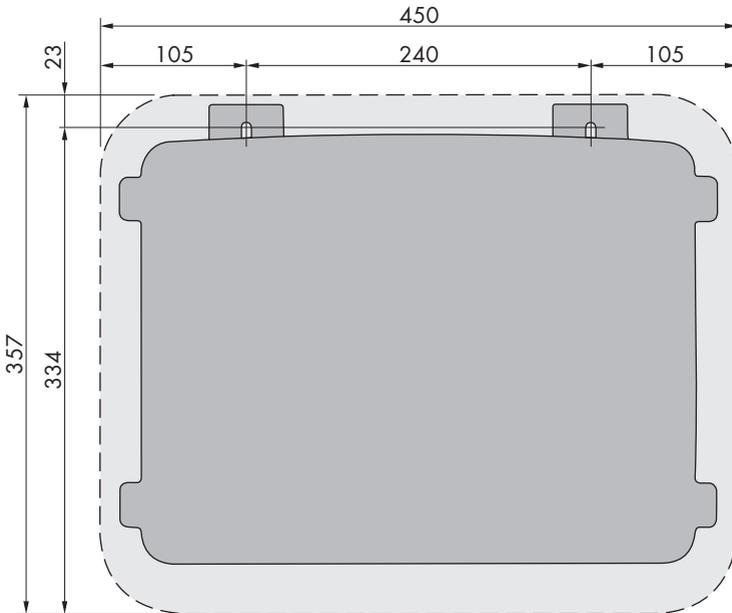
Dimensions for mounting:

Figure 8: Position of the anchoring points(Dimensions in mm)

Recommended clearances:

If you maintain the recommended clearances, adequate heat dissipation will be ensured. Thus, you will prevent power reduction due to excessive temperature.

- Maintain the recommended clearances to walls as well as to other inverters or objects.
- If multiple products are mounted in areas with high ambient temperatures, increase the clearances between the products and ensure sufficient fresh-air supply.

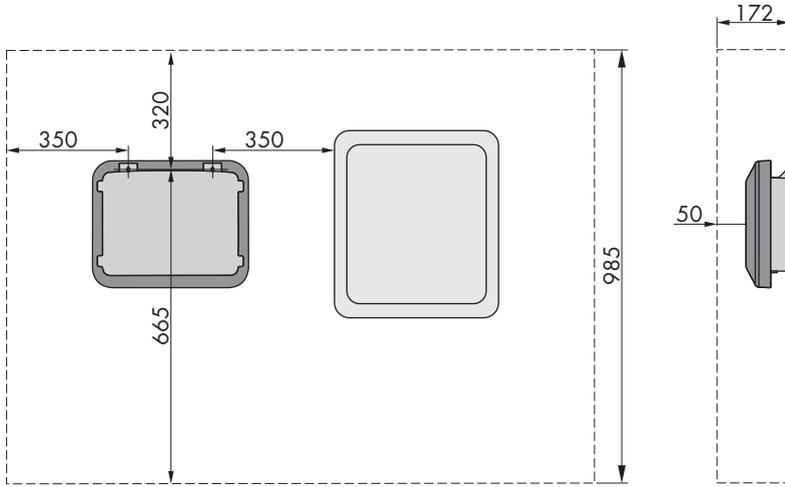


Figure 9: Recommended clearances(Dimensions in mm)

5.2 Mounting the product

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

- 2 stainless steel hexagon head wood screws (AF 10, diameter 6 mm), screw length must be suitable for the support surface and the weight of the product (fastening bracket thickness: 4 mm)
- Where necessary, 2 screw anchors suitable for the support surface and the screws

⚠ CAUTION

Risk of injury due to weight of product

Injuries may result if the product is lifted incorrectly or dropped while being transported or mounted.

- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.

Procedure:

1.

⚠ CAUTION

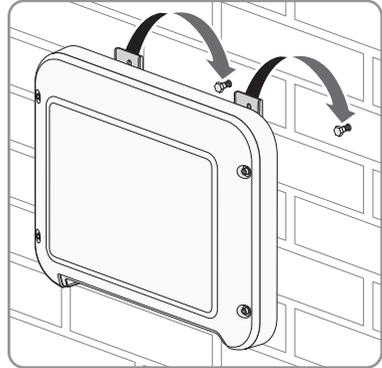
Risk of injury due to damaged cables

There may be power cables or other supply lines (e.g. gas or water) routed in the wall.

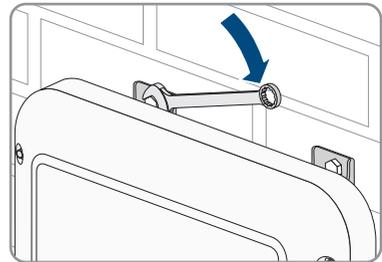
- Ensure that no lines are laid in the wall which could be damaged when drilling holes.

2. Mark the position of the drill holes. Align the markings horizontally.
3. Drill the holes.
4. Insert screw anchors into the drill holes if the support surface requires them.

5. Insert the screws until there is at least 6 mm clearance between the screw head and the support surface.
6. Hang the product onto the screws using the metal brackets.



7. Tighten the screws hand-tight using a ratchet or box wrench. When doing this you can compensate for any misalignment of the drill holes by aligning the metal brackets accordingly.



8. Ensure that the product is securely in place.

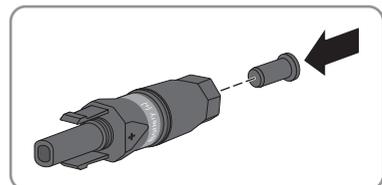
9. **NOTICE**

Damage to the product due to sand, dust and moisture ingress if the DC inputs are not closed

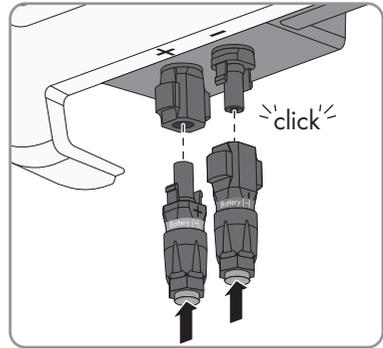
The product is only properly sealed when all unused DC inputs are closed with DC connectors and sealing plugs. Sand, dust and moisture penetration can damage the product and impair its functionality.

- Seal all unused DC inputs using the DC connectors and sealing plugs as described in the following. When doing so, do not plug the sealing plugs directly into the DC inputs on the inverter.

10. For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.
11. Insert the sealing plug into the DC connector.



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



- The DC connectors snap into place.

13. Ensure that the DC connectors with sealing plugs are securely in place.

6 Electrical Connection

6.1 Overview of the Connection Area

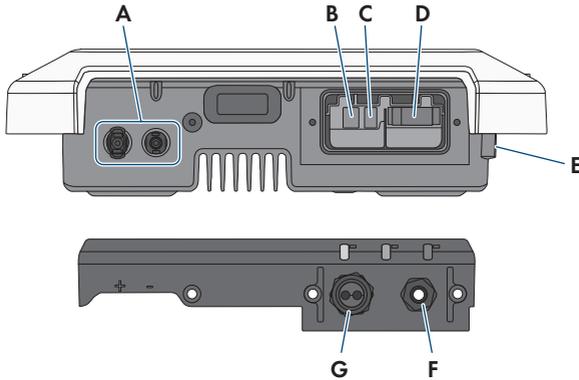


Figure 10: Connection areas at the bottom of the inverter and cable glands at the connection cap

Position	Designation
A	DC connectors for connecting the battery power cable
B	Pin connector for connecting the network cable
C	Pin connector for connecting the data cable of the battery.
D	Jack for the AC connection
E	Connection point for an additional grounding
F	Cable gland for the AC connection
G	Cable gland with cable support sleeve for connecting the network cable and the battery communication cable

6.2 AC Connection

6.2.1 Requirements for the AC Connection

AC cable requirements as follows:

- Conductor type: copper wire
- External diameter: 5 mm to 13 mm
- Conductor cross-section: 1.5 mm² to 4 mm²
- Insulation stripping length: 15 mm
- Sheath stripping length: 70 mm
- The cable must be dimensioned in accordance with the local and national directives for the dimensioning of cables. The requirements for the minimum wire size derive from these directives. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

Load-break switch and cable protection:

NOTICE

Damage to the inverter due to the use of screw-type fuses as load-break switches

Screw-type fuses (e.g. DIAZED fuse or NEOZED fuse) are not load-break switches.

- Do not use screw-type fuses as load-break switches.
- Use a load-break switch or circuit breaker as a load disconnection unit (for information and design examples, see the Technical Information "Circuit Breaker" at www.SMA-Solar.com).

- In PV systems with multiple inverters, protect each inverter with a separate circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 14 "Technical Data", page 100). This will prevent residual voltage from being present at the corresponding cable after disconnection.
- Loads installed between the inverter and the circuit breaker must be fused separately.

Residual-current monitoring unit:

The inverter does not require an external residual-current device when operating. If local regulations require the use of a residual-current device, the following must be observed:

- The inverter is compatible with type A and B residual-current devices that have a rated residual current of 100 mA or higher (information about the selection of a residual-current device see technical information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com). Each inverter in the system must be connected to the utility grid via a separate residual-current device.

Overvoltage category:

The inverter can be used in grids of overvoltage category III or lower in accordance with IEC 60664-1. That means that the inverter can be permanently connected to the grid-connection point of a building. In case of installations with long outdoor cabling routes, additional measures to reduce overvoltage category IV to overvoltage category III are required (see the Technical Information "Overvoltage Protection" at www.SMA-Solar.com).

Grounding conductor monitoring:

The inverter is equipped with a grounding conductor monitoring device. This grounding conductor monitoring device detects when there is no grounding conductor connected and disconnects the inverter from the utility grid if this is the case. Depending on the installation site and grid configuration, it may be advisable to disable the grounding conductor monitoring. This can be necessary, for example, in a Delta IT system or other grid configurations if there is no neutral conductor present and you intend to install the inverter between two line conductors. If you are uncertain about this, contact your grid operator or SMA Solar Technology AG.

- Grounding conductor monitoring must be disabled after initial start-up depending on the grid configuration (see Section 8.13, page 66).

i **Safety in accordance with IEC 62109 when the grounding conductor monitoring is deactivated**

In order to guarantee safety in accordance with IEC 62109 when the grounding conductor monitoring is deactivated, you have to connect additional grounding:

- In order to guarantee safety in accordance with IEC 62109 when the grounding conductor monitoring is deactivated, you have to connect additional grounding (see Section 6.2.3, page 34): The additional grounding conductor must have the same cross-section as the connected grounding conductor at the connecting terminal plate for the AC cable. This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

i **Connection of additional grounding**

In some countries, additional grounding is generally required. In each case, observe the locally applicable regulations.

- If additional grounding is required, connect an additional grounding that has at least the same cross-section as the connected grounding conductor to the connecting terminal plate for the AC cable (see Section 6.2.3, page 34). This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

6.2.2 Connecting the Inverter to the Utility Grid

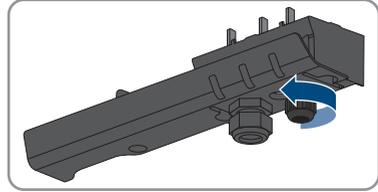
⚠ QUALIFIED PERSON

Requirements:

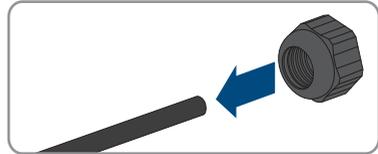
- Only the terminal block supplied may be used for the AC connection.
- The connection requirements of the grid operator must be met.
- The grid voltage must be within the permissible range. The exact operating range of the inverter is specified in the operating parameters.

Procedure:

1. Disconnect the AC circuit breaker and secure it against reconnection.
2. Unscrew the swivel nut from the cable gland for the AC connection at the connector cap.

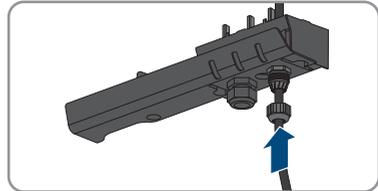


3. Thread the swivel nut over the AC cable.

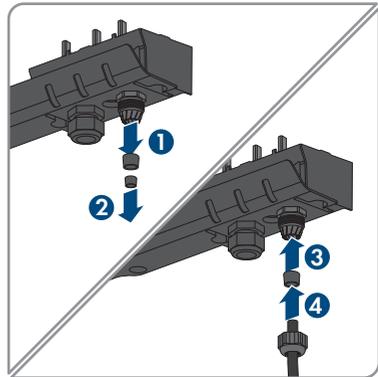


4. Thread the AC cable through the cable gland of the AC connection:

- If the external diameter of the cable is 5 mm to 7 mm, thread the AC cable through the cable gland directly.

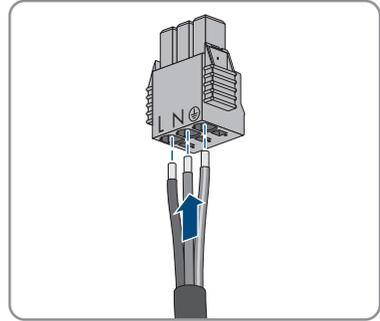


- If the external diameter of the AC cable is 8 mm to 13 mm, first remove the inner sealing ring from the cable gland and then thread the AC cable through the cable gland. When doing so, ensure that the outer sealing ring is positioned correctly in the cable gland.

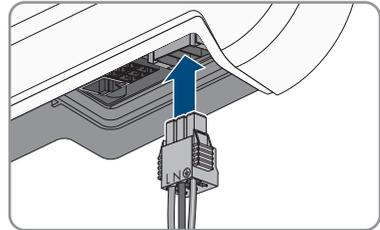


5. Dismantle 70 mm of the AC cable.
6. Shorten L and N by 5 mm each. Thus, the grounding conductor will be released from the terminal block last when tensile load is applied.
7. Strip 15 mm of the insulation of L, N and the grounding conductor.

8. Connect L, N and the grounding conductor to the terminal block for the AC connection in accordance with the labeling. When doing so, ensure that the conductors are plugged completely into the terminals up to the insulation. Tip: To release the conductors from the terminals, the terminals must be opened. To do this, stick a flat-blade screwdriver (blade width: 3 mm) as far as it can go into the rectangular opening behind the terminal.



9. Ensure that all terminals are allocated to the correct conductors.
 10. Make sure that all conductors are securely in place.
 11. Plug the terminal block with the connected conductors for the AC connection into the slot in the inverter until the terminal block clicks into place.



12. Ensure that the terminal block is securely in place by slightly pulling it.

6.2.3 Connecting Additional Grounding

⚠ QUALIFIED PERSON

If additional grounding or equipotential bonding is required locally, you can connect additional grounding to the product. This prevents touch current if the grounding conductor at the terminal for the AC cable fails.

The required clamping bracket, the cylindrical screw M5x16, the washer and the spring lock washer are part of the scope of delivery of the inverter.

i Grounding of the battery

The grounding of the battery must not be connected to the connection point for additional grounding on the inverter.

- Ground the battery according to the battery manufacturer's specifications.

Cable requirements:**i Use of fine-stranded conductors**

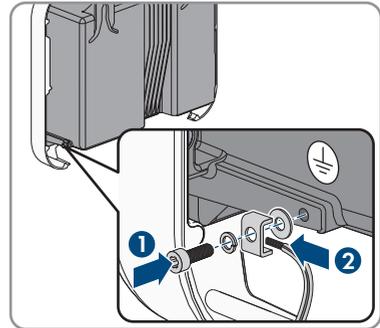
You can use an inflexible or a flexible, fine-stranded conductor.

- When using a fine-stranded conductor, it has to be double crimped by a ring terminal lug. Make sure that no insulated conductor is visible when pulling or bending. This will ensure sufficient strain relief by means of the ring terminal lug.

