



SUNNY BOY STORAGE 3.7 / 5.0 / 6.0

Important information

Depending on availability, the product is or is not equipped with Wi-Fi functionality. The reason for this is the currently problematic semiconductor supply, caused by the COVID-19 pandemic.

If the product is not equipped with Wi-Fi functionality, please use the standard Ethernet communication interface included for commissioning, configuration and integrating the product into a network.

If integrating the product into a Wi-Fi network is absolutely necessary, this can be done using a commercial Wi-Fi repeater, which is connected to the product via Ethernet.

Without the Wi-Fi function, a direct connection to the user interface by scanning the QR code on the product with the SMA 360° app is not possible. Use a different type of connection.

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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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1 Information on this Document

1.1 Validity

This document is valid for:

- SBS3.7-10 (Sunny Boy Storage 3.7) from firmware version \geq 4.00.00.R
- SBS5.0-10 (Sunny Boy Storage 5.0) from firmware version \geq 4.00.00.R
- SBS6.0-10 (Sunny Boy Storage 6.0) from firmware version \geq 4.00.00.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 to safely disconnect SMA inverters
- 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
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, regulations, 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 and as eManual at www.SMA-Solar.com. You can also call up the eManual via the user interface of the product.

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

Icon	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
	Example
	Sections describing activities to be performed by qualified persons only

1.6 Typographical Elements in the Document

Typographical element	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"> Go to Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> Button or key to be clicked on or pressed down 	<ul style="list-style-type: none"> Select [Enter].
#	<ul style="list-style-type: none"> Placeholder for variable components (e.g., parameter names) 	<ul style="list-style-type: none"> Parameter WCtHz.Hz#

1.7 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
"SUNNY BOY STORAGE - Approved batteries and information on connecting batteries / Approved automatic transfer switching devices for battery-backup operation"	Technical Information
"SMA Smart Home" The System Solution for Greater Independence	Planning Guidelines
"SMA GRID GUARD 10.0 - Grid Management Services via Inverter and System Controller"	Technical Information
"Efficiency and Derating" Efficiency and derating behavior of the SMA inverters	Technical Information
"Parameters and Measured Values" Device-specific overview of all parameters and measured values and their setting options Information about the SMA Modbus registers	Technical Information
"SMA and SunSpec Modbus® Interface" Information on the Modbus interface	Technical Information
"Modbus® parameters and measured values" Device-specific list of the Modbus register	Technical Information
"SMA SPEEDWIRE FIELDBUS"	Technical information

2 Safety

2.1 Intended Use

The Sunny Boy Storage is an AC-coupled battery inverter for parallel grid and stand-alone mode operation. The Sunny Boy Storage converts the direct current supplied by a battery into grid-compliant alternating current. The Sunny Boy Storage, together with a battery and a compatible energy meter, make up a system for increased self-consumption (SMA Energy System Home) or, together with a automatic transfer switching device compatible with Sunny Boy Storage, a battery-backup system. For further information on this, see the Technical Information "SMA Energy System Home".

The product must only be used as stationary equipment.

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 "Safety Concept for Battery-Storage System" 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.

The product may only be operated with one of the energy meters approved by SMA Solar Technology AG. The following energy meters are allowed to be used when operating this product:

- EMETER-20 (SMA Energy Meter)
- HM-20 (Sunny Home Manager 2.0)

The product may only be operated in battery-backup systems using an automatic transfer switching device approved by SMA Solar Technology AG. You are not allowed to build automatic transfer switching devices for operation with this product by yourself on the basis of a circuit diagram.

A list of the approved automatic transfer switching devices can be found in the technical information at "SUNNY BOY STORAGE - Approved batteries and information on connecting batteries / Approved automatic transfer switching devices for battery-backup operation".

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 appropriate.

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 any regional, state, provincial, federal or national laws, regulations or standards that apply 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

Keep the manual for future reference.

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, some residual risks remain despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

DANGER

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

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

- Disconnect the product and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.
- Do not touch non-insulated parts or cables.

 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.
- Wait five minutes before working on the inverter.
- Observe all safety information of the battery manufacturer.
- Do not touch non-insulated parts or cables.
- Do not remove the terminal block with the connected DC conductors from the slot under load.
- Wear suitable personal protective equipment for all work on 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 and 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****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 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**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.

⚠ WARNING**Danger to life due to electric shock from destruction of the measuring device due to overvoltage**

Overvoltage can damage a measuring device and result in voltage being present in the enclosure of the measuring device. Touching the live enclosure of the measuring device results in death or lethal injuries due to electric shock.

- Only use measuring devices with a DC input voltage range of 600 V or higher.

⚠ CAUTION**Risk of burns from hot surfaces**

The surface of the inverter can get very hot. Touching the surface can result in burns.

- Mount the inverter in such a way that it cannot be touched inadvertently.
- Do not touch hot surfaces.
- Wait 30 minutes for the surface to cool sufficiently.
- Observe the safety messages on 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**Damage to the enclosure seal in subfreezing conditions**

If you open the product or disconnect the Power Unit and Connection Unit when temperatures are below freezing, the enclosure seals can be damaged. Moisture can penetrate the product and damage it.

- Only open the product if the ambient temperature is not below 0 °C.
- If a layer of ice has formed on the enclosure seal when temperatures are below freezing, remove it prior to opening the product (e.g. by melting the ice with warm air).
- Do not disassemble the Power Unit and Connection Unit unless the ambient temperature is at least 0 °C and conditions are frost-free.

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

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

- Only open the product if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the product during a dust storm or precipitation.

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

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

- Ground yourself before touching any component.

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 and the frequency of device updates. High costs for the Internet connection can be the result.

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

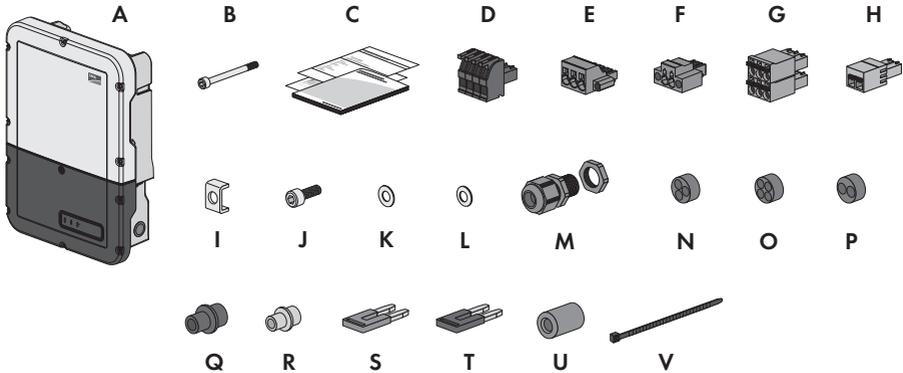


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Hexagon socket cap head screw M5 x 60 (not required)
C	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
D	1	4-pole terminal block for connecting a RS485 energy meter
E	1	Terminal block for the AC connection
F	1	Terminal block for connecting the outlet for secure power supply operation
G	4	6-pole terminal block for connecting the CAN battery communication cables and the CAN communication cable of the automatic transfer switching device
H	2	2-pole terminal block for the switch connection for secure power supply operation or for black start function.
I	5	Clamping bracket
J	5	Cylindrical screw M5 x 16
K	5	Washer M5

Position	Quantity	Designation
L	5	Spring washer M5
M	6	Cable gland and counter nut PG 21
N	2	Three-hole cable support sleeve
O	4	Four-hole cable support sleeve
P	1	Two-hole cable support sleeve
Q	6	Sealing plug for two-hole and three-hole cable support sleeve
R	6	Sealing plug for four-hole cable support sleeve
S	2	Blue jumper
T	2	Red jumper
U	1	Ferrite
V	1	Cable tie

4 Product Overview

4.1 Product Description

The Sunny Boy Storage uses the connected battery for the intermediate storage of excess PV energy in the SMA Energy System Home. For this purpose, the Sunny Boy Storage receives the feed-in and purchased energy data from the energy meter. This data is used by the Sunny Boy Storage to control the charging and discharging of the battery.

The use of an automatic transfer switching device is required in a SMA Energy System Home with battery-backup function. In the event of grid failure, the automatic transfer switching device disconnects the PV system, loads and the Sunny Boy Storage from the utility grid and creates a battery-backup grid. The battery-backup grid supplies loads that should continue to be supplied with electricity in the event of grid failure. In the event of grid failure, the Sunny Boy Storage supplies the loads with energy after a short switching time. The SMA Energy System Home supplies additional energy that can be used to supply the loads and charge the battery.

The use of an automatic transfer switching device is not required in a limited SMA Energy System Home with battery-backup function. To build a limited SMA Energy System Home with battery-backup function, you must attach a socket and a switch to the inverter. You can connect a load to the outlet, which should continue to be supplied with power from the battery in the event of grid failure. The secure power supply operation is not automatically enabled in the event of a grid failure, neither is it automatically disabled once the utility grid is available again. During secure power supply operation, the load can only be supplied with energy as long as there is stored energy available in the battery.

i No secure power supply operation possible in the SMA Energy System Home with Battery-Backup Function

If the inverter is used in an SMA Energy System Home with battery-backup function and connected with an automatic transfer switching device, the secure power supply operation is not available.

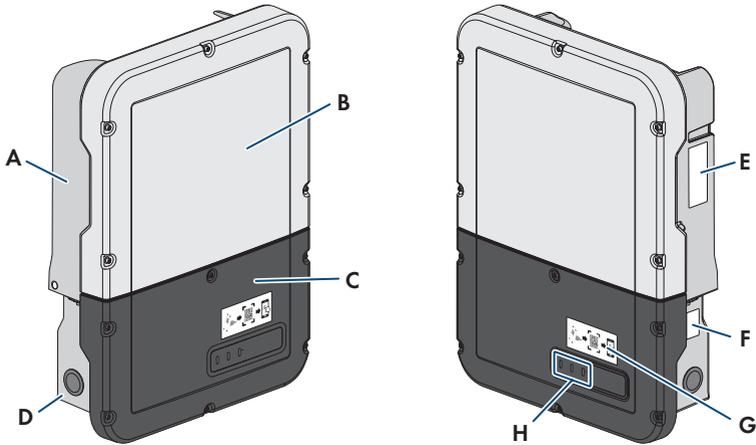


Figure 2: Design of the inverter

Position	Designation
A	Power Unit
B	Enclosure lid of the Power Unit
C	Enclosure lid for the Connection Unit
D	Connection Unit
E	Type label The type label uniquely identifies the inverter. The type label must remain permanently attached to the product. You will find the following information on the type label: <ul style="list-style-type: none"> • Inverter device type (Model) • Serial number of the Power Unit (Serial No. Power Unit or S/N Power Unit) • Date of manufacture • Device-specific characteristics
F	Additional type label The additional type label must remain permanently attached to the product. You will find the following information on the additional type label: <ul style="list-style-type: none"> • Device type (Model) • Inverter serial number (Serial number device or S/N device) • Identification key (PIC) for registration in Sunny Portal • Registration ID (RID) for registration in Sunny Portal • WLAN password (WPA2-PSK) for the direct connection to the user interface of the inverter via WLAN

Position	Designation
G	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via Wi-Fi (only available if the product is equipped with a Wi-Fi interface)
H	LEDs The LEDs indicate the operating state of the product.

4.2 Symbols on the Product

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

Icon	Explanation
	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.
	UKCA marking The product complies with the regulations of the applicable laws of England, Wales and Scotland.
	RoHS labeling The product complies with the requirements of the applicable EU directives.
	RCM (Regulatory Compliance Mark) The product complies with the requirements of the applicable Australian standards.

4.3 Interfaces and Functions

The inverter can be equipped or retrofitted 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.

Once the connection has been established to the smart device, use a terminal (e.g. smartphone, tablet or laptop) to connect to the product's user interface using a web browser.

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 PUK2.0

SMA PUK2.0 replaces for products with firmware version $\geq 4.00.00.R$ the previous procedure for logging in to the user interface if you have forgotten the password for your product. Whether your product supports PUK2.0 is shown on the login page of the user interface via the information button.

To improve security for your product, you can generate a product key. If the password is forgotten, the product can be directly unlocked with the product key on the login page of the user interface. A chargeable order of a PUK from SMA Solar Technology AG is no longer required for products with a firmware version $\geq 4.00.00.R$. If you have lost the product key, you can generate a new one by physically accessing the product.

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 1 products per visualized system. In PV systems with more than 1 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 Wi-Fi or Ethernet connection, you can directly access your visualized system via the web browser on your smart device (e.g. smartphone, tablet or laptop).

WLAN connection to SMA 360° app

There is a QR code on the product by default. If the product is equipped with a Wi-Fi interface, you can access the product via Wi-Fi by scanning the QR code on the product using the SMA 360° or SMA Energy app. This automatically connects to the user interface.

Wi-Fi

Depending on availability, the product is or is not equipped with a Wi-Fi interface. If the Wi-Fi interface is present, the Wi-Fi interface is enabled by default at delivery. If you do not want to use WLAN, you can deactivate the WLAN interface.

If the Wi-Fi interface is present, the product also 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 a smart end device.

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
- Controlling the battery

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.

Secure power supply operation

In case of a grid failure, the secure power supply operation supplies the loads with energy from the battery. You can connect a standard outlet (230 V) and a standard switch to the inverter. You can connect a load with a maximum of 16 A and 230/240 V to the emergency power outlet. The load is supplied with energy from the battery during grid failure. The switch is used to enable and disable secure power supply operation.

The secure power supply operation is not automatically enabled in the event of a grid failure, neither is it automatically disabled once the utility grid is available again. If the utility grid fails, the load supply must be enabled manually by activating the switch. The inverter automatically regulates the energy supply of the outlet after activating the switch. When the utility grid is available again and the load can be supplied by this again, the secure power supply operation must be disabled manually by switching the switch off.

During active secure power supply operation, the inverter is disconnected from the building's main electrical system and does not therefore feed into the utility grid. During secure power supply operation, the load can only be supplied with energy as long as there is stored energy available in the battery. If there is insufficient energy available from the battery, the secure power supply operation remains active, even if the utility grid is available again. Switching over to supplying the load from the utility grid is not carried out automatically.

i **No secure power supply operation possible in the SMA Energy System Home with Battery-Backup Function**

If the inverter is used in an SMA Energy System Home with battery-backup function and connected with an automatic transfer switching device, the secure power supply operation is not available.

i **Do not connect any loads that require an uninterrupted energy supply**

The secure power supply operation and the battery-backup operation may not be used for loads that require an uninterrupted energy supply. The energy that is available during the secure power supply operation or battery-backup operation depends on the battery capacity available and the state of charge of the battery (SOC).

- Do not connect loads if they are dependent on an uninterrupted energy supply for reliable operation.

Battery-backup function

The inverter is equipped with a battery-backup function. The battery-backup function is disabled by default and must be enabled via the user interface. The battery-backup function can only be enabled if the inverter is operated in a battery-backup system with an automatic transfer switching device. If the system is retrofitted with an automatic transfer switching device, the battery configuration must be reset and carried out once again. Then the battery-backup system must be configured. The configuration is carried out via the installation assistant on the user interface of the battery inverter.

The battery-backup function ensures that the inverter forms a battery-backup grid that uses energy from the battery and the PV system to supply the household grid in the event of a utility grid failure. When the battery-backup operation is activated, the automatic transfer switch disconnects the PV system and the household grid from the utility grid in the event of a grid failure, and connects these to the battery-backup grid. After a short switch-over time, the battery-backup grid and loads connected can be supplied by the battery and supplemented with energy from the PV system. The charging of the battery is ensured by the existing PV system during battery-backup operation. The charging process of the battery (initiated by the PV system) can be deactivated via a certain parameter during battery-backup operation. As soon as the utility grid is available again, the battery-backup operation is disabled automatically and the loads are supplied with energy from the utility grid. If the automatic battery-backup operation is not set, the battery-backup operation must be manually enabled in the event of a grid failure, and must also be disabled again once the utility grid is available (information in terms of switching operations of the automatic transfer switch and procedures during grid failure and grid reconnection see planning guidelines "SMA Energy System Home with Battery-Backup Function").

When the utility grid is down and the battery fully discharged, there is, in the beginning, not enough power available to create a stable battery-backup grid. In this case, the battery must be charged by the PV system. The battery inverter is able to create a stable battery-backup grid only when enough power is available in the battery. To use battery charging power from the PV system, the battery inverter has to create a stand-alone grid. For this purpose, the battery inverter requires energy from the battery reserve. If enough PV power is available, the PV inverters start automatically and the battery is charged with energy from the PV system. The battery is charged with energy until the battery inverter is able to provide a battery-backup grid. By setting parameters, it is possible to define up to which state of charge the battery is charged and discharged. If not enough PV energy is available to start the PV inverters, the stand-alone grid breaks down. The battery inverter makes another attempt to start the PV inverter 2 hours later to charge the battery with energy from the PV system. If the battery inverter still fails to create a stand-alone grid after several attempts due to insufficient PV energy, the battery inverter and battery switch to sleep mode. In this case, a manual black start is required to switch the battery inverter and battery from sleep mode back to operation.

i **No secure power supply operation possible in the SMA Energy System Home with Battery-Backup Function**

If the inverter is used in an SMA Energy System Home with battery-backup function and connected with an automatic transfer switching device, the secure power supply operation is not available.

i **Do not connect any loads that require an uninterrupted energy supply**

The secure power supply operation and the battery-backup operation may not be used for loads that require an uninterrupted energy supply. The energy that is available during the secure power supply operation or battery-backup operation depends on the battery capacity available and the state of charge of the battery (SOC).

- Do not connect loads if they are dependent on an uninterrupted energy supply for reliable operation.

Black start function

The inverter has a black start function and an auxiliary battery that provides energy for the black start. In battery-backup systems, you have the possibility to install a standard switch for black starting the inverter and battery. The black-start switch is used to start the battery-backup operation manually in the event of grid failure if the battery and inverter are in sleep mode and, therefore, are unable to provide energy. When the black-start switch is switched on manually, the energy from the auxiliary battery is made available in order to automatically switch the battery and therefore also the inverter from sleep mode to operation in order that the inverter can make energy available from the battery. You can stop the battery-backup operation by switching it off manually. To enable the black-start function, at least one battery capable of black start must be connected to input A.

Multi-battery device

The product is equipped with the multi-battery function as standard from firmware version 1.50.10.R. The multi-battery function enables to charge and discharge several batteries of the same or different type. If the system is extended by one or several batteries or one battery is replaced, the battery configuration must be reset and carried out again. The configuration is carried out via the installation assistant on the user interface of the battery inverter. An overview of batteries approved by SMA Solar Technology AG and their possible combinations is available at www.SMA-Solar.com.

Multifunction Relay

The inverter is equipped with a multifunction relay as standard. The multifunction relay is an interface that can be configured for the operating mode used by a particular system.

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.

SMA Smart Connected

SMA Smart Connected is the free monitoring of the product via the SMA Sunny Portal. Thanks to SMA Smart Connected, the operator and qualified person will be informed automatically and proactively about product events that occur.

SMA Smart Connected is activated during registration in Sunny Portal. In order to use SMA Smart Connected, it is necessary that the product is permanently connected to Sunny Portal and the data of the operator and qualified person is stored in Sunny Portal and up-to-date.

Time-of-Use

The Time-of-Use (TOU) function is disabled by default and must be enabled by creating power profiles.

With the TOU function, you can adjust the charging behavior of the battery to your utility rate plan (electricity tariff). Energy bills are thus reduced and electricity at lower cost can be used. You can determine in which time range the battery with a specified charging power is operated. At specific times, this is mostly useful when the battery's state of charge has to take on a certain value or the rate plan makes the charging more attractive, regardless of the power at the grid connection point. The charging parameters set in the power profile are only limited by the state of charge (SOC). At times when the Time-of-Use function is not enabled, the battery is charged correspondent to the increased self-consumption for the entire system.

Peak load shaving

With the "Peak Load Shaving" function, you can optimize the behavior of the battery inverter with respect to the power exchange at the point of interconnection. This is mostly useful when a higher supply of energy would lead to a higher electricity cost. With the "Peak Load Shaving" function, certain grid-exchange power outputs to which the battery inverter is adjusted depending on its power and battery capacity available can be set. Power peaks and additional costs can thus be avoided.

You can configure times and setpoints for the power drawn at the grid-connection point. When the loads require additional energy, the battery is discharged and the maximum value is kept constant at the grid-connection point. This is based on the prerequisite that the battery is sufficiently charged. At times when the "Peak Load Shaving" function is not activated, the battery is charged or discharged correspondent to the increased self-consumption for the entire system. The "Peak Load Shaving" function is deactivated by default and must be activated by creating power profiles.

Frequency Shift Power Control

If PV inverters are connected on the AC side during battery-backup operation, the battery inverter must be able to limit their output power. This limitation becomes necessary when, for example, the battery inverter's battery is fully charged and the power available from the PV system exceeds the power requirement of the connected loads.

To prevent excess energy from overcharging the battery, the battery inverter automatically detects the problem and changes the frequency at the AC output. This frequency adjustment is analyzed by the PV inverter. As soon as the power frequency of the battery-backup grid increases beyond the value specified in **f Start Delta**, the PV inverter limits its output power accordingly.

The frequency shift power control is enabled by default. No additional settings must be carried out. It must be ensured that the connected PV inverters limit their power at the AC output via the battery inverter due to changes in frequency. The frequency-dependent active power limitation $P(f)$ must be set in the PV inverter.

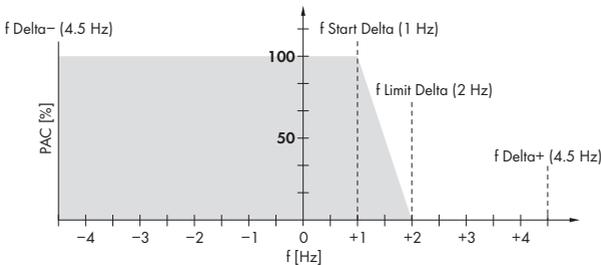


Figure 3: Impact of the frequency shift power control on the power output of a PV inverter

Designation	Explanation
f	Base frequency of the stand-alone grid
f Delta- to f Delta+	Maximum range in relation to the base frequency in which the PV inverter is active.
f Start Delta	Frequency increase in relation to the base frequency, at which point the power regulation via frequency begins.
f Limit Delta	Frequency increase in relation to the base frequency, at which point the power regulation via frequency ends. The power of the PV inverter at this point is 0 W.

4.4 LED Signals

LED signal	Explanation
Green LED and red LED flash simultaneously (2 s on and 2 s off)	No country data set set Operation of the product is stopped because no country data set is set. Once the configuration has been completed (for instance using the installation assistant or via a communication product), the product will start operation automatically.
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 is flashing (1.5 s on and 0.5 s off)	Secure power supply operation or battery-backup operation The secure power supply operation or battery-backup operation is enabled and the inverter supplies the loads with energy from the battery.
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 a smart device via Ethernet (e.g. smartphone, tablet or laptop).
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 via Ethernet with a smart end device (e.g. smartphone, tablet or laptop).

