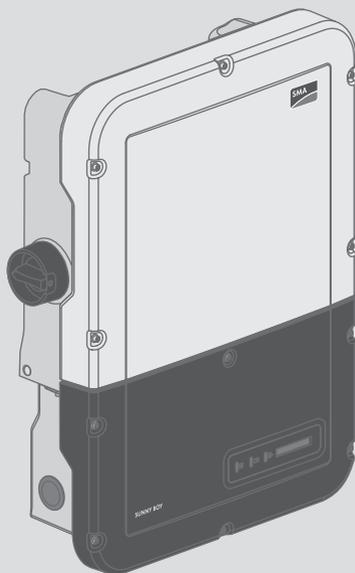


User Manual

**SUNNY BOY 3.0-US / 3.8-US / 5.0-US /
6.0-US / 7.0-US / 7.7-US**



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Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- SB3.0-1SP-US-40 (Sunny Boy 3.0-US)
- SB3.8-1SP-US-40 (Sunny Boy 3.8-US)
- SB5.0-1SP-US-40 (Sunny Boy 5.0-US)
- SB6.0-1SP-US-40 (Sunny Boy 6.0-US)
- SB7.0-1SP-US-40 (Sunny Boy 7.0-US)
- SB7.7-1SP-US-40 (Sunny Boy 7.7-US)

This manual must be followed when using this product.

The product is designed and tested in accordance with international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the product. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this manual.

Warnings in this Document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.

Symbol	Description
 DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE is used to address practices not related to personal injury.

Warnings on this Product

The following symbols are used as product markings with the following meanings.



Warning regarding dangerous voltage

The product works with high voltages. All work on the product must only be performed as described in the documentation of the product.



Beware of hot surface

The product can become hot during operation. Do not touch the product during operation.



Observe the operating instructions

Read the documentation of the product before working on it. Follow all safety precautions and instructions as described in the documentation.

General Warnings

WARNING

All electrical installations must be carried out in accordance with the local electrical standards and the *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

The product contains no user-serviceable parts.

Before installing or using the product, read all of the instructions, cautions, and warnings in this manual.

Before connecting the product to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

Wiring of the product must be made by qualified personnel only.

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1 Information on this Document

1.1 Validity

This document is valid for the following device types:

- SB3.0-1SP-US-40 (Sunny Boy 3.0-US)
- SB3.8-1SP-US-40 (Sunny Boy 3.8-US)
- SB5.0-1SP-US-40 (Sunny Boy 5.0-US)
- SB6.0-1SP-US-40 (Sunny Boy 6.0-US)
- SB7.0-1SP-US-40 (Sunny Boy 7.0-US)
- SB7.7-1SP-US-40 (Sunny Boy 7.7-US)

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

1.3 Symbols

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

1.4 Additional Information

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

Document title	Document type
Mounting, installation, commissioning and decommissioning	Installation Manual

Document title	Document type
"Application for SMA Grid Guard Code"	Form
"Webconnect Systems in Sunny Portal" Registration in Sunny Portal	User Manual
"SMA Modbus® Interface" Information on the commissioning and configuration of the SMA Modbus interface	Technical Information
"SunSpec® Modbus® Interface" Information on the commissioning and configuration of the SunSpec Modbus interface	Technical Information
"SMA Modbus® Interface" List with the product specific SMA Modbus registers	Technical Information
"SunSpec® Modbus® Interface" List with the product specific SunSpec Modbus registers	Technical Information

1.5 Nomenclature

Complete designation	Designation in this document
Sunny Boy	Inverter, product
SMA Solar Technology America LLC	SMA
SMA Solar Technology Canada Inc.	

1.6 Typographies

Typography	Use	Example
bold	<ul style="list-style-type: none"> • Display texts • Elements on a user interface • Terminals • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • The value can be found in the field Energy. • Select Settings. • Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Select Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> • Button or key to be selected or pressed 	<ul style="list-style-type: none"> • Select [Next].

2 Safety

2.1 Intended Use

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

The product is suitable for indoor and outdoor use.

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

The product must only be operated with PV arrays (PV modules and cabling) that are approved by the electrical standards applicable on-site and the *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1.

i No galvanic isolation

The product is not equipped with a transformer and therefore has no galvanic isolation.

- Do not operate grounded PV modules together with the product. If grounded PV modules are connected to the product, an event will occur which will appear on the product display. The event will also be displayed, along with the associated message, in the event list on the user interface of the product.
- Only ground the mounting frames of the PV modules.
- The neutral conductor of the AC output is not bonded to ground within the product.
- The neutral conductor of the AC output for secure power supply operation is bonded to ground within the product.

PV modules with a high capacity to ground may only be used if their coupling capacity does not exceed 2.5 μF .

To protect the PV system against excessive reverse currents under fault conditions, the *National Electrical Code*®, Section 690.9, requires overcurrent protection for PV source circuits where possible short-circuit currents exceed the ampacity of source circuit conductors or the maximum series fuse rating of the PV modules. Typically, this requires string fusing where more than two strings are combined in parallel. Where overcurrent protection is required, *National Electrical Code*®, Section 690.35, requires that both positive and negative conductors have overcurrent protection for ungrounded PV arrays.

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

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA 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 place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

2.2 Safety Information

This section contains safety information that must be observed at all times when working on or with the product.

To prevent personal injury 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 in case of a ground fault

If a ground fault occurs, parts of the system may still be live. Touching live components can lead to lethal electric shocks.

- Ensure that no voltage is present and wait five minutes before touching any parts of the PV system or the inverter.

⚠ 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.

NOTICE

Damage to the inverter due to moisture and dust intrusion

Dust or moisture intrusion can damage the inverter and impair its functionality.

- Close all enclosure openings of the inverter tightly.
- Never open the inverter when it is raining or snowing, or the humidity is over 95%.

NOTICE

Damage to the display or the type label due to the use of cleaning agents

- If the inverter is dirty, clean the enclosure, the enclosure lid of the Connection Unit, the enclosure lid of the Power Unit, the type label, the display and the LEDs with a damp cloth and clear water only.

3 Product Description

3.1 Sunny Boy

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

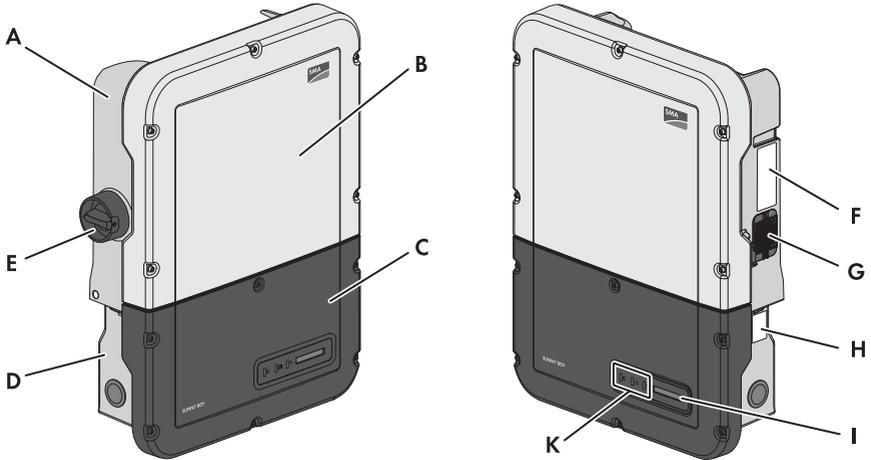


Figure 1: Design of the Sunny Boy

Position	Designation
A	Power Unit
B	Enclosure lid of the Power Unit
C	Enclosure lid for the Connection Unit
D	Connection Unit
E	DC load-break switch The inverter is equipped with a DC load-break switch. If the DC load-break switch is set to the position I, it establishes a conductive connection between the PV array and the Power Unit. Switching the DC load-break switch to the O position will interrupt the DC electric circuit.

Position	Designation
F	<p>Inverter type label</p> <p>The type label uniquely identifies the inverter. You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. The type label must remain permanently attached to the product. You will find the following information on the type label:</p> <ul style="list-style-type: none"> • Device type (Model) • Serial number (Serial No.) • Date of manufacture • Device-specific characteristics
G	Fan (only with Sunny Boy 7.0 and 7.7)
H	<p>Type label of the Connection Unit</p> <p>The type label clearly identifies the Connection Unit. The type label must remain permanently attached to the product. You will find the following information on the type label:</p> <ul style="list-style-type: none"> • 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
I	<p>Display</p> <p>The display shows the current operating data and events or errors.</p>
K	<p>LEDs</p> <p>The LEDs indicate the operating state of the inverter.</p>

Symbols on the Inverter and on the Type Label

Symbol	Explanation
	<p>Inverter</p> <p>Together with the green LED, this symbol indicates the operating state of the inverter.</p>
	<p>Observe the documentation</p> <p>Together with the red LED, this symbol indicates an error.</p>
	<p>Data transmission</p> <p>Together with the blue LED, this symbol indicates the status of the network connection.</p>
	<p>Equipment Grounding Terminal</p> <p>This symbol indicates the position for the connection of an equipment grounding conductor.</p>

Symbol	Explanation
	<p>Warning label with FCC Compliance and IC Compliance</p>
	<p>Risk of burns due to hot surfaces The product can get hot during operation. Avoid contact during operation. Prior to performing any work on the product, allow the product to cool down sufficiently.</p>
	<p>Danger to life due to electric shock The product operates at high voltages. Prior to performing any work on the product, disconnect the product from voltage sources. All work on the product must be carried out by electrically qualified persons only.</p>
	<p>Observe the documentation Observe all documentation supplied with the product.</p>
	<p>UL 1741 is the standard applied by Underwriters Laboratories to the product to certify that it meets the requirements of the <i>National Electrical Code</i>[®], the <i>Canadian Electrical Code</i>[®] CSA C22.1; the IEEE 929-2000 and IEEE 1547.</p>

3.2 Interfaces and Functions

The inverter is equipped with the following interfaces and functions:

User interface for the monitoring and configuration of the inverter

The inverter is standard-equipped with an integrated web server, which provides a user interface for configuring and monitoring the inverter. The inverter user interface can be called up via the web browser if there is an existing WLAN or Ethernet connection to a computer, tablet PC or smartphone.

