Operating Manual

# SUNNY TRIPOWER 125

ENGLISH

STPxxx-70-BE-en-11 | Version 1.1

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Status: Thursday, October 10, 2024

# Table of contents

# 1 Information on this Document

## 1.1 Validity

This document is valid for:

- STP 125-70 (Sunny Tripower 125)

## 1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

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

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

## 1.3 Levels of Warning Messages

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

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

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

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

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

## 1.4 Symbols in the Document

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

| Symbol | Explanation |
|---|---|
| ☐ | Indicates a requirement for meeting a specific goal |
| ☑ | Required result |
|  | Example |
| ⚠ QUALIFIED PERSON | Sections describing activities to be performed by qualified persons only |

## 1.5 Typographies in the document

| Typography | Use | Example |
|---|---|---|
| **bold** | • Messages<br>• Terminals<br>• Elements on a user interface<br>• Elements to be selected<br>• Elements to be entered | • Connect the insulated conductors to the terminals **X703:1** to **X703:6**.<br>• Enter **10** in the field **Minutes**. |
| **>** | • Connects several elements to be selected | • Go to **Settings > Date**. |
| [**Button**]<br>[**Key**] | • Button or key to be selected or pressed | • Select [**Enter**]. |
| # | • Placeholder for variable components (e.g., parameter names) | • Parameter **WCtlHz.Hz#** |

## 1.6 Designations in the Document

| Complete designation | Designation in this document |
|---|---|
| Sunny Tripower 125-70 | Sunny Tripower, inverter, product |

## 1.7 Additional Information

Additional information is available at www.SMA-Solar.com.

| Title and information content | Type of information |
|---|---|
| "PUBLIC CYBER SECURITY - Guidelines for a Secure PV System Communication" | Technical Information |
| "Efficiency and Derating"<br>Efficiency and derating behavior of the SMA inverters | Technical Information |
| "Compatibility between common grid configurations and SMA inverters and SMA charging stations" | Technical Information |

| Title and information content | Type of information |
|---|---|
| "Impedance at 175 Hz for PV Systems in France" | Technical Information |
| "Arc-fault circuit interrupter" | Technical Information |

# 2 Safety

## 2.1 Intended Use

The Sunny Tripower is a transformerless PV inverter with 12 MPP trackers that converts the direct current of the PV modules to grid-compliant three-phase current and feeds it into the utility grid.

The product is intended for use in industrial environments.

The product must only be accessible to qualified persons.

The product complies with EN 55011 of class A, group 1:

- a.c. mains power port: ≤ 20 kVA
- d.c. power port: > 75 kVA
- Electromagnetic radiation disturbance: ≤ 20 kVA

In accordance with EN 55011, the product must only be operated at locations where the distance between the product and third-party radio-communication installations is greater than 30 m.

This product is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

The product is suitable for indoor and outdoor use.

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

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

The products by SMA Solar Technology AG are not suitable for use in

- Medical devices, in particular products for supplying life-support systems and machines,
- Aircraft, the operation of aircraft, the supply of critical airport infrastructure and airport systems,
- Rail vehicles, the operation and supply of rail vehicles and their critical infrastructure.

The above list is not exhaustive. Contact us if you are unsure whether products by SMA Solar Technology AG are suitable for your application.

The documentation must be strictly followed. Deviations from the described actions and the use of materials, tools, and aids other than those specified by SMA Solar Technology AG are expressly forbidden.

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

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

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

The type label must remain permanently attached to the product.

The product is not equipped with an integrated transformer and therefore has no galvanic isolation. The product must not be operated with PV modules whose outputs are grounded. This can cause the product to be destroyed. The product may be operated with PV modules whose frame is grounded.

PV modules with a high capacity to ground must only be used if the coupling capacity of all PV modules does not exceed 18.75 µF.

## 2.2 IMPORTANT SAFETY INFORMATION

Keep the manual for future reference.

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

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

**⚠ DANGER**

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

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

- Do not open the product during operation.
- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.

**⚠ DANGER**

**Danger to life due to electric shock when touching live system components in case of a ground fault**

If a ground fault occurs, parts of the system may still be live. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.
- Only touch the cables of the PV modules on their insulation.
- 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.

**⚠ DANGER**

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

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

- Ensure that all devices in the same network are integrated in the existing overvoltage protection.
- When laying the network cable outdoors, ensure that there is suitable surge protection at the network cable transition from the product outdoors to the network inside the building.

**⚠ WARNING**

**Danger to life due to fire and deflagration**

In rare cases, an explosive gas mixture can be generated inside the product under fault conditions. In this state, switching operations can cause a fire and, in very rare cases, a deflagration inside the product. Death or lethal injuries due to the spread of a fire can result.

- In the event of a fault, do not perform any direct actions on the product.
- In the event of a fault, ensure that unauthorized persons have no access to the product.
- In case of failure, disconnect the PV module via an external disconnection device. If there is no disconnection device present, wait until no more DC power is applied to the inverter.
- In the event of a fault, disconnect the AC circuit breaker, or keep it disconnected in case it has already tripped, and secure it against reconnection.

**⚠ WARNING**

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

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

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

**⚠ WARNING**

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

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

- Only use measuring devices with a measurement ranges designed for the maximum AC and DC voltage of the inverter.

**⚠ 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.

**⚠ CAUTION**

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

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

- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.
- Transport the product using the carrying handles or hoist. Take the weight of the product into account.
- Use all carrying handles provided during transport with carrying handles.
- Do not use the carrying handles as attachment points for hoist equipment (e.g. straps, ropes, chains). Insert eye bolts into threads provided on top of the product to attach the hoist system.

**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 and damage it.

- Only open the product if the ambient temperature is not below -5 °C.
- If the product must be opened in freezing conditions, make sure that the DC load-break switch is free of ice.

**NOTICE**

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

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

- Only open the product if the humidity is within the thresholds and the environment is free of sand and dust.
- Close tightly all enclosure openings.

**NOTICE**

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

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

- Ground yourself before touching any component.

**NOTICE**

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

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

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

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

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

**Communication disturbances in the local network**

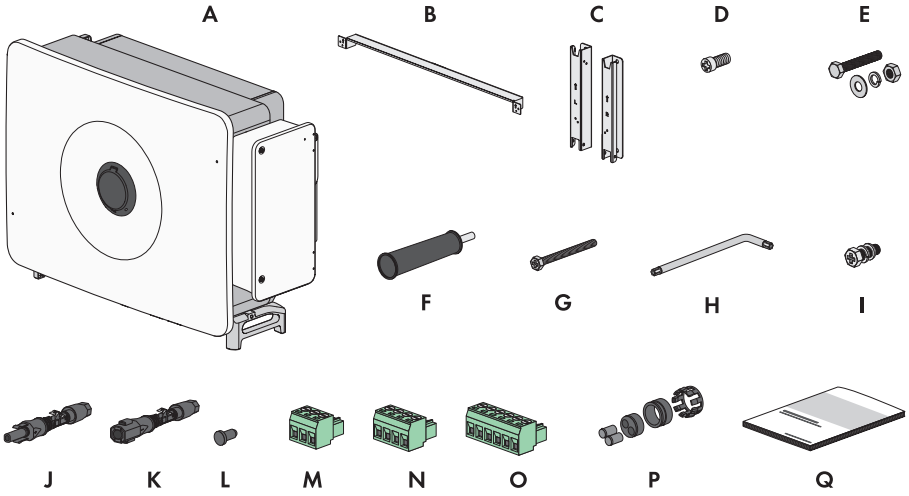
The IP address range 192.168.12.0 to 192.168.12.255 is occupied for communication amongst SMA products and for direct access to SMA products.

Communication problems might occur if this IP address range is used in the local network.

- Do not use the IP address range 192.168.12.0 to 192.168.12.255 in the local network.

# 3 Scope of delivery

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




| Position | Quantity | Designation |
|---|---|---|
| A | 1 | Inverter |
| B | 1 | Connecting rod for mounting bracket |
| C | 1 | Bracket part for mounting bracket |
| D | 2 | Cylindrical screw M4 x 10 |
| E | 4 | M10x45 hexagon head bolt with 1 M10 washer, 1 M10 spring washer and one M10 hex nut |
| F | 4 | Carrying handle |
| G | 2 | Hexagon head bolt M6x65 |
| H | 1 | Internal Allen key TX30 |
| I | 1 | Hexagon head bolt M6x20, replacement bolt for the AC cable compartment |
| J | 24 | Positive DC connector |
| K | 24 | Negative DC connector |
| L | 48 | Sealing plug |
| M | 1 | 3-pole terminal block, pre-assembled |
| N | 2 | 4-pole terminal block, pre-assembled |

| Position | Quantity | Designation |
|---|---|---|
| O | 1 | 6-pole terminal block, pre-assembled |
| P | 2 | Two-hole sealing block for communication terminal with inserts for cable diameters from 4.5 mm to 6 mm and 6 mm to 8 mm |
| Q | 1 | Documentation package consists of:<br>• Safety information booklet<br>• Quick reference guide poster with illustrated instructions for initial installation and commissioning<br>• Supplementary sheet with password label contains the following information:<br>– PIC (Product Identification Code) identification key for registering the system in Sunny Portal<br>– RID (Registration Identifier) registration ID for registering the system in Sunny Portal<br>– Wi-Fi password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the product via Wi-Fi<br>– Device Key (DEV KEY) for resetting the administrator password |

# 4 Additionally Required Materials and Equipment

| Material | Quantity | Explanation |
|---|---|---|
| Profile rail (length: min. 1100 mm, depth: max. 60 mm, height: 50 mm to 80 mm) | 2 | Required exclusively if the product is intended to be mounted using a profile rail |
| Threaded ring (M12) | 2 | Only required if the product is to be transported with a lifting gear |
| Heavy-duty anchor (M10x95) | 4 | Only required if mounted without profile rails: For mounting the device on a wall |
| Ring terminal lugs (M12) | 5 | To attach to the AC connection cables |
| Ethanol cleaning agent | 1 | Used to clean terminal lugs |
| Protective grease | 1 | Only required if cable is made of aluminum: Used to apply to aluminum conductor |
| Network cable | 1 | To establish communication with the product |
| Field-assembly RJ45 connector. | 2 | Only required if self-assembly network cable is used |

| Aids | Quantity | Explanation |
|---|---|---|
| Means of transport (e.g., pallet truck) | 1 | Used to transport packed product to installation site |
| Lifting gear | 1 | Only required if the product is to be transported with a lifting gear |
| Utility knife | 1 | Used to unpack the product |
| Flat-blade screwdriver (4 mm) | 1 | For loosening the sealing screw on the attachment bars of the inverter |
| Phillips screwdriver (PH2) | 1 | For attaching the connecting rod at the bracket parts for the mounting bracket |
| Tape measure | 1 | For measuring the distances between bore holes for mounting |
| Marker pen | 1 | For marking the bore holes for mounting |

| Aids | Quantity | Explanation |
|---|---|---|
| Hammer drill with Ø 12 mm and Ø 14 mm drill bit | 1 | For drilling the bore holes for mounting |
| Spirit level | 1 | For aligning the mounting bracket |
| Rubber mallet | 1 | Only required if mounted without profile rails: For securing the expanding screws for mounting |
| Wrench (AF16) | 1 | Only required if mounted with profile rails: For attaching the mounting bracket |
| Socket wrench with 16 mm insert | 1 | Only required if mounted with profile rails: For attaching the mounting bracket |
| Phillips screwdriver (PH3) | 1 | For attaching the product to the mounting bracket |
| Cable cutter | 1 | For trimming cables |
| Insulation stripping tool | 1 | For insulating the cable for the AC connection |
| Press tool | 1 | For attaching the ring terminal lugs to the cables of the AC connection |
| Hot-air blower | 1 | For attaching the heat-shrink tubings to the AC conductors |
| Socket wrench with deep sockets (AF18) | 1 | For releasing and fastening the conductors with ring terminal lugs in the AC cable compartment |
| Clean cloth | 1 | Used to clean terminal lugs |
| Brush | 1 | Only required if mounted with profile rails: For cleaning the aluminum conductors |
| Wrench (AF33) | 1 | For loosening and attaching the swivel nut of the communication connection |
| Voltage detector with a measurement range designed for the maximum AC and DC voltage of the inverter | 1 | For verifying that no voltage is present |
| Current clamp | 1 | For verifying that no current is present |

# 5 Product overview

## 5.1 Product Description

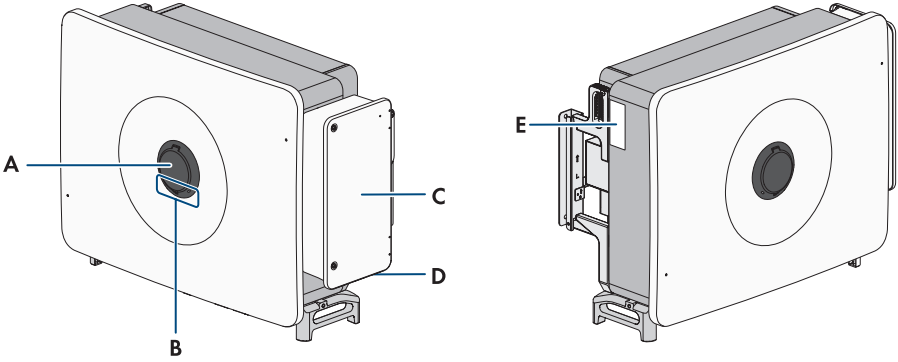



Figure 1: Design of the product

| Position | Designation |
|---|---|
| A | SMA Easy Lock enclosure lock |
| B | LEDs<br>The LEDs indicate the operating state of the product. |
| C | Cable compartment cover |
| D | External ground connection (see Section 9.2.2, page 40) |
| E | Type label<br>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:<br>• Device type (Model)<br>• Serial number (Serial No. or S/N)<br>• Date of manufacture<br>• Device specific characteristics |

## 5.2 Symbols on the Product

| Symbol | Explanation |
|---|---|
|  | Beware of a danger zone<br>This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site. |

| Symbol | Explanation |
|---|---|
|  | Beware of electrical voltage<br>The product operates at high voltages. |
|  | Beware of hot surface<br>The product can get hot during operation. |
|   | Danger to life due to high voltages in the inverter; observe a waiting time of 5 minutes.<br>High voltages that can cause lethal electric shocks are present in the live components of the inverter.<br>Before carrying out any work on the inverter, always de-energize the inverter as described in this document and secure it against reconnection. |
|  | Observe the documentations<br>Observe all documentations supplied with the product. |
|  | Operation LED<br>Indicates whether the product is in operation. |
|  | Error<br>Together with the red LED, this symbol indicates an error. Observe the documentation. |
|  | Data transmission<br>Together with the blue LED, this symbol indicates the status of the network connection. |
|  | Grounding conductor<br>This symbol indicates the position for connecting a grounding conductor. |
|   | Three-phase alternating current with neutral conductor |
|   | Direct current |
|  | The product has no galvanic isolation. |

| Symbol | Explanation |
|---|---|
|  | WEEE designation<br>Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site. |
|  | The product is suitable for outdoor installation. |
|  | CE marking<br>The product complies with the requirements of the applicable EU directives. |
|  | UKCA marking<br>The product complies with the regulations of the applicable laws of England, Wales and Scotland. |
|  | RoHS labeling<br>The product complies with the requirements of the applicable EU directives. |
|  | RCM (Regulatory Compliance Mark)<br>The product complies with the requirements of the applicable Australian standards. |

## 5.3 Interfaces and Functions

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

### 5.3.1 User Interface

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

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

### 5.3.2 Grid Management Services

The product is equipped with service functions for grid management.

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

### 5.3.3 Zero export

Some grid operators permit connection of PV systems only on condition that no active power is fed into the utility grid. The PV energy is therefore consumed exclusively at the place where it is generated.

This product supports limiting zero export only in conjunction with a communication product.

### 5.3.4 Modbus

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

The Modbus interface of the supported SMA 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

### 5.3.5 SMA ShadeFix

The inverter is equipped with the shade management system SMA ShadeFix. SMA ShadeFix uses an intelligent MPP tracking system to determine the operating point with the highest output during shading conditions. With SMA ShadeFix, inverters use the best possible energy supply from the PV modules at all times to increase yields in shaded systems.

SMA ShadeFix is enabled by default.

The time interval of SMA ShadeFix is usually 6 minutes. This means that the inverter determines the optimum operating point every 6 minutes. Depending on the PV system or shading situation, it may be useful to adjust the time interval.

**Also see:**

- Setting SMA ShadeFix ⇒ page 77

### 5.3.6 Arc-Fault Circuit Interrupter (AFCI)

The arc-fault circuit interrupter is deactivated by default and can be activated on the user interface.

The inverter is equipped with an arc fault circuit interrupter (AFCI). The inverter supports the Arc Fault Protection Equipment (AFPE) for arc fault detection and interruption. The AFPE protection covers the PV modules and DC cables of the PV system connected to the DC input terminals of the inverter. A detected electric arc causes a brief interruption of the feed-in operation.

