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# Important Safety Instructions

## SAVE THESE INSTRUCTIONS

This manual contains important instructions for:

- STP 50-US-40 (Sunny Tripower CORE1-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 on this Product

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



### **Beware of dangerous voltage**

The product operates at 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 get 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 applicable electrical standards on site and the *National Electrical Code*® ANSI/NFPA 70. 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:




- STP 50-US-40 (Sunny Tripower CORE1-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 the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, standards and directives
- Knowledge of and compliance with this document and all safety information
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices and installations

## 1.3 Types of warning message

 <b>DANGER</b>
Safety information that, if not avoided, will result in death or serious injury.
 <b>WARNING</b>
Safety information that, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>
Safety information that, if not avoided, can result in minor or moderate injury.
<b>NOTICE</b>
Safety information that, if not avoided, can result in property damage.

## 1.4 Symbols

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
	Indicates a requirement for meeting a specific goal

Symbol	Explanation
☑	Desired result
✘	A problem that might occur

## 1.5 Typographies

Typography	Use	Example
<b>bold</b>	<ul style="list-style-type: none"> <li>Terminals</li> <li>Slots</li> <li>Parameters</li> <li>Elements on the user interface</li> <li>Elements to be selected</li> <li>Elements to be entered</li> </ul>	<ul style="list-style-type: none"> <li>The value can be found in the field <b>Energy</b>.</li> <li>Select <b>Settings</b>.</li> <li>Enter <b>10</b> in the field <b>Minutes</b>.</li> </ul>
>	<ul style="list-style-type: none"> <li>Connects several elements to be selected</li> </ul>	<ul style="list-style-type: none"> <li>Select <b>Settings &gt; Date</b>.</li> </ul>
[Button]	<ul style="list-style-type: none"> <li>Button to be selected or pressed</li> </ul>	<ul style="list-style-type: none"> <li>Select [Next].</li> </ul>

## 1.6 Nomenclature

Complete designation	Designation in this document
Sunny Tripower CORE1-US	Inverter, product
SMA Solar Technology America LLC	SMA

## 1.7 Additional Information

Links to additional information can be found at [www.SMA-Solar.com](http://www.SMA-Solar.com):

Document title	Document type
"Parameters and Measured Values" Overview of All Inverter Operating Parameters and Their Configuration Options	Technical Information
"Webconnect Systems in Sunny Portal" Registration in Sunny Portal and setting or changing operating parameters of the inverter	User Manual
"SMA Modbus® Interface" Information on the commissioning and configuration of the SMA Modbus interface	Technical Information



Document title	Document type
"SunSpec® Modbus® Interface" Information on the commissioning and configuration of the SunSpec Modbus interface	Technical Information
"Efficiency and Derating" Efficiency and Derating Behavior of the Sunny Boy, Sunny Tripower and Sunny Mini Central Inverters	Technical Information

## 2 Safety

### 2.1 Intended Use

The Sunny Tripower is a transformerless PV inverter, with 6 MPP trackers, that converts the direct current of the PV array to grid-compliant, three-phase current and feeds it into the utility grid.

The product is suitable for indoor and outdoor use.

The product may only be operated with PV arrays (PV modules and cabling) that are approved in accordance with the electrical standards applicable on-site and the *National Electrical Code*® ANSI/NFPA 70.

#### **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. The event will 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 grounded within the product as standard. When connecting a utility grid with neutral conductor, the bridge between the neutral conductor of the AC output and the enclosure must be removed.

PV modules with a high capacity to ground may only be used if their coupling capacity does not exceed 12.6  $\mu\text{F}$ .

To protect the PV system against excessive reverse currents under fault conditions, a DC-side overcurrent protective device must be connected in accordance with the *National Electrical Code*® to prevent any short-circuit currents that exceed the ampacity of the DC electric circuit 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 an overcurrent protection device is required, the *National Electrical Code*® requires that both positive and negative conductors have overcurrent protection for ungrounded PV modules.

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

The product is approved for the USA market.

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 the intended use.

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 high voltages of the PV array**

When exposed to light, the PV array generates dangerous DC voltage, which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch non-insulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed and commissioned only by qualified persons with the appropriate skills.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document.

### 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.

### DANGER

#### **Danger to life due to electric shock**

Touching an ungrounded PV module or array frame can cause a lethal electric shock.

- Connect and ground the frame of the PV modules, the array frame and the electrically conductive surfaces so that there is continuous conduction. Observe the applicable local regulations.

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

The enclosure and the enclosure lid may get hot during operation. The DC load-break switch can not become hot.

- Do not touch hot surfaces.
- Wait until the inverter has cooled down before touching the enclosure or enclosure lid.

**NOTICE****Damage to the enclosure seal in subfreezing conditions**

If you open the product when temperatures are below freezing, the enclosure seals can be damaged. Moisture can penetrate the product then.

- Only open the product if the ambient temperature is not below  $-5^{\circ}\text{C}$  ( $23^{\circ}\text{F}$ ).
- If a layer of ice has formed on the enclosure seal when temperatures are below freezing, remove it prior to opening the product (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

**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 type label due to the use of cleaning agents**

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

### 3 Product Overview

#### 3.1 Product Description

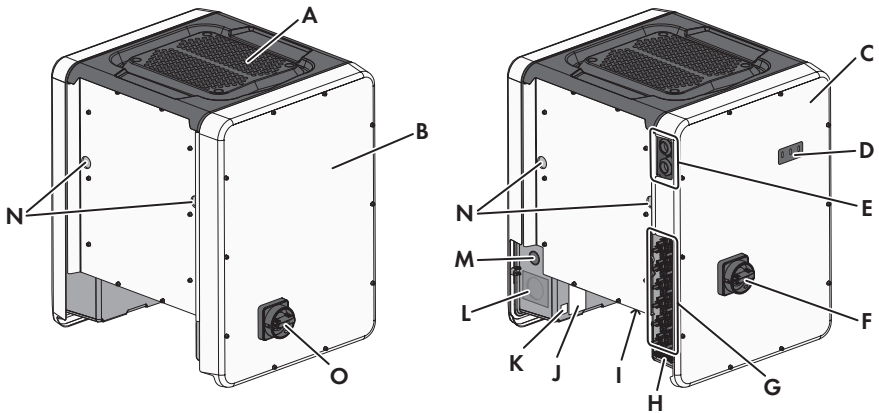










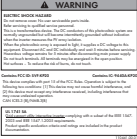

Figure 1: Design of the Sunny Tripower

Position	Designation
A	Cover
B	AC Connection Unit
C	DC Connection Unit
D	LEDs The LEDs indicate the operating state of the inverter.
E	Cable glands for data cables
F	DC load-break switch
G	DC connector
H	Equipment grounding bar for the equipment grounding conductor of the PV array
I	Fan bracket with three fans
J	Type label The type label clearly identifies the product. The type label must remain permanently attached to the product. You will find the following information on the type label: <ul style="list-style-type: none"> <li>• Device type (Model)</li> <li>• Serial number (Serial No. or S/N)</li> <li>• Date of manufacture</li> <li>• Device-specific characteristics</li> </ul>