Grounding cable cross-section: max. 10 mm²

Procedure:

1. Strip off 12 mm of the grounding cable insulation.
2. Insert the screw through the spring lock washer, the clamping bracket and the washer.
3. Lightly screw the screw into the thread of the connection point for the additional grounding.
4. Guide the grounding cable between the washer and clamping bracket and tighten the screw (TX25) (torque: 6 Nm).

**6.3 Connecting the Network Cables****⚠ QUALIFIED PERSON****⚠ DANGER****Danger to life due to electric shock in case of overvoltages and if surge protection is missing**

Overvoltages (e. g. in the event of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cables or other data cables if there is no surge protection. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.

i Failure-free operation of all system components due to tethered connection

- To ensure failure-free operation, SMA Solar Technology AG recommends connecting all system components with each other via Speedwire.

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

- 1 network cable
- Where required: Field-assembly RJ45 connector for the network cable. SMA Solar Technology AG recommends the connector "MFP8 T568 A Cat.6A" from "Telegärtner".

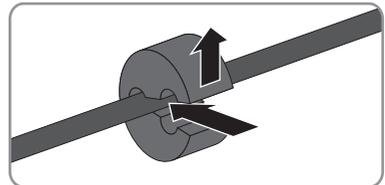
Network cable requirements:

The cable length and quality affect the quality of the signal. Observe the following cable requirements.

- Cable type: 100BaseTx
- Cable category: minimum CAT5e
- Plug type: RJ45 of Cat5, Cat5e or higher
- Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP
- Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.22 mm²
- Maximum cable length between two nodes when using patch cables: 50 m (164 ft)
- Maximum cable length between two nodes when using installation cables: 100 m (328 ft)
- UV-resistant for outdoor use.

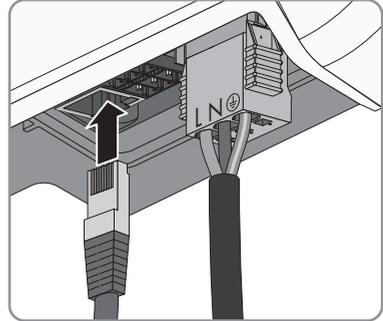
Procedure:

1. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
2. Unscrew the swivel nut from the cable gland for the connection of a network cable and the battery communication cable at the connection cap.
3. Thread the swivel nut over the network cable.
4. Press the cable support sleeve out of the cable gland.
5. Remove the filler plug from the cable support sleeve.
6. Route the network cable through an opening in the cable support sleeve.



7. Thread the network cable through the cable gland.

8. Insert the RJ45 plug of the network cable into the network pin connector on the inverter until it snaps into place.



9. Ensure that the network connector is securely in place by pulling slightly on the network cable.
 10. Connect the other end of the network cable to the local network (e.g. via a router). You can only connect the inverter to other nodes via star topology.
 11. Connecting the data cable of the battery (see Section 6.4, page 37).

6.4 Connecting CAN communication cable

⚠ QUALIFIED PERSON

i Communication between Inverter and Battery

- Communication between the inverter and the battery takes place via the battery communication cable via CAN bus.

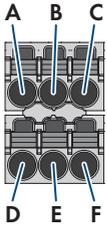
Additionally required material (not included in the scope of delivery):

- One battery communication cable for the communication between inverter and battery

Requirement for the communication cable:

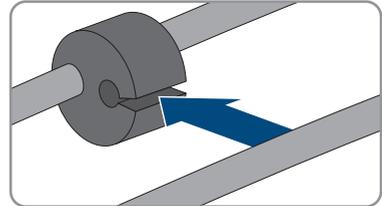
- Twisted pair conductors
- Cable category: minimum CAT5e
- Shielding: yes
- Conductor cross-section: 0.25 mm² to 0.34 mm²
- Recommended number of conductor pairs: 4
- Maximum cable length: 10 m
- The cable has to be insulated for 600 V.
- UV-resistant for outdoor use. SMA Solar Technology AG recommends the cable "UC900 SS23 Cat.7 PE"
- Comply with the requirements of the battery manufacturer.

Assignment of the terminal block:

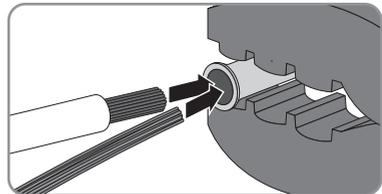
Terminal block	Position	Assignment
	A	Not assigned
	B	Enable
	C	GND and shielding
	D	CAN L
	E	CAN H
	F	Not assigned

Procedure:

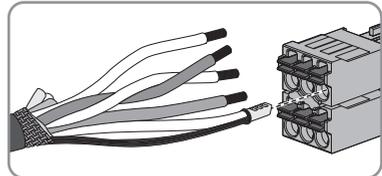
1. Thread the swivel nut over the data cable of the battery.
2. Route the data cable of the battery through an opening in the cable support sleeve.



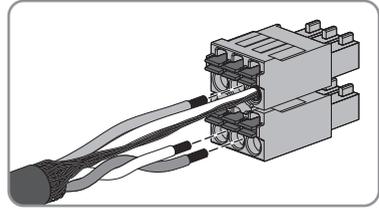
3. Insert the data cable of the battery through the cable gland.
4. Dismantle the data cable of the battery.
5. Strip the insulation off the wires. The **CAN L** and **CAN H** must be a twisted pair.
6. If necessary, trim unused insulated conductors flush with the cable sheath or fold it over the cable sheath.
7. Twist the cable shield together and insert it into a bootlace ferrule (1.5 mm² without collar) together with the **GND** conductor and crimp using a crimping tool.



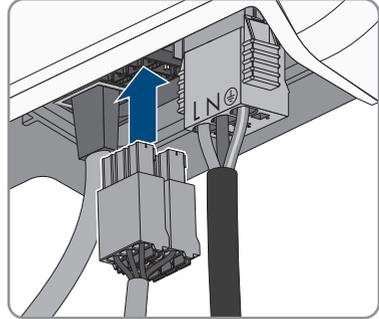
8. Connect the shielding and **GND** with the bootlace ferrule to the **GND** terminal of the plug for the battery communication connection. Observe the plug assignment.



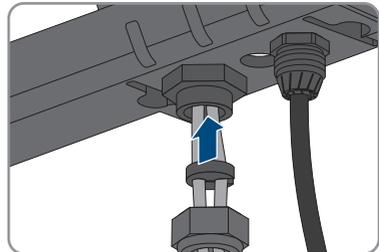
9. Connect the remaining conductors of the battery communication cable to the 6-pole terminal block. Pay attention to the assignment of the terminal block and communication connection on the battery and/or automatic transfer switch and make sure that CAN L and CAN H consist of a pair of conductors.



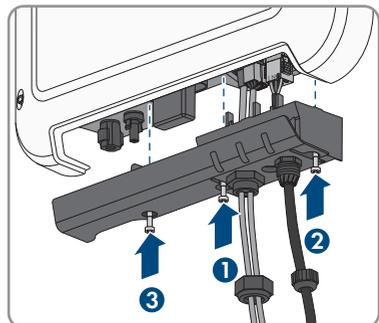
10. Ensure that the conductors are plugged into the terminal points tightly by pulling slightly on the conductors.
11. Insert the terminal block into the jack on the right of the network jack. The terminal points must face forwards and the operating levers must face to the rear towards the mounting surface.



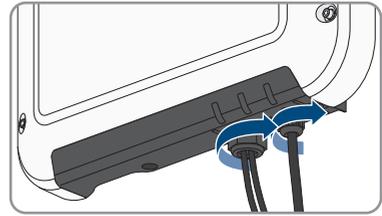
12. Ensure that the terminal block is plugged into the jack tightly.
13. Press the cable support sleeve into the cable gland.



14. Screw the swivel nut hand-tight onto the cable gland for the connection of the network cable and the battery communication cable.
15. Tighten the connection cap to the inverter using the three screws and a Torx screwdriver (TX20) (torque: 3.5 Nm).



16. Screw the swivel nuts onto the cable glands on the connection cap.



17. Connect the other end of the battery communication cable directly to the battery (see the battery manufacturer's manual).

6.5 DC Connection

6.5.1 Assembling the DC Connectors

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life due to electric shock when live components or DC cables are touched

The DC cables connected to a battery may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the product and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Observe all safety information of the battery manufacturer.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.

The battery connection cables must be fitted with the supplied DC connectors. Assemble the DC connectors as described in the following. Be sure to observe the correct polarity. The DC connectors are marked with the symbols "Battery (+)" and "Battery (-)".

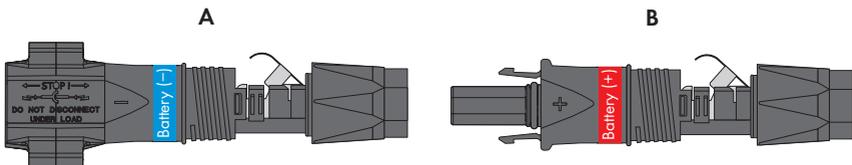


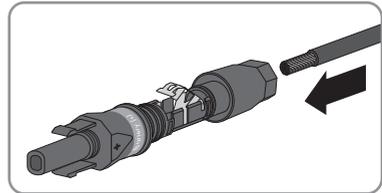
Figure 11: Negative (A) and positive (B) DC connectors

Cable requirements:

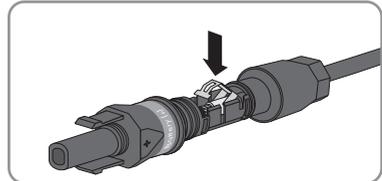
- Cable type: PV1-F, UL-ZKLA, USE2
- External diameter: 5.5 mm to 8 mm
- Conductor cross-section: 2.5 mm² to 6 mm²
- Qty single wires: minimum 7
- Nominal voltage: minimum 1000 V
- Using bootlace ferrules is not allowed.

Procedure:

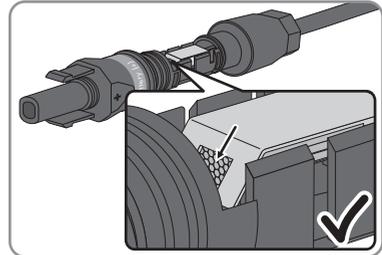
1. Strip 12 mm of the cable insulation.
2. Insert the stripped cable into the DC connector up to the stop. When doing so, ensure that the stripped cable and the DC connector are of the same polarity.



3. Press the clamping bracket down until it audibly snaps into place.

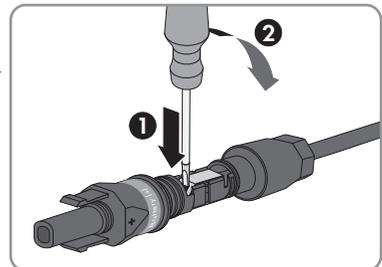


- The stranded wire can be seen inside the clamping bracket chamber.

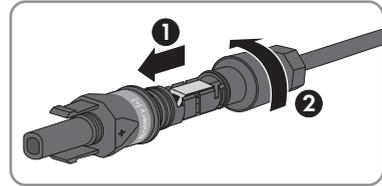


4. If the stranded wire is not visible in the chamber, the cable is not correctly inserted and the connector must be reassembled. To do this, the cable must be removed from the connector.

- Release the clamping bracket. To do so, insert a screwdriver (blade width: 3.5 mm) into the clamping bracket and pry the clamping bracket open.



- Remove the cable and go back to step 2.



5. Push the swivel nut up to the thread and tighten (torque: 2 Nm).

6.5.2 Connecting the power cable of the battery

⚠ QUALIFIED PERSON

NOTICE

Damage to the DC connectors due to the use of contact cleaner or other cleaning agents

Some contact cleaners or other cleaning agents may contain substances that decompose the plastic of the DC connectors.

- Do not use contact cleaners or other cleaning agents for cleaning the DC connectors.

⚠ DANGER

Danger to life due to electric shock and electric arc when pulling off the DC connectors when connecting a PV field to the battery inverter

If the DC connectors with the DC conductors of the PV field were accidentally connected to the battery inverter, the high voltages of the PV field are present at the DC conductors. The removal of the DC connectors results in death or serious injury due to electric shock and electric arc.

- Leave the DC connectors plugged on the battery inverter.
- Stop working on the inverter, and only once it is dark, unlock and then remove the DC connectors and assemble again.
- If you would like to leave the system before troubleshooting, secure the danger zone against unauthorized entry (e.g. with a fence).

Requirements:

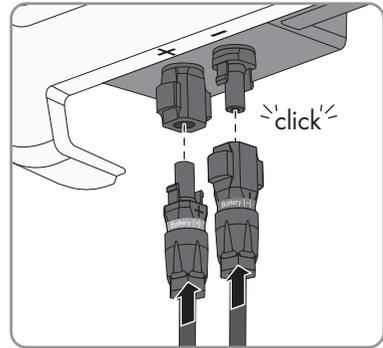
- Only the supplied connectors for connecting the battery power cable may be used.
- The length of the battery power cable must not exceed 10 m.

Procedure:

1. Ensure that the DC connectors have the correct polarity.

If the DC connector is equipped with a DC cable of the wrong polarity, the DC connector must be reassembled. The DC cable must always have the same polarity as the DC connector.

2. Connect the assembled DC connectors to the inverter.



- The DC connectors snap into place.
3. Ensure that all DC connectors are securely in place.

6.5.3 Disassembling the DC Connectors

⚠ QUALIFIED PERSON

To disassemble the DC connectors (e.g. due to faulty assembly), proceed as follows.

⚠ DANGER

Danger to life due to electric shock and electric arc when pulling off the DC connectors when connecting a PV field to the battery inverter

If the DC connectors with the DC conductors of the PV field were accidentally connected to the battery inverter, the high voltages of the PV field are present at the DC conductors. The removal of the DC connectors results in death or serious injury due to electric shock and electric arc.

- Leave the DC connectors plugged on the battery inverter.
- Stop working on the inverter, and only once it is dark, unlock and then remove the DC connectors and assemble again.
- If you would like to leave the system before troubleshooting, secure the danger zone against unauthorized entry (e.g. with a fence).

⚠ DANGER

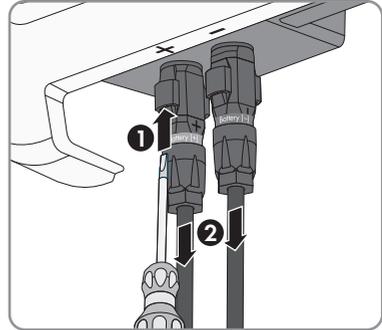
Danger to life due to electric shock when touching exposed DC conductors or DC plug contacts if the DC connectors are damaged or loose

The DC connectors can break or become damaged, become free of the DC cables, or no longer be connected correctly if the DC connectors are released and disconnected incorrectly. This can result in the DC conductors or DC plug contacts being exposed. Touching live DC conductors or DC plug connectors will result in death or serious injury due to electric shock.

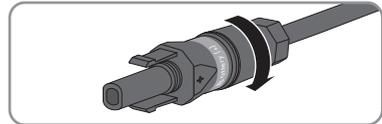
- Wear insulated gloves and use insulated tools when working on the DC connectors.
- Ensure that the DC connectors are in perfect condition and that none of the DC conductors or DC plug contacts are exposed.
- Carefully release and remove the DC connectors as described in the following.

Procedure:

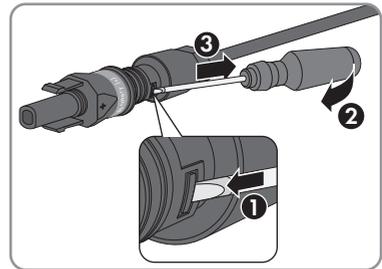
1. Release and remove the DC connectors. To do so, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors out. When doing so, do not lever the DC connectors out, but insert the tool into one of the side slots only to release the locking mechanism, and do not pull on the cable.