An event message is entered on the user interface when an electric arc is detected. After a waiting period of 10 minutes, the inverter starts automatically and checks whether the electric arc is still present. If the electric arc is still present, the inverter disconnects from the utility grid again and the process is repeated. After 5 electric arc detections per day (24h), the feed-in operation of the inverter must be activated via direct or remote access via the user interface of the inverter.

The AFPE detection has 24 channels and one input port per channel.

**Also see:**

- Arc-Fault Circuit Interrupter (AFCI) ⇒ page 70

### 5.3.7 SMA Smart Connected

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

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

## 5.3.8 Fast stop function

The fast stop function is a digital input on the inverter via which the inverter can be disconnected from the utility grid. It can be triggered by means of an external potential-free contact (break contact or make contact). It can be configured whether the disconnection from the utility grid should take place when the contact is open or closed.

The fast stop function is deactivated by default and must be activated in the inverter.

**Also see:**

- Fast stop circuitry overview ⇒ page 46
- Connecting contact for fast stop to digital input ⇒ page 46

## 5.3.9 Grid and PV system protection

The inverter is equipped with redundant and monitored switching elements for grid disconnection simplifying grid and PV system protection required according to VDE-AR-N 4105. Here, the disconnection units integrated in the inverter can replace an external interface switch. An external, certified monitoring unit with an integrated PV system protection relay (potential-free) and an alarm contact (implemented as break contact) must be included.

**Also see:**

- Fast stop function ⇒ page 23

## 5.3.10 Wi-Fi

The product is equipped with a Wi-Fi 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.

**Also see:**

- Switching WLAN Off ⇒ page 67
- Switching WLAN On ⇒ page 67

## 5.3.11 Wi-Fi connection to SMA 360° app and SMA Energy app

There is a QR code on the product by default. By scanning the QR Code attached to the product via the SMA 360° app or SMA Energy app, access to the product is established via Wi-Fi and the connection to the user interface is made automatically.

### 5.3.12 SMA Speedwire

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

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

### 5.3.13 SMA Webconnect

The product is equipped with a Webconnect function as standard. The Webconnect function enables direct data transmission between the product and SMA Internet portals without any additional communication device and for a maximum of 4 products per visualized system. In PV systems with more than 4 products, there is the option of establishing data transmission between the products and Sunny Portal via the data logger (e.g., SMA Data Manager) or distributing the inverters over several systems. If there is an existing Wi-Fi or Ethernet connection, you can directly access your visualized system via the web browser on your smart device (e.g. smartphone, tablet or laptop).

## 5.4 LED Signals

The LEDs indicate the operating state of the product.

| LED signal | Explanation |
|---|---|
| Green LED and red LED flash simultaneously (2 s on and 2 s off) | No country data set set<br>Operation of the product is stopped because no country data set is set. Once the configuration has been completed (for instance using the installation assistant or via a communication product), the product will start operation automatically. |
| The green LED is flashing (2 s on and 2 s off) | Waiting for feed-in conditions<br>The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation. |
| The green LED is glowing | Feed-in operation<br>The inverter is feeding in. |
| The green LED is off | There is no voltage at the PV inputs of the inverter. |
| The red LED is glowing | Event occurred<br>If an event occurs, a distinct event message and the corresponding event number will be displayed in addition on the product user interface or in the communication product (e.g. Sunny Home Manager). |

| LED signal | Explanation |
|---|---|
| Red LED is flashing (0.25 s on, 0.25 s off, 0.25 s on, 1.25 s off) | Warning<br>Communication with a superordinate plant controller has failed. The inverter continues to operate with restricted function (e.g. with set fallback level).<br>In addition, a distinct event message and the corresponding event number will be displayed on the product user interface or in the communication product (e.g. Sunny Home Manager). |
| The blue LED flashes slowly for approx. 1 minute | Communication connection is being established<br>The product is establishing a connection to a local network or is establishing a direct connection to a smart device via Ethernet (e.g. smartphone, tablet or laptop). |
| The blue LED is flashing fast (0.25 s on and 0.25 s off) | A communication product requests identification of the inverter. |
| The blue LED is glowing | There is an active connection with a local network (LAN/Wi-Fi) or there is a direct connection (Ethernet/WPS function) with a smart end device (e.g. smartphone, tablet or laptop). |
| Blue LED is off | There is no active connection. |
| All 3 LEDs are on | Inverter update or booting procedure |

## 5.5 System overview

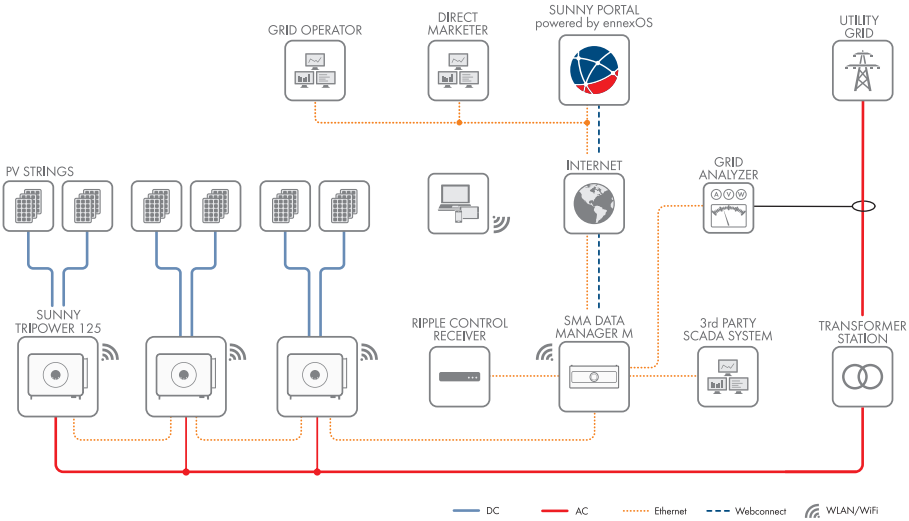



Figure 2: System design

# 6 Mounting

## 6.1 Requirements for Mounting

### 6.1.1 Requirements for the Mounting Location

**⚠ QUALIFIED PERSON**

**⚠ WARNING**

**Danger to life due to fire and deflagration**

In rare cases, an explosive gas mixture can be generated inside the product under fault conditions. In this state, switching operations can cause a fire and, in very rare cases, a deflagration inside the product. Death or lethal injuries due to the spread of a fire can result.

- In the event of a fault, do not perform any direct actions on the product.
- In the event of a fault, ensure that unauthorized persons have no access to the product.
- In case of failure, disconnect the PV module via an external disconnection device. If there is no disconnection device present, wait until no more DC power is applied to the inverter.
- In the event of a fault, disconnect the AC circuit breaker, or keep it disconnected in case it has already tripped, and secure it against reconnection.

☐ Mounting the inverter in living areas is not permitted.

☐ Specialists must have exclusive access to the mounting location.

☐ A solid support surface must be available. When mounted on drywall or similar materials, the product emits audible vibrations during operation which could be perceived as annoying.

☐ The mounting location must be suitable for the weight and dimensions of the product.

☐ The mounting location must not be exposed to direct solar irradiation. If the product is exposed to direct solar irradiation, the exterior plastic parts might age prematurely and overheating might occur. When becoming too hot, the product reduces its power output to avoid overheating.

☐ The DC load-break switch of the product must always be freely accessible.

☐ All ambient conditions must be met.

### 6.1.2 Permitted and prohibited mounting positions

**⚠ QUALIFIED PERSON**

☐ The product may only be mounted in a permitted position. This will ensure that no moisture can penetrate the product.

☐ The product should be mounted such that the LED signals can be read off without difficulty.

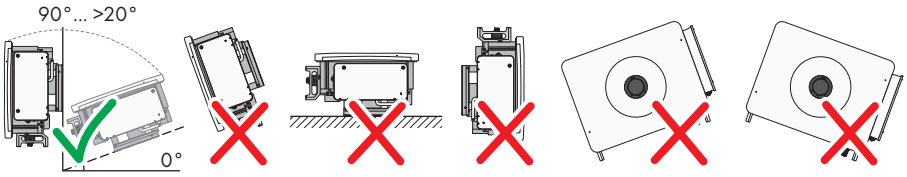
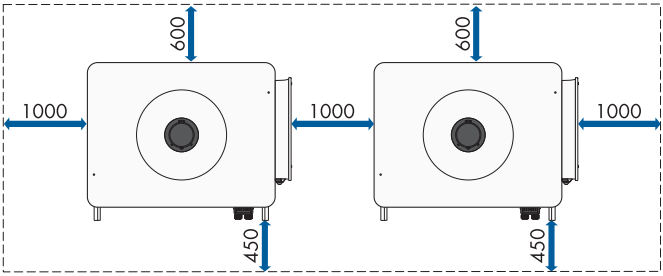


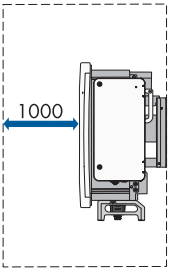

Figure 3: Permitted and prohibited mounting positions

### 6.1.3 Recommended clearances

**⚠ QUALIFIED PERSON**

- ☐ Recommended distances to walls, other devices and objects should be maintained.
- ☐ If multiple products are mounted in areas with high ambient temperatures, increase the clearances between the products and ensure sufficient fresh-air supply.




## 6.2 Mounting to Profile Rails

### 6.2.1 Requirements for mounting on profile rails

**⚠ QUALIFIED PERSON**

- ☐ At least 2 profile rails must be available for mounting.
- ☐ The support surface of the frame to which the profile rails are attached should be firm and level (e.g. concrete). Non-fulfillment of these criteria may restrict servicing.
- ☐ The profile rails must be designed for the load and orientation of the inverters in the PV system. The profile rails might need to be reinforced.
- ☐ The spacing of the profile rails must be designed for the spacing of the holes in the bracket parts for the mounting bracket.
- ☐ The profile rails must be designed for the clamping range of the mounting bracket.

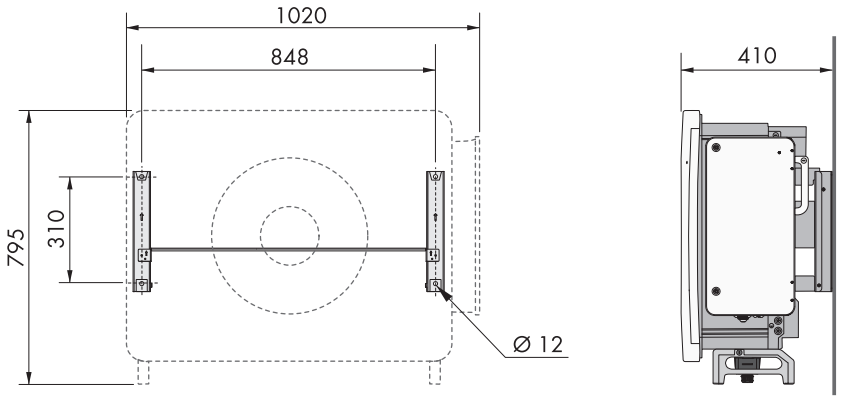



Figure 4: Dimensions of the mounting bracket (dimensions in mm)

## 6.2.2 Mounting the Product to Profile Rails

**⚠ QUALIFIED PERSON**

**⚠ CAUTION**

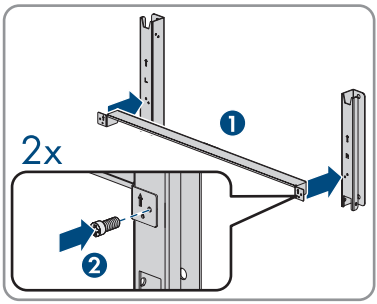
**Risk of injury due to weight of product**

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

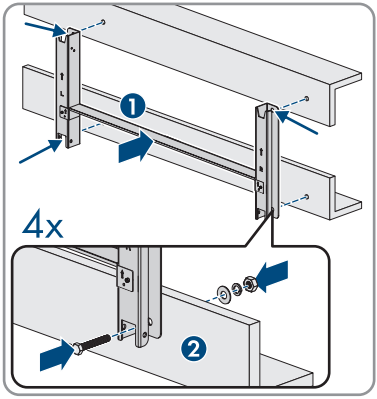
- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.
- Transport the product using the carrying handles or hoist. Take the weight of the product into account.
- Use all carrying handles provided during transport with carrying handles.
- Do not use the carrying handles as attachment points for hoist equipment (e.g. straps, ropes, chains). Insert eye bolts into threads provided on top of the product to attach the hoist system.

**Procedure:**

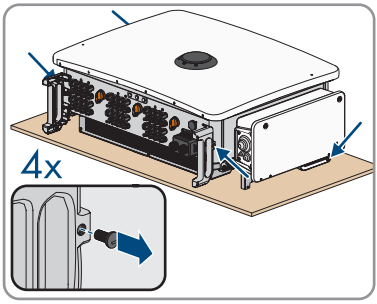
1. Screw the bracket parts to the ends of the connecting rod (PH2, torque: 1.5 Nm) using the cheese head screws (M4x10) to mount the mounting bracket.



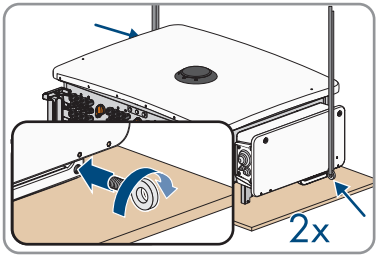

2. Align the mounting bracket using a spirit level and mark the drilling positions on the profile rails.
3. Drill the bore holes (Ø 12 mm) at the marked areas.
4. Attach the mounting bracket to the profile rails (AF16, tightening torque: 35 Nm) using 4 hexagon head screws (M10x45). In this process, use 1 washer, 1 spring washer and 1 hex nut each.



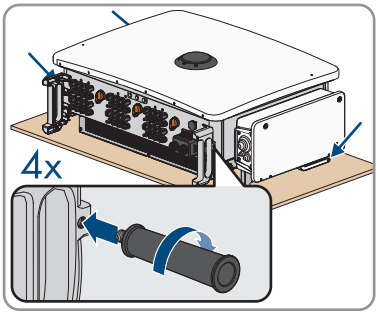

5. Remove the sealing screws on the sides of the inverter using a flat-blade screwdriver (4 mm).

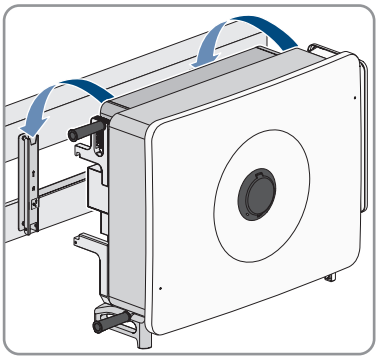


6. If the inverter is to be hooked into the mounting bracket using a lifting gear, screw the eye bolts into the 2 upper threaded holes on the right-hand and left-hand side of the inverter and attach the lifting gear to them. The lifting gear must be suitable to take the weight of the inverter.



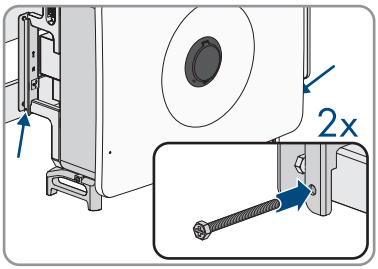

7. If the inverter is to be hooked into the mounting bracket without using a lifting gear, screw the carrying handles as far as they will go into the threaded holes on the right-hand and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the carrying handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the threaded holes to the extent that carrying handles can no longer be screwed into them.
8. Hook the inverter into the mounting bracket.



9. Remove all 4 carrying handles from the threaded holes or remove the eye bolts of the lifting gear and again screw in the sealing screws using a flat-blade screwdriver (4 mm, tightening torque: 2 Nm).

10. Use the hexagon head screws (M6x65) to attach the inverter to the mounting bracket (PH3, tightening torque: 4.5 Nm).




11. If the inverter was hooked into the mounting bracket without lifting gear, remove the carrying handles from the threaded holes on the right and left side.

## 6.3 Mounting the Product on a Wall

**⚠ QUALIFIED PERSON**

**⚠ CAUTION**

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

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

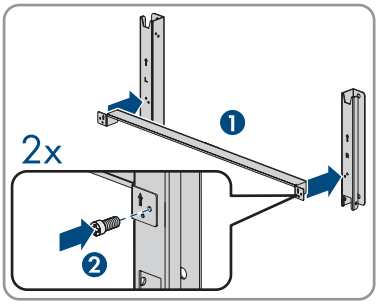
- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.
- Transport the product using the carrying handles or hoist. Take the weight of the product into account.
- Use all carrying handles provided during transport with carrying handles.
- Do not use the carrying handles as attachment points for hoist equipment (e.g. straps, ropes, chains). Insert eye bolts into threads provided on top of the product to attach the hoist system.