SMA Speedwire

The inverter is equipped with SMA Speedwire as standard. SMA Speedwire is a type of communication based on the Ethernet standard. This enables inverter-optimized 10 or 100 Mbit data transmission between Speedwire devices in PV systems and the user interface of the inverter. Class 1 wiring methods are to be used for field wiring connection to the terminals of the communication interface.

SMA Webconnect

The inverter is equipped with a Webconnect function as standard. The Webconnect function enables direct data transmission between the inverters of a small-scale system and the Internet portal Sunny Portal without any additional communication device and for a maximum of 4 inverters per Sunny Portal system. In large-scale PV power plants with more than 4 inverters, there is the option of establishing data transmission between the inverters and the Sunny Portal web-based monitoring platform via the SMA Cluster Controller or to distribute the inverters over several plants in the Sunny Portal. If there is an existing WLAN or Ethernet connection, you can directly access your Sunny Portal system via the web browser on the computer, tablet PC or smartphone.

WLAN

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

In addition, the inverter has a WPS (WiFi Protected Setup) function. The WPS function is for automatically connecting the inverter to a device in the same network as the inverter (e.g. router, computer, tablet PC or smartphone).

Expanding the radio range in the WLAN network

In order to expand the radio range of the inverter in the WLAN network, you can install the Antenna Extension Kit accessory set in the inverter.

Modbus

The inverter 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 devices is designed for industrial use and has the following tasks:

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

Parallel Operation of the DC Inputs A and B

The DC inputs A and B of the inverter can be operated in parallel and up to three strings can be connected to it in parallel. As a result, as opposed to normal operation, up to three strings can be connected directly to inverters with two DC inputs and up to four strings to inverters with three DC inputs. The inverter automatically detects the parallel operation of the DC inputs A and B.

Module slots

The inverter is standard-equipped with two module slots. The module slots are located on the communication assembly and allow additional modules to be connected (e.g. SMA Sensor Module). The modules are available as accessories. The installation of two identical modules is not permissible.

Secure power supply operation

You can connect an external outlet and a switch to the inverter in order to activate the outlet. In case of a grid failure, the outlet supplies a load with current from the PV system. When the outlet is activated via the switch, the load is supplied with current from the PV system. The inverter automatically regulates the energy supply of the outlet depending on the solar irradiation on the PV system. When the outlet is activated and a load is supplied with current from the PV system, the inverter is disconnected from the utility grid and does not feed into the utility grid.

i Do not connect loads that require a stable electricity supply to the outlet for secure power supply operation

Secure power supply operation must not be used for loads that require a stable electricity supply. The power available during secure power supply operation depends on the solar irradiation on the PV system. Therefore, power output can fluctuate considerably depending on the weather or may not be available at all.

- Do not connect loads to the outlet for secure power supply operation if they are dependent on a stable electricity supply for reliable operation.

Multifunction relay

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

Arc-Fault Circuit Interrupter (AFCI)

In accordance with the *National Electrical Code*[®], Article 690.11, the inverter has a system for arc fault detection and interruption.

An electric arc with a power of 300 W or greater must be interrupted by the AFCI in the time specified by UL 1699B. A detected electric arc causes the inverter to interrupt feed-in operation: In order to restart feed-in operation, the feed-in operation must be activated manually. If the installation conditions allow it, you can deactivate the arc-fault circuit interrupter.

3.3 LED Signals

The LEDs indicate the operating state of the inverter.

LED	Status	Explanation
Green LED	flashing: 2 s on 2 s off	Waiting for connection 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.
	flashing: 1.5 s on 0.5 s off	Secure power supply operation The secure power supply operation is activated and the inverter supplies the outlet with current from the PV system.
	flashing quickly	Update of central processing unit The central processing unit of the inverter is being updated.
	glowing	Feed-in operation (Power: $\geq 90\%$, relative to the active power limit set) The inverter feeds in with a power of at least 90%.
	pulsing	Feed-in operation (Power: $\geq 20\%$ to max. 90%, relative to the set active power limit) The inverter is equipped with a dynamic power display via the green LED. The green LED pulses faster or slower, depending on the power. If necessary, you can switch off the dynamic power display via the green LED.
Red LED	glowing	Event occurred In addition to the glowing red LED, the display indicates the following information about the event: <ul style="list-style-type: none"> • Event type • Event number • Date and time at which the event occurred
Blue LED	flashes slowly for approx. one minute	Communication connection is being established The inverter is establishing a connection to a local network or is establishing a direct connection to an end device via Ethernet (e.g. computer, tablet PC or smartphone).
	flashes quickly for approx. two minutes	WPS active The WPS function is active.
	glowing	Communication active There is an active connection with a local network or there is a direct connection with an end device via Ethernet (e.g. computer, tablet PC or smartphone).

4 Operation of the Inverter

4.1 Activating and Operating the Display

You can activate and operate the display by tapping on the enclosure lid of the Connection Unit.

Procedure:

1. Activate the display. Tap on the enclosure lid of the Connection Unit once.
 - The backlight is switched on.
2. To move to the next message, tap on the enclosure lid of the Connection Unit once.

4.2 Activate WPS Function

- Tap twice on the enclosure lid of the Connection Unit.
 - The blue LED flashes quickly for approx. two minutes.

4.3 Secure Power Supply Operation

4.3.1 Activating Secure Power Supply Operation

If an outlet and a switch for secure power supply operation are connected to the inverter, you can supply a load with current from the PV system in case of a grid failure during the day. If you activate the secure power supply operation, the inverter supplies loads that are connected to the outlet for secure power supply operation.

In case of overload, underload or insufficient solar irradiation, the voltage supply of the outlet is briefly interrupted. The inverter automatically attempts to reestablish the voltage 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.

i In case of a grid failure during the night, secure power supply operation is not possible

During the night, secure power supply operation cannot be activated since the PV system does not produce power that is required to supply the load.

- In case of a grid failure during the night, do not activate secure power supply operation.
- Continue to operate the inverter on the utility grid and wait for restoration of grid operation.
- In the event of a persistent grid failure, switch to secure power supply operation after sunrise.

i **Do not connect loads that require a stable electricity supply to the outlet for secure power supply operation**

Secure power supply operation must not be used for loads that require a stable electricity supply. The power available during secure power supply operation depends on the solar irradiation on the PV system. Therefore, power output can fluctuate considerably depending on the weather or may not be available at all.

- Do not connect loads to the outlet for secure power supply operation if they are dependent on a stable electricity supply for reliable operation.

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. As soon as the inverter supplies the outlet with power, the green LED flashes (1.5 s on and 0.5 s off) and the message **SPS-mode active** is shown in the display along with the amount of power being supplied from the inverter to the outlet. In addition, the control light of the outlet for secure power supply operation glows.
 - The green LED does not flash and no message that the secure power supply operation mode is activated appears on the display or the control lamp of the outlet does not glow?
The output power of the PV system is too low. Irradiation on the PV system is probably too low or the connected load requires more power than currently available.
 - Ensure that the outlet's switch is set to secure power supply operation.
 - If irradiation is too low, wait for it to increase.
 - Connect a load with lower power consumption to the outlet.
 - No voltage can be measured at the outlet?
 - Ensure that the outlet's switch is set to secure power supply operation.
 - Ensure that the switch, outlet and control light for secure power supply operation are correctly connected.

4.3.2 Deactivating 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.
 3. Switch on the circuit breaker of the PV system.
- The inverter connects to the utility grid and starts feed-in operation.

5 Using the Inverter User Interface

5.1 Establishing a connection to the user interface

5.1.1 Establishing a direct connection via WLAN

Requirements:

- The inverter must be commissioned.
- A computer, tablet PC or smartphone with WLAN interface must be available.
- In the case of a computer connection, one of the following web browsers must be installed: Firefox (as of version 25), Internet Explorer (as of version 10), Safari (as of version 7), Opera (as of version 17) or Google Chrome (as of version 30).
- In the case of a tablet PC or smartphone connection, one of the following web browsers must be installed: Firefox (as of version 25), Safari (as of version iOS 7) or Google Chrome (as of version 29).
- The personal SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten operating hours (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

i Inverter SSID and IP address and necessary passwords

- Inverter SSID in WLAN: SMA[serial number] (e.g. SMA2130019815)
- Standard WLAN password (usable for initial configuration to completion of the first ten operating hours): SMA 12345
- Device-specific WLAN password (usable for initial configuration to completion of the first ten operating hours): see WPA2-PSK on the type label of the inverter or on the back of the manual included in the delivery
- Standard IP inverter address for a direct connection via WLAN outside of a local network: 192.168.12.3

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

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

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

The procedure can be different depending on the terminal devices used (e.g. computer, tablet PC or smartphone). If the procedure described does not apply to your device, establish the direct connection via WLAN as described in the manual of your device.

Procedure:

1. If your computer, tablet PC or smartphone has a WPS function:
 - 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. The WPS function is active.
 - Activate the WPS on your device.
 - The connection with your device will be established automatically. It can take up to 20 seconds for this connection to be established.
 2. If your computer, tablet PC or smartphone does not have a WPS function:
 - Search for WLAN networks with your device.
 - Select the SSID of the inverter **SMA[serial number]** in the list with the found WLAN networks.
 - Enter the inverter WLAN password. Within the first 10 operating hours, you must use the standard WLAN password **SMA12345**. After the first 10 operating hours, you must use the device-specific WLAN password (WPA2-PSK) of the inverter. The WLAN password (WPA2-PSK) is printed on the type label.
 3. Enter the IP address **192.168.12.3** or, if your device supports mDNS services, **SMA[serial number].local** in the address line of the web browser and press the enter key.
 4.  **Web browser signals a security vulnerability**

After the IP address has been confirmed by pressing the enter key, a message might appear indicating that the connection to the user interface of the inverter is not secure. SMA guarantees that calling up the user interface is secure.