4.5 System overview

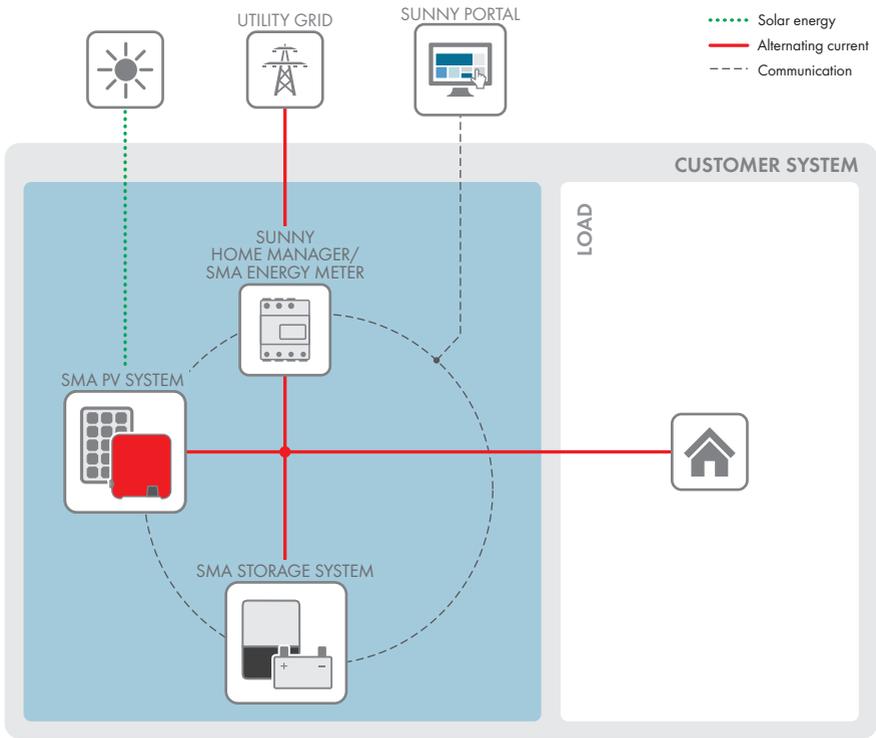


Figure 4: Design of the system

4.5.1 Circuitry Overview

4.5.1.1 System with secure power supply

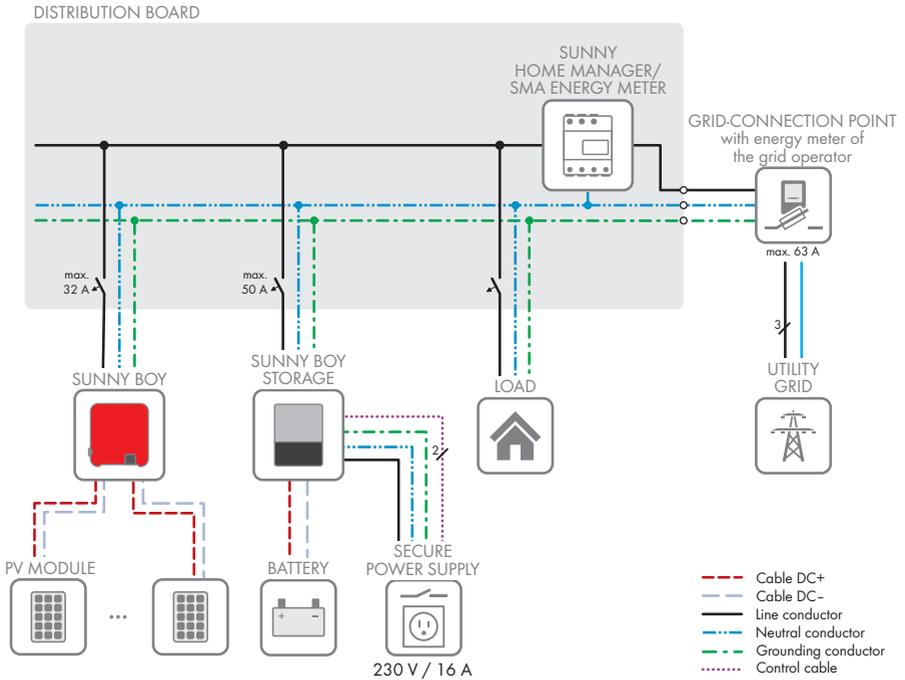


Figure 5: Circuitry overview of an SMA Energy System Home with switch and socket for secure power supply operation (example)

4.5.1.2 System with battery-backup function

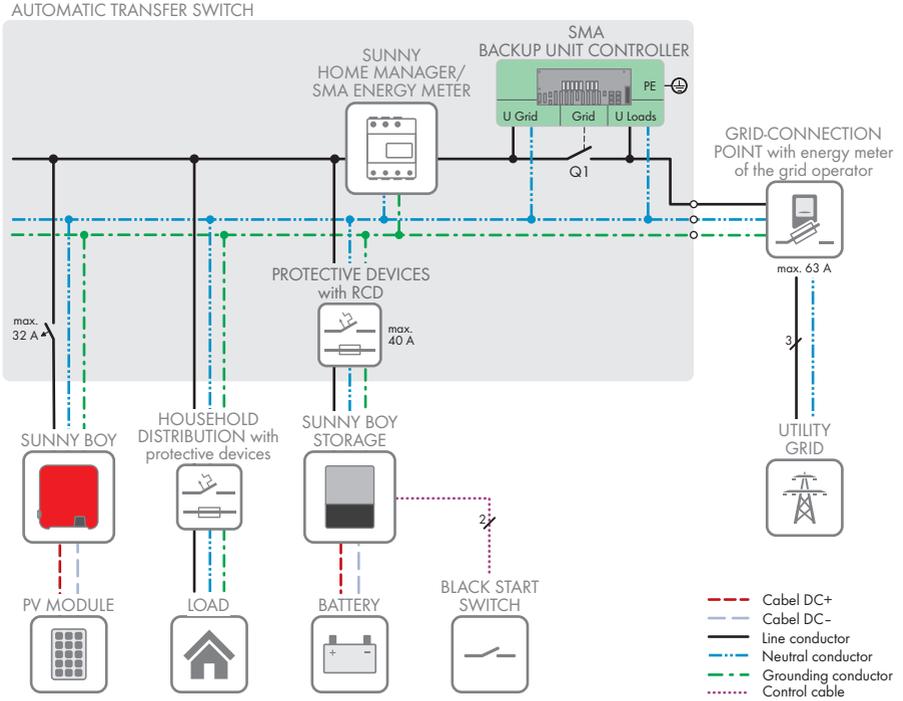


Figure 6: System design of an SMA Energy System Home with battery-backup function (example)

4.5.2 Communication Overview

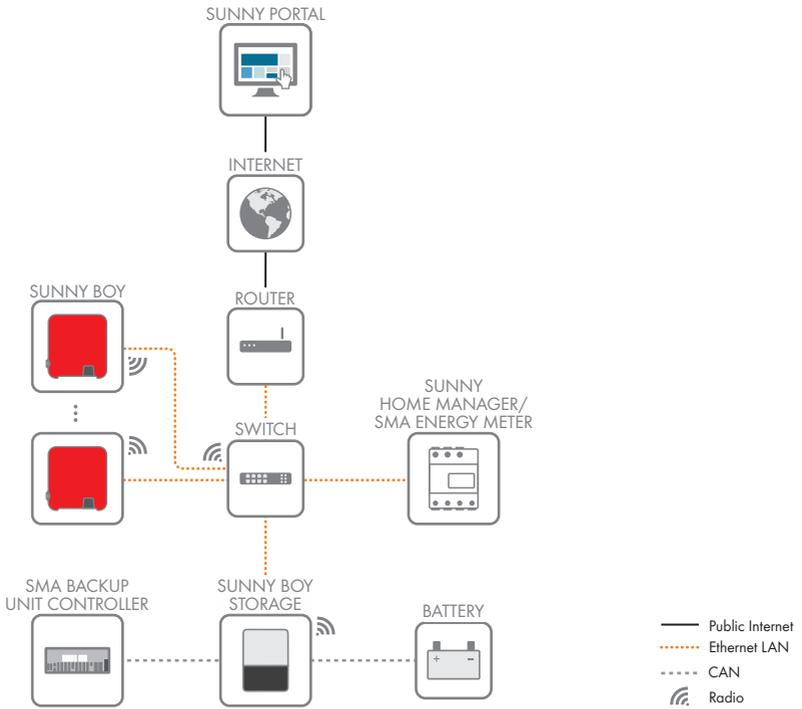


Figure 7: Design of system communication

4.6 Battery Management

4.6.1 Battery Use by Systems for Increased Self-Consumption

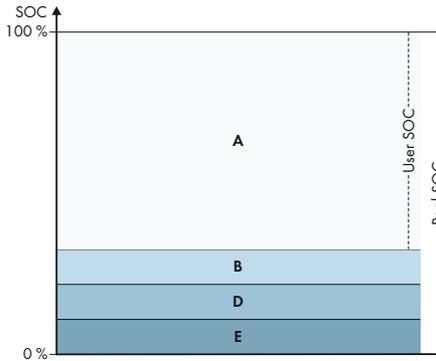


Figure 8: State of charge ranges of the battery in systems for increased self-consumption without battery backup

Range	Parameter	Battery inverter behavior
A	Self-consumption range (SlfCsmP)	The battery inverter uses the batteries within this range for increased self-consumption and for the "Time-of-Use" and "Peak Load Shaving" functions that can be configured in the power profile.
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 batteries are recharged with 3 A 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 with 3 A. 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 batteries.. The battery inverter and batteries are switched off. Exception: black start function
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 batteries with 3 A from the utility grid until range A is reached.

4.6.2 Battery Use by Battery-Backup Systems with Increased Self-Consumption

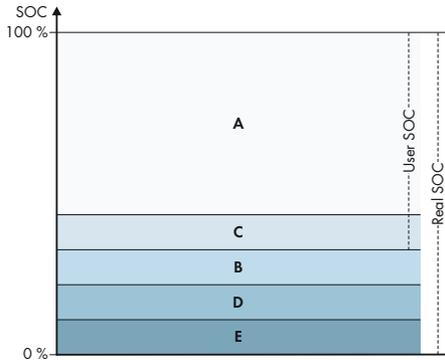


Figure 9: State of charge ranges of the battery in battery-backup systems

Range	Parameter (technical term)	Battery inverter behavior
A	Self-consumption range (SlfCsmP)	The battery inverter uses the batteries within this range for increased self-consumption and for the "Time-of-Use" and "Peak Load Shaving" functions that can be configured in the power profile.
C	Minimum width of backup power range (BURes)	<p>Range for battery-backup operation during grid failure This range is set to 0% by default. If an automatic transfer switching device is connected, the range must be set depending on your needs. The setting value refers to the user SOC.</p> <p>Utility grid available:</p> <p>When the upper limit of C is reached, the battery inverter goes into standby mode. The batteries remain switched on. Excess PV energy is used for conserving the battery charge.</p> <p>When the SOC in range C has decreased by the set value of range B, the battery inverter recharges the batteries with 3 A from the utility grid.</p> <p>If the set value of the parameter for range B is higher than the set value of the parameter for range C, the batteries are recharged in range D first.</p>

Range	Parameter (technical term)	Battery inverter behavior
B	Range for maintaining battery state of charge (PVRes)	<p>Utility grid available:</p> <p>The battery inverter checks the current SOC every 24 hours. If the SOC is in range D, the batteries are recharged with 3 A from the utility grid until the upper limit of range C is reached.</p> <p>During battery-backup operation:</p> <p>The battery inverter starts up every 2 hours for approx. 6 minutes and attempts to charge the batteries with PV energy. If no excess PV energy is available, the battery inverter switches to standby mode.</p>
D	Minimum width of deep-discharge protection range (BatRes)	<p>Once the limit from B to D is reached, the battery and battery inverter switch off. The battery-backup operation can be enabled by switching on the black-start switch of the battery inverter. If the battery is not recharged after 6 minutes, the battery-backup operation will be stopped. No automatic start-up process will be initiated after 2 hours</p> <p>When range D is reached and the utility grid is available, the battery inverter charges the batteries with 3 A from the utility grid.</p>
E	Lower limit of the deep-discharge protection range for disconnection (ProfRes)	<p>If range E is reached during battery-backup operation, the batteries are switched off. The battery inverter is also switched off due to a lack of DC voltage.</p> <p>When range E is reached and the utility grid is available, the battery inverter charges the batteries with 3 A from the utility grid until range A is reached.</p>

4.6.3 Upper battery charge limit

Unlike with lead-acid batteries, a parameterization of the upper battery charging limit does not make sense when using lithium-ion batteries.

There is a battery management system (BMS) in each lithium-ion battery, which dynamically adapts the limiting values depending on the module temperature, the state of charge of the battery (SOC) and also individual cells, thus optimizing the service life of the battery. Thus, the upper battery charging limit is adapted on its own through the BMS.

In addition, it is important to approach the upper battery charging limit at longer intervals in order to prevent the cells connected in series from drifting apart. With this type of calibration, the 100 % SOC value of the battery is relearned and the displayed value is thus synchronized with the actual state of charge of the battery.

For the reasons mentioned, the still partly visible parameter for the upper battery charging limit in the Sunny Boy Storage does not have any function when using lithium-ion batteries.

4.6.4 Battery discharge limits with external active power setpoint

With an external active power setpoint, the lower and upper discharge limits can be set via parameters.

This setting only refers to the control via Modbus and defines that the battery can only be charged and discharged within the set limits.

In self-consumption mode, the battery itself defines the range of the state of charge (SOC). There is no limitation made by the inverter. This means that manually setting the state of charge (SOC) in self-consumption mode is not possible.

5 Mounting

5.1 Requirements for Mounting

Requirements for the 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.
- A solid support surface must be available (e.g., concrete or masonry). When mounted on drywall or similar materials, the product emits audible vibrations during operation which could be perceived as annoying.
 - 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 152).
 - 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 152).
 - To ensure optimum operation, the ambient temperature should be between -25°C and $+45^{\circ}\text{C}$.

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.

$90^{\circ} \dots 75^{\circ}$

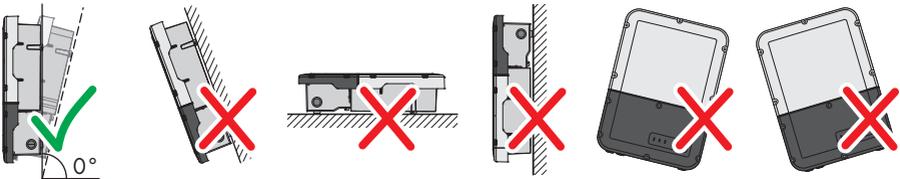


Figure 10: Permitted and prohibited mounting positions

- Do not mount multiple inverters directly above one another.

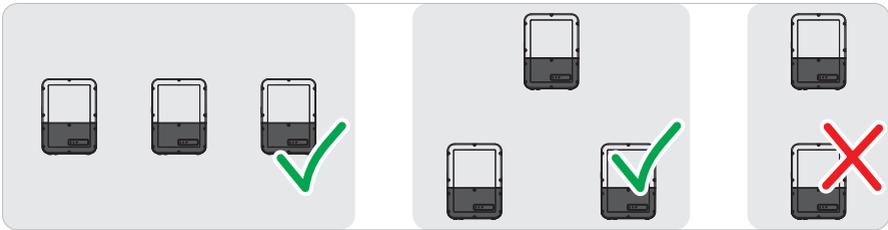


Figure 11: Permissible and impermissible mounting positions of multiple inverters

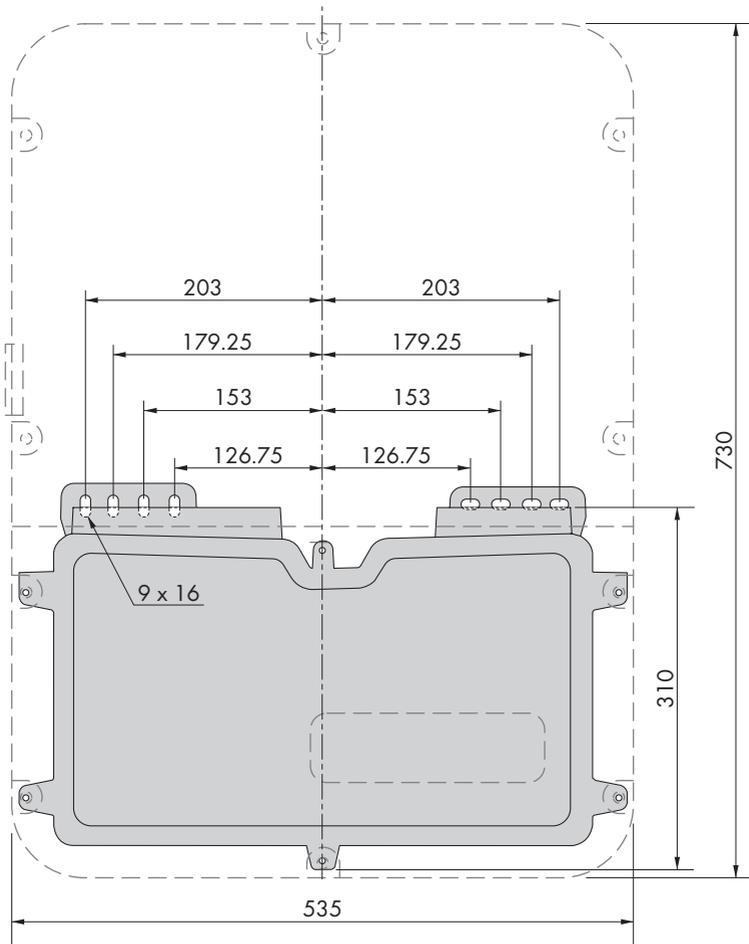
Dimensions for mounting:

Figure 12: 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. A sufficient supply of fresh air can be ensured, for example, by an external room fan controlled via the multifunction relay.

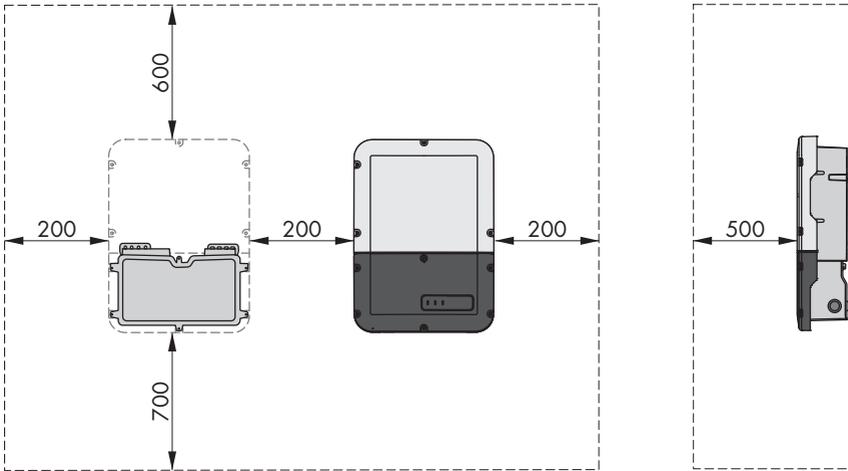


Figure 13: Recommended clearances (Dimensions in mm)

5.2 Mounting the product

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

- 2 screws suitable for the support surface (diameter: 8 mm)
- 2 washers suitable for the screws
- Where necessary, 2 screw anchors suitable for the support surface and the screws

CAUTION

Risk of injury due to weight of product

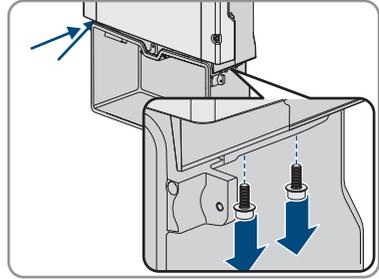
Injuries may result if the product is lifted incorrectly or dropped while being transported or mounted.

- 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.

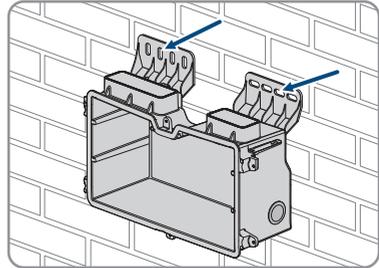
Procedure:

1. Opening the Connection Unit Unscrew all 6 screws (TX25) and carefully remove the enclosure lid toward the front.

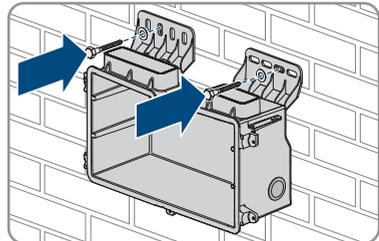
2. Unscrew the 2 screws on the right and left side of the Power Unit (TX25). As a result, the Power Unit and the Connection Unit are not connected to one another.



3. Disconnect the Connection Unit from the Power Unit.
4. Align the connection unit horizontally and vertically. Mark the position of the drill holes using the brackets.

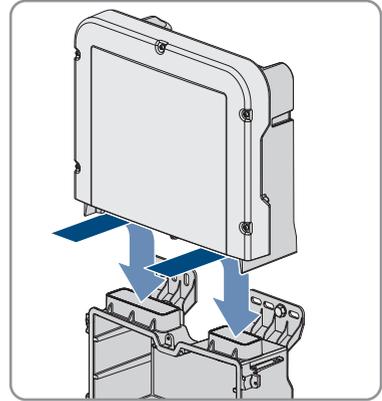


5. Drill the holes in the marked positions.
6. Insert screw anchors into the drill holes if the support surface requires them.
7. Secure the Connection Unit horizontally using screws and washers.

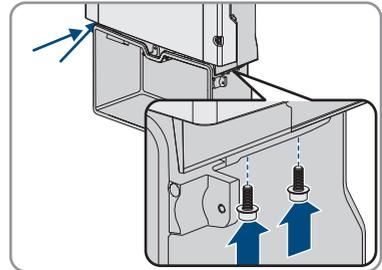


8. Check whether the Connection Unit is firmly positioned.

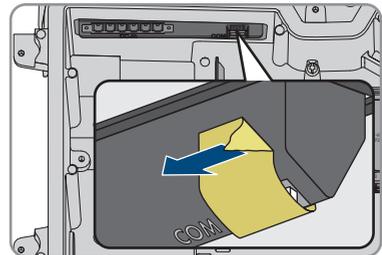
9. Plug the Power Unit into the Connection Unit. Make sure that the screw holes on the left and right sides of the Power Unit are directly over those of the Connection Unit; and the cables protruding from the Power Unit must not be pinched.



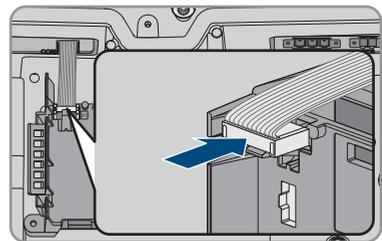
10. Tighten 2 screws on the right and left side of the Power Unit (TX25) (torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$).



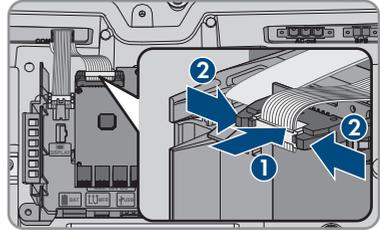
11. Remove the adhesive tape with which the ribbon cable is attached to the Connection Unit.



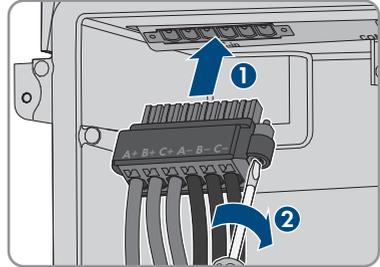
12. Pull the ribbon cable used to connect the communication assembly to the Power Unit into the Connection Unit, and plug it into the jack on the communication assembly.



13. Insert the ribbon cable used to connect the communication assembly to the battery interface module into the jack on the battery interface module and lock it.



14. Insert the DC terminal block into the **DC-in** slot.
Tighten the screws using a flat-blade screwdriver (blade width: 3.5 mm (0.14 in)) (torque: 0.3 Nm (2.65 in-lb)).