2. Remove the DC connector swivel nut.

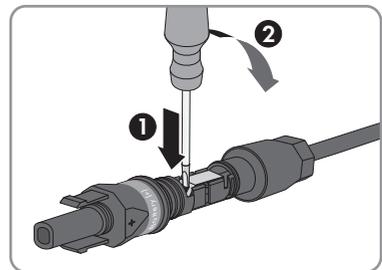


3. Unlock the DC connector. To do this, insert a flat-blade screwdriver (blade width: 3.5 mm) into the side catch mechanism and pry the catch mechanism open.



4. Carefully pull the DC connector apart.

5. Release the clamping bracket. To do so, insert a flat-blade screwdriver (blade width: 3.5 mm) into the clamping bracket and pry the clamping bracket open.



6. Remove the cable.

7 Commissioning

7.1 Commissioning Procedure

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Commissioning an inverter that is captured in a communication device

When the inverter is captured in a communication device, the communication device (e.g. SMA Data Manager) is the unit for configuring the total system. The configuration is transferred to all inverters in the system. The system password assigned via the communication device is also the password for the user interface of the inverter.

- Commission the inverter (see Section 7.2, page 46).
- The initial configuration of the inverter is made via the communication device. The configuration is transferred to the inverter and the settings of the inverter are overwritten.
- Deactivate the Webconnect function of the inverter via the Sunny Portal. This prevents unnecessary connection attempts of the inverter with Sunny Portal.

This section describes the commissioning procedure and gives an overview of the steps you must perform in the prescribed order.

Procedure	See
1. Commission the inverter.	Section 7.2, page 46
2. Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: <ul style="list-style-type: none"> • Direct connection via WLAN • Direct connection via Ethernet • Connection via WLAN in the local network • Connection via Ethernet in the local network 	Section 8.1, page 50
3. Log into the user interface.	Section 8.2, page 54
4. Select the inverter configuration option. Please note that the SMA Grid Guard code for changing the grid-relevant parameters must be available after completion of the first ten feed-in hours or installation assistant (see "Application for the SMA Grid Guard code" available at www.SMA-Solar.com).	Section 7.3, page 47
5. Ensure that the country data set has been configured correctly.	Section 8.9, page 63
6. For PV systems in Italy or Dubai: Start the self-test.	Section 7.4, page 49
7. Make further inverter settings as needed.	Section 8, page 50

7.2 Commissioning the Inverter

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WARNING

Danger to life due to fire or explosion when batteries are fully discharged

A fire may occur due to incorrect charging of fully discharged batteries. This can result in death or serious injury.

- Before commissioning the system, verify that the battery is not fully discharged.
- Do not commission the system if the battery is fully discharged.
- If the battery is fully discharged, contact the battery manufacturer for further proceedings.
- Only charge fully discharged batteries as instructed by the battery manufacturer.

Requirements:

- The AC circuit breaker must be correctly rated and mounted.
- The product must be correctly mounted.
- All cables must be correctly connected.

Procedure:

1. Switch on the AC circuit breaker.
2. Switch on the battery or the load-break switch of the battery (see documentation of the battery manufacturer).
 - All 3 LEDs light up briefly. The start-up phase begins.
3. If the red LED is glowing, an error has occurred that must be rectified (see Section 11, page 74).
4. Establish a connection to the user interface of the inverter (see Section 8.1, page 50).

7.3 Selecting a configuration option

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After having assigned the password to the **Installer** or **User**, the **Configuring the Inverter** page opens.

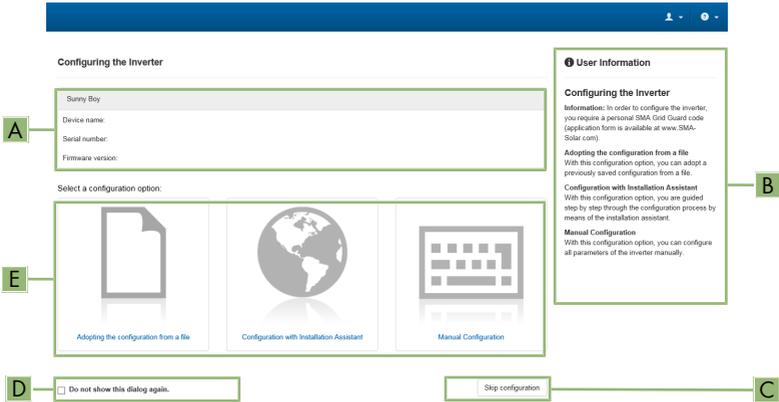


Figure 12: Layout of the **Configuring the Inverter** page

Position	Designation	Description
A	Device information	Provides the following information: <ul style="list-style-type: none"> • Device name • Inverter serial number • Inverter firmware version
B	User information	Provides brief information on the listed configuration options
C	Skip configuration	Offers the option of skipping the inverter configuration and going directly to the user interface (not recommended; the inverter cannot be operated without configuration)
D	Checkbox	Allows you to choose not to have the displayed page displayed again when the user interface is called up again
E	Configuration options	Provides a selection of the various configuration options

Configuration options:

On the **Configuring the Inverter** page, different configuration options are available to choose from. Select one of the options and proceed for the selected option as described below. SMA Solar Technology AG recommends carrying out the configuration with the installation assistant. This way, you ensure that all relevant parameters are set for optimal inverter operation.

- Adoption of configuration from a file
- Configuration with the installation assistant (recommended)
- Manual configuration

Adopting the Configuration from a File

You can adopt the inverter configuration from a file. To do this, there must be an inverter configuration saved to a file.

Procedure:

1. Select the configuration option **Adopting configuration from a file**.
2. Select [**Browse...**] and select the desired file.
3. Select [**Import file**].

Configuring the Installation Assistant (Recommended)

Procedure:

1. Select the configuration option **Configuration with Installation Assistant**.
 - The installation assistant will open.
2. Follow the installation assistant steps and make the settings appropriate for your system.
3. For every setting made in a step, select [**Save and next**].
 - In the last step, all made settings are listed in a summary.
4. To correct settings you made, select [**Back**], navigate to the desired step, correct settings and select [**Save and continue**].
5. Once all settings are correct, select [**Next**] in the summary.
6. To save the settings to a file, select [**Export a summary**] and save the file on your end device.
7. To export all parameters and their settings, select [**Export all parameters**]. This exports all parameters and their settings into an HTML file.
 - The start page of the user interface opens.

Manual configuration

You can configure the inverter manually by setting the desired parameters.

Procedure:

1. Select the configuration option **Manual Configuration**.
 - The **Device Parameters** menu on the user interface will open and all available parameter groups of the inverter will be displayed.
2. Select [**Edit parameters**].

3. Select the desired parameter group.
 - All available parameters of the parameter group will be displayed.
4. Set the desired parameters.
5. Select [**Save all**].
 - The inverter parameters are set.

7.4 Starting the Self-Test (for Italy and Dubai)

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The self-test is only required for inverters that are to be commissioned in Italy or Dubai. The Italian standard CEI 0-21 and the DEWA (Dubai Electricity and Water Authority) stipulate that all inverters that feed into the utility grid are equipped with a self-test function. During the self-test, the inverter will consecutively check the reaction times for overvoltage, undervoltage, maximum frequency and minimum frequency.

The self-test changes the upper and lower disconnection values for each protective function on a linear basis for frequency monitoring and voltage monitoring. As soon as the measured value exceeds the permitted disconnection threshold, the inverter disconnects from the utility grid. In this way, the inverter determines the reaction time and checks itself.

After the self-test has been completed, the inverter automatically switches back to feed-in operation, resets the original disconnection conditions and connects to the utility grid. The test takes approximately three minutes.

Requirements:

- The country data set of the inverter must be set to **CEI 0-21 internal** or **DEWA 2016 internal**.

Procedure:

1. Select the menu **Device Configuration**.
2. Select [**Settings**].
3. Select [**Starting the Self-Test**] in the subsequent context menu.
4. Follow the instructions appearing in the dialog and save the report of the self-test where necessary.

8 Operation

8.1 Establishing a connection to the user interface

8.1.1 Establishing a Direct Connection via Ethernet

Requirements:

- The product must be commissioned.
- An end device (e.g. computer) with an Ethernet interface must be available.
- The product must be connected directly to the end device.
- The respective latest version of one of the following web browsers must be installed: Chrome, Edge, Firefox or Safari.
- The SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours or installation assistant (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

i IP address of the inverter

- Standard inverter IP address for the direct connection via Ethernet: **169.254.12.3**

Procedure:

1. Open the web browser of your end device, enter the IP address **169.254.12.3** in the address bar and press the enter key.

2. **i** **Web browser signals a security vulnerability**

After the IP address has been entered, a message might appear indicating that the connection to the user interface of the product is not secure. SMA Solar Technology AG guarantees the security of the user interface.

- Continue loading the user interface.

- The login page of the user interface opens.

8.1.2 Establishing a direct connection via WLAN

You have several options to connect the product to an end device. The procedure can be different depending on the end devices. If the procedures described do not apply to your end device, establish the direct connection via Wi-Fi as described in the manual of your end device.

The following connection options are available:

- Connection to SMA 360° App
- Connection with WPS
- Connection with Wi-Fi network search

Requirements:

- The product must be commissioned.
- An end device (e.g. computer, tablet PC or smartphone) must be available.
- The respective latest version of one of the following web browsers must be installed: Chrome, Edge, Firefox or Safari.
- JavaScript must be enabled in the web browser of the end device.
- The SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours or installation assistant (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

i SSID, IP address and WLAN password

- SSID in WLAN: **SMA[serial number]** (e.g. SMA0123456789)
- Device-specific WLAN password: see WPA2-PSK on the type label of the product or the rear side of the manual included in delivery
- Standard access address for a direct connection via WLAN outside of a local network: **<http://smalogin.net>** or **192.168.12.3**

i Importing and exporting files with end devices having an iOS operating system is not possible.

For technical reasons, importing and exporting files (e.g., importing an inverter configuration, saving the current inverter configuration or exporting events and parameters) is not possible with mobile end devices having an iOS operating system.

- Use an end device that does not have an iOS operating system for importing and exporting files.

Connection to SMA 360° App**Requirements:**

- An end device with camera must be available.
- The SMA 360° App must be installed on the end device.
- An user account for Sunny Portal must already exist.

Procedure:

1. Open the SMA 360° App and login with dem Sunny Portal account details.
2. Select **QR-Code Scan** in the menu.
3. Scan the QR Code on your product via the SMA 360° App.
 - The end device automatically connects to the product. The web browser of your end device opens and the login page of the user interface is displayed.
4. If the web browser of your end device does not open automatically and the login page of the user interface is not displayed, open the web browser and enter **<http://smalogin.net>** in the address bar.

Connection with WPS

Requirements:

- The end device must have a WPS function.

Procedure:

1. Enable the WPS function on the inverter. To do this, tap on the enclosure lid of the inverter twice.
 - The blue LED flashes quickly for approx. two minutes. The WPS function is active during this time.
2. Enable the WPS function on your end device.
3. Open the web browser of your end device and enter **http://smalogin.net** in the address bar.

Connection with Wi-Fi network search

1. Search for Wi-Fi networks with your end device.
2. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
3. Enter the device-specific Wi-Fi password (see WPA2-PSK on the type label of the product or the rear side of the manual included in delivery).
4. Open the web browser of your end device and enter **http://smalogin.net** in the address bar.
 - The login page of the user interface is displayed.
5. If the login page of the user interface does not open, enter the IP address **192.168.12.3** or, if your end device supports mDNS services, **SMA[serial number].local** or **http://SMA[serial number]** in the address bar of the web browser.

8.1.3 Establishing a Connection via Ethernet in the local network

New IP address for connecting with a local network

If the product is connected to a local network (e.g. via a router), the product will receive a new IP address. Depending on the type of configuration, the new IP address will be assigned automatically by the DHCP server (router) or manually by you. Upon completion of the configuration, the product can only be reached via the following access addresses:

- Generally applicable access address: IP address manually assigned or assigned by the DHCP server (router) (identification via network scanner software or network configuration of the router).
- Access address for Apple and Linux systems: **SMA[serial number].local** (e.g. SMA0123456789.local)
- Access address for Windows and Android systems: **http://SMA[serial number]** (e.g., http://SMA0123456789)

Requirements:

- The product must be connected to the local network via a network cable (e.g. via a router).
- The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- An end device (e.g. computer, tablet PC or smartphone) must be available.
- The end device must be in the same local network as the product.
- The respective latest version of one of the following web browsers must be installed: Chrome, Edge, Firefox or Safari.
- The SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours or installation assistant (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Open the web browser of your end device. Enter the IP address of the product in the address bar of the web browser. Then press Enter key.
 2.  **Web browser signals a security vulnerability**

After the IP address has been entered, a message might appear indicating that the connection to the user interface of the product is not secure. SMA Solar Technology AG guarantees the security of the user interface.

 - Continue loading the user interface.
- The login page of the user interface opens.

8.1.4 Establishing a Connection via WLAN in the Local Network

New IP address for connecting with a local network

If the product is connected to a local network (e.g. via a router), the product will receive a new IP address. Depending on the type of configuration, the new IP address will be assigned automatically by the DHCP server (router) or manually by you. Upon completion of the configuration, the product can only be reached via the following access addresses:

- Generally applicable access address: IP address manually assigned or assigned by the DHCP server (router) (identification via network scanner software or network configuration of the router).
- Access address for Apple and Linux systems: **SMA[serial number].local** (e.g. SMA0123456789.local)
- Access address for Windows and Android systems: **http://SMA[serial number]** (e.g., <http://SMA0123456789>)

Requirements:

- The product must be commissioned.
- The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- An end device (e.g. computer, tablet PC or smartphone) must be available.
- The end device must be in the same local network as the product.
- The respective latest version of one of the following web browsers must be installed: Chrome, Edge, Firefox or Safari.
- The SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours or installation assistant (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

i **Importing and exporting files with end devices having an iOS operating system is not possible.**

For technical reasons, importing and exporting files (e.g., importing an inverter configuration, saving the current inverter configuration or exporting events and parameters) is not possible with mobile end devices having an iOS operating system.

- Use an end device that does not have an iOS operating system for importing and exporting files.

Procedure:

- Enter the IP address of the product in the address bar of the web browser.
 - The login page of the user interface opens.

8.2 Logging In and Out of the User Interface

After a connection to the user interface of the inverter has been established, the login page opens. Log onto the user interface as described below.

i **Usage of cookies**

For the correct display of the user interface, cookies are required. The cookies are used for convenience only. By using this user interface you agree to the placement of cookies.

Log in as Installer or User for the First Time

i **Password assignment for user and installer**

The passwords for the user groups **Installer** and **User** must be assigned when accessing the user interface for the first time. If the inverter was registered in a communication device (e.g., SMA Data Manager) and the system password was assigned, the system password is also the installer password. In this case, only the user password must be assigned.

- If you as a specialist assign the user password, only pass the password on to persons to access the inverter data via the user interface.
- If you as a user assign the installer password, only pass the password on to persons to receive access to the system.

Installer password for inverters registered in a communication device or in Sunny Portal

To be able to register the inverter in a communication device (e.g., SMA Data Manager) or in a Sunny Portal system, the password for the user group **Installer** must match the system password. If you assign a password for the user group **Installer** via the user interface of the inverter, the same password must also be used as the system password.

- Assign a uniform installer password to all SMA devices in the system.

Procedure:

1. In the drop-down list **Language**, select the desired language.
2. In the **Password** field, enter a password for the **User** user group.
3. In the **Repeat password** field, enter the password again.
4. Click on **Save**.
5. In the **New password** field, enter a password for the **Installer** user group. Assign a uniform password to all SMA devices to be registered in a system. The installer password is also the system password.
6. In the **Repeat password** field, enter the password again.
7. Click on **Save and log in**.