Position	Designation
K	Additional label with details for registration in Sunny Portal and WLAN password: <ul style="list-style-type: none"> <li>• Identification key (PIC) for registration in Sunny Portal</li> <li>• Registration ID (RID) for registration in Sunny Portal</li> <li>• WLAN password (WPA2-PSK) for the direct connection to the user interface of the inverter via WLAN</li> </ul>
L	Enclosure opening for AC connection
M	Enclosure opening for additional cable
N	Enclosure opening for carrying handle
O	AC load-break switch

### Symbols on the Product 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>
	<p>Grounding</p> <p>This symbol indicates the position for the connection of an additional equipment grounding conductor.</p>
	<p>Risk of burns due to hot surfaces</p> <p>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</p> <p>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 qualified persons only.</p>

Symbol	Explanation
	<p>Observe the documentation Observe all documentation supplied with the product.</p>
	<p>Warning label with compliance information</p>
	<p>UL 1741 is the standard applied by Underwriters Laboratories to the product to certify that the product meets the requirements of the <i>National Electrical Code</i>® and the IEEE 1547 standard.</p>

## 3.2 Interfaces and Functions

The inverter can be equipped or retrofitted with the following interfaces and functions:

### User interface for monitoring and configuration

The product is equipped as standard with an integrated webserver, which provides a user interface for configuring and monitoring the product. The product user interface can be called up via the web browser if there is an existing connection to an end device (e.g. computer, tablet PC or smartphone).

### SMA Speedwire

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

### 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 plant and the Internet portals Sunny Portal and Sunny Places without any additional communication device and for a maximum of 4 inverters per visualized 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 web-based monitoring platform Sunny Portal and Sunny Places via the SMA Cluster Controller or to distribute the inverters over several plants. If there is an existing WLAN or Ethernet connection, you can directly access your visualized system via the web browser on your end device.

## WLAN

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

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

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

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

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

## 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.

## SMA RS485 Module

With the assembly of the RS485 Module, the inverter can communicate with special SMA communication products (Information on assembly and connection see manual of the SMA RS485 Module). The SMA RS485 Module can be retrofitted.

## Antenna Extension Kit

Within the WLAN network, the Antenna Extension Kit enables the radio range of the inverter to be upgraded (Information on assembly and connection see manual of the Antenna Extension Kit). The Antenna Extension Kit can be retrofitted.

## Grid Management Services

The inverter is a grid support interactive inverter.

The inverter was tested in accordance with the UL 1741 SA (2016-09-07) to be compliant with the source requirements documents of the states available at the time. For connecting the inverter to the utility grid, no additional grid monitoring equipment is necessary. A description of the tested functions and instructions on the activation and setting of functions can be found in the technical information "Grid Support Utility Interactive Inverters" at [www.SMA-Solar.com](http://www.SMA-Solar.com).



## PV Rapid Shutdown System Equipment

The inverter is a PV Rapid Shutdown System Equipment and performs the function of voltage reduction according to UL 1741 CRD PV Rapid Shutdown Systems 2015. When a rapid shutdown is triggered by disconnecting the utility grid, the inverter discharges independently on the AC side to  $\leq 30$  V within 30 seconds.

If a disconnection device is used in addition between the inverter and the PV array that disconnects the PV array in the case of a rapid shutdown, the inverter discharges independently on the DC side to  $\leq 30$  V within 30 seconds.

**Attention** - The system status indicator shall be installed in a location in close proximity to the system actuator, where the indication of safe shutdown can be clearly seen.

## SMA Sensor Module

The SMA Sensor Module has different interfaces for connecting various sensors (i.e. temperature sensor, irradiation sensor, anemometer or energy meter). The SMA Sensor Module converts the signals of the connected sensors and transmits them to the inverter. The SMA Sensor Module can be retrofitted.

## Multifunction Relay

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

## String-Failure Detection

The string-failure detection measures the total current of every input and continuously calculates the mean values for the inputs in question. The total currents are compared with the mean values. If a total current exceeds or falls short of the mean value by the set tolerance value, an event is reported. Marginally increased total currents are reliably detected over several query intervals and distinguished from typical current fluctuations of the PV array. String-failure detection is deactivated by default and must be activated. In addition, the tolerance value can be set via the user interface and the mean values read off.

## Arc-Fault Circuit Interrupter (AFCI)

In accordance with the *National Electrical Code*<sup>®</sup>, 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 signal	Explanation
The green LED is flashing (two seconds on and two seconds off)	Waiting for feed-in conditions The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation.

LED signal	Explanation
The green LED flashes quickly	Update of central processing unit The central processing unit of the inverter is being updated.
The green LED is glowing	Feed-in operation The inverter feeds in with a power of at least 90%.
The green LED is pulsing	Feed-in operation The inverter is equipped with a dynamic power display via the green LED. Depending on the power, the green LED pulses fast or slow. If necessary, you can switch off the dynamic power display via the green LED.
The green LED is off	The inverter is not feeding into the utility grid.
The red LED is glowing	Event occurred If an event occurs, a distinct event message and the corresponding event number will be displayed in addition on the inverter user interface or in the communication product.
The 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).
The blue LED flashes quickly for approx. two minutes.	WPS active The WPS function is active.
The blue LED is glowing	Communication active There is an active connection with a local network or there is a direct connection with an end device via Ethernet (e.g. computer, tablet PC or smartphone).

## 4 Using the Inverter User Interface

### 4.1 Establishing a connection to the user interface

#### 4.1.1 Establishing a direct connection via WLAN

**Requirements:**

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

**i Inverter SSID and IP address and necessary passwords**

- Inverter SSID in WLAN: SMA[serial number] (e.g. SMA0123456789)
- Standard WLAN password (usable until completion of the configuration by means of the installation assistant or prior to the end of the first ten feed-in hours): SMA12345
- Device-specific WLAN password (usable for initial configuration to completion of the first ten feed-in 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 end devices. If the procedure described does not apply to your end device, establish the direct connection via WLAN as described in the manual of your end device.

**Procedure:**

1. If your end device has a WPS function:
  - Activate the WPS function on the inverter. To do this, tap twice in succession on the enclosure lid of the DC connection unit next to the LEDs.
    - The blue LED flashes quickly for approx. two minutes. The WPS function is active.

- Activate the WPS on your end device.
    - The connection with your end device will be established automatically. It can take up to 20 seconds for this connection to be established.
2. If your end device has not a WPS function:
    - Search for WLAN networks with your end 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 ten feed-in hours and prior to completing the configuration by means of the installation assistant, you must use the standard WLAN password **SMA12345**. After the first ten feed-in hours or after completing the configuration by means of the installation assistant, you must use the device-specific WLAN password (WPA2-PSK) of the inverter. You find the WLAN password (WPA2-PSK) on the type label.
  3. Enter the IP address **192.168.12.3** or, if your device supports mDNS services, **SMA[serial number].local** or **https://SMA[serial number]** 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.