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

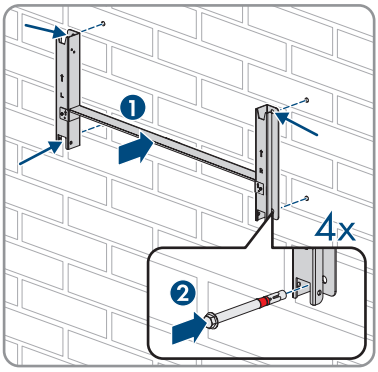
☐ 4 heavy-duty anchors

**Procedure:**

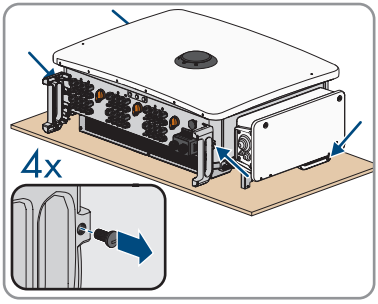
1. Screw the bracket parts to the ends of the connecting rod (PH2, tightening torque: 1.5 Nm) using the cheese head screws (M4x10) to mount the mounting bracket.



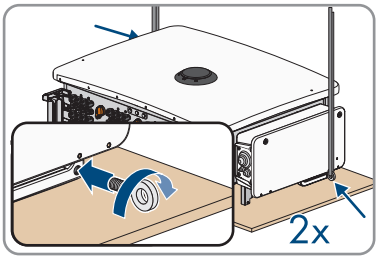
2. Align the mounting bracket using a spirit level and mark the drilling positions.
3. Drill the bore holes (Ø 12 mm) at the marked areas.
4. Attach the mounting bracket to the wall using the heavy-duty anchors.



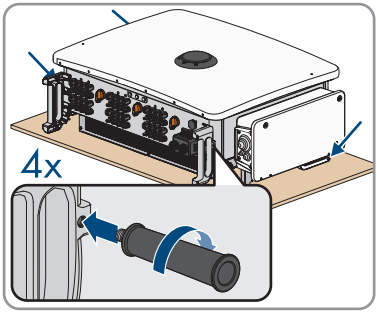

5. Remove the sealing screws on the sides of the inverter using a flat-blade screwdriver (4 mm).



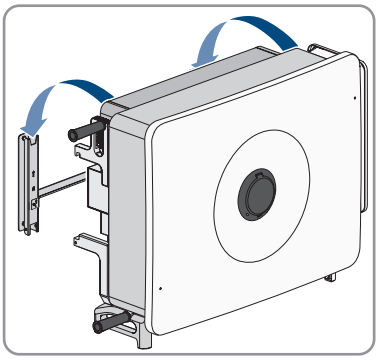

6. If the inverter is to be hooked into the mounting bracket using lifting gear, screw the eye bolts into the 2 upper threaded holes on the right-hand and left-hand side of the inverter and attach the lifting gear to them. The lifting gear must be suitable to take the weight of the inverter.



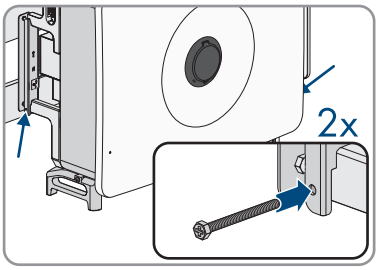
7. If the inverter is to be hooked into the mounting bracket without using a lifting gear, screw the carrying handles as far as they will go into the threaded holes on the right-hand and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the carrying handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the threaded holes to the extent that carrying handles can no longer be screwed into them.




8. Hook the inverter into the mounting bracket.



9. Remove all 4 carrying handles from the threaded holes or remove the eye bolts of the lifting gear and once again screw in the sealing screws (flat-blade screwdriver 4 mm, tightening torque: 2 Nm).
10. Use the hexagon head screws (M6x65) to attach the inverter to the mounting bracket (PH3, tightening torque: 4.5 Nm).




11. If the inverter was hooked into the mounting bracket without lifting gear, remove the carrying handles from the threaded holes on the right and left side.

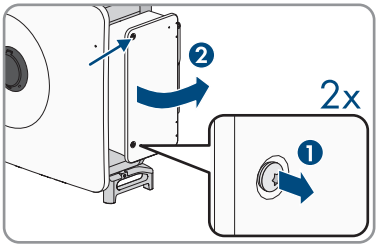
# 7 Opening the Cable Compartment

## ⚠ QUALIFIED PERSON

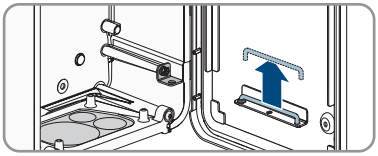
For some of the actions described in this document, the cable compartment must be opened.

**Procedure:**

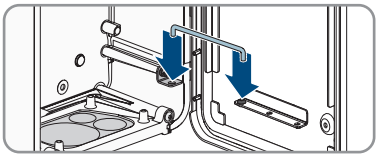
1. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 12, page 78).
2. Loosen the two screws (M6x20) on the cable compartment cover using the enclosed internal Allen key and open the cable compartment.




3. Lift the limiting lever on the inside of the cover on the right and remove from the thread.



4. Engage the end of the limiting lever in the cable compartment with the thread.



☑ The cable compartment cover has been secured and remains open.

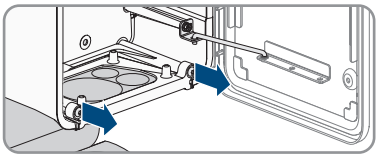
# 8 Installing Optional AC Sealing Plate

## ⚠ QUALIFIED PERSON

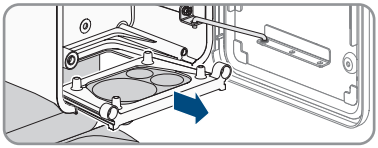
An optional AC sealing plate with 5 sealing rings can be used for the product. The optional AC sealing plate can be ordered in the SMA online shop (www.sma-onlineshop.com) by indicating the material number 211813-00.01.

**Procedure:**

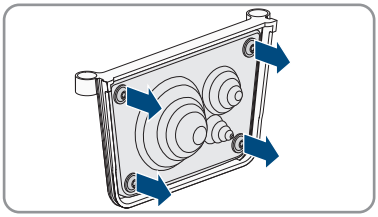
1. Open the AC cable compartment (see Section 7, page 34).
2. Loosen the 2 screws (TX30) in the lower section of the cable compartment.



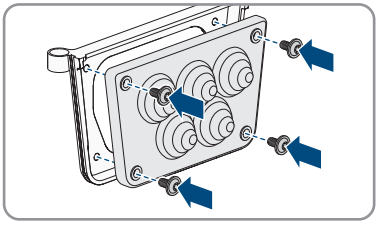
3. Pull the AC seal plate with cassette out of the guide.



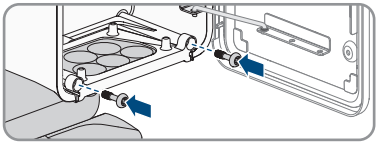
4. Loosen the 4 screws of the AC sealing plate attached to the inverter at delivery (TX30) and remove the AC sealing plate.



5. Ensure that the AC device opening is free of contamination.
6. Ensure that the seal of the optional AC sealing plate is undamaged and free of contamination.
7. Attach the optional AC sealing plate to the cassette using the 4 screws included in delivery (TX30, tightening torque: 4.3 Nm).



8. Slide the cassette into the inverter and secure it to the cable compartment with the 2 screws (TX30, tightening torque: 4.3 Nm).



# 9 Electrical Connection

## 9.1 Requirements for the electrical connection

### 9.1.1 Permitted grid configurations

The inverter approved for operation in the following utility grids:

- TN-C
- TN-S
- TN-C-S
- TT (if UN_PE < 20 V)

Operation of the inverter in IT or Delta IT grids is not permitted. An N conductor is always required.

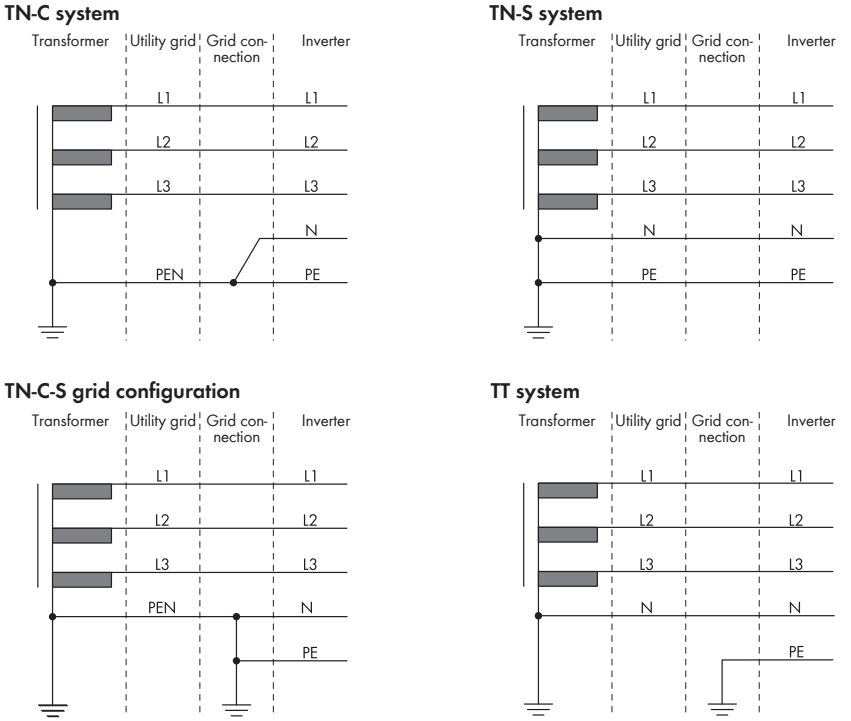



Figure 5: Overview of approved grid configurations

### 9.1.2 Residual-current monitoring unit

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

- ☐ The inverter is compatible with type B residual-current devices with a rated residual current of 1250 mA or higher (see Technical Information "Criteria for Selecting a Residual-Current Device" in www.SMA-Solar.com for information on how to select a residual-current device). Each inverter in the system must be connected to the utility grid via a separate residual-current device.
- ☐ When using residual-current devices with a lower rated residual current, there is a risk of false tripping of the residual-current device, depending on the system design.

### 9.1.3 Load-break switch and cable protection

**NOTICE**

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

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

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

- ☐ In PV systems with multiple inverters, protect each inverter with a separate three-phase circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 17, page 116). This will prevent residual voltage from being present at the corresponding cable after disconnection.
- ☐ Loads installed between the inverter and the circuit breaker must be fused separately.

### 9.1.4 Equipotential Bonding

If components are used in the PV system that require equipotential bonding (e.g., mounting racks, module frames), these must be connected to a central equipotential panel provided for this purpose.

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

### 9.1.5 AC cable requirements

- ☐ Conductor type: copper wire or aluminum wire
- ☐ External diameter: 30 mm to 60 mm
- ☐ Conductor cross-section of grounding conductor:
  For copper wire: 35 mm² to 80 mm²
  For aluminum wire: 60 mm² to 120 mm²
- ☐ Conductor cross-section of line conductor and neutral conductor:
  For copper wire: 70 mm² to 150 mm²
  For aluminum wire: 120 mm² to 240 mm²
- ☐ Insulation stripping length: 18 mm to 20 mm

- ☐ Sheath stripping length: 120 mm to 150 mm
- ☐ The cable must be dimensioned in accordance with the local and national directives for the dimensioning of cables. The requirements for the minimum conductor cross-section derive from these directives. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

## 9.1.6 Network cable requirements

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

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

## 9.1.7 DC cable requirements

- ☐ Outer diameter: 5.5 mm to 8 mm
- ☐ Conductor cross-section: 2.5 mm² to 6 mm²
- ☐ Qty single wires: minimum 7
- ☐ Nominal voltage: minimum 1100 V
- ☐ Using bootlace ferrules is not allowed.

## 9.1.8 Signal cable requirements

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

- ☐ Conductor cross-section: from 0.2 mm² to 1.5 mm²
- ☐ External outer diameter: max. 8 mm
- ☐ Maximum cable length: 200 m
- ☐ Insulation stripping length: 6 mm
- ☐ Sheath stripping length: 150 mm
- ☐ UV-resistant for outdoor use
- ☐ The cable type and cable-laying method must be appropriate for the application and location.

## 9.2 Overview of the Connection Area

### 9.2.1 View from Below

**⚠ QUALIFIED PERSON**

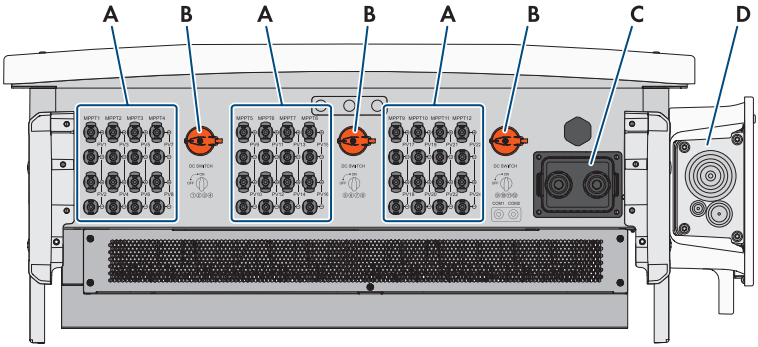



Figure 6: Enclosure openings at the bottom of the inverter

| Position | Designation |
|---|---|
| A | Positive and negative connectors for DC connection |
| B | DC load-break switch |
| C | Cable gland for connecting the communication |
| D | Sealing plate for the AC connection |

## 9.2.2 Interior View

**⚠ QUALIFIED PERSON**

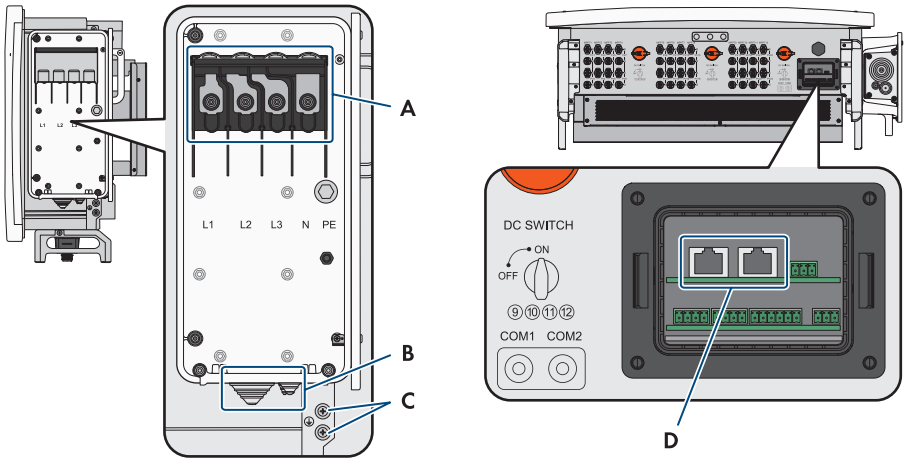



Figure 7: Connection area inside the inverter

| Position | Designation |
|---|---|
| A | AC connection area |
| B | Sealing plate for the AC connection |
| C | Terminal for external grounding |
| D | Connection for Ethernet communication |

# 9.3 Electrical connection procedure

**⚠ QUALIFIED PERSON**

This section describes the procedure for the electrical connection of the product. It provides an overview of the steps, which must be performed in the prescribed sequence.

| Procedure | | See |
|---|---|---|
| 1. | Ensure that the requirements for the electrical connection are fulfilled. | Section 9.1, page 36 |
| 2. | Connect the inverter to the utility grid. | Section 9.4, page 41 |
| 3. | Connect protective grounding. | Section 9.5, page 43 |
| 4. | Connect the network cables. | Section 9.6.2, page 44 |
| 5. | Connect the PV modules. | Section 9.8.3, page 52 |

## 9.4 Connecting the Inverter to the Utility Grid

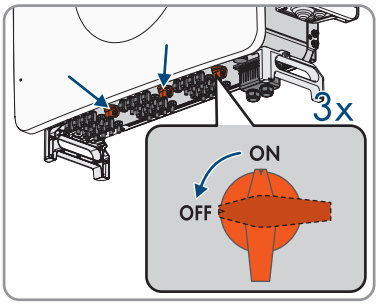
**⚠ QUALIFIED PERSON**

**Required material (not included in the scope of delivery):**

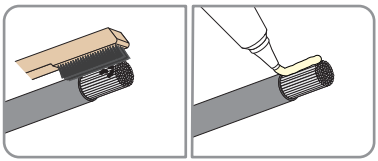
- ☐ Protective grease (only for conductors made of aluminum)
- ☐ 4 heat-shrink tubings
- ☐ 4 ring terminal lugs with hole diameter 12 mm (for conductors made of aluminum bimetal terminal lugs made of aluminum and copper)

**Procedure:**

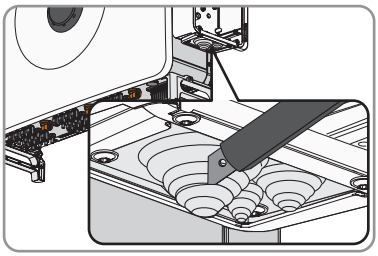
1. Disconnect the AC miniature circuit breaker from all 3 line conductors and secure against reconnection.
2. Make sure that all 3 DC load-break switches have been switched off and secured against reconnection.



