



SUNNY TRIPOWER 5.0 / 6.0 / 8.0 / 10.0 SMART ENERGY

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SMA Warranty

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

SOFTWARE LICENSES

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

Trademarks

All trademarks are recognized, even if not explicitly identified as such. Missing designations do not mean that a product or brand is not a registered trademark.

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1.1 Validity

This document is valid for:

- STP5.0-3SE-40
- STP6.0-3SE-40
- STP8.0-3SE-40
- STP10.0-3SE-40

1.2 Target Group

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

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

1.3 Content and Structure of this Document

This document describes the mounting, installation, commissioning, configuration, operation, troubleshooting and de-commissioning of the product.

The latest version of this document and additional information about the product can be found in PDF format and as an eManual at www.SMA-Solar.com. You can also call up the eManual via the user interface of the product.

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

1.4 Levels of Warning Messages

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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

1.5 Symbols in the Document

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
	Indicates a requirement for meeting a specific goal
	Required result
	Example
	Sections describing activities to be performed by qualified persons only

1.6 Typographies in the document

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

1.7 Designations in the Document

Complete designation	Designation in this document
Sunny Tripower Smart Energy	Inverter, product

1.8 Additional Information

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

Title and information content	Type of information
SUNNY TRIPOWER SMART ENERGY "Approved Batteries and Information on Battery Communication Connection"	Technical Information
"PUBLIC CYBER SECURITY - Guidelines for a Secure PV System Communication"	Technical Information
"SMA Smart Home"	Planning guidelines
"Efficiency and Derating" Efficiency and derating behavior of the SMA inverters	Technical Information

Title and information content	Type of information
"Parameters and Measured Values" Device-specific overview of all parameters and measured values and their setting options Information about the SMA Modbus registers	Technical Information
"SMA MODBUS" Information on the SMA Modbus interface as well as an overview of all SMA Modbus registers	Technical Information
"Temperature Derating"	Technical Information

1.9 Intended Use

The Sunny Tripower Smart Energy is a transformerless hybrid inverter with 2 MPP trackers and a battery connection that feeds the direct current of the PV array into the connected battery or converts it to grid-compliant three-phase current and then feeds it into the utility grid. The Sunny Tripower Smart Energy also converts the direct current supplied by the battery into grid-compliant three-phase current. In a system with additional PV inverters, the Sunny Tripower Smart Energy can convert the three-phase current generated by the PV inverters into direct current and feed it into the battery.

The Sunny Tripower Smart Energy has a battery-backup function. In the event of a power outage, the Sunny Tripower Smart Energy can continue to supply selected circuits with power from the battery and PV system.

The product is suitable for indoor and outdoor use.

The product must only be operated with PV modules of protection class II in accordance with IEC 61730, application class A. The PV modules must be compatible with this 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.

The product must only be operated in connection with an intrinsically safe lithium-ion battery approved by SMA Solar Technology AG. An updated list of the batteries approved by SMA Solar Technology AG can be found in the technical information "Approved Batteries and Information on Battery Communication Connection" at www.SMA-Solar.com.

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

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

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

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

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

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

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

The 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.

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

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.

Alterations to SMA products, e.g., changes or modifications, are only permitted with the express written permission of and according to the instructions from SMA Solar Technology AG. Unauthorized alterations can be dangerous and lead to personal injury. In addition, an unauthorized alteration as well as disregard of the documentation will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

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

The 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.

1.10 IMPORTANT SAFETY INSTRUCTIONS

Keep the manual for future reference.

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

The product has been designed and tested in accordance with international safety requirements. As with all electrical or 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 touching live system components during battery-backup operation

Even if the AC miniature circuit breaker and the DC load-break switch of the inverter are disconnected, parts of the system may still be live when the battery is switched on due to battery-backup operation.

- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document.
- Ensure that the grounding conductors of the electric circuits of the battery-backup appliances are connected to the grounding busbar of the house connection box.

⚠ DANGER**Danger to life due to electric shock when live components or DC cables are touched when working on the battery**

The DC cables connected to the battery can be energized even when the battery is disconnected if the inverter has not been disconnected. Touching live DC cables results in death or serious injury due to electric shock.

- Prior to performing any work on the battery, disconnect the inverter from all voltage sources as described in this document.

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

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

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

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

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

- Do not open the product.

⚠ DANGER**Danger to life due to electric shock from touching an ungrounded PV module or array frame**

Touching ungrounded PV modules or array frames results in death or lethal injuries due to electric shock.

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

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

⚠ DANGER**Danger to life due to electric shock when touching live enclosure parts with damaged grounding conductor**

High voltages may be applied to the enclosure of the product if the grounding conductor of the AC connection is damaged or has not been connected correctly and the additional grounding has not been connected. Touching live enclosure parts results in death or lethal injuries due to electric shock.

- Connect additional grounding for the AC connection as described in this document.

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

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

- In the event of a fault, do not perform any direct actions on the product.
- Ensure that unauthorized persons have no access to the product.
- Do not operate the DC load-break switch on the inverter in case of an error.
- Disconnect the PV array from the inverter via an external disconnection device. If there is no disconnecting device present, wait until no more DC power is applied to the inverter.
- Disconnect the battery from the product via an external disconnection device. Do not operate the DC load-break switch on the product.
- Disconnect the AC circuit breaker, or keep it disconnected in case it has already tripped, and secure it against reconnection.
- Only perform work on the product (e.g., troubleshooting, repair work) when wearing personal protective equipment for handling of hazardous substances (e.g., safety gloves, eye and face protection, respiratory protection).

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

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

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

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

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

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

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

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

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

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

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

- Only use measuring devices with a DC input voltage range of 1000 V or higher.

⚠ 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.

- Transport and lift the product carefully. Take the weight of the product into account.
- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.

NOTICE**Damage to the DC connectors due to the weight of the product**

The DC connectors mounted on the product may be damaged if the product is set down on them.

- Do not set the product down on its DC connectors.
- Do not remove the protective cover from the DC connectors until the product is installed on the wall mounting bracket.

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

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

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

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

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

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

i 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.

i A country data set must be set for feed-in operation

A country data set must be set (e.g. via the product commissioning wizard or a System Manager) in order for the inverter to start feed-in operation during commissioning.

If no country data set is set, then feed-in operation will be stopped. This state is signaled by the green and red LEDs flashing simultaneously.

The inverter will automatically start feed-in operation only after the inverter configuration is completed.

i The country data set must be set correctly.

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

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

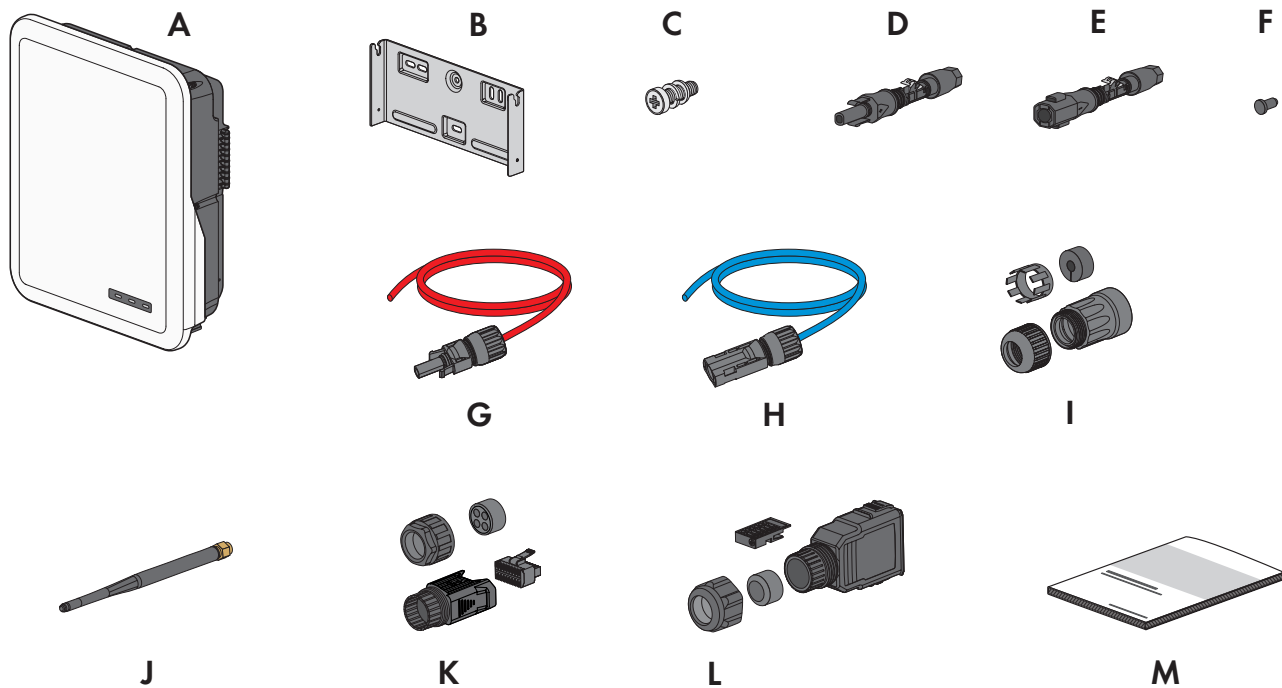


Figure 1: Components included in scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Wall mounting bracket
C	2	Hexagon head screw M4x14 with spring washer and washer
D	2/3	Positive DC connector (2 pieces for Sunny Tripower 5.0 SE, 6.0 SE and 8.0 SE, 3 pieces for Sunny Tripower 10.0 SE)
E	2/3	Negative DC connector (2 pieces for Sunny Tripower 5.0 SE, 6.0 SE and 8.0 SE, 3 pieces for Sunny Tripower 10.0 SE)
F	4/6	Sealing plug (4 pieces for Sunny Tripower 5.0 SE, 6.0 SE and 8.0 SE, 6 pieces for Sunny Tripower 10.0 SE)
G	1	Battery connection cable with positive DC connector
H	1	Battery connection cable with negative DC connector

Position	Quantity	Designation
I	2	RJ45 protective sleeve: swivel nut, cable support sleeve, threaded sleeve
J	1	WLAN antenna
K	1	COM connector for connection of battery communication and digital inputs and outputs: swivel nut, threaded sleeve, terminal
L	2	AC connector: swivel nut, sealing ring, connector enclosure, terminal, fuse terminal block
M	1	Quick reference guide with password label on the rear side The label contains the following information: • PIC (Product Identification Code) identification key for registering the system in Sunny Portal • RID (Registration Identifier) registration ID for registering the system in Sunny Portal • WLAN password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the inverter via WLAN

1.11 Product Description

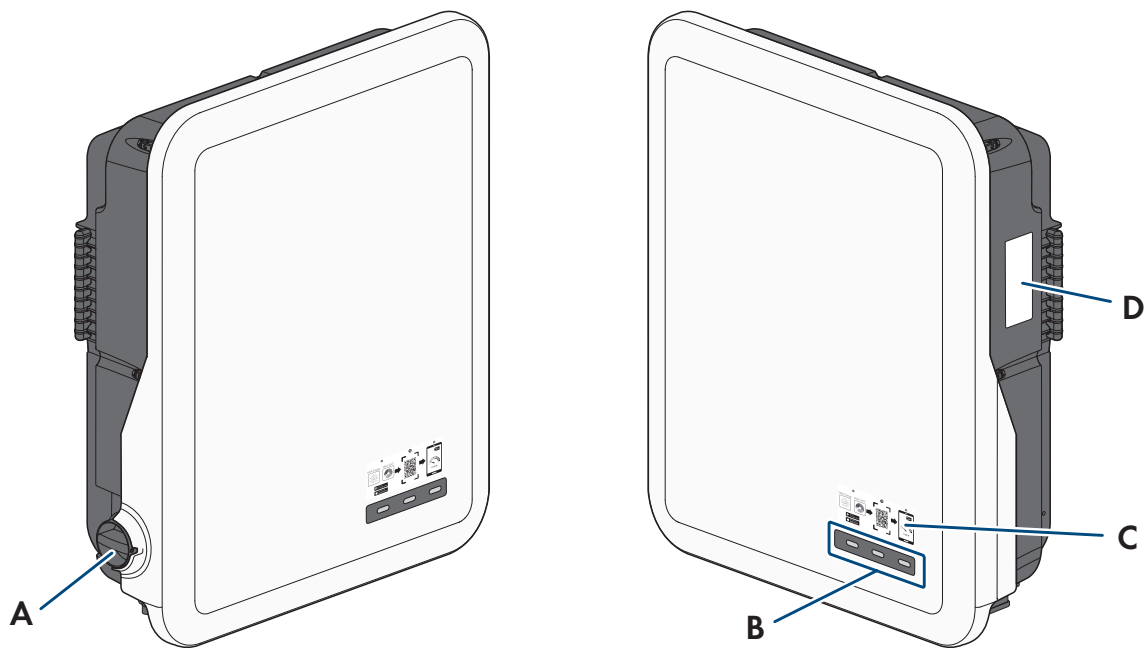


Figure 2: Design of the product

Position	Designation
A	DC load-break switch
B	LEDs The LEDs indicate the operating state of the product

Position	Designation
C	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via WLAN
D	Type label The type label clearly identifies the product. The type label must remain permanently attached to the product. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Identification key (PIC) for registration in Sunny Portal • Registration ID (RID) for registration in Sunny Portal • Wi-Fi password (WPA2-PSK) for the direct connection to the user interface of the product via Wi-Fi • Device specific characteristics

1.12 Symbols on the Product

	Beware of a danger zone This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	Beware of electrical voltage The product operates at high voltages.
	Beware of hot surface The product can get hot during operation.
	Danger to life due to high voltages in the inverter; observe a waiting time of 10 minutes. High voltages that can cause lethal electric shocks are present in the live components of the inverter. 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 documentation Observe all documentations supplied with the product.
	Observe the documentation Together with the red LED, this symbol indicates an error.
	Three-phase alternating current with neutral conductor
	Direct current

	The product has no galvanic isolation.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	The product is suitable for outdoor installation.
IP65	Degree of protection IP65 The product is protected against the penetration of dust and water that is directed as a jet against the enclosure from all directions.
CE	CE marking The product complies with the requirements of the applicable EU directives.
UKCA	UKCA marking The product complies with the regulations of the applicable laws of England, Wales and Scotland.
	RoHS labeling The product complies with the requirements of the applicable EU directives.
	RCM (Regulatory Compliance Mark) The product complies with the requirements of the applicable Australian standards.
	The product complies with the Moroccan safety and EMC requirements for electronic products.

1.13 Interfaces and Functions

1.13.1 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.

1.13.2 Smart Inverter Screen

The Smart Inverter Screen enables you to view the status display and to display the current power and consumption on the user interface login page. This gives you an overview of the most important product data without having to log into the user interface.

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

1.13.3 SMA PUK2.0

The PUK (Personal Unlocking Key) is a security code. It is used to reset lost or forgotten passwords for digital devices. The PUK security feature protects against unauthorized access. If passwords and/or product keys are no longer available, there are two procedures depending on the firmware version:

- For PUK for products with firmware version < 4.xx.xx.R via the Online Service Center
- For PUK2.0 for products with firmware version ≥ 4.xx.xx.R via the user interface of the product

1.13.4 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, must support the function SMA Speedwire Encrypted Communication.

1.13.5 SMA Webconnect

The inverter is equipped with a Webconnect function as standard. The Webconnect function enables direct data transmission between the inverters of SMA Internet portals, without any additional communication device and for a maximum of 4 inverters per visualized system. 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). If the system is subject to a control requirement, a data logger, such as the SMA Data Manager M, must be installed together with an energy meter at the point of interconnection.

1.13.6 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.

Also see:

- [Direct connection via Wi-Fi ⇒ page 78](#)

1.13.7 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.

1.13.8 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
- Controlling the battery

1.13.9 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.

1.13.10 Battery-backup function

The inverter is equipped with a battery-backup function. The battery-backup function is disabled by default and must be enabled via the user interface. The configuration is set on the user interface of the inverter.

The battery-backup function ensures that the inverter forms a three-phase battery-backup grid that uses energy from the battery and the PV system that is directly connected to the inverter to supply the circuits of the household grid in the event of a utility grid failure. If automatic battery-backup operation is activated, the selected backup loads connected to the AC-BACKUP terminal are connected and supplied to the AC-GRID terminal in parallel grid operation mode via an integrated bypass contactor. In the event of a grid failure, the contactor opens. The inverter provides a stand-alone grid and the backup loads continue to be supplied by the energy stored in the battery and the PV modules connected directly to the inverter. The charging of the battery is ensured by the existing PV system during battery-backup operation. As soon as the utility grid is available again, the battery-backup operation is disabled automatically and the loads are supplied with energy from the household grid. When the utility grid is down and the battery fully discharged, there is, in the beginning, not enough power available to create a stable battery-backup grid. In this case, the battery must be charged by the PV system. The inverter is able to create a stable battery-backup grid only when enough power is available in the battery. Battery-backup operation starts automatically as soon as enough energy is available from the PV system. By setting parameters, it is possible to define up to which state of charge the battery is charged and discharged. For example, it is possible to set the amount of energy that should remain in the battery for battery-backup operation.

Communication between the inverter and the SMA apps takes place via a direct Wi-Fi connection in battery-backup operation.

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

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

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

1.13.11 Multifunction relay (MFR)

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

1.13.12 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.

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.

1.13.13 All-pole sensitive residual-current monitoring unit

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

1.13.14 SMA Smart Connected

SMA Smart Connected is the free monitoring of the inverter via the SMA Sunny Portal. Thanks to SMA Smart Connected, the operator and qualified person will be informed automatically and proactively about inverter 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 inverter is permanently connected to Sunny Portal and the data of the operator and qualified person is stored in Sunny Portal and up-to-date.

1.14 LED Signals

The LEDs indicate the operating state of the inverter.

LED signal	Explanation
Green LED and red LED flash simultaneously (2 s on and 2 s off)	No country data set set Operation of the inverter is stopped because no country data set is set. The inverter automatically starts operation as soon as the configuration has been carried out (e.g., using the commissioning wizard or via a System Manager).
The green LED is flashing (2 s on and 2 s off)	Waiting for feed-in conditions The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation.
The green LED is flashing (1.5 s on and 0.5 s off)	Battery-backup operation The battery-backup operation is activated and the inverter supplies the loads with energy from the battery.
The green LED is glowing	Operation The inverter is in operation.
The green LED is off	No voltage is applied to the PV system or battery.
The red LED is glowing	Error Inverter operation has been stopped. In addition, a distinct event message and the corresponding event number will be displayed on the product user interface or in Sunny Portal.
Red LED is flashing (0.25 s on, 0.25 s off, 0.25 s on, 1.25 s off)	Warning Communication with a superordinate plant controller has failed. The inverter continues to operate with restricted function (e.g. with set fallback level). 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 is flashing slowly (2 s on and 2 s off)	Communication connection is being established. The inverter is establishing a connection with a local network or is establishing a direct connection to a smart device (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.