## 4.1.2 Establishing a Connection via WLAN in the Local Network

### New IP address for connecting with a local network

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

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

#### Requirements:

- The product must be commissioned.
- The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- The end device must be in the same local network as the product.

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

### **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. Enter the IP address of the inverter in the address bar of the web browser.
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.

## **4.1.3 Establishing a Connection via Ethernet in the local network**

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


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

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

**Requirements:**

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

**Procedure:**

1. Open the web browser of your end device, enter the IP address of the inverter in the address line of the web browser and press the enter key.
  2.  **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.

## 4.2 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.

** 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**** Password for PV systems that are registered in a 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, the password must match the PV system password. If the new password for logging onto the user interface does not match the system password in the communication product, the inverter cannot be reached by the communication product.

- A uniform password is assigned for all Speedwire devices in the PV system.

**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 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.

### 4.3 Start Page Design of the User Interface

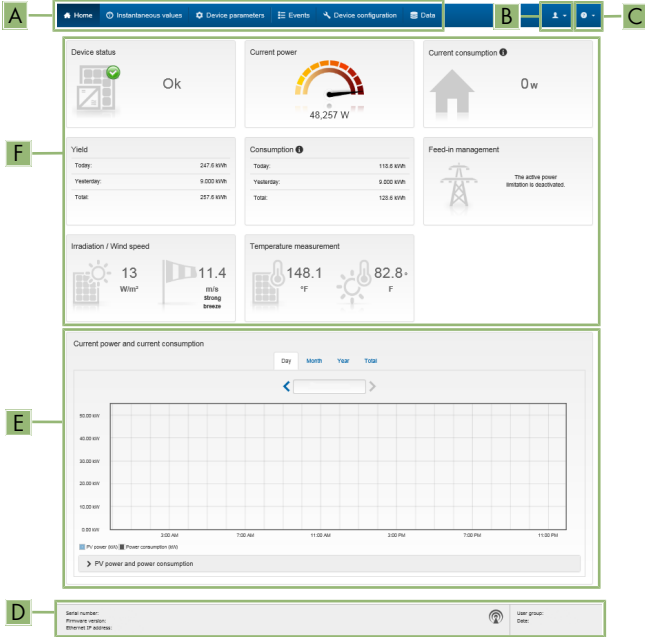


Figure 2: Start page design of the user interface (example)



Position	Designation	Description
A	Menu	<p>Provides the following functions:</p> <ul style="list-style-type: none"> <li>• <b>Home</b> Opens the user interface homepage</li> <li>• <b>Instantaneous values</b> Current measured values of the inverter</li> <li>• <b>Device Parameters</b> The various operating parameters of the inverter can be viewed and configured here depending on the user group.</li> <li>• <b>Events</b> All events that have occurred in the selected time period are displayed here. The event types are <b>Information</b>, <b>Warning</b> and <b>Error</b>. Currently existing events of the types <b>Error</b> and <b>Warning</b> will be additionally displayed in the <b>Device status</b> 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.</li> <li>• <b>System Configuration</b> 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"> <li>- Changing device names</li> <li>- Updating firmware (not available with devices having an iOS operating system)</li> <li>- Saving a configuration to file (not available with devices having an iOS operating system)</li> <li>- Loading a configuration from a file (not available with devices having an iOS operating system)</li> <li>- Importing a proxy certificate (not available with devices having an iOS operating system)</li> </ul> </li> </ul>
B	User settings	<p>Provides the following functions, depending on the user group logged in:</p> <ul style="list-style-type: none"> <li>• Starting the installation assistant</li> <li>• SMA Grid Guard login</li> <li>• Logout</li> </ul>

Position	Designation	Description
C	Help	Provides the following functions: <ul style="list-style-type: none"><li>• Displaying information on Open Source licenses used</li><li>• Link to the website of SMA</li></ul>
D	Status bar	Displays the following information: <ul style="list-style-type: none"><li>• Inverter serial number</li><li>• Inverter firmware version</li><li>• IP address of the inverter within the local network and/or IP address of the inverter during WLAN connection</li><li>• User group logged in</li><li>• Date and device time of the inverter</li></ul>

Position	Designation	Description
E	Current power and current consumption	Temporal progression of the PV power and the power consumption of the household over the selected time period. Please note, the power consumption will only be displayed if an energy meter is installed in the PV system.
F	Status display	<p>The various areas display information on the current status of the PV system.</p> <ul style="list-style-type: none"> <li>• <b>Device status</b> Displays whether the inverter is currently in a fault-free operating state or whether there is an event type <b>Error</b> or <b>Warning</b> present.</li> <li>• <b>Current power</b> Displays the power currently being generated by the inverter.</li> <li>• <b>Current consumption</b> Displays the current consumption of the household if an energy meter is installed in the PV system.</li> <li>• <b>Yield</b> Displays the energy yield of the inverter.</li> <li>• <b>Consumption</b> Displays the energy consumption of the household if an energy meter is installed in the PV system.</li> <li>• <b>Feed-in management</b> Displays whether the inverter is currently limiting its active power.</li> <li>• <b>Irradiation / wind speed</b> Depending on the connected sensors, displays the current solar irradiation or wind speed.</li> <li>• <b>Temperature measurement</b> Depending on the connected sensors, displays the current temperature of the PV modules and/or the ambient temperature.</li> </ul>

## 4.4 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

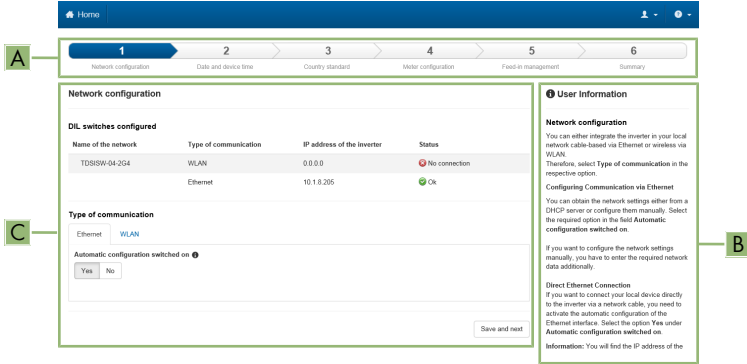


Figure 3: Layout of the installation assistant (example)

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

#### Requirement:

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

#### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
  2. Log in as **Installer**.
  3. Select the menu **User Settings** (see Section 4.3, page 24) on the start page of the user interface.
  4. In the context menu, select **[Start the installation assistant]**.
- The installation assistant will open.

## 4.5 Displaying and Downloading the Stored Data

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

**Procedure:**

1. Activate the user interface (see Section 4.1, page 19).
2. Log into the user interface (see Section 4.2, page 22).
3. Select the menu **Data**.
4. Select the folder **Data**.
5. To call up the data, select the respective folder and click on the required file.
6. To download the data, select the data type to be exported in the drop-down list. Then apply the time filter and select **Data export**.