6 Electrical Connection

6.1 Overview of the Connection Area

6.1.1 View from Below

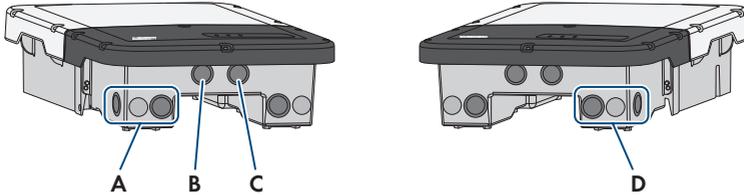


Figure 14: Enclosure openings at the bottom of the inverter

Position	Designation
A	Enclosure opening for the DC connection
B	Enclosure opening for the battery communication cable of the Antenna Extension Kit (optional)
C	Enclosure opening for the network cables and, if needed, for other data cables
D	Enclosure opening for the AC connection and the connection cables of the outlet and of the switch for the secure power supply operation or for the signal cable for the black start

6.1.2 Interior View

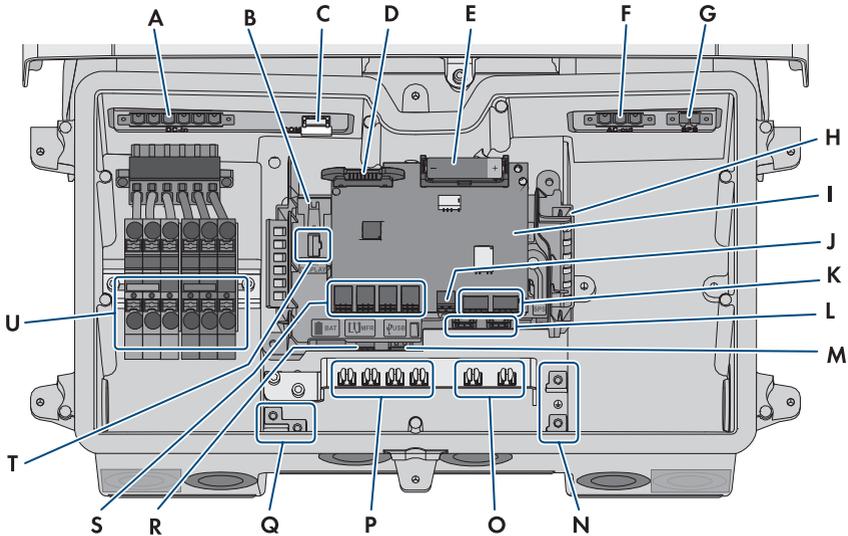


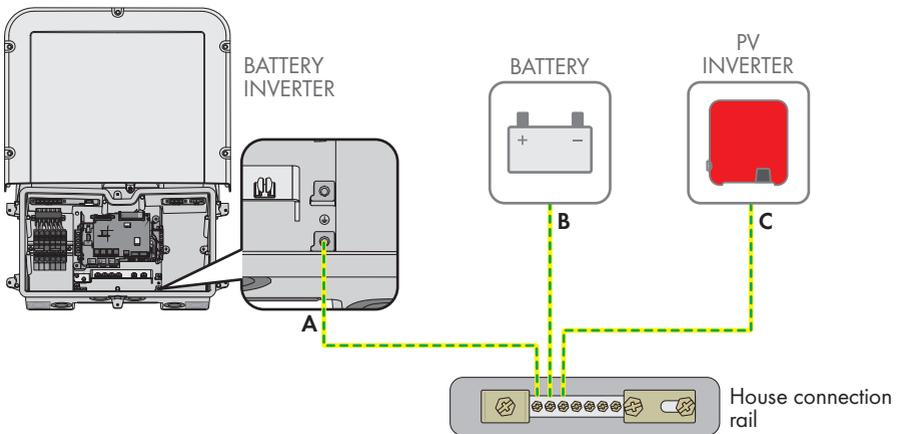
Figure 15: Connection areas in the interior of the inverter

Position	Designation
A	DC-in slot for DC connection
B	Jack for connecting the ribbon cable for the connection of the communication assembly to the Power Unit.
C	COM slot with inserted ribbon cables to connect communication assembly and battery interface module with Power Unit
D	Slot for slim ribbon cable to connect Power Unit with battery interface module
E	Auxiliary battery (3.6 V, 2600 mAh, size: AA / 14500) After switching the black-start switch, energy is made available from the auxiliary battery in order to switch the battery and therefore also the inverter on when they are in sleep mode. The auxiliary battery is designed to function for the entire service life of the product and must not be replaced when used in the usual manner.
F	Slot AC-out for direct connection to utility grid or automatic transfer switch
G	SPS slot for connecting the secure power supply outlet
H	Communication assembly
I	Battery Interface Module
J	Jack to connect switch for secure power supply operation or switch for black start function

Position	Designation
K	No function
L	Network ports A and B for connecting a router or network switch and for connecting an SMA Energy Meter
M	USB port for connecting a USB flash drive (for service purposes)
N	Grounding point for the grounding conductor of the utility grid, the outlet for secure power supply operation and, if necessary, an additional grounding or for the equipotential bonding
O	Shield clamps for the connection of the cable shields of the RS485 communication cables
P	Shield clamps for the connection of the cable shields of the battery communication cables
Q	Grounding point for grounding the battery/batteries
R	MFR slot for connection to the multifunction relay
S	Jacks BAT1 to BAT4 for the connection of the battery communication cable and the communication cable of the automatic transfer switch
T	Jack DISPLAY for the LED assembly connection in the enclosure lid of the Connection Unit
U	Terminal blocks for DC connection

6.2 Grounding

6.2.1 Overview of Grounding Connection



6.2.2 Requirements for Battery Inverter Grounding Cable

- Conductor type: copper wire
- External diameter: 18 mm
- Conductor cross-section: 4 mm² to 16 mm²
- Sheath stripping length: 250 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).

6.3 AC Connection

6.3.1 Requirements for the AC Connection

AC cable requirements as follows:

- Conductor type: copper wire
- External diameter: 18 mm
- Conductor cross-section: 4 mm² to 16 mm²
- Insulation stripping length: 18 mm
- Sheath stripping length: 250 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, page 152). 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 product can be used in grids of overvoltage category III or lower in accordance with IEC 60664-1. That means that the product 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 8.20, page 100).

6.3.2 Connecting the Inverter to the Utility Grid

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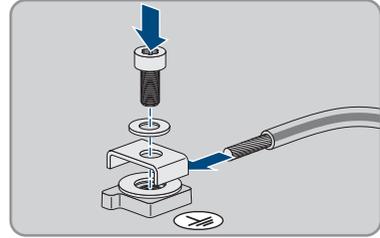
Requirements:

- 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.

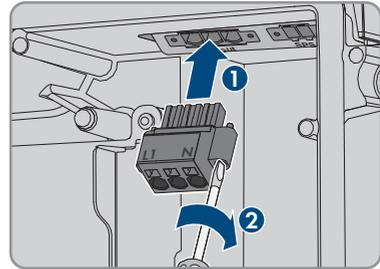
Procedure:

1. Disconnect the AC miniature circuit breaker and secure against reconnection.
2. Remove the adhesive tape from the enclosure opening for the AC connection.
3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Guide each cable into the inverter. In the process, lay each cable in such a way that they do not come into contact with the communication assembly.

5. To connect the grounding conductor to the grounding terminal, first strip off the insulation of the conductor by 18 mm.
6. Insert the screw through the conical spring washer, the clamping bracket and the washer. Guide the conductor between the washer and clamping bracket and tighten the screw (TX 25; torque: 6 Nm \pm 0.3 Nm).



7. Plug the terminal block for the AC connection in the **AC-out** slot in the inverter, and tighten it with a flat-blade screwdriver (blade width: 3.5 mm) (torque: 0.3 Nm).



8. Ensure that the terminal block is securely in place and the screws are tightened.
9. Thread the conductors L and N through the ferrite.
10. Strip off the conductor insulation of L1 and N 18 mm.
11. In the case of fine stranded wire, provide the conductors with a bootlace ferrule.

12. **Connection of conductors of finely stranded wire**

To connect conductors made of finely stranded wire, each terminal point must be opened.

- First insert the conductor into the terminal point all the way to the lock (round opening). Then insert a flat-blade screwdriver (blade width: 3.5 mm) as far as it can go into the actuation shaft (rectangular opening). Hereby the lock opens and the conductor can be placed into the terminal point as far as possible. After the connection has been made, the flat-blade screwdriver must be pulled out of the actuation shaft.

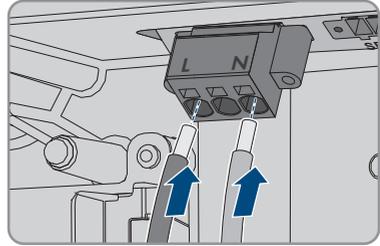
13.

WARNING

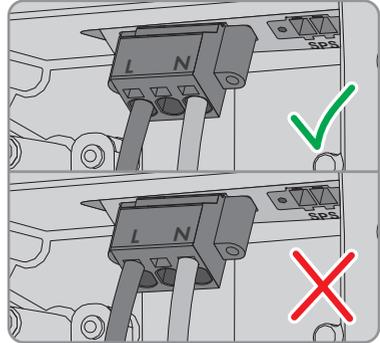
Fire hazard due to faulty conductor connection

If the conductors are inserted into the actuation shafts (right-angled openings), a fire may occur during inverter commissioning.

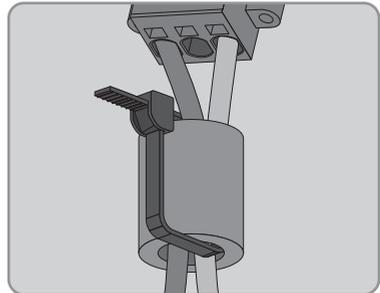
14. Connect the conductors L and N to the terminal block for the AC connection according to the labeling. Insert the conductors into the corresponding terminal point (round opening) up to the stop.



15. Ensure the conductors are plugged into the terminal points (round openings) as far as it will go and not into the actuation shafts (rectangular openings).



16. Ensure that the terminal points are allocated to the correct conductors.
 17. Ensure that the conductors are plugged completely into the terminal points up to their insulation.
 18. Position the ferrite as close as possible to the bottom of the AC connection terminal block and secure using the cable tie.



6.3.3 Connecting Additional Grounding

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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.

i Grounding of the battery

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

- Connect the grounding of the battery to the grounding point of the battery.
- Ground the battery according to the battery manufacturer's specifications.

Cable requirements:

i Use of fine-stranded conductors

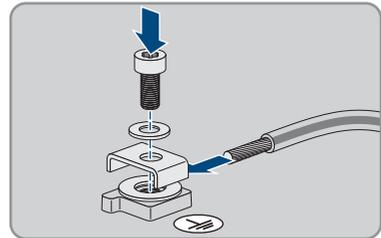
You can use an inflexible or a flexible, fine-stranded conductor.

- 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. To connect the grounding conductor to the grounding terminal, first strip off the insulation of the conductor by 18 mm.
2. Insert the screw through the conical spring washer, the clamping bracket and the washer. Guide the conductor between the washer and clamping bracket and tighten the screw (TX 25; torque: 6 Nm \pm 0.3 Nm).



6.3.4 Equipotential Bonding

If components are used in the PV system that require equipotential bonding (e.g. mounting rack, module frame, etc.), these must be connected with a grounding busbar intended for this purpose.

Observe the installation guidelines and regulations applicable in your country. The enclosure of the inverter is not suitable as equipotential bonding. Improper implementation of the equipotential bonding can lead to a product defect that is not covered by the warranty.

6.4 Connecting the Network Cables

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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.

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

- 1 to 2 network cables
- Where required: Field-assembly RJ45 connector.

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 2 nodes when using patch cables: 50 m
- Maximum cable length between 2 nodes when using installation cables: 100 m
- UV-resistant for outdoor use.

Procedure:

1.

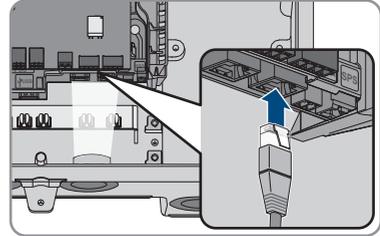
DANGER

Danger to life due to electric shock

- Disconnect the inverter from all voltage sources (see Section 9, page 106).

2. Remove the sealing plugs from the network connection opening on the inverter.

3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Cut into the two-hole cable support sleeve with a box cutter. This will push the cable into the grommet.
5. Press the cable support sleeve into the two-hole cable gland.
6. Insert the cable into the enclosure opening of the two-hole cable support sleeve.
7. Lead one end of each network cable into the inverter.
8. Put the network plug of each cable into one of the network sockets of the communication assembly.



9. Ensure that the network connector is securely in place by pulling slightly on each cable.
10. Connect the other end of the network cable to the energy meter.

6.5 Connecting the energy meter

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This section describes how to connect the energy meter to the inverter.

The energy meter measures the flow of energy out of and into the utility grid. The measured values of the energy meter are transmitted to the inverter and influence the charging behavior of the battery. The energy meter data may not be used for billing purposes.

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

- 1 approved energy meter (SMA Energy Meter or Sunny Home Manager)
- 1 network cable

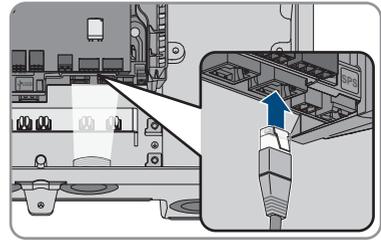
Network cable requirements:

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 2 nodes when using patch cables: 50 m
- Maximum cable length between 2 nodes when using installation cables: 100 m
- UV-resistant for outdoor use.

Procedure:

1. Disconnect the product from voltage sources (see Section 9, page 106).
2. Remove the sealing plugs from the network connection opening on the inverter.
3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Cut into the two-hole cable support sleeve with a box cutter. This will push the cable into the grommet.
5. Press the cable support sleeve into the two-hole cable gland.
6. Insert the cable into the enclosure opening of the two-hole cable support sleeve.
7. Lead one end of each network cable into the inverter.
8. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
9. Put the network plug of each cable into one of the network sockets of the communication assembly.



10. Ensure that the network connector is securely in place by pulling slightly on each cable.
11. If the inverter is installed outdoors, install surge protection device.
12. If you would like to establish a direct connection, connect the other end of the network cable directly to the end device.
13. If you would like to integrate the inverter into a local network, connect the other end of the network cable to the local network (e.g. via a router).

6.6 Connecting the Data Cable of the Battery

⚠ QUALIFIED PERSON

Connect the communication cable of each battery and, in battery-backup systems, the communication cable of the automatic transfer switch as described in the following.

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):

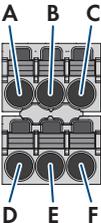
- 1 battery communication cable for the communication between inverter and battery
- In battery-backup systems with automatic transfer switch: one communication cable between inverter and automatic transfer switch

Network cable (SBS to switch, battery to switch) requirements:

- Twisted pair conductors

- Cable category: minimum CAT5e
- Cable with shielding: Yes
- Conductor cross-section: 0.25 mm² to 0.34 mm²
- Recommended number of conductor pairs: 4
- External diameter: 6 mm to 8.5 mm
- Maximum cable length between battery and inverter and, in battery-backup systems, between automatic transfer switch and inverter: 10 m
- The cable has to be insulated for 600 V.
- UV-resistant for outdoor use.
- Comply with the requirements of the battery manufacturer.

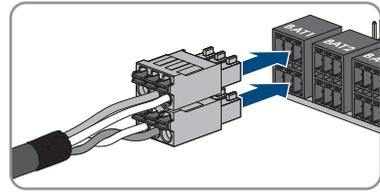
Assignment of the terminal block:

Terminal block	Position	Assignment
	A	Not assigned
	B	Enable
	C	GND
	D	CAN L
	E	CAN H
	F	+12 V supply for automatic transfer switching device

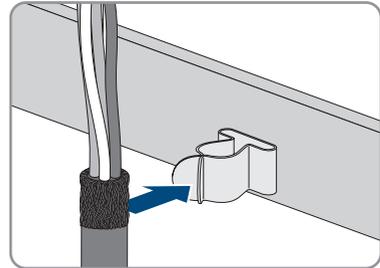
Procedure:

1. Remove the sealing plugs from the network connection opening on the inverter.
2. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
3. Lead the communication cable into the inverter.
4. Strip the communication cable 50 mm.
5. Trim the cable shield to a length of 15 mm and fold it over the cable sheath.
6. Strip the insulation on the insulated conductors each by 6 mm.
7. If necessary, trim unused insulated conductors flush with the cable sheath or fold it over the cable sheath.
8. Connect **Enable**, **GND**, **CAN L** and **CAN H** to the connector for the battery communication according to the circuitry overview in the technical information "SUNNY BOY STORAGE - Approved batteries and information on connecting batteries / Approved automatic transfer switching devices for battery-backup operation". 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.
9. Ensure that the conductors are plugged into the terminal points tightly by pulling slightly on the conductors.

10. Insert the terminal block for the communication connection into the jack **BATx** on the battery interface module. If only one battery is available, insert the plug into the jack **BAT1**. If multiple batteries and/or an automatic transfer switch are available, insert the communication connection of the first battery into the jack **BAT1** and connect all other communication cables in succession to the respective jacks.



11. Press the communication cable with cable shield into the shield clamp on the busbar below the communication assembly.



12. Tighten the cable gland. This will provide tightness and strain relief for the communication cable.

6.7 Connecting the Multifunction Relay

6.7.1 Procedure for connecting the multifunction relay

⚠ QUALIFIED PERSON

Procedure	See
1. Select for which operating mode you would like to use the multifunction relay.	Section 6.7.2, page 58
2. Connect to the multifunction relay according to the operating mode and the associated connection variant.	Section 6.7.3, page 59 Section 6.7.4, page 62
3. After commissioning the inverter, change the operating mode of the multifunction relay, if necessary.	Section 8.17, page 98

6.7.2 Operating Modes of the Multifunction Relay

Operating mode of multifunction relay (Mlt.Op-Mode)	Description
Fault indication (FltInd)	The multifunction relay controls a display device (e.g. a warning light) which, depending on the type of connection, signals either an error or the undisturbed operation of the inverter.

Operating mode of multi-function relay (Mlt.Op-Mode)	Description
Self-consumption (SelfC-smp)	The multifunction relay switches loads on or off, depending on the power production of the PV system.
Control via communication (ComCtl)	The multifunction relay switches loads on or off according to commands transmitted by a communication product.
Battery bank (BatCha)¹⁾	The multifunction relay controls the charging of the batteries depending on the power production of the PV system.
Fan control (FanCtl)	The multifunction relay controls an external fan, depending on the temperature of the inverter.
Switching status grid relay (GriSwCpy)	The local grid operator may require that a signal is transmitted as soon as the inverter connects to the utility grid. The multifunction relay can be used to trigger this signal.

6.7.3 Connection Options

The connection procedures vary, depending on the operating mode.

Operating mode	Connection option
Fault indication (FltInd)	Using the Multifunction Relay as a Fault Indicator Contact
Self-consumption (SelfC-smp)	Controlling the loads via multifunction relay
Control via communication (ComCtl)	Controlling the loads via multifunction relay
Battery bank (BatCha)	Controlling the loads via multifunction relay
Fan control (FanCtl)	Connecting the external fan (see fan documentation)
Switching status grid relay (GriSwCpy)	Reporting the switching status of the grid relay

Using the Multifunction Relay as a Fault Indicator Contact

You can use the multifunction relay as a fault indicator contact and have an error or smooth operation of the inverter displayed or signaled via a suitable display device. You can connect multiple inverters to one fault indicator or operation indicator, as needed.

¹⁾ This operating mode cannot be used in battery inverters

The technical requirements of the multifunction relay must be met (see Section 14, page 152).

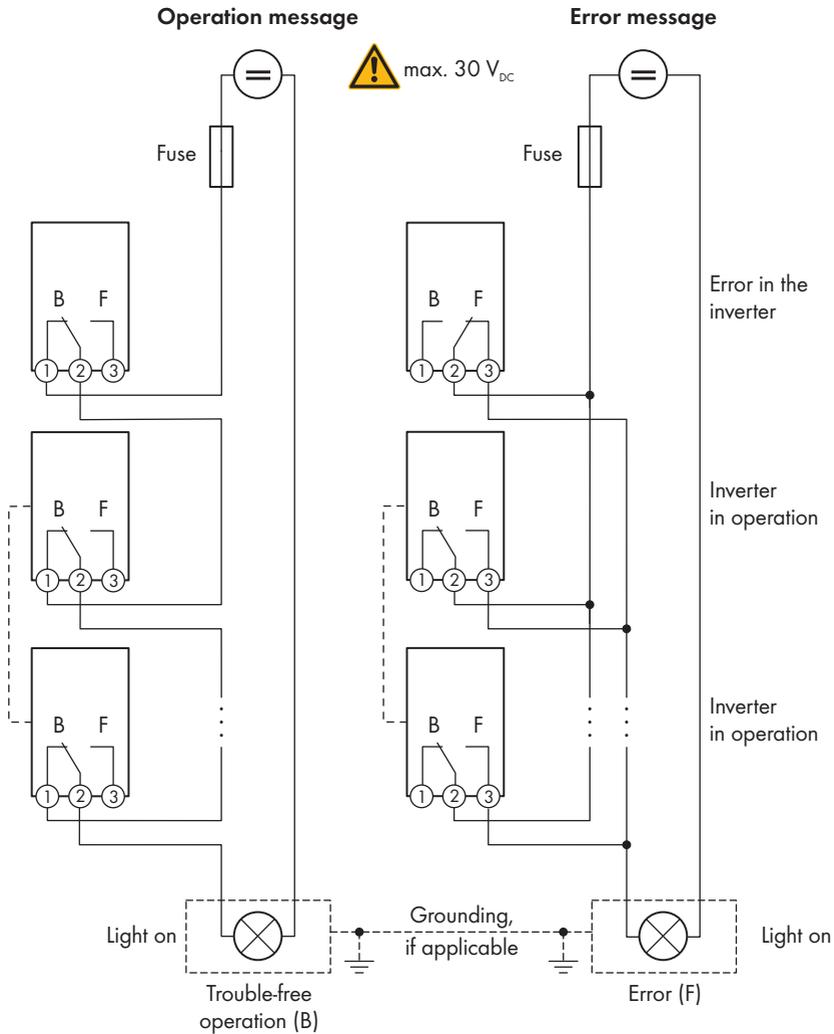


Figure 16: Circuit diagram with multiple inverters for connection to an operation indicator and circuit diagram for connection to a fault indicator (example)

Controlling the loads via multifunction relay

The multifunction relay can control loads. To enable this function, you must connect a contactor (K1) to the multifunction relay. The contactor (K1) switches the operating current for the load on or off.

The technical requirements of the multifunction relay must be met (see Section 14, page 152).

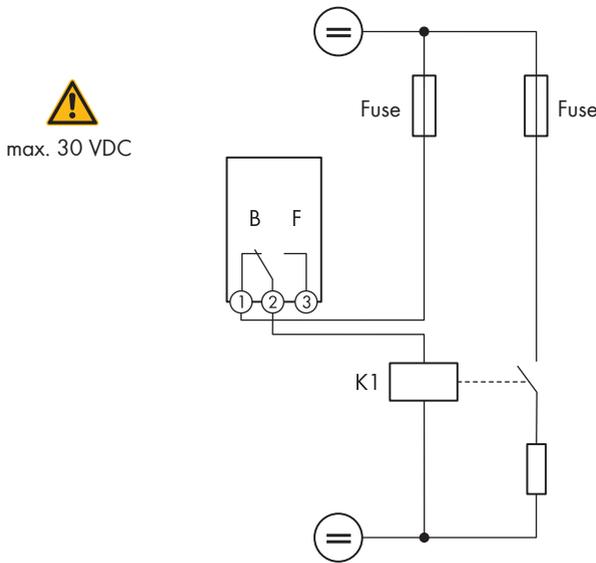


Figure 17: Wiring diagram for connection to control a load

Reporting the switching status of the grid relay

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

The technical requirements of the multifunction relay must be met (see Section 14, page 152).

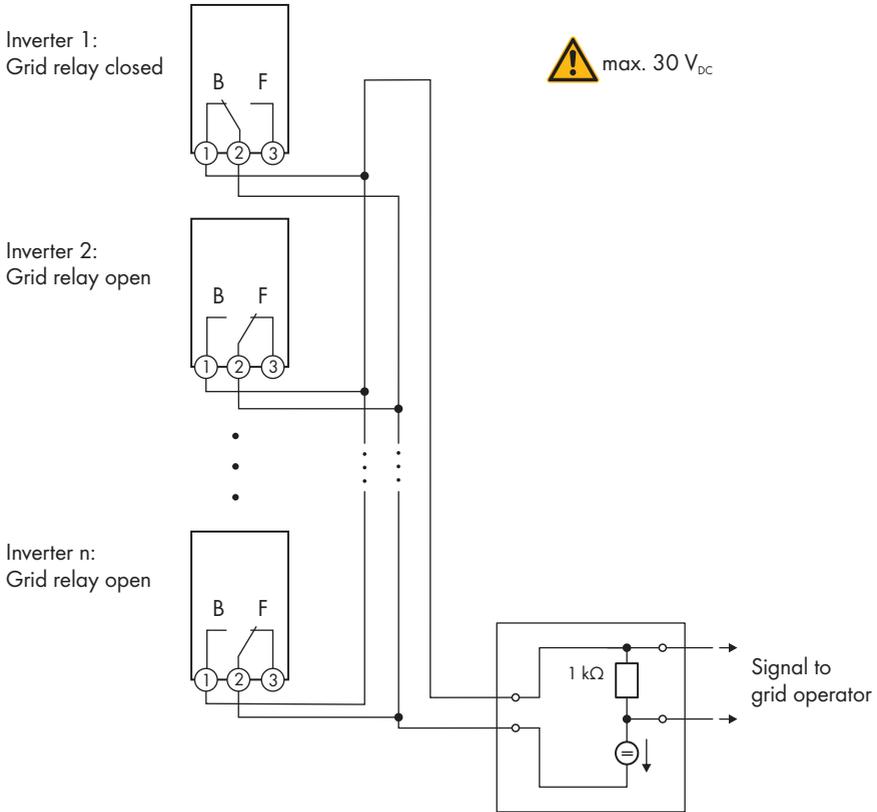


Figure 18: Wiring diagram for signaling the switching status of the grid relay (example)

6.7.4 Connection to the Multifunction Relay

⚠ QUALIFIED PERSON

Requirement:

- The technical requirements of the multifunction relay must be met (see Section 14, page 152).

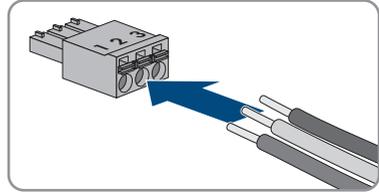
Cable requirements:

- Conductor cross-section: 0.2 mm² to 1.5 mm²
- The cable type and cable-laying method must be appropriate for the application and location.

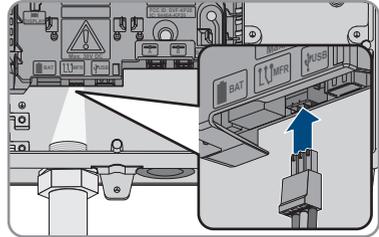
Procedure:

1. Remove the sealing plugs from the network connection opening on the inverter.
2. Insert the cable gland into the opening and tighten it with the counter nut from the inside.