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

5.1.2 Establishing a Direct Connection via Ethernet

Requirements:

- The inverter must be commissioned.
- A computer with an Ethernet interface must be available.
- The inverter must be connected directly to a computer.
- One of the following web browsers must be installed: Firefox (as of version 25), Internet Explorer (as of version 10), Safari (as of version 7), Opera (as of version 17) or Google Chrome (as of version 30).
- The personal SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten operating hours (see certificate "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

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

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

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

Procedure:

1. Tap on the enclosure lid of the Connection Unit and continue to switch up to the message **E-IP: 169.254.xxx.xxx**.
2. Read off the displayed IP address for the direct connection via Ethernet and either remember it or write it down.
3. Open the web browser of your device, enter the IP address in the address line of the web browser and press the enter key.

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

After the IP address has been confirmed by pressing the enter key, a message might appear indicating that the connection to the user interface of the inverter is not secure. SMA guarantees that calling up the user interface is secure.

- Continue loading the user interface.

- The login page of the user interface opens.

5.1.3 Establishing a Connection via Ethernet in the local network

i **New IP address for connecting with a local network**

If the inverter is connected to a local network via a network cable (e.g. via a router), the inverter 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 inverter is only reachable via this new IP address or the alternative addresses.

Access addresses of the inverter:

- Generally applicable access address, e.g. for android products: IP address manually assigned or assigned by the DHCP server (router) (identification via network scanner software or router manual).
- Alternative access address for Apple products: SMA[serial number].local (e.g. SMA2130019815.local)
- Alternative access address for certain Windows products: SMA[serial number] (e.g. SMA2130019815)

Requirements:

- The inverter must be connected to the local network via a network cable (e.g. via a router).
- The inverter must be integrated in the local network.

- A computer, tablet PC or smartphone must be available and the computer, tablet PC or smartphone must be connected with the network to which the inverter is also connected.
- In the case of a computer connection, one of the following web browsers must be installed: Firefox (as of version 25), Internet Explorer (as of version 10), Safari (as of version 7), Opera (as of version 17) or Google Chrome (as of version 30).
- In the case of a tablet PC or smartphone connection, one of the following web browsers must be installed: Firefox (as of version 25), Safari (as of version iOS 7) or Google Chrome (as of version 29).
- The personal SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours (see certificate "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

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

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

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

Procedure:

1. Open the web browser of your device, enter the IP address of the inverter in the address line of the web browser and press the enter key.

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

After the IP address has been confirmed by pressing the enter key, a message might appear indicating that the connection to the user interface of the inverter is not secure. SMA guarantees that calling up the user interface is secure.

- Continue loading the user interface.

- The login page of the user interface opens.

5.2 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

Procedure:

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. In the **New password** field, enter a new password for the selected user group.

4. In the **Repeat password** field, enter the new password again.
 5. Select **Login**.
- The **Configuring the Inverter** page or the user interface start 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.

5.3 Start Page Design of the User Interface

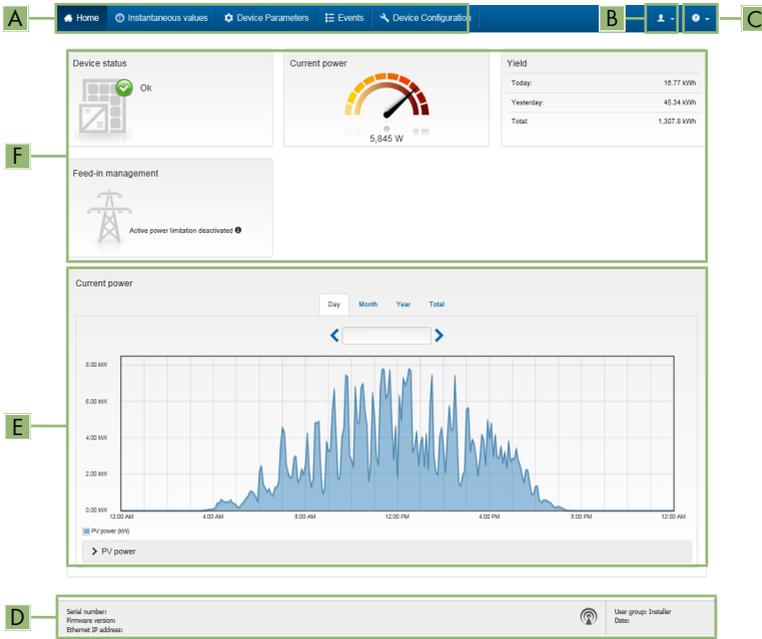


Figure 2: Start Page Design of the User Interface

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. • System Configuration The following settings for the inverter can be performed 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. <ul style="list-style-type: none"> - Changing device names - Updating firmware (not available with devices having an iOS operating system) - Saving a configuration to file (not available with devices having an iOS operating system) - Loading a configuration from a file (not available with devices having an iOS operating system) - Importing a proxy certificate (not available with devices having an iOS operating system)
B	User settings	<p>Provides the following functions, depending on the user group logged in:</p> <ul style="list-style-type: none"> • Start the installation assistant • SMA Grid Guard login • Logout

Position	Designation	Description
C	Help	Provides the following functions: <ul style="list-style-type: none"> • Displaying information on Open Source licenses used • Link to the website of SMA
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 • User group logged in • Date and device time of the inverter
E	PV power curve	Temporal progression of the PV power of the household over the selected time period.
F	Status display	The various areas display information on the current status of the PV system. <ul style="list-style-type: none"> • Device status Displays whether the inverter is currently in a fault-free operating state or whether there is an event type Error or Warning present. • Current power Displays the power currently being generated by the inverter. • Yield Displays the energy yield of the inverter. • Feed-in management Displays whether the inverter is currently limiting its active power.

5.4 Starting the Installation Assistant

QUALIFIED PERSON

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

Layout of the installation assistant

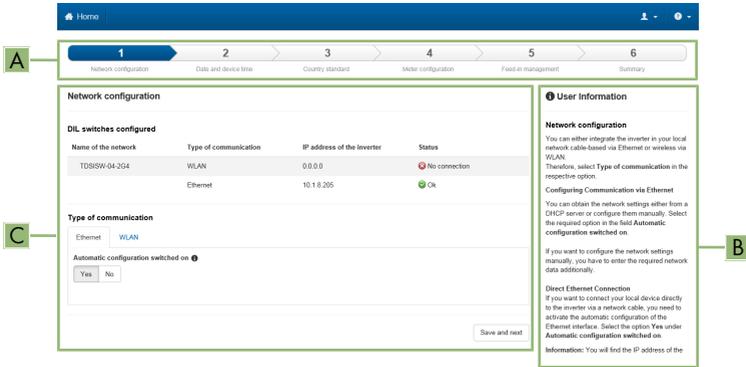


Figure 3: Layout of the installation assistant

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

Requirement:

- When configuring after completion of the first ten operating hours, the SMA Grid Guard code must be available (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
 2. Log in as **Installer**.
 3. Select the menu **User Settings** (see Section 5.3, page 25) on the start page of the user interface.
 4. In the context menu, select **[Start the installation assistant]**.
- The Installation Assistant will open.

5.5 Changing the Password

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

i PV systems registered in a communication product

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

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

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
2. Log into the user interface (see Section 5.2, page 23).
3. Call up the menu **Device Parameters**.
4. Select [**Edit parameters**].
5. In the parameter group **User Rights > Access Control** change the password of the desired user group.
6. Select [**Save all**] to save the changes.

6 Configuration of the Inverter

6.1 Changing Operating Parameters

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

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

i No configuration via Sunny Explorer

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

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

Requirements:

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

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
 2. Log into the user interface (see Section 5.2, page 23).
 3. Call up the menu **Device Parameters**.
 4. Select [**Edit parameters**].
 5. Log in using the SMA Grid Guard code to change those parameters designated by a lock (only for installers):
 - Select the menu **User Settings** (see Section 5.3, page 25).
 - In the subsequent context menu, select [**SMA Grid Guard login**].
 - Enter the SMA Grid Guard code and select [**Login**].
 6. Expand the parameter group that contains the parameter which is to be configured.
 7. Change the desired parameters.
 8. Select [**Save all**] to save the changes.
- The inverter parameters are set.

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. in the evening), 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.

6.2 Configuring the Country Data Set

QUALIFIED PERSON

As standard, the inverter is meant for connection to a utility grid with a 208 V wye connection or a 240 V split-phase system, and the associated country data set **UL1741/2010/120** is factory-set. If the default country data set does not correspond with the grid configuration, the country data set can be adapted to the connected grid configuration.

The basic procedure for changing operating parameters is explained in another section (see Section 6.1 "Changing Operating Parameters", page 30).

Grid configuration	Country data set
208 V delta connection	UL1741/2010/208
208 V wye connection	UL1741/2010/120
240 V delta connection	UL1741/2010/240
240 V split-phase system	UL1741/2010/120

Procedure:

- Select the parameter **Set country standard** and set the required country data set.

6.3 Deactivating the Arc-Fault Circuit Interrupter (AFCI)

QUALIFIED PERSON

The basic procedure for changing operating parameters is explained in another section (see Section 6.1 "Changing Operating Parameters", page 30).

Procedure:

- Select the parameter **AFCI switched on** or **AfcilsOn** and set to **No**.

6.4 Changing the Operating Mode of the Multifunction Relay

QUALIFIED PERSON

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 6.1 "Changing Operating Parameters", page 30).