## 4.6 Changing the Password

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

### **PV systems registered in a communication product**

With PV systems that are registered in a communication product (e.g. Sunny Portal, 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 4.1, page 19).
2. Log into the user interface (see Section 4.2, page 22).
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.

## 5 Configuration of the Inverter

### 5.1 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.

#### 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](http://www.SMA-Solar.com)). A charge is levied for this code.

#### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
  2. Log into the user interface (see Section 4.2, page 22).
  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 4.3, page 24).
    - 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.

## 5.2 Configuring the Country Data Set

### QUALIFIED PERSON

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

#### The country data set must be set correctly.

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

- If you are not sure which country data set is valid for your country or purpose, contact your grid operator for information on which country data set is to be configured.

The basic procedure for changing operating parameters is explained in another section (see Section 5.1 "Changing Operating Parameters", page 30).

#### Procedure:

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

## 5.3 Deactivating the Arc-Fault Circuit Interrupter (AFCI)

### QUALIFIED PERSON

The basic procedure for changing operating parameters is explained in another section (see Section 5.1 "Changing Operating Parameters", page 30).

#### Procedure:

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

## 5.4 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 5.1 "Changing Operating Parameters", page 30).

#### Procedure:

1. Call up the menu **Device Parameters**.
2. Select **[Edit parameters]**.

3. In the parameter group **Device > Multifunction relay > Operating mode** select the parameter **Operating mode of multifunction relay** or **Mlt.OpMode** and set the desired operating mode.
4. Once you have set the operating mode **Self-consumption** or **SelfCsmP**, you can configure other settings:
  - In the parameter group **Device > Multifunction relay > Self-consumption > Minimum On power** select the parameter **Minimum On power for MFR self-consumption** or **Mlt.MinOnPwr** and set the desired value. This will configure the power threshold from which a load is to be activated.
  - In the parameter group **Device > Multifunction relay > Self-consumption > Minimum power On time** select the parameter **Minimum power On time, MFR self-consumption** or **Mlt.MinOnPwrTmm** and set the desired value. This 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.
  - In the parameter group **Device > Multifunction relay > Self-consumption > Minimum On power** select the parameter **Minimum On time for MFR self-consumption** or **Mlt.MinOnTmm** and set the desired value. This will configure the minimum time for which the load remains activated.
5. If you have set the operating mode **Control via communication** or **ComCtl**, in the parameter group **Device > Multifunction relay > Control via communication > Status** select the parameter **Status of MFR with control via communication** or **Mlt.ComCtl.Sw** and set the desired value. This determines whether the multifunction relay can be controlled via a communication product.
6. If you have set the operating mode **Battery bank** or **BatCha**, make further settings:
  - In the parameter group **Device > Multifunction relay > Battery bank > Minimum On power** select the parameter **Minimum On power for MFR battery bank** or **Mlt.BatCha.Pwr** and set the desired value. This will configure the power threshold from which the battery is to be charged.
  - In the parameter group **Device > Multifunction relay > Battery bank > Minimum time before reconnection** select the parameter **Minimum time before reconnection of MFR battery bank** or **Mlt.BatCha.Tmm** and set the desired value. This will configure the minimum time which must elapse after charging the battery before the battery can be charged again.
7. Select [**Save all**] to save the changes.

## 5.5 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](http://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](http://www.SMA-Solar.com).

### **i** 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 or deactivate the activated parameter again.

#### **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](http://www.SMA-Solar.com)).

## 5.6 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 5.1 "Changing Operating Parameters", page 30).

#### **Procedure:**

- In the parameter group **DC-side > DC settings > OptiTrac Global Peak**, set the parameter **Cycle time of the OptiTrac Global Peak algorithm** 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, in the parameter group **DC-side > DC settings > OptiTrac Global Peak**, set the parameter **OptiTrac Global Peak switched on** to **Off**.

## 5.7 Activating String-Failure Detection

### **⚠ QUALIFIED PERSON**

1. Activate the user interface (see Section 4.1, page 19).
2. Log into the user interface as an **Installer**.

3. On the right-hand side of the menu bar, select the menu **User Settings** (see Section 4.3 "Start Page Design of the User Interface", page 24).
4. In the context menu, select [**Starting the installation assistant**].
5. Select [**Save and next**] until you reach the **String configuration** step.
6. Activate string-failure detection and configure it as required.

## 5.8 Saving the Configuration in a File

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

### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
2. Log into the user interface (see Section 4.2, page 22).
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Saving the configuration in a file**].
6. Follow the instructions in the dialog.

## 5.9 Adopting a Configuration from a File

### QUALIFIED PERSON

To configure the inverter, you can adopt the configuration from a file. To be able to do this, you must first save the configuration of another inverter from the same type or device family in a file (see Section 5.8 "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](http://www.SMA-Solar.com)). A charge is levied for this code.
- Changes to grid-relevant parameters must be approved by the responsible grid operator.

### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
2. Log into the user interface as an **Installer**.
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Adopting the configuration from a file**].
6. Follow the instructions in the dialog.

## 5.10 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 5.1 "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**.

## 5.11 Activate WPS Function

The WPS function can be used for different purposes:

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

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

### Activating WPS function for automatic connection to a network

Requirements:

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

### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
  2. Log in as **Installer**.
  3. Start the installation assistant (see Section 4.4, page 27).
  4. Select **Network configuration**.
  5. Select **WPS for WLAN network** button in the **WLAN** tab.
  6. Select **Activate WPS**.
  7. Select **Save and next** and exit the installation assistant.
- The WPS function is activated and the automatic connection to the network can be established.

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

- Activate the WPS function on the inverter. To do this, tap twice in succession on the enclosure lid of the DC connection unit next to the LEDs.
  - The blue LED flashes quickly for approx. two minutes. The WPS function is active.

## 5.12 Switching WLAN On and Off

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

### Switching on the WLAN function only possible via Ethernet connection

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

The basic procedure for changing operating parameters is explained in another section (see Section 5.1 "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**.

## 6 Cleaning the Inverter

### NOTICE

#### **Damage to the type label due to the use of cleaning agents**

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

## 7 Troubleshooting

### 7.1 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**).  
Tip: 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](http://www.SMA-Solar.com)).
2. Activate the user interface (see Section 4.1, page 19).
3. Enter the PUK instead of the password into the field **Password**.
4. Select **Login**.
5. Call up the menu **Device Parameters**.
6. Select [**Edit parameters**].
7. In the parameter group **User Rights > Access Control** change the password of the desired user group.
8. Select [**Save all**] to save the changes.