3. Lead the communication cable into the inverter.
4. Strip 9 mm (0.35 in) of the cable insulation at maximum.
5. Connect the cable to the 3-pole terminal block according to the circuit diagram, depending on the operating mode (see Section 6.7.3, page 59). Ensure that the conductors are plugged completely into the terminal points up to their insulation.



6. Stick the 3-pole terminal block with the connected conductors into the **MFR** slot on the communication assembly in the inverter.



7. Ensure that the terminal block is securely in place.
8. Ensure that all conductors are correctly connected.
9. Ensure that the conductors sit securely in the terminal points. Tip: To release the conductors, open the terminal points using a suitable tool.
10. Tighten the swivel nut on the cable gland hand-tight. This will provide tightness and strain relief for the cable.

6.8 Connecting the switch and outlet for secure power supply operation

⚠ QUALIFIED PERSON

i Neutral and grounding conductor of output for secure power supply permanently connected

The inverter's output for secure power supply includes a permanent connection between neutral and grounding conductor, which cannot be disconnected.

i Do not connect any loads that require an uninterrupted energy supply

The secure power supply operation and the battery-backup operation may not be used for loads that require a uninterrupted energy supply. The energy that is available during the secure power supply operation or battery-backup operation depends on the battery capacity available and the state of charge of the battery (SOC).

- Do not connect loads if they are dependent on an uninterrupted energy supply for reliable operation.

Requirements:

- The technical requirements for connecting the switch and outlet for secure power supply operation must be met (see Section 14, page 152).

Residual-current device:

- SMA Solar Technology AG recommends installing a residual-current device (type A) between the inverter's output for secure power supply and the outlet for secure power supply operation, which trips at a residual current of 30 mA. Observe all locally applicable standards and directives when doing so.

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

- 1 standard outlet
- 1 standard switch (e.g. light switch)

Procedure:

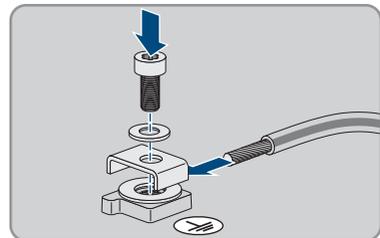
- Connect the outlet for secure power supply operation
- Connecting the switch for secure power supply operation

Connect the outlet for secure power supply operation**Requirements for the conductors:**

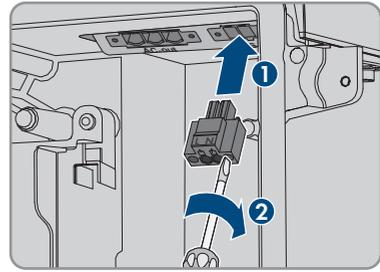
- Conductor type: copper wire
- The conductors must be made of solid wire, stranded wire or fine stranded wire. When using fine stranded wire, bootlace ferrules must be used.
- Conductor cross-section: 2.5 mm² to 4 mm²
- Maximum length of conductors: 10 m

Procedure:

1. Ensure that the inverter is disconnected from all voltage sources (see Section 9, page 106).
2. Remove the sealing plug from the enclosure opening for connecting the outlet for secure power supply operation.
3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Guide the conductors into the inverter.
5. To connect the grounding conductor of the socket for secure power supply operation to a grounding point, first strip off the insulation of the conductor by 18 mm.
6. Insert the screw through the conical spring washer, the clamping bracket and the washer. Guide the conductor between the washer and clamping bracket and tighten the screw (TX 25; torque: 6 Nm ± 0.3 Nm).



7. Plug the terminal block for connecting the outlet for secure power supply operation into the **SPS** slot in the inverter and tighten it with a flat-blade screwdriver (blade width: 3.5 mm (0.14 in)).



8. Ensure that the terminal block is securely in place.
 9. Strip off the conductor insulation by max. 15 mm.
 10. In the case of finely stranded wire, provide the conductors L and N with a bootlace ferrule.

11. **i** **Connection of conductors of finely stranded wire**

To connect conductors made of finely stranded wire, each terminal point must be opened.

- First insert the conductor into the terminal point all the way to the lock (round opening). Then insert a flat-blade screwdriver (blade: 3.5 mm) as far as it can go into the actuation shaft (rectangular opening). Hereby the lock opens and the conductor can be placed into the terminal point as far as possible. After the connection has been made, the flat-blade screwdriver must be pulled out of the actuation shaft.

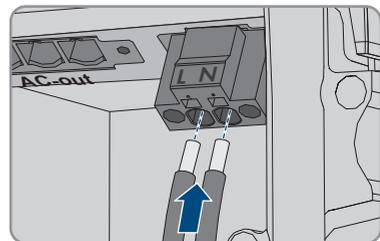
12.

⚠ WARNING

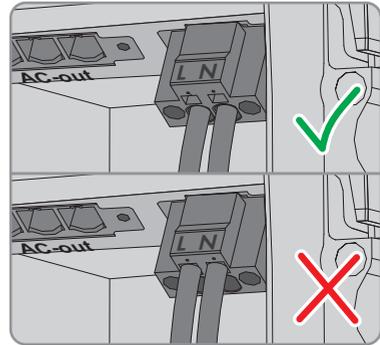
Fire hazard due to faulty conductor connection

If the conductors are inserted into the actuation shafts (right-angled openings), a fire may occur during inverter commissioning.

13. Connect the conductors L and N to the terminal block in accordance with the labeling. Insert each conductor into the corresponding terminal point (round opening) up to the stop.



14. Ensure the conductors are plugged into the terminal points (round openings) as far as it will go and not into the actuation shafts (rectangular openings).



15. Ensure that the terminal points are allocated to the correct conductors.
 16. Ensure that the conductors are plugged completely into the terminal points up to their insulation.
 17. Install outlet in desired position (e.g. next to the inverter or as switch/outlet combination optionally at short distance from the inverter (to max. 10 m)).
 18. Connect the other end of the cable using it directly as energy supply to the outlet.

Connect the switch for secure power supply operation

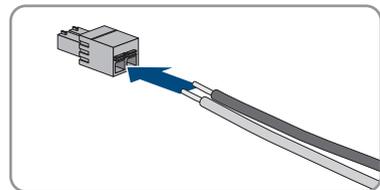
Connection overview

Requirements for the conductors:

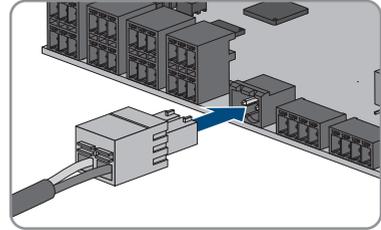
- Conductor cross-section: 0.2 mm² to 2.5 mm²
- The conductor type and wiring method must be appropriate for the application and location.
- Maximum length of conductors: 10 m

Procedure:

1. Ensure that the inverter is disconnected from all voltage sources (see Section 9, page 106).
2. Remove the sealing plug from the opening for connecting the switch for secure power supply operation.
3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Guide the conductors into the inverter.
5. Strip off the conductor insulation by min. 6 mm to max. 10 mm.
6. Connect the conductors to the 2-pole terminal blocks. Ensure that the conductors are plugged completely into the terminal points up to their insulation.



7. Stick the terminal block into the slot  on the battery interface module in the inverter.



8. Ensure that the terminal block is securely in place.
 9. Ensure that all conductors are correctly connected.
 10. Ensure that the conductors sit securely in the terminal points. Tip: To release the conductors from the terminal block, open the terminal points using a suitable tool.
 11. Install switch in desired position (e.g. next to the inverter or as switch/outlet combination optionally at short distance from the inverter (to max. 10 m)).
 12. Connect the other end of the cable directly to the switch.

6.9 Connecting Switch for black start (in battery-backup systems)

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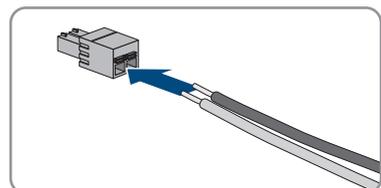
The switch for black start is connected to the same jack as the switch for secure power supply operation. Observe that the secure power supply operation is not available in battery-backup systems.

Requirements for the conductors:

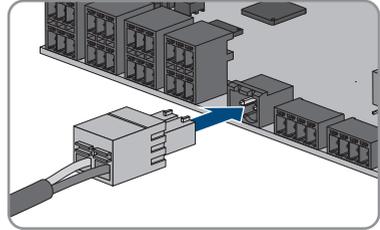
- Conductor cross-section: 0.2 mm² to 2.5 mm²
- The conductor type and wiring method must be appropriate for the application and location.
- Maximum length of conductors: 10 m

Procedure:

1. Ensure that the inverter is disconnected from all voltage sources (see Section 9, page 106).
2. Remove the sealing plug from the opening for connecting the switch for secure power supply operation.
3. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
4. Guide the conductors into the inverter.
5. Strip off the conductor insulation by min. 6 mm to max. 10 mm.
6. Connect the conductors to the 2-pole terminal blocks. Ensure that the conductors are plugged completely into the terminal points up to their insulation.



7. Stick the terminal block into the slot  on the battery interface module in the inverter.



8. Ensure that the terminal block is securely in place.
 9. Ensure that all conductors are correctly connected.
 10. Ensure that the conductors sit securely in the terminal points. Tip: To release the conductors from the terminal block, open the terminal points using a suitable tool.
 11. Install switch in desired position (e.g. next to the inverter or as switch/outlet combination optionally at short distance from the inverter (to max. 10 m)).
 12. Connect the other end of the cable directly to the switch.

6.10 DC connection

6.10.1 Possible Connection

The inverter includes the multi-battery function. This enables to charge and discharge several batteries of the same or different type.

Each DC terminal is designed for a maximum charging/discharging current of 10 A. You can choose between the following connection possibilities:

- Connection of one, two or three batteries with a charging/discharging current limit of 10 A each.
- Connection of two batteries: The first has a charging/discharging current limit of 20 A and the second 10 A.
- Connection of one single battery with a charging/discharging current limit of 20 A.
- Connection of one single battery with a charging/discharging current limit of 30 A.

In the following sections, you find detailed information as well as a wiring- and connection overview for each connection possibility.

6.10.1.1 Connection of batteries with a charging/discharging current limit of 10 A

You may connect one, two or three batteries with a charging/discharging current limit of 10 A each to the inverter:

Procedure:

Connect each battery to a DC terminal.

If there is only one battery available, the battery must be connected to the terminal blocks **A+** and **A-**.

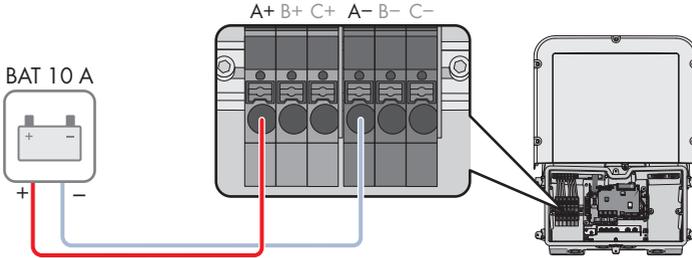


Figure 19: Overview for connection of one battery with a charging/discharging current limit of 10 A

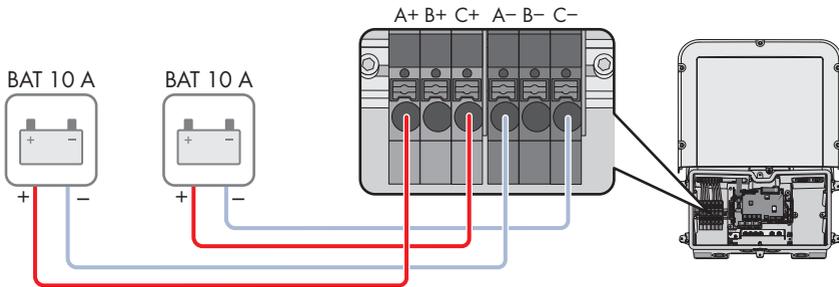


Figure 20: Overview for connection of two batteries with a charging/discharging current limit of 10 A each

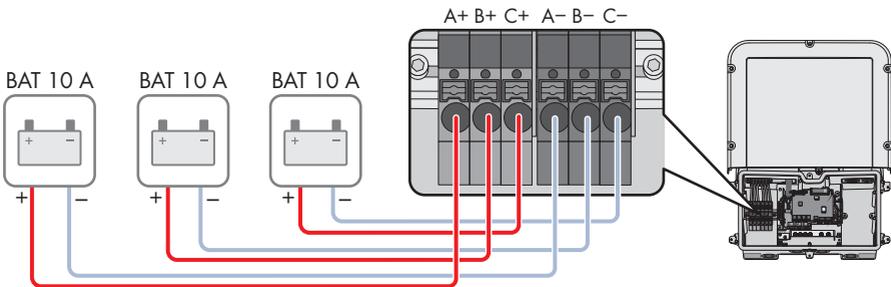


Figure 21: Overview for connection of three batteries with a charging/discharging current limit of 10 A each

6.10.1.2 Connection of two batteries with different charging/discharging currents

You may connect two batteries: The first has a charging/discharging current limit of 20 A and the second 10 A.

Procedure:

The DC terminals A and B must be switched parallelly using the jumpers provided.

The battery limited to a charging/discharging current of 20 A must be connected to the terminal blocks **A+** and **A-**.

The battery limited to a charging/discharging current of 10 A must be connected to the terminal blocks **C+** and **C-**.

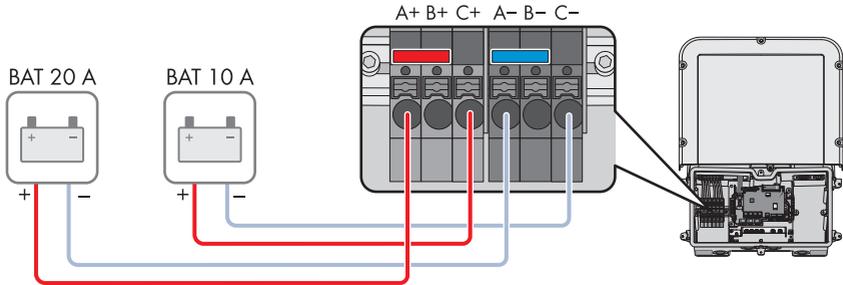


Figure 22: Overview for connection of two batteries with varying charging/discharging current limits

6.10.1.3 Connection of one battery with a charging/discharging current limit of 20 A

You may connect one battery with a charging/discharging current limit of 20 A each to the inverter.

Procedure:

The DC terminals A and B must be switched parallelly using the jumpers provided.

The battery must be connected to the terminal blocks **A+** and **A-**.

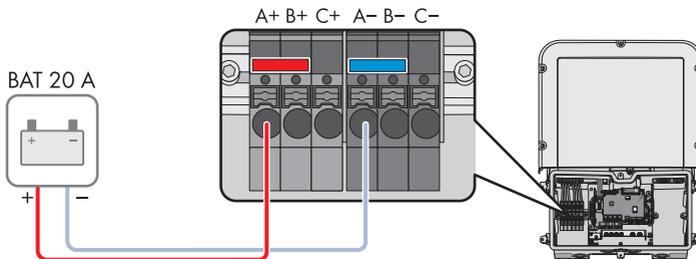


Figure 23: Overview for connection of one battery with a charging/discharging current limit of 20 A

6.10.1.4 Connection of a battery with a charging/discharging current limit of 30 A

You may connect 1 battery with a charging/discharging current limit of 30 A each to the inverter.

Procedure:

All DC terminals must be switched parallelly with the jumpers provided.

The battery must be connected to the terminal blocks **A+** and **A-**.

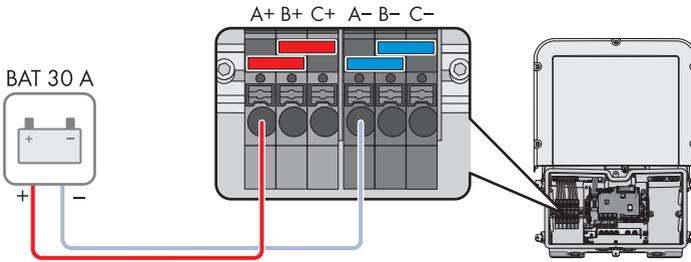


Figure 24: Overview for connection of one battery with a charging/discharging current limit of 30 A

6.10.2 Requirements for the DC Connection

Fusing the DC terminals:

Each DC terminal is designed for a maximum charging/discharging current of 10 A. The conditional short-circuit current-carrying capacity of all DC inputs is 40 A.

As of firmware version 3.11.03.R, the inverter is equipped with a monitoring function of the DC input current. If the 40 A is exceeded, the battery is automatically disconnected for protection and the inverter goes into permanent operation inhibition. For batteries approved by SMA Solar Technology AG, even those with an output current > 40 A, additional fusing between the battery and the inverter is not mandatory. If additional protection is required by local laws, regulations or standards, it must be installed. Local regulations must be checked and complied with.

Cable requirements:

- Conductor cross-section: 2.5 mm² to 10 mm²
- Insulation stripping length: 12 mm
- The conductors must consist of copper.
- The conductors must be made of solid wire, stranded wire or fine stranded wire. When using fine stranded wire, bootlace ferrules must be used.
- Maximum cable length: 10 m

6.10.3 Connecting the power cable of the battery

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life from electric shock due to live DC cables at the battery.

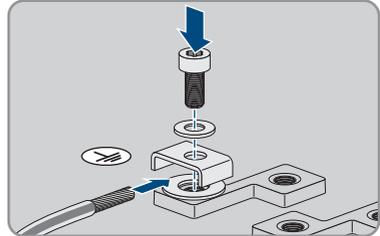
The DC cables connected to a battery may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Ensure that the inverter is disconnected from all voltage sources.
- Do not touch non-insulated cable ends.

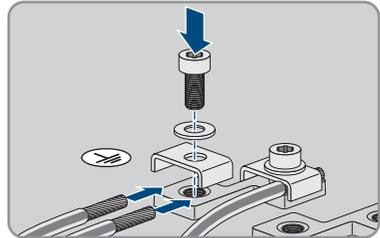
Procedure:

1. Remove the adhesive tape from the enclosure opening for DC connection and, if other enclosure openings are to be used, take the sealing plugs out of these enclosure openings.
2. Insert the cable gland into the opening and tighten it with the counter nut from the inside.
3. Guide each cable into the inverter. In the process, lay each cable in such a way that they do not come into contact with the communication assembly.
4. To connect equipotential bonding of the battery to a grounding point, first strip off the insulation of the conductor by 18 mm.

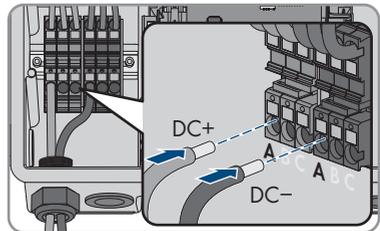
5. Insert the screw through the conical spring washer, the clamping bracket and the washer. Then put the conductor between the washer and clamping bracket and tighten the screw (TX 25, torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$). Here, the conductor must have contact with an inner edge of the clamping bracket.



6. If 2 conductors have to be connected to a grounding point, put both conductors between the washer and clamping bracket and tighten the screw (TX25, torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$). Here, each conductor must have contact with an inner edge of the clamping bracket.



7. Strip off the DC conductor insulation.
8. Connect the cables according to the labeling. Insert each conductor into the corresponding terminal point.



9. Ensure that the terminal points are allocated to the correct conductors.
10. Ensure that the conductors are plugged completely into the terminal points up to their insulation.

7 Commissioning

7.1 Commissioning Procedure

⚠ QUALIFIED PERSON

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

i Commissioning a product in SMA Energy Systems

If the product is used in an SMA Energy System, the commissioning must be performed according to the manual of the SMA Energy System. The procedure and the sequence may differ from the steps described in this section.

- Commissioning an SMA Energy System (see system manual of the SMA Energy System).

i 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 74).
- 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.

Procedure	See
1. Commission the inverter.	Section 7.2, page 74
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 79
3. Log into the user interface.	Section 8.2, page 83
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. You can request the SMA Grid Guard code via the Online Service Center.	Section 7.3, page 76

Procedure	See
5. Configure the product and set country data set. Then the product will begin operation.	Section 8.13, page 96
6. Make further inverter settings as needed.	Section 8, page 79

7.2 Commissioning the Inverter

⚠ QUALIFIED PERSON

⚠ 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.

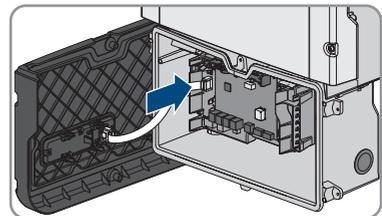
- Before commissioning the system, verify that the battery is not fully discharged.
- Do not commission the system if the battery is fully discharged.
- If the battery is fully discharged, contact the battery manufacturer for further proceedings.
- Only charge fully discharged batteries as instructed 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.
- Unused enclosure openings must be sealed tightly with sealing plugs.

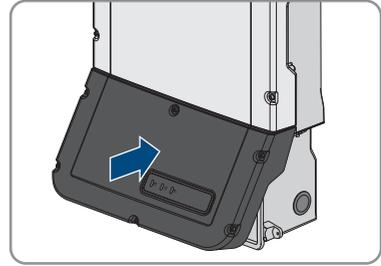
Procedure:

1. Lead the enclosure lid to the Connection Unit and plug the ribbon cable into the socket on the communication assembly.



2. Ensure that the ribbon cable is securely plugged into the sockets at both ends.

3. Position the enclosure lid of the Connection Unit at an angle on the top edge, press down and tighten all 6 screws crosswise (TX25, torque: $3 \text{ Nm} \pm 0.3 \text{ Nm}$).



4. Switch on the AC circuit breaker.
5. Switch on the battery or the load-break switch of the battery (see documentation of the battery manufacturer).
 - All 3 LEDs light up. The start-up phase begins.
 - All 3 LEDs go out again after approximately 90 seconds.
 - Depending on the available power, the green LED pulses or is continuously illuminated. The inverter is feeding in.
6. If the LEDs do not start to glow, the ribbon cable between the assembly in the enclosure lid and the communication assembly in the inverter is most likely not properly plugged in. Ensure that the ribbon cable is securely plugged into the sockets at both ends.
7. If the green LED is still flashing, the conditions for activating feed-in operation are not yet met. As soon as the conditions for feed-in operation are met, the inverter starts with feed-in operation and, depending on the available power, the green LED will light up continuously or it will pulse.

7.3 Selecting a configuration option

⚠ QUALIFIED PERSON

After you have assigned the password for the user groups **Installer** and **User** and logged in as **Installer**, the **Configuring the Inverter** page opens.

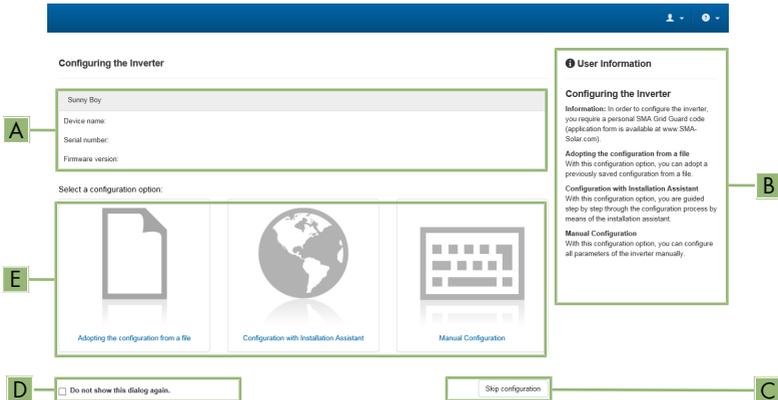


Figure 25: Layout of the **Configuring the Inverter** page

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

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

Configuring the Installation Assistant (Recommended)

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 smart 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.

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.
- A smart device (e.g. laptop) with an Ethernet interface must be available.
- The product must be connected directly to the smart device.
- The respective latest version of one of the following web browsers must be installed on the smart device: Chrome, Edge, Firefox or Safari.
- The installer's SMA Grid Guard code must be available to change network-relevant settings after the first 10 hours of feed-in operation, or after completing the installation assistant. You can request the SMA Grid Guard code via the Online Service Center.
- JavaScript must be enabled in the web browser of the smart device.

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 smart device and enter the IP address **169.254.12.3** in the address bar.
 2. **i Web browser displays warning**

After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.

 - Continue loading the user interface (scroll to bottom and click proceed/advance).
- 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 a smart device. The procedure can be different depending on the devices. If the procedures described do not apply to your device, establish the direct connection via Wi-Fi as described in the manual of your 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.
- A smart device (e.g. smartphone, tablet or laptop) must be available.