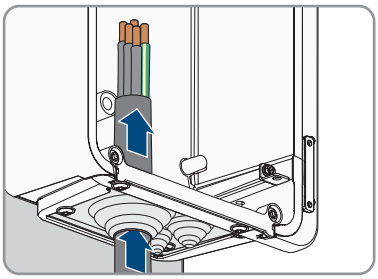

3. Open the cable compartment (see Section 7, page 34).
4. Dismantle the AC cable (≤ 375 mm).
   If the optional AC sealing plate is used, dismantle all 4 cables.
5. Strip the insulation of L1, L2, L3, N and the grounding conductor (30 mm).
6. For conductors made of aluminum, remove the oxide film and apply protective grease to the conductors.



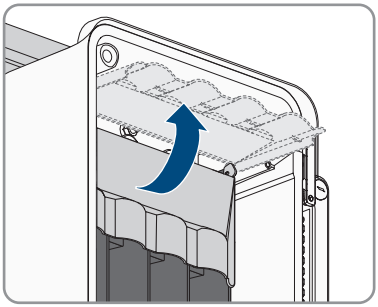
7. Cut the sealing plate of the AC connection at the bottom of the inverter according to the cable diameter.



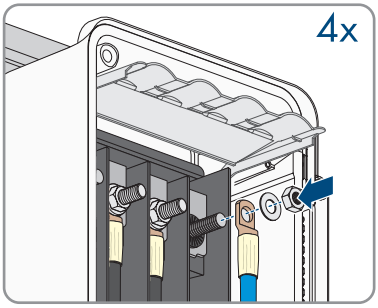
8. Route the cable through the sealing plate for the AC connection into the device.



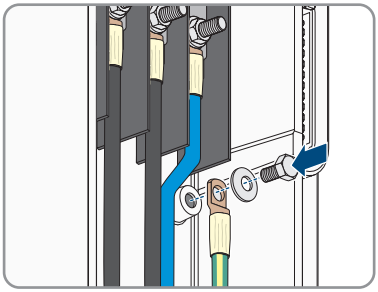
9. Open the protective cover.



10. Pull 1 heat-shrink tubing each over conductors L1, L2, L3, N and the grounding conductor. The heat-shrink tubing must be below the stripped conductor section.
11. Place the conductors with ring terminal lugs as labeled for L1, L2, L3, N incl. 1 washer and hex nut each onto the stud bolts (M12, torque: 20 Nm to 30 Nm) at the top. Now tighten it all using a ratchet.

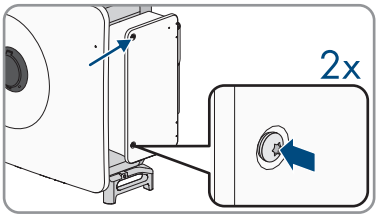



12. Place the grounding conductor incl. 1 washer and hex nut onto the stud bolt (M8, torque: 20 Nm to 30 Nm) in the middle section. Now tighten it all using a ratchet.



13. Ensure that the AC cable is not under tension.
14. Close the protective cover of the cable compartment.

15. Move the limiting lever back to its original position and close the cable compartment cover.
16. Tighten the 2 screws on the cable compartment cover (TX30, tightening torque: 4.2 Nm to 4.5 Nm).




## 9.5 Connecting the external protective grounding

**⚠ QUALIFIED PERSON**

An additional grounding of the inverter is required to protect from touch current in case the grounding conductor fails at the terminal of the AC cable.

The inverter features a ground connection with two connection points for grounding (e.g., when using a grounding electrode).

The connection points have been labeled with the following symbol: ⏚

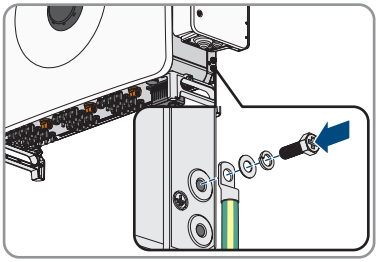
The required screw (MX8) and washer are included in the inverter's scope of delivery.

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

- 1 heat-shrink tubing

**Procedure:**

1. Strip the grounding cable insulation.
2. Pull the heat-shrink tubing over the grounding cable. The heat-shrink tubing must be below of the stripped cable section Crimp the heat-shrink tubing.
3. Tighten the grounding cable to the ground connection with washer and screw (MX8, tightening torque 7 Nm to 9 Nm) using a screwdriver.



# 9.6 Communication Connection

## 9.6.1 Overview of the COM assembly connections

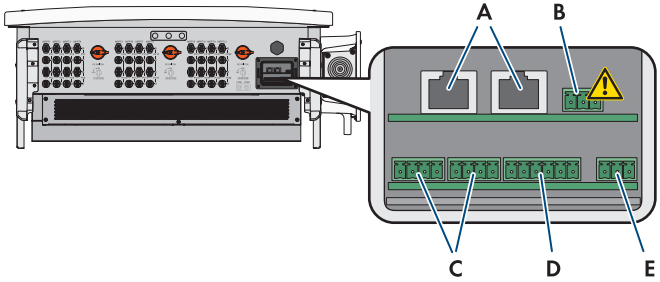



Figure 8: Digital inputs on the COM assembly

| Position | Designation |
|---|---|
| A | Ethernet connections |
| B | Not allowed to be connected |
| C | Terminal for fast stop |
| D | Terminal for digital inputs for curtailment |
| E | Connection for the multifunction relay |

## 9.6.2 Connecting the Network Cables

**⚠ QUALIFIED PERSON**

**⚠ DANGER**

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

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

- Ensure that all devices in the same network are integrated in the existing overvoltage protection.
- When laying the network cable outdoors, ensure that there is suitable surge protection at the network cable transition from the product outdoors to the network inside the building.

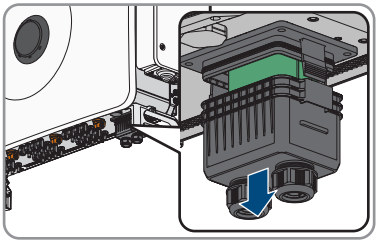
**Additionally required material (not included in the scope of delivery):**

☐ Network cable

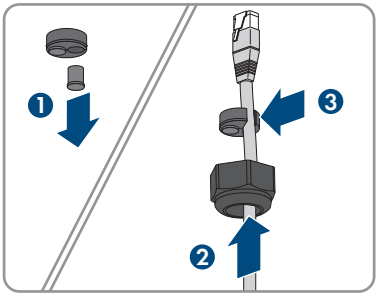
☐ Where required: Field-assembly RJ45 connector.

**Procedure:**

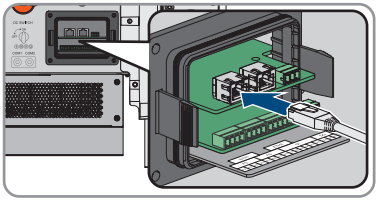
1. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
2. Remove the cover from the communication connection area.



3. Remove the swivel nut from one of the cable glands for the communication cable.
4. Thread the swivel nut over the network cable.
5. Remove the two-hole cable support sleeve from the cable gland. As required, use the cable support sleeve for a cable diameter of between 4.5 mm to 6 mm or between 6 mm to 8 mm that is included in the scope of delivery.
6. Remove the sealing plug from one of the enclosure openings of the two-hole cable support sleeve and insert the network cable into the enclosure opening. Ensure that the network cable is located about 15 cm within the cover so as not to damage the connector when pulling off the cover.




7. Press the two-hole cable support sleeve with the cable into the cable gland and route the network cable to the RJ45 connection at the bottom of the cable compartment. Ensure that any unused enclosure openings of the two-hole cable support sleeve are sealed with sealing plugs.
8. Put the RJ45 plug of the cable into one of the network jacks of the communication assembly.



9. Ensure that the RJ45 connector is firmly seated and that there is no tension on the cable.
10. Press the cover of the communication connection area back into the inverter.
11. Tighten the union nut of the cable gland to the cover hand-tight. This will secure the network cable in place.

12. If the inverter is installed outdoors, install overvoltage protection for all components in the network.
13. To integrate the inverter into a local network, connect the other end of the network cable to the local network (e.g., via a router).

## 9.6.3 Fast stop circuitry overview

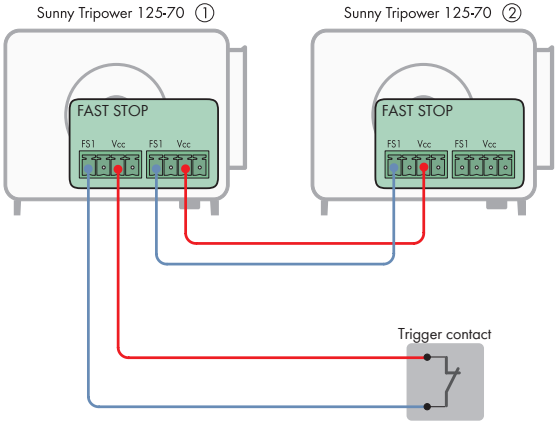



Figure 9: Circuitry overview for connecting a contact for the fast stop and the connection of several inverters

## 9.6.4 Connecting contact for fast stop to digital input

**⚠ QUALIFIED PERSON**

You can connect a contact for the fast-stop switch at the digital inputs FS1 and Vcc. The inputs are provided twice and allow the parallel connection of several inverters (see Section 9.6.3, page 46). To guarantee a reliable function through parallel connection of several devices, only inverters of the same type may be used.

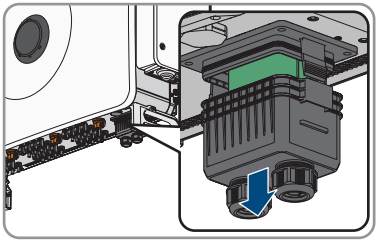
**Additionally required material (not included in the scope of delivery):**

☐ External disconnecting device with potential-free contact to trigger the fast stop function

**Procedure:**

1. Connect the connection cable to the contact for the fast stop (see the manual from manufacturer).
2. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 12, page 78).
3. Open the cable compartment (see Section 7, page 34).
4. Strip off 7 mm of the conductor insulation from each of the connection cable conductors.

5. Remove the cover from the communication connection area.



6. Remove the swivel nut from an unused cable gland for communication cables.
7. Thread the swivel nut over the connection cable.
8. Remove the two-hole cable support sleeve from the cable gland. As required, use the cable support sleeve for a cable diameter of between 4.5 mm to 6 mm or between 6 mm to 8 mm that is included in the scope of delivery.
9. Remove the sealing plug from one of the enclosure openings of the two-hole cable support sleeve and insert the connection cable into the enclosure opening. Ensure that the connection cable is located about 15 cm within the cover so as not to damage the cable connection when pulling off the cover.
10. Press the two-hole cable support sleeve with the cable into the cable gland and route the connection cable to the COM assembly at the bottom of the cable compartment. Ensure that any unused enclosure openings of the two-hole cable support sleeve are sealed with sealing plugs.
11. Remove the terminal block incl. connection area **FS** from the COM assembly.
12. Insert the stripped conductors up to the stop into the terminal points **FS1** and **Vcc** and fasten with a flat-blade screwdriver (tightening torque: 0.2 Nm).
13. Ensure that the conductors are plugged into the terminal points tightly by pulling slightly on the conductors.
14. Plug the terminal block onto the COM assembly according to labeling.
15. Tighten the swivel nut on the cable gland hand-tight. This will secure the connection cable in place.
16. Configure the fast stop function Activating the fast stop function.

## 9.6.5 Connecting the Multifunction Relay

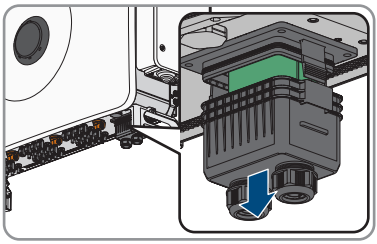
The multifunction relay of the inverter is designed as a potential-free change-over contact (NO / NC / COM). Various status messages can be displayed depending on the configuration of the operating mode (see Section 11.29, page 76).

**Cable requirements:**

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

**Procedure:**

1. Remove the cover from the communication connection area.



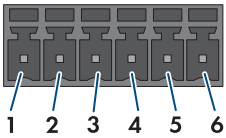
2. Remove the swivel nut from one of the cable glands for the communication cable.
3. Thread the swivel nut over the cable.
4. Remove the two-hole cable support sleeve from the cable gland. As required, use the cable support sleeve for a cable diameter of between 4.5 mm to 6 mm or between 6 mm to 8 mm that is included in the scope of delivery.
5. Remove the sealing plug from one of the enclosure openings of the two-hole cable support sleeve and insert the cable into the enclosure opening. Ensure that the cable is located about 15 cm within the cover so as not to damage the connector when pulling off the cover.
6. Strip off a maximum of 6 mm of the cable insulation.
7. Unlock the conductor inserts on the provided 3-pole connector by loosening the screw.
8. Connect the conductors of the connection cable to the supplied 3-pole connector. To do so, plug the conductors into the conductor entries and close the conductor entries by tightening the screws. Observe the connector assignment.
9. Plug the 3-pole connector into the socket **D0: COM, NC, NO** on the product. Observe the pin assignment.
10. Ensure that the connector is securely in place.
11. Ensure that all conductors are correctly connected.
12. Ensure that the conductors sit securely in the terminal points.
13. Tighten the swivel nut on the cable gland hand-tight.

## 9.7 Connection to digital input

### 9.7.1 Digital input DI: D1-D4, Vcc

At the digital input DI: D1-D4, Vcc you can connect a ripple control receiver or a remote terminal unit with which the active power output of the inverter can be limited.

## 9.7.2 Pin assignment DI: D1-D4, Vcc

| Digital input D1-4 | Pin | Labeling on Inverter | Assignment |
|---|---|---|---|
|  | 1 | D1 | Digital input 1 |
| | 2 | D2 | Digital input 2 |
| | 3 | D3 | Digital input 3 |
| | 4 | D4 | Digital input 4 |
| | 5 | Vcc (12 V) | Voltage supply output |
| | 6 | Vcc (12 V) | Voltage supply output |



## 9.7.3 Circuitry overview DI: D1-D4, Vcc

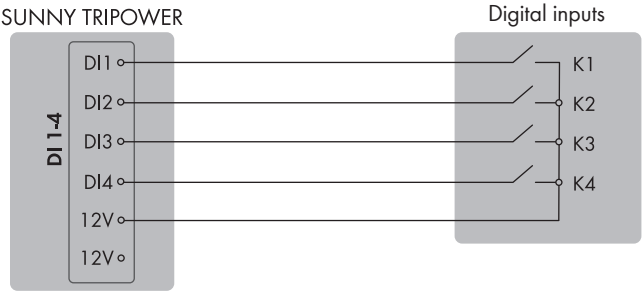
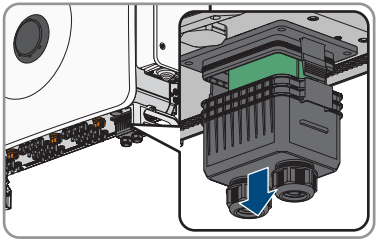



Figure 10: Connection of a remote terminal unit to the digital input DI D1-D4, Vcc of the Sunny Tripower.

## 9.7.4 Connecting the Digital Input

1. Connect the connection cable to the ripple control receiver or the remote terminal unit (see the manual from manufacturer).
2. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 12, page 78).
3. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
4. Remove the cover from the communication connection area.



5. Remove the swivel nut from one of the cable glands for the communication cable.
6. Thread the swivel nut over the network cable.

7. Remove the two-hole cable support sleeve from the cable gland. As required, use the cable support sleeve for a cable diameter of between 4.5 mm to 6 mm or between 6 mm to 8 mm that is included in the scope of delivery.
8. Remove the sealing plug from one of the enclosure openings of the two-hole cable support sleeve and insert the cable into the enclosure opening. Ensure that the cable is located about 15 cm within the cover so as not to damage the connector when pulling off the cover.
9. Strip off a maximum of 6 mm of the cable insulation.
10. Unlock the conductor inserts on the provided 6-pole connector by loosening the screw.
11. Connect the conductors of the connection cable to the supplied 6-pole connector. To do so, plug the conductors into the conductor entries and close the conductor entries by tightening the screws. Observe the connector assignment.
12. Plug the 6-pole connector into the port **DI: D1-D4, Vcc** on the product. Observe the pin assignment.
13. Ensure that the connector is securely in place.
14. Ensure that all conductors are correctly connected.
15. Ensure that the conductors sit securely in the terminal points.
16. Tighten the swivel nut on the cable gland hand-tight.