#### **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](http://www.SMA-Solar.com)).

## 7.2 Event Messages

Event number	Message, cause and corrective measures
101	<p data-bbox="311 236 594 268"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 284 393 309"><b>Grid fault</b></p> <p data-bbox="288 320 983 376">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="288 384 508 410"><b>Corrective measures:</b></p> <ul data-bbox="311 419 992 475" style="list-style-type: none"> <li data-bbox="311 419 992 475">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.</li> </ul> <p data-bbox="333 483 992 595">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="333 603 1000 687">If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service (see Section 10 "Contact", page 60).</p>
301	<p data-bbox="311 703 594 735"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 751 393 777"><b>Grid fault</b></p> <p data-bbox="288 788 995 900">The ten-minute average value of the grid voltage is no longer within the permissible range. The grid voltage or grid impedance at the connection point is too high. The inverter disconnects from the utility grid to maintain power quality.</p> <p data-bbox="288 908 508 933"><b>Corrective measures:</b></p> <ul data-bbox="311 943 992 999" style="list-style-type: none"> <li data-bbox="311 943 992 999">• During the feed-in operation, check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.</li> </ul> <p data-bbox="333 1007 992 1118">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 1126 1000 1211">If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service (see Section 10 "Contact", page 60).</p>
401	<p data-bbox="311 1230 594 1262"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 1278 393 1303"><b>Grid fault</b></p> <p data-bbox="288 1315 1006 1370">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 1378 508 1404"><b>Corrective measures:</b></p> <ul data-bbox="311 1414 1009 1437" style="list-style-type: none"> <li data-bbox="311 1414 1009 1437">• Check the grid connection for significant short-term frequency fluctuations.</li> </ul>

Event number	Message, cause and corrective measures
501	<p data-bbox="311 183 593 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 231 392 263"><b>Grid fault</b></p> <p data-bbox="288 271 991 327">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 335 509 359"><b>Corrective measures:</b></p> <ul data-bbox="311 367 996 606" style="list-style-type: none"> <li data-bbox="311 367 907 422">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 10 "Contact", page 60).</li> </ul>
601	<p data-bbox="311 622 593 659"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 670 392 702"><b>Grid fault</b></p> <p data-bbox="288 710 980 766">The inverter has detected an excessively high proportion of direct current in the grid current.</p> <p data-bbox="288 774 509 798"><b>Corrective measures:</b></p> <ul data-bbox="311 805 968 893" style="list-style-type: none"> <li data-bbox="311 805 739 837">• Check the grid connection for direct current.</li> <li data-bbox="311 837 968 893">• If this message is displayed frequently, contact the grid operator and check whether the monitoring threshold on the inverter can be raised.</li> </ul>



Event number	Message, cause and corrective measures
801	<p data-bbox="311 185 596 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 236 960 263"><b>Waiting for grid voltage &gt; Grid failure &gt; Check AC circuit breaker</b></p> <p data-bbox="288 272 1012 327">The AC cable is not correctly connected or the country data set is not correctly configured.</p> <p data-bbox="288 336 508 360"><b>Corrective measures:</b></p> <ul data-bbox="311 370 991 555" style="list-style-type: none"> <li data-bbox="311 370 781 394">• Make sure that the circuit breaker is switched on.</li> <li data-bbox="311 403 930 458">• Ensure that the AC cable is not damaged and that it is connected correctly.</li> <li data-bbox="311 467 904 491">• Ensure that the country data set has been configured correctly.</li> <li data-bbox="311 501 991 555">• Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.</li> </ul> <p data-bbox="333 564 991 676">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="333 686 997 774">If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service (see Section 10 "Contact", page 60).</p>
901	<p data-bbox="311 782 596 817"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 833 661 860"><b>PE conn. missing &gt; Check connection</b></p> <p data-bbox="288 869 764 896">The grounding conductor is not correctly connected.</p> <p data-bbox="288 906 508 930"><b>Corrective measures:</b></p> <ul data-bbox="311 940 876 963" style="list-style-type: none"> <li data-bbox="311 940 876 963">• Ensure that the grounding conductor is correctly connected.</li> </ul>
3401 to 3407	<p data-bbox="311 978 596 1013"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 1029 695 1056"><b>DC overvoltage &gt; Disconnect generator</b></p> <p data-bbox="288 1066 820 1093">Overvoltage at the DC input. This can destroy the inverter.</p> <p data-bbox="288 1102 917 1129">This message is signaled additionally by rapid flashing of the LEDs.</p> <p data-bbox="288 1139 508 1163"><b>Corrective measures:</b></p> <ul data-bbox="311 1173 997 1473" style="list-style-type: none"> <li data-bbox="311 1173 897 1227">• <b>Immediately</b> disconnect the inverter from all voltage sources Disconnecting the Inverter from Voltage Sources.</li> <li data-bbox="311 1236 997 1315">• 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 DC connectors to the inverter.</li> <li data-bbox="311 1324 991 1410">• 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> <li data-bbox="311 1420 904 1473">• If this message is repeated frequently, contact the Service (see Section 10 "Contact", page 60).</li> </ul>

Event number	Message, cause and corrective measures
3501	<p data-bbox="311 188 595 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 236 658 263"><b>Insulation failure &gt; Check generator</b></p> <p data-bbox="288 272 801 300">The inverter has detected a ground fault in the PV array.</p> <p data-bbox="288 309 508 336"><b>Corrective measures:</b></p> <ul data-bbox="311 341 941 368" style="list-style-type: none"> <li data-bbox="311 341 941 368">• Check the PV system for ground faults (see Section 7.3, page 53).</li> </ul>
3701	<p data-bbox="311 387 595 419"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 435 678 462"><b>Resid.curr.too.high &gt; Check generator</b></p> <p data-bbox="288 472 1012 523">The inverter has detected a residual current due to temporary grounding of the PV array.</p> <p data-bbox="288 533 508 560"><b>Corrective measures:</b></p> <ul data-bbox="311 564 941 592" style="list-style-type: none"> <li data-bbox="311 564 941 592">• Check the PV system for ground faults (see Section 7.3, page 53).</li> </ul>
3801 to 3805	<p data-bbox="311 611 595 643"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 659 642 686"><b>DC overcurrent &gt; Check generator</b></p> <p data-bbox="288 695 981 722">Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.</p> <p data-bbox="288 732 508 759"><b>Corrective measures:</b></p> <ul data-bbox="311 764 1003 817" style="list-style-type: none"> <li data-bbox="311 764 1003 817">• If this message is displayed frequently, ensure that the PV array has been correctly rated and wired.</li> </ul>
6002 to 6412	<p data-bbox="311 834 595 866"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 882 654 909"><b>Self diagnosis &gt; Interference device</b></p> <p data-bbox="288 919 707 946">The cause must be determined by the Service.</p> <p data-bbox="288 956 508 983"><b>Corrective measures:</b></p> <ul data-bbox="311 987 860 1015" style="list-style-type: none"> <li data-bbox="311 987 860 1015">• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>
6502	<p data-bbox="311 1031 595 1062"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 1078 636 1106"><b>Self-diagnosis &gt; Overtemperature</b></p> <p data-bbox="288 1115 826 1142">The inverter has switched off due to excessive temperature.</p> <p data-bbox="288 1152 508 1179"><b>Corrective measures:</b></p> <ul data-bbox="311 1184 981 1370" style="list-style-type: none"> <li data-bbox="311 1184 981 1236">• Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.</li> <li data-bbox="311 1246 770 1273">• Ensure that the inverter has sufficient ventilation.</li> <li data-bbox="311 1283 936 1335">• Ensure that the ambient temperature +35°C (95°F) has not been exceeded.</li> <li data-bbox="311 1345 919 1370">• Ensure that the inverter is not exposed to direct solar irradiation.</li> </ul>