- The **Configuring the Inverter** page opens.

Log in as the User or Installer

1. In the drop-down list **Language**, select the desired language.
2. In the **User group** drop-down list, select the entry **Installer** or **User**.
3. Enter the password in the field **Password**.
4. Select **Login**.

- The start page of the user interface opens.

Log Out as the User or Installer

1. On the right-hand side of the menu bar, select the menu **User Settings**.
2. In the subsequent context menu, select [**Logout**].

- The login page of the user interface opens. The logout was successful.

8.3 Start Page Design of the User Interface



Figure 13: Design of the user interface's start page (example)

Position	Designation	Description
A	Menu	<p>Provides the following functions:</p> <ul style="list-style-type: none"> • Home Opens the user interface homepage • Instantaneous values Current measured values of the inverter • Device Parameters The various operating parameters of the inverter can be viewed and configured here depending on the user group. • Events All events that have occurred in the selected time period are displayed here. The event types are Information, Warning and Error. Currently existing events of the types Error and Warning will be additionally displayed in the Device status viewlet. However, only the higher-priority event is displayed. If, for example, there is a Warning and an Error present at the same time, only the Error will be displayed. • Device configuration Various settings for the inverter can be made here. The selection available is dependent on which user group you are logged in as and the operating system of the device with which the user interface has been called up. • Data You will find all data that is saved in the internal memory of the inverter or on an external storage medium on this page.
B	User settings	<p>Provides the following functions, depending on the user group logged in:</p> <ul style="list-style-type: none"> • Starting the installation assistant • SMA Grid Guard login • Logout
C	Help	<p>Provides the following functions:</p> <ul style="list-style-type: none"> • Displaying information on Open Source licenses used • Link to the website of SMA Solar Technology AG

Position	Designation	Description
D	Status bar	<p>Displays the following information:</p> <ul style="list-style-type: none"> • Inverter serial number • Inverter firmware version • IP address of the inverter within the local network and/or IP address of the inverter during WLAN connection • With WLAN connection: Signal strength of WLAN connection • User group logged in • Date and device time of the inverter
E	State of charge	Chronological sequence of the state of charge (SOC) of the battery
F	Status display	<p>The various areas display information on the current status of the system.</p> <ul style="list-style-type: none"> • Device status Displays whether the inverter and/or the battery is/ are currently in a fault-free operating state or whether there is an event type Error or Warning present. • Feed-in management Displays whether the inverter is currently limiting its active power. • Nominal energy throughput of the battery Indicates how much energy has been charged to the battery and how much has been discharged from the battery. • Battery Displays the following information: <ul style="list-style-type: none"> - Operating status of battery - Current battery state of charge - Current battery charging power • Energy exchange at the grid-connection point Indicates how much energy was obtained from the utility grid to supply the household and how much the PV system fed in. • Power at the grid connection point Indicates which power is currently fed in or obtained at the grid-connection point.

8.4 Starting the Installation Assistant

⚠ QUALIFIED PERSON

The installation assistant leads you step-by-step through the steps necessary for the initial configuration of the inverter.

Layout of the installation assistant

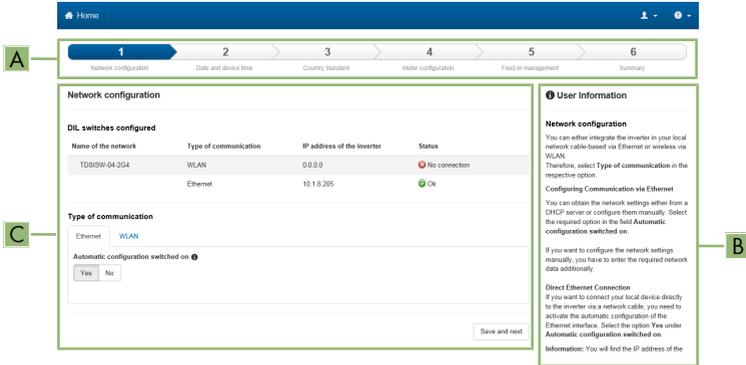


Figure 14: Layout of the installation assistant (example)

Position	Designation	Description
A	Configuration steps	Overview of the installation assistant steps. The number of steps depends on the type of device and the additionally installed modules. The current step is highlighted in blue.
B	User information	Information about the current configuration step and the setting options of the configuration step.
C	Configuration field	You can make settings in this field.

Requirement:

- When configuring after completion of the first ten feed-in hours or after exiting the installation assistant, the SMA Grid Guard code must be available in order to change the grid-relevant parameters (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Open the user interface (see Section 8.1, page 50).
 2. Log in as **Installer**.
 3. Select the menu **User Settings** (see Section 8.3, page 56) on the start page of the user interface.
 4. In the context menu, select [**Starting the installation assistant**].
- The installation assistant will open.

8.5 Activate WPS Function

The WPS function can be used for different purposes:

- Automatic connection to a network (e.g. via router)
- Direct connection between the product and an end device

Depending on the intended application of the WPS function, the procedure for activation will vary.

Activating WPS function for automatic connection to a network

Requirements:

- WLAN must be activated in the product.
- WPS must be activated on the router.

Procedure:

1. Open the user interface (see Section 8.1, page 50).
 2. Log in as **Installer**.
 3. Start the installation assistant (see Section 8.4, page 59).
 4. Select **Network configuration**.
 5. Select **WPS for WLAN network** button in the **WLAN** tab.
 6. Select **Activate WPS**.
 7. Select **Save and next** and exit the installation assistant.
- The WPS function is activated and the automatic connection to the network can be established.

Activating the WPS function for direct connection to the end device.

- Enable WPS function on the product. To do this, tap on the enclosure lid of the product twice.
 - The blue LED flashes quickly for approx. 2 minutes. The WPS function is active during this time.

8.6 Switching WLAN On and Off

The inverter is equipped with an activated WLAN interface as standard. If you do not want to use WLAN, you can switch the WLAN function off and switch it on again whenever needed. In doing so, you can switch the WLAN direct connection and the WLAN connection in the local network on independently of each other.

i Switching on the WLAN function only possible via Ethernet connection

If you switch off both the WLAN function for the direct connection and for the connection in the local network, access to the inverter user interface and therefore reactivation of the WLAN interface is only possible via an Ethernet connection.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

Switching WLAN Off

If you would like to switch the WLAN function off completely, you must switch off both the direct connection and the connection in the local network.

Procedure:

- To switch off the direct connection in the parameter group **PV system communication > WLAN**, select the parameter **Soft-access-point is turned on** and set this to **No**.
- To switch off the connection in the local network in the parameter group **PV system communication > WLAN**, select the parameter **WLAN is turned on** and set this to **No**.

Switching WLAN On

If you have switched the WLAN function for direct connection or for connection in the local network off, you can switch the WLAN function back on in accordance with the following procedure.

Requirement:

- If the WLAN function was previously switched off completely, the inverter must be connected to a computer or router via Ethernet.

Procedure:

- To switch on the WLAN direct connection, in the parameter group **PV system communication > WLAN**, select the parameter **Soft-access-point is turned on** and set this to **Yes**.
- To switch on the WLAN connection in the local network, in the parameter group **System communication > WLAN**, select the parameter **WLAN is turned on** and set this to **Yes**.

8.7 Changing the Password

The password for the inverter can be changed for both user groups. Furthermore, the user group **Installer** can change the password for the user group **User** as well as its own password.

PV systems registered in a communication product

With PV systems that are registered in a communication product (e.g. Sunny Portal, Sunny Home Manager), you can also assign a new password for the user group **Installer** via the communication product. The password for the user group **Installer** is also the system password. If you assign a password for the user group **Installer** via the user interface of the inverter that does not correspond to the system password in the communication product, the inverter can no longer be reached by the communication product.

- Ensure that the password for the user group **Installer** is the same as the system password in the communication product.

Procedure:

1. Activate the user interface (see Section 8.1, page 50).
2. Log into the user interface (see Section 8.2, page 54).
3. Call up the menu **Device Parameters**.
4. Select [**Edit parameters**].

5. In the parameter group **User Rights > Access Control** change the password of the desired user group.
6. Select [**Save all**] to save the changes.

8.8 Changing Operating Parameters

The operating parameters of the inverter are set to certain values by default. You can change the operating parameters to optimize the performance of the inverter.

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section. Some function-sensitive parameters can only be viewed by qualified persons and can only be changed by qualified persons by entering the personal SMA Grid Guard code.

No configuration via Sunny Explorer

Sunny Explorer does not support the configuration of inverters with their own user interface. The inverter can be detected via Sunny Explorer, however it is expressly not recommended to use Sunny Explorer to configure this inverter. SMA Solar Technology AG does not accept liability for missing or incorrect data and possibly resulting yield losses.

- Use the user interface for the configuration of the inverter.

Requirements:

- Changes to grid-relevant parameters must be approved by the responsible grid operator.
- Modifications of factory-set parameters for the battery configuration must be approved by the battery manufacturer.

Procedure:

1. Open the user interface (see Section 8.1, page 50).
 2. Log into the user interface (see Section 8.2, page 54).
 3. Call up the menu **Device Parameters**.
 4. Click on [**Edit parameters**].
 5. Log in using the SMA Grid Guard code to change those parameters designated by a lock (only for installers):
 - Select the menu **User Settings** (see Section 8.3, page 56).
 - In the subsequent context menu, select [**SMA Grid Guard login**].
 - Enter the SMA Grid Guard code and select [**Login**].
 6. Expand the parameter group that contains the parameter which is to be configured.
 7. Change the desired parameters.
 8. Select [**Save all**] to save the changes.
- The inverter parameters are set.

i Accepting the settings

Saving the made settings is indicated by an hourglass symbol on the user interface. If the DC voltage is sufficient, the data is transferred directly to the inverter and accepted. If the DC voltage is too low (e.g. when the battery is switched off), the settings are saved, but they cannot be directly transferred to or accepted by the inverter. As long as the inverter has not yet received and accepted the settings, the hourglass symbol will continue to be displayed on the user interface. The settings will be accepted when there is sufficient DC voltage applied and the inverter restarts. As soon as the hourglass symbol appears on the user interface, the settings have been saved. The settings will not be lost. You can log off of the user interface and leave the system.

8.9 Configuring the Country Data Set

⚠ QUALIFIED PERSON

By default, the inverter is set to a universally valid country data set. You must adjust the country data set for the installation site.

i The country data set must be set correctly.

If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which standards and directives are valid for your country or purpose, contact the grid operator.

i Change to the names and units of grid parameters to comply with the grid-connection requirements in accordance with Regulation (EU) 2016/631 (valid from April 27, 2019)

To comply with the EU grid-connection requirements (valid from April 27, 2019) the names and units of grid parameters were changed. This change is valid from firmware version $\geq 3.00.00.R$ if a country data set for fulfilling the EU grid-connection requirements (valid from 2019-04-27) is set. Names and units of grid parameters for inverters with firmware version $\leq 2.99.99.R$ are not affected by this change and remain valid. This also applies from firmware version $\geq 3.00.00.R$ if a country data set that is valid for countries outside the EU is set.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

Procedure:

- In the parameter group **Grid monitoring > Grid monitoring** select the parameter **Set country standard** and set the required country data set.

8.10 Configuring the Active Power Mode

QUALIFIED PERSON

Starting the installation assistant

1. Open the user interface (see Section 8.1, page 50).
2. Log in as **Installer**.
3. Start the installation assistant (see Section 8.4, page 59).
4. Select [**Save and continue**] after each step up until the step **Grid management service**.
5. Make the settings as described in the following.

Setting the connected line conductors

- In the tab **Active power mode**, select the line conductor to which the inverter is connected from the drop-down list **Connected line conductors**.

Make the settings for systems with manual setpoint

1. In the tab **Active power mode** set the switch **Grid connection point regulation** to [**On**].
2. Enter the total PV array power in the field **Nominal PV system power**.
3. In the drop-down list **Operating mode active power setting**, select whether active power setting is to be performed via a fixed specification in percent or in watts.
4. In the field **Set active power limit**, enter the value to which the active power at the grid-connection point is to be specified. The value must be set to **0** for zero power output.

Make the settings for systems with external setpoint

- In the tab **Active power mode** set the switch **Grid connection point regulation** to [**Off**].

Activating unbalanced load limitation

Depending on the country data set, unbalanced load limitation may have already been set. In this case, check the settings.

- If there are single-phase PV inverters in the system and unbalanced load limitation is requested, set **Unbalanced load limitation** to [**On**] and enter the maximum permissible unbalanced load in the field **Maximum unbalanced load**.
- If there are three-phase PV inverters in the system, set **Unbalanced load limitation** to [**Off**].

Configuring the Active Power Mode of the PV Inverters

1. Activate the PV inverter user interface.
2. Log in as **Installer**.
3. Start the installation assistant on the PV inverter user interface.
4. Select [**Save and continue**] until the step **Grid management service**.
5. Ensure that the function **Active power setpoint** is set to [**On**].
6. In the drop-down list **Operating mode active power**, select the entry **External setpoint**.
7. In the drop-down list **Fallback behavior**, select the entry **Apply fallback values**.

8. In the field **Fallback value of the maximum active power** enter the value to which the inverter is to limit its nominal power in case of a communication failure to the higher control unit at the end of the timeout time.
9. In the field **Timeout**, enter the time that the inverter is to wait before it limits its nominal power to the set fallback value.
10. If, in the event of a 0% or 0 W specification, the inverter is not permitted to feed small amounts of active power into the utility grid, select the entry **Yes** in the drop-down list **Grid disconnection for 0% active power setpoint**. This ensures that in the event of a 0% or 0 W specification, the inverter disconnects from the utility grid and does not feed in active power.

8.11 Configuring the Modbus Function

QUALIFIED PERSON

The Modbus interface is deactivated by default and the communication ports 502 set.

In order to access SMA inverters with SMA Modbus® or SunSpec® Modbus®, the Modbus interface must be activated. After activating the interface, the communication ports of both IP protocols can be changed. For information on commissioning and configuration of the Modbus interface, see the technical information "SMA and SunSpec Modbus® Interface" at www.SMA-Solar.com.

For information on which Modbus registers are supported, see the technical information "Modbus® parameters and measured values" at www.SMA-Solar.com.

Measures for data security during activated Modbus interface

If you activate the Modbus interface, there is a risk that unauthorized users may access and manipulate the data or devices in your PV system.

To ensure data security, take appropriate protective measures such as:

- Set up a firewall.
- Close unnecessary network ports.
- Only enable remote access via VPN tunnel.
- Do not set up port forwarding at the communication port in use.
- In order to deactivate the Modbus interface, reset the inverter to the default settings or deactivate the activated parameter again.

Deactivate the dynamic active power limitation for the PV inverters when controlled via Modbus

If the PV inverters and the battery inverter are controlled in a PV system via Modbus, the dynamic active power limitation of the PV inverters must be deactivated.

Procedure:

- Activate the Modbus interface and adjust the communication ports if necessary (see the technical information "SMA and SunSpec Modbus® Interface" at www.SMA-Solar.com).

8.12 Activating the Receipt of Control Signals (Only for Italy)

QUALIFIED PERSON

In order for PV systems in Italy to receive control commands from the grid operator, set the following parameters.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

Parameter	Value/range	Resolution	Default
Application ID	0 to 16384	1	16384
GOOSE-Mac address	01:0C:CD:01:00:00 to 01:0C:CD:01:02:00	1	01:0C:CD:01:00:00

Procedure:

1. Select the parameter group **External communication > IEC 61850 configuration**.
 2. In the field **Application ID**, enter the application ID of the grid operator gateway. You will receive this value from your grid operator. You can enter a value between 0 and 16384. The value 16384 indicates "deactivated".
 3. In the field **GOOSE-Mac address**, enter the MAC address of the grid operator gateway from which the inverter is to receive the control commands. You will receive this value from your grid operator.
- The receipt of control signals from the grid operator is activated.