**Also see:**

- Digital input DI: D1-D4, Vcc ⇒ page 48
- Pin assignment DI: D1-D4, Vcc ⇒ page 49
- Circuitry overview DI: D1-D4, Vcc ⇒ page 49

## 9.8 DC connection

### 9.8.1 Overview of DC connectors

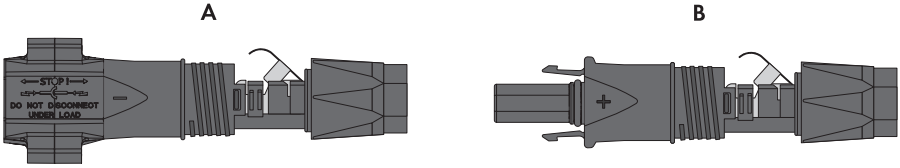



Figure 11: Negative (A) and positive (B) DC connectors

## 9.8.2 Assembling the DC Connectors

**⚠ QUALIFIED PERSON**

For connection to the inverter, all PV module connection cables must be fitted with the DC connectors provided. Assemble the DC connectors as described in the following. The procedure is identical for both connectors (+ and -). The graphics for the procedure are shown for only the positive connector as an example. Pay attention to the correct polarity when assembling the DC connectors. The DC connectors are marked with the symbols "+" and "-".

**⚠ DANGER**

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

When exposed to light, the PV modules generate high DC voltage which is present in the DC cables. Touching live DC cables results in death or lethal injuries due to electric shock.

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

**NOTICE**

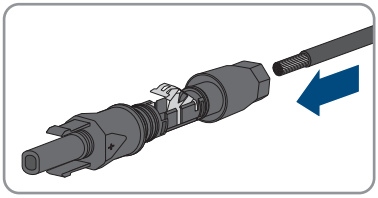
**Destruction of the inverter due to overvoltage**

If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, the inverter can be destroyed due to overvoltage.

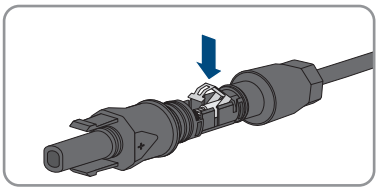
- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

**Procedure:**

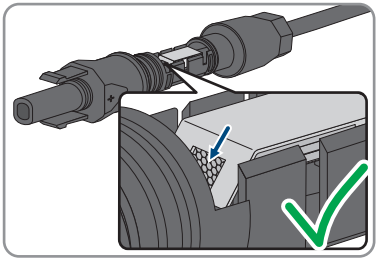
1. Strip approx. 15 mm of the cable insulation.
2. Insert the stripped cable into the DC connector up to the stop. When doing so, ensure that the stripped cable and the DC connector are of the same polarity.



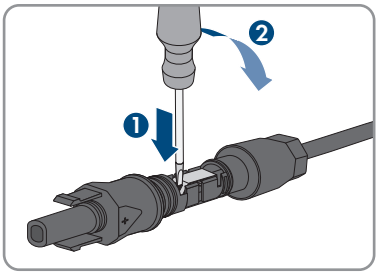
3. Press the clamping bracket down until it audibly snaps into place.



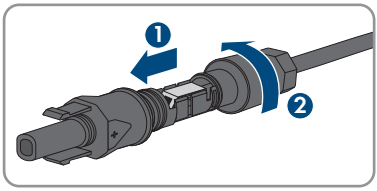
☑ The stranded wire can be seen inside the clamping bracket chamber.



4. If the stranded wire is not visible in the chamber, the cable is not correctly inserted and the connector must be reassembled. To do this, the cable must be removed from the connector.
5. To take out the cable, loosen the clamping bracket. To do so, insert a screwdriver (blade width: 3.5 mm) into the clamping bracket and pry the clamping bracket open.




6. Remove the cable and go back to step 2.
7. Push the swivel nut up to the thread and tighten (torque: 2 Nm).




## 9.8.3 Connecting the PV Array

**⚠ QUALIFIED PERSON**

**⚠ DANGER**

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

When exposed to light, the PV modules generate high DC voltage which is present in the DC cables. Touching live DC cables results in death or lethal injuries due to electric shock.

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

**⚠ WARNING**

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

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

- Only use measuring devices with a measurement ranges designed for the maximum AC and DC voltage of the inverter.

**NOTICE**

**Destruction of the inverter due to overvoltage**

If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, the inverter can be destroyed due to overvoltage.

- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

**NOTICE**

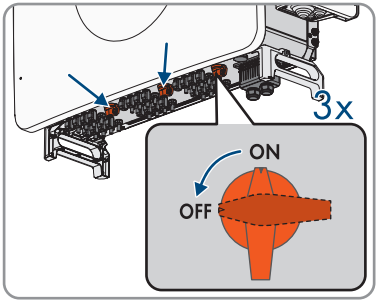
**Damage to the product due to sand, dust and moisture ingress if the DC inputs are not closed**

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

- Do not remove the sealing plugs from DC inputs that are not required.

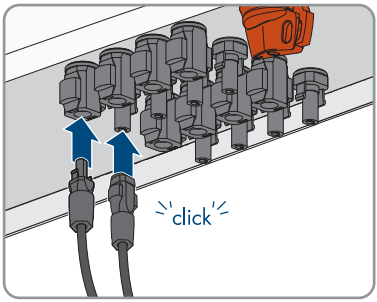
**Procedure:**

1. Ensure that the AC miniature circuit breaker is switched off and that it cannot be reconnected.
2. Switch off the 3 DC load-break switches of the inverter.

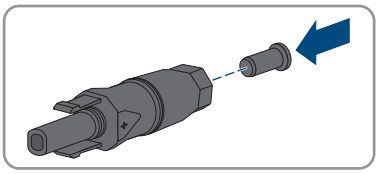



3. Measure the PV array voltage. Ensure that the maximum input voltage of the inverter is adhered to and that there is no ground fault in the PV array.
4. Check whether the DC connectors have the correct polarity. If the DC connector is equipped with a DC cable of the wrong polarity, the DC connector must be reassembled. When this is done, the respective DC cable must always have the same polarity as the DC connector.

5. Ensure that the open-circuit voltage of the PV array does not exceed the maximum input voltage of the inverter.
6. Connect the assembled DC connectors to the inverter.




   ☑ The DC connectors snap into place.
7. For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.
8. Insert the sealing plug into the DC plug connector.



9. Insert the DC connectors with sealing plugs into the corresponding DC inputs of the inverter.
   ☑ The DC connectors snap into place.
10. Ensure that all DC connectors are securely in place.

# 10 Commissioning

## 10.1 Commissioning Procedure

**⚠ QUALIFIED PERSON**

This section describes the procedure for commissioning the product. It provides an overview of the steps, which must be performed in the prescribed sequence.

| Procedure | | See |
|---|---|---|
| 1. | Commission the inverter. | Section 10.3, page 55 |
| 2. | Establish a connection to the user interface of the product. There are various connection options to choose from for this:<br>• Direct connection via Wi-Fi<br>• Connection via Wi-Fi in the local network<br>• Connection via Ethernet in the local network | Section 11.1, page 59 |
| 3. | Log into the user interface. | Section 11.7, page 66 |
| 4. | Update the firmware. | Section 11.28, page 76 |
| 5. | Carry out the configuration using the installation assistant and set the country data set. Then the product will begin operation. | Section 11.9, page 66 |
| 6. | Make further inverter settings as needed. | Section 11, page 59 |

## 10.2 Procedure for commissioning with communication device

## 10.3 Commissioning the Inverter

**Requirements:**

☐ The AC circuit breaker must be correctly rated and mounted.

☐ The product must be correctly mounted.

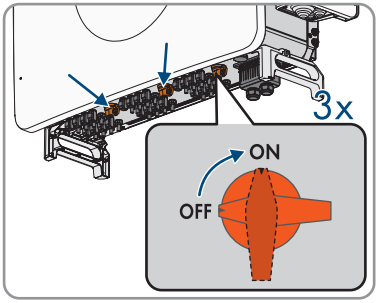
☐ All cables must be correctly connected.

☐ Unused enclosure openings must be sealed tightly with sealing plugs.

**Procedure:**

1. Make sure that the AC cable compartment is closed.

2. Switch on all 3 DC load-break switches.




3. Switch the AC voltage supply on.
   ☑ Green LED is flashing. The inverter is waiting for the input conditions.
   ☑ After approx. 90 seconds, the green LED is permanently on. The inverter is feeding in.
4. Ensure that the inverter feeds in correctly.

## 10.4 Logging into the user interface for the first time

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

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

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

**Procedure:**

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

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

**Also see:**

- Establishing a Direct Connection via Ethernet ⇒ page 59

## 10.5 Carry out the configuration using the installation assistant

**⚠ QUALIFIED PERSON**

The installation assistant helps you to configure the inverter and guides you to the most important settings.

**Requirements:**

☐ You are logged in as **Installer**, and the user interface is open on the **Configuring the Inverter** page.

**Procedure:**

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

☑ The start page of the user interface opens.

**Also see:**

- Logging Into the User Interface ⇒ page 66
- Layout of the installation assistant ⇒ page 61

## 10.6 Adopting the Configuration from a File

**⚠ QUALIFIED PERSON**

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

**Requirements:**

☐ You are logged in as **Installer**, and the user interface is open on the **Configuring the Inverter** page.

**Procedure:**

1. Select the configuration option **Adopt the configuration from a file**.

2. Select [**Browse...**] and select the desired file.
3. Select [**Import file**].

## 10.7 Carry out the configuration manually

**⚠ QUALIFIED PERSON**

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

**Requirements:**

☐ You are logged in as **Installer**, and the user interface is open on the **Configuring the Inverter** page.

**Procedure:**

1. Select the configuration option **Manual Configuration**.
   ☑ The **Device Parameters** menu on the user interface will open and all available parameter groups of the inverter will be displayed.
2. Click on [**Edit parameters**].
3. Select the desired parameter group.
   ☑ All available parameters of the parameter group will be displayed.
4. Set the desired parameters.
5. Select [**Save all**].

☑ The inverter parameters are set.

**Also see:**

- Logging Into the User Interface ⇒ page 66

# 11 Operation

## 11.1 Establishing a connection to the user interface

### 11.1.1 Establishing a Direct Connection via Ethernet

**IP address of the product**

- Default IP address of the product for direct connection via Ethernet: **169.254.12.3**

**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.

**Requirements:**

☐ An end device (e.g. laptop) with an Ethernet interface must be available.

☐ The product must be connected directly to the end device.

**Procedure:**

1. Open the web browser of your end device.
2. Enter the IP address **169.254.12.3** into the address bar and press the enter key.
3. **Web browser displays warning**

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

   - Continue loading the user interface (scroll to bottom and click proceed/advance).

☑ The login page of the user interface opens.

**Also see:**

- Logging Into the User Interface ⇒ page 66

## 11.2 Layout of the 'Configuring the Inverter' page

**⚠ QUALIFIED PERSON**

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

On the **Configuring the Inverter** page, different configuration options for the first configuration of the device are available to choose from. SMA Solar Technology AG recommends carrying out the configuration with the installation assistant. This way, you ensure that all relevant parameters are set for optimal inverter operation.

- Adopting the Configuration from a File
- Configuring the Installation Assistant (Recommended)
- Manual configuration

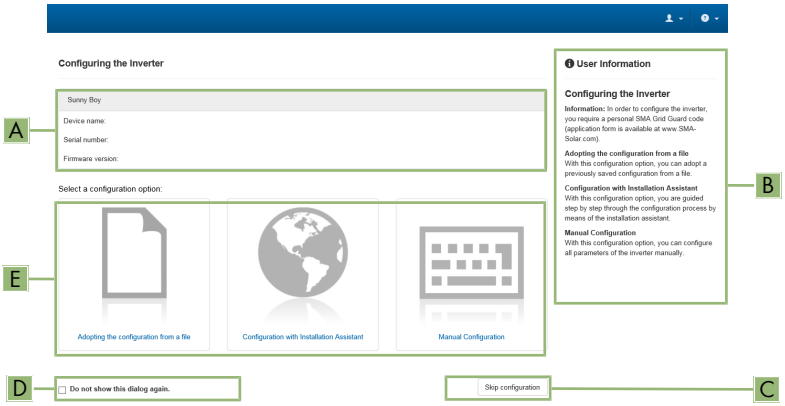



Figure 12: Layout of the **Configuring the Inverter** page

| Position | Designation | Description |
|---|---|---|
| A | Device information | Provides the following information:<br>• Device name<br>• Inverter serial number<br>• Inverter firmware version |
| B | User information | Provides brief information on the listed configuration options |
| C | Skip configuration | Offers the option of skipping the inverter configuration and go directly to the user interface (not recommended) |
| D | Checkbox | Allows you to choose not to have the displayed page displayed again when the user interface is called up again |
| E | Configuration options | Provides a selection of the various configuration options |

**Also see:**

- Carry out the configuration using the installation assistant ⇒ page 57
- Adopting the Configuration from a File ⇒ page 57
- Carry out the configuration manually ⇒ page 58

## 11.3 Layout of the installation assistant

**⚠ QUALIFIED PERSON**

The installation assistant guides you step-by-step through the steps required for initial configuration of the product.

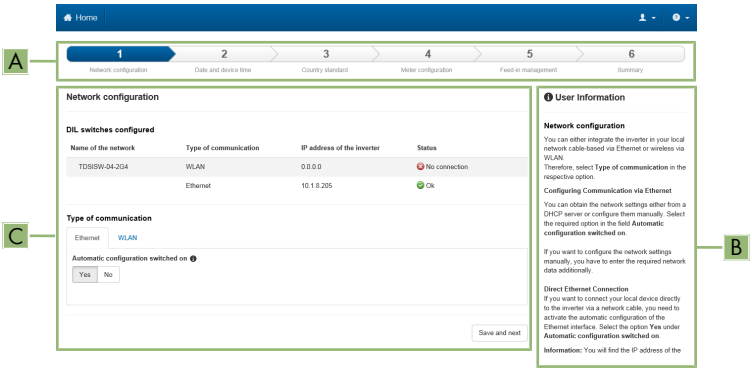



Figure 13: Layout of the installation assistant (example)

| 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. |

**Also see:**

- Establishing a connection to the user interface ⇒ page 59
- Starting the Installation Assistant ⇒ page 66

## 11.4 Start Page Design of the User Interface

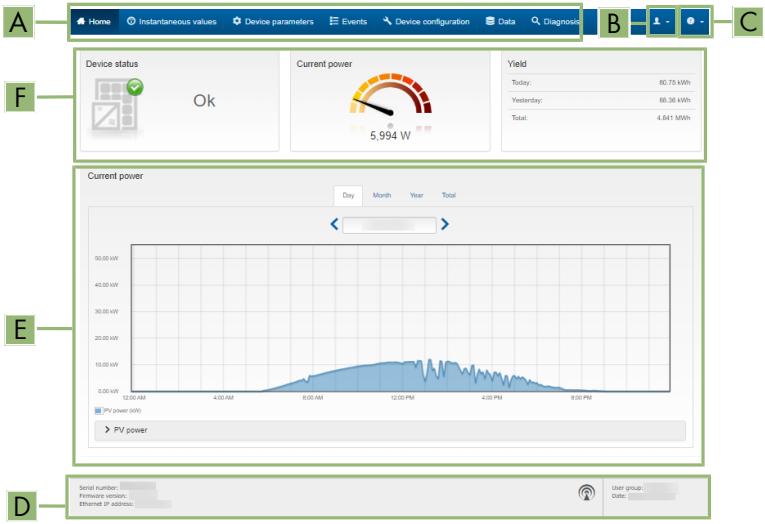



Figure 14: Design of the user interface's home page (example)

| Position | Designation | Description |
|---|---|---|
| A | Menu | Provides the following functions:<br>• **Home**<br>Opens the user interface home page<br>• **Instantaneous Values**<br>Current measured values of the inverter<br>• **Device Parameters**<br>The various operating parameters of the inverter can be viewed and configured here depending on the user group.<br>• **Events**<br>All events that have occurred in the selected time period are displayed here. The event types are **Information**, **Warning** and **Error**. Currently existing events of the types **Error** and **Warning** will be additionally displayed in the **Device status** viewlet. However, only the higher-priority event is displayed. If, for example, there is a Warning and an Error present at the same time, only the error will be displayed.<br>• **Device Configuration**<br>Various settings for the inverter can be made here. The selection available is dependent on which user group you are logged in as and the operating system of the device with which the user interface has been called up.<br>• **Data**<br>You will find all data that is saved in the internal memory of the inverter on this page.<br>• **Diagnosis**<br>Here, an I-V characteristic curve of the PV array per MPP tracker can be created and exported. |

| Position | Designation | Description |
|---|---|---|
| B | User settings | Provides the following functions, depending on the user group logged in:<br>• Starting the Installation Assistant<br>• Set access rights<br>• Activating and Deactivating the Smart Inverter Screen<br>• Show eManual<br>• Link to SMA Online Service Center (www.my.sma-service.com)<br>• Logout |
| C | Help | Provides the following functions:<br>• Displaying information on Open Source licenses used<br>• Link to the website of SMA Solar Technology AG |
| D | Status bar | Displays the following information:<br>• Serial number of the inverter<br>• Inverter firmware version<br>• IP address of the inverter in the local network<br>• User group logged in<br>• Date and device time of the inverter |

| 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 | The various areas display information on the current status of the PV system.<br>• **Device status**<br>Displays whether the inverter is currently in a fault-free operating state or whether there is an Error or Warning present.<br>• **Current power**<br>Displays the power currently being generated by the inverter.<br>• **Yield**<br>Displays the energy yield of the inverter.<br>• **Grid supply**<br>Displays the energy supply from the utility grid.<br>• **Power at the grid connection point**<br>Indicates which power is currently fed in or obtained at the grid-connection point. |

## 11.5 Access rights to the user interface

An installer is created during registration. As an installer, you can add additional users to the system by defining and sharing a user password.