Event number	Message, cause and corrective measures
6512	<p><b>Minimum operating temperature not reached</b></p> <p>The inverter will only recommence grid feed-in once the temperature has reached at least <math>-25^{\circ}\text{C}</math>.</p>
6603 to 6604	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Self-diagnosis &gt; Overload</b></p> <p>The cause must be determined by the Service.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>
6701 to 6702	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Communication disturbed</b></p> <p>Error in the communication processor, the inverter continues feeding in, however. The cause must be determined by the Service.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• If this message is displayed frequently, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7102	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Parameter file not found or defective</b></p> <p>The parameter file was not found or is defective. Loading the parameter file has failed. The inverter continues feeding power into the grid.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Copy the parameter file to the correct folder again.</li> </ul>
7105	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Param. setting failed</b></p> <p>Parameters could not be set using the memory card. The inverter continues feeding power into the grid.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Ensure that the parameters are set correctly.</li> <li>• Ensure that the SMA Grid Guard code is available.</li> </ul>
7106	<p><b>Update file defect.</b></p> <p>The update file is defective. The update failed. The inverter continues feeding power into the grid.</p>
7110	<p><b>No update file found</b></p> <p>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><b>Update file successfully copied</b></p>

Event number	Message, cause and corrective measures
7113	<b>The memory card is full or write-protected</b>
7201 to 7202	<b>Data storage not possible</b>
7303	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Update main CPU failed</b> The cause must be determined by the Service.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7320	<p><b>The device with serial number [xx] was successfully updated to firmware version [xxx].</b> The firmware update was completed successfully.</p>
7330	<p><b>Condition test failed</b> The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p>
7331	<p><b>Update transport started</b> Update file is being copied.</p>
7332	<p><b>Update transport successful</b> Update file was copied successfully to the inverter's internal memory.</p>
7333	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Update transport failed</b> 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><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Retry update.</li> <li>• For WLAN connection: Improve the WLAN connection quality (e.g. via WLAN repeater) or establish connection with the inverter via Ethernet.</li> <li>• If this message is displayed again, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7341	<p><b>Update Bootloader</b> The inverter is performing a bootloader update.</p>

Event number	Message, cause and corrective measures
7342	<p data-bbox="314 188 596 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="292 236 555 260"><b>Update Bootloader failed</b></p> <p data-bbox="292 272 566 296">The bootloader update failed.</p> <p data-bbox="292 309 508 333"><b>Corrective measures:</b></p> <ul data-bbox="311 346 978 427" style="list-style-type: none"> <li data-bbox="311 346 460 370">• Retry update.</li> <li data-bbox="311 376 978 427">• If this message is displayed again, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7347	<p data-bbox="314 448 596 480"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="292 496 463 520"><b>Incompatible file</b></p> <p data-bbox="292 533 757 557">The configuration file is not suitable for this inverter.</p> <p data-bbox="292 569 508 593"><b>Corrective measures:</b></p> <ul data-bbox="311 606 950 663" style="list-style-type: none"> <li data-bbox="311 606 950 630">• Ensure that the selected configuration file is suitable for this inverter.</li> <li data-bbox="311 643 452 663">• Retry import.</li> </ul>
7348	<p data-bbox="314 679 596 711"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="292 727 493 751"><b>Incorrect file format</b></p> <p data-bbox="292 764 885 788">The configuration file is not of the required format or is damaged.</p> <p data-bbox="292 801 508 825"><b>Corrective measures:</b></p> <ul data-bbox="311 837 997 927" style="list-style-type: none"> <li data-bbox="311 837 997 888">• Ensure that the selected configuration file is of the required format and is not damaged.</li> <li data-bbox="311 901 452 927">• Retry import.</li> </ul>
7350	<p data-bbox="292 940 720 963"><b>Transfer of a configuration file has started</b></p> <p data-bbox="292 976 669 1000">The configuration file is being transferred.</p>
7351	<p data-bbox="292 1011 443 1035"><b>Update WLAN</b></p> <p data-bbox="292 1048 686 1072">The inverter is updating the WLAN module.</p>
7352	<p data-bbox="292 1083 614 1107"><b>Update of WLAN not successful</b></p> <p data-bbox="292 1120 658 1144">The update of the WLAN module failed.</p> <p data-bbox="292 1157 508 1181"><b>Corrective measures:</b></p> <ul data-bbox="311 1193 978 1286" style="list-style-type: none"> <li data-bbox="311 1193 460 1217">• Retry update.</li> <li data-bbox="311 1224 978 1286">• If this message is displayed again, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7353	<p data-bbox="292 1299 577 1323"><b>Update time zone database</b></p> <p data-bbox="292 1335 731 1359">The inverter is updating the time zone database.</p>

Event number	Message, cause and corrective measures
7354	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Update of time zone database not successful</b> The update of the time zone database failed.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Retry update.</li> <li>• If this message is displayed again, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7355	<p><b>Update WebUI</b> The inverter is updating the inverter user interface.</p>
7356	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Update of the WebUI not successful</b> The update of the inverter user interface failed.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Retry update.</li> <li>• If this message is displayed again, contact the Service (see Section 10 "Contact", page 60).</li> </ul>
7500 to 7501	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Fan fault &gt; Check inverter electronic and fan</b></p>
7619	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Communication fault with meter unit &gt; Check communication to meter</b> The inverter is not receiving any data from the energy meter.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual).</li> <li>• For WLAN connection: Improve the WLAN connection quality (e.g. via WLAN repeater) or connect the inverter with the DHCP server (router) via Ethernet.</li> </ul>
7702	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Interference device</b> The cause must be determined by the Service.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>