1.15 Battery Management

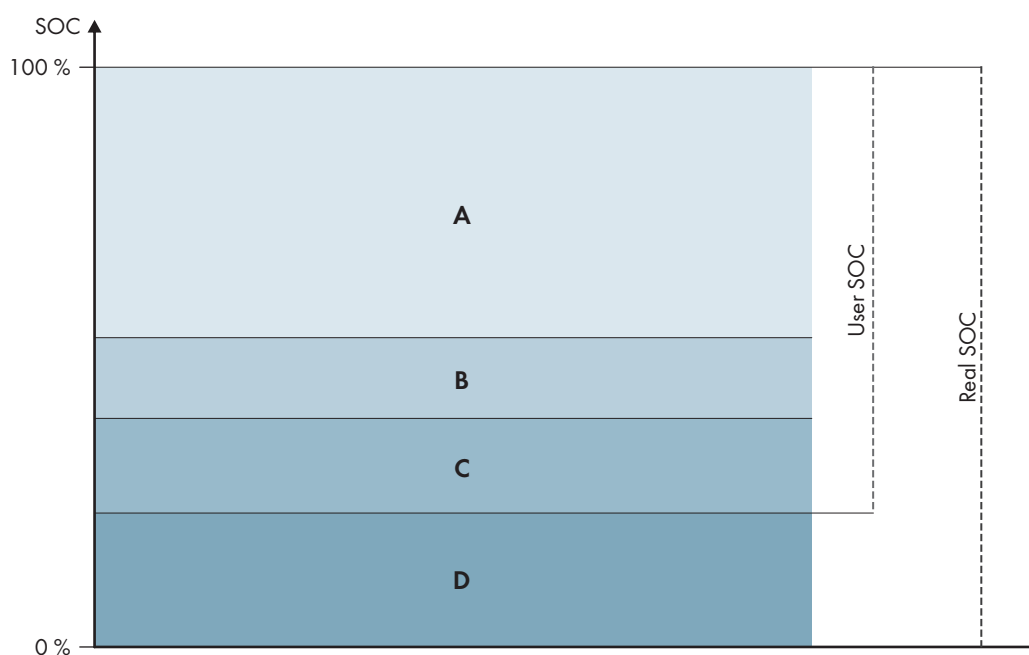


Figure 3: State of charge ranges of the battery

Range	Inverter parameters	Inverter behavior
A	-	The inverter uses the battery within this range for increased self-consumption. When more energy is needed than can be supplied by the PV modules, the battery is discharged.
B	Battery > Areas of application > Minimum width of backup power area (BatUsDm.BckDmMin)	The value indicates the percentage of battery charge to be retained for battery-backup operation. This battery charge cannot be used in parallel grid operation, even if the battery-backup operation is deactivated.
C	Device > Self-consumption > Lower battery discharge limit (BatChaSttMin)	In this range, the battery is no longer discharged, even in battery-backup operation.
D	Battery > Areas of application > Minimum width of deep discharge protection area (BatUsDm.DschProDmMin)	The value specifies which percentage of the Real SOC is to be reserved as deep discharge protection. This value corresponds to a User SOC of 0%. When the state of charge is displayed as 0% (User SOC), the battery is actually (Real SOC) still charged to as much percentage as this value indicates.

1.16 System Components

The Sunny Tripower Smart Energy is part of the SMA Home Energy Solution. For more information on the SMA Home Energy Solution and the individual components, see www.SMA-Solar.com.

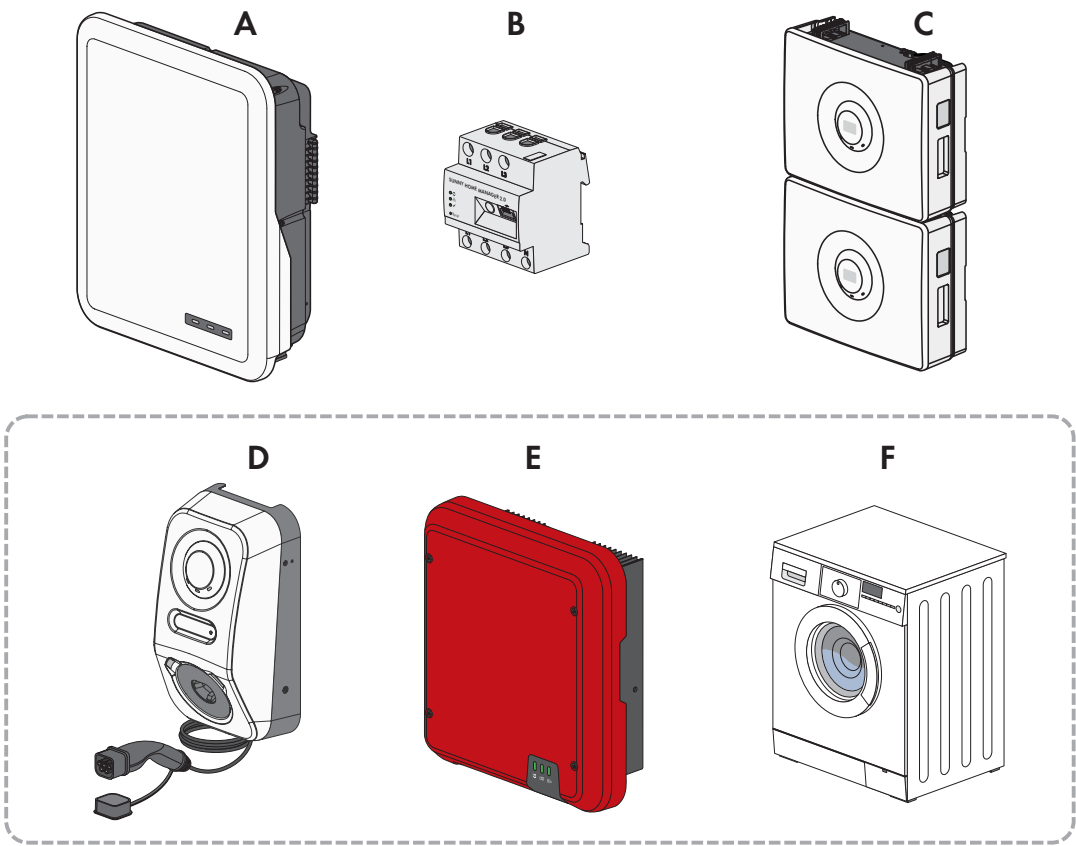


Figure 4: Main system components

Position	Designation
A	Sunny Tripower Smart Energy

Position	Designation
B	Sunny Home Manager 2.0 The Sunny Home Manager is the central device responsible for energy management in households with a PV system for self-consumption. The Sunny Home Manager can carry out the following tasks: • Collection of energy- and power measured values in the interconnected household • Energy monitoring: Presentation of energy flows via Sunny Portal • Interconnection and networking of loads via EEBUS and SEMP • Energy management: Automatic control of interconnected household loads with the aim of energy efficiency optimization • Dynamic limiting of the active power feed-in • Active power measurement via integrated measuring unit with direct connection up to 63 A limiting current • Support for Wi-Fi sockets such as Edimax SP-2101W up to firmware version 2.08 and Edimax SP-2101W V2 from firmware version 1.00. You can find a list of other smart home control devices in the technical information "SMA SMART HOME - Compatibility list for the Sunny Home Manager 2.0"
C	SMA Home Storage A list of approved batteries can be found under Technical Information "Approved Batteries and Information on Battery Communication Connection" under www.SMA-Solar.com
D	Optional: SMA eCharger The SMA eCharger is an AC charging station that is designed for standard-compliant charging of an electric vehicle.
E	Optional: Additional PV inverters PV inverters that convert direct current from the PV modules into alternating current for the grid. The hybrid inverter can convert the three-phase current generated by the PV inverters into direct current and feed it into the battery. In battery-backup operation mode, power generated by additional PV inverters cannot be used.
F	Optional: controllable loads Appliances (e.g. washing machines, heat pumps) that are directly controlled by the Sunny Home Manager 2.0 or via EEBUS or SEMP. You can find a list with compatible loads in the technical information ""SMA SMART HOME - Compatibility list for the Sunny Home Manager 2.0"" at www.SMA-Solar.com

1.17 System Overview

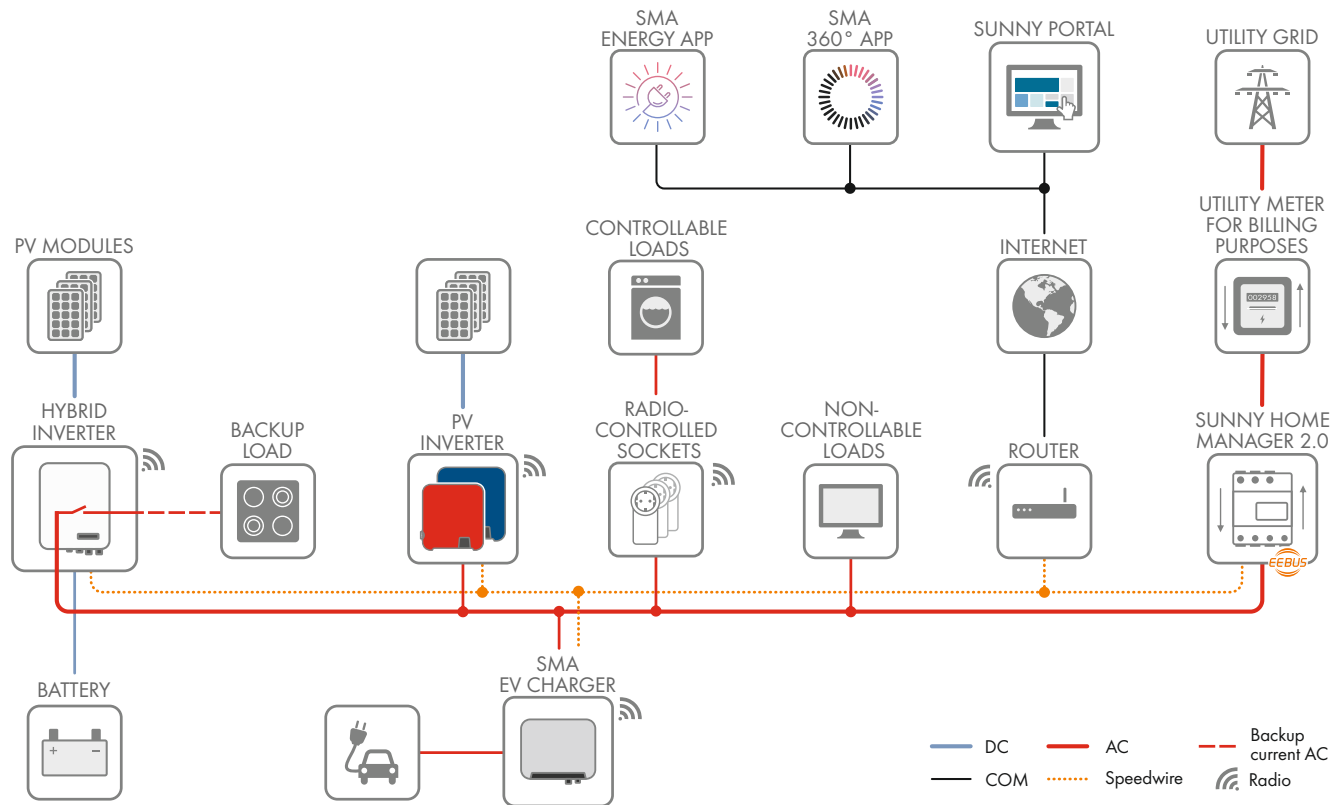


Figure 5: System design

1.18 Circuitry Overview

1.18.1 Circuitry overview without battery-backup system

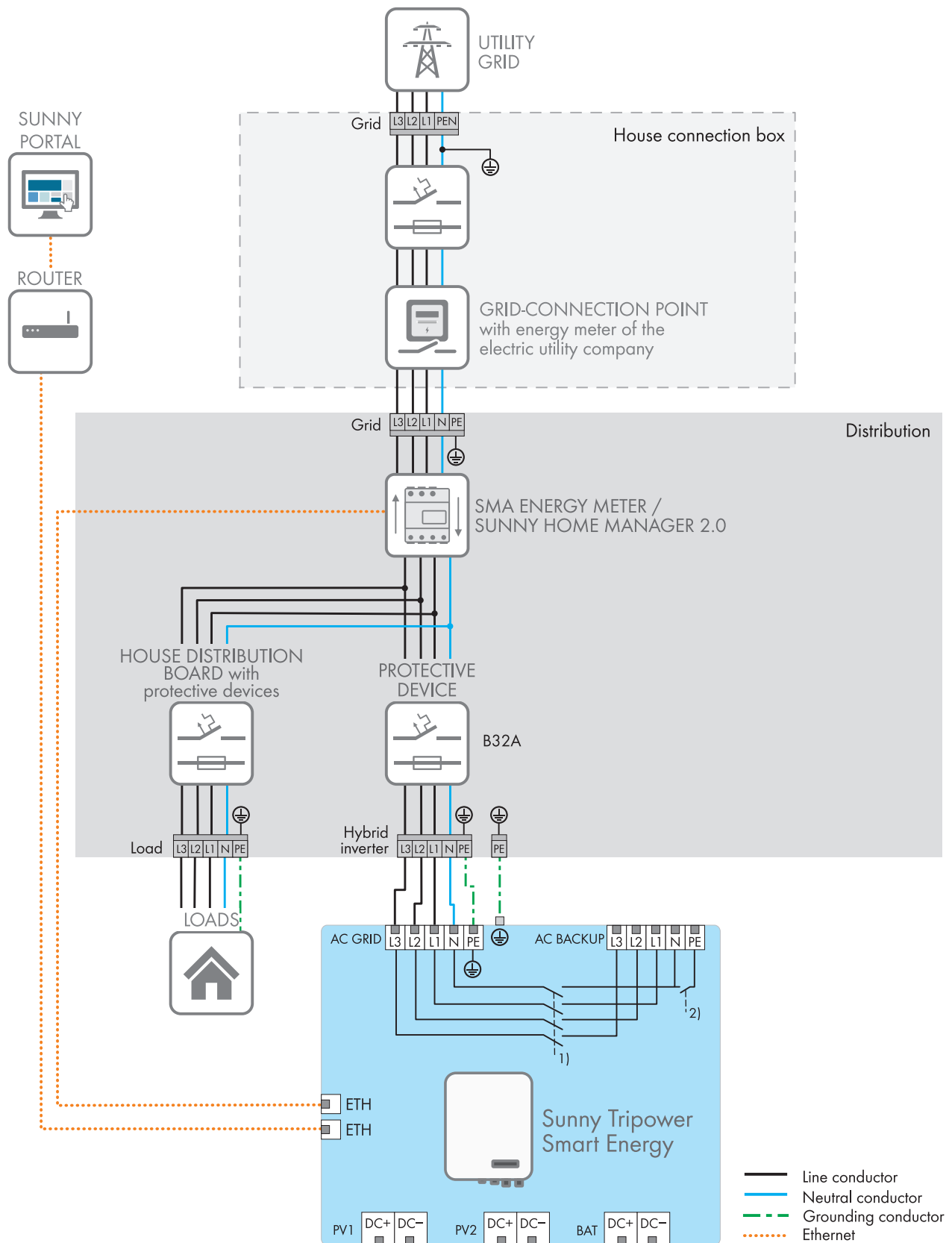


Figure 6: Circuitry overview without battery-backup system (example)

Footnotes:

1. always open
2. always open

1.18.2 Circuitry overview with battery-backup system

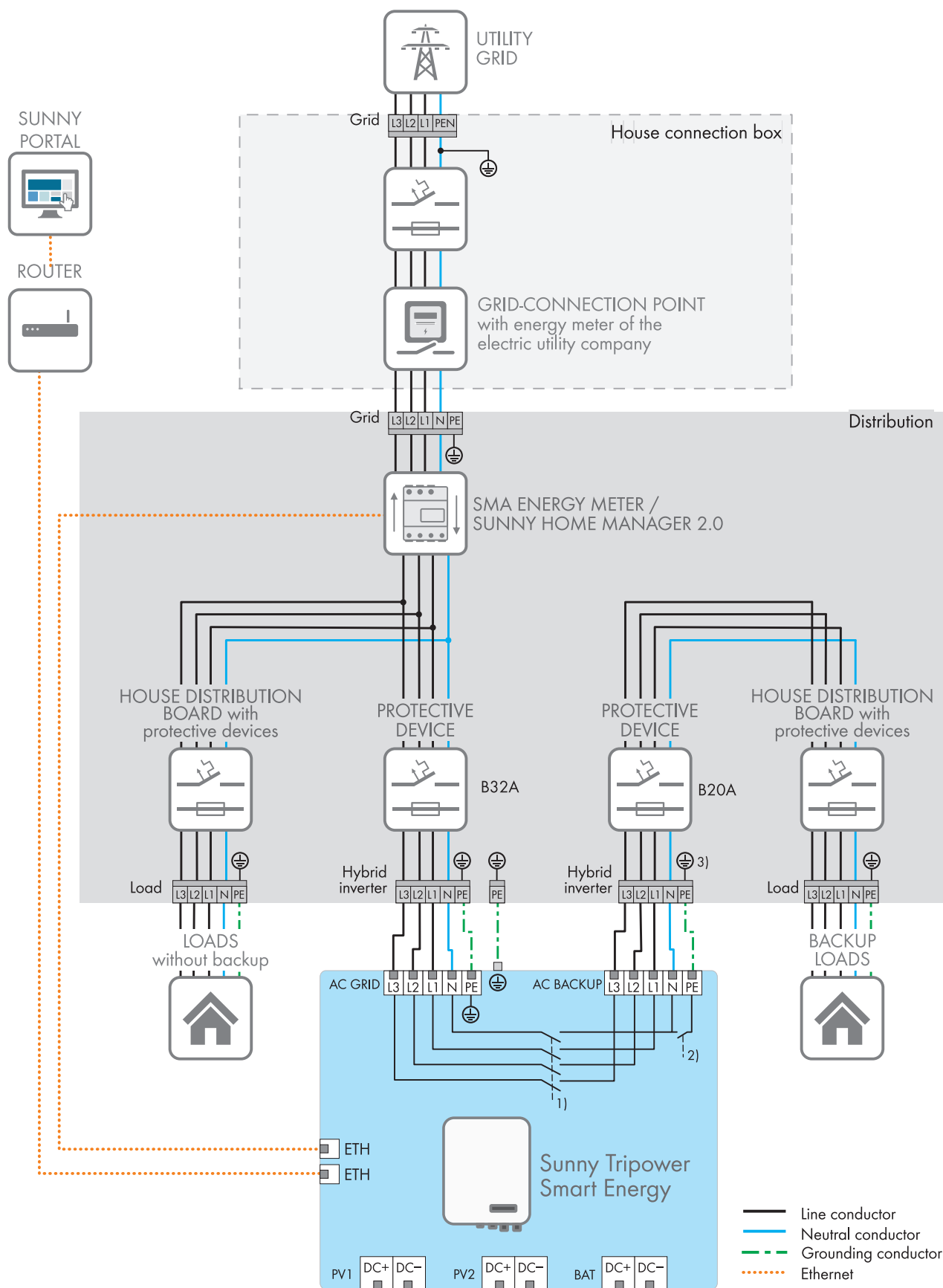


Figure 7: Circuitry overview with battery-backup system (example)