This gives users access to the system and to the devices recorded in the system.

The following rights are available on the user interface:

- User
- Installer
- Service

**Also see:**

- Creating a user password ⇒ page 65

## 11.6 Creating a user password

1. Follow the procedure for changing the parameters.
2. In the parameter group **User rights > Access control**, select the parameter **Set user password**.

3. Create a user password.
4. Select [**Save all**] to save the changes.

**Also see:**

- Changing parameters ⇒ page 69

## 11.7 Logging Into the User Interface

**Requirement:**

☐ A connection to the user interface of the inverter has been established and the login page is open.

**Procedure:**

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

☑ The start page of the user interface opens.

## 11.8 Logging out of the user interface

**Requirement:**

☐ You are logged in on the user interface as **User** or **Installer**.

**Procedure:**

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.

## 11.9 Starting the Installation Assistant

**⚠ QUALIFIED PERSON**

The installation assistant guides you step-by-step through the initial configuration of the product.

**Requirements:**

☐ You must be logged in on the user interface as **Installer**.

☐ The inverter must be updated to the latest firmware version.

**Procedure:**

1. Select the menu **User settings** on the home page of the user interface.
2. In the context menu, select [**Starting the installation assistant**].

☑ The installation assistant will open.

**Also see:**

- Updating firmware via the user interface ⇒ page 76
- Layout of the installation assistant ⇒ page 61

## 11.10 Activating the WPS Function

**Requirements:**

☐ WLAN must be activated in the product.

☐ WPS must be activated on the router.

**Procedure:**

1. Open the user interface (see Section 11.1, page 59).
2. Log in as **Installer**.
3. Start the installation assistant Starting the Installation Assistant.
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.

## 11.11 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 > Wi-Fi**, 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**.

## 11.12 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.

**Requirements:**

☐ 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**.

## 11.13 Configuring the active power mode for systems with external setpoint

**⚠ QUALIFIED PERSON**

**Requirement:**

☐ Installation assistant has been started.

**Procedure:**

1. Select [**Save and continue**] after each step up until the step **Grid management service**.
2. In the tab **Active power mode** set the switch **Active power setpoint** to [**On**].
3. In the drop-down list **Operating mode active power setpoint**, select the entry **External setpoint**.
4. In the drop-down list **Fallback behavior**, select the entry **Apply fallback values**.
5. In the **Fallback value of maximum active power** field, enter the value to which the product should limit its nominal power if communication to the higher-level control unit fails after the timeout time has elapsed.
6. In the **Timeout** field, enter the time that the product should wait until it limits its nominal power to the set fallback value.
7. If, in the event of a 0% or 0 W specification, the inverter is not permitted to feed small amounts of active power into the utility grid, select the entry **Yes** in the drop-down list **Grid disconnection for 0% active power setting**. This ensures that in the event of a 0% or 0 W specification, the inverter disconnects from the utility grid and does not feed in active power.

## 11.14 Configuring the active power mode for systems with manual setpoint

**⚠ QUALIFIED PERSON**

**Requirement:**

☐ Installation assistant has been started.

**Procedure:**

1. Select [**Save and continue**] after each step up until the step **Grid management service**.
2. In the tab **Active power mode** set the switch **Grid connection point regulation** to [**On**].
3. Enter the total power of the PV array in the field **Nominal system power**.
4. In the drop-down list **Operating mode of active power limitation at the point of interconnection**, select whether active power limitation is to be performed via a fixed specification in percent or in watts.

5. In the field **Set active power limit at the grid-connection point**, enter the value to which the active power at the grid-connection point is to be limited. The value must be set to **0** for zero power output.
6. Set the **Active power setpoint** to [**On**].
   ☑ You can manually specify the active power or have the active power controlled by the inverter.
7. Manual preset: In the **Operating mode active power setting** drop-down list, select **Manual setting in %** or **Manual setting in W**.
8. Manual preset: Enter the default value in the **Active power** field.
9. Preset by inverter: In the drop-down list **Operating mode active power setpoint**, select the entry **External setting**.
10. Preset by inverter: In the drop-down list **Fallback behavior**, select the entry **Apply fallback values**.
11. Preset by inverter: In the drop-down list **Grid disconnection for 0% active power setting** select the entry **No**.

## 11.15 Changing parameters

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

This section describes the basic procedure for changing parameters. Always change parameters as described in this section.

### i Accepting the settings

Saving the made settings is indicated by an hourglass symbol on the user interface. If the DC voltage is sufficient, the data is transferred directly to the inverter and accepted. If the DC voltage is too low (e. g. 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.

**Requirements:**

☐ You are logged in on the user interface.

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

**Procedure:**

1. Call up the menu **Device parameters**.
2. Click on [**Edit parameters**].
3. Expand the parameter group that contains the parameter which is to be configured.
4. Change the required parameters.
5. Select [**Save all**] to save the changes.

☑ The parameters are set.

**Also see:**

- Establishing a connection to the user interface ⇒ page 59

## 11.16 Arc-Fault Circuit Interrupter (AFCI)

**⚠ QUALIFIED PERSON**

The arc fault circuit interrupter (AFCI) can be activated with immediate operating inhibition, activated without operating inhibition or activated with operating inhibition after 5 detections within 24 hours.

You can set the arc-fault circuit interrupter using the following parameters.

| Name | Group | Settings |
|---|---|---|
| AFCI | **Device > Inverter** | **Yes**<br>**No** |

You can use the following parameters to set the manual restart after an arc fault detection.

| Name | Group | Settings |
|---|---|---|
| **Manual restart after arc detection** | **AC Side > Operation > Manual restart** | **On**<br>**Off**<br>**Yes, after 5 electric arc detections within 24 hrs** |

You can use the following parameters to resume operation after an operating interruption.

| Name | Group | Settings |
|---|---|---|
| **General operating mode** | **Device > Operation** | **Start**<br>**Stop** |

**Also see:**

- Changing parameters ⇒ page 69
- Arc-Fault Circuit Interrupter (AFCI) ⇒ page 22

## 11.17 Generating a product key for the first time

If you have forgotten the product's password, you can use the product key to create a new one. The product key is stored only on the device. A lost product key cannot be recovered, it can only be recreated.

Creating a product key is not mandatory, but is recommended by SMA Solar Technology AG because the product key significantly increases the security of the system. A product key must be generated for each of the user groups **User** and **Installer**.

**Requirements:**

☐ The user interface is open and you are logged in as **User** or **Installer**.

**Procedure:**

1. Select the menu **User settings**.
2. Select [**Access rights**].
3. Select [**Product key**].
4. Enter the specific device secret of the product. Which specific device secret is used and where you can find the specific device secret is indicated on the user interface.
5. Click on [**Generate**].
   ☑ A string representing the product key is generated.
6. Write down the product key immediately and keep it safe. After leaving this page, the newly generated product key can no longer be displayed. The copy of the product key must be accessible only to you.

**Also see:**

- Establishing a connection to the user interface ⇒ page 59
- Logging Into the User Interface ⇒ page 66

## 11.18 Generate new product key

If the product key has become accessible to unauthorized persons, you can generate a new product key at any time.

**Requirements:**

☐ The currently valid product key must be available.

☐ The user interface is open and you are logged in as **User** or **Installer**.

**Procedure:**

1. Select the menu **User settings**.
2. Select [**Access rights**].
3. Select [**Product key**].
4. Enter the currently valid product key.
5. Click on [**Generate**].
   ☑ A string representing the new product key is generated.
6. Write down the new product key immediately and keep it safe. After leaving this page, the newly generated product key can no longer be displayed. The previously valid product key is invalid after a new product key is generated. The copy of the product key must be accessible only to you.

**Also see:**

- Establishing a connection to the user interface ⇒ page 59
- Logging Into the User Interface ⇒ page 66

## 11.19 Activate Service access

In the event of a malfunction of the product, it may be necessary for a service user authorized by SMA Solar Technology AG to access the user interface of the product.

Service access must be activated to execute warranty services. If a quick and uncomplicated service intervention is to be enabled in an emergency, the service access must be permanently activated.

You have the option of activating the service access permanently or for a certain period of time.

**Requirements:**

☐ The user interface is open and you are logged in as **User** or **Installer**.

**Procedure:**

1. Select the menu **User settings**.
2. Select [**Access rights**].
3. Select [**Service**].
4. To activate service access permanently, click on [**Yes, permanently**] in the drop-down list.
5. To enable service access for a specific time, click on [**Yes, temporary**] in the drop-down list and adjust the expiration date if necessary.
6. Click on [**Save**].

**Also see:**

- Establishing a connection to the user interface ⇒ page 59
- Logging Into the User Interface ⇒ page 66

## 11.20 Deactivate Service access

**Requirements:**

☐ The user interface is open and you are logged in as **User** or **Installer**.

**Procedure:**

1. Select the menu **User settings**.
2. Select [**Access rights**].
3. Select [**Service**].
4. In the drop-down list select the entry [**No**].
5. Click on [**Save**].

**Also see:**

- Establishing a connection to the user interface ⇒ page 59
- Logging Into the User Interface ⇒ page 66

## 11.21 Dynamic power display (green LED)

As standard, the product 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 product.

You can deactivate the dynamic power display. In this case, the green LED is lit permanently in feed-in operation.

| Channel | Name | Group | Settings |
|---|---|---|---|
| **Operation.GrnLedWInd** | **Dynamic power display via green LED** | **Device > Operation** | • **On** (standard)<br>• **Off** |

**Also see:**

- Logging Into the User Interface ⇒ page 66

## 11.22 Password

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

| Channel | Name | Group | Settings |
|---|---|---|---|
| **Acs.PwdIstl** | **Set user password** | **User Rights > Access Control** | • Random password according to password guideline |
| **Acs.PwdIstl** | **Set installer password** | **User Rights > Access Control** | • Random password according to password guideline |

## 11.23 Q on Demand 24/7

The general setting of the grid management services (e.g. cos phi setpoint or Q(V) characteristic curve) can not be fully set independently of the "Q on Demand 24/7" function via the relevant parameters - "Q on Demand 24/7" only permits Q specifications. It is to be noted here that certain settings can have an influence on other grid-support settings and functions.

This means that if the "Q on Demand 24/7" function" is active, no other grid-supporting functions (e.g., cos phi) are possible between day and night operation of the inverter. Should an independent reactive power provision be desired between day- and night operation, the reactive power provision must be communicated to the inverter via a superordinate control unit.

The function "Q on Demand 24/7" is not compatible with the reactive power modes **cos φ(P) charac. curve** or **cos φ(V) charac. curve**.

Currently, the provision of reactive power can only be read off via the phase currents and phase voltages in the instantaneous values (**Realtime values > AC Side > Phase currents / Phase voltage**) or requested via Modbus.

You can set the reactive power mode using the following parameters.

| Channel | Name | Group | Settings |
|---|---|---|---|
| **Inverter.VArModCfg.VArModOutFlb** | **Reactive power fallback process in case of active power output** | **System and device control > Inverter > Reactive power mode** | Selection of various reactive power modes |
| **Inverter.VArModCfg.VArModZerW** | **Reactive power for zero active power** | **System and device control > Inverter > Reactive power mode** | Selection of various reactive power modes |

## 11.24 Saving the Configuration in a File

You can save the current configuration of the product to a file. To configure the products, you can use this file as a backup of this product and then import the file back into this product or other products of the same type or device family. When saving, only the device parameters will be saved, not any passwords.

**Prerequisite:**

☐ You are logged in on the user interface.

**Procedure:**

1. Select the menu **Device Configuration**.
2. Select [**Settings**].
3. In the context menu, select [**Saving the configuration in a file**].
4. Follow the instructions in the dialog.

**Also see:**

- Adopting a Configuration from a File ⇒ page 74

## 11.25 Adopting a Configuration from a File

**⚠ QUALIFIED PERSON**

To configure the product, you can transfer the configuration from a file. To do this, you must first save the configuration of another product of the same type or the same device family to a file. When saving, only the device parameters will be adopted, not any passwords.

**Requirements:**

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

☐ You are logged in on the user interface as **Installer**.

**Procedure:**

1. Select the menu **Device Configuration**.
2. Select [**Settings**].

3. In the context menu, select [**Adopting the configuration from a file**].
4. Follow the instructions in the dialog.

**Also see:**

- Saving the Configuration in a File ⇒ page 74

## 11.26 Configuring the Country Data Set

For the product to begin operation, a country data set must be set (for instance via the installation assistant on the user interface of the product, or via a communication product). As long as no country data set is set, operation of the product will remain stopped. This state is signaled by the green and red LEDs flashing simultaneously. Once configuration of the product is completed, the product will start operating automatically.

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

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

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

**Procedure:**

1. Follow the procedure for changing the parameters.
2. In the parameter group **Grid monitoring > Grid monitoring**, select the parameter **Set country data set**.
3. Configure the required country data set.
4. Select [**Save all**] to save the changes.

## 11.27 Automatic firmware update

The product can automatically download and install a firmware update. You can activate the automatic firmware update either via the user interface of the product or the System Manager (e.g. SMA Data Manager) or via the Sunny Portal.

If the automatic firmware updated is deactivated, you can manually search and install new firmware versions.

You can activate or deactivate the automatic firmware update using the following parameter.

| Channel | Name | Group | Settings |
|---|---|---|---|
| **Upd.AutoUpdIsOn** | **Automatic updates activated** | **Device > Update** | • **Yes**<br>• **No** (standard) |

**Also see:**

- Updating firmware via the user interface ⇒ page 76

## 11.28 Updating firmware via the user interface

**⚠ QUALIFIED PERSON**

**Requirements:**

☐ The product must be connected to the Internet.

☐ You are logged in on the user interface as **Installer**.

**Procedure:**

1. Select the menu **Device Parameters**.
2. Click on [**Edit parameters**].
3. Select **Device > Update**.
4. Select the parameter **Check for update and install it** and set it to **Execute**.
5. Click on [**Save all**].

☑ The firmware is updated in the background.

## 11.29 Operating Modes of the Multifunction Relay

You can use the following parameters to set the operating mode of the multifunction relay.

| Name | Group | Settings |
|---|---|---|
| **Operating mode of multifunction relay** | **Device>Multifunction relay** | • **Off**<br>• **Battery bank**<br>• **Self-consumption**<br>• **Fan control**<br>• **Switching status grid relay**<br>• **Control via communication**<br>• **Fault indication** |

The setting values for the operating mode of the multifunction relay are to be understood as follows:

| Settings | Description |
|---|---|
| **Battery bank** | The multifunction relay controls the charging of the batteries depending on the power production of the PV system. |
| **Self-consumption** | The multifunction relay switches loads on or off, depending on the power production of the PV system. |
| **Fan control** | The multifunction relay controls an external fan, depending on the temperature of the inverter. |
| **Switching status grid relay** | The local grid operator may require that a signal is transmitted as soon as the inverter connects to the utility grid. The multifunction relay can be used to trigger this signal. |

| Settings | Description |
|---|---|
| **Control via communication** | The multifunction relay switches loads on or off according to commands transmitted by a communication product. |
| **Fault indication** | The multifunction relay controls a display device (e.g. a warning light) which, depending on the type of connection, signals either an error or the undisturbed operation of the inverter. |

**Also see:**

- Changing the Operating Mode of the Multifunction Relay ⇒ page 77

## 11.30 Changing the Operating Mode of the Multifunction Relay

The default operating mode of the multifunction relay is **Fault indication**. 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.