Event number	Message, cause and corrective measures
8003	<p data-bbox="311 183 593 215"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 231 593 263"><b>Active power limited derating</b></p> <p data-bbox="288 271 1002 327">The inverter has reduced its power output for more than ten minutes due to excessive temperature.</p> <p data-bbox="288 335 504 359"><b>Corrective measures:</b></p> <ul data-bbox="311 367 980 550" style="list-style-type: none"> <li>• Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.</li> <li>• Ensure that the inverter has sufficient ventilation.</li> <li>• Ensure that the ambient temperature +35 °C (95 °F) has not been exceeded.</li> <li>• Ensure that the inverter is not exposed to direct solar irradiation.</li> </ul>
8101 to 8104	<p data-bbox="311 566 593 598"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 614 554 646"><b>Communication disturbed</b></p> <p data-bbox="288 654 705 678">The cause must be determined by the Service.</p> <p data-bbox="288 686 504 710"><b>Corrective measures:</b></p> <ul data-bbox="311 718 856 750" style="list-style-type: none"> <li>• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>
9002	<p data-bbox="311 766 593 798"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 813 599 845"><b>SMA Grid Guard code invalid</b></p> <p data-bbox="288 853 1002 909">The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.</p> <p data-bbox="288 917 504 941"><b>Corrective measures:</b></p> <ul data-bbox="311 949 705 973" style="list-style-type: none"> <li>• Enter the correct SMA Grid Guard code.</li> </ul>
9003	<p data-bbox="288 989 526 1021"><b>Grid parameter locked</b></p> <p data-bbox="288 1029 1002 1109">Changes to the grid parameters are now blocked. In order to be able to make changes to the grid parameters, from now on you must log in using the SMA Grid Guard code.</p>
9005	<p data-bbox="311 1125 593 1157"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 1173 924 1204"><b>Changing of grid parameters not possible &gt; Ensure DC supply</b></p> <p data-bbox="288 1212 660 1236">This error can have the following causes:</p> <ul data-bbox="311 1244 957 1308" style="list-style-type: none"> <li>• The parameters to be changed are protected.</li> <li>• The DC voltage at the DC input is not sufficient to run the main CPU.</li> </ul> <p data-bbox="288 1316 504 1340"><b>Corrective measures:</b></p> <ul data-bbox="311 1348 935 1436" style="list-style-type: none"> <li>• Enter the SMA Grid Guard code.</li> <li>• Ensure that at least the DC start voltage is available (green LED is flashing, pulsing or glowing).</li> </ul>

Event number	Message, cause and corrective measures
9007	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Abort self-test</b> The self-test (Italy only) was terminated.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Ensure that the AC connection is correct.</li> <li>• Restart the self-test.</li> </ul>
10108	<p><b>Time adjusted / old time</b></p>
10109	<p><b>Time adjusted / new time</b></p>
10110	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>Time synchronization failed:  xx </b> No time information could be called up from the set NTP server.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Ensure that the NTP server was configured correctly.</li> <li>• Ensure that the inverter is integrated into a local network with Internet connection.</li> </ul>
10118	<p><b>Parameter upload complete</b> The configuration file was loaded successfully.</p>
10248	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>[Interface]: network busy</b> The network is busy. Data exchange between the devices is not at an optimum and is greatly delayed.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Increase the query intervals.</li> <li>• If necessary, reduce the number of devices in the network.</li> </ul>
10249	<p><b>⚠ QUALIFIED PERSON</b></p> <p><b>[Interface]: network overloaded</b> The network is overloaded. There is no data exchange between the devices.</p> <p><b>Corrective measures:</b></p> <ul style="list-style-type: none"> <li>• Reduce the number of devices in the network.</li> <li>• If necessary, increase the data query intervals.</li> </ul>



Event number	Message, cause and corrective measures
10250	<p data-bbox="311 188 595 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 236 722 263"><b>[Interface]: package error rate [ok / high]</b></p> <p data-bbox="288 272 1005 355">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="288 363 837 391"><b>Corrective measures if the package error rate is high:</b></p> <ul data-bbox="311 400 1009 550" style="list-style-type: none"> <li data-bbox="311 400 1009 483">• 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> <li data-bbox="311 491 759 518">• If necessary, increase the data query intervals.</li> <li data-bbox="311 526 865 550">• If necessary, reduce the number of devices in the network.</li> </ul>
10251	<p data-bbox="288 563 968 619"><b>[Interface]: communication status goes to [OK / Warning / Error / Not connected]</b></p> <p data-bbox="288 628 983 684">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="311 699 595 730"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 746 669 774"><b>[Interface]: communication disrupted</b></p> <p data-bbox="288 783 686 810">There is no valid signal on the network line.</p> <p data-bbox="288 818 509 845"><b>Corrective measures:</b></p> <ul data-bbox="311 855 1009 1005" style="list-style-type: none"> <li data-bbox="311 855 1009 938">• 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> <li data-bbox="311 946 946 1005">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.</li> </ul>
10253	<p data-bbox="311 1018 595 1050"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 1066 890 1093"><b>[Interface]: connection speed goes to [100 Mbit / 10 Mbit]</b></p> <p data-bbox="288 1102 1005 1185">The data transfer rate has changed. The cause for the status [10 Mbit] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p data-bbox="288 1193 753 1220"><b>Corrective measures if the status is [10 Mbit]:</b></p> <ul data-bbox="311 1230 1009 1378" style="list-style-type: none"> <li data-bbox="311 1230 1009 1313">• 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> <li data-bbox="311 1321 946 1378">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.</li> </ul>

Event number	Message, cause and corrective measures
10254	<p data-bbox="311 188 595 220"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 236 754 263"><b>[Interface]: duplex mode goes to [Full / Half]</b></p> <p data-bbox="288 272 1000 355">The duplex mode (data transfer mode) has changed. The cause for the status [Half] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p data-bbox="288 365 717 392"><b>Corrective measures if the status is [Half]:</b></p> <ul data-bbox="311 400 1009 544" style="list-style-type: none"> <li data-bbox="311 400 1009 483">• 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> <li data-bbox="311 491 1009 544">• Ensure that the DHCP server (router) and any network switches are signaling correct operation.</li> </ul>
10255	<p data-bbox="311 563 595 595"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 611 598 638"><b>[Interface]: Network load OK</b></p> <p data-bbox="288 647 900 675">The network load has returned to a normal range after being busy.</p>
10282	<p data-bbox="288 691 706 718"><b>[User group]-Login via [protocol] locked</b></p> <p data-bbox="288 727 966 810">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 data-bbox="288 820 508 847"><b>Corrective measures:</b></p> <ul data-bbox="311 855 861 882" style="list-style-type: none"> <li data-bbox="311 855 861 882">• Wait until the given time has expired and then retry login.</li> </ul>
10283	<p data-bbox="311 890 595 922"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 938 510 965"><b>WLAN module faulty</b></p> <p data-bbox="288 975 807 1002">The WLAN module integrated in the inverter is defective.</p> <p data-bbox="288 1011 508 1038"><b>Corrective measures:</b></p> <ul data-bbox="311 1046 861 1074" style="list-style-type: none"> <li data-bbox="311 1046 861 1074">• Contact the Service (see Section 10 "Contact", page 60).</li> </ul>