- The respective latest version of one of the following web browsers must be installed on the smart device: Chrome, Edge, Firefox or Safari.
- JavaScript must be enabled in the web browser of the smart device.
- The installer's SMA Grid Guard code must be available to change network-relevant settings after the first 10 hours of feed-in operation, or after completing the installation assistant. You can request the SMA Grid Guard code via the Online Service Center.

i SSID, IP address and WLAN password

- SSID in WiFi: **https://SMA[serial number]** (e.g. **https://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: **https://smalogin.net** or **192.168.12.3**

i Using serial number of inverter for connecting to user interface

The inverter serial number is on the supplementary type label. PIC and RID for registration in the Sunny Portal are also included there. The supplementary type label is attached to the Connection Unit.

- Use serial number on supplementary type label for connecting to user interface.

i Importing and exporting files with smart 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 smart devices having an iOS operating system.

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

Connection to SMA 360° App

Requirements:

- A smart device with camera (e.g. smartphone or tablet) must be available.
- The SMA 360° App must be installed on the smart device.
- An user account for Sunny Portal must already exist.

Procedure:

1. Open the SMA 360° App and login with the 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 smart device automatically connects to the product. The web browser of your smart device opens and the login page of the user interface is displayed.
4. If the web browser of the smart end device does not open automatically and the login page of the user interface is not displayed, open the web browser and enter **https://smalogin.net** in the address bar.

Connection with WPS

Requirement:

- The smart device must have a WPS function.

Procedure:

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

Connection with Wi-Fi network search

1. Search for Wi-Fi networks with your smart 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 smart end device and enter **https://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 smart end device supports mDNS services, **SMA[serial number].local** or **https://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: **https://SMA[serial number].local** (e.g. **https://SMA0123456789.local**)
- Access address for Windows and Android systems: **https://SMA[serial number]** (e.g. **https://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.
- A smart device (e.g. smartphone, tablet or laptop) must be available.
- The smart 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 on the smart device: Chrome, Edge, Firefox or Safari.
- The installer's SMA Grid Guard code must be available to change network-relevant settings after the first 10 hours of feed-in operation, or after completing the installation assistant. You can request the SMA Grid Guard code via the Online Service Center.

Procedure:

1. Open the web browser of your smart device. Enter the IP address of the product in the address bar of the web browser.
 2. ** Web browser displays warning**
After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.
 - Continue loading the user interface (scroll to bottom and click proceed/advance).
- 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: **https://SMA[serial number].local** (e.g. https://SMA0123456789.local)
- Access address for Windows and Android systems: **https://SMA[serial number]** (e.g. https://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.
- A smart device (e.g. smartphone, tablet or laptop) must be available.
- The smart 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 on the smart device: Chrome, Edge, Firefox or Safari.
- The installer's SMA Grid Guard code must be available to change network-relevant settings after the first 10 hours of feed-in operation, or after completing the installation assistant. You can request the SMA Grid Guard code via the Online Service Center.

i Importing and exporting files with smart 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 smart devices having an iOS operating system.

- Use a smart 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 System Manager (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.

i Installer password for inverters registered in a System Manager or in Sunny Portal

To be able to register the inverter in a System Manager (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 26: Design of the user interface's home 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	Displays the following information: <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

Position	Designation	Description
E	State of charge	<p>Chronological sequence of the state of charge (SOC) of the battery</p> <p>This value may be different from the values that the battery provides. Only the value supplied by the inverter is used for this purpose.</p>
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 Displaying and Downloading the Stored Data

If an external storage device is plugged in, you can display and download the stored data.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface (see Section 8.2, page 83).
3. Select the menu **Data**.
4. Select the folder **Data**.

5. To call up the data, select the respective folder and click on the required file.
6. To download the data, select the data type to be exported in the drop-down list. Then apply the time filter and select **Data export**.

8.5 Starting the Installation Assistant

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

Layout of the installation assistant

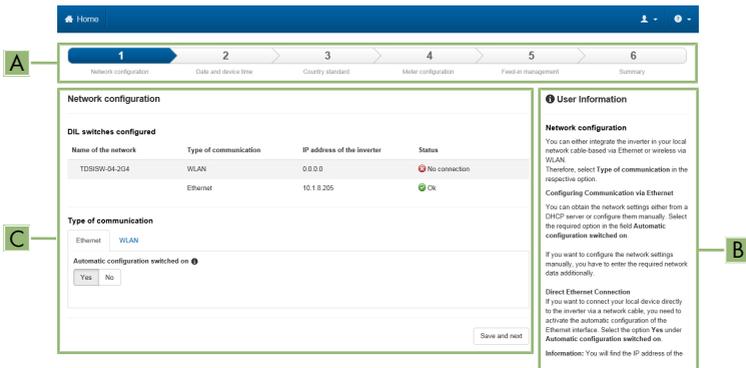


Figure 27: Layout of the installation assistant (example)

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:

- The SMA Grid Guard code must be available to change network-relevant parameters after the first 10 hours of feed-in operation, or after completing the installation assistant. You can request the SMA Grid Guard code via the Online Service Center.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log in as **Installer**.

3. Select the menu **User Settings** (see Section 8.3, page 85) on the start page of the user interface.
 4. In the context menu, select [**Starting the installation assistant**].
- The installation assistant will open.

8.6 Secure power supply operation

If a socket and a switch for secure power supply operation are connected to the inverter, you can supply a load with energy from the battery in case of a grid failure.

The secure power supply operation is not automatically enabled in the event of a grid failure, neither is it automatically disabled once the utility grid is available again. If the utility grid fails, the load supply must be enabled manually by activating the switch. The inverter automatically regulates the energy supply of the outlet after activating the switch. When the utility grid is available again and the load can be supplied by this again, the secure power supply operation must be disabled manually by switching the switch off.

If you enable the secure power supply operation, the inverter supplies the loads that are connected to the socket for secure power supply operation until the battery's state of charge (SOC) has reached the lower limit. In case the battery's state of charge (SOC) is too low, the energy supply of the outlet is permanently interrupted. The lower state of charge limit can be modified by setting a parameter. The lower limit is 0% by default. The secure power supply operation runs only when the battery can be recharged after connecting to the utility grid.

In case of overload, the energy supply of the outlet is briefly interrupted. The inverter automatically attempts to reestablish the energy supply 20 seconds after the interruption. This can lead to inadvertent starting of the load that is connected to the outlet. Ensure that the load connected to the outlet does not consume too much power. If necessary, reduce the power consumption of the load.

During active secure power supply operation, the inverter is disconnected from the building's main electrical system and does not therefore feed into the utility grid. During secure power supply operation, the load can only be supplied with energy as long as there is stored energy available in the battery. If there is insufficient energy available from the battery, the secure power supply operation remains active, even if the utility grid is available again. Switching over to supplying the load from the utility grid is not carried out automatically. Once the battery is sufficiently recharged and the load can be supplied, the secure power supply operation must be restarted.

i No secure power supply operation possible in the SMA Energy System Home with Battery-Backup Function

If the inverter is used in an SMA Energy System Home with battery-backup function and connected with an automatic transfer switching device, the secure power supply operation is not available.

i Do not connect any loads that require an uninterrupted energy supply

The secure power supply operation and the battery-backup operation may not be used for loads that require an uninterrupted energy supply. The energy that is available during the secure power supply operation or battery-backup operation depends on the battery capacity available and the state of charge of the battery (SOC).

- Do not connect loads if they are dependent on an uninterrupted energy supply for reliable operation.

8.6.1 Enable secure power supply operation

To supply the loads with energy in the event of utility grid failure, you can enable the secure power supply operation as follows.

To check the secure power supply operation, proceed as described in this section. Disable the secure power supply operation afterwards (see Section 8.6.2, page 91).

Procedure:

1. If no load is connected to the outlet, connect a load.
2. Turn the switch of the outlet to secure power supply operation.
3. Wait one minute.
 - The inverter commences secure power supply operation. Once the inverter supplies the socket, the green LED flashes (1.5 s on and 0.5 s off).
4. If the green LED is not flashing, it is likely that the battery's state of charge (SOC) is too low. Ensure that the socket's switch is set to secure power supply operation. Then connect a load with lower power consumption to the socket.
5. If no voltage can be measured at the outlet, ensure that the switch of the outlet is set to secure power supply operation, and that the switch, outlet and control light for secure power supply operation are correctly connected.

8.6.2 Disable secure power supply operation

1. If necessary, disconnect the load from the outlet.
2. Turn the switch of the outlet to grid operation.
 - Grid operation is activated.
- The inverter connects to the utility grid and starts feed-in operation.

8.7 Checking or Disabling Battery-Backup Operation

You may check the battery-backup operation. This ensures that the battery-backup system works and provides a battery-backup grid in the event of utility grid failure.

The basic procedure for changing operating parameters is explained in another section (see Section 8.12, page 95).

Procedure:

1. Select the parameter **Backup box operating mode** and set it to **Force**.
 - The battery-backup operation is started.
2. To ensure that the battery-backup system works, proceed as follows: check loads, select the menu **[Results]** and check whether a battery-backup system error is displayed. During battery-backup operation, the loads must be supplied with energy from the battery-backup system. If the loads are supplied with energy, an error has occurred. If an error is displayed in the menu **[Results]**, it must be fixed.

3. To finish the check, set the parameter **Backup box operating mode** to **Auto**.
4. To disable the battery-backup operation, set the parameter **Backup box operating mode** to **Off**. The battery-backup operation is disabled until it is re-enabled manually. The battery-backup operation is enabled when it is set to **Auto**.

8.8 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 a smart 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 79).
 2. Log in as **Installer**.
 3. Start the installation assistant (see Section 8.5, page 89).
 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 smart device.

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

8.9 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.

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 8.12, page 95).

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**.

8.10 Changing the Password

The password for the product 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.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface (see Section 8.2, page 83).
3. Call up the menu **Device parameters**.
4. Click on **[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.

8.11 Generating or Changing a Product Key

If you have forgotten the product's password, you can use the product key to create a new one. The product key is stored only on the device. A lost product key cannot be recovered, it can only be recreated. Creating a product key is not mandatory, but is recommended by SMA Solar Technology AG because the product key significantly increases the security of the system.

Generating a product key for the first time

A product key must be generated for each of the groups **User** and **Installer**.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface as an **User** or **Installer** (see Section 8.2, page 83).
3. Select the menu **User settings**.
4. Select [**Access rights**].
5. Select [**Product key**].
6. Enter the specific device secret of the product. Which specific device secret is used and where you can find the specific device secret is indicated on the user interface.
7. Click on [**Generate**].
 - A string representing the product key is generated.
8. Write down the product key immediately and keep it safe. After leaving this page, the newly generated product key can no longer be displayed. The copy of the product key must be accessible only to you.

Generate new product key

If the product key has become accessible to unauthorized persons, you can generate a new product key at any time. To generate a new product key, the currently valid product key must be available.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface as an **User** or **Installer** (see Section 8.2, page 83).
3. Select the menu **User settings**.
4. Select [**Access rights**].
5. Select [**Product key**].
6. Enter the currently valid product key.
7. Click on [**Generate**].
 - A string representing the new product key is generated.
8. Write down the new product key immediately and keep it safe. After leaving this page, the newly generated product key can no longer be displayed. The previously valid product key is invalid after a new product key is generated. The copy of the product key must be accessible only to you.

8.12 Changing Operating Parameters

The parameters of the inverter are set to certain values by default. You can change the 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. You can request the SMA Grid Guard code via the Online Service Center.

Requirements:

- Changes to grid-relevant parameters must be approved by the responsible grid operator.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
 2. Log into the user interface (see Section 8.2, page 83).
 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). In the menu, select **User Settings > 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 required parameters.
 8. Select [**Save all**] to save the changes.
- The parameters are set.

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.

8.13 Configuring the Country Data Set

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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 8.12, page 95).

Procedure:

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

8.14 Configuring the Active Power Mode

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Starting the installation assistant

1. Open the user interface (see Section 8.1, page 79).
2. Log in as **Installer**.
3. Start the installation assistant (see Section 8.5, page 89).
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.

8.15 Configuring Battery and Automatic Transfer Switching Device

When a battery is replaced or a new battery is added, and when the system is upgraded with an automatic transfer switching device to a battery-backup system or an existing automatic transfer switching device is replaced, the new components must be reconfigured as described below.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log in as **Installer**.
3. Start the installation assistant (see Section 8.5, page 89).
4. Click on **[Save and next]** for each step up to the step **Battery configuration**.
5. Click on the button **New configuration Battery / backup power supply**.
 - New components are detected. The detection process may take several minutes. Wait until all the connected batteries are detected and shown in the overview.
6. In case of battery-backup systems, make the settings in the **Battery-backup system** step. For this purpose, all batteries connected to the inverter must be shown in the overview.

8.16 Disabling Battery Charging by PV System in Battery-Backup Operation Mode

Depending on the state of charge in terms of battery and PV generation, it can happen that the battery-backup grid is interrupted for a few seconds in battery-backup operation mode during load changes and then restarts again. To prevent this behavior, you must make the following settings. The basic procedure for changing operating parameters is explained in another section (see Section 8.12, page 95).

Procedure:

1. Select the parameter **Output power limitation of PV inverter** and set it to **Permanently derated**.
2. Set the parameter **Upper limit for the charging state for derating of the PV inverters** to **0**.

8.17 Changing the Operating Mode of the Multifunction Relay

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The default operating mode of the multifunction relay is **Fault indication (FltInd)**. If you decide to use another operating mode and have established the correct electrical connection for this operating mode and the associated connection variant, you will have to change the operating mode of the multifunction relay and make other settings, if necessary.

The basic procedure for changing operating parameters is explained in another section (see Section 8.12, page 95).

Procedure:

1. Call up the menu **Device parameters**.
2. Click on [**Edit parameters**].
3. In the parameter group **Device > Multifunction relay > Operating mode** select the parameter **Operating mode of multifunction relay** or **Mlt.OpMode** and set the desired operating mode.
4. In **Self-consumption** or **SelfCsmp** operating mode: In the parameter group **Device > Multifunction relay > Self-consumption > Minimum On power**, select the parameter **Minimum On power for MFR self-consumption** or **Mlt.MinOnPwr** and set the desired value. This determines the power threshold at which a load is switched on.
5. In **Self-consumption** or **SelfCsmp** operating mode: In the parameter group **Device > Multifunction relay > Self-consumption > Minimum power On time**, select the parameter **Minimum power On time, MFR self-consumption** or **Mlt.MinOnPwrTmm** and set the desired value. This determines the minimum time for which the power must exceed the minimum switch-on power threshold before the load is switched on.

6. In **Self-consumption** or **SelfCsmp** operating mode: In the parameter group **Device > Multifunction relay > Self-consumption > Minimum On power**, select the parameter **Minimum On time for MFR self-consumption** or **Mlt.MinOnTmm** and set the desired value. This determines the minimum time for which the load remains switched on.
7. In **Control via communication** or **ComCtl** operating mode: In the parameter group **Device > Multifunction relay > Control via communication > Status**, select the parameter **Status of MFR with control via communication** or **Mlt.ComCtl.Sw** and set the desired value. This determines whether the multifunction relay can be controlled via a communication product.
8. In **Battery bank** or **BatCha** operating mode: In the parameter group **Device > Multifunction relay > Battery bank > Minimum On power**, select the parameter **Minimum On power for MFR battery bank** or **Mlt.BatCha.Pwr** and set the desired value. This determines the power threshold at which the battery is supposed to be charged.
9. In **Battery bank** or **BatCha** operating mode: In the parameter group **Device > Multifunction relay > Battery bank > Minimum time before reconnection**, select the parameter **Minimum time before reconnection of MFR battery bank** or **Mlt.BatCha.Tmm** and set the desired value. This sets the minimum time which must elapse after charging the battery before battery charging can resume.
10. Select [**Save all**] to save the changes.

8.18 Configuring the Modbus Function

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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 enabled. After enabling 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).

8.19 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 8.12, page 95).

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.

8.20 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 8.12, page 95).

Procedure:

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

8.21 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 8.12, page 95).

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 79).
2. Log in as **Installer**.
3. Start the installation assistant (see Section 8.5, page 89).
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.

8.22 Saving the Configuration in a File

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface (see Section 8.2, page 83).
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.

8.23 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 8.22, page 101). 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. You can request the SMA Grid Guard code via the Online Service Center.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface as an **Installer** (see Section 8.2, page 83).
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.

8.24 Firmware Update

If no automatic update is set for the inverter in the communication product (e.g. SMA Data Manager, Cluster Controller, Sunny Portal) or via the user interface of the inverter, you have the option of carrying out a manual firmware update.

Depending on the battery used, the firmware update of the inverter also updates the battery.

You have the following options to update the firmware:

- Automatic Firmware Update (Recommended)
- Update the firmware with the existing update file via the user interface of the inverter.
- Update the firmware with the existing update file via USB flash drive.
- Search and install the firmware via the user interface of the inverter.

i Faulty firmware update due to disconnecting the inverter from the utility grid or when the battery is disconnected or discharged.

The inverter must be connected to the utility grid and the battery must be switched on during the firmware update. The state of charge must be at least 5%. The battery-backup and secure power supply operation must be disabled. This ensures a proper firmware update.

- Ensure that the battery is switched on and the state of charge is above 5%.
- Do not disconnect the inverter from the utility grid during the firmware update.
- Do not enable secure power supply operation during the firmware update.
- Do not use the black-start button during the firmware update.

8.24.1 Activating Automatic Firmware Update

⚠ QUALIFIED PERSON

You can activate the automatic firmware update in the inverter or in the communication product.

If the automatic firmware update is activated in the inverter, the inverter searches for updates and carries out the update.

If the automatic firmware update is activated in the communication product, the communication product searches for updates for the inverter and carries out the update of the inverter. In this case, the automatic firmware update is deactivated by default in the inverter. This prevents multiple downloads of updates.

In this section we describe how to activate the automatic firmware update in the inverter. The procedure for activating the automatic firmware update for detected devices in the communication product can be found in the manual for the communication product.

The basic procedure for changing operating parameters is explained in another section (see Section 8.12, page 95).

Procedure:

- In the parameter group **Device > Update**, select the **Automatic Update** parameter and set to **Yes**.

8.24.2 Updating Firmware with Update File via the User Interface

QUALIFIED PERSON

Requirements:

- An 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.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface as an **Installer** (see Section 8.2, page 83).
3. Click on **[Edit parameters]**.
4. Select the menu **Device Configuration**.
5. In the product row, click on the gear icon and select **Update firmware**.
6. Select **[Browse]** and select the update file for the product.
7. Select **Update firmware**.
8. Follow the instructions in the dialog.
9. Open the user interface and check the events to see whether the firmware update has been completed successfully.

8.24.3 Updating Firmware with Update File via the USB Flash Drive

QUALIFIED PERSON

Requirement:

- A USB flash drive with maximum 32 GB and file system FAT32 must be available.

Procedure:

1. Create an "UPDATE" folder on the USB stick.
2. Save the update file with the required firmware in the "UPDATE" folder on the USB flash drive. The update file is, for example, available for download on the product page of the inverter at www.SMA-Solar.com. Ensure that only the update file to which the inverter is to be updated must be stored on the USB flash drive.

3.

⚠ DANGER**Danger to life due to high voltages**

- Disconnect the inverter from all voltage sources and open the enclosure lid of the DC connection unit (see Section 9, page 106).

4. Insert the USB flash drive in the USB port on the communication assembly.
5. Commission the inverter (see Section 7.2, page 74).
 - During start-up phase of the inverter, the desired firmware is being installed.

6.

⚠ DANGER**Danger to life due to high voltages**

- Disconnect the inverter from all voltage sources and open the enclosure lid of the DC connection unit (see Section 9, page 106).

7. Pull the USB flash drive out of the USB port.
8. Commission the inverter (see Section 7.2, page 74).
9. Open the user interface and check the events to see whether the firmware update has been completed successfully.
10. If the firmware update has not been successfully completed, perform the firmware update again.

8.24.4 Searching for and Installing New Firmware via the User Interface

⚠ QUALIFIED PERSON**Requirement:**

- The inverter must be connected to the Internet.

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Log into the user interface as an **Installer** (see Section 8.2, page 83).
3. Select the menu **Device Parameters**.
4. Click on **[Edit parameters]**.
5. Go to **Device > Update**.

6. Select the parameter **Check for update and install it** and set it to **Execute**.
 7. Click on [**Save all**].
- The firmware is updated in the background.

9 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

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

⚠ WARNING

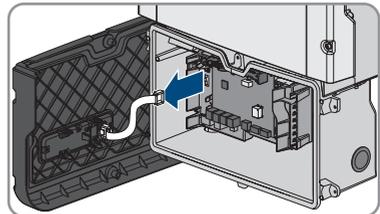
Danger to life due to electric shock from destruction of the measuring device due to overvoltage

Overvoltage can damage a measuring device and result in voltage being present in the enclosure of the measuring device. Touching the live enclosure of the measuring device results in death or lethal injuries due to electric shock.

- Only use measuring devices with a DC input voltage range of 600 V or higher.

Procedure:

1. Disconnect the AC miniature circuit breaker and secure against reconnection.
2. Switch off the battery or the load-break switch of the battery (see documentation of the battery manufacturer).
3. If the multifunction relay is used, switch off any supply voltage to the load.
4. Wait 5 minutes. This will ensure that the capacitors are discharged.
5. Unscrew all 6 screws of the enclosure lid of the Connection Unit and carefully remove the enclosure lid toward the front (TX25). When doing so, note that the LED assembly in the enclosure lid and the communication assembly in the inverter are connected via a ribbon cable.
6. Pull the ribbon cable connecting the LED assembly in the enclosure lid to the communication assembly out of the jack located on the communication assembly.



7. Ensure that no voltage is present on the **AC-out** terminal block between **L** and **N** using a suitable measuring device. To do this, stick the test probe in each rectangular opening of the terminal.
8. Ensure that no voltage is present on the **AC-out** terminal block between **L** and **PE** using a suitable measuring device. To do this, stick the test probe in each rectangular opening of the terminal.

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, leaves and other dirt.

11 Troubleshooting

11.1 Product Key Lost

If you have forgotten the password for the product and additionally lost the product key, use the procedure described below to generate a new password. The procedure requires physical access to the product.

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 PV 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).

Procedure:

1. Open the user interface (see Section 8.1, page 79).
2. Select the group **User** or **Installer**.
3. Click on **[Forgot your password?]**.
4. Click on **[Product key lost?]** wählen. If you have not yet generated a product key, the name of the specific device secret is displayed instead of **Product key**. In this case, click on **[### lost?]**.
5. Read the help text and enter a new password.
6. Select **[Next]**.
7. Perform one of the displayed actions within the specified time period.
 - A newly generated product key is displayed.
 - If the action performed was tapping the enclosure lid 2 times, the blue LED will flash rapidly.
8. Write down the new product key immediately and keep it safe. After leaving this page, the newly generated product key can no longer be displayed. The previously valid product key is invalid after a new product key is generated. The copy of the product key must be accessible only to you.
9. Select **[Login]**.
 - You are logged in on the user interface of the product.

11.2 Event messages

Event number	Message, cause and corrective measures
101	<p>⚠ QUALIFIED PERSON</p> <p>Grid fault > Check grid voltage</p> <p>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>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the correct country data set has been configured. • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p>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>If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.</p>
102	
103	
105	
202	<p>⚠ QUALIFIED PERSON</p> <p>Grid incident</p> <p>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>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the miniature circuit breaker is switched on. • Ensure that the AC cable is not damaged and that it is connected correctly. • Ensure that the country standard has been configured correctly. • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p>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>If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.</p>
203	
205	
206	

Event number	Message, cause and corrective measures
301	<p data-bbox="311 185 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 695 263">Grid fault > Voltage increase protection</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="288 394 508 419">Corrective measures:</p> <ul data-bbox="311 429 994 667" style="list-style-type: none"> <li data-bbox="311 429 994 483">• 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. <li data-bbox="311 611 994 667">• If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.
302	<p data-bbox="288 679 596 707">Active power limit AC voltage</p> <p data-bbox="288 716 975 770">The inverter has reduced its power due to a too-high grid voltage to ensure grid stability.</p> <p data-bbox="288 780 508 805">Corrective measures:</p> <ul data-bbox="311 815 1005 954" style="list-style-type: none"> <li data-bbox="311 815 1005 954">• 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	<p data-bbox="311 970 596 1005">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1021 524 1048">Grid fault > Island grid</p> <p data-bbox="288 1058 1005 1112">The inverter has disconnected from the utility grid. A stand-alone grid has been detected.</p> <p data-bbox="288 1121 508 1147">Corrective measures:</p> <ul data-bbox="311 1157 1005 1182" style="list-style-type: none"> <li data-bbox="311 1157 1005 1182">• Check the grid connection for significant short-term frequency fluctuations.
404	<p data-bbox="311 1197 596 1232">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1248 745 1275">Grid fault > Frequency change not permitted</p> <p data-bbox="288 1284 994 1339">The inverter has disconnected from the utility grid. A very large change in the grid frequency was detected.</p> <p data-bbox="288 1348 508 1374">Corrective measures:</p> <ul data-bbox="311 1383 1005 1409" style="list-style-type: none"> <li data-bbox="311 1383 1005 1409">• Check the grid connection for significant short-term frequency fluctuations.