8.13 Deactivating Grounding Conductor Monitoring

QUALIFIED PERSON

If the inverter is to be installed in an IT network or another grid configuration in which deactivation of the grounding conductor monitoring is required, deactivate the grounding conductor monitoring as follows.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

Procedure:

- In the parameter group **Grid monitoring > Grid monitoring > Country standard** set the parameter **PE connection monitoring** to **Off**.

8.14 Configuring the Energy Meter

You can add an energy meter to your PV system or replace an existing energy meter.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

i Removing a detected energy meter from the PV system

If only one energy meter is detected by the inverter, this will be added to the PV system automatically. Removal via the menu **Device configuration** is not possible in this case. To remove the energy meter from the PV system, proceed as follows:

- In the parameter group **System communication > Measured values > Meter on Speedwire**, set the parameter **Serial number** to any number (e.g. **1**). In this way, instead of the energy meter detected, the PV system will add a fictitious energy meter to which the inverter cannot establish communication.

Procedure:

1. Activate the user interface (see Section 8.1, page 50).
2. Log in as **Installer**.
3. Start the installation assistant (see Section 8.4, page 59).
4. In the context menu, select **[Starting the installation assistant]**.
5. Select **[Save and next]** until you get to the step **Meter configuration**.
6. Add or replace the desired energy meter.

8.15 Setting the heating mode for the battery

The inverter features a heating mode for "Tesla Daily Powerwall" batteries from Tesla Energy. The heating mode helps conserve the battery at low temperatures. This way, you can increase the service life of the battery. The heating mode is normally set such that the battery is automatically if temperatures are too low and enough charging power is available. The heating energy is covered by excess PV power.

The heating mode should always be activated if the battery is installed on a location where temperatures below -10°C are expected and, in this case, has to be charged immediately when excess PV power is available. The heating energy will be drawn from the utility grid.

The heating mode for the battery can be deactivated if the battery is installed on a location where the temperature does not fall below 10°C .

To modify the default setting of the heating mode for the battery, proceed as described below.

The basic procedure for changing operating parameters is explained in another section (see Section 8.8 "Changing Operating Parameters", page 62).

Procedure:

1. Select the parameter group **Battery > Operation > Battery**.
2. To activate the heating mode, set the parameter **Heating mode** to **On**.
3. To set the automatic heating mode, set the parameter **Heating mode** to **Automatic**.
4. To deactivate the heating mode, set the parameter **Heating mode** to **Off**.

8.16 Saving the Configuration in a File

You can save the current configuration of the inverter in a file. You can use this file as a data backup for this inverter and then import this file into this inverter again or another inverter from the same type or device family to configure the inverter. When saving, only the device parameters will be saved, not any passwords.

Procedure:

1. Activate the user interface (see Section 8.1, page 50).
2. Log into the user interface (see Section 8.2, page 54).
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Saving the configuration in a file**].
6. Follow the instructions in the dialog.

8.17 Adopting a Configuration from a File

QUALIFIED PERSON

To configure the inverter, you can adopt the configuration from a file. To be able to do this, you must first save the configuration of another inverter from the same type or device family in a file (see Section 8.16 "Saving the Configuration in a File", page 68). When saving, only the device parameters will be adopted, not any passwords.

Requirements:

- Changes to grid-relevant parameters must be approved by the responsible grid operator.
- The SMA Grid Guard code must be available (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Open the user interface (see Section 8.1, page 50).
2. Log into the user interface as an **Installer** (see Section 8.2, page 54).
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Adopting the configuration from a file**].
6. Follow the instructions in the dialog.

8.18 Updating the Firmware

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If the automatic firmware update function for the inverter or for the battery has not been enabled in the communication product (e.g. SMA Data Manager, Sunny Home Manager) or in Sunny Portal, you can update the inverter firmware and/or the battery firmware as described in the following. The inverter and the battery each have an individual firmware package. If the firmware of both the inverter and the battery is to be updated, the inverter firmware is to be updated first.

Faulty firmware update due to disconnecting the inverter from the utility grid.

The inverter must be connected to the utility grid during the firmware update. This will ensure a proper firmware update.

- Do not disconnect the inverter from the utility grid during the firmware update.

Requirements:

- To update the inverter firmware, the update file with the desired inverter firmware must be available. The update file is, for example, available for download on the product page of the inverter at www.SMA-Solar.com. To download the update file, it is necessary to enter the serial number of the inverter.
- To update the battery firmware, the update file with the desired battery firmware must be available. The update file is, for example, available for download on the product page of the inverter at www.SMA-Solar.com. To download the update file, it is necessary to enter the serial number of the inverter.

Procedure:

1. Open the user interface (see Section 8.1, page 50).
2. Log into the user interface (see Section 8.2, page 54).
3. Update the inverter firmware:
 - Select the menu **Device Configuration**.
 - In the inverter row, click on the gear icon and select **Update firmware**.
 - Select [**Browse**] and select the update file for the inverter.
 - Select **Update firmware**.
 - Follow the instructions in the dialog.
 - The inverter firmware has been updated.
4. Update the battery firmware:
 - Select the menu **Device Configuration**.
 - In the inverter row, click on the gear icon and select **Update firmware**.
 - Select [**Browse**] and select the update file for the battery.
 - Select **Update firmware**.
 - Follow the instructions in the dialog.
 - The battery firmware has been updated.

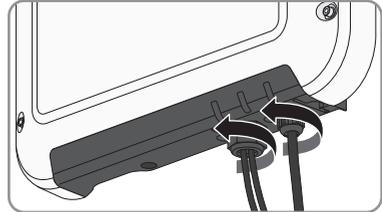
9 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

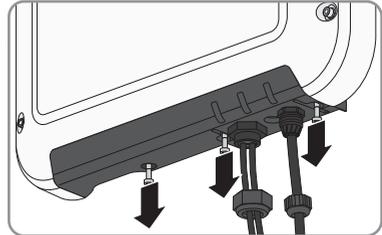
Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section. Always adhere to the prescribed sequence.

Procedure:

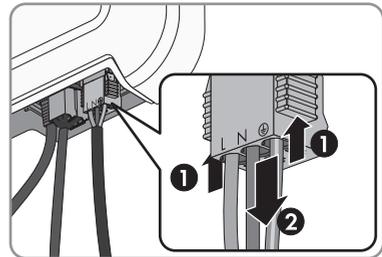
1. Disconnect the AC circuit breaker and secure it against reconnection.
2. If the battery has a load-break switch, then switch it off (see the documentation of the battery manufacturer).
3. Unscrew the swivel nuts from the cable glands on the connection cap.



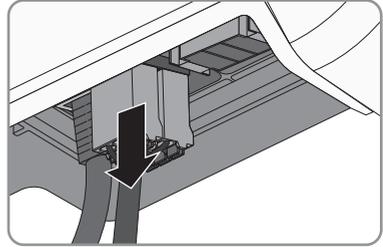
4. Unscrew the screws of the connection cap with a Torx screwdriver (TX 20) and remove the connection cap towards the bottom.



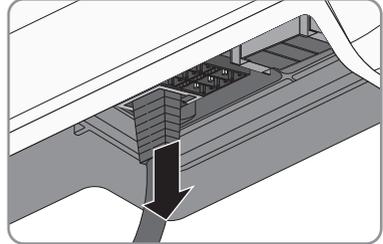
5. Ensure that no voltage is present between **L** and **N** and **L** and \ominus on the terminal block for the AC connection using a suitable measuring device. To do so, insert the test probe (maximum diameter: 2 mm) into each round opening of the terminal block.
6. Release and disconnect the terminal block using the sliders located at the side.



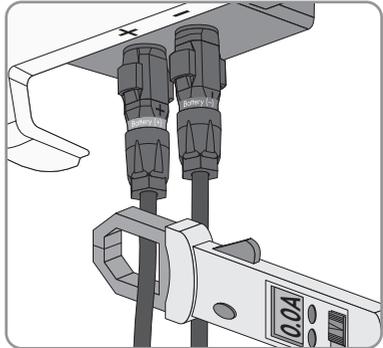
7. Remove the plug with the battery communication cable.



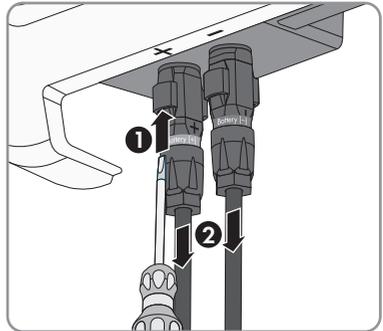
8. Release and remove the plug of the network cable.



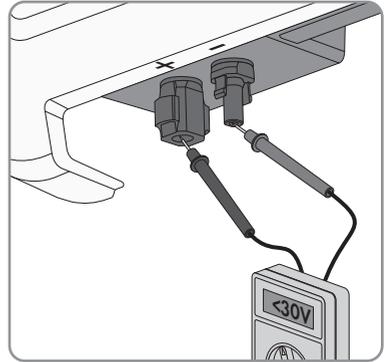
9. Use a current clamp to ensure that no current is present in the DC conductors.



10. Release and remove the DC connectors. To do this, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the slide slots and pull the DC connectors out in a downward direction. Do not pull on the cable.



11. Ensure that no voltage is present at the DC inputs on the inverter using a suitable measuring device.



10 Clean the product

NOTICE

Damage to the product due to cleaning agents

The use of cleaning agents may cause damage to the product and its components.

- Clean the product and all its components only with a cloth moistened with clear water.

Procedure:

- Ensure that the product is free of dust, foliage and other dirt.

11 Troubleshooting

11.1 Forgotten Password

If you have forgotten the password for the inverter, you can unlock the inverter with a Personal Unlocking Key (PUK). For each inverter, there is one PUK for each user group (**User** and **Installer**).
Tipp: With PV systems that are registered in a communication product, you can also assign a new password for the user group **Installer** via the communication product. The password for the user group **Installer** is the same as the system password in the communication product.

Procedure:

1. Request PUK (application form available at www.SMA-Solar.com).
2. Open the user interface (see Section 8.1, page 50).
3. Enter the PUK instead of the password into the field **Password**.
4. Select **Login**.
5. Call up the menu **Device Parameters**.
6. Click on [**Edit parameters**].
7. In the parameter group **User Rights > Access Control** change the password of the desired user group.
8. Select [**Save all**] to save the changes.

i Password assignment for inverters that are registered in a communication product

The password for the user group **Installer** is also the system password for the system in the communication product. Changing the password of the user group **Installer** can lead to the inverter no longer being able to be reached by the communication product.

- In the communication product, assign the changed password of the user group **Installer** as the new system password (see the manual of the communication product).

11.2 Event Messages

Event number	Message, cause and corrective measures
101 102 103 105	<p data-bbox="311 236 595 268">⚠ QUALIFIED PERSON</p> <p data-bbox="288 284 392 308">Grid fault</p> <p data-bbox="288 320 983 379">The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 387 508 411">Corrective measures:</p> <ul data-bbox="311 419 992 507" style="list-style-type: none"> <li data-bbox="311 419 893 443">• Ensure that the correct country data set has been configured. <li data-bbox="311 451 992 507">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p data-bbox="333 515 992 627">If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.</p> <p data-bbox="333 635 977 691">If the grid voltage is permanently within the permissible range and this message is still displayed, contact Service.</p>
202 203 205 206	<p data-bbox="311 710 595 742">⚠ QUALIFIED PERSON</p> <p data-bbox="288 758 392 782">Grid fault</p> <p data-bbox="288 794 992 874">The utility grid has been disconnected, the AC cable is damaged or the grid voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 882 508 906">Corrective measures:</p> <ul data-bbox="311 914 992 1106" style="list-style-type: none"> <li data-bbox="311 914 748 938">• Ensure that the circuit breaker is switched on. <li data-bbox="311 946 932 1002">• Ensure that the AC cable is not damaged and that it is connected correctly. <li data-bbox="311 1010 910 1034">• Ensure that the country data set has been configured correctly. <li data-bbox="311 1042 992 1106">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p data-bbox="333 1114 992 1225">If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.</p> <p data-bbox="333 1233 977 1289">If the grid voltage is permanently within the permissible range and this message is still displayed, contact Service.</p>

Event number	Message, cause and corrective measures
301	<p data-bbox="311 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 393 260">Grid fault</p> <p data-bbox="288 272 994 384">The ten-minute average value of the grid voltage is no longer within the permissible range. The grid voltage or grid impedance at the connection point is too high. The inverter disconnects from the utility grid to maintain power quality.</p> <p data-bbox="288 395 508 419">Corrective measures:</p> <ul data-bbox="311 432 994 667" style="list-style-type: none"> <li data-bbox="311 432 994 483">• During the feed-in operation, check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits. If the grid voltage is permanently within the permissible range and this message is still displayed, contact Service.
302	<p data-bbox="311 683 596 715">⚠ QUALIFIED PERSON</p> <p data-bbox="288 730 596 754">Active power limit AC voltage</p> <p data-bbox="288 767 975 818">The inverter has reduced its power due to a too-high grid voltage to ensure grid stability.</p> <p data-bbox="288 831 508 855">Corrective measures:</p> <ul data-bbox="311 868 1005 1007" style="list-style-type: none"> <li data-bbox="311 868 1005 1007">• If possible, check the grid voltage and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.
401 404	<p data-bbox="311 1026 596 1058">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1074 393 1098">Grid fault</p> <p data-bbox="288 1110 1005 1161">The inverter has disconnected from the utility grid. A stand-alone grid or a very large change in the power frequency was detected.</p> <p data-bbox="288 1174 508 1198">Corrective measures:</p> <ul data-bbox="311 1211 1005 1233" style="list-style-type: none"> <li data-bbox="311 1211 1005 1233">• Check the grid connection for significant short-term frequency fluctuations.

Event number	Message, cause and corrective measures
501	<p data-bbox="311 183 593 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 392 263">Grid fault</p> <p data-bbox="288 271 991 327">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 996 582" style="list-style-type: none"><li data-bbox="311 367 996 422">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.
507	<p data-bbox="311 590 593 627">⚠ QUALIFIED PERSON</p> <p data-bbox="288 638 621 670">Active power limit AC frequency</p> <p data-bbox="288 678 985 734">The inverter has reduced its power due to a too-high power frequency to ensure grid stability.</p> <p data-bbox="288 742 509 766">Corrective measures:</p> <ul data-bbox="311 774 1002 949" style="list-style-type: none"><li data-bbox="311 774 1002 949">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.
601	<p data-bbox="311 957 593 994">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1005 392 1037">Grid fault</p> <p data-bbox="288 1045 980 1101">The inverter has detected an excessively high proportion of direct current in the grid current.</p> <p data-bbox="288 1109 509 1133">Corrective measures:</p> <ul data-bbox="311 1141 968 1240" style="list-style-type: none"><li data-bbox="311 1141 739 1173">• Check the grid connection for direct current.<li data-bbox="311 1181 968 1240">• If this message is displayed frequently, contact the grid operator and check whether the monitoring threshold on the inverter can be raised.