**Procedure:**

1. Follow the procedure for changing the parameters.
2. In the parameter group **Device>Multifunction relay**, select the parameter **Operating mode of multifunction relay** and set the required operating mode.
3. Select [**Save all**] to save the changes.

**Also see:**

- Operating Modes of the Multifunction Relay ⇒ page 76
- Establishing a connection to the user interface ⇒ page 59

## 11.31 Setting SMA ShadeFix

You can set the time interval in which the inverter has to determine the optimum operating point and to optimize the MPP of the PV system. In battery-backup operation mode, SMA ShadeFix is automatically deactivated.

**Procedure:**

1. Follow the procedure for changing the parameters Changing parameters.
2. In the parameter group **DC-side > DC settings > SMA ShadeFix**, set the parameter **Time interval of SMA ShadeFix** and set the required time interval.
3. Set the desired time interval. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.

# 12 Disconnecting the Inverter from Voltage Sources

## ⚠ QUALIFIED PERSON

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

### ⚠ WARNING

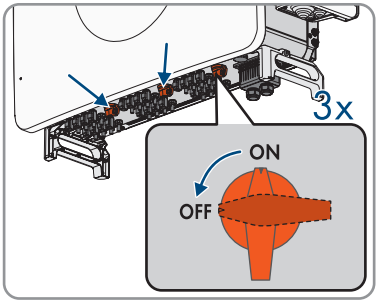
**Danger to life due to electric shock from destruction of the measuring device due to overvoltage**

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

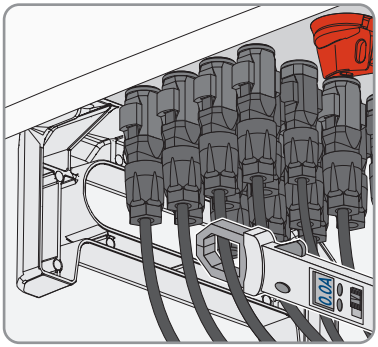
- Only use measuring devices with a measurement ranges designed for the maximum AC and DC voltage of the inverter.

**Procedure:**

1. Shut down the AC voltage supply and secure against unintentional reconnection.
2. Switch off all 3 DC load-break switches of the inverter and secure against reconnection.




3. Wait until the LEDs have gone out.
4. Use a current clamp to ensure that no current is present in the DC cables.



5. Note the position of the DC connectors.

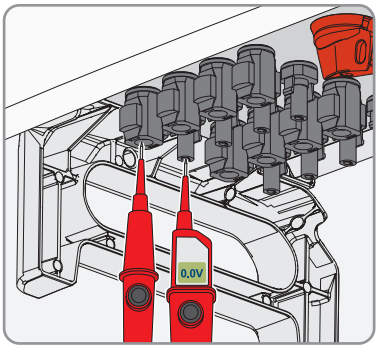
6. **⚠ DANGER**

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

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

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

7. Unlock the DC connector using the corresponding unlocking tool and remove (refer to the manufacturer manual for further information).
8. Ensure that the DC connectors on the product and those that are equipped with DC conductors are in perfect condition and that none of the DC conductors or DC plug contacts are exposed.
9. Ensure that no voltage is present at the DC inputs on the inverter using a suitable voltage detector.




10. **⚠ DANGER**

    **Danger to life due to high voltages**

    Even after disconnection, there are residual voltages on the product that must be removed.

    - Wait 5 minutes before proceeding.

11. Check that there is no voltage at the AC connection between L1 and L2, L2 and L3, L1 and L3 and L1 and grounding conductor, L2 and grounding conductor, L3 and grounding conductor and between L1 and N, L2 and N and L3 and N using a suitable voltage detector. For this purpose, hold the test prods to the conductors' ring terminal lugs.

# 13 Troubleshooting

## 13.1 Overview of the designations for MPP trackers

The designations of the MPP trackers on the product user interface differ from the labeling on the product. In case of failure, observe the following table for troubleshooting:

| Designation on the product | Designations on the user interface |
|---|---|
| MPPT-1 | MPPT-A |
| MPPT-2 | MPPT-B |
| MPPT-3 | MPPT-C |
| MPPT-4 | MPPT-D |
| MPPT-5 | MPPT-E |
| MPPT-6 | MPPT-F |
| MPPT-7 | MPPT-G |
| MPPT-8 | MPPT-H |
| MPPT-9 | MPPT-I |
| MPPT-10 | MPPT-J |
| MPPT-11 | MPPT-K |
| MPPT-12 | MPPT-L |

## 13.2 Event messages

### 13.2.1 Event 102

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.

**Corrective measures:**

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

  If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.

  If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

## 13.2.2 Event 103

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.

**Corrective measures:**

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

  If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.

  If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

## 13.2.3 Event 203

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The utility grid has been disconnected, the AC cable is damaged or the grid voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid.

**Corrective measures:**

- Ensure that the miniature circuit breaker is switched on.
- Ensure that the AC cable is not damaged and that it is connected correctly.
- Ensure that the country data set has been configured correctly.

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

  If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.

  If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

### 13.2.4 Event 502

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The grid frequency is not within the permissible range. The inverter has disconnected from the utility grid.

**Corrective measures:**

- If possible, check the grid frequency and observe how often fluctuations occur.

  If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter.

  If the grid operator gives approval, discuss any changes to the operating parameters with the Service.

### 13.2.5 Event 503

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The grid frequency is not within the permissible range. The inverter has disconnected from the utility grid.

**Corrective measures:**

- If possible, check the grid frequency and observe how often fluctuations occur.

  If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter.

  If the grid operator gives approval, discuss any changes to the operating parameters with the Service.

### 13.2.6 Event 601

**⚠ QUALIFIED PERSON**

**Event message:**

- **Grid incident**

**Explanation:**

The inverter has detected an excessively high proportion of direct current in the grid current.

**Corrective measures:**

- Check the grid connection for direct current.
- If this message is displayed frequently, contact the grid operator and check whether the monitoring threshold on the inverter can be raised.

### 13.2.7 Event 901

**⚠ QUALIFIED PERSON**

**Event message:**

- **PE connection missing**
- **Check connection**

**Explanation:**

The grounding conductor is not correctly connected.

**Corrective measures:**

- Ensure that the grounding conductor is correctly connected.

### 13.2.8 Event 1302

**⚠ QUALIFIED PERSON**

**Event message:**

- **Waiting for grid voltage**
- **Grid connection installation failure**
- **Check grid and fuses**

**Explanation:**

L or N not connected.

**Corrective measures:**

- Ensure that the line conductors are connected.
- Ensure that the miniature circuit breaker is switched on.
- Ensure that the AC cable is not damaged and that it is connected correctly.

## 13.2.9 Event 1416

**⚠ QUALIFIED PERSON**

**Event message:**

- Grid incident

**Explanation:**

Due to a voltage imbalance between the line conductors, the system disconnects from the utility grid.

**Corrective measures:**

- Eliminate any faults in the installation.

## 13.2.10 Event 1501

**⚠ QUALIFIED PERSON**

**Event message:**

- **Reconnection fault grid**

**Explanation:**

The changed country standard or the value of a parameter you have set does not correspond to the local requirements. The inverter cannot connect to the utility grid.

**Corrective measures:**

- Ensure that the country data set has been configured correctly. To do this, select the parameter **Set country standard** and check the value.

## 13.2.11 Event 3401

**⚠ QUALIFIED PERSON**

**Event message:**

- **DC overvoltage**
- **Disconnect generator**

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.12 Event 3402

**⚠ QUALIFIED PERSON**

**Event message:**

- **DC overvoltage**
- **Disconnect generator**

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.13 Event 3407

**⚠ QUALIFIED PERSON**

**Event message:**

- **DC overvoltage**
- **Disconnect generator**

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.14 Event 3410

**⚠ QUALIFIED PERSON**

**Event message:**

- **DC overvoltage**
- **Disconnect generator**

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.15 Event 3411

**⚠ QUALIFIED PERSON**

**Event message:**

- **DC overvoltage**
- **Disconnect generator**

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.16 Event 3412

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.17 Event 3413

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.18 Event 3414

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.19 Event 3415

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.20 Event 3416

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.21 Event 3417

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.

- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.22 Event 3418

**⚠ QUALIFIED PERSON**

**Event message:**

- DC overvoltage
- Disconnecting generator

**Explanation:**

Overvoltage at the DC input. This can destroy the inverter.

This message is signalized additionally by rapid flashing of the LEDs.

**Corrective measures:**

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- 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 cables to the inverter.
- 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.
- If this message is repeated frequently, contact the Service.

## 13.2.23 Event 3501

**⚠ QUALIFIED PERSON**

**Event message:**

- **Insulation failure**
- **Check generator**

**Explanation:**

The inverter has detected a ground fault in the PV module.

**Corrective measures:**

- Check the PV system for ground faults.

## 13.2.24 Event 3601

**⚠ QUALIFIED PERSON**

**Event message:**

- **High discharge current**

- **Check generator**

**Explanation:**

The leakage current of the inverter and the PV module is too high. There is a ground fault, a residual current or a malfunction.

The inverter interrupts feed-in operation immediately after exceeding a threshold. When the fault is eliminated, the inverter automatically reconnects to the utility grid.

**Corrective measures:**

- Check the PV system for ground faults.

## 13.2.25 Event 3800

**⚠ QUALIFIED PERSON**

**Event message:**

- **Residual current too high**
- **Check generator**

**Explanation:**

Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.

**Corrective measures:**

- If this message is displayed frequently, ensure that the PV module has been correctly rated and wired.

## 13.2.26 Event 3804

**⚠ QUALIFIED PERSON**

**Event message:**

- **Residual current too high**
- **Check generator**

**Explanation:**

Overcurrent at the DC input. The inverter briefly interrupts feed-in operation.

**Corrective measures:**

- If this message is displayed frequently, ensure that the PV module has been correctly rated and wired.

## 13.2.27 Event 3901

**⚠ QUALIFIED PERSON**

**Event message:**

- **Waiting for DC start conditions**

- **Start conditions not met**

**Explanation:**

The feed-in conditions for the utility grid are not yet fulfilled.

**Corrective measures:**

- Ensure that the PV module is not covered by snow or otherwise shaded.
- Wait for higher irradiation.
- If this message is displayed frequently in the morning, increase the voltage limit for starting grid feed-in. Change the parameter **Critical voltage to start feed-in**.
- If this message is displayed frequently with medium irradiation, ensure that the PV module is correctly rated and wired.

## 13.2.28 Event 4002

**⚠ QUALIFIED PERSON**

**Event message:**

- String [#] disturbance of the output current

**Corrective measures:**

- Check whether individual PV modules are heavily soiled or covered with snow.
- Ensure that the PV module shows no signs of abnormal aging.
- If the fault cannot be rectified using the indicated corrective measures, contact Service.

## 13.2.29 Event 4013

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.30 Event 4014

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.31 Event 4015

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.32 Event 4016

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.33 Event 4017

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.34 Event 4018

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.35 Event 4019

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.36 Event 4020

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.37 Event 4021

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.38 Event 4022

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.39 Event 4023

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.40 Event 4024

**⚠ QUALIFIED PERSON**

**Event message:**

- Reverse currents or input X polarity reversed
- Check generator

**Explanation:**

The displayed input is in reverse polarity or reverse current has been detected in the input.

**Corrective measures:**

- Check the correct polarity of the connected PV modules.
- Ensure correct design and circuitry of the PV array.
- If solar irradiation is sufficient, check whether the same voltage is present at the DC inputs.
- Ensure that no PV module is defective.

## 13.2.41 Event 4301

**⚠ QUALIFIED PERSON**

**Event message:**

- **Serial el.arc in String |s0| detected by AFCI mod.**

**Explanation:**

The inverter has detected an electric arc in the displayed string. If "String N/A" is displayed, the string could not be uniquely assigned.

The inverter stops feeding into the utility grid.

**Corrective measures:**

- Disconnect the inverter from voltage sources and secure it against being switched on again.
- Check the PV modules and the cabling in the affected string or, if the string was not displayed, in all strings for damage.
- Ensure that the DC connection in the inverter is correct.
- Repair or replace defective PV modules, DC cables or the DC connection in the inverter.
- Start manual restart (if necessary).

## 13.2.42 Event 6001-6499

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Interference device**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.43 Event 6501

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Overtemperature**

**Explanation:**

The inverter has switched off due to excessive temperature.

**Corrective measures:**

- Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.
- Ensure that the inverter has sufficient ventilation.
- Ensure the maximum ambient temperature is not exceeded.

## 13.2.44 Event 6502

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Overtemperature**

**Explanation:**

The inverter has switched off due to excessive temperature.

**Corrective measures:**

- Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.
- Ensure that the inverter has sufficient ventilation.
- Ensure that the maximum permissible ambient temperature is complied with.

## 13.2.45 Event 6509

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**

- **Overtemperature**

**Explanation:**

The inverter has switched off due to excessive temperature.

**Corrective measures:**

- Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.
- Ensure that the inverter has sufficient ventilation.
- Ensure the maximum ambient temperature is not exceeded.

## 13.2.46 Event 6512

**Event message:**

- **Minimum operating temperature not reached**

**Explanation:**

The inverter will only recommence grid feed-in once the temperature has reached at least −25°C.

## 13.2.47 Event 6513

**Event message:**

- **Self-diagnosis**
- **Overtemperature**

**Explanation:**

The inverter has switched off due to excessive temperature.

**Corrective measures:**

- Ensure that the airflow is free of dirt.
- Ensure that the ambient temperature does not exceed the maximum permissible temperatures.
- If the maximum permissible temperature is met at all times and this message is displayed again, contact the Service.

## 13.2.48 Event 6603

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Overcurrent grid (HW)**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.49 Event 6604

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Overvoltage intermediate circuit (SW)**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.50 Event 6802

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Input A defective**

**Explanation:**

Polarity error on the inverter.

**Corrective measures:**

- Check whether a string is connected to input A.
- Contact Service.

## 13.2.51 Event 6902

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Input B defective**

**Explanation:**

Polarity error on the inverter.

**Corrective measures:**

- Check whether a string is connected to input B.
- Contact Service.

## 13.2.52 Event 7001

**⚠ QUALIFIED PERSON**

**Event message:**

- **Fault sensor interior temperature**

**Explanation:**

A temperature sensor in the inverter is defective and the inverter interrupts the feed-in operation. The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.53 Event 7002

**⚠ QUALIFIED PERSON**

**Event message:**

- **Fault sensor interior temperature**

**Explanation:**

A temperature sensor in the inverter is defective and the inverter interrupts the feed-in operation. The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.54 Event 7007

**⚠ QUALIFIED PERSON**

**Event message:**

- Fault sensor interior temperature

**Explanation:**

A temperature sensor in the inverter is defective and the inverter interrupts the feed-in operation. The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.55 Event 7500

**⚠ QUALIFIED PERSON**

**Event message:**

- Sensor error

**Explanation:**

Measurement error

**Corrective measures:**

- Contact Service.

## 13.2.56 Event 7600

**⚠ QUALIFIED PERSON**

**Event message:**

- Self-diagnosis > Communication error

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.57 Event 7701

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Interference device**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.58 Event 7702

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Interference device**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.59 Event 7712

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Interference device**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.60 Event 7729

**⚠ QUALIFIED PERSON**

**Event message:**

- Self-diagnosis > Device disturbance
- Backup bypass relay fault

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.61 Event 8204

**⚠ QUALIFIED PERSON**

**Event message:**

- **AFCI self-test failed**

**Explanation:**

An error occurred during the self-test of the arc-fault circuit interrupter (AFCI). It is not guaranteed that the arc-fault circuit interrupter (AFCI) will function correctly. The device does not feed in.

**Corrective measures:**

- Contact Service.

## 13.2.62 Event 8903

**⚠ QUALIFIED PERSON**

**Event message:**

- **Self-diagnosis**
- **Interference device**

**Explanation:**

The cause must be determined by the Service.

**Corrective measures:**

- Contact Service.

## 13.2.63 Event 9006

**Event message:**

- Self-test

## 13.2.64 Event 29253

**Event message:**

- Input power for backup too low

**Explanation:**

The input power is too low. The battery-backup operation cannot be started. As soon as the minimum input power for the battery-backup operation is reached, the battery-backup operation starts.

**Corrective measures:**

- Switch off or disconnect backup loads that are not required.

## 13.2.65 Event 29255

**Event message:**

- AC overcurrent backup (fast/slow)

**Explanation:**

The loads connected to the terminal for backup loads exceed the permissible current.

**Corrective measures:**

- Check electric circuits of backup loads and the loads connected.
- Disconnect the loads from the electric circuit.

## 13.2.66 Event 29256

**Event message:**

- AC overcurrent backup (fast)

**Explanation:**

The loads connected to the terminal for backup loads exceed the permissible current.