Event number	Message, cause and corrective measures
501	<p data-bbox="311 183 599 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 700 263">Grid fault > Grid frequency disturbance</p> <p data-bbox="288 271 1002 327">The grid 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="311 367 996 574" style="list-style-type: none"><li data-bbox="311 367 996 422">• If possible, check the grid 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="288 590 621 622">Active power limit AC frequency</p> <p data-bbox="288 630 991 686">The inverter has reduced its power due to a too-high power frequency to ensure grid stability.</p> <p data-bbox="288 694 509 718">Corrective measures:</p> <ul data-bbox="311 726 1008 861" style="list-style-type: none"><li data-bbox="311 726 1008 861">• If possible, check the grid 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="311 877 599 914">⚠ QUALIFIED PERSON</p> <p data-bbox="288 925 571 957">Grid fault > DC grid feed-in</p> <p data-bbox="288 965 980 1021">The inverter has detected an excessively high proportion of direct current in the grid current.</p> <p data-bbox="288 1029 509 1053">Corrective measures:</p> <ul data-bbox="311 1061 968 1157" style="list-style-type: none"><li data-bbox="311 1061 968 1093">• Check the grid connection for direct current.<li data-bbox="311 1101 968 1157">• 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="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 744 263">Frequency not permitted > Check parameter</p> <p data-bbox="288 271 1002 327">The grid 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="311 367 996 574" style="list-style-type: none"> <li data-bbox="311 367 996 422">• If possible, check the grid 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. <li data-bbox="311 518 996 574">• If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.
901	<p data-bbox="311 590 593 622">⚠ QUALIFIED PERSON</p> <p data-bbox="288 638 806 670">Grounding connection missing > 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="311 750 879 774" style="list-style-type: none"> <li data-bbox="311 750 879 774">• Ensure that the grounding conductor is correctly connected.
1001	<p data-bbox="311 790 593 821">⚠ QUALIFIED PERSON</p> <p data-bbox="288 837 649 869">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="311 941 974 965" style="list-style-type: none"> <li data-bbox="311 941 974 965">• Ensure that L and N are correctly connected (see installation manual).
1101	<p data-bbox="311 989 593 1021">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1037 565 1069">2nd phase connected to N</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 896 1165" style="list-style-type: none"> <li data-bbox="311 1141 896 1165">• Connect the neutral conductor to N (see installation manual).
1302	<p data-bbox="311 1189 593 1220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1236 744 1268">Phase(s) or neutral conductor not connected</p> <p data-bbox="288 1276 492 1300">L or N not connected.</p> <p data-bbox="288 1308 509 1332">Corrective measures:</p> <ul data-bbox="311 1340 1008 1460" style="list-style-type: none"> <li data-bbox="311 1340 1008 1364">• Ensure that L and N are connected (see installation manual). <li data-bbox="311 1372 1008 1428">• Ensure that the AC conductors are not damaged and correctly connected (see installation manual). <li data-bbox="311 1436 1008 1460">• Ensure that the miniature circuit breaker is switched on.

Event number	Message, cause and corrective measures
1501	<p data-bbox="308 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="285 231 532 263">Reconnection fault grid</p> <p data-bbox="285 271 1002 359">The changed country standard 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="285 367 509 391">Corrective measures:</p> <ul data-bbox="308 399 980 454" style="list-style-type: none"> • Ensure that the country standard has been configured correctly. To do this, select the parameter Set country standard and check the value.
3301 3302 3303	<p data-bbox="308 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="285 518 492 550">Unstable operation</p> <p data-bbox="285 558 1002 614">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="285 622 509 646">Corrective measures:</p> <ul data-bbox="308 654 856 678" style="list-style-type: none"> • Ensure that the correct battery type has been configured.
3401 3402 3407	<p data-bbox="308 694 593 726">⚠ QUALIFIED PERSON</p> <p data-bbox="285 742 688 774">DC overvoltage > Disconnect PV array</p> <p data-bbox="285 782 823 805">Overvoltage at the DC input. This can destroy the inverter.</p> <p data-bbox="285 813 509 837">Corrective measures:</p> <ul data-bbox="308 845 980 1061" style="list-style-type: none"> • Immediately disconnect the inverter from all voltage sources. • 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. • If the DC voltage is above the maximum DC voltage of the inverter, ensure that the correct battery has been selected. • If this message is repeated frequently, contact the Service.
3501	<p data-bbox="308 1085 593 1117">⚠ QUALIFIED PERSON</p> <p data-bbox="285 1133 660 1165">Insulation failure > Check generator</p> <p data-bbox="285 1173 800 1197">The inverter has detected a ground fault on the DC side.</p> <p data-bbox="285 1204 509 1228">Corrective measures:</p> <ul data-bbox="308 1236 812 1260" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.

Event number	Message, cause and corrective measures
3601	<p data-bbox="311 185 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 692 263">High leakage current > Check PV array</p> <p data-bbox="288 272 949 325">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="288 335 986 416">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="288 426 508 453">Corrective measures:</p> <ul data-bbox="311 461 810 488" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.
3701	<p data-bbox="311 499 596 534">⚠ QUALIFIED PERSON</p> <p data-bbox="288 550 732 577">Residual current too high > Check PV array</p> <p data-bbox="288 587 986 639">The inverter detected a residual current due to brief grounding of the battery or the DC cabling.</p> <p data-bbox="288 649 508 676">Corrective measures:</p> <ul data-bbox="311 684 810 711" style="list-style-type: none"> • Check the battery and DC cabling for ground faults.
3801 3802 3805	<p data-bbox="311 727 596 762">⚠ QUALIFIED PERSON</p> <p data-bbox="288 778 631 805">DC overcurrent > Check PV array</p> <p data-bbox="288 815 981 842">Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.</p> <p data-bbox="288 852 508 879">Corrective measures:</p> <ul data-bbox="311 887 986 940" 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.
3901	<p data-bbox="311 956 596 991">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1007 479 1034">DC power too low</p> <p data-bbox="288 1043 508 1070">Corrective measures:</p> <ul data-bbox="311 1078 997 1193" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available, check for other events. If there are other events, carry out the corrective measures for the other events.

Event number	Message, cause and corrective measures
3902	<p data-bbox="308 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="285 231 565 263">Generator voltage too low</p> <p data-bbox="285 271 509 295">Corrective measures:</p> <ul data-bbox="308 303 1002 454" style="list-style-type: none"> <li data-bbox="308 303 1002 359">• Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. <li data-bbox="308 367 1002 454">• If a new firmware version is not available, check whether there are other event messages. If there are further event messages, perform the corrective measures of the further messages.
6001	<p data-bbox="308 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="285 518 509 550">System data restored</p> <p data-bbox="285 558 509 582">Corrective measures:</p> <ul data-bbox="308 590 834 614" style="list-style-type: none"> <li data-bbox="308 590 834 614">• If this message is displayed again, contact the Service.
6002	<p data-bbox="308 630 593 662">⚠ QUALIFIED PERSON</p> <p data-bbox="285 678 520 710">System data defective</p> <p data-bbox="285 718 509 742">Corrective measures:</p> <ul data-bbox="308 750 834 774" style="list-style-type: none"> <li data-bbox="308 750 834 774">• If this message is displayed again, contact the Service.
6003	<p data-bbox="308 790 593 821">⚠ QUALIFIED PERSON</p> <p data-bbox="285 837 621 869">System data access not possible</p> <p data-bbox="285 877 509 901">Corrective measures:</p> <ul data-bbox="308 909 834 933" style="list-style-type: none"> <li data-bbox="308 909 834 933">• If this message is displayed again, contact the Service.
6004	<p data-bbox="308 949 593 981">⚠ QUALIFIED PERSON</p> <p data-bbox="285 997 532 1029">Main memory defective</p> <p data-bbox="285 1037 509 1061">Corrective measures:</p> <ul data-bbox="308 1069 834 1093" style="list-style-type: none"> <li data-bbox="308 1069 834 1093">• If this message is displayed again, contact the Service.
6005	<p data-bbox="308 1109 593 1141">⚠ QUALIFIED PERSON</p> <p data-bbox="285 1157 532 1189">Code memory defective</p> <p data-bbox="285 1197 509 1220">Corrective measures:</p> <ul data-bbox="308 1228 834 1252" style="list-style-type: none"> <li data-bbox="308 1228 834 1252">• If this message is displayed again, contact the Service.
6006	<p data-bbox="308 1268 593 1300">⚠ QUALIFIED PERSON</p> <p data-bbox="285 1316 453 1348">CPU self-test HP</p> <p data-bbox="285 1356 509 1380">Corrective measures:</p> <ul data-bbox="308 1388 834 1412" style="list-style-type: none"> <li data-bbox="308 1388 834 1412">• If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6009	<p>Data inconsistency</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
6101	<p>⚠ QUALIFIED PERSON</p> <p>24 h watchdog test</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
6105	<p>⚠ QUALIFIED PERSON</p> <p>Execution (Operation)</p> <p>Processor defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
6107	<p>⚠ QUALIFIED PERSON</p> <p>Execution (State machine)</p> <p>Processor defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
6109	<p>⚠ QUALIFIED PERSON</p> <p>General BSP fault</p> <p>Processor defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
6111	<p>⚠ QUALIFIED PERSON</p> <p>Execution (SharedMemory)</p> <p>Processor defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
6112	<p>⚠ QUALIFIED PERSON</p> <p>Execution (Watchdog)</p> <p>Processor defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.

Event number	Message, cause and corrective measures
6121	<p data-bbox="311 183 595 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 448 263">Watchdog DSP</p> <p data-bbox="288 271 472 298">Processor defective.</p> <p data-bbox="288 306 508 333">Corrective measures:</p> <ul data-bbox="311 341 519 368" style="list-style-type: none"><li data-bbox="311 341 519 368">• Contact the Service.
6155	<p data-bbox="311 383 595 419">⚠ QUALIFIED PERSON</p> <p data-bbox="288 435 477 462">Version test failed</p> <p data-bbox="288 470 472 497">Processor defective.</p> <p data-bbox="288 505 508 533">Corrective measures:</p> <ul data-bbox="311 541 519 568" style="list-style-type: none"><li data-bbox="311 541 519 568">• Contact the Service.
6202	<p data-bbox="311 574 595 611">⚠ QUALIFIED PERSON</p> <p data-bbox="288 627 472 654">DI converter fault</p> <p data-bbox="288 662 472 689">Measurement error.</p> <p data-bbox="288 697 508 724">Corrective measures:</p> <ul data-bbox="311 732 519 759" style="list-style-type: none"><li data-bbox="311 732 519 759">• Contact the Service.
6301	<p data-bbox="311 766 595 802">⚠ QUALIFIED PERSON</p> <p data-bbox="288 818 553 845">Offset grid current sensor</p> <p data-bbox="288 853 472 880">Measurement error.</p> <p data-bbox="288 888 508 916">Corrective measures:</p> <ul data-bbox="311 924 519 951" style="list-style-type: none"><li data-bbox="311 924 519 951">• Contact the Service.
6304	<p data-bbox="311 957 595 994">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1010 631 1037">Grid voltage measurement offset</p> <p data-bbox="288 1045 472 1072">Measurement error.</p> <p data-bbox="288 1080 508 1107">Corrective measures:</p> <ul data-bbox="311 1115 519 1142" style="list-style-type: none"><li data-bbox="311 1115 519 1142">• Contact the Service.
6305	<p data-bbox="311 1149 595 1185">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1201 669 1228">Deviation grid voltage measurement</p> <p data-bbox="288 1236 472 1264">Measurement error.</p> <p data-bbox="288 1272 508 1299">Corrective measures:</p> <ul data-bbox="311 1307 519 1334" style="list-style-type: none"><li data-bbox="311 1307 519 1334">• Contact the Service.

Event number	Message, cause and corrective measures
6306	<p data-bbox="311 188 595 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 655 263">DC voltage measurement deviation</p> <p data-bbox="288 274 476 300">Measurement error.</p> <p data-bbox="288 308 509 331">Corrective measures:</p> <ul data-bbox="311 339 520 363" style="list-style-type: none"> <li data-bbox="311 339 520 363">• Contact the Service.
6401	<p data-bbox="311 387 595 419">⚠ QUALIFIED PERSON</p> <p data-bbox="288 435 655 462">Sensor system insulation resistance</p> <p data-bbox="288 474 476 499">Measurement error.</p> <p data-bbox="288 507 509 531">Corrective measures:</p> <ul data-bbox="311 539 520 563" style="list-style-type: none"> <li data-bbox="311 539 520 563">• Contact the Service.
6403	<p data-bbox="311 579 595 611">⚠ QUALIFIED PERSON</p> <p data-bbox="288 627 532 654">Overvoltage grid (HW)</p> <p data-bbox="288 662 509 686">Corrective measures:</p> <ul data-bbox="311 694 991 877" style="list-style-type: none"> <li data-bbox="311 694 991 782">• If there are several inverters in the system, check whether they also display this event message. If all inverters display this event message, a grid error is present. <li data-bbox="311 790 789 813">• If there is only one inverter, check for a grid error. <li data-bbox="311 821 991 877">• If there is no grid error and this message is displayed again, contact the Service.
6404	<p data-bbox="311 898 595 930">⚠ QUALIFIED PERSON</p> <p data-bbox="288 946 532 973">Overvoltage grid (HW)</p> <p data-bbox="288 981 509 1005">Corrective measures:</p> <ul data-bbox="311 1013 1002 1101" style="list-style-type: none"> <li data-bbox="311 1013 1002 1069">• Check whether there is a new firmware version available for the inverter. If a newer version is available, perform the firmware update. <li data-bbox="311 1077 845 1101">• If no new firmware version is available, contact Service.
6405	<p data-bbox="311 1121 595 1153">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1169 688 1197">Overvoltage intermediate circuit (HW)</p> <p data-bbox="288 1204 509 1228">Corrective measures:</p> <ul data-bbox="311 1236 1002 1324" style="list-style-type: none"> <li data-bbox="311 1236 1002 1292">• Check whether there is a new firmware version available for the inverter. If a newer version is available, perform the firmware update. <li data-bbox="311 1300 845 1324">• If no new firmware version is available, contact Service.

Event number	Message, cause and corrective measures
6406	<p data-bbox="311 188 582 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 557 263">Overcurrent input A (HW)</p> <p data-bbox="288 272 508 296">Corrective measures:</p> <ul data-bbox="311 308 999 526" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available, check for other events. If there are other events, carry out the corrective measures for the other events. • Check the battery for any faults. • Ensure that there is not a short circuit present at the DC connection. • If this message is displayed again, contact the Service.
6407	<p data-bbox="311 547 582 579">⚠ QUALIFIED PERSON</p> <p data-bbox="288 595 557 622">Overcurrent input B (HW)</p> <p data-bbox="288 632 508 655">Corrective measures:</p> <ul data-bbox="311 667 999 885" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available, check for other events. If there are other events, carry out the corrective measures for the other events. • Check the battery for any faults. • Ensure that there is not a short circuit present at the DC connection. • If this message is displayed again, contact the Service.
6408	<p data-bbox="311 903 582 935">⚠ QUALIFIED PERSON</p> <p data-bbox="288 951 454 978">UCE monitoring</p> <p data-bbox="288 987 508 1011">Corrective measures:</p> <ul data-bbox="311 1023 833 1050" style="list-style-type: none"> • If this message is displayed again, contact the Service.
6409	<p data-bbox="311 1066 582 1098">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1114 483 1141">Bridge short-circuit</p> <p data-bbox="288 1150 508 1174">Corrective measures:</p> <ul data-bbox="311 1185 833 1212" style="list-style-type: none"> • If this message is displayed again, contact the Service.
6410	<p data-bbox="311 1228 582 1260">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1276 669 1303">On-board supply system disturbance</p> <p data-bbox="288 1313 508 1337">Corrective measures:</p> <ul data-bbox="311 1348 833 1375" style="list-style-type: none"> • If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6411	<p>⚠ QUALIFIED PERSON</p> <p>Power unit</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
6412	<p>⚠ QUALIFIED PERSON</p> <p>Overcurrent input C (HW)</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available, check for other events. If there are other events, carry out the corrective measures for the other events. • Check the battery for any faults. • Ensure that there is not a short circuit present at the DC connection. • If this message is displayed again, contact the Service.
6415	<p>⚠ QUALIFIED PERSON</p> <p>Reference voltage test</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
6416	<p>⚠ QUALIFIED PERSON</p> <p>External watchdog (enable)</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
6462	<p>⚠ QUALIFIED PERSON</p> <p>Interference of device > Self diagnosis</p> <p>Battery overcurrent charge/discharge (hardware)</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available and this message is displayed again, contact the Service.
6499	<p>⚠ QUALIFIED PERSON</p> <p>Precharging overload protection triggered</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6501	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 554 263">Overtemperature interior</p> <p data-bbox="288 271 509 295">Corrective measures:</p> <ul data-bbox="311 303 963 454" style="list-style-type: none"> <li data-bbox="311 303 700 327">• Check whether the airflow is free of dirt. <li data-bbox="311 335 952 391">• Ensure that the ambient temperature does not exceed the maximum permissible temperatures. <li data-bbox="311 399 963 454">• If the maximum permissible temperatures are met at all times and this message is displayed again, contact the Service.
6502	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 588 550">Overtemperature power unit</p> <p data-bbox="288 558 509 582">Corrective measures:</p> <ul data-bbox="311 590 963 742" style="list-style-type: none"> <li data-bbox="311 590 700 614">• Check whether the airflow is free of dirt. <li data-bbox="311 622 952 678">• Ensure that the ambient temperature does not exceed the maximum permissible temperatures. <li data-bbox="311 686 963 742">• If the maximum permissible temperatures are met at all times and this message is displayed again, contact the Service.
6509	<p data-bbox="311 758 593 790">⚠ QUALIFIED PERSON</p> <p data-bbox="288 805 638 837">Overtemperature boost converter</p> <p data-bbox="288 845 509 869">Corrective measures:</p> <ul data-bbox="311 877 963 1029" style="list-style-type: none"> <li data-bbox="311 877 700 901">• Check whether the airflow is free of dirt. <li data-bbox="311 909 952 965">• Ensure that the ambient temperature does not exceed the maximum permissible temperatures. <li data-bbox="311 973 963 1029">• If the maximum permissible temperatures are met at all times and this message is displayed again, contact the Service.
6512	<p data-bbox="288 1045 756 1077">Minimum operating temperature not reached</p> <p data-bbox="288 1085 952 1133">The inverter will only recommence grid feed-in once the temperature has reached at least -25°C.</p>
6603	<p data-bbox="311 1149 593 1181">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1197 520 1228">Overcurrent grid (SW)</p> <p data-bbox="288 1236 509 1260">Corrective measures:</p> <ul data-bbox="311 1268 991 1452" style="list-style-type: none"> <li data-bbox="311 1268 991 1356">• If there are several inverters in the system, check whether they also display this event message. If all inverters display this event message, a grid error is present. <li data-bbox="311 1364 789 1388">• If there is only one inverter, check for a grid error. <li data-bbox="311 1396 991 1452">• If there is no grid error and this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6604	<p data-bbox="311 183 582 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 677 263">Overvoltage intermediate circuit (SW)</p> <p data-bbox="288 271 504 295">Corrective measures:</p> <ul data-bbox="311 303 996 454" style="list-style-type: none"> <li data-bbox="311 303 996 359">• Check whether there is a new firmware version available for the inverter. If a newer version is available, perform the firmware update. <li data-bbox="311 367 840 391">• If no new firmware version is available, contact Service. <li data-bbox="311 399 996 454">• Check whether there was a DC overvoltage. If DC overvoltage was present, contact the Service.
6607	<p data-bbox="311 470 582 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 649 550">Charge battery overcurr. (SW limit)</p> <p data-bbox="288 558 504 582">Corrective measures:</p> <ul data-bbox="311 590 996 710" style="list-style-type: none"> <li data-bbox="311 590 996 646">• Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. <li data-bbox="311 654 996 710">• If no new firmware version is available and this message is displayed again, contact the Service.
6608	<p data-bbox="311 726 582 758">⚠ QUALIFIED PERSON</p> <p data-bbox="288 774 588 805">Disch. battery overcurr. (SW)</p> <p data-bbox="288 813 504 837">Corrective measures:</p> <ul data-bbox="311 845 996 965" style="list-style-type: none"> <li data-bbox="311 845 996 901">• Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. <li data-bbox="311 909 996 965">• If no new firmware version is available and this message is displayed again, contact the Service.
6609	<p data-bbox="311 981 582 1013">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1029 616 1061">Battery undervoltage (SW limit)</p> <p data-bbox="288 1069 504 1093">Corrective measures:</p> <ul data-bbox="311 1101 996 1220" style="list-style-type: none"> <li data-bbox="311 1101 996 1157">• Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. <li data-bbox="311 1165 996 1220">• If no new firmware version is available and this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6610	<p data-bbox="308 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="285 231 604 263">Battery overvoltage (SW limit)</p> <p data-bbox="285 271 509 295">Corrective measures:</p> <ul data-bbox="308 303 996 422" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available and this message is displayed again, contact the Service.
6701	<p data-bbox="308 438 593 470">⚠ QUALIFIED PERSON</p> <p data-bbox="285 486 487 518">Program Sequence</p> <p data-bbox="285 526 509 550">Corrective measures:</p> <ul data-bbox="308 558 996 678" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available and this message is displayed again, contact the Service.
6702	<p data-bbox="308 694 593 726">⚠ QUALIFIED PERSON</p> <p data-bbox="285 742 453 774">No system data</p> <p data-bbox="285 782 509 805">Corrective measures:</p> <ul data-bbox="308 813 996 933" style="list-style-type: none"> • Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update. • If no new firmware version is available and this message is displayed again, contact the Service.
6801	<p data-bbox="308 949 593 981">⚠ QUALIFIED PERSON</p> <p data-bbox="285 997 565 1029">Offset DC current sensor A</p> <p data-bbox="285 1037 509 1061">Corrective measures:</p> <ul data-bbox="308 1069 834 1093" style="list-style-type: none"> • If this message is displayed again, contact the Service.
6802	<p data-bbox="308 1109 593 1141">⚠ QUALIFIED PERSON</p> <p data-bbox="285 1157 610 1189">DC converter string A defective</p> <p data-bbox="285 1197 509 1220">Corrective measures:</p> <ul data-bbox="308 1228 834 1252" style="list-style-type: none"> • If this message is displayed again, contact the Service.
6901	<p data-bbox="308 1268 593 1300">⚠ QUALIFIED PERSON</p> <p data-bbox="285 1316 565 1348">Offset DC current sensor B</p> <p data-bbox="285 1356 509 1380">Corrective measures:</p> <ul data-bbox="308 1388 834 1412" style="list-style-type: none"> • If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
6902	<p>⚠ QUALIFIED PERSON</p> <p>DC converter string B defective</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
7001	<p>⚠ QUALIFIED PERSON</p> <p>Fault sensor interior temperature</p> <p>Measurement error.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
7002	<p>⚠ QUALIFIED PERSON</p> <p>Fault sensor power unit temperature</p> <p>Measurement error.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
7106	<p>Update file defective</p> <p>The update file is defective. The update failed. The inverter continues to feed in.</p>
7110	<p>No update file found</p> <p>No new update file was found on the SD memory card. The update failed. The inverter continues to feed in.</p>
7112	<p>Update file successfully copied</p>
7113	<p>The memory card is full or write-protected</p>
7201	<p>Data storage defective</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
7202	<p>Long term data defective</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed again, contact the Service.
7303	<p>⚠ QUALIFIED PERSON</p> <p>Host computer update failed</p> <p>The cause must be determined by the Service.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.

Event number	Message, cause and corrective measures
7320	The device with serial number [xx] was successfully updated to firmware version [xx].
7324	<p>⚠ QUALIFIED PERSON</p> <p>Wait for update conditions</p> <p>The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • Ensure that the selected update file is suitable for this inverter. • If this message is displayed again, contact the Service.
7330	<p>⚠ QUALIFIED PERSON</p> <p>Condition test failed</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • Ensure that the selected update file is suitable for this inverter. • If this message is displayed again, contact the Service.
7331	<p>Update transport started</p> <p>Update file is being copied.</p>
7332	<p>Update transport successful</p> <p>Update file was copied successfully to the inverter's internal memory.</p>
7333	<p>⚠ QUALIFIED PERSON</p> <p>Update transport failed</p> <p>Update file could not be copied to the inverter's internal memory. In the event of connection with the inverter via Wi-Fi network, a poor connection quality can be the cause.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • If this message is displayed again, contact the Service.
7337	<p>⚠ QUALIFIED PERSON</p> <p>Battery management system update unsuccessful ([d0])</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • Ensure that the selected update file is suitable for this inverter. • If this message is displayed again, contact the Service.