Footnotes:

1. opens during battery-backup operation
2. closes during battery-backup operation
3. grounding conductor must be connected separately

1.18.3 Circuitry overview with battery-backup system and optional transfer switch

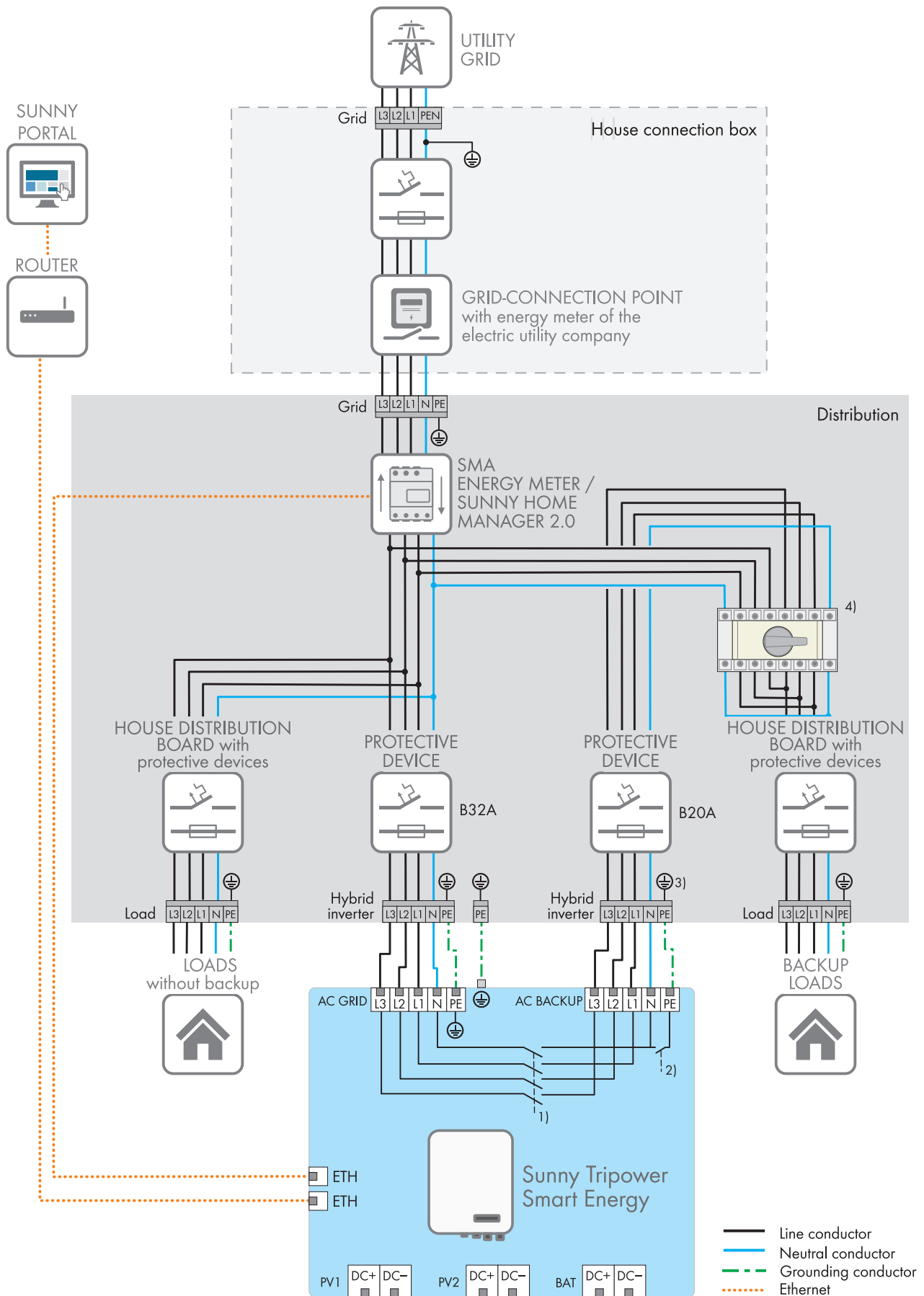


Figure 8: Circuitry overview with battery-backup system and optional transfer switch (example)

Footnotes:

1. opens during battery-backup operation and with disabled AC backup
2. closes only during battery-backup operation
3. grounding conductor is to be connected during activated battery-backup operation and connected to the grounding busbar in addition
4. optional manual switch
 - for supplying the entire house
 - for low-noise operation of the inverter
 - additionally, the inverter is to be parameterized according to the operating mode

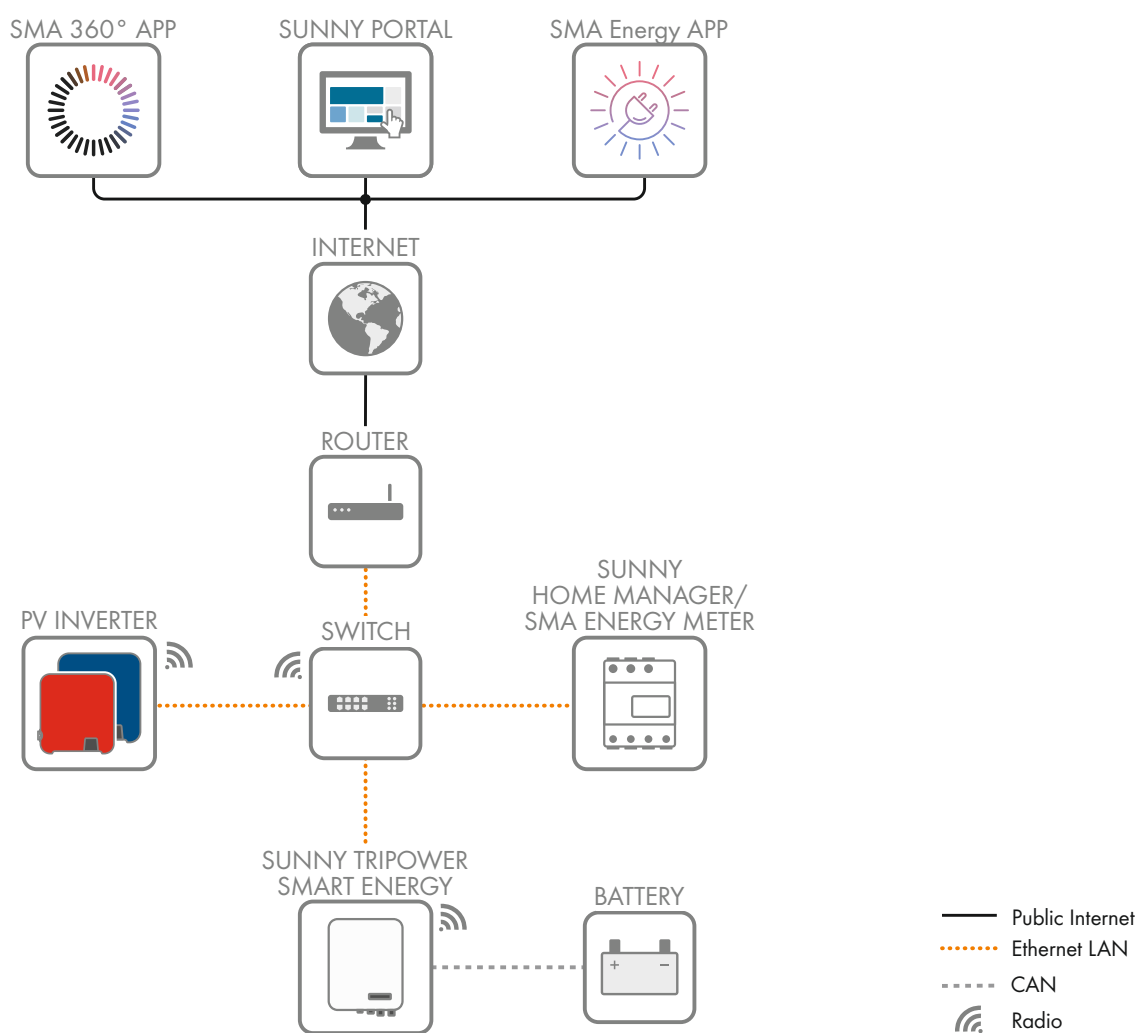
1.19 Communication Overview

Figure 9: Design of system communication

1.20 Requirements for Mounting

1.20.1 Requirements for the Mounting Location

⚠ WARNING

Danger to life due to fire or explosion

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

- Do not mount the product in areas containing highly flammable materials or gases.
- Do not mount the product in potentially explosive atmospheres.

- ☐ A solid support surface must be available. When mounted on drywall or similar materials, the product emits audible vibrations during operation which could be perceived as annoying.
- ☐ The support surface for installation must be made of a non-flammable material.
- ☐ The mounting location must be inaccessible to children.
- ☐ The installation site must be suitable for the weight and dimensions of the product (see Section 17, page 169).
- ☐ 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 installation site should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.
- ☐ The DC load-break switch of the product must always be freely accessible.
- ☐ All ambient conditions must be met (see Section 17, page 169).
- ☐ The ambient temperature should be 0 °C to +45 °C to ensure optimal operation.

1.20.2 Permitted and prohibited mounting positions

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

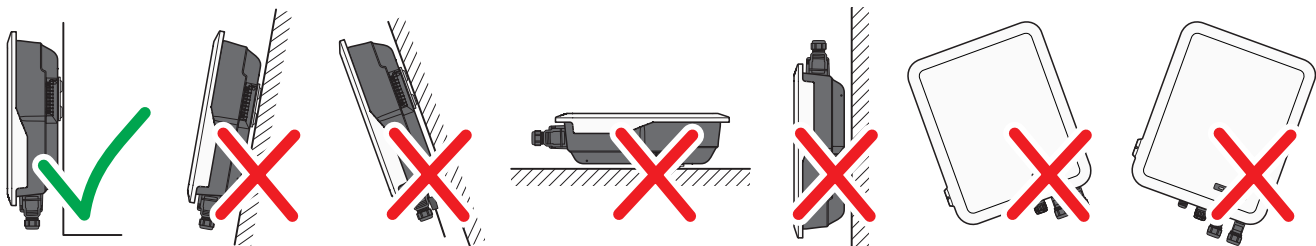


Figure 10: Permitted and prohibited mounting positions

1.20.3 Dimensions for mounting

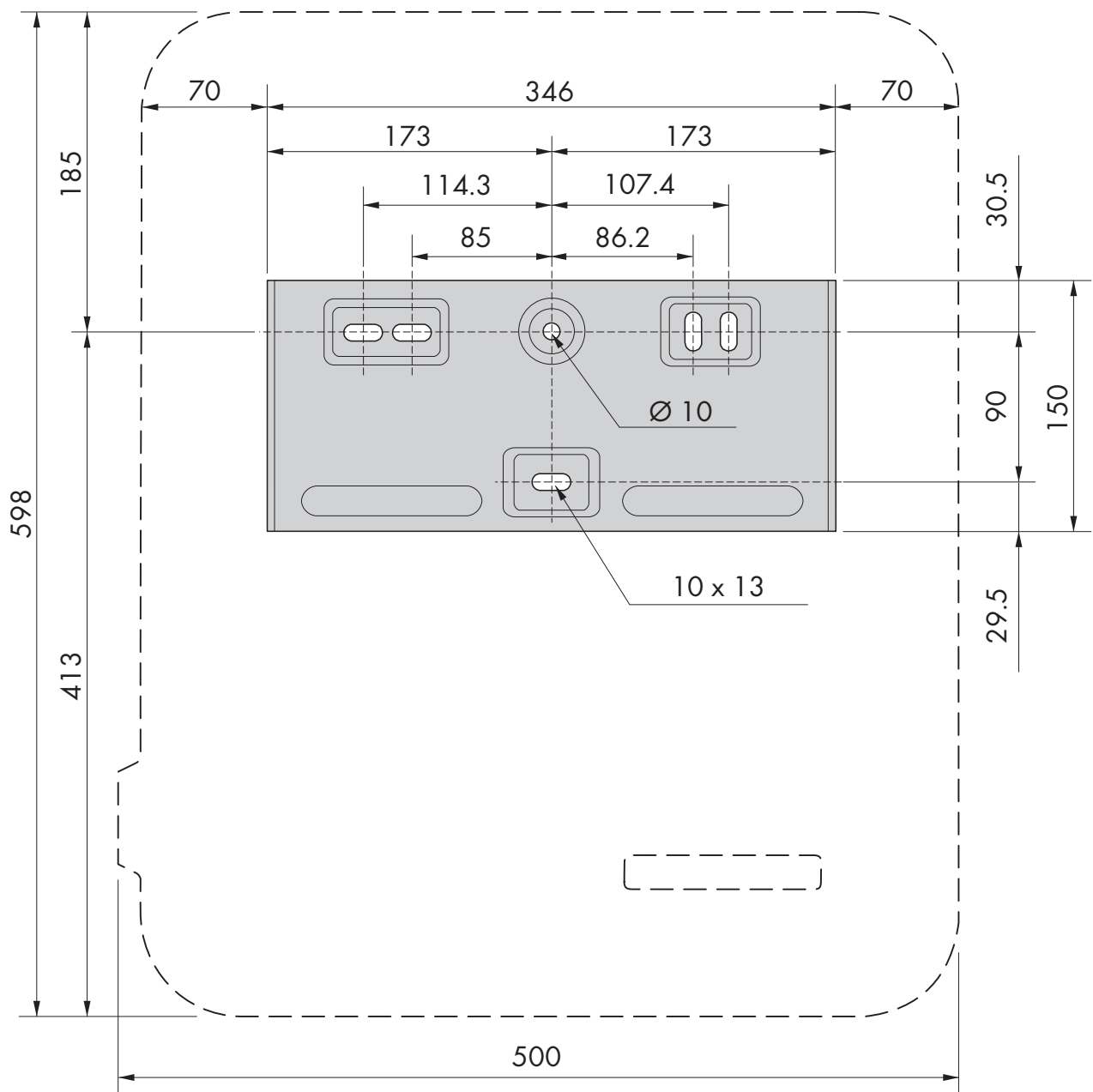


Figure 11: Locations of Anchor Points(Dimensions in mm)

1.20.4 Recommended clearances for mounting

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

- ☐ Maintain the recommended clearances to walls as well as to other inverters or objects.
- ☐ If multiple products are mounted in areas with high ambient temperatures, increase the clearances between the products and ensure sufficient fresh-air supply. A sufficient supply of fresh air can be ensured, for example, by an external room fan controlled via the multifunction relay.

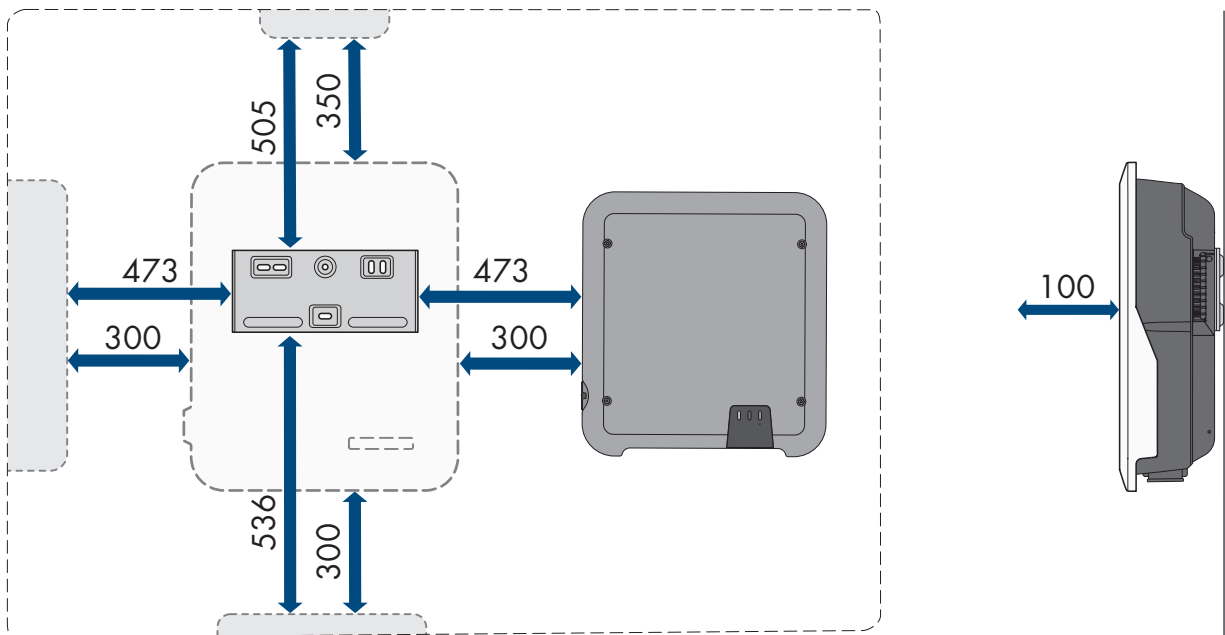


Figure 12: Recommended clearances (Dimensions in mm)