**Corrective measures:**

- Check electric circuits of backup loads and the loads connected.
- Disconnect the loads from the electric circuit.

# 14 Maintenance

## 14.1 Safety during Maintenance

**⚠ DANGER**

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

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

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

**⚠ DANGER**

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

When exposed to light, the PV modules generate high DC voltage which is present in the DC cables. Touching live DC cables results in death or lethal injuries due to electric shock.

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

**⚠ WARNING**

**Danger to life due to electric shock when touching live components or cables while the device is exposed to sunlight**

In the event of a fault, a high voltage may be present at the DC terminals on the inverter. Touching live components can result in death or serious injury due to electric shock.

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- Stop all work on the inverter until nightfall.
- Wear suitable personal protective equipment of the corresponding hazard risk category for all work.

**NOTICE**

**Damage to the inverter due to unapproved spare parts**

If accessories and spare parts not approved by SMA Solar Technology AG are used for maintenance, the product may be damaged.

- Only use spare parts approved by SMA Solar Technology AG.

## 14.2 Servicing Schedule

**⚠ QUALIFIED PERSON**

| Task | Interval |
|---|---|
| Check the temperature of the inverter and check the inverter for dust contamination. Clean the enclosure if necessary. | Every 6 to 12 months, depending on the environment's dust content |
| Check the condition of the air inlet and air outlet and check for dirt and blockages. If necessary, remove dirt and blockages so that the ventilation of the device is ensured again. | Every 6 to 12 months, depending on the environment's dust content |
| Check if there is a fan event message or if there are unusual noises when the fan is rotating. Clean or replace the external fans if necessary. | Every 12 months |
| Ensure that all cable glands are sufficiently sealed. Seal the cable glands again if necessary. | Every 12 months |
| Ensure that all cables are connected correctly and are not damaged. If necessary, correct the connection and replace damaged cables. | Every 6 to 12 months |

**Also see:**

- Removing the Fan Assembly ⇒ page 108
- Installing the External Fan Assembly ⇒ page 109
- Cleaning ⇒ page 107

## 14.3 Cleaning

The product must be cleaned regularly to ensure that the product is free of dust, leaves and other dirt.

**NOTICE**

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

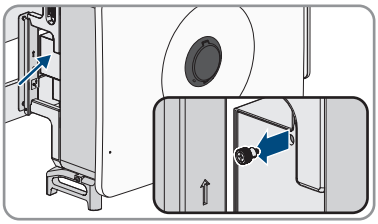
The use of cleaning agents may cause damage to the product and its components.

## 14.4 Removing the Fan Assembly

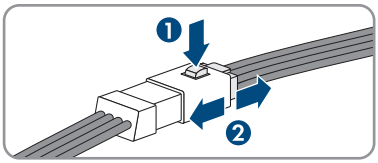
**⚠ QUALIFIED PERSON**

1. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 12, page 78).
2. **⚠ CAUTION**

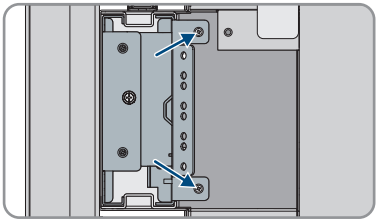
   **Risk of burns due to hot enclosure parts**
   - Wait 30 minutes for the enclosure to cool down.
3. Loosen the spring-loaded cross-head screw (M4).



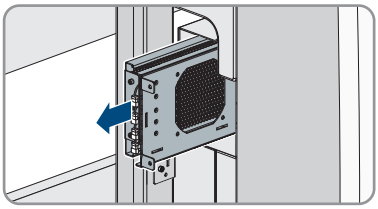
4. Remove the sealing plate of the fan cassette.
5. To release the cable connection, press the clamping bracket together to unlock and pull the cable connection apart.




6. Loosen the 2 cross-head screws (M4) on the fan cassette.



7. Pull the fan cassette out of the inverter.

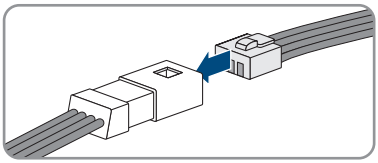


8. Clean (see Section 14.3, page 107) or replace the fan cassette if necessary.

## 14.5 Installing the External Fan Assembly

**⚠ QUALIFIED PERSON**

1. Insert the fan cassette into the inverter.
2. Screw the 2 cross-head screws (M4) to the fan cassette.
3. Plug the cable connectors together and ensure that they are locked.



4. Position the sealing plate of the fan cassette.
5. Screw down the spring-loaded cross-head screw (M4).
6. Commission the inverter (see Section 10.3, page 55).

# 15 Decommissioning

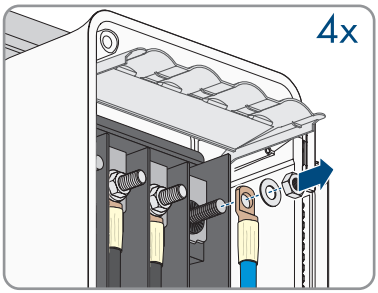
## 15.1 Disconnecting the Terminals from the Inverter

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

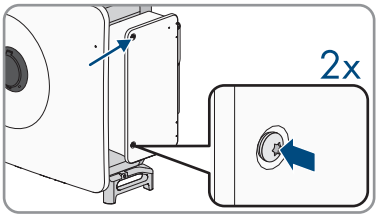
**Procedure:**

1. Disconnect the inverter from voltage sources and secure it against being switched on again(see Section 12, page 78).
2. **⚠ CAUTION**

   **Risk of burns due to hot enclosure parts**
   - Wait 30 minutes for the enclosure to cool down.
3. Open the cable compartment (see Section 7, page 34).
4. Open the protective cover.
5. Loosen the conductors L1, L2, L3, N with the ring terminal lugs from the threads at the top using a ratchet.

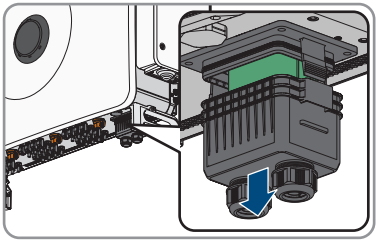



6. Loose the grounding conductor and the ring terminal lug using a ratchet.
7. Close the protective cover of the cable compartment.
8. Move the limiting lever back to its original position and close the cable compartment cover.
9. Tighten the 2 screws on the cable compartment cover (TX30, tightening torque: 4.2 Nm to 4.5 Nm).

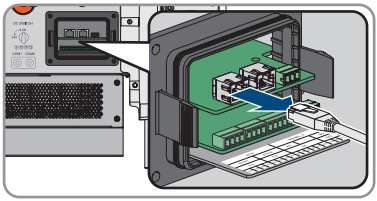



10. Remove the union nut of the cable glands for the communication cable.

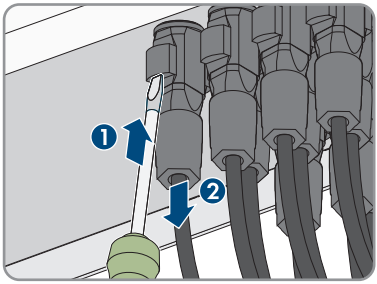
11. Remove the cover from the communication connection area.



12. Remove all connection cables from the communication assembly.



13. Remove the connection cable from the cable gland.
14. Tighten the union nut of the cable gland to the cover hand-tight.
15. Press the cover of the communication connection area back into the inverter.
16. Remove the DC connectors from the inputs.




17. Insert sealing plugs onto the DC inputs.

## 15.2 Disassembling the DC Connectors

**⚠ QUALIFIED PERSON**

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

**⚠ DANGER**

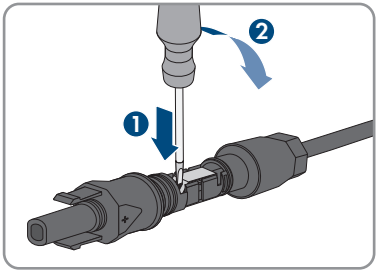
**Danger to life due to electric shock when touching exposed DC conductors or DC plug contacts if the DC connectors are damaged or loose**

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

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

**Procedure:**

1. Release and remove the DC connectors. To do so, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors out. When doing so, do not lever the DC connectors out, but insert the tool into one of the side slots only to release the locking mechanism, and do not pull on the cable.
2. Remove the DC connector swivel nut.
3. Unlock the DC connector. To do this, insert a flat-blade screwdriver (blade width: 3.5 mm) into the side catch mechanism and pry the catch mechanism open.
4. Carefully pull the DC connector apart.
5. Release the clamping bracket. To do so, insert a flat-blade screwdriver (blade width: 3.5 mm) into the clamping bracket and pry the clamping bracket open.




6. Remove the cable.

## 15.3 Disassembling the Inverter

**Requirements:**

☐ Original packaging or packaging suitable for the weight and dimensions of the product must be available.

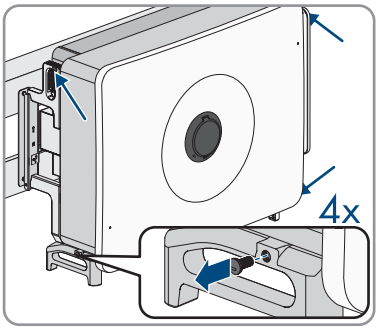
☐ A pallet must be available.

☐ Mounting material for attaching the packaging on the pallet must be available (e.g. tie-down straps).

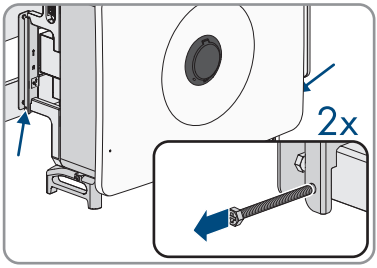
☐ All transport handles must be in place.

**Procedure:**

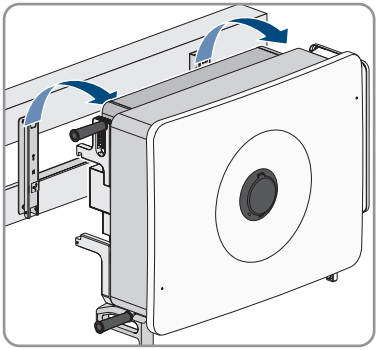
1. Remove the sealing screws on the sides of the inverter using a flat-blade screwdriver (4 mm).




2. Screw all 4 carrying handles or the eye bolts of the lifting gear into the threaded holes.
3. If the inverter is to be unhooked from the mounting bracket using lifting gear, screw the eye bolts into the 2 upper threaded holes on the right-hand and left-hand side of the inverter and attach the lifting gear to them. The lifting gear must be suitable to take the weight of the inverter.
4. If the inverter is to be lifted out of the mounting bracket without using lifting gear, screw the carrying handles as far as they will go into the threaded holes on the right-hand and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the carrying handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the threaded holes to the extent that carrying handles can no longer be screwed into them.
5. Remove the hexagon head screws (M6xM65) from the mounting bracket.



6. Unhook the inverter from the mounting bracket.



7. If the inverter is to be shipped, pack the inverter according to its size and weight.
8. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

# 16 Disposal

The product must be disposed of in accordance with the locally applicable disposal regulations for waste electrical and electronic equipment.

# 17 Technical Data

## 17.1 General Data

| | |
|---|---|
| Width x height x depth | 1020 mm x 795 mm x 410 mm |
| Weight | 96 kg |
| Way of attaching | Wall mounting bracket |
| Operating temperature range | -30°C to +60°C |
| Max. permissible value for relative humidity (condensing) | 100 % |
| Maximum operating altitude above mean sea level (MSL) | 4000 m |
| Typical noise emission | < 71 dB(A) |
| Power loss in night mode | < 6.5 W |
| Topology | Without transformers |
| Cooling method | Active cooling |
| Degree of protection for electronics in accordance with IEC 60529 | IP65 |
| Corrosivity classification according to IEC 61701 (at a minimum distance of 0.5 km (0.3 mile) from the coast) | C5 |
| Protection class in accordance with IEC 62109-1 | I |
| Radio technology | Wi-Fi 802.11 b/g/n or Ethernet |
| Radio spectrum | 2.4 GHz |
| Maximum transmission power | 100 mW |
| Wi-Fi range in free-field conditions | 10 m (33 ft) |
| Quantity maximum detectable Wi-Fi networks | 32 |
| Grid conformity | IEC 62109-1/-2, EN50549-1/-2:2018, VDE-AR-N 4105/4110/4120:2018 |
| Grid Support | LVRT, HVRT, active and reactive power control and power ramp rate control |
| Power control / Demand response (DRED) | Communication via Modbus interface |

| | |
|---|---|
| Export limiting in accordance with AS/NZS 4777.2 | EDMM-10 / EDMM-20 with compatible Modbus counting device (Janitza UMG 604-PRO) |
| Demand response mode in accordance with AS/NZS 4777.2 | DRM0 |

## 17.2 DC Input

| | |
|---|---|
| Maximum PV array power | 187500 Wp STC |
| Maximum input voltage | 1100 V |
| Minimum input voltage | 180 V |
| Start voltage | 200 V |
| Rated input voltage | 600 V |
| MPP voltage range | 180 V to 1000 V |
| MPP Voltage Range for rated power | 450 V to 800 V |
| Number of independent MPP inputs | 12 |
| Strings per MPP input | 2 |
| Maximum usable input current | 360 A (30 A *12) |
| Maximum short-circuit current per input | 480 A (40 A *12) |
| Maximum reverse current into the PV array | 0 A[1)] |
| Overvoltage category as per IEC 62109-1 | AC: III, DC: II |
| Maximum PV module coupling capacity to ground according to IEC 63112 | 18.75 µF |

## 17.3 AC Output

| | |
|---|---|
| Rated power (at 230 V, 50 Hz) | 125000 W |
| Maximum output power | 125 kW |
| Maximum apparent power | 125 kVA |
| Maximum output current | 181.1 A |
| Grid output current at 230 V | 181.1 A |
| Rated AC voltage | 3 / N / PE, 230 V / 400 V<br>3 / N / PE, 240 V / 415 V |
| Voltage range | 320 V to 480 V[2)] |

[1)] The topology prevents a reverse current from the inverter in the system.

[2)] In accordance with IEC 62109-2: $I_{SC\,PV}$

| | |
|---|---|
| Total harmonic distortion | < 3 % |
| Grid frequency | 50 Hz / 60 Hz |
| Operating range at grid frequency 50 Hz | 45 Hz to 55 Hz |
| Operating range at grid frequency 60 Hz | 55 Hz to 65 Hz |
| Displacement power factor, adjustable | 0.8 overexcited to 0.8 underexcited |
| Power factor at rated power | 1 |
| Feed-in phases | 3 |
| AC connection | 3-N-PE |

## 17.4 Efficiency

| | |
|---|---|
| Maximum efficiency, $\eta_{max}$ | 98.4 % |
| European weighted efficiency, $\eta_{EU}$ | 98.1 % |

## 17.5 Protective devices

| | |
|---|---|
| Grid monitoring | Available |
| Input-side disconnection point | DC load-break switch[3)] |
| DC reverse polarity protection | Available |
| AC short-circuit current capability | Available |
| Leakage current protection | Available |
| AC overvoltage protection" | Surge arrester type 2 |
| DC overvoltage protection | Surge arrester type 1+2 |
| Ground fault monitoring | Insulation monitoring: $R_{iso}$ > 50 kΩ |
| DC switch | Available |
| Arc-fault circuit interrupter (AFCI) | Available |
| Maximal output overcurrent protection | 375 A |
| All-pole sensitive residual-current monitoring unit | Available |
| Active anti-islanding method | Frequency shift |

## 17.6 Equipment

| | |
|---|---|
| DC connection | SUNCLIX DC connector |
| AC terminal | Ring terminal lug |

[3)] Usage category according to IEC 60947: DC-PV2

| | |
|---|---|
| Multifunction relay | By default, ≥ 30 V / 1 A |
| Digital inputs | 1x fast stop, 4x active power reduction |

# 18 EU Declaration of Conformity

within the scope of the EU directives

- Electromagnetic compatibility 2014/30/EU (29.3.2014 L 96/79-106) (EMC)
- Low Voltage Directive 2014/35/EU (29.3.2014 L 96/357-374) (LVD)
- Radio Equipment Directive 2014/53/EU (22.5.2014 L 153/62) (RED)
- Restriction of the use of certain hazardous substances 2011/65/EU (L 174/88, June 8, 2011) and 2015/863/EU (L 137/10, March 31, 2015) (RoHS)

SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the aforementioned directives. More information on the availability of the entire Declaration of Conformity can be found at https://www.sma.de/en/ce-ukca.

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

# 19 UK Declaration of Conformity

according to the regulations of England, Wales and Scotland

SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned regulations. More information on the availability of the entire declaration of conformity can be found at https://www.sma.de/en/ce-ukca.

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

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