Event number	Message, cause and corrective measures
701	<p data-bbox="311 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 744 263">Frequency not permitted > Check parameter</p> <p data-bbox="288 271 991 327">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 996 582" style="list-style-type: none"> <li data-bbox="311 367 907 422">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.
901	<p data-bbox="311 590 596 627">⚠ QUALIFIED PERSON</p> <p data-bbox="288 643 677 670">No PE connection > Check connection</p> <p data-bbox="288 678 767 710">The grounding conductor is not correctly connected.</p> <p data-bbox="288 718 509 742">Corrective measures:</p> <ul data-bbox="311 750 879 782" style="list-style-type: none"> <li data-bbox="311 750 879 782">• Ensure that the grounding conductor is correctly connected.
1001	<p data-bbox="311 790 596 826">⚠ QUALIFIED PERSON</p> <p data-bbox="288 842 649 869">L / N swapped > Check connection</p> <p data-bbox="288 877 649 901">The connection of L and N is swapped.</p> <p data-bbox="288 909 509 933">Corrective measures:</p> <ul data-bbox="311 941 744 973" style="list-style-type: none"> <li data-bbox="311 941 744 973">• Ensure that L and N are correctly connected.
1101	<p data-bbox="311 989 596 1026">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1042 660 1069">Installation fault > Check connection</p> <p data-bbox="288 1077 688 1101">A second line conductor is connected to N.</p> <p data-bbox="288 1109 509 1133">Corrective measures:</p> <ul data-bbox="311 1141 666 1173" style="list-style-type: none"> <li data-bbox="311 1141 666 1173">• Connect the neutral conductor to N.

Event number	Message, cause and corrective measures
1302	<p data-bbox="311 188 595 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 1001 293">Waiting for grid voltage > Installation failure grid connection > Check grid and fuses</p> <p data-bbox="288 300 490 325">L or N not connected.</p> <p data-bbox="288 335 508 360">Corrective measures:</p> <ul data-bbox="311 370 931 491" style="list-style-type: none"> <li data-bbox="311 370 658 395">• Ensure that L and N are connected. <li data-bbox="311 405 931 459">• Ensure that the AC cable is not damaged and that it is connected correctly. <li data-bbox="311 469 745 494">• Ensure that the circuit breaker is switched on.
1501	<p data-bbox="311 507 595 539">⚠ QUALIFIED PERSON</p> <p data-bbox="288 561 528 587">Reconnection fault grid</p> <p data-bbox="288 596 994 676">The changed country data set or the value of a parameter you have set does not correspond to the local requirements. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 686 508 711">Corrective measures:</p> <ul data-bbox="311 721 1005 778" style="list-style-type: none"> <li data-bbox="311 721 1005 778">• Ensure that the country data set has been configured correctly. To do this, select the parameter Set country standard and check the value.
3301	<p data-bbox="311 794 595 826">⚠ QUALIFIED PERSON</p> <p data-bbox="288 849 490 874">Unstable operation</p> <p data-bbox="288 884 1001 932">There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 941 508 967">Corrective measures:</p> <ul data-bbox="311 976 853 1002" style="list-style-type: none"> <li data-bbox="311 976 853 1002">• Ensure that the correct battery type has been configured.
3401	<p data-bbox="311 1018 595 1050">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1072 696 1098">DC overvoltage > Disconnect generator</p> <p data-bbox="288 1107 822 1133">Overvoltage at the DC input. This can destroy the inverter.</p> <p data-bbox="288 1142 508 1168">Corrective measures:</p> <ul data-bbox="311 1177 983 1390" style="list-style-type: none"> <li data-bbox="311 1177 904 1203">• Immediately disconnect the inverter from all voltage sources. <li data-bbox="311 1212 983 1292">• Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum DC voltage of the inverter, reconnect the DC connectors to the inverter. <li data-bbox="311 1302 949 1359">• If the DC voltage is above the maximum DC voltage of the inverter, ensure that the correct battery has been selected. <li data-bbox="311 1369 864 1394">• If this message is repeated frequently, contact the Service.

Event number	Message, cause and corrective measures
3501	<p data-bbox="291 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="291 231 660 263">Insulation failure > Check generator</p> <p data-bbox="291 271 800 295">The inverter has detected a ground fault on the DC side.</p> <p data-bbox="291 303 509 327">Corrective measures:</p> <ul data-bbox="308 335 812 367" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.
3601	<p data-bbox="291 383 593 414">⚠ QUALIFIED PERSON</p> <p data-bbox="291 430 694 462">High discharge curr. > Check generator</p> <p data-bbox="291 470 946 518">The leakage current of the inverter and the battery is too high. There is a ground fault, a residual current or a malfunction.</p> <p data-bbox="291 526 985 614">The inverter interrupts parallel grid operation immediately after exceeding a threshold. When the fault is eliminated, the inverter automatically reconnects to the utility grid.</p> <p data-bbox="291 622 509 646">Corrective measures:</p> <ul data-bbox="308 654 812 686" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.
3701	<p data-bbox="291 702 593 734">⚠ QUALIFIED PERSON</p> <p data-bbox="291 750 744 782">Residual current too high > Check generator</p> <p data-bbox="291 790 985 837">The inverter detected a residual current due to brief grounding of the battery or the DC cabling.</p> <p data-bbox="291 845 509 869">Corrective measures:</p> <ul data-bbox="308 877 812 909" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.
3801	<p data-bbox="291 925 593 957">⚠ QUALIFIED PERSON</p> <p data-bbox="291 973 644 1005">DC overcurrent > Check generator</p> <p data-bbox="291 1013 980 1037">Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.</p> <p data-bbox="291 1045 509 1069">Corrective measures:</p> <ul data-bbox="308 1077 985 1133" style="list-style-type: none"> • If this message is displayed frequently, ensure that the battery has been correctly connected and that the correct battery has been selected.
6603 6604	<p data-bbox="291 1149 593 1181">⚠ QUALIFIED PERSON</p> <p data-bbox="291 1197 560 1228">Self-diagnosis > Overload</p> <p data-bbox="291 1236 711 1260">The cause must be determined by the Service.</p> <p data-bbox="291 1268 509 1292">Corrective measures:</p> <ul data-bbox="308 1300 487 1332" style="list-style-type: none"> • Contact Service.

Event number	Message, cause and corrective measures
6607 6608	<p>⚠ QUALIFIED PERSON</p> <p>Self-diagnosis > Battery overcurrent</p> <p>The battery detected an overcurrent on the DC side.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the battery is correct. • If this message is displayed frequently, contact the Service.
6609 6610	<p>⚠ QUALIFIED PERSON</p> <p>Self-diagnosis > Battery overvoltage</p> <p>The battery has detected DC overvoltage.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the battery is correct. • If this message is displayed frequently, contact the Service.
6701 6702	<p>⚠ QUALIFIED PERSON</p> <p>Communication disturbed</p> <p>Error in the communication processor. The inverter is still in parallel grid operation.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed frequently, contact the Service.
7001 7002	<p>⚠ QUALIFIED PERSON</p> <p>Sensor fault</p> <p>A temperature sensor in the inverter is defective and the inverter interrupts the feed-in operation. The cause must be determined by the Service.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact Service.
7201 7202	<p>⚠ QUALIFIED PERSON</p> <p>Data stor. not poss.</p> <p>Internal error. The inverter is still in parallel grid operation.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact Service.

Event number	Message, cause and corrective measures
7303	<p data-bbox="311 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 540 260">Update main CPU failed</p> <p data-bbox="288 272 708 296">The cause must be determined by the Service.</p> <p data-bbox="288 309 507 333">Corrective measures:</p> <ul data-bbox="311 341 484 365" style="list-style-type: none"> <li data-bbox="311 341 484 365">• Contact Service.
7324	<p data-bbox="311 387 596 419">⚠ QUALIFIED PERSON</p> <p data-bbox="288 435 566 459">Wait for update conditions</p> <p data-bbox="288 472 988 523">The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p> <p data-bbox="288 536 507 560">Corrective measures:</p> <ul data-bbox="311 568 897 659" style="list-style-type: none"> <li data-bbox="311 568 460 592">• Retry update. <li data-bbox="311 600 897 624">• Ensure that the selected update file is suitable for this inverter. <li data-bbox="311 632 832 659">• If this message is displayed again, contact the Service.
7331	<p data-bbox="288 679 546 703">Update transport started</p> <p data-bbox="288 716 546 740">Update file is being copied.</p>
7332	<p data-bbox="288 754 574 778">Update transport successful</p> <p data-bbox="288 791 916 815">Update file was copied successfully to the inverter's internal memory.</p>
7333	<p data-bbox="311 829 596 861">⚠ QUALIFIED PERSON</p> <p data-bbox="288 877 533 901">Update transport failed</p> <p data-bbox="288 914 997 997">Update file could not be copied to the inverter's internal memory. In the event of connection with the inverter via WLAN, a poor connection quality can be the cause.</p> <p data-bbox="288 1010 507 1034">Corrective measures:</p> <ul data-bbox="311 1042 988 1165" style="list-style-type: none"> <li data-bbox="311 1042 460 1066">• Retry update. <li data-bbox="311 1074 988 1125">• For WLAN connection: Improve the WLAN connection quality (e.g., via WLAN repeater) or establish connection with the inverter via Ethernet. <li data-bbox="311 1133 832 1160">• If this message is displayed again, contact the Service.
7337	<p data-bbox="311 1182 596 1214">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1230 488 1254">Update BMS failed</p> <p data-bbox="288 1267 745 1291">The firmware of the battery could not be updated.</p> <p data-bbox="288 1303 507 1327">Corrective measures:</p> <ul data-bbox="311 1335 832 1426" style="list-style-type: none"> <li data-bbox="311 1335 776 1359">• Make sure that the correct update file was used. <li data-bbox="311 1367 460 1391">• Retry update. <li data-bbox="311 1399 832 1426">• If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
7341	<p>Update Bootloader The inverter is performing a bootloader update.</p>
7342	<p>⚠ QUALIFIED PERSON</p> <p>Update Bootloader failed The bootloader update failed.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • If this message is displayed again, contact the Service.
7347	<p>⚠ QUALIFIED PERSON</p> <p>Incompatible file The configuration file is not suitable for this inverter.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the selected configuration file is suitable for this inverter. • Retry import.
7348	<p>⚠ QUALIFIED PERSON</p> <p>Incorrect file format The configuration file is not of the required format or is damaged.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the selected configuration file is of the required format and is not damaged. • Retry import.
7349	<p>⚠ QUALIFIED PERSON</p> <p>Incorrect login rights for configuration file The user group logged in does not have the user rights necessary to be able to import a configuration.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Log in as Installer. • Import configuration file again.
7350	<p>Transfer of a configuration file has started The configuration file is being transferred.</p>
7351	<p>Update WLAN The inverter is updating the WLAN module.</p>

Event number	Message, cause and corrective measures
7352	<p data-bbox="292 181 594 217">⚠ QUALIFIED PERSON</p> <p data-bbox="292 233 613 260">Update of WLAN not successful</p> <p data-bbox="292 268 658 295">The update of the WLAN module failed.</p> <p data-bbox="292 303 508 330">Corrective measures:</p> <ul data-bbox="311 338 832 399" style="list-style-type: none"> <li data-bbox="311 338 460 365">• Retry update. <li data-bbox="311 373 832 399">• If this message is displayed again, contact the Service.
7353	<p data-bbox="292 413 577 440">Update time zone database</p> <p data-bbox="292 448 729 475">The inverter is updating the time zone database.</p>
7354	<p data-bbox="292 489 594 525">⚠ QUALIFIED PERSON</p> <p data-bbox="292 541 749 568">Update of time zone database not successful</p> <p data-bbox="292 576 701 603">The update of the time zone database failed.</p> <p data-bbox="292 611 508 638">Corrective measures:</p> <ul data-bbox="311 646 832 707" style="list-style-type: none"> <li data-bbox="311 646 460 673">• Retry update. <li data-bbox="311 681 832 707">• If this message is displayed again, contact the Service.
7355	<p data-bbox="292 721 449 748">Update WebUI</p> <p data-bbox="292 756 743 783">The inverter is updating the inverter user interface.</p>
7356	<p data-bbox="292 798 594 833">⚠ QUALIFIED PERSON</p> <p data-bbox="292 849 656 876">Update of the WebUI not successful</p> <p data-bbox="292 884 714 911">The update of the inverter user interface failed.</p> <p data-bbox="292 919 508 946">Corrective measures:</p> <ul data-bbox="311 954 832 1015" style="list-style-type: none"> <li data-bbox="311 954 460 981">• Retry update. <li data-bbox="311 989 832 1015">• If this message is displayed again, contact the Service.
7701	<p data-bbox="292 1031 594 1066">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1082 542 1109">Grid disconnection point</p> <p data-bbox="292 1117 608 1144">Grid relay of the inverter defective.</p> <p data-bbox="292 1152 508 1179">Corrective measures:</p> <ul data-bbox="311 1187 486 1214" style="list-style-type: none"> <li data-bbox="311 1187 486 1214">• Contact Service.
7702	<p data-bbox="292 1224 594 1259">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1275 418 1302">Relay defect</p> <p data-bbox="292 1310 608 1337">Grid relay of the inverter defective.</p> <p data-bbox="292 1345 508 1372">Corrective measures:</p> <ul data-bbox="311 1380 486 1407" style="list-style-type: none"> <li data-bbox="311 1380 486 1407">• Contact Service.

Event number	Message, cause and corrective measures
7703	<p data-bbox="311 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 434 263">24h relay test</p> <p data-bbox="288 271 442 298">Relay test failed.</p> <p data-bbox="288 306 509 333">Corrective measures:</p> <ul data-bbox="311 341 834 368" style="list-style-type: none"> <li data-bbox="311 341 834 368">• If this message is displayed again, contact the Service.
8003	<p data-bbox="311 383 596 419">⚠ QUALIFIED PERSON</p> <p data-bbox="288 435 613 462">Active power limit Temperature</p> <p data-bbox="288 470 1002 523">The inverter has reduced its power output for more than ten minutes due to excessive temperature.</p> <p data-bbox="288 531 509 558">Corrective measures:</p> <ul data-bbox="311 566 980 726" style="list-style-type: none"> <li data-bbox="311 566 980 622">• Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush. <li data-bbox="311 630 767 657">• Ensure that the inverter has sufficient ventilation. <li data-bbox="311 665 968 692">• Ensure that the ambient temperature +40 °C has not been exceeded. <li data-bbox="311 700 918 726">• Ensure that the inverter is not exposed to direct solar irradiation.
9002	<p data-bbox="311 742 596 778">⚠ QUALIFIED PERSON</p> <p data-bbox="288 794 599 821">SMA Grid Guard code invalid</p> <p data-bbox="288 829 1002 882">The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.</p> <p data-bbox="288 890 509 917">Corrective measures:</p> <ul data-bbox="311 925 711 952" style="list-style-type: none"> <li data-bbox="311 925 711 952">• Enter the correct SMA Grid Guard code.
9003	<p data-bbox="288 965 532 992">Grid parameter locked</p> <p data-bbox="288 1000 1002 1085">Changes to the grid parameters are now blocked. In order to be able to make changes to the grid parameters, from now on you must log in using the SMA Grid Guard code.</p>
9005	<p data-bbox="311 1101 596 1137">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1153 565 1181">Waiting for host computer</p> <p data-bbox="288 1189 666 1216">This error can have the following causes:</p> <ul data-bbox="311 1224 957 1276" style="list-style-type: none"> <li data-bbox="311 1224 756 1251">• The parameters to be changed are protected. <li data-bbox="311 1259 957 1276">• The DC voltage at the DC input is not sufficient to run the main CPU. <p data-bbox="288 1284 509 1311">Corrective measures:</p> <ul data-bbox="311 1319 935 1412" style="list-style-type: none"> <li data-bbox="311 1319 644 1347">• Enter the SMA Grid Guard code. <li data-bbox="311 1355 935 1412">• Ensure that at least the DC start voltage is available (green LED is flashing, pulsing or glowing).