Procedure:

1. Select the parameter **Operating mode of multifunction relay** or **Mlt.OpMode** and set the desired operating mode.
2. Once you have set the operating mode **Self-consumption** or **SelfCsmP**, you can configure other settings:
 - Select the parameter **Minimum On power for MFR self-consumption** or **Mlt.MinOnPwr** and set the desired value. This will configure the power threshold from which a load is to be activated.
 - Select the parameter **Minimum power On time, MFR self-consumption** or **Mlt.MinOnPwrTmm** and set the desired value. This will configure the minimum time for which the power must have exceeded the minimum switch-on power threshold in order to trip activation of the load.
 - Select the parameter **Minimum On time for MFR self-consumption** or **Mlt.MinOnTmm** and set the desired value. This will configure the minimum time for which the load remains activated.
3. If you have set the operating mode **Control via communication** or **ComCtl**, select the parameter **Status of MFR with control via communication** or **Mlt.ComCtl.Sw** and set the desired value. This will configure the status at which the multifunction relay is controlled via a communication product.
4. If you have set the operating mode **Battery bank** or **BatCha**, make further settings:
 - Select the parameter **Minimum On power for MFR battery bank** or **Mlt.BatCha.Pwr** and set the desired value. This will configure the power threshold from which the battery is to be charged.
 - Select the parameter **Minimum time before reconnection of MFR battery bank** or **Mlt.BatCha.Tmm** and set the desired value. This will configure the minimum time which must elapse after charging the battery before the battery can be charged again.

6.5 Configuring the Modbus Function

QUALIFIED PERSON

The Modbus interface is deactivated by default and the communication ports **502** set. In order to access SMA inverters with SMA Modbus® or SunSpec® Modbus®, the Modbus interface must be activated. After activating the interface, the communication ports of both IP protocols can be changed.

For information on commissioning and configuration of the Modbus interface, see the Technical Information "SMA Modbus® Interface" or in the Technical Information "SunSpec® Modbus® Interface" at www.SMA-Solar.com.

For information on which Modbus registers are supported, see the Technical Descriptions "SMA Modbus® Interface" or "SunSpec® Modbus® Interface" at www.SMA-Solar.com.

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.

- 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 default settings.

Procedure:

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

6.6 Setting SMA OptiTrac Global Peak

QUALIFIED PERSON

For partially shaded PV modules, you should set the interval at which the inverter is to optimize the MPP of the PV system. If you do not want to use SMA OptiTrac Global Peak feature, you can deactivate the feature.

The basic procedure for changing operating parameters is explained in another section (see Section 6.1 "Changing Operating Parameters", page 30).

Procedure:

- Select the parameter **Cycle time of the OptiTrac Global Peak algorithm** or **MPPShdw.CycTms** and set the required time interval. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.
 - The inverter optimizes the MPP of the PV system at the predetermined time interval.
- In order to deactivate the SMA OptiTrac Global Peak feature, select the parameter **OptiTrac Global Peak switched on** or set **MPPShdw.IsOn** to **Off**.

6.7 Saving the Configuration in a File

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

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
2. Log into the user interface (see Section 5.2, page 23).
3. Select the menu **System Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Saving the configuration in a file**].
6. Follow the instructions in the dialog.

6.8 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 in a file (see Section 6.7 "Saving the Configuration in a File", page 34). When saving, only the device parameters will be adopted, not any passwords.

Requirements:

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

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
2. Log into the user interface as an **Installer**.
3. Select the menu **System Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Adopting the configuration from a file**].
6. Follow the instructions in the dialog.

6.9 Switching the Dynamic Power Display Off

As standard, the inverter signals its power dynamically via the pulsing of the green LED. When doing so, the LED flashes on and off uniformly or is permanently lit at full power. The various gradations are related here to the set active power limit of the inverter. If this display is not desired, switch this function off in accordance with the following procedure. Once this has been done, the green LED is lit permanently to signalize feed-in operation.

The basic procedure for changing operating parameters is explained in another section (see Section 6.1 "Changing Operating Parameters", page 30).

Procedure:

- In the parameter group **Device > Operation**, select the parameter **Dynamic power display via green LED** and set this to **Off**.

6.10 Switching WLAN On and Off

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

i Switching on the WLAN function only possible via Ethernet connection

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

The basic procedure for changing operating parameters is explained in another section (see Section 6.1 "Changing Operating Parameters", page 30).

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**.

7 Cleaning the Inverter

NOTICE**Damage to the display or the type label due to the use of cleaning agents**

- If the inverter is dirty, clean the enclosure, the enclosure lid of the Connection Unit, the enclosure lid of the Power Unit, the type label, the display and the LEDs with a damp cloth and clear water only.

8 Troubleshooting

8.1 Forgotten Password

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

Procedure:

1. Request PUK (application form available at www.SMA-Solar.com).
2. Activate the user interface (see Section 5.1, page 20).
3. Enter the PUK instead of the password into the field **Password**.
4. Call up the menu **Device Parameters**.
5. Select [**Edit parameters**].
6. In the parameter group **User Rights > Access Control** change the password of the desired user group.
7. Select [**Save all**] to save the changes.

PV Systems in Sunny Portal

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

- Assign the changed password of the user group **Installer** as the new system password in Sunny Portal (see the Sunny Portal user manual at www.SMA-Solar.com).

8.2 Event Messages

Event number	Message, cause and corrective measures
101 to 105	<div data-bbox="311 236 596 272" style="background-color: #cccccc; padding: 2px;">⚠ QUALIFIED PERSON</div> <p data-bbox="288 288 393 316">Grid fault</p> <p data-bbox="288 323 983 379">The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 387 508 411">Corrective measures:</p> <ul data-bbox="311 419 990 539" style="list-style-type: none"> <li data-bbox="311 419 930 475">• Ensure that the correct country data set has been configured (see Section 6.2, page 31). <li data-bbox="311 483 990 539">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p data-bbox="333 547 994 659">If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.</p> <p data-bbox="333 667 1000 754">If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service (see Section 11 "Contact", page 67).</p>
202 to 206	<div data-bbox="311 766 596 802" style="background-color: #cccccc; padding: 2px;">⚠ QUALIFIED PERSON</div> <p data-bbox="288 818 393 845">Grid fault</p> <p data-bbox="288 853 994 938">The utility grid has been disconnected, the AC cable is damaged or the grid voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 946 508 970">Corrective measures:</p> <ul data-bbox="311 978 990 1169" style="list-style-type: none"> <li data-bbox="311 978 785 1002">• Make sure that the circuit breaker is switched on. <li data-bbox="311 1010 930 1066">• Ensure that the AC cable is not damaged and that it is connected correctly. <li data-bbox="311 1074 908 1098">• Ensure that the country data set has been configured correctly. <li data-bbox="311 1106 990 1169">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. <p data-bbox="333 1177 994 1289">If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.</p> <p data-bbox="333 1297 1000 1377">If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service (see Section 11 "Contact", page 67).</p>

Event number	Message, cause and corrective measures
401 to 404	<p data-bbox="311 183 599 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 392 263">Grid fault</p> <p data-bbox="288 271 1012 327">The inverter has disconnected from the utility grid. A stand-alone grid or a very large change in the power frequency was detected.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 1012 399" style="list-style-type: none"> <li data-bbox="311 367 1012 399">• Check the grid connection for significant short-term frequency fluctuations.
501	<p data-bbox="311 406 599 443">⚠ QUALIFIED PERSON</p> <p data-bbox="288 454 392 486">Grid fault</p> <p data-bbox="288 494 1012 550">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 558 509 582">Corrective measures:</p> <ul data-bbox="311 590 1012 805" style="list-style-type: none"> <li data-bbox="311 590 1012 646">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 11 "Contact", page 67).
601	<p data-bbox="311 813 599 850">⚠ QUALIFIED PERSON</p> <p data-bbox="288 861 392 893">Grid fault</p> <p data-bbox="288 901 1012 957">The inverter has detected an excessively high proportion of direct current in the grid current.</p> <p data-bbox="288 965 509 989">Corrective measures:</p> <ul data-bbox="311 997 1012 1094" style="list-style-type: none"> <li data-bbox="311 997 1012 1029">• Check the grid connection for direct current. <li data-bbox="311 1029 1012 1094">• 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="311 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 676 263">Freq. not permitted > Check parameter</p> <p data-bbox="288 272 992 327">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 336 508 360">Corrective measures:</p> <ul data-bbox="311 370 997 579" style="list-style-type: none"> <li data-bbox="311 370 908 424">• If possible, check the power frequency and observe how often fluctuations occur. <li data-bbox="311 434 997 517">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="311 526 997 579">If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 11 "Contact", page 67).
1001	<p data-bbox="311 598 596 630">⚠ QUALIFIED PERSON</p> <p data-bbox="288 646 637 673">L/N swapped > Check connection</p> <p data-bbox="288 683 648 707">The connection of L and N is swapped.</p> <p data-bbox="288 716 508 740">Corrective measures:</p> <ul data-bbox="311 750 972 774" style="list-style-type: none"> <li data-bbox="311 750 972 774">• Ensure that L and N are correctly connected (see installation manual).
1302	<p data-bbox="311 798 596 829">⚠ QUALIFIED PERSON</p> <p data-bbox="288 845 1001 900">Waiting for grid voltage > Installation failure grid connection > Check grid and fuses</p> <p data-bbox="288 909 490 933">L or N not connected.</p> <p data-bbox="288 943 508 967">Corrective measures:</p> <ul data-bbox="311 976 1006 1098" style="list-style-type: none"> <li data-bbox="311 976 888 1000">• Ensure that L and N are connected (see installation manual). <li data-bbox="311 1010 1006 1064">• Ensure that the AC conductors are not damaged and correctly connected (see installation manual). <li data-bbox="311 1074 785 1098">• Make sure that the circuit breaker is switched on.
1501	<p data-bbox="311 1117 596 1149">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1165 529 1192">Reconnection fault grid</p> <p data-bbox="288 1201 994 1284">The changed country data set or the value of a parameter you have set does not correspond to the local requirements. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 1294 508 1318">Corrective measures:</p> <ul data-bbox="311 1327 1006 1382" style="list-style-type: none"> <li data-bbox="311 1327 1006 1382">• Ensure that the country data set has been configured correctly. To do this, select the parameter Set country standard and check the value.