1.21 Mounting the Product

⚠ CAUTION

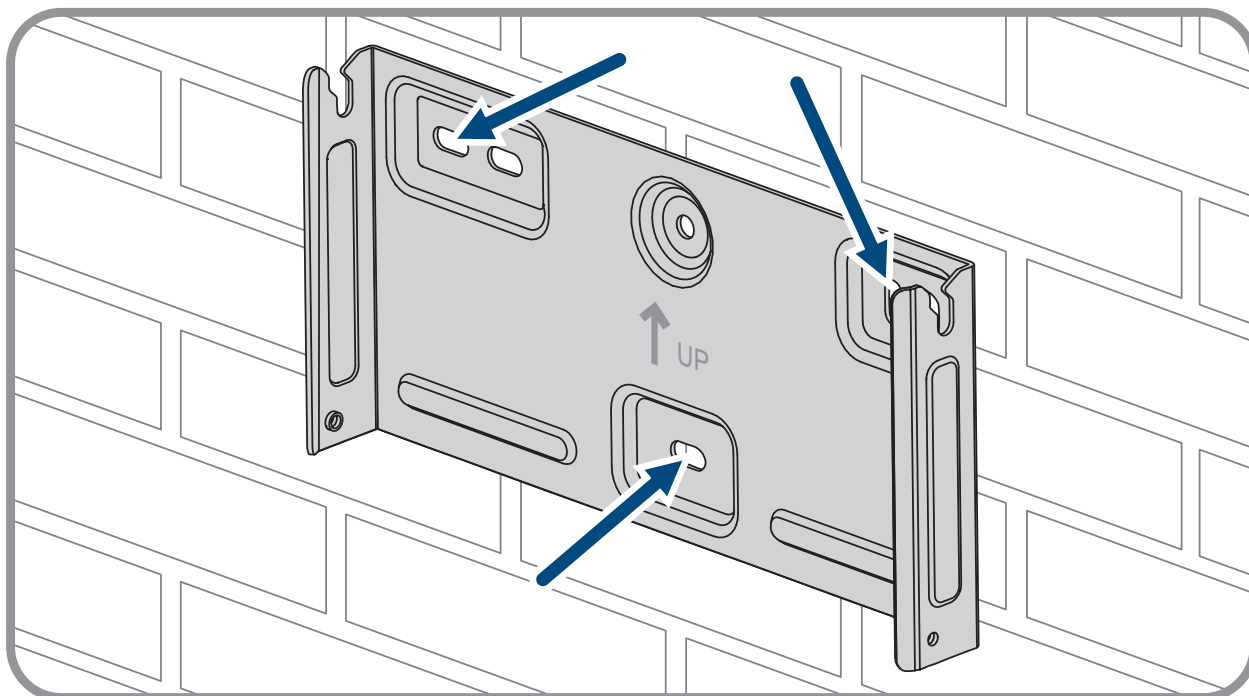
Risk of injury due to weight of product

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

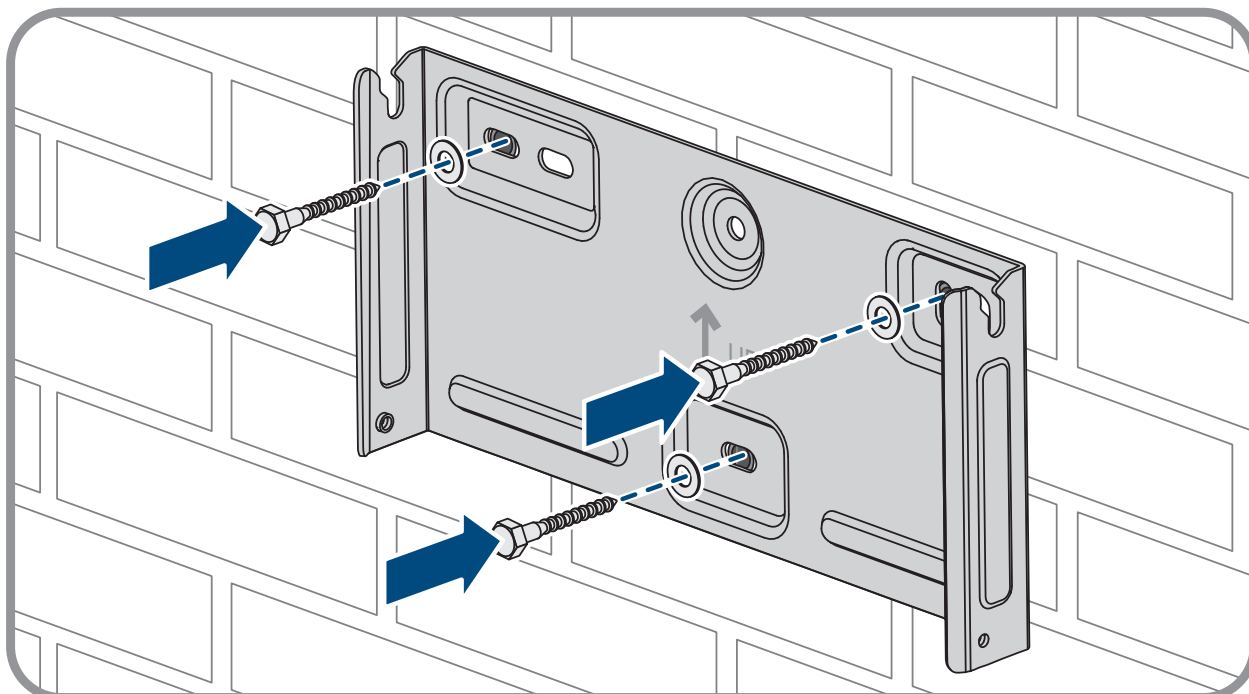
- Transport and lift the product carefully. Take the weight of the product into account.
- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.

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

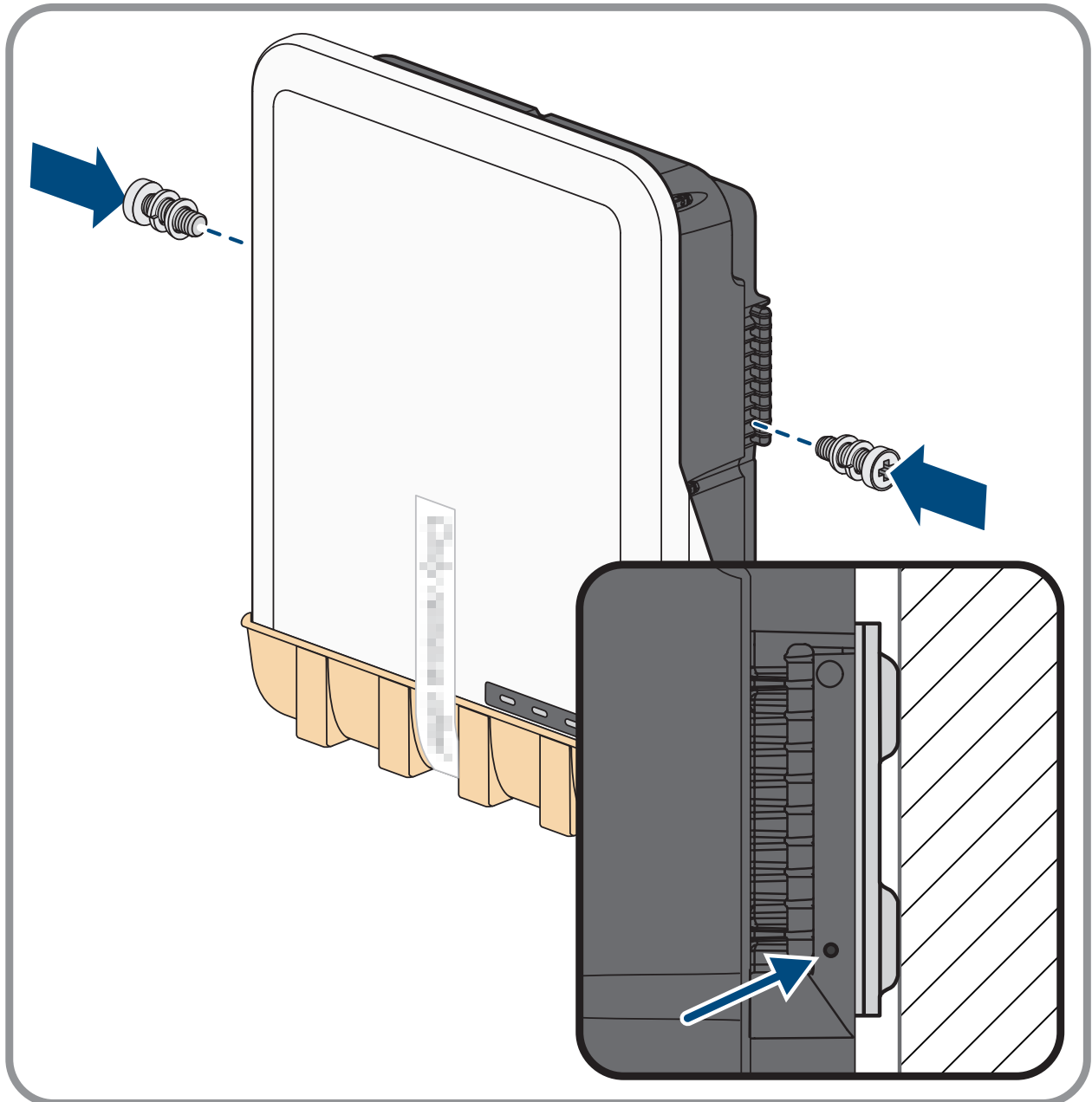
- ☐ 3 screws, suitable for the support surface and the weight of the inverter (diameter: minimum 6 mm)
- ☐ 3 washers, suitable for the screws (outer diameter: minimum 18 mm)
- ☐ Where necessary, 3 screw anchors suitable for the support surface and the screws

Procedure:

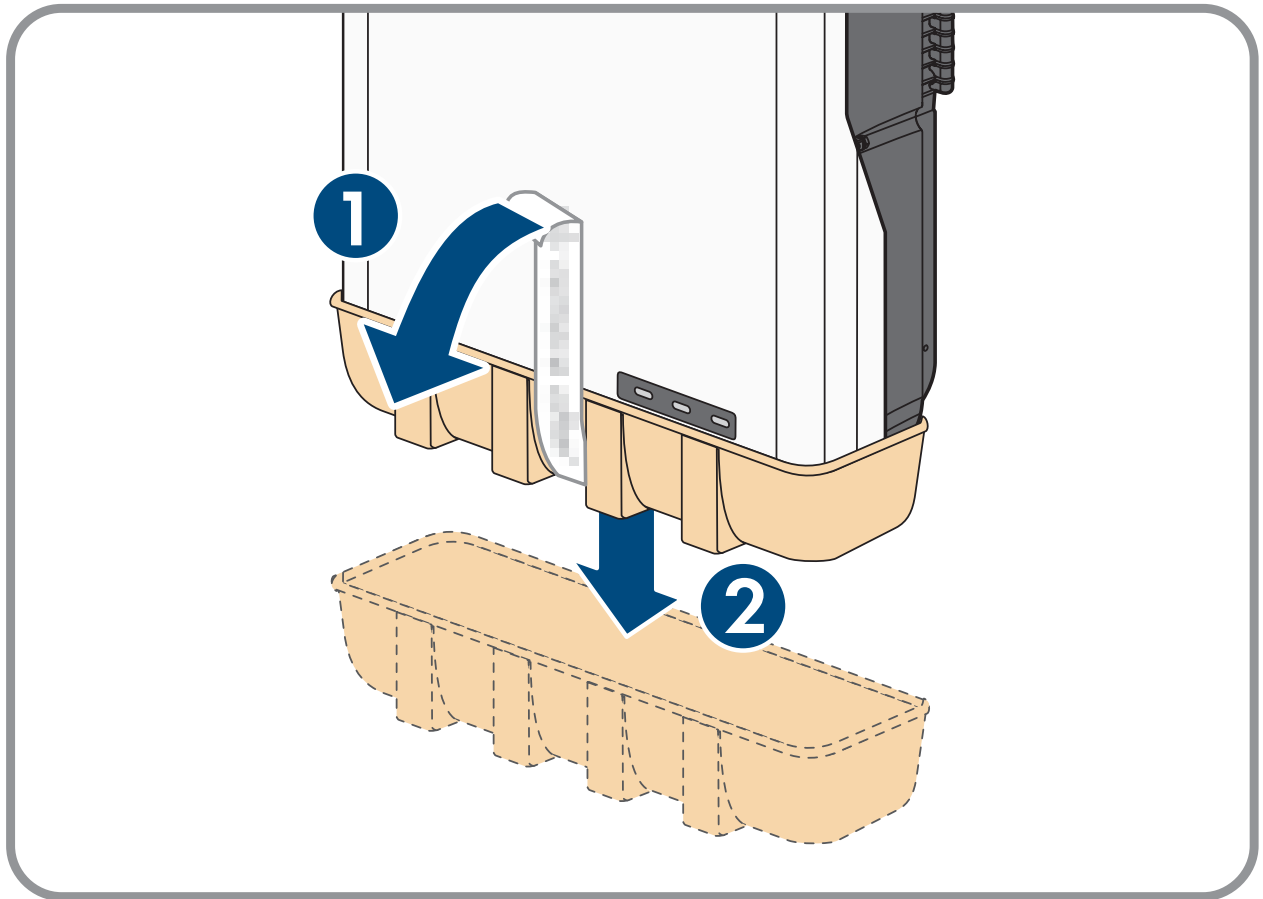
1. Align the wall mounting bracket horizontally on the wall and mark the position of the drill holes. Use at least one hole on the right- and left-hand side and the lower hole in the middle of the wall mounting bracket. Tip: When mounting on a post, use the upper and lower central holes of the wall mounting bracket.
2. Set the wall mounting bracket aside and drill the marked holes.
3. Insert screw anchors into the drill holes if the support surface requires them.



4. Secure the wall mounting bracket horizontally using screws and washers.
5. Hook the inverter into the wall mounting bracket. When doing so, the two right- and left-hand keys on the ribs on the rear side of the inverter must be hooked into the respective keyways in the wall mounting bracket.
6. Ensure that the inverter is securely in place.



7. Secure the inverter to the wall mounting bracket on both sides with a hexagon head screw (M4x14) provided. Use a magnetized screwdriver to insert a screw into the lower screw hole of the inverter's anchorage bracket and tighten it (PH2, torque: 1.5 Nm).



8. Remove the protective cover from the connection area.

1.22 Requirements for the electrical connection

1.22.1 AC cable requirements

- ☐ Conductor type: copper wire (flexible)
- ☐ External diameter: 14 mm to 25 mm
- ☐ Conductor cross-section: from 1.5 mm² to 10 mm²
- ☐ Insulation stripping length: 12 mm
- ☐ Sheath stripping length: 80 mm to 90 mm
- ☐ The cable and conductor cross-sections must always be dimensioned according to the local and national directives and within the range specified by the manufacturer (SMA Solar Technology AG).¹ If the manufacturer (SMA Solar Technology AG) requires a higher conductor cross-section than the standard, the range of the manufacturer must be observed. 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).
- ☐ Recommendation: Use a cable with the marking H07

1.22.2 Network cable requirements

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

- ☐ Cable type: 100BaseTx
- ☐ Cable category: minimum CAT5e
- ☐ Plug type: RJ45 of Cat5, Cat5e or higher
- ☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP

- ☐ Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.22 mm²
- ☐ Maximum cable length between two nodes when using patch cables: 50 m
- ☐ Maximum cable length between two nodes when using installation cables: 100 m
- ☐ UV-resistant if installed outdoors.

1.22.3 Residual-current monitoring unit

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

- ☐ The inverter is compatible with type A residual-current devices with a rated residual current of 100 mA or higher (see Technical Information "Criteria for Selecting a Residual-Current Device" for information on how to select a residual-current device at <http://www.SMA-Solar.com>). Each inverter in the system must be connected to the utility grid via a separate residual-current device.
- ☐ The internal residual-current device monitors the leakage current of the battery and PV connections and not the leakage current of the loads connected to the AC backup. If necessary, an external residual-current device with a rated residual current of 30 mA is to be connected.

1.22.4 Overvoltage category

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

1.22.5 Battery Communication Cable Requirements

- ☐ Twisted pair conductors
- ☐ Cable category: minimum CAT5e
- ☐ Cable with shielding: Yes
- ☐ Conductor cross-section: 0.2 mm² to 1.5 mm²
- ☐ External diameter: 5.3 mm to 7 mm
- ☐ Maximum cable length: 10 m
- ☐ The cable has to be insulated for 600 V.
- ☐ UV-resistant for outdoor installation.
- ☐ Recommendation: Use a network installation cable with 1-core rigid wire.
- ☐ Comply with the requirements of the battery manufacturer.

1.22.6 Requirements for Battery Power Cables

- ☐ Only use the supplied battery connection cables with DC connectors.
- ☐ The system must be designed for battery connection cables with a length of 3 m. If this is not possible, the battery connection cable can be extended. Only PV cables with a cross-section of 6 mm² and Sunclix connectors may be used for this purpose.

1.22.7 Signal cable requirements

- ☐ Cable with shielding: Yes
- ☐ Conductor cross-section: 0.2 mm² to 1.5 mm²
- ☐ External diameter: 5.3 mm to 7 mm
- ☐ UV-resistant for outdoor installation.

1.22.8 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 1000 V
- ☐ Using bootlace ferrules is not allowed.

1.22.9 DC connection options

The inverter has two DC inputs. In case of STP5.0-3SE-40 / STP6.0-3SE-40 / STP8.0-3SE-40, 1 string can be connected to DC input A and 1 string can be connected to DC input B. 1 string can be connected to DC input A and 2 strings to DC input B for STP10.0-3SE-40.