Event number	Message, cause and corrective measures
9007	<p data-bbox="311 185 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 434 260">Abort self-test</p> <p data-bbox="288 272 650 296">The self-test (Italy only) was terminated.</p> <p data-bbox="288 309 508 333">Corrective measures:</p> <ul data-bbox="311 341 706 365" style="list-style-type: none"> <li data-bbox="311 341 706 365">• Ensure that the AC connection is correct.
9301	<p data-bbox="311 379 596 414">⚠ QUALIFIED PERSON</p> <p data-bbox="288 430 518 454">New battery detected</p> <p data-bbox="288 467 658 491">The inverter has detected a new battery.</p> <p data-bbox="288 504 508 528">Corrective measures:</p> <ul data-bbox="311 536 1003 679" style="list-style-type: none"> <li data-bbox="311 536 1003 616">• Ensure that the correct battery type has been configured when replacing the battery. To do so, start the installation assistant and check the battery type set. <li data-bbox="311 628 1003 679">• If this message occurs even though the battery was not replaced, contact Service .
9303	<p data-bbox="311 699 596 734">⚠ QUALIFIED PERSON</p> <p data-bbox="288 750 701 774">The service life of the battery is expiring</p> <p data-bbox="288 786 936 837">The minimum service life defined by the battery manufacturer has been reached.</p> <p data-bbox="288 850 508 874">Corrective measures:</p> <ul data-bbox="311 882 904 906" style="list-style-type: none"> <li data-bbox="311 882 904 906">• Contact the battery manufacturer and discuss what to do next.
9304	<p data-bbox="311 922 596 957">⚠ QUALIFIED PERSON</p> <p data-bbox="288 973 846 997">Fault in battery connection > Check battery connection</p> <p data-bbox="288 1010 647 1034">This message can have several causes:</p> <ul data-bbox="311 1042 960 1169" style="list-style-type: none"> <li data-bbox="311 1042 960 1093">• The battery power cable is either not connected to the battery or not properly connected to the inverter. <li data-bbox="311 1106 960 1129">• The CAN communication between battery and inverter is disturbed. <li data-bbox="311 1142 521 1166">• The battery is faulty. <p data-bbox="288 1177 508 1201">Corrective measures:</p> <ul data-bbox="311 1209 992 1457" style="list-style-type: none"> <li data-bbox="311 1209 992 1260">• Make sure that the battery communication cable and the battery power cable are properly connected to the inverter as well as to the battery. <li data-bbox="311 1273 916 1324">• Ensure that the firmware versions of the inverter and battery are compatible with each other. <li data-bbox="311 1337 729 1361">• Ensure the perfect operation of the battery. <li data-bbox="311 1374 972 1457">• If the battery communication cable and the battery power cable have been properly connected and the correct operation of the battery is ensured, contact Service.

Event number	Message, cause and corrective measures
9305	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 588 263">Unauthorized battery system</p> <p data-bbox="288 271 711 295">The inverter has detected an incorrect battery.</p> <p data-bbox="288 303 509 327">Corrective measures:</p> <ul data-bbox="311 335 929 391" style="list-style-type: none"> • Only operate batteries with the inverter approved by SMA Solar Technology AG.
9306	<p data-bbox="311 406 593 438">⚠ QUALIFIED PERSON</p> <p data-bbox="288 454 576 486">Deviation in battery voltage</p> <p data-bbox="288 494 996 550">Too high a deviation between the battery and DC voltage of inverter was detected.</p> <p data-bbox="288 558 509 582">Corrective measures:</p> <ul data-bbox="311 590 912 646" style="list-style-type: none"> • Make sure that the battery power cable is correctly connected. • If this error is repeated frequently, contact Service.
9307	<p data-bbox="311 662 593 694">⚠ QUALIFIED PERSON</p> <p data-bbox="288 710 627 742">Battery system defective (ID [xx])</p> <p data-bbox="288 750 677 774">The battery has detected an internal error.</p> <p data-bbox="288 782 509 805">Corrective measures:</p> <ul data-bbox="311 813 1002 965" style="list-style-type: none"> • Note the displayed error ID and look for that ID in the battery manufacturer's error list. • Carry out the corrective measures indicated in the battery manufacturer's error list. • Contact Service.
9308	<p data-bbox="311 989 593 1021">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1037 968 1069">Communication fault in battery system > Check battery connection</p> <p data-bbox="288 1077 851 1101">The inverter receives invalid data or no data from the battery.</p> <p data-bbox="288 1109 509 1133">Corrective measures:</p> <ul data-bbox="311 1141 1008 1324" style="list-style-type: none"> • Make sure that the battery communication cable is properly connected to the inverter as well as to the battery. • Ensure that the battery has been approved for operation with the inverter. • Ensure the perfect operation of the battery. • If the battery communication cable has been properly connected and the correct operation of the battery is ensured, contact Service.

Event number	Message, cause and corrective measures
9311	<p data-bbox="294 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="294 236 589 263">Battery cell overvoltage fault</p> <p data-bbox="294 272 908 300">The battery has detected an overvoltage of at least one battery cell.</p> <p data-bbox="294 309 508 336">Corrective measures:</p> <ul data-bbox="311 344 949 432" style="list-style-type: none"> <li data-bbox="311 344 949 395">• If a service contract with SMA Solar Technology AG exists, contact Service. <li data-bbox="311 403 788 432">• If no service contract exists, contact your supplier.
9312	<p data-bbox="294 446 596 483">⚠ QUALIFIED PERSON</p> <p data-bbox="294 499 602 526">Battery cell undervoltage fault</p> <p data-bbox="294 536 921 563">The battery has detected an undervoltage of at least one battery cell.</p> <p data-bbox="294 572 508 600">Corrective measures:</p> <ul data-bbox="311 608 949 695" style="list-style-type: none"> <li data-bbox="311 608 949 659">• If a service contract with SMA Solar Technology AG exists, contact Service. <li data-bbox="311 667 788 695">• If no service contract exists, contact your supplier.
9313	<p data-bbox="294 702 596 738">⚠ QUALIFIED PERSON</p> <p data-bbox="294 754 869 782">Low temperature fault in battery > Check installation site</p> <p data-bbox="294 791 975 847">The lower limit of the temperature range approved by the battery manufacturer has been exceeded.</p> <p data-bbox="294 857 508 884">Corrective measures:</p> <ul data-bbox="311 892 975 948" style="list-style-type: none"> <li data-bbox="311 892 975 948">• Make sure that the ambient conditions of the battery manufacturer are complied with.
9314	<p data-bbox="294 957 596 994">⚠ QUALIFIED PERSON</p> <p data-bbox="294 1010 872 1037">Overtemperature fault in battery > Check installation site</p> <p data-bbox="294 1046 975 1102">The upper limit of the temperature range approved by the battery manufacturer has been exceeded.</p> <p data-bbox="294 1112 508 1139">Corrective measures:</p> <ul data-bbox="311 1147 975 1203" style="list-style-type: none"> <li data-bbox="311 1147 975 1203">• Make sure that the ambient conditions of the battery manufacturer are complied with.
9315	<p data-bbox="294 1212 596 1249">⚠ QUALIFIED PERSON</p> <p data-bbox="294 1265 552 1292">Battery imbalancing fault</p> <p data-bbox="294 1302 891 1329">The states of charge of the individual battery cells differ too much.</p> <p data-bbox="294 1339 508 1366">Corrective measures:</p> <ul data-bbox="311 1374 949 1461" style="list-style-type: none"> <li data-bbox="311 1374 949 1425">• If a service contract with SMA Solar Technology AG exists, contact Service. <li data-bbox="311 1433 788 1461">• If no service contract exists, contact your supplier.

Event number	Message, cause and corrective measures
9334	<p>Battery charging test</p> <p>The battery test for charging the battery was started.</p>
9335	<p>Discharge battery test</p> <p>The battery test for discharging the battery was started.</p>
9336	<p>⚠ QUALIFIED PERSON</p> <p>Start conditions for battery test not fulfilled</p> <p>The battery test cannot be started since the start conditions for the battery test are not fulfilled.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the battery is not charged above 98% and that the battery state of charge is not 2% above the lower discharge threshold. • Ensure the perfect operation of the battery. • Make sure that the grid connection conditions are met.
9337	<p>Charge battery test successful</p> <p>The battery test for charging the battery was carried out successfully.</p>
9338	<p>Battery discharging test successful</p> <p>The battery test for discharging the battery was carried out successfully.</p>
9339	<p>⚠ QUALIFIED PERSON</p> <p>Battery charging test failed</p> <p>The battery test for charging the battery was not carried out successfully. The power required in the test was not reached. The battery or the inverter limited the power due to normative requirements.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Carry out the test again at a later time. <p>If a power limitation occurred due to normative requirements, check whether the battery is charging after commissioning.</p>
9340	<p>⚠ QUALIFIED PERSON</p> <p>Battery discharging test failed</p> <p>The battery test for discharging the battery was not carried out successfully.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Make sure that the battery has been approved for operation with the inverter. • Carry out the test again at a later time. • Make sure that the inverter and the battery are not currently in a power reduction state.

Event number	Message, cause and corrective measures
9345	<p data-bbox="311 183 599 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 716 263">Battery charging for start process too low</p> <p data-bbox="288 271 1002 383">The state of charge of the battery is too low for the start process. The inverter can no longer charge the battery by itself. The battery must be charged immediately by a qualified person. This message causes a permanent operation inhibition, which must be reset manually.</p> <p data-bbox="288 391 509 422">Corrective measures:</p> <ul data-bbox="311 422 952 518" style="list-style-type: none"> <li data-bbox="311 422 952 486">• If a service contract with SMA Solar Technology AG exists, contact Service and instruct them to manually charge the battery. <li data-bbox="311 486 789 518">• If no service contract exists, contact your supplier.
9347	<p data-bbox="288 526 554 558">Battery is reporting event</p> <p data-bbox="288 566 677 598">The battery has detected an internal error.</p> <p data-bbox="288 598 509 630">Corrective measures:</p> <ul data-bbox="311 630 1002 790" style="list-style-type: none"> <li data-bbox="311 630 901 694">• Note the displayed error ID and look for that ID in the battery manufacturer's error list. <li data-bbox="311 694 1002 758">• Carry out the corrective measures indicated in the battery manufacturer's error list. <li data-bbox="311 758 487 790">• Contact Service.
10100	<p data-bbox="288 798 744 829">Parameter [xx] set successfully. [xx] to [xx]</p> <p data-bbox="288 837 767 869">The displayed parameter was successfully changed.</p>
10101	<p data-bbox="288 877 750 909">Setting of parameter [xx] failed. [xx] to [xx]</p> <p data-bbox="288 917 688 949">The displayed parameter was not changed.</p> <p data-bbox="288 949 509 981">Corrective measures:</p> <ul data-bbox="311 981 879 1045" style="list-style-type: none"> <li data-bbox="311 981 879 1013">• Make sure thresholds of the parameters are complied with. <li data-bbox="311 1013 610 1045">• Change the parameter again.
10102	<p data-bbox="288 1053 744 1085">Parameter [xx] set successfully. [xx] to [xx]</p> <p data-bbox="288 1093 767 1125">The displayed parameter was successfully changed.</p>
10103	<p data-bbox="311 1133 599 1165">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1181 750 1212">Setting of parameter [xx] failed. [xx] to [xx]</p> <p data-bbox="288 1220 688 1252">The displayed parameter was not changed.</p> <p data-bbox="288 1252 509 1284">Corrective measures:</p> <ul data-bbox="311 1284 879 1350" style="list-style-type: none"> <li data-bbox="311 1284 879 1316">• Make sure thresholds of the parameters are complied with. <li data-bbox="311 1316 610 1350">• Change the parameter again.

Event number	Message, cause and corrective measures
10110	<p>Time synchronization failed: [x]</p> <p>No time information could be called up from the set NTP server.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the NTP server was configured correctly. • Ensure that the inverter is integrated into a local network with Internet connection.
10118	<p>Parameter upload complete</p> <p>The configuration file was loaded successfully.</p>
10248 10249	<p>Load reduced through device reduction or increase of query interval</p> <p>The network is busy. Data exchange between the devices is not at an optimum and is greatly delayed.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Reduce the number of devices in the network. • If necessary, increase the data query intervals. • If necessary, reduce the number of devices in the network.
10250	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: package error rate [ok / high]</p> <p>The package error rate has changed. If the package error rate is high, the network is overloaded or the connection to the network switch or DHCP server (router) is disturbed.</p> <p>Corrective measures if the package error rate is high:</p> <ul style="list-style-type: none"> • Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. • If necessary, increase the data query intervals. • If necessary, reduce the number of devices in the network.
10251	<p>[Interface]: communication status goes to [OK / Warning / Error / Not connected]</p> <p>The communication status to the network switch or DHCP server (router) has changed. An additional error message may be displayed.</p>

Event number	Message, cause and corrective measures
10252	<p data-bbox="311 188 594 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 669 261">[Interface]: communication disrupted</p> <p data-bbox="288 272 685 298">There is no valid signal on the network line.</p> <p data-bbox="288 309 508 335">Corrective measures:</p> <ul data-bbox="311 344 1012 491" style="list-style-type: none"> <li data-bbox="311 344 1012 427">• Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. <li data-bbox="311 437 1012 491">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10253	<p data-bbox="311 502 594 534">⚠ QUALIFIED PERSON</p> <p data-bbox="288 550 891 576">[Interface]: connection speed goes to [100 Mbit / 10 Mbit]</p> <p data-bbox="288 587 1003 670">The data transfer rate has changed. The cause for the status [10 Mbit] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p data-bbox="288 681 752 707">Corrective measures if the status is [10 Mbit]:</p> <ul data-bbox="311 716 1012 863" style="list-style-type: none"> <li data-bbox="311 716 1012 799">• Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. <li data-bbox="311 809 1012 863">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10254	<p data-bbox="311 879 594 911">⚠ QUALIFIED PERSON</p> <p data-bbox="288 927 752 952">[Interface]: duplex mode goes to [Full / Half]</p> <p data-bbox="288 963 1003 1046">The duplex mode (data transfer mode) has changed. The cause for the status [Half] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p data-bbox="288 1058 715 1083">Corrective measures if the status is [Half]:</p> <ul data-bbox="311 1093 1012 1240" style="list-style-type: none"> <li data-bbox="311 1093 1012 1176">• Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. <li data-bbox="311 1185 1012 1240">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10255	<p data-bbox="288 1256 596 1281">[Interface]: Network load OK</p> <p data-bbox="288 1292 900 1318">The network load has returned to a normal range after being busy.</p>

Event number	Message, cause and corrective measures
10282	<p>[User group]-Login via [protocol] locked</p> <p>After several incorrect login attempts, login has been blocked for a limited time. In this case, the User login will be blocked for 15 minutes, the Grid Guard login for 12 hours.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Wait until the given time has expired and then retry login.
10283	<p>WLAN module faulty</p> <p>The WLAN module integrated in the inverter is defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact Service.
10284	<p>⚠ QUALIFIED PERSON</p> <p>No WLAN connection possible</p> <p>The inverter does not currently have a WLAN connection to the selected network.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the SSID, the WLAN password and the encryption method have been entered correctly. The encryption method is specified by your WLAN router or WLAN Access Point and can be changed there. • Ensure that the WLAN router or WLAN Access Point is in range and is signalizing correct operation. • If this message is displayed often, improve the WLAN connection by using a WLAN repeater.
10285	<p>WLAN connection established</p> <p>Connection to the selected WLAN network has been established.</p>
10286	<p>⚠ QUALIFIED PERSON</p> <p>WLAN connection lost</p> <p>The inverter has lost WLAN connection to the selected network.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the WLAN router or WLAN Access Point is still active. • Ensure that the WLAN router or WLAN Access Point is in range and is signalizing correct operation. • If this message is displayed often, improve the WLAN connection by using a WLAN repeater.
10339	<p>Webconnect enabled</p> <p>The inverter can communicate with Sunny Portal without an additional SMA communications product (e.g. Sunny Home Manager).</p>