Event number	Message, cause and corrective measures
3301 to 3303	<p data-bbox="311 185 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 490 263">Unstable operation</p> <p data-bbox="288 272 1003 327">There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 336 508 363">Corrective measures:</p> <ul data-bbox="311 371 969 464" style="list-style-type: none"> <li data-bbox="311 371 754 399">• Ensure that the PV array is designed correctly. <li data-bbox="311 405 969 432">• Ensure that the PV array is not covered by snow or otherwise shaded. <li data-bbox="311 438 703 464">• Ensure that the PV array is free of errors.
3401 to 3407	<p data-bbox="311 478 596 513">⚠ QUALIFIED PERSON</p> <p data-bbox="288 529 695 557">DC overvoltage > Disconnect generator</p> <p data-bbox="288 566 820 593">Overvoltage at the DC input. This can destroy the inverter.</p> <p data-bbox="288 603 917 630">This message is signaled additionally by rapid flashing of the LEDs.</p> <p data-bbox="288 639 508 667">Corrective measures:</p> <ul data-bbox="311 675 997 1002" style="list-style-type: none"> <li data-bbox="311 675 917 729">• Disconnect the inverter from voltage sources immediately (see installation manual). <li data-bbox="311 735 997 847">• Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the connecting terminal plate with the connected DC conductors to the inverter. <li data-bbox="311 853 994 940">• If the DC voltage exceeds the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the installer of the PV array. <li data-bbox="311 946 904 1002">• If this message is repeated frequently, contact the Service (see Section 1.1 "Contact", page 67).
3501	<p data-bbox="311 1015 596 1050">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1066 659 1093">Insulation failure > Check generator</p> <p data-bbox="288 1102 801 1129">The inverter has detected a ground fault in the PV array.</p> <p data-bbox="288 1139 508 1166">Corrective measures:</p> <ul data-bbox="311 1174 941 1200" style="list-style-type: none"> <li data-bbox="311 1174 941 1200">• Check the PV system for ground faults (see Section 8.4, page 59).

Event number	Message, cause and corrective measures
3601	<p data-bbox="314 188 594 217">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 695 260">High discharge curr. > Check generator</p> <p data-bbox="292 272 964 323">The leakage current of the inverter and the PV array is too high. There is a ground fault, a residual current or a malfunction.</p> <p data-bbox="292 336 997 416">The inverter interrupts feed-in operation immediately after exceeding a threshold. When the fault is eliminated, the inverter automatically reconnects to the utility grid.</p> <p data-bbox="292 429 508 453">Corrective measures:</p> <ul data-bbox="309 464 941 488" style="list-style-type: none"> • Check the PV system for ground faults (see Section 8.4, page 59).
3701	<p data-bbox="314 507 594 536">⚠ QUALIFIED PERSON</p> <p data-bbox="292 555 678 579">Resid.curr.too.high > Check generator</p> <p data-bbox="292 592 997 643">The inverter has detected a residual current due to temporary grounding of the PV array.</p> <p data-bbox="292 655 508 679">Corrective measures:</p> <ul data-bbox="309 691 941 715" style="list-style-type: none"> • Check the PV system for ground faults (see Section 8.4, page 59).
3801	<p data-bbox="314 730 594 759">⚠ QUALIFIED PERSON</p> <p data-bbox="292 778 642 802">DC overcurrent > Check generator</p> <p data-bbox="292 815 981 839">Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.</p> <p data-bbox="292 852 508 876">Corrective measures:</p> <ul data-bbox="309 887 997 935" style="list-style-type: none"> • If this message is displayed frequently, ensure that the PV array has been correctly rated and wired.
3901 to 3902	<p data-bbox="314 954 594 983">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1002 824 1026">Waiting for DC start conditions > Start cond. not met</p> <p data-bbox="292 1038 829 1062">The feed-in conditions for the utility grid are not yet fulfilled.</p> <p data-bbox="292 1075 508 1099">Corrective measures:</p> <ul data-bbox="309 1110 997 1326" style="list-style-type: none"> • Ensure that the PV array is not covered by snow or otherwise shaded. • Wait for higher irradiation. • If this message is displayed frequently in the morning, increase the voltage limit for starting grid feed-in. Change the parameter Critical voltage to start feed-in. • If this message is displayed frequently with medium irradiation, ensure that the PV array is correctly rated.

Event number	Message, cause and corrective measures
4301	<p data-bbox="302 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="302 231 728 263">Electric arc detected > Check DC generator</p> <p data-bbox="302 271 974 327">The inverter has detected an electric arc. The inverter interrupts grid feed-in and cannot connect to the utility grid.</p> <p data-bbox="302 335 504 359">Corrective measures:</p> <ul data-bbox="302 367 952 422" style="list-style-type: none"> • Resetting the operation inhibition after detection of an arc fault (see Section 8.5, page 62).
6512	<p data-bbox="302 438 750 470">Minimum operating temperature not reached</p> <p data-bbox="302 478 952 526">The inverter will only recommence grid feed-in once the temperature has reached at least -25°C.</p>
6701 to 6702	<p data-bbox="302 542 593 574">⚠ QUALIFIED PERSON</p> <p data-bbox="302 590 548 622">Communication disturbed</p> <p data-bbox="302 630 985 686">Error in the communication processor, the inverter continues feeding in, however. The cause must be determined by the Service.</p> <p data-bbox="302 694 504 718">Corrective measures:</p> <ul data-bbox="302 726 907 782" style="list-style-type: none"> • If this message is displayed frequently, contact the Service (see Section 11 "Contact", page 67).
6803	<p data-bbox="302 798 593 829">⚠ QUALIFIED PERSON</p> <p data-bbox="302 845 627 877">Self-diagnosis > Input A defective</p> <p data-bbox="302 885 705 909">The cause must be determined by the Service.</p> <p data-bbox="302 917 504 941">Corrective measures:</p> <ul data-bbox="302 949 862 981" style="list-style-type: none"> • Contact the Service (see Section 11 "Contact", page 67).
6903	<p data-bbox="302 989 593 1021">⚠ QUALIFIED PERSON</p> <p data-bbox="302 1037 627 1069">Self-diagnosis > Input B defective</p> <p data-bbox="302 1077 705 1101">The cause must be determined by the Service.</p> <p data-bbox="302 1109 504 1133">Corrective measures:</p> <ul data-bbox="302 1141 862 1173" style="list-style-type: none"> • Contact the Service (see Section 11 "Contact", page 67).
7106	<p data-bbox="302 1189 481 1220">Update file defect.</p> <p data-bbox="302 1228 985 1276">The update file is defective. The update failed. The inverter continues feeding power into the grid.</p>
7110	<p data-bbox="302 1292 504 1324">No update file found</p> <p data-bbox="302 1332 974 1380">No new update file was found on the SD memory card. The update failed. The inverter continues feeding power into the grid.</p>
7112	<p data-bbox="302 1396 604 1428">Update file successfully copied</p>
7113	<p data-bbox="302 1436 716 1468">The memory card is full or write-protected</p>

Event number	Message, cause and corrective measures
7323	<p data-bbox="314 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 538 260">Update main CPU failed</p> <p data-bbox="292 272 706 296">The cause must be determined by the Service.</p> <p data-bbox="292 309 508 333">Corrective measures:</p> <ul data-bbox="311 341 860 365" style="list-style-type: none"> <li data-bbox="311 341 860 365">• Contact the Service (see Section 11 "Contact", page 67).
7324	<p data-bbox="314 387 596 419">⚠ QUALIFIED PERSON</p> <p data-bbox="292 435 566 459">Wait for update conditions</p> <p data-bbox="292 472 988 520">The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p> <p data-bbox="292 533 508 557">Corrective measures:</p> <ul data-bbox="311 564 975 687" style="list-style-type: none"> <li data-bbox="311 564 460 588">• Retry update. <li data-bbox="311 601 894 625">• Ensure that the selected update file is suitable for this inverter. <li data-bbox="311 638 975 687">• If this message is displayed again, contact the Service (see Section 11 "Contact", page 67).
7331	<p data-bbox="292 711 544 735">Update transport started</p> <p data-bbox="292 743 544 767">Update file is being copied.</p>
7332	<p data-bbox="292 783 575 807">Update transport successful</p> <p data-bbox="292 815 917 839">Update file was copied successfully to the inverter's internal memory.</p>
7333	<p data-bbox="314 858 596 890">⚠ QUALIFIED PERSON</p> <p data-bbox="292 906 533 930">Update transport failed</p> <p data-bbox="292 943 997 1023">Update file could not be copied to the inverter's internal memory. In the event of connection with the inverter via WLAN, a poor connection quality can be the cause.</p> <p data-bbox="292 1035 508 1059">Corrective measures:</p> <ul data-bbox="311 1067 994 1251" style="list-style-type: none"> <li data-bbox="311 1067 460 1091">• Retry update. <li data-bbox="311 1104 994 1184">• For WLAN connection, improve the WLAN connection quality (e.g. via SMA Antenna Extension Kit) or establish connection with the inverter via Ethernet. <li data-bbox="311 1197 975 1251">• If this message is displayed again, contact the Service (see Section 11 "Contact", page 67).
7340	<p data-bbox="292 1270 594 1294">Update communication failed</p>