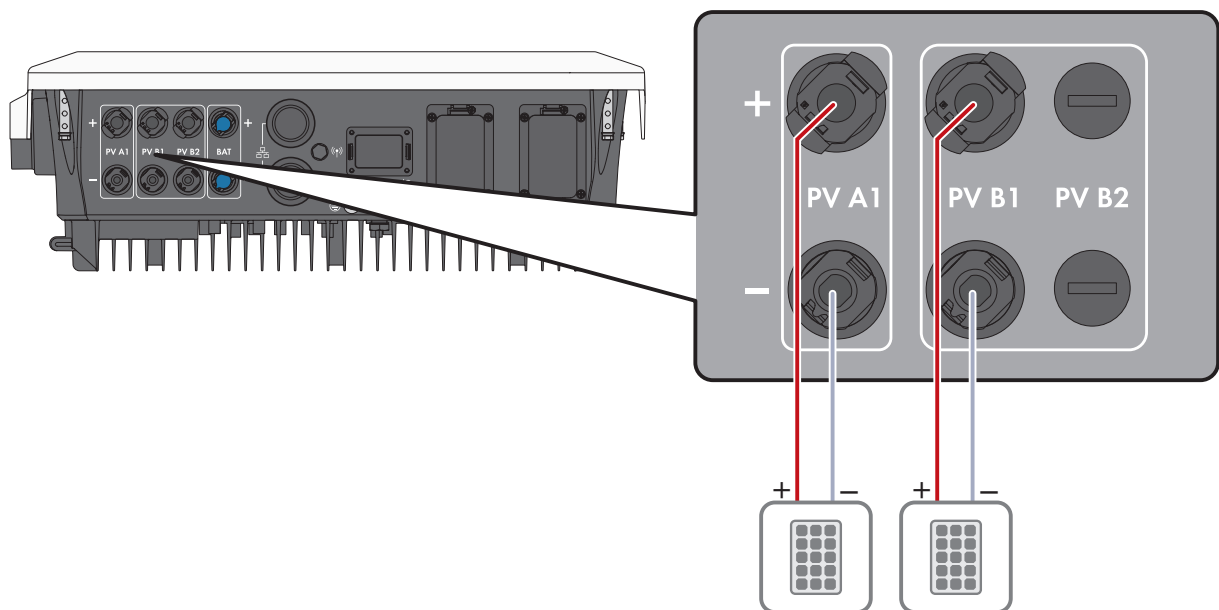


Figure 13: Connection overview with STP5.0-3SE-40 / STP6.0-3SE-40 / STP8.0-3SE-40

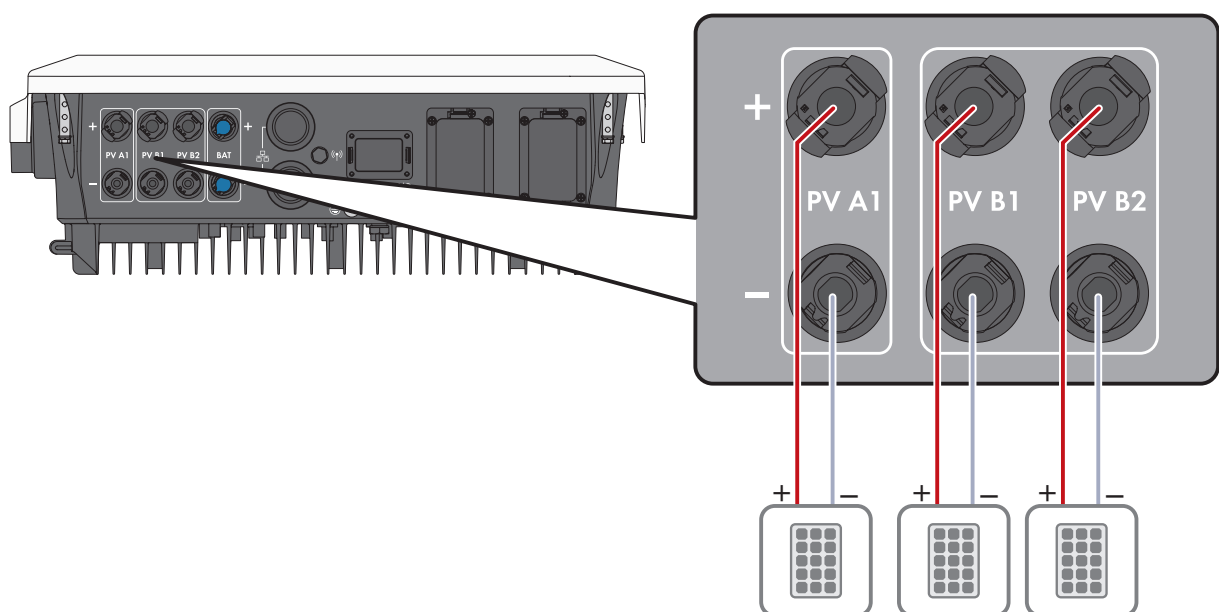


Figure 14: Connection overview with STP10.0-3SE-40

1.22.10 Requirements for the PV modules per input

- All PV modules should be of the same type.
- All PV modules should be aligned and tilted identically.
- On the coldest day based on statistical records, the open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter.
- The same number of series-connected PV modules must be connected to each string.
- The maximum short-circuit current of a string must not exceed the maximum short-circuit current of the inverter (see Section 17, page 169).
- The thresholds for the input voltage of the inverter must be adhered to (see Section 17, page 169).
- The maximum usable input power may be exceeded (see Section 17, page 169). The power exceeding the specified value cannot be used.
- The positive connection cables of the PV modules must be fitted with the positive DC connectors (for information on assembling DC connectors, see the DC connector installation manual).
- The negative connection cables of the PV modules must be fitted with the negative DC connectors (for information on assembling DC connectors, see the DC connector installation manual).

i Use of Y adapters for parallel connection of strings

The Y adapters must not be used to interrupt the DC circuit.

- Do not use the Y adapters in the immediate vicinity of the inverter. The adapters must not be visible or freely accessible.
- In order to interrupt the DC circuit, always disconnect the inverter as described in this document
Disconnecting the Inverter from Voltage Sources.

1.23 Overview of the Connection Area

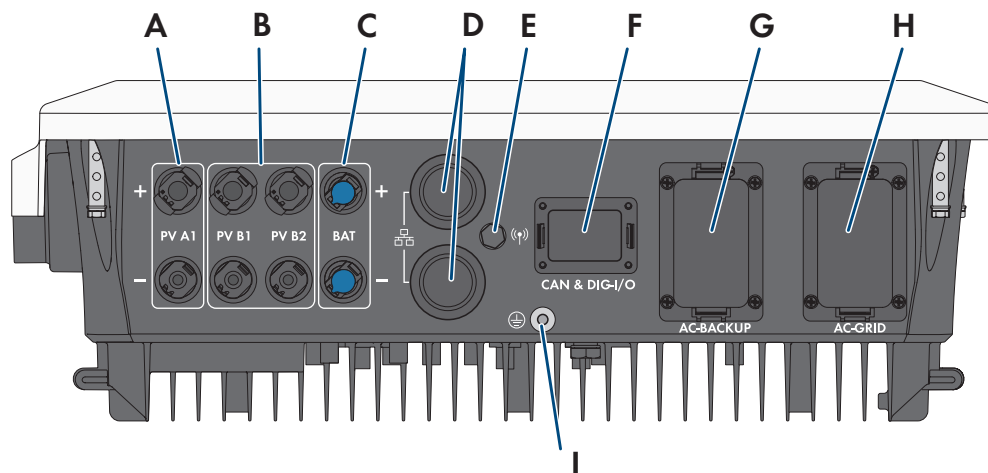


Figure 15: Connection areas at the bottom of the inverter

Position	Designation
A	1 positive and 1 negative DC connector (type Sunclix), input A
B	1 positive and 1 negative DC connector (type: Sunclix) for Sunny Tripower 5.0 SE, 6.0 SE and 8.0 SE, 2 positive and 2 negative DC connectors (type: Sunclix) for Sunny Tripower 10.0 SE, input B
C	1 positive and 1 negative DC connector for battery (type: Multi-Contact MC4) connection
D	Network port with protective cap

Position	Designation
E	Jack with protective cap for the WLAN antenna
F	CAN & DIG-I/O socket with protective cap for connection of COM connector
G	AC-BACKUP socket with protective cap for connection of AC backup loads. The protective cap may only be removed when backup loads are connected.
H	AC-GRID socket with protective cap for AC grid connection
I	Connection point for an additional grounding

1.24 Connecting the Protective Grounding

QUALIFIED PERSON

An additional protective 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 protective grounding (e.g., when using a grounding electrode).

The connection points have been labeled with the following symbol: 

The required M5x12 screw with spring washer and washer is included in the scope of delivery of the inverter.

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

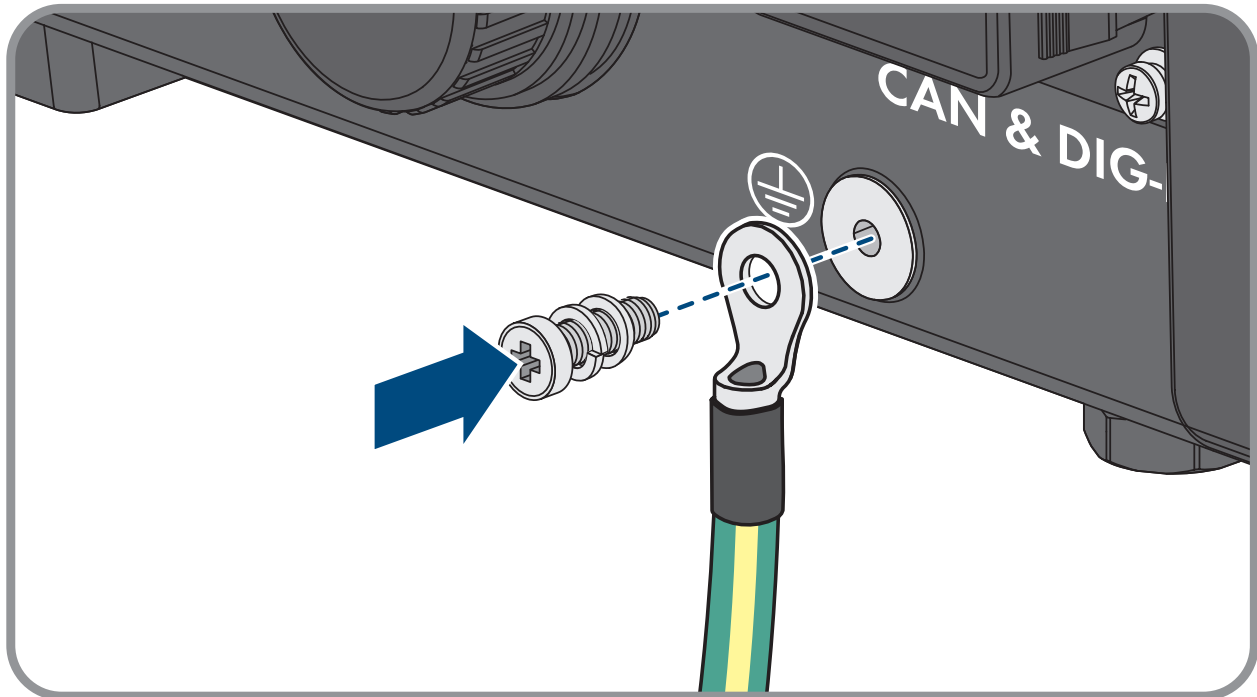
- ☐ 1 grounding cable
- ☐ 1 ring terminal lug M5

Cable requirements:

- ☐ Cross-section of grounding cable corresponds to the grounding conductor at the **AC-GRID** terminal, but at least 2.5 mm²

Procedure:

1. Strip the grounding cable insulation.
2. Crimp the ring terminal lug to the cable.



3. Tighten the screw with washer and spring washer at one of the two connection points for the additional grounding (PH2, tightening torque: 1.5 Nm).

1.25 Connecting the Inverter to the Utility Grid

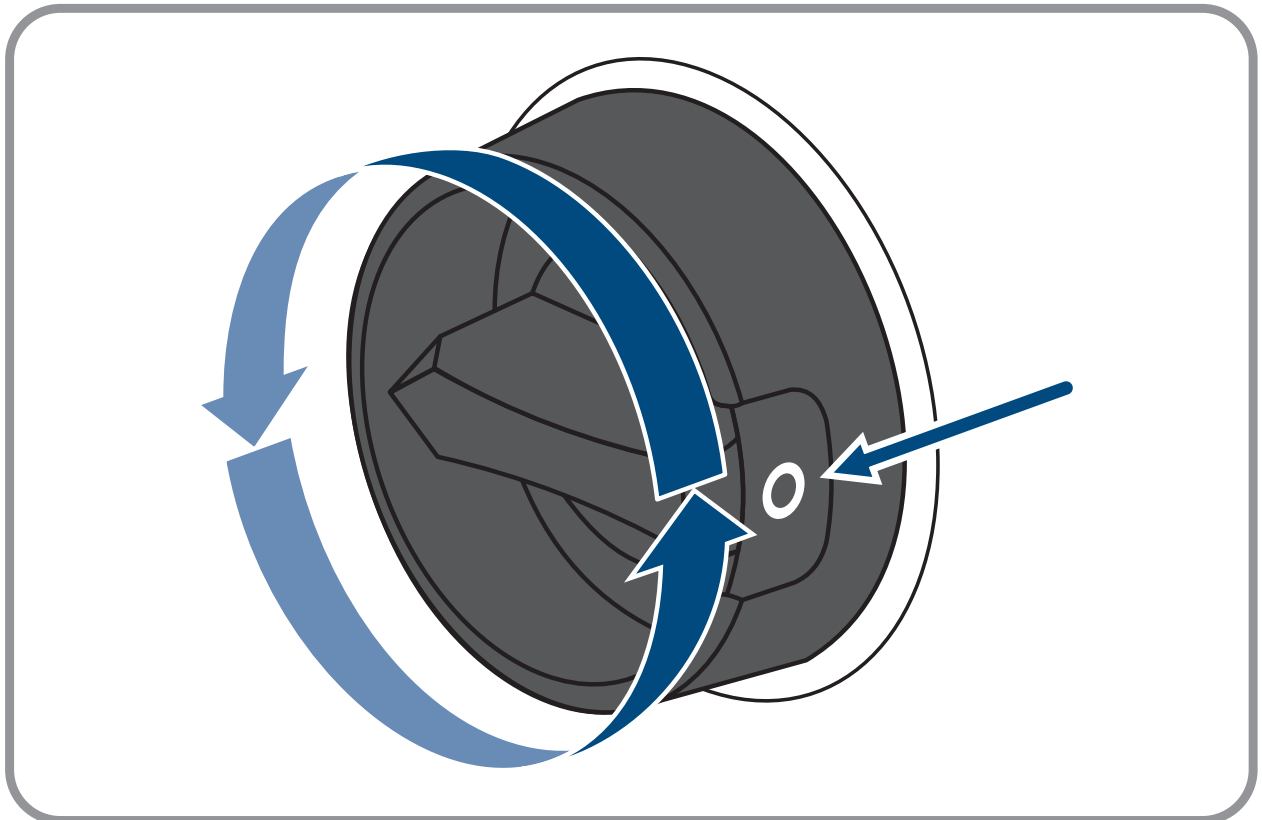
⚠ QUALIFIED PERSON

Requirements:

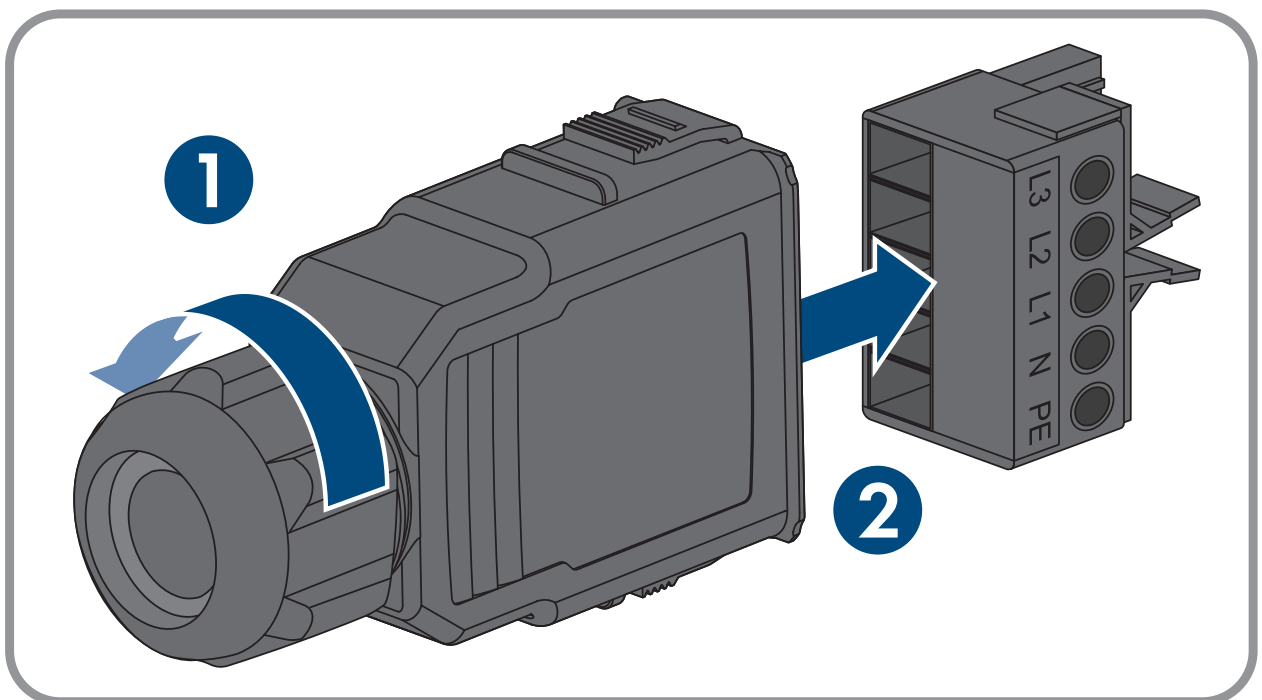
- ☐ The connection requirements of the grid operator must be met.
- ☐ The grid voltage must be within the permissible range. The exact operating range of the inverter is specified in the operating parameters.

Procedure:

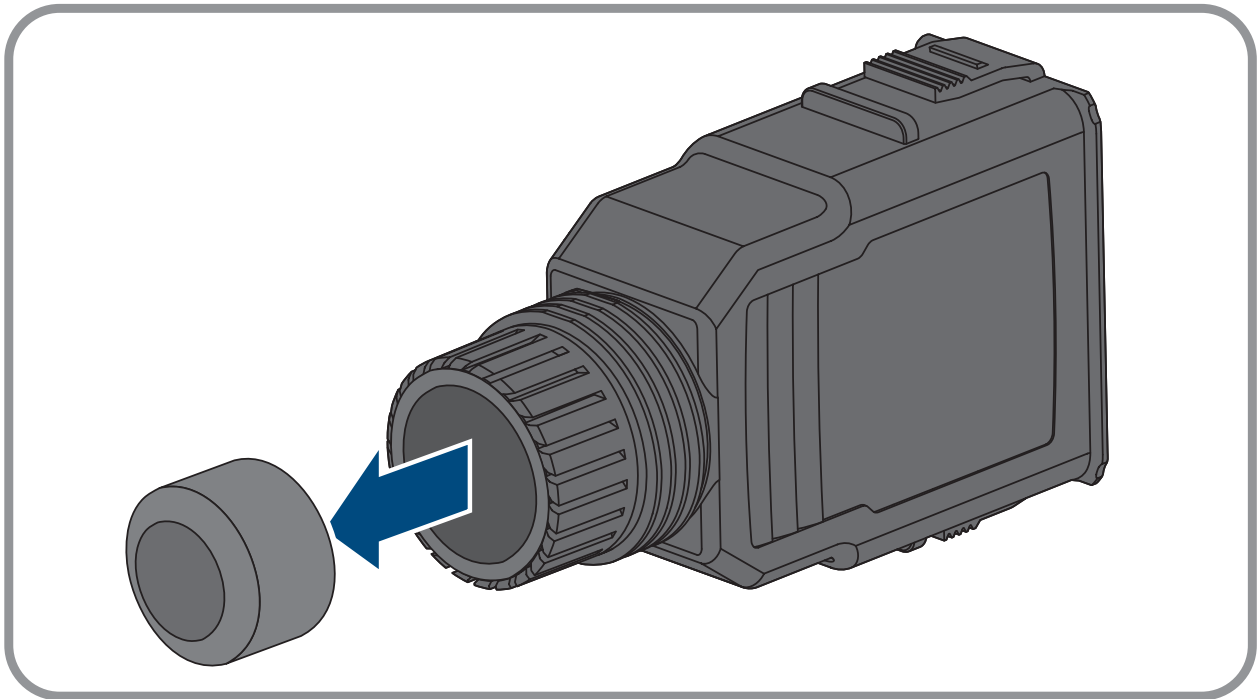
1. Disconnect the AC miniature circuit breaker from all 3 line conductors and secure against reconnection.