Event number	Message, cause and corrective measures
7340	Update communication failed
7347	<p data-bbox="294 228 596 260">⚠ QUALIFIED PERSON</p> <p data-bbox="294 276 462 308">Incompatible file</p> <p data-bbox="294 316 759 339">The configuration file is not suitable for this inverter.</p> <p data-bbox="294 347 507 371">Corrective measures:</p> <ul data-bbox="311 379 955 443" style="list-style-type: none"> <li data-bbox="311 379 955 411">• Ensure that the selected configuration file is suitable for this inverter. <li data-bbox="311 419 451 443">• Retry import.
7348	<p data-bbox="294 456 596 488">⚠ QUALIFIED PERSON</p> <p data-bbox="294 504 496 536">Incorrect file format</p> <p data-bbox="294 544 888 568">The configuration file is not of the required format or is damaged.</p> <p data-bbox="294 576 507 600">Corrective measures:</p> <ul data-bbox="311 608 1000 703" style="list-style-type: none"> <li data-bbox="311 608 1000 671">• Ensure that the selected configuration file is of the required format and is not damaged. <li data-bbox="311 679 451 703">• Retry import.
7349	<p data-bbox="294 711 720 743">Incorrect login rights for configuration file</p> <p data-bbox="294 751 658 775">The configuration file cannot be loaded.</p> <p data-bbox="294 783 507 807">Corrective measures:</p> <ul data-bbox="311 815 899 879" style="list-style-type: none"> <li data-bbox="311 815 899 879">• Ensure you are logged on in the correct user level to load the configuration file.
7350	<p data-bbox="294 887 720 919">Transfer of a configuration file has started</p> <p data-bbox="294 927 675 951">The configuration file is being transferred.</p>
7351	<p data-bbox="294 967 428 999">Update Wi-Fi</p> <p data-bbox="294 1007 675 1031">The inverter is updating the Wi-Fi module.</p>
7352	<p data-bbox="294 1046 596 1078">⚠ QUALIFIED PERSON</p> <p data-bbox="294 1094 596 1126">Update of Wi-Fi not successful</p> <p data-bbox="294 1134 641 1158">The update of the Wi-Fi module failed.</p> <p data-bbox="294 1166 507 1190">Corrective measures:</p> <ul data-bbox="311 1198 832 1262" style="list-style-type: none"> <li data-bbox="311 1198 462 1222">• Retry update. <li data-bbox="311 1230 832 1262">• If this message is displayed again, contact the Service.
7353	<p data-bbox="294 1270 574 1302">Update time zone database</p> <p data-bbox="294 1310 731 1334">The inverter is updating the time zone database.</p>

Event number	Message, cause and corrective measures
7354	<p data-bbox="291 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="291 231 750 263">Update of time zone database not successful</p> <p data-bbox="291 271 705 295">The update of the time zone database failed.</p> <p data-bbox="291 303 504 327">Corrective measures:</p> <ul data-bbox="308 335 828 399" style="list-style-type: none"> <li data-bbox="308 335 459 359">• Retry update. <li data-bbox="308 367 828 399">• If this message is displayed again, contact the Service.
7355	<p data-bbox="291 414 448 438">Update WebUI</p> <p data-bbox="291 446 739 470">The inverter is updating the inverter user interface.</p>
7356	<p data-bbox="291 494 593 526">⚠ QUALIFIED PERSON</p> <p data-bbox="291 542 649 566">Update of the WebUI not successful</p> <p data-bbox="291 574 716 598">The update of the inverter user interface failed.</p> <p data-bbox="291 606 504 630">Corrective measures:</p> <ul data-bbox="308 638 828 702" style="list-style-type: none"> <li data-bbox="308 638 459 662">• Retry update. <li data-bbox="308 670 828 702">• If this message is displayed again, contact the Service.
7357	<p data-bbox="291 718 414 742">Update BIM</p> <p data-bbox="291 750 985 805">The Battery Interface Module on the communication assembly has been successfully updated.</p>
7358	<p data-bbox="291 821 593 853">⚠ QUALIFIED PERSON</p> <p data-bbox="291 869 481 893">Update BIM failed</p> <p data-bbox="291 901 974 957">The Battery Interface Module on the communication assembly has not been updated successfully.</p> <p data-bbox="291 965 504 989">Corrective measures:</p> <ul data-bbox="308 997 828 1061" style="list-style-type: none"> <li data-bbox="308 997 459 1021">• Retry update. <li data-bbox="308 1029 828 1061">• If this message is displayed again, contact the Service.
7359	<p data-bbox="291 1085 414 1109">Update BUC</p> <p data-bbox="291 1117 952 1173">The SMA Backup Unit Controller that is installed in the automatic transfer switch has been updated successfully.</p>

Event number	Message, cause and corrective measures
7360	<p data-bbox="311 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 484 260">Update BUC failed</p> <p data-bbox="288 272 507 296">Corrective measures:</p> <ul data-bbox="311 308 1012 520" style="list-style-type: none"> <li data-bbox="311 308 1012 363">• Ensure that the communication between SMA Backup Unit Controller and the inverter functions perfectly. <li data-bbox="311 371 1012 451">• Ensure that the cable requirements of the communication cable for the communication between the SMA Backup Unit Controller and the inverter have been met. <li data-bbox="311 459 462 483">• Retry update. <li data-bbox="311 491 832 520">• If this message is displayed again, contact the Service.
7619	<p data-bbox="311 539 596 571">⚠ QUALIFIED PERSON</p> <p data-bbox="288 587 1003 611">Communication fault with meter unit > Check communication to meter</p> <p data-bbox="288 624 841 647">The inverter is not receiving any data from the energy meter.</p> <p data-bbox="288 660 507 684">Corrective measures:</p> <ul data-bbox="311 695 1012 743" style="list-style-type: none"> <li data-bbox="311 695 1012 743">• Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual).
7623	<p data-bbox="311 762 596 794">⚠ QUALIFIED PERSON</p> <p data-bbox="288 810 745 834">Communication to backup module disrupted</p> <p data-bbox="288 847 1003 903">The communication between the inverter and the SMA Backup Unit Controller in the automatic transfer switch is disrupted.</p> <p data-bbox="288 916 507 940">Corrective measures:</p> <ul data-bbox="311 951 1012 1192" style="list-style-type: none"> <li data-bbox="311 951 1012 1031">• Ensure that the cable requirements of the communication cable for the communication between the SMA Backup Unit Controller and the inverter have been met. <li data-bbox="311 1038 462 1062">• Retry update. <li data-bbox="311 1070 608 1094">• Carry out communication test. <li data-bbox="311 1102 1012 1192">• If the communication test was successful, contact the manufacturer of the automatic transfer switch. If the communication test failed, contact the Service.

Event number	Message, cause and corrective measures
7624	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 840 263">Communication to battery interface module disrupted</p> <p data-bbox="288 271 994 327">The communication between the inverter and the battery interface module on the communication assembly is disrupted.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 1002 454" style="list-style-type: none"> • Ensure that the ribbon cable is in perfect condition and securely in place. • If the ribbon cable is in perfect condition and firmly plugged in the jack, contact the Service.
7701	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 543 550">Grid disconnection point</p> <p data-bbox="288 558 610 582">Grid relay of the inverter defective.</p> <p data-bbox="288 590 509 614">Corrective measures:</p> <ul data-bbox="311 622 520 646" style="list-style-type: none"> • Contact the Service.
7702	<p data-bbox="288 662 420 694">Relay defect</p> <p data-bbox="288 702 610 726">Grid relay of the inverter defective.</p> <p data-bbox="288 734 509 758">Corrective measures:</p> <ul data-bbox="311 766 520 790" style="list-style-type: none"> • Contact the Service.
7703	<p data-bbox="311 813 593 845">⚠ QUALIFIED PERSON</p> <p data-bbox="288 861 431 893">24h relay test</p> <p data-bbox="288 901 442 925">Relay test failed.</p> <p data-bbox="288 933 509 957">Corrective measures:</p> <ul data-bbox="311 965 834 989" style="list-style-type: none"> • If this message is displayed again, contact the Service.
8003	<p data-bbox="311 1013 593 1045">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1061 610 1093">Active power limit Temperature</p> <p data-bbox="288 1101 1002 1157">The inverter has reduced its power output for more than 10 minutes due to excessive temperature.</p> <p data-bbox="288 1165 509 1189">Corrective measures:</p> <ul data-bbox="311 1197 980 1348" style="list-style-type: none"> • Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush. • Ensure that the inverter has sufficient ventilation. • Ensure that the ambient temperature +45 °C has not been exceeded. • Ensure that the inverter is not exposed to direct solar irradiation.

Event number	Message, cause and corrective measures
8101	<p data-bbox="311 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 535 263">Main memory defective</p> <p data-bbox="288 271 507 298">Corrective measures:</p> <ul data-bbox="311 306 832 333" style="list-style-type: none"> <li data-bbox="311 306 832 333">• If this message is displayed again, contact the Service.
8102	<p data-bbox="311 343 596 379">⚠ QUALIFIED PERSON</p> <p data-bbox="288 395 535 422">Code memory defective</p> <p data-bbox="288 430 507 458">Corrective measures:</p> <ul data-bbox="311 466 832 493" style="list-style-type: none"> <li data-bbox="311 466 832 493">• If this message is displayed again, contact the Service.
8103	<p data-bbox="311 502 596 539">⚠ QUALIFIED PERSON</p> <p data-bbox="288 555 453 582">CPU self-test HP</p> <p data-bbox="288 590 456 617">The self-test failed.</p> <p data-bbox="288 625 507 652">Corrective measures:</p> <ul data-bbox="311 660 832 687" style="list-style-type: none"> <li data-bbox="311 660 832 687">• If this message is displayed again, contact the Service.
8104	<p data-bbox="311 702 596 738">⚠ QUALIFIED PERSON</p> <p data-bbox="288 754 532 782">internal communication</p> <p data-bbox="288 790 507 817">Corrective measures:</p> <ul data-bbox="311 825 832 852" style="list-style-type: none"> <li data-bbox="311 825 832 852">• If this message is displayed again, contact the Service.
8501	<p data-bbox="311 861 596 898">⚠ QUALIFIED PERSON</p> <p data-bbox="288 914 557 941">DC current sensor C offset</p> <p data-bbox="288 949 507 976">Corrective measures:</p> <ul data-bbox="311 984 832 1011" style="list-style-type: none"> <li data-bbox="311 984 832 1011">• If this message is displayed again, contact the Service.
8502	<p data-bbox="311 1021 596 1058">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1074 608 1101">DC converter string C defective</p> <p data-bbox="288 1109 507 1136">Corrective measures:</p> <ul data-bbox="311 1144 832 1171" style="list-style-type: none"> <li data-bbox="311 1144 832 1171">• If this message is displayed again, contact the Service.
8708	<p data-bbox="311 1181 596 1217">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1233 832 1260">Timeout in communication for active power limitation</p> <p data-bbox="288 1268 1002 1359">Communication to the system control absent. Depending on the fallback setting, either the last received values will be retained or the active power will be limited to the set percentage value of the inverter nominal power.</p> <p data-bbox="288 1367 507 1394">Corrective measures:</p> <ul data-bbox="311 1402 955 1461" style="list-style-type: none"> <li data-bbox="311 1402 955 1461">• Ensure that the connection to the system control is intact and that no cables are damaged or that no plugs have been pulled.

Event number	Message, cause and corrective measures
8709	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 840 263">Timeout in communication for reactive power setpoint</p> <p data-bbox="288 271 1002 359">Communication to the system control absent. Depending on the fallback setting, either the last received values will be retained or the active power will be limited to the set percentage value of the inverter nominal power.</p> <p data-bbox="288 367 504 391">Corrective measures:</p> <ul data-bbox="311 399 952 454" style="list-style-type: none"> • Ensure that the connection to the system control is intact and that no cables are damaged or that no plugs have been pulled.
8710	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 756 550">Timeout in communication for cos phi setpoint</p> <p data-bbox="288 558 1002 646">Communication to the system control absent. Depending on the fallback setting, either the last received values will be retained or the active power will be limited to the set percentage value of the inverter nominal power.</p> <p data-bbox="288 654 504 678">Corrective measures:</p> <ul data-bbox="311 686 952 734" style="list-style-type: none"> • Ensure that the connection to the system control is intact and that no cables are damaged or that no plugs have been pulled.
9002	<p data-bbox="311 750 593 782">⚠ QUALIFIED PERSON</p> <p data-bbox="288 798 599 829">SMA Grid Guard code invalid</p> <p data-bbox="288 837 1002 893">The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.</p> <p data-bbox="288 901 504 925">Corrective measures:</p> <ul data-bbox="311 933 711 965" style="list-style-type: none"> • Enter the correct SMA Grid Guard code.
9003	<p data-bbox="288 973 537 1005">Grid parameters locked</p> <p data-bbox="288 1013 1002 1093">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 1117 593 1149">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1165 924 1197">Changing of grid parameters not possible > Ensure DC supply</p> <p data-bbox="288 1204 666 1228">This error can have the following causes:</p> <ul data-bbox="311 1236 957 1292" style="list-style-type: none"> • The parameters to be changed are protected. • The DC voltage at the DC input is not sufficient to run the main CPU. <p data-bbox="288 1300 504 1324">Corrective measures:</p> <ul data-bbox="311 1332 935 1425" style="list-style-type: none"> • Enter the SMA Grid Guard code. • 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="311 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 434 260">Abort self-test</p> <p data-bbox="288 272 546 296">The self-test was terminated.</p> <p data-bbox="288 309 508 333">Corrective measures:</p> <ul data-bbox="311 346 508 370" style="list-style-type: none"> <li data-bbox="311 346 508 370">• Restart the self-test.
9202	<p data-bbox="311 383 596 414">⚠ QUALIFIED PERSON</p> <p data-bbox="288 430 499 454">SPS AC overvoltage</p> <p data-bbox="288 467 1003 523">An AC source has been connected to the outlet for secure power supply operation.</p> <p data-bbox="288 536 508 560">Corrective measures:</p> <ul data-bbox="311 572 921 627" style="list-style-type: none"> <li data-bbox="311 572 921 627">• Check the connection at the SPS slots, and make any necessary corrections.
9203	<p data-bbox="311 638 596 670">⚠ QUALIFIED PERSON</p> <p data-bbox="288 686 656 710">Short circuit in the SPS power outlet</p> <p data-bbox="288 722 1003 810">The maximum initial load has been overshoot or the appliance's initial current is above the maximum permissible load current of the terminal for secure power supply operation for more than 5 s.</p> <p data-bbox="288 823 508 847">Corrective measures:</p> <ul data-bbox="311 860 947 914" style="list-style-type: none"> <li data-bbox="311 860 947 884">• Reduce the load at the terminal for secure power supply operation. <li data-bbox="311 887 882 914">• If necessary, select an appliance with a lower initial current.
9204	<p data-bbox="311 925 596 957">⚠ QUALIFIED PERSON</p> <p data-bbox="288 973 594 997">AC overvoltage backup (fast)</p> <p data-bbox="288 1010 1012 1066">Voltage in the battery-backup grid too high or step changes in load too high in the battery-backup grid.</p> <p data-bbox="288 1078 508 1102">Corrective measures:</p> <ul data-bbox="311 1115 1000 1206" style="list-style-type: none"> <li data-bbox="311 1115 1000 1139">• Check whether there is a new firmware version available for the inverter. <li data-bbox="311 1142 889 1166">• If a newer version is available, perform the firmware update. <li data-bbox="311 1169 844 1206">• If no new firmware version is available, contact Service.

Event number	Message, cause and corrective measures
9205	<p data-bbox="311 183 599 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 604 263">AC overvoltage backup (slow)</p> <p data-bbox="288 271 1012 327">Voltage in the battery-backup grid too high or step changes in load too high in the battery-backup grid.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 1002 462" style="list-style-type: none"> • Check whether there is a new firmware version available for the inverter. • If a newer version is available, perform the firmware update. • If no new firmware version is available, contact Service.
9206	<p data-bbox="311 478 599 510">⚠ QUALIFIED PERSON</p> <p data-bbox="288 526 520 558">Short circuit in backup</p> <p data-bbox="288 566 672 590">Loads in the battery-backup grid too high.</p> <p data-bbox="288 598 509 622">Corrective measures:</p> <ul data-bbox="311 630 520 694" style="list-style-type: none"> • Reduce loads. • Contact the Service.
9207	<p data-bbox="311 710 599 742">⚠ QUALIFIED PERSON</p> <p data-bbox="288 758 604 790">Backup module bimetal switch</p> <p data-bbox="288 798 672 821">Automatic transfer switching device error.</p> <p data-bbox="288 829 509 853">Corrective measures:</p> <ul data-bbox="311 861 957 893" style="list-style-type: none"> • Contact the manufacturer of the automatic transfer switching device.
9208	<p data-bbox="311 909 599 941">⚠ QUALIFIED PERSON</p> <p data-bbox="288 957 627 989">Backup module relay error [d0]</p> <p data-bbox="288 997 750 1021">Relay in automatic transfer switching device faulty.</p> <p data-bbox="288 1029 509 1053">Corrective measures:</p> <ul data-bbox="311 1061 957 1093" style="list-style-type: none"> • Contact the manufacturer of the automatic transfer switching device.
9209	<p data-bbox="311 1109 599 1141">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1157 627 1189">N-PE monitoring backup module</p> <p data-bbox="288 1197 509 1220">Corrective measures:</p> <ul data-bbox="311 1228 957 1252" style="list-style-type: none"> • Contact the manufacturer of the automatic transfer switching device.
9211	<p data-bbox="311 1268 599 1300">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1316 632 1348">Backup module overtemperature</p> <p data-bbox="288 1356 509 1380">Corrective measures:</p> <ul data-bbox="311 1388 957 1447" style="list-style-type: none"> • Check the installation of the automatic transfer switching device. • Contact the manufacturer of the automatic transfer switching device.

Event number	Message, cause and corrective measures
9214	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 644 263">Black start battery voltage too low</p> <p data-bbox="288 271 1008 359">The service life of the backup battery has expired. The backup battery must be replaced when you want to use the black start for the battery-backup function or the secure power supply operation.</p> <p data-bbox="288 367 509 391">Corrective measures:</p> <ul data-bbox="311 399 823 454" style="list-style-type: none"> • Procure new backup battery and exchange batteries. • Contact the Service.
9215	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 711 550">Battery interface module hardware error</p> <p data-bbox="288 558 666 582">The battery interface module is defective.</p> <p data-bbox="288 590 509 614">Corrective measures:</p> <ul data-bbox="311 622 520 646" style="list-style-type: none"> • Contact the Service.
9216	<p data-bbox="311 670 593 702">⚠ QUALIFIED PERSON</p> <p data-bbox="288 718 532 750">Supply voltage too low</p> <p data-bbox="288 758 509 782">Corrective measures:</p> <ul data-bbox="311 790 974 877" style="list-style-type: none"> • Check whether the ribbon cable between the inverter and the battery interface module on the communication assembly is correctly inserted. • If this message is displayed again, contact the Service.
9217	<p data-bbox="311 893 593 925">⚠ QUALIFIED PERSON</p> <p data-bbox="288 941 1002 997">Output supply voltage of the battery interface module too low xx xx </p> <p data-bbox="288 1005 509 1029">Corrective measures:</p> <ul data-bbox="311 1037 974 1133" style="list-style-type: none"> • Check whether the plugs for connecting the battery and the automatic transfer switching device are correctly inserted. • If this message is displayed again, contact the Service.
9218	<p data-bbox="311 1149 593 1181">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1197 946 1228">Battery interface module output communication error xx xx </p> <p data-bbox="288 1236 509 1260">Corrective measures:</p> <ul data-bbox="311 1268 974 1356" style="list-style-type: none"> • Check whether the plugs for connecting the battery and the automatic transfer switching device are correctly inserted. • Carry out communication test.

Event number	Message, cause and corrective measures
9219	<p>⚠ QUALIFIED PERSON</p> <p>Battery interface module output communication error xx xx </p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that only one node each is connected to the terminal for the communication cables of the battery and the automatic transfer switching device.
9220	<p>Battery interface module test mode xx , success rate: xx </p> <p>The communication test was successful.</p>
9221	<p>⚠ QUALIFIED PERSON</p> <p>Limitation of the switching frequency of the input relay for current limitation</p> <p>There are too many faulty control commands by the system control.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check system control.
9223	<p>Backup operation</p> <p>The battery-backup function is enabled.</p>
9224	<p>⚠ QUALIFIED PERSON</p> <p>Conditions for connecting the input relay xx not met</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9225	<p>⚠ QUALIFIED PERSON</p> <p>Overload at the SPS socket</p> <p>Brief interruption of the socket's energy supply.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • The power consumption of the connected loads may need to be reduced to ensure interruption-free operation.
9226	<p>⚠ QUALIFIED PERSON</p> <p>Overload in backup operation</p> <p>Brief interruption of the energy supply of the battery-backup grid.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • The power consumption of the connected loads may need to be reduced to ensure interruption-free operation.

Event number	Message, cause and corrective measures
9227	<p data-bbox="314 188 594 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 972 261">Load shedding (relay [xx]) due to overload in the electrical island</p> <p data-bbox="292 272 882 298">Brief interruption of the energy supply of the battery-backup grid.</p> <p data-bbox="292 309 508 331">Corrective measures:</p> <ul data-bbox="311 343 1003 395" style="list-style-type: none"> <li data-bbox="311 343 1003 395">• The power consumption of the connected loads may need to be reduced to ensure interruption-free operation.
9301	<p data-bbox="292 411 516 435">New battery detected</p>
9303	<p data-bbox="314 454 594 486">⚠ QUALIFIED PERSON</p> <p data-bbox="292 502 701 528">The service life of the battery is expiring</p> <p data-bbox="292 539 549 564">The battery can fail anytime.</p> <p data-bbox="292 576 508 598">Corrective measures:</p> <ul data-bbox="311 609 748 635" style="list-style-type: none"> <li data-bbox="311 609 748 635">• Procure new battery and exchange batteries.
9304	<p data-bbox="314 654 594 686">⚠ QUALIFIED PERSON</p> <p data-bbox="292 702 535 727">Battery connection fault</p> <p data-bbox="292 738 508 761">Corrective measures:</p> <ul data-bbox="311 772 776 834" style="list-style-type: none"> <li data-bbox="311 772 776 798">• Check terminal for the data cable of the battery. <li data-bbox="311 809 609 834">• Carry out communication test.
9305	<p data-bbox="314 853 594 885">⚠ QUALIFIED PERSON</p> <p data-bbox="292 901 589 927">Unauthorized battery system</p> <p data-bbox="292 938 508 960">Corrective measures:</p> <ul data-bbox="311 971 997 1090" style="list-style-type: none"> <li data-bbox="311 971 997 1024">• Check whether there is a new firmware version available for the battery. If a newer version is available, perform the firmware update. <li data-bbox="311 1035 997 1090">• If this message is displayed again, contact the Service (see Section 1.5, page 157).
9306	<p data-bbox="314 1109 594 1141">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1157 580 1182">Deviation in battery voltage</p> <p data-bbox="292 1193 508 1216">Corrective measures:</p> <ul data-bbox="311 1227 986 1313" style="list-style-type: none"> <li data-bbox="311 1227 580 1252">• Check the DC connection. <li data-bbox="311 1264 986 1313">• If this message is displayed again, contact the Service (see Section 1.5, page 157).
9307	<p data-bbox="314 1332 594 1364">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1380 542 1406">Battery system defective</p> <p data-bbox="292 1417 508 1439">Corrective measures:</p> <ul data-bbox="311 1450 645 1473" style="list-style-type: none"> <li data-bbox="311 1450 645 1473">• Contact the battery manufacturer.