Event number	Message, cause and corrective measures
7347	<p data-bbox="311 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 463 263">Incompatible file</p> <p data-bbox="288 272 759 300">The configuration file is not suitable for this inverter.</p> <p data-bbox="288 309 508 336">Corrective measures:</p> <ul data-bbox="311 341 953 400" style="list-style-type: none"> <li data-bbox="311 341 953 368">• Ensure that the selected configuration file is suitable for this inverter. <li data-bbox="311 373 452 400">• Retry import.
7348	<p data-bbox="311 414 596 451">⚠ QUALIFIED PERSON</p> <p data-bbox="288 467 493 494">Incorrect file format</p> <p data-bbox="288 504 885 531">The configuration file is not of the required format or is damaged.</p> <p data-bbox="288 541 508 568">Corrective measures:</p> <ul data-bbox="311 572 997 662" style="list-style-type: none"> <li data-bbox="311 572 997 632">• Ensure that the selected configuration file is of the required format and is not damaged. <li data-bbox="311 636 452 662">• Retry import.
7350	<p data-bbox="288 675 721 702">Transfer of a configuration file has started</p> <p data-bbox="288 711 669 738">The configuration file is being transferred.</p>
7351	<p data-bbox="288 750 443 777">Update WLAN</p> <p data-bbox="288 786 687 813">The inverter is updating the WLAN module.</p>
7352	<p data-bbox="311 825 596 861">⚠ QUALIFIED PERSON</p> <p data-bbox="288 877 617 904">Update of WLAN not successful</p> <p data-bbox="288 914 658 941">The update of the WLAN module failed.</p> <p data-bbox="288 951 508 978">Corrective measures:</p> <ul data-bbox="311 983 975 1072" style="list-style-type: none"> <li data-bbox="311 983 460 1010">• Retry update. <li data-bbox="311 1015 975 1072">• If this message is displayed again, contact the Service (see Section 11 "Contact", page 67).
7353	<p data-bbox="288 1085 579 1112">Update time zone database</p> <p data-bbox="288 1121 732 1149">The inverter is updating the time zone database.</p>
7354	<p data-bbox="311 1160 596 1197">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1212 751 1240">Update of time zone database not successful</p> <p data-bbox="288 1249 703 1276">The update of the time zone database failed.</p> <p data-bbox="288 1286 508 1313">Corrective measures:</p> <ul data-bbox="311 1318 975 1407" style="list-style-type: none"> <li data-bbox="311 1318 460 1345">• Retry update. <li data-bbox="311 1350 975 1407">• If this message is displayed again, contact the Service (see Section 11 "Contact", page 67).

Event number	Message, cause and corrective measures
7355	<p>Update WebUI The inverter is updating the inverter user interface.</p>
7356	<p>⚠ QUALIFIED PERSON</p> <p>Update of the WebUI not successful The update of the inverter user interface failed.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Retry update. • If this message is displayed again, contact the Service (see Section 11 "Contact", page 67).
7619	<p>⚠ QUALIFIED PERSON</p> <p>Communication fault with meter unit > Check communication to meter The inverter is not receiving any data from the energy meter.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual). • For WLAN connection, improve the WLAN connection quality (e.g. via SMA Antenna Extension Kit) or connect the inverter with the DHCP server (router) via Ethernet.
8003	<p>⚠ QUALIFIED PERSON</p> <p>Active power limited derating The inverter has reduced its power output for more than ten minutes due to excessive temperature.</p> <p>Corrective measures:</p> <ul 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 (113 °F) has not been exceeded. • Ensure that the inverter is not exposed to direct solar irradiation.

Event number	Message, cause and corrective measures
8206	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 778 263">Electr. arc detected > Please confirm by tapping</p> <p data-bbox="288 271 996 359">The inverter has detected an electric arc and was recommissioned after a disconnection. By tapping, you are confirming that you have repaired any possible damage to PV modules, DC conductors or plugs in the PV system.</p> <p data-bbox="288 367 509 391">Corrective measures:</p> <ul data-bbox="311 399 996 454" style="list-style-type: none"> • Tap on the enclosure lid of the Connection Unit within ten seconds of the message appearing in order to recommission the inverter.
8503	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 632 550">Self-diagnosis > Input C defective</p> <p data-bbox="288 558 711 582">The cause must be determined by the Service.</p> <p data-bbox="288 590 509 614">Corrective measures:</p> <ul data-bbox="311 622 862 646" style="list-style-type: none"> • Contact the Service (see Section 11 "Contact", page 67).
8708	<p data-bbox="311 662 593 694">⚠ QUALIFIED PERSON</p> <p data-bbox="288 710 834 742">Timeout in communication for active power limitation</p> <p data-bbox="288 750 1002 837">Communication to the system control absent. Depending on the fall-back 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="288 845 509 869">Corrective measures:</p> <ul data-bbox="311 877 1002 965" style="list-style-type: none"> • Ensure that the connection to the system manager (e.g. Sunny Home Manager) is intact and that no cables are damaged or that no plugs have been pulled.
8801 to 8803	<p data-bbox="288 973 408 1005">No display</p> <p data-bbox="288 1013 705 1037">No information can be shown on the display.</p>
9002	<p data-bbox="311 1053 593 1085">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1101 599 1133">SMA Grid Guard code invalid</p> <p data-bbox="288 1141 1002 1197">The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.</p> <p data-bbox="288 1204 509 1228">Corrective measures:</p> <ul data-bbox="311 1236 711 1260" style="list-style-type: none"> • Enter the correct SMA Grid Guard code.
9003	<p data-bbox="288 1276 532 1308">Grid parameter locked</p> <p data-bbox="288 1316 1002 1398">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>

Event number	Message, cause and corrective measures
9005	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 924 263">Changing of grid parameters not possible > Ensure DC supply</p> <p data-bbox="288 271 666 295">This error can have the following causes:</p> <ul data-bbox="311 303 957 367" style="list-style-type: none"> <li data-bbox="311 303 756 327">• The parameters to be changed are protected. <li data-bbox="311 335 957 367">• The DC voltage at the DC input is not sufficient to run the main CPU. <p data-bbox="288 375 509 399">Corrective measures:</p> <ul data-bbox="311 406 935 494" style="list-style-type: none"> <li data-bbox="311 406 644 430">• Enter the SMA Grid Guard code. <li data-bbox="311 438 935 494">• Ensure that at least the DC start voltage is available (green LED is flashing, pulsing or glowing).
9202	<p data-bbox="311 510 593 542">⚠ QUALIFIED PERSON</p> <p data-bbox="288 558 498 590">SPS AC overvoltage</p> <p data-bbox="288 598 1002 654">An AC source has been connected to the socket connection for secure power supply operation.</p> <p data-bbox="288 662 509 686">Corrective measures:</p> <ul data-bbox="311 694 924 750" style="list-style-type: none"> <li data-bbox="311 694 924 750">• Check the connection at the SPS slots, and make any necessary corrections.
9203	<p data-bbox="311 766 593 798">⚠ QUALIFIED PERSON</p> <p data-bbox="288 813 655 845">Short circuit in the SPS power outlet</p> <p data-bbox="288 853 1002 933">The maximum initial load has been overshoot or the appliance's initial current is above the maximum permissible load current of the connection for secure power supply operation for more than 5 s.</p> <p data-bbox="288 941 509 965">Corrective measures:</p> <ul data-bbox="311 973 980 1037" style="list-style-type: none"> <li data-bbox="311 973 980 1005">• Reduce the load at the connection for secure power supply operation. <li data-bbox="311 1013 879 1037">• If necessary, select an appliance with a lower initial current.
10110	<p data-bbox="288 1053 616 1085">Time synchronization failed: [x]</p> <p data-bbox="288 1093 879 1117">No time information could be called up from the set NTP server.</p> <p data-bbox="288 1125 509 1149">Corrective measures:</p> <ul data-bbox="311 1157 968 1244" style="list-style-type: none"> <li data-bbox="311 1157 812 1189">• Ensure that the NTP server was configured correctly. <li data-bbox="311 1197 968 1244">• Ensure that the inverter is integrated into a local network with Internet connection.

Event number	Message, cause and corrective measures
10248 to 10249	<p data-bbox="280 175 1014 215">Load reduced through device reduction or increase of query interval</p> <p data-bbox="280 215 1014 279">The network is busy. Data exchange between the devices is not at an optimum and is greatly delayed.</p> <p data-bbox="280 279 1014 311">Corrective measures:</p> <ul data-bbox="280 311 1014 414" style="list-style-type: none"> <li data-bbox="280 311 1014 343">• Reduce the number of devices in the network. <li data-bbox="280 343 1014 375">• If necessary, increase the data query intervals. <li data-bbox="280 375 1014 414">• If necessary, reduce the number of devices in the network.
10250	<p data-bbox="280 414 1014 462">⚠ QUALIFIED PERSON</p> <p data-bbox="280 462 1014 502">[Interface]: package error rate [ok / high]</p> <p data-bbox="280 502 1014 598">The package error rate has changed. If the package error rate is high, the network is overloaded or the connection to the network switch or DHCP server (router) is disturbed.</p> <p data-bbox="280 598 1014 630">Corrective measures if the package error rate is high:</p> <ul data-bbox="280 630 1014 798" style="list-style-type: none"> <li data-bbox="280 630 1014 726">• 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="280 726 1014 758">• If necessary, increase the data query intervals. <li data-bbox="280 758 1014 798">• If necessary, reduce the number of devices in the network.
10251	<p data-bbox="280 798 1014 861">[Interface]: communication status goes to [OK / Warning / Error / Not connected]</p> <p data-bbox="280 861 1014 933">The communication status to the network switch or DHCP server (router) has changed. An additional error message may be displayed.</p>
10252	<p data-bbox="280 933 1014 981">⚠ QUALIFIED PERSON</p> <p data-bbox="280 981 1014 1021">[Interface]: communication disrupted</p> <p data-bbox="280 1021 1014 1053">There is no valid signal on the network line.</p> <p data-bbox="280 1053 1014 1085">Corrective measures:</p> <ul data-bbox="280 1085 1014 1246" style="list-style-type: none"> <li data-bbox="280 1085 1014 1181">• 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="280 1181 1014 1246">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.

Event number	Message, cause and corrective measures
10253	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: connection speed goes to [100 Mbit / 10 Mbit]</p> <p>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>Corrective measures if the status is [10 Mbit]:</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. • Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10254	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: duplex mode goes to [Full / Half]</p> <p>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>Corrective measures if the status is [Half]:</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. • Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10255	<p>[Interface]: Network load OK</p> <p>The network load has returned to a normal range after being busy.</p>
10282	<p>[User group]-Login via [protocol] locked</p> <p>After several incorrect login attempts, login has been blocked for a limited time. In this case, the User login will be blocked for 15 minutes, the Grid Guard login for 12 hours.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Wait until the given time has expired and then retry login.
10283	<p>WLAN module faulty</p> <p>The WLAN module integrated in the inverter is defective.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service (see Section 11 "Contact", page 67).