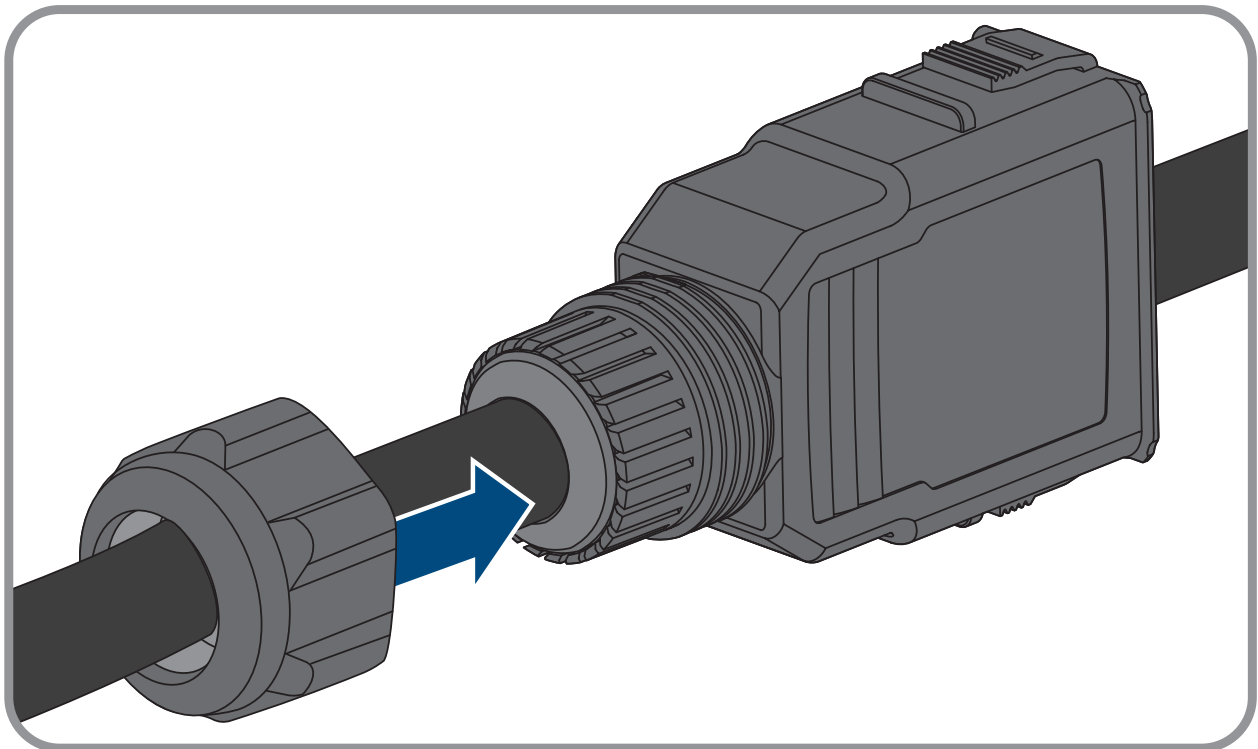
2. Ensure that the DC load-break switch has been switched off and secured against reconnection.
3. Ensure that the battery is switched off.
4. Label the AC connector for connection to the utility grid to prevent subsequent confusion with the AC connector for connection to the backup loads.



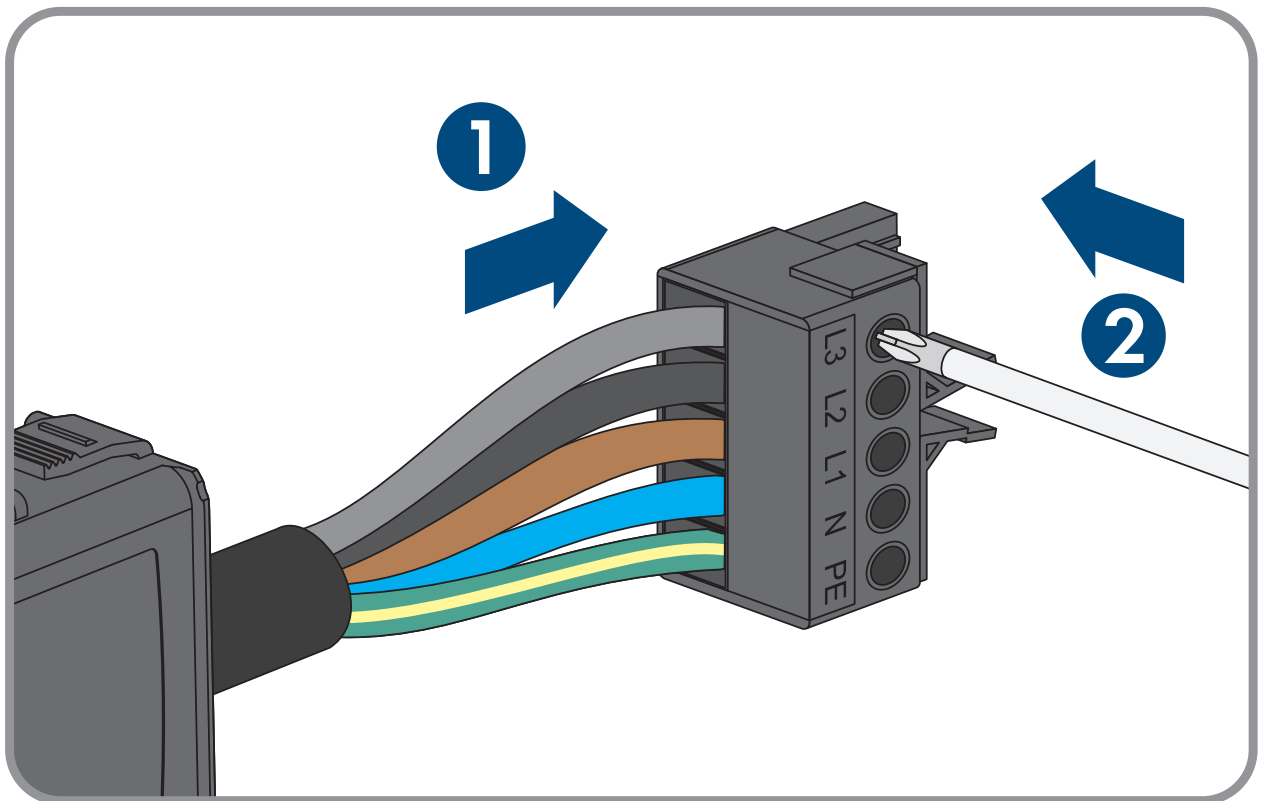
5. Unscrew the swivel nut of the AC connector and remove the terminal from the AC connector.



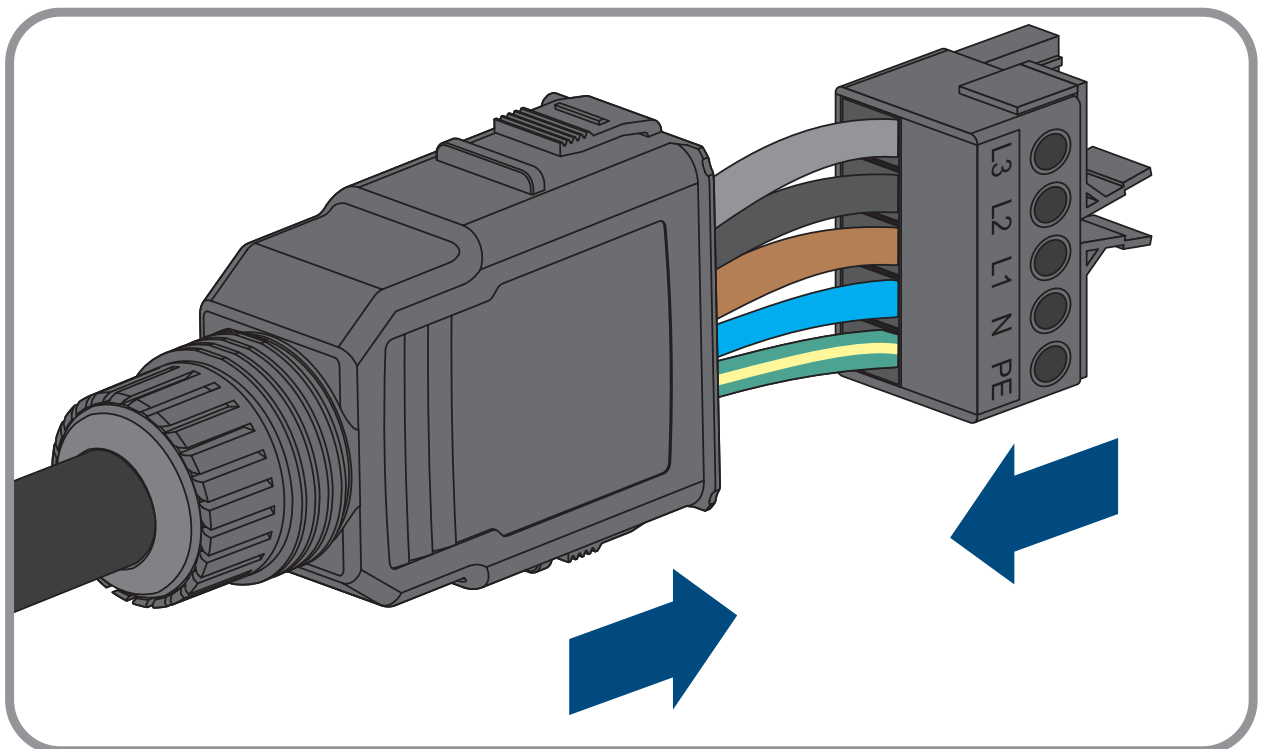
6. For a cable diameter of ≥ 19 mm, remove the inner sealing ring from the AC connector.



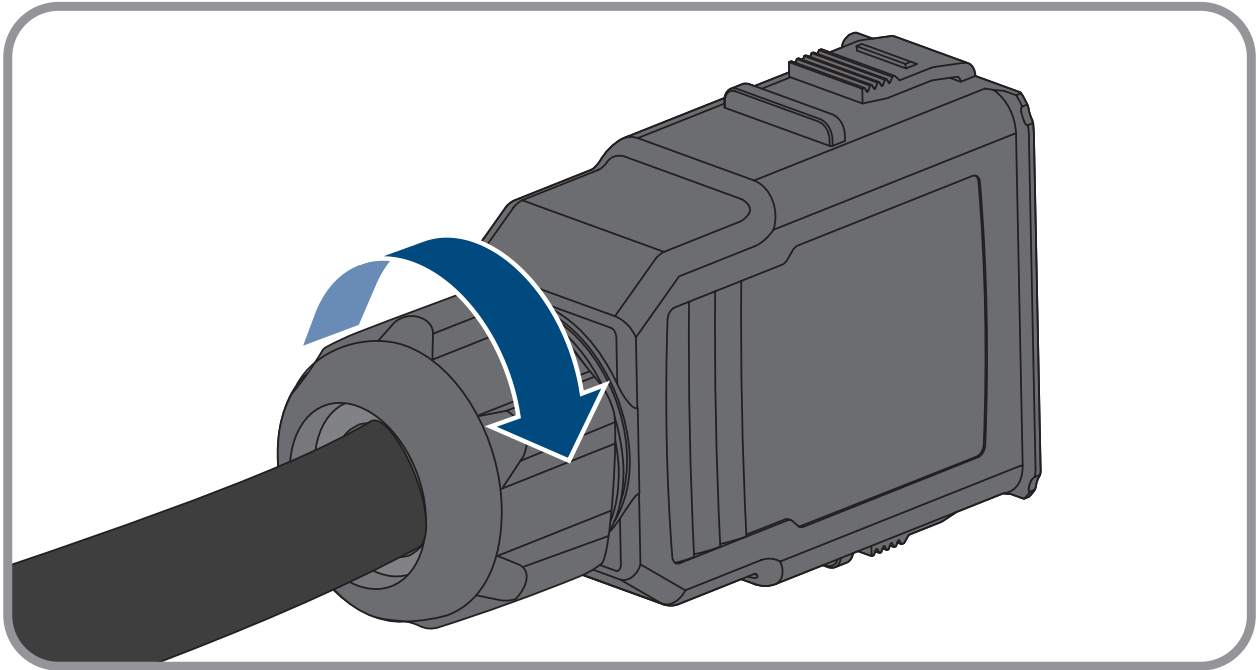
7. Route the AC cable through the swivel nut and connector enclosure.
8. Dismantle the AC cable (80 mm to 90 mm).
9. Strip the insulation of L1, L2, L3, N and the grounding conductor (12 mm).



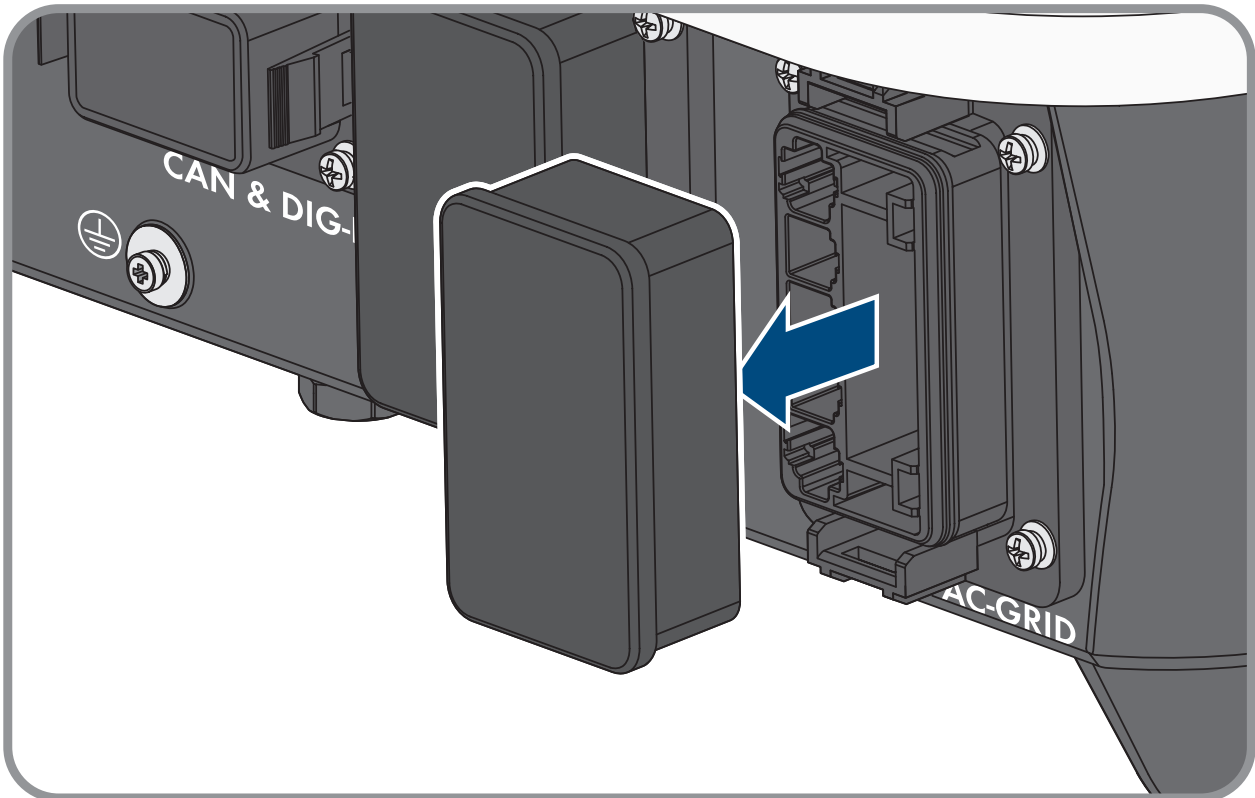
10. Insert the conductors L1, L2, L3, N, and grounding conductor into the terminal according to the labeling and tighten the terminal screws (PH2, tightening torque: 1.5 Nm).
11. Ensure that the conductors are correctly assigned and firmly seated in the terminal.



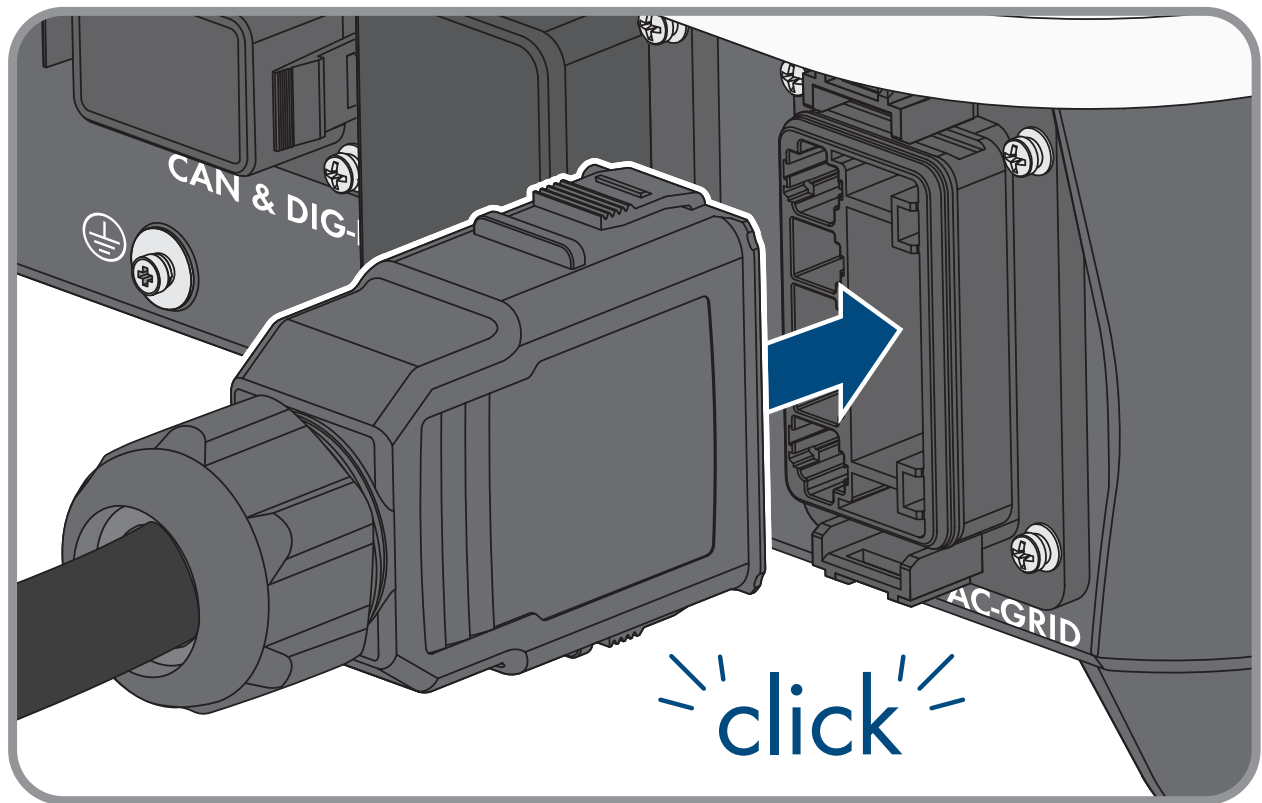
12. Insert the terminal into the connector enclosure. The terminal must snap audibly into place.