Event number	Message, cause and corrective measures
10340	<p>Webconnect disabled</p> <p>The Webconnect function has been switched off. This means that the inverter can not communicate with Sunny Portal without an additional SMA communications product (e.g. Sunny Home Manager).</p> <ul style="list-style-type: none"> • If the inverter is to communicate with Sunny Portal without an additional SMA communication product, switch the Webconnect function on.
10420	<p>Internal consumption control was started</p> <p>The battery is automatically charged or discharged depending on the purchased electricity or the grid feed-in.</p>
10421	<p>Internal consumption control was stopped</p> <p>The automatic charging or discharging of the battery stopped due to an external control command.</p>
10422	<p>Only charging operation in internal consumption mode</p> <p>The battery is charged only when increased self-consumption is active. The battery is only charged again once there is sufficient PV power in the system.</p>
10425	<p>The device switches off</p> <p>The battery is switched off in order to protect against deep discharge. The inverter can only be recommissioned once it has been disconnected from the utility grid.</p>
10517	<p>Dynamic active power limitation started.</p> <p>The inverter limits the active power of the PV inverters to the set limit.</p>
10518	<p>Dynamic active power limitation terminated.</p> <p>The inverter terminated the active power limitation of the PV inverters.</p>
10520	<p>⚠ QUALIFIED PERSON</p> <p>Supplied power: [xx] W (permitted value: [xx] W)</p> <p>The set active power limitation cannot be met.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the correct active power limitation has been configured. • Ensure that the PV inverters have been configured correctly. • Ensure that the communication between battery inverter and PV inverter functions perfectly. • Ensure that no external feeders are in the system.
10521	<p>Active power was limited today for [xx] minutes.</p> <p>The active power limitation of the PV inverters was limited for the specified time.</p>
27103	<p>Set parameter</p> <p>The parameter change has been adopted.</p>

Event number	Message, cause and corrective measures
27104	Parameters set successfully The parameter changes were successfully adopted.
27107	Update file OK The update file is suitable for this inverter and its components and is fully available for the next update step.
27301	Update communication The inverter is updating the communication component.
27302	Update main CPU The inverter is updating the inverter component.
27312	Update completed The inverter has successfully completed the update.
27336	Battery management system The inverter is updating the battery.
29001	Installer code valid The entered Grid Guard code is valid. Protected parameters have now been unlocked and you can adjust the parameters. The parameters will be automatically locked again after ten feed-in hours.
29004	Grid parameters unchanged Changing the grid parameters is not possible.

11.3 Problems with streaming services

If you use the streaming service in your local network (in which the inverter is also included), there may be interference to the transfer of data. In this case, the IGMP settings of the inverter can be changed via operating parameters.

- Contact the Service and change IGMP settings in consultation with the Service department.

12 Decommissioning the Inverter

⚠ QUALIFIED PERSON

⚠ CAUTION

Risk of injury due to weight of product

Injuries may result if the product is lifted incorrectly or dropped while being transported or mounted.

- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.

Procedure:

1.

⚠ DANGER

Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 9, page 70).

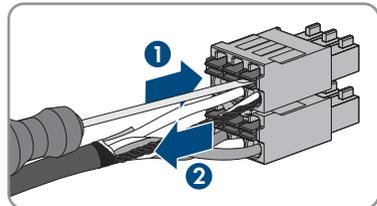
2.

⚠ CAUTION

Risk of burns due to hot enclosure parts

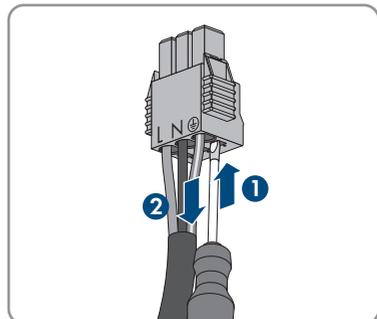
- Wait 30 minutes for the enclosure to cool down.

3. Remove the conductors from the terminal block for the connection of the battery communication cable.

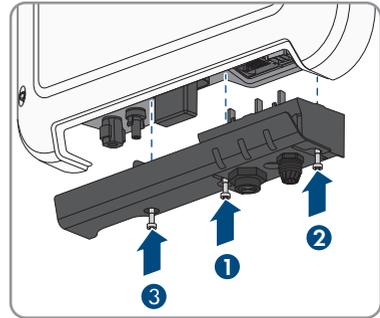


4. Remove the conductors from the DC connectors (see Section 6.5.3, page 43).

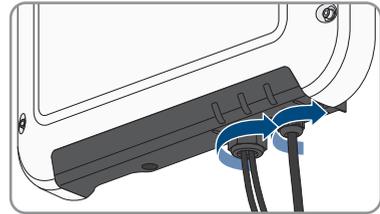
5. Remove the L, N and grounding conductor from the terminal block for the AC connection. To do this, stick a flat-blade screwdriver (blade width: 3 mm) as far as it can go into the rectangular opening behind the terminal and remove the conductors from the terminals.



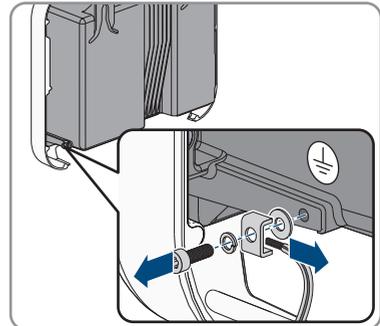
6. Tighten the connection cap with the three screws (TX20, torque: 3.5 Nm).



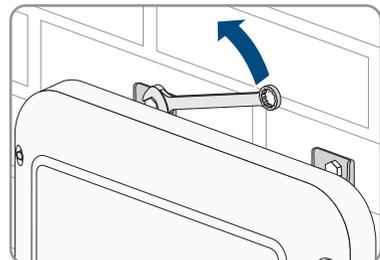
7. Screw the swivel nuts onto the cable glands on the connection cap.



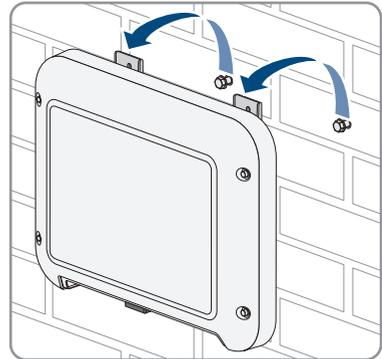
8. If an additional grounding or an equipotential bonding is connected to the inverter, release the hexagon socket cap head screw (TX 25) and remove the grounding cable.



9. Using a ratchet or a box wrench, slightly loosen the screws for attaching the inverter.



10. Remove the inverter from the screws using the metal brackets.



11. If the inverter is to be stored or shipped, pack the inverter. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter.
12. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

13 Procedure when Replacing a Battery

When a connected battery is replaced by a new battery, the battery configuration must be performed.

Procedure:

1. Open the user interface (see Section 8.1, page 50).
 2. Log in as **Installer**.
 3. Start the installation assistant (see Section 8.4, page 59).
 4. Click on [**Save and next**] for each step up to the step **Battery configuration**.
 5. Select the new battery type from the drop-down list **Selectable battery types**.
 6. Select **Save and next** until the Summary is displayed.
 7. Check the configuration in the summary.
 8. Select **Next**.
- The battery configuration is being updated. The new battery is captured.

14 Technical Data

AC connection

Rated power at 230 V, 50 Hz	2500 W
Maximum apparent AC power at $\cos \varphi = 1$	2500 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range*	180 V to 280 V
Nominal AC current at 220 V	11 A
Nominal AC current at 230 V	11 A
Nominal AC current at 240 V	10.5 A
Maximum AC current	11 A
Total harmonic distortion of the AC current at total harmonic distortion of the AC voltage < 2%, and the AC power > 50% of the rated power	$\leq 3\%$
Maximum output current under fault conditions	19 A
Inrush current	< 20% of the nominal AC current for a maximum of 10 ms
Rated power frequency	50 Hz
AC power frequency*	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45 Hz to 55 Hz
Operating range at AC power frequency 60 Hz	55 Hz to 65 Hz
Power factor at rated power	1
Displacement power factor $\cos \varphi$, adjustable	0.8 overexcited to 1 to 0.8 underexcited
Feed-in phases	1
Phase connection	1
Surge category in accordance with IEC 60664-1	III

* Depending on the configured country data set

Battery DC Input

Maximum DC power at $\cos \varphi = 1$	2650 W
Maximum DC voltage	500 V
Voltage range	100 V to 500 V
DC rated voltage	360 V

Minimum DC voltage	100 V
DC start voltage	100 V
Maximum DC current	10 A
Maximum short-circuit current	18 A
Battery type*	Li-ion
Surge category in accordance with IEC 60664-1	III

* Only use batteries approved by SMA Solar Technology AG (see list of approved batteries at www.SMA-Solar.com)

Protective Devices

DC reverse polarity protection	Not available
Input-side disconnection point	Not available
AC short-circuit current capability	Current control
Ground fault monitoring	Available
Grid monitoring	SMA Grid Guard 10.0
Maximum permissible fuse protection	16 A
All-pole sensitive residual-current monitoring unit	Available

General Data

Width x height x depth with connection cap	450 mm x 357 mm x 122 mm
Weight	9.2 kg
Length x width x height of the packaging	597 mm x 399 mm x 238 mm
Weight including packaging	11.5 kg
Climatic category in accordance with IEC 60721-3-4	4K4H
Environmental category	Outdoors
Pollution degree outside the inverter	3
Pollution degree inside the inverter	2
Operating temperature range	-40°C to +60°C
Maximum permissible value for relative humidity (condensing)	100 %
Maximum operating altitude above MSL	3000 m
Noise emission, typical	< 25 dB
Self-consumption in standby operation	< 2 W

Self-consumption without the load necessary to supply the battery	< 10 W
Maximum data volume per inverter with Speedwire/Webconnect	550 MB/month
Additional data volume when using the Sunny Portal live interface	600 kB/hour
WLAN range in free-field conditions	100 m
Quantity maximum detectable WLAN networks	32
Topology	Transformerless
Cooling method	Convection
Degree of protection in accordance with IEC 60529	IP65
Protection class in accordance with IEC 62477	I
Grid configurations	TN-C, TN-S, TN-CS, TT (if $V_{N,PE} < 30 \text{ V}$), IT, Delta IT, split phase

Climatic Conditions

Installation in accordance with IEC 60721-3-4, Class 4K4H

Extended temperature range	-40 °C to +60 °C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

Transport in accordance with IEC 60721-3-4, Class 2K3

Extended temperature range	-25 °C to +70 °C
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Equipment

DC connection	DC connector
AC connection	Spring-cage terminal
Battery communication	CAN bus
Speedwire interface	As standard
Webconnect function	As standard
WLAN interface	As standard

Torques

Screws for mounting	Hand-tight
Swivel nut of the DC connector	2 Nm

Swivel nut of the cable gland for the AC connection.	Hand-tight
Swivel nut cable gland network and battery communication connection	Hand-tight
Screws for attaching the connection cap	3.5 Nm \pm 0.3 Nm
Screw for additional grounding	6 Nm \pm 0.3 Nm
Screws for attaching the enclosure lid	6 Nm \pm 0.3 Nm

Data Storage Capacity

Energy yields in the course of the day	63 days
Daily yields	30 years
Event messages for users	1 000 events
Event messages for installers	1 000 events

Efficiency

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

15 Spare Parts

You will find the spare parts for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
Enclosure lid	Enclosure lid white	101840-00.01
Connection cap	Connection cap for covering the connection area	102143-00.01
accessory kit	Accessory kit with DC connectors, grounding terminal for additional grounding, connecting terminal plate for the AC connection and connecting terminal plate for the connection of the battery communication cable	101439-00.01

16 Contact

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

- Battery inverter:
 - Device type
 - Serial number
 - Firmware version
 - Event message
 - Mounting location and mounting height
 - Optional equipment, e.g. communication products
 - Use the name of the system in Sunny Portal (if available)
 - Access data for Sunny Portal (if available)
 - Special country-specific settings (if available)
- Battery:
 - Type
 - Firmware version

Deutschland	SMA Solar Technology AG	Belgien	SMA Benelux BVBA/SPRL
Österreich	Niestetal	Belgique	Mechelen
Schweiz	Sunny Boy, Sunny Mini Central, Sunny Tripower, Sunny High- power: +49 561 9522-1499 Monitoring Systems, SMA EV Charger: +49 561 9522-2499 Hybrid Controller: +49 561 9522-3199 Sunny Island, Sunny Boy Stor- age, Sunny Backup: +49 561 9522-399 Sunny Central, Sunny Cen- tral Storage: +49 561 9522-299 SMA Online Service Center: www.SMA-Service.com	België	+32 15 286 730
		Luxemburg	for Netherlands: +31 30 2492 000
		Luxembourg	SMA Online Service Center: www.SMA-Service.com
		Nederland	
		Česko	SMA Service Partner TERMS a.s. +420 387 6 85 111
		Magyarország	SMA Online Service Center: www.SMA-Service.com
		Slovensko	
		Türkiye	SMA Service Partner DEKOM Telekomünikasyon A. Ş +90 24 22430605 SMA Online Service Center: www.SMA-Service.com
France	SMA France S.A.S. Lyon +33 472 22 97 00 SMA Online Service Center: www.SMA-Service.com	Ελλάδα	SMA Service Partner AKTOR FM. Αθήνα +30 210 8184550 SMA Online Service Center: www.SMA-Service.com
		Κύπρος	

España Portugal	SMA Ibérica Tecnología Solar, S.L.U. Barcelona +34 935 63 50 99 SMA Online Service Center: www.SMA-Service.com	United King- dom	SMA Solar UK Ltd. Milton Keynes +44 1908 304899 SMA Online Service Center: www.SMA-Service.com
Italia	SMA Italia S.r.l. Milano +39 02 8934-7299 SMA Online Service Center: www.SMA-Service.com	Australia	SMA Australia Pty Ltd. Sydney Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200
United Arab Emirates	SMA Middle East LLC Abu Dhabi +971 2234 6177 SMA Online Service Center: www.SMA-Service.com	India	SMA Solar India Pvt. Ltd. Mumbai +91 22 61713888

ไทย	Service Partner for String inverter: 대한민국 Solar Power Engineering Co., Ltd. 333/7,8,9 United Tower Building 4th floor. Soi Sukhumvit 55 (Thonglor 17), Klongton Nua, Wattana, 10110 Bangkok, Thailand +66 20598220 smaservice@spe.co.th Service Partner for Utility: Tirathai E & S Co., Ltd 516/1 Moo 4, Bangpoo Industrial Estate Sukhumvit Road, T. Praksa, A. Muang 10280 Samutprakarn, Thailand +63 1799866 servicepartner.sma@tirathai.co.th	Enerone Technology Co., Ltd 4th Fl, Jungbu Bldg, 329, Yeongdong-daero, Gangnam-gu, Seoul, 06188, Korea +82-2-520-2666
	Argentina Brasil Chile Perú	<hr/> SMA South America SPA Santiago de Chile +562 2820 2101
	South Africa	<hr/> SMA Solar Technology South Africa Pty Ltd. Cape Town 08600SUNNY (08600 78669) International: +27 (0)21 826 0699 SMA Online Service Center: www.SMA-Service.com
Other countries	International SMA Service Line Niestetal 00800 SMA SERVICE (00800 762 7378423) SMA Online Service Center: www.SMA-Service.com	

17 EU Declaration of Conformity

within the scope of the EU directives

- Radio Equipment Directive 2014/53/EU (22.5.2014 L 153/62) (RED)
- Restriction of the use of certain hazardous substances 2011/65/EU (L 174/88, June 8, 2011) and 2015/863/EU (L 137/10, March 31, 2015) (RoHS)



SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EU Declaration of Conformity can be found at www.SMA-Solar.com.