Event number	Message, cause and corrective measures
10284	<p data-bbox="311 183 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 605 263">No WLAN connection possible</p> <p data-bbox="288 272 986 323">The inverter does not currently have a WLAN connection to the selected network.</p> <p data-bbox="288 336 508 360">Corrective measures:</p> <ul data-bbox="311 371 997 582" style="list-style-type: none"> <li data-bbox="311 371 997 454">• Ensure that the SSID, the WLAN password and the encryption method have been entered correctly. The encryption method is specified by your WLAN router or WLAN Access Point and can be changed there. <li data-bbox="311 464 997 515">• Ensure that the WLAN router or WLAN Access Point is in range and is signaling correct operation. <li data-bbox="311 525 997 582">• If this message is displayed often, improve the WLAN connection by using a WLAN repeater (e.g. SMA Antenna Extension Kit).
10285	<p data-bbox="288 595 598 619">WLAN connection established</p> <p data-bbox="288 630 885 654">Connection to the selected WLAN network has been established.</p>
10286	<p data-bbox="311 675 596 711">⚠ QUALIFIED PERSON</p> <p data-bbox="288 722 519 746">WLAN connection lost</p> <p data-bbox="288 758 869 782">The inverter has lost WLAN connection to the selected network.</p> <p data-bbox="288 794 508 818">Corrective measures:</p> <ul data-bbox="311 829 978 981" style="list-style-type: none"> <li data-bbox="311 829 978 853">• Ensure that the WLAN router or WLAN Access Point is still active. <li data-bbox="311 865 978 916">• Ensure that the WLAN router or WLAN Access Point is in range and is signaling correct operation. <li data-bbox="311 925 978 981">• If this message is displayed often, improve the WLAN connection by using a WLAN repeater (e.g. SMA Antenna Extension Kit).
10339	<p data-bbox="288 994 510 1018">Webconnect enabled</p> <p data-bbox="288 1029 981 1080">The inverter can communicate with Sunny Portal without an additional SMA communications product (e.g. Cluster Controller).</p>
10340	<p data-bbox="288 1106 514 1129">Webconnect disabled</p> <p data-bbox="288 1141 995 1217">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. Cluster Controller).</p> <ul data-bbox="311 1228 990 1281" style="list-style-type: none"> <li data-bbox="311 1228 990 1281">• If the inverter is to communicate with Sunny Portal without an additional SMA communication product, switch the Webconnect function on.

Event number	Message, cause and corrective measures
10341	<p>Webconnect error: no connection</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10343	<p>Webconnect error: Default gateway not configured</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10344	<p>Webconnect error: DNS server not configured</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10345	<p>No reply to DNS request</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)

Event number	Message, cause and corrective measures
10346	<p>SIP proxy DNS resolution failed</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10347	<p>Stun server DNS resolution failed</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10348	<p>Webconnect error: No reply to request to STUN server</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)

Event number	Message, cause and corrective measures
10349	<p>Webconnect error: No reply to SIP option packs</p> <p>It is likely that there is an error in the network settings or a Sunny Portal maintenance message is present.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If a Sunny Portal maintenance message is present, wait until the maintenance has been completed. • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10350	<p>Webconnect error: Registration rejected by SIP registrar</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10351	<p>Unknown SIP registry</p> <p>It is likely that there is an error in the network settings.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)

Event number	Message, cause and corrective measures
10352	<p>Webconnect error: Faulty communication</p> <p>It is likely that there is an error in the network settings or a Sunny Portal maintenance message is present.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If a Sunny Portal maintenance message is present, wait until the maintenance has been completed. • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
10353	<p>Webconnect error: registration of the SIP registry has not responded</p> <p>It is likely that there is an error in the network settings or a Sunny Portal maintenance message is present.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If a Sunny Portal maintenance message is present, wait until the maintenance has been completed. • Check the network components (DLAN, WLAN Access Point etc.). • Ensure that the following ports are not blocked: <ul style="list-style-type: none"> - Registrar: ied.sma.de:9523 - Proxy: ied.sma.de:9523 - Stun: stun.sma.de:3478 - Domain: ied.sma.de (for SIP URI)
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>

Event number	Message, cause and corrective measures
27331	Update transport started The inverter has successfully started the update.
27332	Update transport successful The update file has been successfully transferred to the communication component.
29001	Inst. code valid The entered Grid Guard code is valid. Protected parameters have now been unlocked and you can adjust the parameters. The parameters will be automatically locked again after ten feed-in hours.
29004	Grid parameters unchanged Changing the grid parameters is not possible.

8.3 Cleaning the Fan (only with Sunny Boy 7.0-US / 7.7-US)

Procedure:

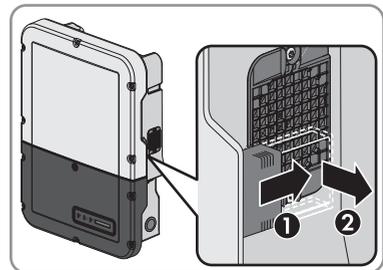
- Remove and clean the fan.
- Install the fan.

Removing and Cleaning the Fan

1. **⚠ DANGER**

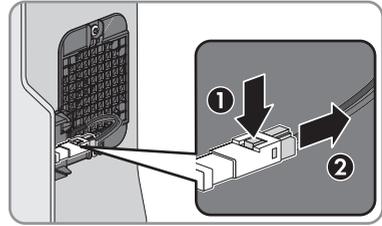
Danger to life due to high voltages

- Disconnect the inverter from any voltage sources (see the inverter installation manual).
2. Remove the cover of the plug. To do this hold the ribbed surface at the top and button and push the cover as far as possible to the right.

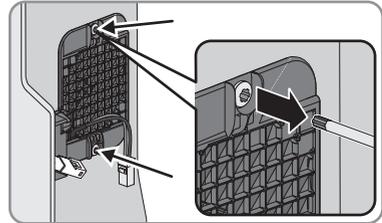


3. Remove the plug from the bracket.

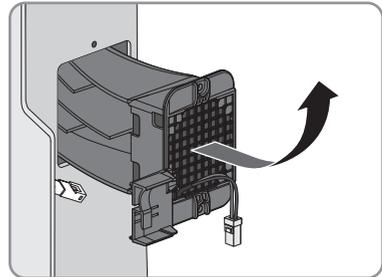
4. Unlock and remove the plug.



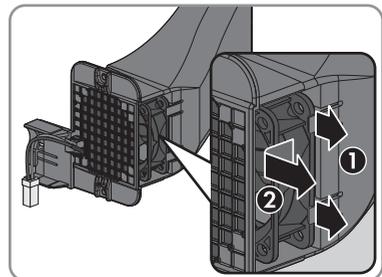
5. Unscrew the screws with a Torx screwdriver (TX 20).



6. Remove the fan guard from the enclosure opening.



7. Remove the fan from the fan guard. To do this, slightly raise the locking tabs and push the fan slightly forward. Remove the fan and the cable together with the plug from the fan guard.



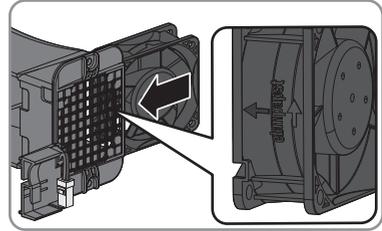
8. **NOTICE**

Damage to the fan due to compressed air

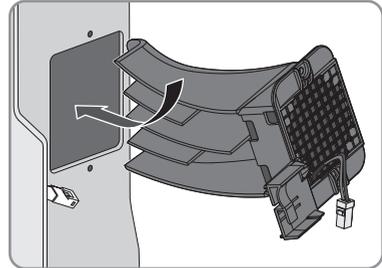
- Clean the fan only with a soft brush, a paint brush, or a damp cloth.

Installing the Fan

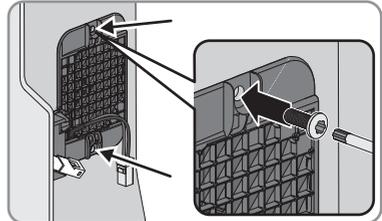
1. Lead the cable into the fan guard and hold the cable at the plug under tension.
2. Insert the fan into the fan guard until it locks into place under the locking tabs. To do this, one arrow must point backwards and one arrow must point upwards.



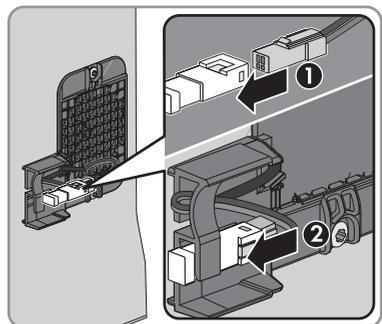
3. Insert the fan guard into the enclosure opening. To do this, the fan guide must point upwards.



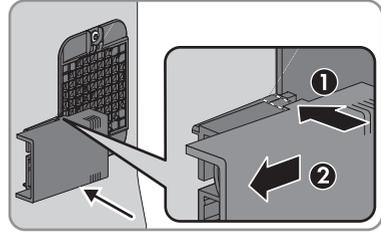
4. Tighten the screws with a Torx screwdriver (TX 20).



5. Insert the plug in the pin connector and clamp the plug into the bracket.



6. Reattach the cover of the plug. To do this, insert the locking tabs of the cover into the guide rails and push the cover to the left.



8.4 Checking the PV System for Ground Faults

⚠ QUALIFIED PERSON

If the inverter displays the event numbers **3501**, **3601** or **3701**, there could be a ground fault. The electrical insulation from the PV system to ground is defective or insufficient.

⚠ WARNING

Danger to life due to electric shock

In the event of a ground fault, high voltages can be present.

- Touch the cables of the PV array on the insulation only.
- Do not touch any parts of the substructure or frame of the PV array.
- Do not connect PV strings with ground faults to the inverter.