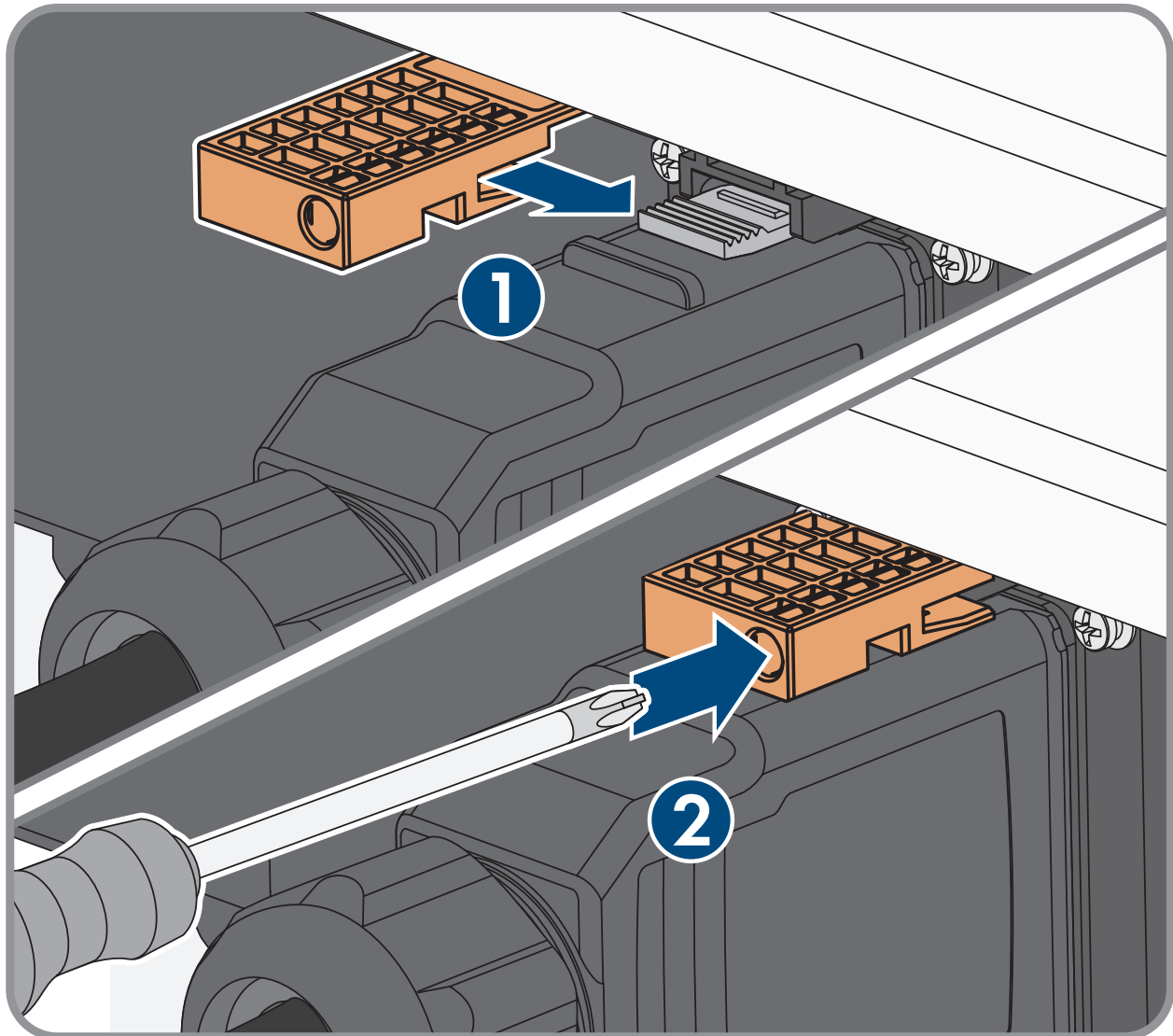
13. Tighten the swivel nut on the connector enclosure.



14. Remove the protective cap from the **AC-GRID** socket.



15. Insert the AC connector into the **AC-GRID** socket. The AC connector must snap audibly into place.



16. Slide the fuse terminal block onto the bracket of the AC connector from the left and screw tight (PH1, tightening torque: 0.5 Nm).

1.26 Connecting the Battery-Backup Appliances

⚠ QUALIFIED PERSON

Backup loads, that are supplied from the battery in the event of a power outage, can be connected to the inverter.

⚠ DANGER

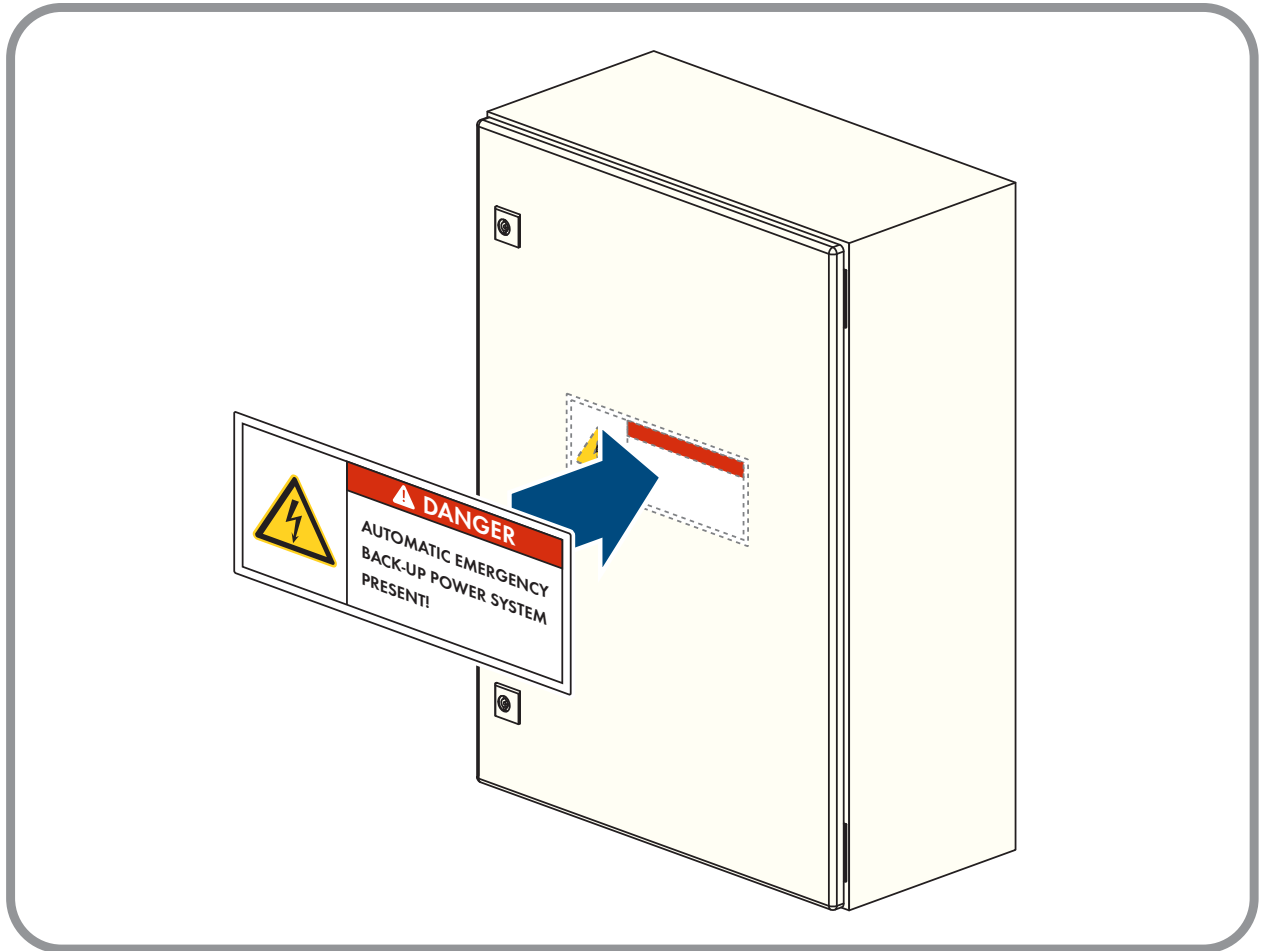
Danger to life due to electric shock when touching live system components during battery-backup operation

Even if the AC miniature circuit breaker and the DC load-break switch of the inverter are disconnected, parts of the system may still be live when the battery is switched on due to battery-backup operation.

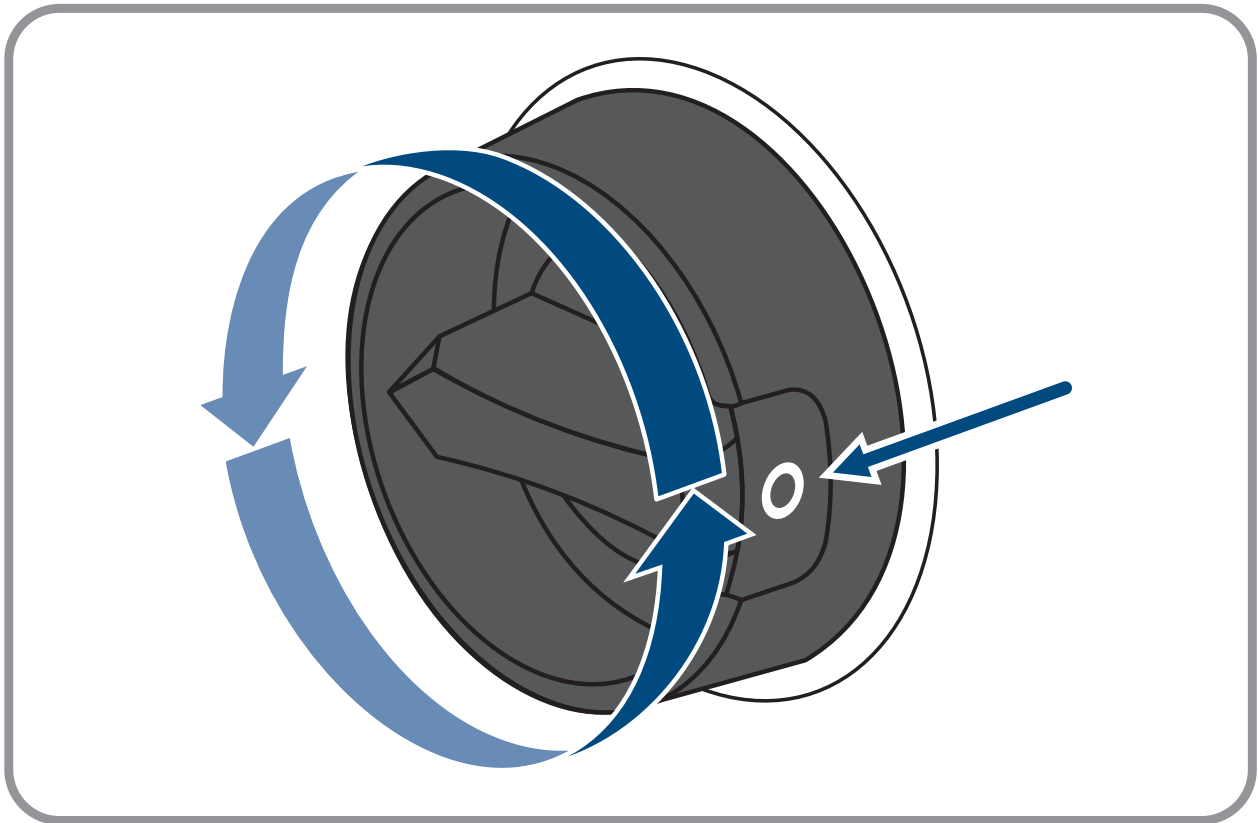
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document.
- Ensure that the grounding conductors of the electric circuits of the battery-backup appliances are connected to the grounding busbar of the house connection box.

Procedure:

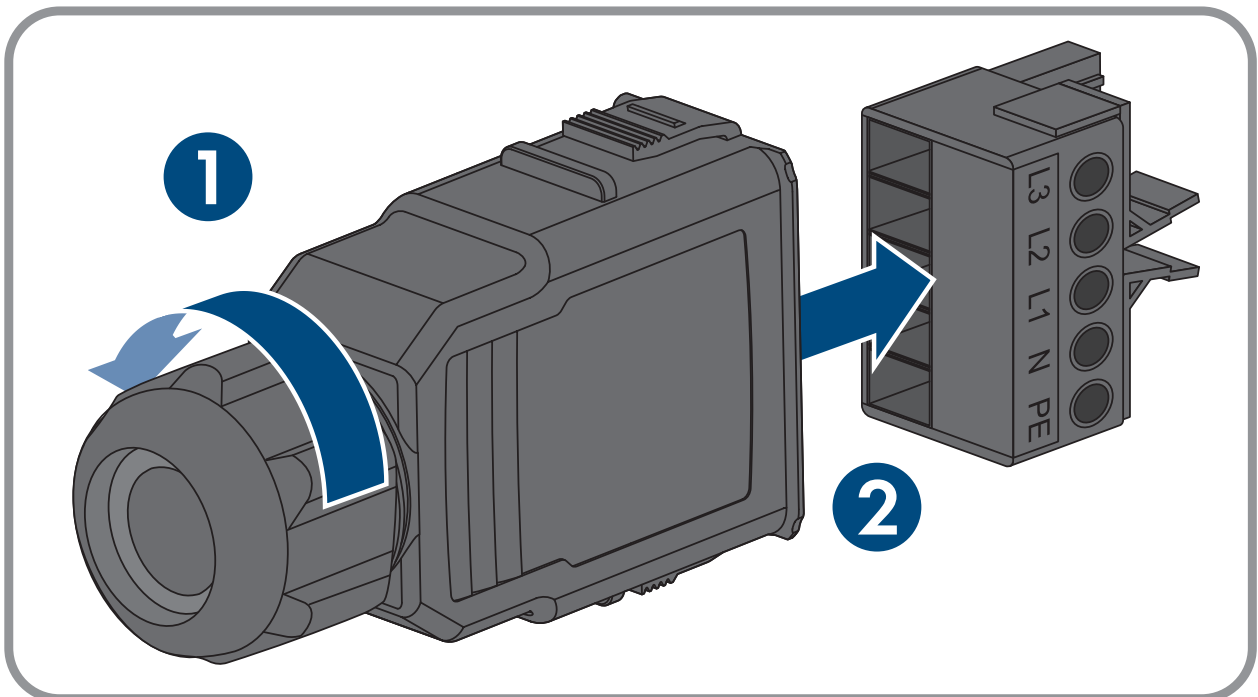
1. Disconnect the AC and backup miniature circuit breaker from all 3 line conductors and secure against reconnection.



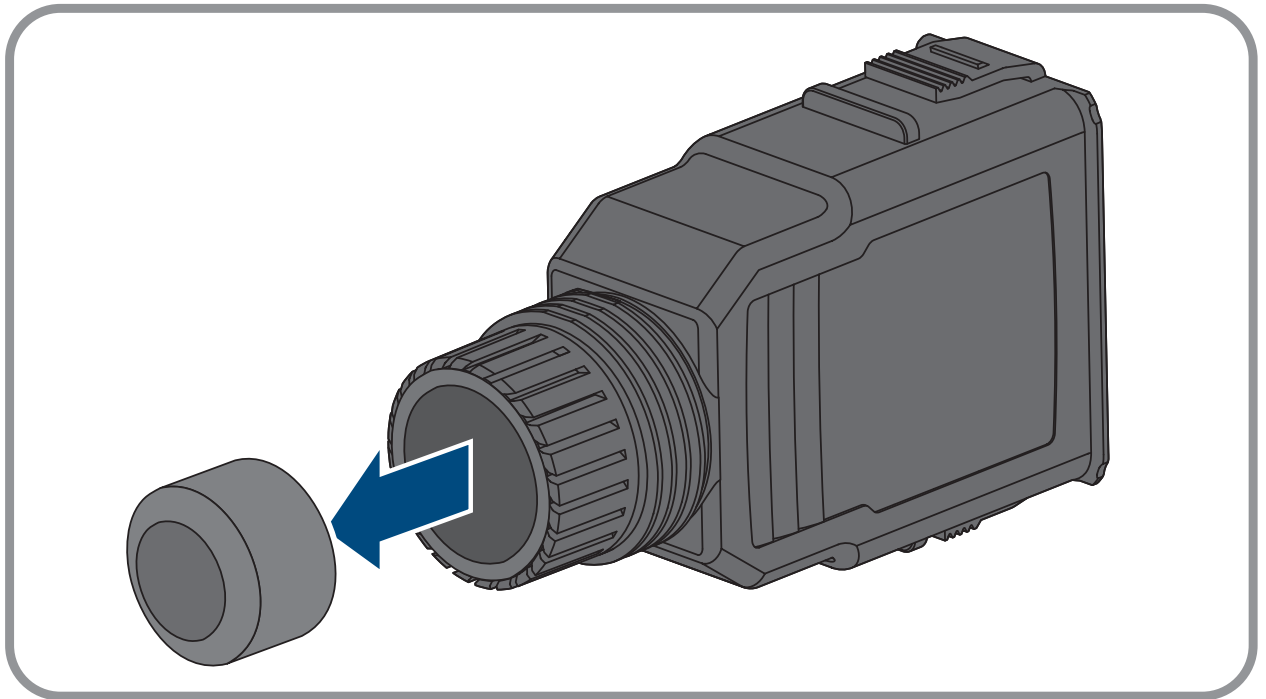
2. Place a notice on the subdistribution indicating the battery-backup operation of the inverter.