Event number	Message, cause and corrective measures
10284	<p data-bbox="311 183 593 215"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 231 604 263"><b>No WLAN connection possible</b></p> <p data-bbox="288 271 985 327">The inverter does not currently have a WLAN connection to the selected network.</p> <p data-bbox="288 335 504 359"><b>Corrective measures:</b></p> <ul data-bbox="311 367 996 574" style="list-style-type: none"> <li>• 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> <li>• Ensure that the WLAN router or WLAN Access Point is in range and is signaling correct operation.</li> <li>• If this message is displayed often, improve the WLAN connection by using a WLAN repeater.</li> </ul>
10285	<p data-bbox="288 590 599 614"><b>WLAN connection established</b></p> <p data-bbox="288 622 884 654">Connection to the selected WLAN network has been established.</p>
10286	<p data-bbox="311 670 593 702"><b>⚠ QUALIFIED PERSON</b></p> <p data-bbox="288 718 520 742"><b>WLAN connection lost</b></p> <p data-bbox="288 750 868 774">The inverter has lost WLAN connection to the selected network.</p> <p data-bbox="288 790 504 813"><b>Corrective measures:</b></p> <ul data-bbox="311 821 980 973" style="list-style-type: none"> <li>• Ensure that the WLAN router or WLAN Access Point is still active.</li> <li>• Ensure that the WLAN router or WLAN Access Point is in range and is signaling correct operation.</li> <li>• If this message is displayed often, improve the WLAN connection by using a WLAN repeater.</li> </ul>
10339	<b>Webconnect enabled</b>
10340	<b>Webconnect disabled</b>
10341	<b>Webconnect error: no connection</b>
10343	<b>Webconnect error: Default gateway not configured</b>
10344	<b>Webconnect error: DNS server not configured</b>
10345	<b>Webconnect error: No reply to DNS request [xx]</b>
10346	<b>Webconnect error: Unknown SIP proxy [xx]</b>
10347	<b>Webconnect error: Unknown STUN server [xx]</b>
10348	<b>Webconnect error: No reply to request to STUN server</b>
10349	<b>Webconnect error: No reply to SIP option packs</b>
10350	<b>Webconnect error: Registration rejected by SIP registrar</b>
10351	<b>Webconnect error: Unknown SIP registrar [xx]</b>

Event number	Message, cause and corrective measures
10352	<b>Webconnect error: Faulty communication</b>
10353	<b>Webconnect error: registration of the SIP registry has not responded</b>
10502	<b>Active power limited AC frequency</b>
10901	<b>Start self-test [xx]</b>
10902	<b>Uac RPro [xxx] V</b>
10903	<b>Uac Max [xxx] V</b>
10904	<b>Uac Min [xxx] V</b>
10905	<b>Uac Min Fast [xxx] V</b>
10906	<b>Fac SwMax [xxx] Hz</b>
10907	<b>Fac SwMin [xxx] Hz</b>
10908	<b>Fac Max [xxx] Hz</b>
10909	<b>Fac Min [xxx] Hz</b>
10910	<b>Disconn. threshold [xxx] [xx]</b>
10911	<b>Stand. Val. [xxx] [xx]</b>
10912	<b>Disconn. time [xx] s</b>
27103	<b>Set parameter</b> The parameter changes are being adopted.
27104	<b>Parameters set successfully</b> The parameter changes were successfully adopted.
27107	<b>Update file OK</b> The update file found is valid.
27301	<b>Update communication</b> The inverter is updating the communication component.
27302	<b>Update main CPU</b> The inverter is updating the inverter component.
27312	<b>Update completed</b> The inverter has successfully completed the update.
29001	<b>Inst. code valid</b> 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	<b>Grid parameters unchanged</b> Changing the grid parameters is not possible.

## 7.3 Checking the PV System for Ground Faults

### QUALIFIED PERSON

### 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 1000 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:

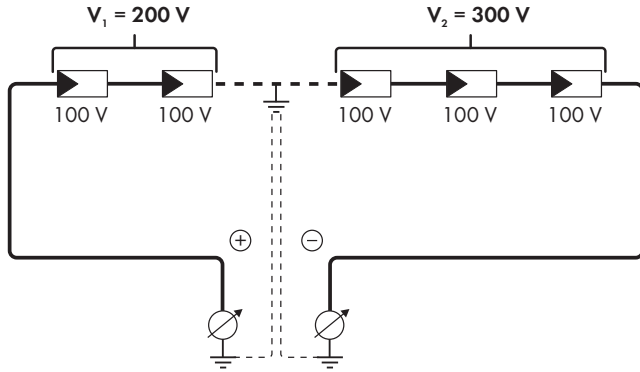
- Measure the voltage between the positive terminal and the ground potential (PE).
- Measure the voltage between the negative terminal and the ground potential (PE).
- Measure the voltage between the positive and negative terminals.

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.

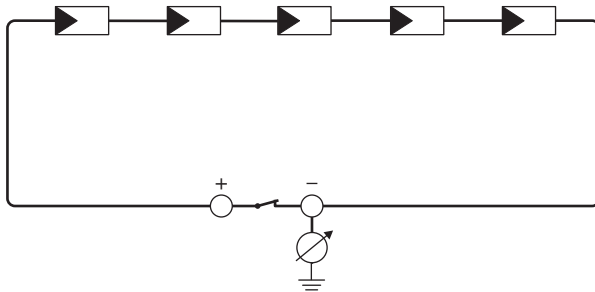


Figure 4: Schematic diagram of the measurement

### **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 MΩ and for polycrystalline and monocrystalline PV modules approximately 50 MΩ 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](http://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 10 "Contact", page 60). The PV modules might not be suitable for the inverter in the present quantity.

## 7.4 Resetting the Operation Inhibition after Detection of an Arc Fault

### QUALIFIED PERSON

If the red LED is glowing and the event number **4301** or **4302** is shown in the event list on the user interface of the inverter, the inverter has detected an electric arc and interrupts feed-in operation.

#### Procedure:

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 terminal block for the DC connection are not defective.  
Repair or replace defective PV modules, DC cables or terminal block for the DC connection.
  3. Recommission the inverter (see inverter installation manual).
  4. Activate the user interface (see Section 4.1, page 19).
  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.

## 7.5 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:

- Update the firmware via the user interface of the inverter.
- Update 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](http://www.SMA-Solar.com).

### Procedure:

1. Activate the user interface (see Section 4.1, page 19).
2. Log into the user interface (see Section 4.2, page 22).
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](http://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 DC 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.

6.  **DANGER**

#### Danger to life due to high voltages

- Disconnect the inverter from any voltage sources and open the enclosure lid of the DC 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. Call up the user interface of the inverter and check the events to see whether a firmware update has been successfully completed.
10. If the firmware update has not been successfully completed, perform the firmware update again.

## 8 Accessories

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

<b>Designation</b>	<b>Short designation</b>	<b>SMA order number</b>
SMA Antenna Extension Kit	Accessory set for one SMA inverter for the optimization of the SMA inverter's WLAN radio range.	EXTANT-US-40
SMA Sensor Module	Interface for one SMA inverter as retrofit kit for capturing environmental data (e.g. solar irradiation, ambient temperature, cell temperature, wind speed or SO meters).	MD.SEN-US-40
SMA 485 Module	Interface for establishing cable-bound communication via RS485	MD.485-US-40

## 9 Compliance Information

### FCC Compliance

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two 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 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.

Changes or modifications made to this equipment not expressly approved by SMA Solar Technology America LLC may void the FCC authorization to operate this equipment.

## 10 Contact

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

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

United States	SMA Solar Technology America LLC Rocklin, CA	Toll free for USA and US Territories +1 877-MY-SMAtech (+1 877-697-6283) International: +1 916 625-0870
México	SMA Solar Technology America LLC	Internacional: +1 916 625-0870