NOTICE

Destruction of the measuring device due to overvoltage

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

Procedure:

In order to check the PV system for ground faults, perform the following actions in the prescribed order. The exact procedure is described in the following sections.

- Check the PV system for ground faults by measuring the voltage.
- If the voltage measurement was not successful, check the PV system via insulation resistance measurement for ground faults.

Test by Measuring the Voltage

Proceed as follows to check each string in the PV system for ground faults.

Procedure:

1. **⚠ DANGER**

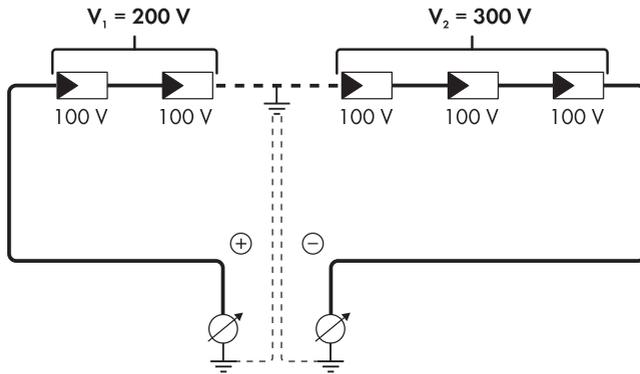
Danger to life due to high voltages

- Disconnect the inverter from any voltage sources (see the inverter installation manual).
2. Measure the voltages:
 - Measure the voltage between the positive terminal and the ground potential (PE).

- Measure the voltage between the negative terminal and the ground potential (PE).
- Measure the voltage between the positive and negative terminals.
 If the following results are present at the same time, there is a ground fault in the PV system:
 - ☑ All measured voltages are stable.
 - ☑ The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.
- If a ground fault is present, determine the location of the ground fault via the ratio of the two measured voltages and eliminate the ground fault.

Example: Location of the ground fault

The example shows a ground fault between the second and third PV module.



3. If a definite ground fault cannot be measured and the message is still displayed, measure the insulation resistance.
4. Reconnect the strings without ground faults to the inverter and recommission the inverter (see inverter installation inverter).

Test by Measuring the Insulation Resistance

If the voltage measurement does not provide sufficient evidence of a ground fault, the insulation resistance measurement can provide more exact results.

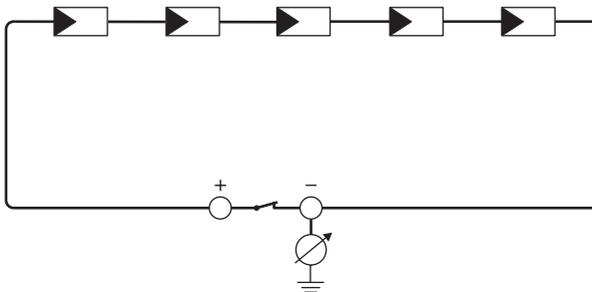


Figure 4: Schematic diagram of the measurement

i Calculating the insulation resistance

The expected total resistance of the PV system or of an individual string can be calculated using the following formula:

$$\frac{1}{R_{\text{total}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

The exact insulation resistance of a PV module can be obtained from the module manufacturer or the datasheet.

For the resistance of a PV module an average value can be assumed: for thin-film PV modules approximately 40 MOhm and for polycrystalline and monocrystalline PV modules approximately 50 MOhm per PV module (for further information on calculating the insulation resistance see the Technical Information "Insulation Resistance (Riso) of Non-Galvanically Isolated PV Systems" at www.SMA-Solar.com).

Required devices:

- Suitable device for safe disconnection and short-circuiting
- Measuring device for insulation resistance

i Device required for safe disconnection and short-circuiting of the PV array

The insulation resistance can only be measured with a suitable device for safe disconnection and short-circuiting of the PV array. If no suitable device is available, the insulation measurement must not be carried out.

Procedure:

1. Calculate the expected insulation resistance per string.

2.  **DANGER**

Danger to life due to high voltages

- Disconnect the inverter from any voltage sources (see the inverter installation manual).

3. Install the short circuit device.

4. Connect the measuring device for insulation resistance.

5. Short-circuit the first string.

6. Set the test voltage. The test voltage should be as close as possible to the maximum system voltage of the PV modules but must not exceed it (see datasheet of the PV modules).

7. Measure the insulation resistance.

8. Eliminate the short circuit.

9. Measure the remaining strings in the same manner.

- If the insulation resistance of a string deviates considerably from the theoretically calculated value, there is a ground fault present in that string.

10. Reconnect to the inverter only those strings from which the ground fault has been eliminated.

11. Reconnect all other strings to the inverter.

12. Recommission the inverter (see inverter installation manual).

13. If the inverter still displays an insulation error, contact the Service (see Section 11 "Contact", page 67). The PV modules might not be suitable for the inverter in the present quantity.

8.5 Resetting the Operation Inhibition after Detection of an Arc Fault

QUALIFIED PERSON

If the red LED is glowing and the event number **4301** is shown on the display and/or in the event list on the user interface of the inverter, the inverter has detected an electric arc and interrupts feed-in operation.

There are two options for resetting the operation inhibition:

- Reset the operation inhibition by tapping twice on the enclosure lid of the Connection Unit.
- Reset the operation inhibition by parameter setting.

Reset the operation inhibition by tapping twice on the enclosure lid of the Connection Unit

1. DANGER

Danger to life due to electric shock

- Disconnect the inverter from any voltage sources (see the inverter installation manual).
2. Ensure that the PV modules, the connected DC cables and the connecting terminal plate for the DC connection are not defective.
Repair or replace defective PV modules, DC cables or connecting terminal plate for the DC connection.
 3. Recommission the inverter (see inverter installation manual).
 4. If the event with the event number **4301** appears in the display, immediately tap on the enclosure lid twice in quick succession. Here, the operation inhibition can only be reset if the event is showing in the display when you begin tapping.
- This effects resetting of the operation inhibition and the inverter will start feeding in again. At the same time, the blue LED can flash rapidly, indicating that there is an active WPS function. The WPS function deactivates automatically after a short period.

Reset the operation inhibition by parameter setting

1. DANGER

Danger to life due to electric shock

- Disconnect the inverter from any voltage sources (see the inverter installation manual).
2. Ensure that the PV modules, the connected DC cables and the connecting terminal plate for the DC connection are not defective.
Repair or replace defective PV modules, DC cables or connecting terminal plate for the DC connection.
 3. Recommission the inverter (see inverter installation manual).
 4. Activate the user interface (see Section 5.1, page 20).
 5. Log into the user interface as an **Installer** Logging Into the User Interface.
 6. Reset the operation inhibition by setting one of the following parameters:

- Select the parameter **Reset operating data** and set to **Reset operation inhibition**.
or
 - Select the parameter **AFCI switched on** and set to **No** and then back to **Yes**.
- This effects resetting of the operation inhibition and the inverter will start feeding in again.

8.6 Updating the Firmware

QUALIFIED PERSON

If no automatic update is set in the communication product (e.g. Cluster Controller) or via the user interface of the inverter, you have two possibilities to update the inverter firmware:

- Updating firmware via the user interface of the inverter.
- Updating the firmware via USB flash drive.

Updating firmware via the user interface

Requirement:

- 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.

Procedure:

1. Activate the user interface (see Section 5.1, page 20).
2. Log into the user interface Logging Into the User Interface.
3. Select the menu **System Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Updating the firmware**].
6. Follow the instructions in the dialog.

Updating the firmware via USB flash drive.

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 desired 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.

3. DANGER

Danger to life due to high voltages

- Disconnect the inverter from any voltage sources and open the enclosure lid of the Connection Unit (see the inverter installation manual).
4. Insert the USB flash drive in the USB port on the communication assembly.

5. Commission the inverter (see inverter installation manual).

- ☑ During start-up phase of the inverter, the desired firmware is being installed. At the same time, the status of the update is shown in the display: **Update status: xxxxxxxx**
- ☑ Once the desired firmware has been installed in the inverter, the status **successful** is shown in the display.
- ✘ The status **error occurred** is shown in the display?
The firmware update was not successful.
 - Update the firmware again.

6.  **DANGER**

Danger to life due to high voltages

- Disconnect the inverter from any voltage sources again and open the enclosure lid of the Connection Unit (see the inverter installation manual).

7. Pull the USB flash drive out of the USB port.

8. Commission the inverter (see inverter installation manual).

9 Accessories

You will find the accessories for your product in the following overview. If required, these can be ordered from SMA or your distributor.

Designation	Short designation	SMA order number
SMA Sensor Module	Multi-function interface for one SMA inverter as retrofit kit for capturing environmental data (e.g. irradiation, ambient temperature, cell temperature, wind speed or SO meters).	MD.SEN-US-40
SMA Antenna Extension Kit	Accessory set for one SMA inverter for the optimization of the SMA inverter's WLAN radio range.	EXTANT-US-40

10 Compliance Information

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

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

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

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

The user is cautioned that changes or modifications not expressly approved by SMA Solar Technology America LLC could void the user's authority to operate this equipment.

IC Compliance

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

11 Contact

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

- Inverter device type
- Inverter serial number
- Inverter firmware version
- Special country-specific settings of the inverter (if applicable)
- Type and number of PV modules connected
- Mounting location and altitude of the inverter
- Inverter message
- Optional equipment, e.g. communication products
- If necessary, system name in the Sunny Portal
- If necessary, access data in the Sunny Portal
- Operating mode of the multifunction relay

United States/ Estados Unidos	SMA Solar Technology America LLC Rocklin, CA	Toll free for USA, Canada and Puerto Rico / Llamada gratuita en EE. UU., Canadá y Puerto Rico: +1 877-MY-SMATech (+1 877-697-6283) International / Internacional: +1 916 625-0870
Canada/ Canadá	SMA Solar Technology Canada Inc. Mississauga	Toll free for Canada / gratuit pour le Canada: +1 877-MY-SMATech (+1 877-697-6283)