Event number	Message, cause and corrective measures
9308	<p data-bbox="314 188 591 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 667 263">Communication error battery system</p> <p data-bbox="292 272 508 296">Corrective measures:</p> <ul data-bbox="311 308 978 392" style="list-style-type: none"> <li data-bbox="311 308 978 392">• Carry out communication test. If the test was successful, contact the battery manufacturer. If the test was not successful, contact the Service (see Section 15, page 157).
9311	<p data-bbox="314 408 591 440">⚠ QUALIFIED PERSON</p> <p data-bbox="292 456 589 483">Battery cell overvoltage fault</p> <p data-bbox="292 493 508 517">Corrective measures:</p> <ul data-bbox="311 528 645 552" style="list-style-type: none"> <li data-bbox="311 528 645 552">• Contact the battery manufacturer.
9312	<p data-bbox="314 568 591 600">⚠ QUALIFIED PERSON</p> <p data-bbox="292 616 602 643">Battery cell undervoltage fault</p> <p data-bbox="292 652 508 676">Corrective measures:</p> <ul data-bbox="311 687 645 711" style="list-style-type: none"> <li data-bbox="311 687 645 711">• Contact the battery manufacturer.
9313	<p data-bbox="314 727 591 759">⚠ QUALIFIED PERSON</p> <p data-bbox="292 775 595 802">Battery low temperature fault</p> <p data-bbox="292 812 508 836">Corrective measures:</p> <ul data-bbox="311 847 645 871" style="list-style-type: none"> <li data-bbox="311 847 645 871">• Contact the battery manufacturer.
9314	<p data-bbox="314 887 591 919">⚠ QUALIFIED PERSON</p> <p data-bbox="292 935 546 962">Battery overtemperature</p> <p data-bbox="292 971 508 995">Corrective measures:</p> <ul data-bbox="311 1007 645 1031" style="list-style-type: none"> <li data-bbox="311 1007 645 1031">• Contact the battery manufacturer.
9315	<p data-bbox="314 1046 591 1078">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1094 553 1121">Battery imbalancing fault</p> <p data-bbox="292 1131 508 1155">Corrective measures:</p> <ul data-bbox="311 1166 645 1190" style="list-style-type: none"> <li data-bbox="311 1166 645 1190">• Contact the battery manufacturer.
9316	<p data-bbox="314 1206 591 1238">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1254 613 1281">Internal battery hardware fault</p> <p data-bbox="292 1291 508 1315">Corrective measures:</p> <ul data-bbox="311 1326 645 1350" style="list-style-type: none"> <li data-bbox="311 1326 645 1350">• Contact the battery manufacturer.
9334	<p data-bbox="292 1366 508 1393">Battery charging test</p> <p data-bbox="292 1402 781 1439">The battery test for charging the battery is carried out.</p>

Event number	Message, cause and corrective measures
9335	<p>Discharge battery test</p> <p>The battery test for discharging the battery is carried out.</p>
9336	<p>⚠ QUALIFIED PERSON</p> <p>Start conditions for battery test not fulfilled</p> <p>The state of charge of the battery is too low or too high for carrying out the test.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Perform the test that has not been performed yet.
9337	<p>Charge battery test successful</p>
9338	<p>Battery discharging test successful</p>
9339	<p>⚠ QUALIFIED PERSON</p> <p>Battery charging test failed</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the installation of the battery. • Perform the test that has not been performed yet.
9340	<p>⚠ QUALIFIED PERSON</p> <p>Battery discharging test failed</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the installation of the battery. • Perform the test that has not been performed yet.
9345	<p>⚠ QUALIFIED PERSON</p> <p>Battery charging for start process too low</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9346	<p>⚠ QUALIFIED PERSON</p> <p>Battery not configured</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Start the installation assistant on the inverter user interface and perform the battery configuration.
9347	<p>⚠ QUALIFIED PERSON</p> <p>Battery [xx] is reporting event: [xxxxxx]</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.

Event number	Message, cause and corrective measures
9351	<p>⚠ QUALIFIED PERSON</p> <p>Incorrect switch position for the battery disconnection point</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9352	<p>⚠ QUALIFIED PERSON</p> <p>Battery system short circuit</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9353	<p>⚠ QUALIFIED PERSON</p> <p>Battery system thermal management defective</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check whether there is a new firmware version available for the battery. If a newer version is available, perform the firmware update. • If this message is displayed again, contact the battery manufacturer.
9354	<p>⚠ QUALIFIED PERSON</p> <p>Battery system heating procedure unsuccessful</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check whether there is a new firmware version available for the battery. If a newer version is available, perform the firmware update. • If this message is displayed again, contact the battery manufacturer.
9392	<p>⚠ QUALIFIED PERSON</p> <p>Battery charge overcurr. [xx]</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9393	<p>⚠ QUALIFIED PERSON</p> <p>Battery discharge overcurr. [xx]</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
9399	<p>⚠ QUALIFIED PERSON</p> <p>Please contact the battery manufacturer [xx]</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the battery manufacturer.
10010	<p>Restart diagnosis system</p>

Event number	Message, cause and corrective measures
10040	Self-test current disconnection limit
10041	Self-test disconnection limit for display
10042	Self-test standard value for display
10043	Self-test disconnection time for display
10044	Display self-test start message
10100	Parameter [xxx] set successfully. xxxx to xxxx
10101	Setting of parameter [xx] failed. xxxx to xxxx Corrective measures: <ul style="list-style-type: none"> • Change parameter again and save change.
10102	Parameter [xxx] set successfully. xxx to xxx
10103	Setting of parameter [xxxx] failed. xxx to xxx Corrective measures: <ul style="list-style-type: none"> • Change parameter again and save change.
10104	Parameter [xxxx] set successfully
10105	Setting of parameter xxxx failed. Corrective measures: <ul style="list-style-type: none"> • Change parameter again and save change.
10108	Time adjusted / old time
10109	Time adjusted / new time
10110	Time synchronization failed: [x] No time information could be called up from the set NTP server. Corrective measures: <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.
10116	Setting of parameter [xxxx] failed. Conflict with parameter xxxx
10118	Parameter upload complete
10120	Currently permitted number of parameterizations exceeded
10224	Dynamic settings established

Event number	Message, cause and corrective measures
10248	<p>[xx]: network busy</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.
10249	<p>⚠ QUALIFIED PERSON</p> <p>[xx]: network overloaded</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 impaired.</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="288 550 889 576">[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="288 681 751 707">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="288 927 751 952">[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 714 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 594 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>Wi-Fi module faulty</p> <p>The Wi-Fi module integrated in the inverter is defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
10284	<p>⚠ QUALIFIED PERSON</p> <p>No Wi-Fi connection possible</p> <p>The inverter does not currently have a Wi-Fi connection to the selected network.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the SSID, the Wi-Fi password and the encryption method have been entered correctly. The encryption method is specified by your Wi-Fi router or Wi-Fi access point and can be changed there. • Ensure that the Wi-Fi router or Wi-Fi access point is in range and is signaling correct operation. • If this message is displayed often, improve the WLAN connection by using a WLAN repeater (e.g. SMA Antenna Extension Kit).
10285	<p>Wi-Fi connection established</p> <p>Connection to the selected Wi-Fi network has been established.</p>
10286	<p>⚠ QUALIFIED PERSON</p> <p>Wi-Fi connection lost</p> <p>The inverter has lost Wi-Fi connection to the selected network.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the Wi-Fi router or Wi-Fi access point is still active. • Ensure that the Wi-Fi router or Wi-Fi access point is in range and is signaling correct operation. • If this message is displayed often, improve the WLAN connection by using a WLAN repeater (e.g. SMA Antenna Extension Kit).
10287	<p>Wi-Fi module detected</p>
10339	<p>Webconnect enabled</p> <p>The inverter can communicate with Sunny Portal without an additional SMA communications product (e.g. Sunny Data Manager).</p>

Event number	Message, cause and corrective measures
10340	<p data-bbox="292 185 512 209">Webconnect disabled</p> <p data-bbox="292 220 997 304">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 Data Manager).</p> <ul data-bbox="311 316 997 368" style="list-style-type: none"> <li data-bbox="311 316 997 368">• If the inverter is to communicate with Sunny Portal without an additional SMA communication product, switch the Webconnect function on.
10341	<p data-bbox="292 384 633 408">Webconnect error: no connection</p> <p data-bbox="292 419 773 443">It is likely that there is an error in the network settings.</p> <p data-bbox="292 454 507 478">Corrective measures:</p> <ul data-bbox="311 489 936 687" style="list-style-type: none"> <li data-bbox="311 489 936 513">• Check the network components (DLAN, WLAN Access Point etc.). <li data-bbox="311 525 768 687">• Ensure that the following ports are not blocked: <ul data-bbox="353 555 633 687" style="list-style-type: none"> <li data-bbox="353 555 633 579">- Registrar: ied.sma.de:9523 <li data-bbox="353 590 602 614">- Proxy: ied.sma.de:9523 <li data-bbox="353 625 598 649">- Stun: stun.sma.de:3478 <li data-bbox="353 660 684 687">- Domain: ied.sma.de (for SIP URI)
10343	<p data-bbox="292 703 818 727">Webconnect error: Default gateway not configured</p> <p data-bbox="292 738 773 762">It is likely that there is an error in the network settings.</p> <p data-bbox="292 774 507 798">Corrective measures:</p> <ul data-bbox="311 809 925 1007" style="list-style-type: none"> <li data-bbox="311 809 925 833">• Check the network components (e.g. DLAN, Wi-Fi access point). <li data-bbox="311 844 768 1007">• Ensure that the following ports are not blocked: <ul data-bbox="353 874 684 1007" style="list-style-type: none"> <li data-bbox="353 874 633 898">- Registrar: ied.sma.de:9523 <li data-bbox="353 909 602 933">- Proxy: ied.sma.de:9523 <li data-bbox="353 944 598 968">- Stun: stun.sma.de:3478 <li data-bbox="353 979 684 1007">- Domain: ied.sma.de (for SIP URI)
10420	Self-consumption control was started
10421	Self-consumption control was stopped
10513	NSS quickstop: xx through xx is executed
10517	Dynamic active power limitation started.
10518	Dynamic active power limitation terminated.
10520	Supplied power: xx W (permitted value: xx W)
10521	Active power was limited today for xx minutes.
10525	Inverter does not respond to active power limitation.
10528	System password of the connected device xx invalid
10901	Start self-test xx

Event number	Message, cause and corrective measures
10915	<p>Result: Test not OK</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check whether the grid voltage and frequency are within the permissible limits. Then, restart the self-test.
27107	<p>Update file OK</p> <p>The update file is suitable for this inverter and its components and is fully available for the next update step.</p>
27108	<p>Memory card is being read</p> <p>The storage medium is being read.</p>
27109	<p>No new update on the memory card</p> <p>A new update file was not found on the storage medium.</p>
27301	<p>Update communication</p> <p>The inverter is updating the communication component.</p>
27302	<p>Update main CPU</p> <p>The inverter is updating the inverter component.</p>
27312	<p>Update completed</p> <p>The inverter has successfully completed the update.</p>
27329	<p>Condition test successful</p>
27331	<p>Update transport started</p> <p>The inverter has successfully started the update.</p>
27332	<p>Update transport successful</p> <p>The update file has been successfully transferred to the communication component.</p>
27336	<p>Battery management system</p>
29001	<p>Inst. code valid</p> <p>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 10 feed-in hours.</p>
29004	<p>Grid parameter unchanged</p> <p>Changing the grid parameters is not possible.</p>
29006	<p>Self-test</p>
29016	<p>Stand-alone operation</p>
29252	<p>SPS mode not available</p> <p>The battery's state of charge is insufficient to supply the loads in secure power supply operation.</p>

Event number	Message, cause and corrective measures
29253	Input power for backup too low The battery's state of charge is insufficient to supply the loads in the battery-backup grid.
29254	Input power for SPS too low The battery's state of charge is insufficient to supply the loads in secure power supply operation.

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

To decommission the inverter completely upon completion of its service life, proceed as described in this Section.

⚠ 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:

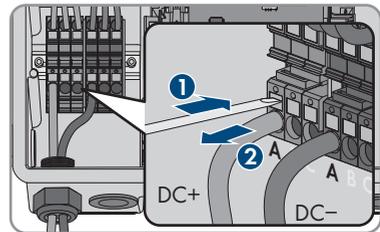
1.

⚠ DANGER

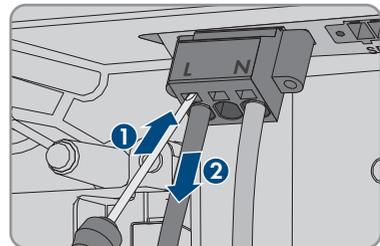
Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 9, page 106).

2. Remove the DC cable from the terminal blocks for the DC connection.

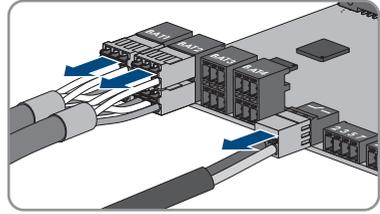


3. Remove the AC conductors from the **AC-out** terminal block. To release the conductors from the terminals, open the terminals with a flat-blade screwdriver (blade width: 3.5 mm).

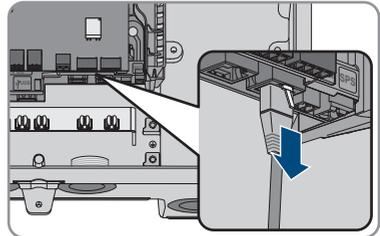


4. Screw out the screws from the **AC-out** terminal block using a flat-blade screwdriver (blade width: 3.5 mm) and pull the terminal block out of the slot.

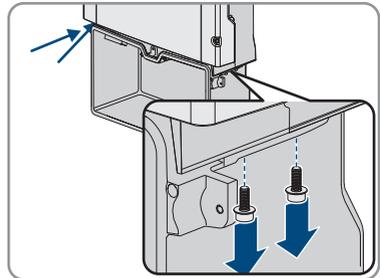
5. Remove all connection cables from the jacks located on the battery interface module.



6. Remove all equipment grounding conductors from the equipment grounding terminals. To do this, loosen each screw (TX 25), remove the equipment grounding conductor from the inverter and retighten each screw (TX 25).
7. Remove the network cables from the jacks of the communication assembly.

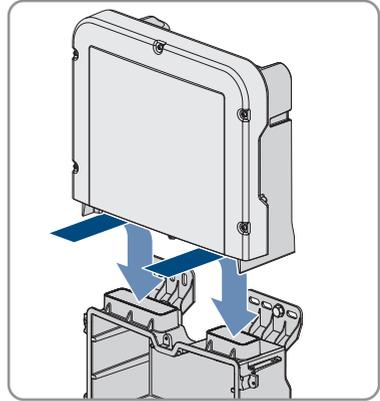


8. Remove all cable glands from the inverter. To do so, unscrew the counter nut from inside and remove the cable gland from the enclosure opening.
9. Seal all enclosure openings with sealing plugs.
10. Remove the 2 screws on the right and left side of the Power Unit (TX25) and retain them for later use. As a result, the Power Unit and the Connection Unit are not connected to one another.

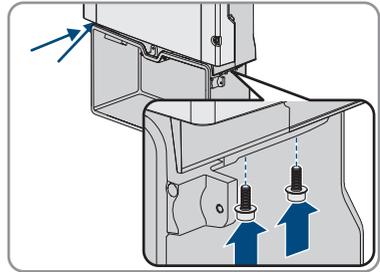


11. Disconnect and remove the Power Unit from the Connection Unit.
12. Unscrew all the screws that are attached to the Connection Unit.
13. Remove the Connection Unit.

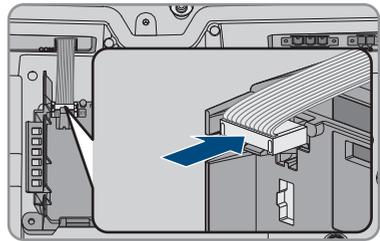
14. Connect the Connection Unit to the Power Unit.
Make sure that the screw holes on the left and right sides of the Power Unit are directly over those of the Connection Unit; and the cables protruding from the Power Unit must not be pinched.



15. Tighten the 2 screws on the right and left side of the Power Unit (TX25) (torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$).



16. Lead the enclosure lid to the Connection Unit and plug the ribbon cable into the socket on the communication assembly.



17. Ensure that the ribbon cable is securely plugged into the sockets at both ends.
18. Position the enclosure lid of the Connection Unit on the enclosure and tighten all 6 screws crosswise (TX 25, torque: $3 \text{ Nm} \pm 0.3 \text{ Nm}$).
19. If the inverter is secured against theft with a padlock, open the padlock and remove it from the inverter.
20. 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 and secure the packaging with tension belts, if necessary.
21. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

13 Procedure for Receiving a Replacement Device

QUALIFIED PERSON

Under fault conditions, the product may need to be replaced. If this is the case, you will receive a replacement device from SMA Solar Technology AG. If you received a replacement device, replace the defective product with the replacement device as described below.

1. To simplify the configuration of the replacement device, save the configuration data of the defective product to a file (see Section 8.22, page 101).
2. Decommission the defective product (see Section 12, page 147). Remove interfaces and keep them safe for installation into the replacement device (if available).
3. Mount the replacement device and make the electrical connections as described in this document.
4. If needed, install interfaces in the replacement device and connect the interfaces (see the interface manual).

5.

DANGER

Danger to life due to high voltages

Once disconnected from voltage sources, residual voltages can remain in the product that should be allowed to discharge completely.

- Wait 10 minutes before opening the upper enclosure lid.

6. If the upper cover of the replacement device is a transport cover (see information on the cover of the enclosure): Replace the transport cover of the replacement device with the upper cover of the defective inverter. To do so, loosen all screws of the upper enclosure lid (TX25) and remove it.
7. If the upper cover of the enclosure of the replacement device is a transport cover (see information on the cover of the enclosure): Position the upper cover of the enclosure with the 6 screws and serrated conical spring washers on the enclosure and tighten it in the specified order (TX25; torque: 6 Nm (53 in-lb)).
8. If the lower cover of the enclosure of the replacement device is a transport cover (see information on the cover of the enclosure): Replace the transport cover of the replacement device with the lower cover of the enclosure of the defective inverter. To do this, unscrew all 6 screws of the lower cover of the enclosure (TX25) and carefully remove it towards the front. When doing so, note that the LED assembly in the enclosure lid and the communication assembly in the inverter are connected via a ribbon cable.
9. If the lower cover the replacement device is a transport cover (see information on the cover of the enclosure): Pull the ribbon cable connecting the LED assembly in the cover of the enclosure to the communication assembly out of the socket located on the communication assembly.
10. If the lower cover of the replacement device is a transport cover (see information on the cover of the enclosure): Move the lower cover of the enclosure to the lower enclosure part. Plug the ribbon cable into the socket on the communication assembly. Ensure that the ribbon cable is firmly plugged into the sockets at both ends.

11. If the lower cover of the replacement device is a transport cover (see information on the cover of the enclosure): Tighten all 6 screws of the lower cover of the enclosure cross-wise (TX25, torque: $3 \text{ Nm} \pm 0.3 \text{ Nm}$)
12. Commission the replacement device (see Section 7.2, page 74).
13. Establish a connection to the user interface (see Section 8.1, page 79).
14. Configure the inverter using the installation assistant.
15. To reuse the saved configuration data of the defective inverter, load it from the respective file (see Section 8.23, page 101).
16. If the defective inverter had been registered by a communication product, replace it with the new product in the communication product.
17. Pack the defective product in the packaging of the replacement device and arrange with SMA Solar Technology AG for it to be picked up.

14 Technical Data

AC connection

	SBS3.7-10	SBS5.0-10	SBS6.0-10
Rated power at 230 V, 50 Hz	3680 W	5000 W	6000 W
Voltage range ²⁾	172.5 V to 264.5 V	172.5 V to 264.5 V	172.5 V to 264.5 V
Nominal grid voltage	230 V	230 V	230 V
Rated current at 220 V	16.7 A	22.7 A	26 A
Rated current at 230 V	16 A	21.7 A	26 A
Rated current at 240 V	15.3 A	20.8 A	25 A
Maximum AC current during battery-backup operation	20 A / 1 min	28 A / 1 min	32 A / 1 min
Total harmonic distortion of the alternating current	< 4 %	< 4 %	< 4 %
Maximum output current under fault conditions	198 A _{peak}	198 A _{peak}	198 A _{peak}
Inrush current	18.5 A	18.5 A	18.5 A
Rated grid frequency	50 Hz	50 Hz	50 Hz
Grid frequency ²⁾	50 Hz / 60 Hz	50 Hz	50 Hz / 60 Hz
Operating range at grid frequency 50 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz
Operating range at grid frequency 60 Hz	55 Hz to 65 Hz	55 Hz to 65 Hz	55 Hz to 65 Hz
Frequency during battery-backup operation (stand-alone grid frequency) ³⁾	F _{nom} + 2 Hz	F _{nom} + 2 Hz	F _{nom} + 2 Hz
Short-term frequency during battery-backup operation (stand-alone grid frequency) ³⁾	F _{nom} + 4 Hz	F _{nom} + 4 Hz	F _{nom} + 4 Hz

²⁾ Depending on the configured country data set

³⁾ The stand-alone grid frequency complies with the features of EN 50160:2010.

	SBS3.7-10	SBS5.0-10	SBS6.0-10
Power factor at rated power	1	1	1
Displacement power factor $\cos \varphi$, adjustable	0.8 overexcited to 1 to 0.8 underexcited	0.8 overexcited to 1 to 0.8 underexcited	0.8 overexcited to 1 to 0.8 underexcited
Feed-in phases	1	1	1
Connection phases	1	1	1
Oversvoltage category as per IEC 60664-1	III	III	III

DC input of battery

	SBS3.7-10	SBS5.0-10	SBS6.0-10
Maximum DC voltage	600 V	600 V	600 V
Voltage range ⁴⁾	100 V to 550 V	100 V to 550 V	100 V to 550 V
Rated DC voltage	360 V	360 V	360 V
Maximum DC current per input	10 A	10 A	10 A
Number of DC inputs	3	3	3
Conditional short-circuit current	40 A	40 A	40 A
Rated short-time withstand current (I_{cw})	600 A / <0.01 s	600 A / <0.01 s	600 A / <0.01 s
Unaffected short-circuit current (I_{cp})	1500 A / <0.01 s	1500 A / <0.01 s	1500 A / <0.01 s
Battery type ⁵⁾	Li-ion	Li-ion	Li-ion
Oversvoltage category as per IEC 60664-1	III	III	III

AC output, secure power supply operation

Maximum AC power	3680 W
Nominal AC voltage	230 V
Maximum output current	16 A
Minimum load	1 W

⁴⁾ The charging and discharging voltage of the connected batteries must be in the range of 220 V and 500 V in order to make optimum use of the power of the inverter

⁵⁾ Warning! Danger of fire due to use of non-approved batteries. Only use batteries approved by SMA Solar Technology AG (technical information with list of approved batteries at www.SMA-Solar.com).

Protective Devices

DC reverse polarity protection	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
Maximal output overcurrent protection	40 A
All-pole sensitive residual-current monitoring unit	Available
Active anti-islanding method	Frequency shift

General Data

Width x height x depth	535 mm x 730 mm x 198 mm
Weight	26 kg
Length x width x height of the packaging	600 mm x 800 mm x 300 mm
Weight including packaging	30 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	-25 °C to +60 °C
Max. permissible value for relative humidity (condensing)	100 %
Maximum operating altitude above MSL	3000 m
Noise emission, typical	39 dB(A)
Self-consumption in standby mode without the load necessary to supply the battery	< 5 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
Power control / Demand response (DRED)	Communication via Modbus interface
Demand Response Mode	DRM0

Topology	Transformerless (Non-isolated)
Cooling method	Convection
Degree of protection in accordance with IEC 60529	IP65
Protection class in accordance with IEC 62103	I
Radio technology	Wi-Fi 802.11 b/g/n
Radio spectrum	2.4 GHz
Maximum transmission power	100 mW
Quantity maximum detectable Wi-Fi networks	32
Grid configurations	Single-phase

Climatic Conditions

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

Extended temperature range	-25 °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
Storage temperature	-40 °C to +60 °C

Equipment

DC connection	Spring-cage terminal
AC connection	Spring-cage terminal
Battery communication	CAN bus
Communication for automatic transfer switch	CAN bus
Speedwire interface	As standard
Webconnect function	As standard
Wi-Fi interface	As standard

Torques

Screw M5x60 for securing the inverter to the wall mounting bracket	1.7 Nm ± 0.3 Nm
Screws for attaching the enclosure lid of the Connection Unit	3 Nm ± 0.3 Nm

Screws for grounding on the grounding terminals	6 Nm \pm 0.3 Nm
Screws for AC-out terminal block for AC connection	0.3 Nm
Screws for SPS terminal block for connecting the outlet for secure power supply operation	0.3 Nm

Data Storage Capacity

Daily yields	30 years
Event messages for users	1 000 events
Event messages for installers	1 000 events

Multifunction relay

Maximum DC switching voltage	30 V
Maximum DC switching current	1.0 A
Minimum load	0.1 W
Minimum electrical endurance when the maximum switching voltage and maximum switching current are complied with ⁶⁾	100 000 switching cycles

Efficiency

Maximum efficiency, η_{\max}	97.5 %
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⁶⁾ Corresponds to 20 years at 12 switching operations per day

15 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)
- Batteries:
 - Type
 - Firmware version
 - Type of automatic transfer switch (if available)

You can find your country's contact information at:



<https://go.sma.de/service>

16 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 aforementioned directives. More information on the availability of the entire declaration of conformity can be found at <https://www.sma.de/en/ce-ukca>.

Radio technology	WLAN 802.11 b/g/n
Radio spectrum	2.4 GHz
Maximum transmission power	100 mW

17 UK Declaration of Conformity

according to the regulations of England, Wales and Scotland

- Electromagnetic Compatibility Regulations 2016 (SI 2016/1091)
- Electrical Equipment (Safety) Regulations 2016 (SI 2016/1101)
- Radio Equipment Regulations 2017 (SI 2017/1206)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (SI 2012/3032)



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 regulations. More information on the availability of the entire declaration of conformity can be found at <https://www.sma.de/en/ce-ukca>.

Radio technology	WLAN 802.11 b/g/n
Radio spectrum	2.4 GHz
Maximum transmission power	100 mW

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