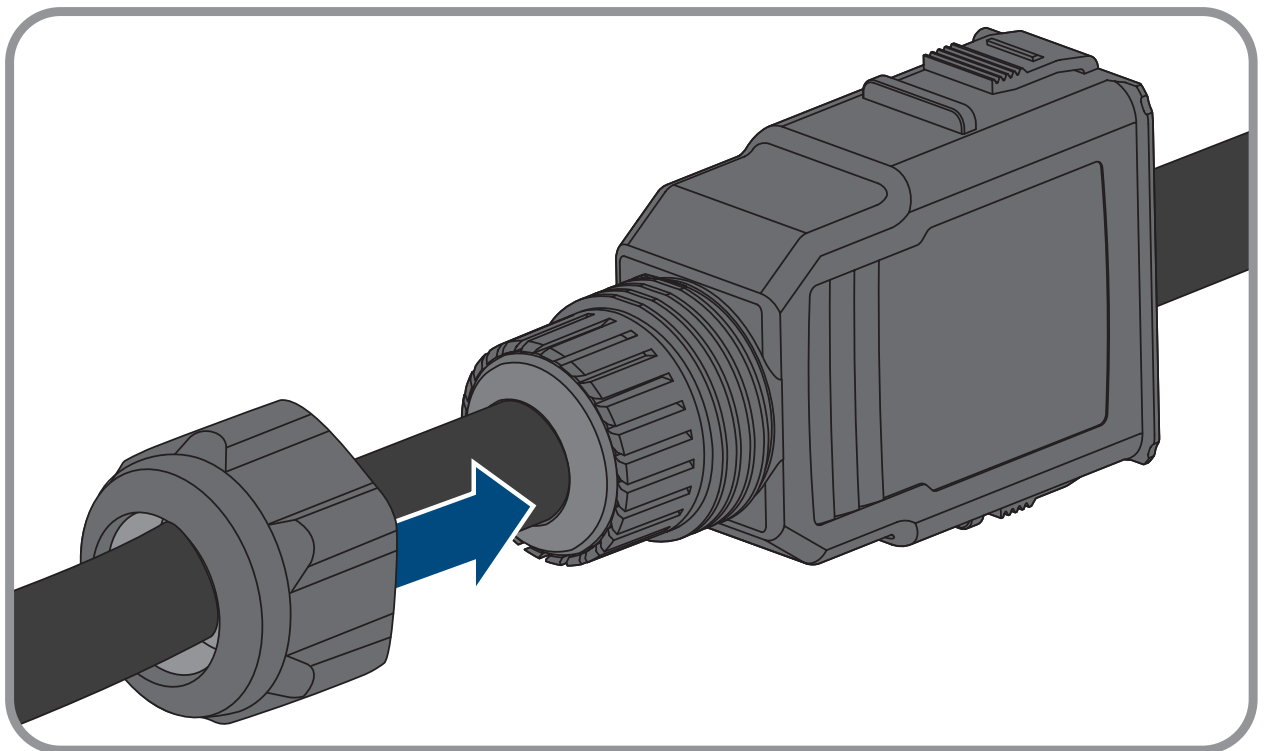
3. Ensure that the DC load-break switch has been switched off and secured against reconnection.
4. Ensure that the battery is switched off.
5. Label the AC connector for connection to the backup loads to prevent subsequent confusion with the AC connector for connection to the utility grid.



6. Unscrew the swivel nut of the AC connector and remove the terminal from the AC connector.



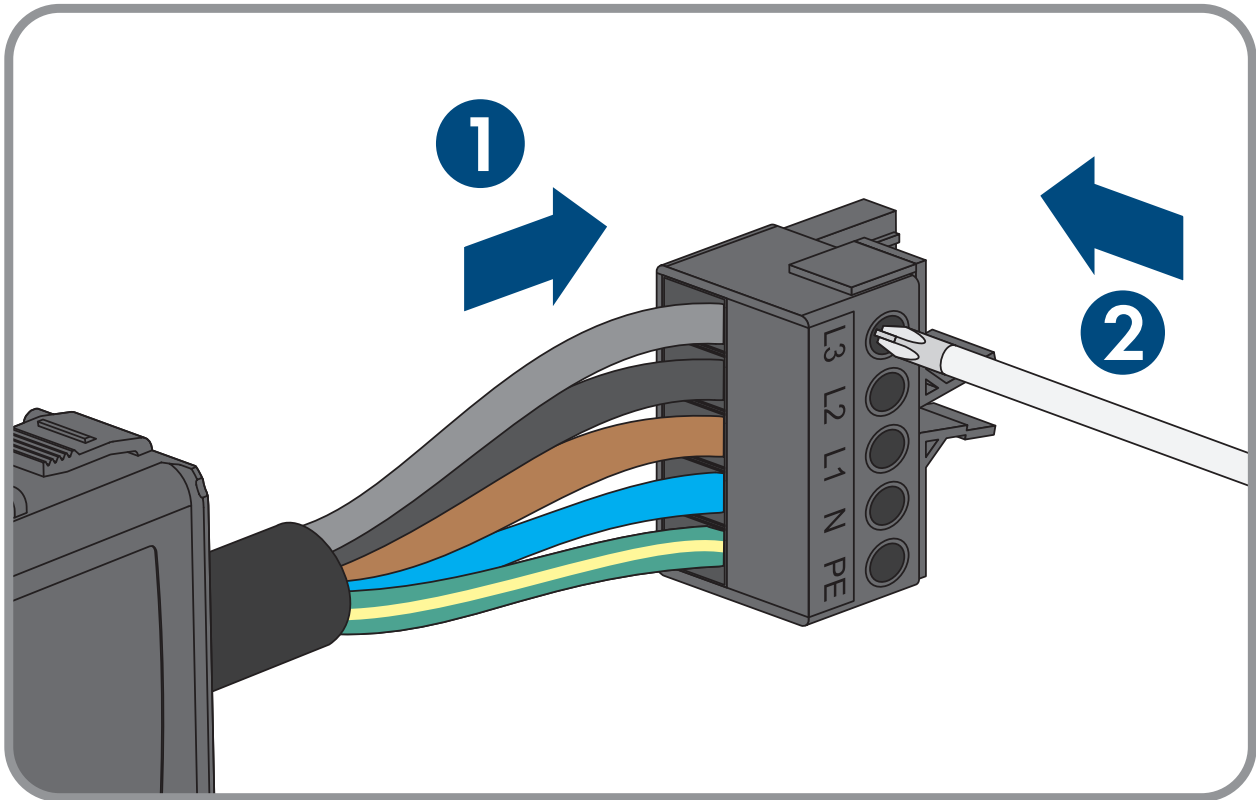
7. For a cable diameter of ≥ 19 mm, remove the inner sealing ring from the AC connector.



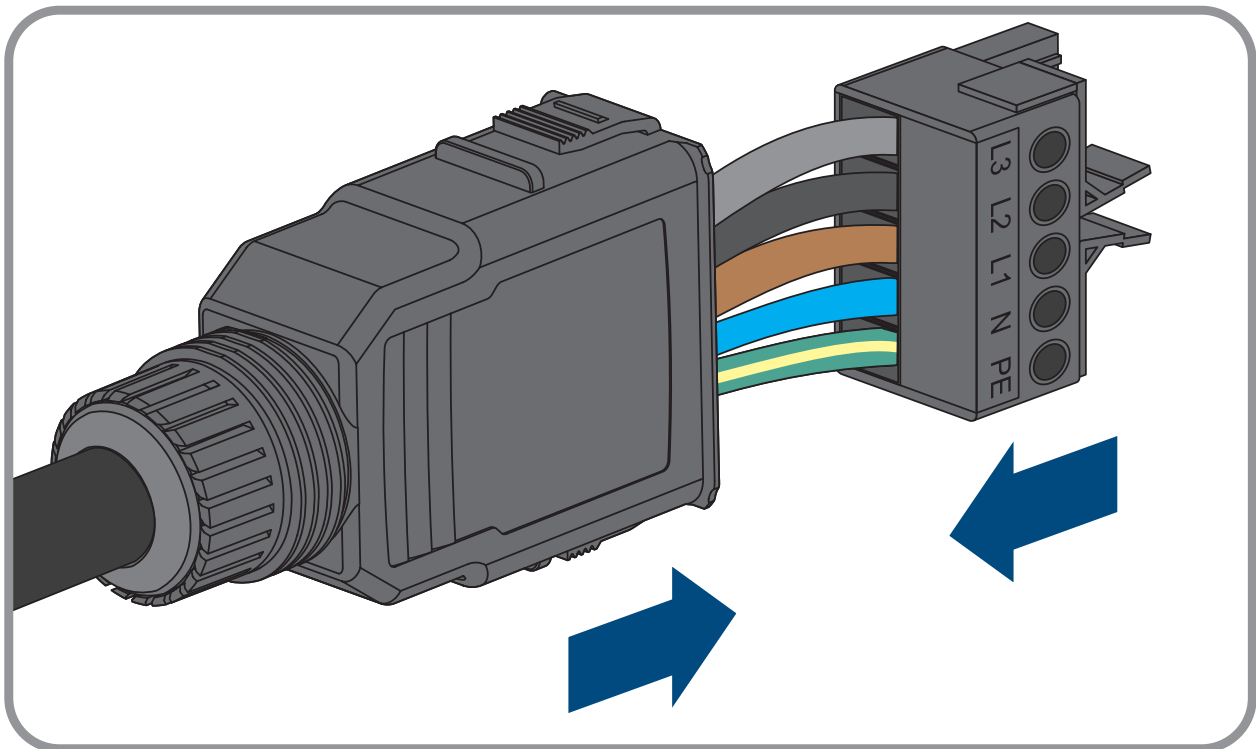
8. Route the AC cable through the swivel nut and connector enclosure.

9. Dismantle the AC cable (80 mm to 90 mm).

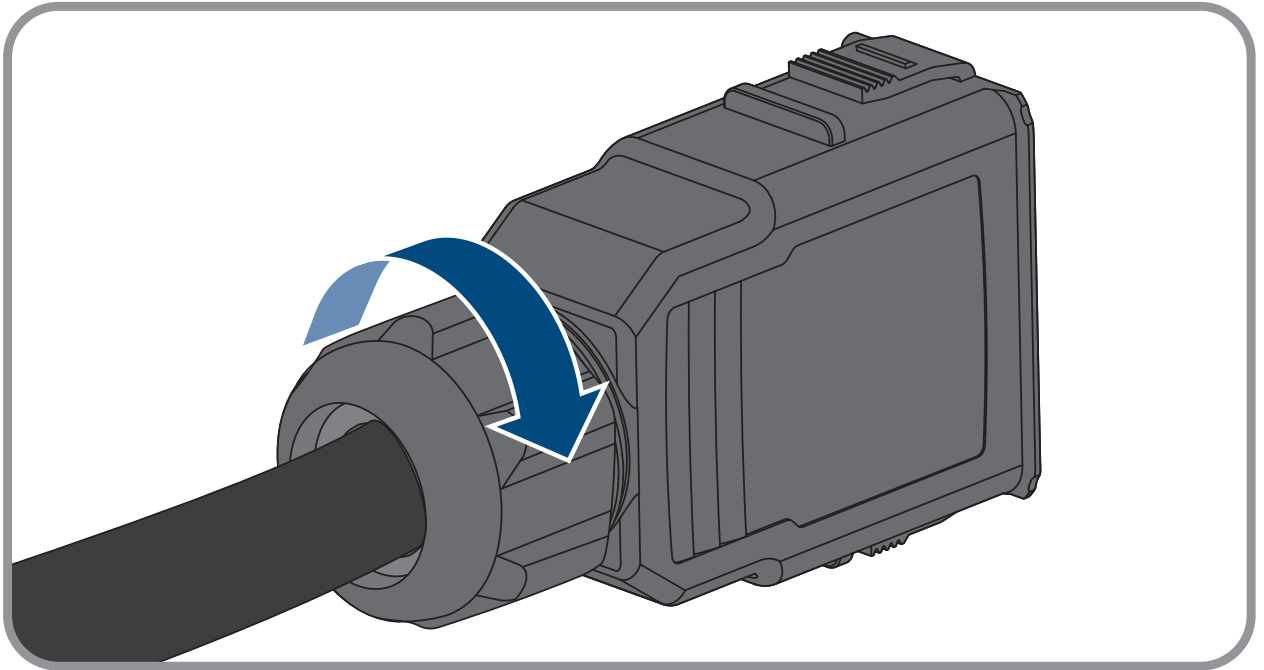
10. Strip the insulation of L1, L2, L3, N and the grounding conductor (12 mm).



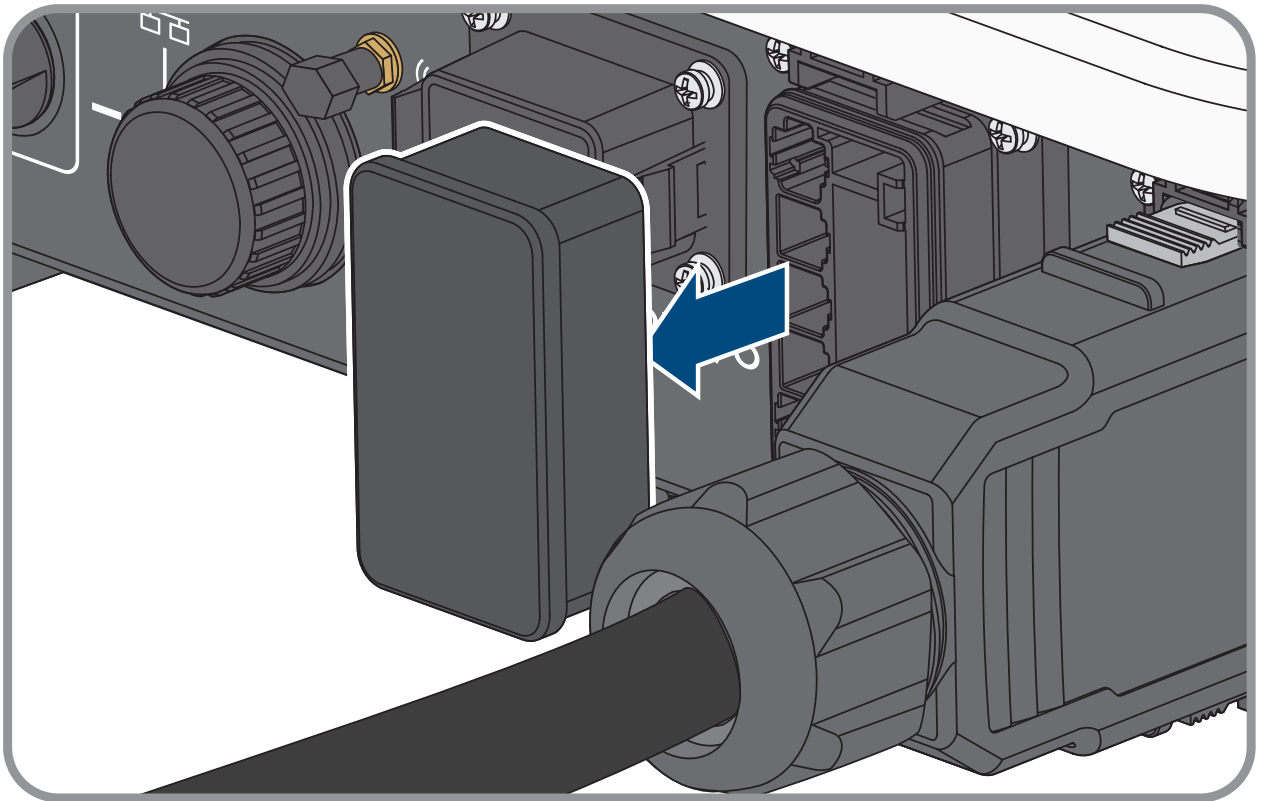
11. Insert the conductors L1, L2, L3, N, and grounding conductor into the terminal according to the labeling and tighten the terminal screws (PH2, tightening torque: 1.5 Nm).
12. Ensure that the conductors are correctly assigned and firmly seated in the terminal.



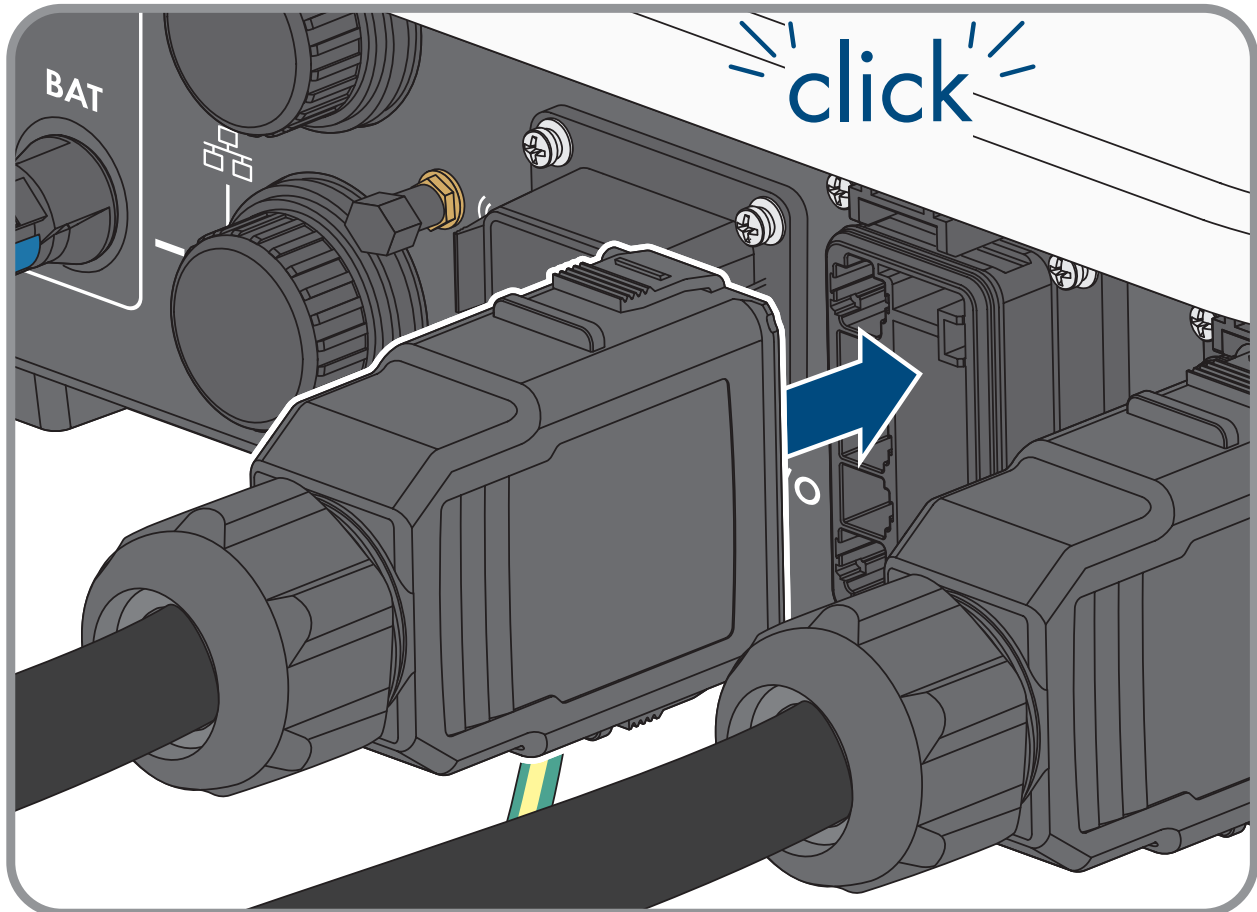
13. Insert the terminal into the connector enclosure. The terminal must snap audibly into place.



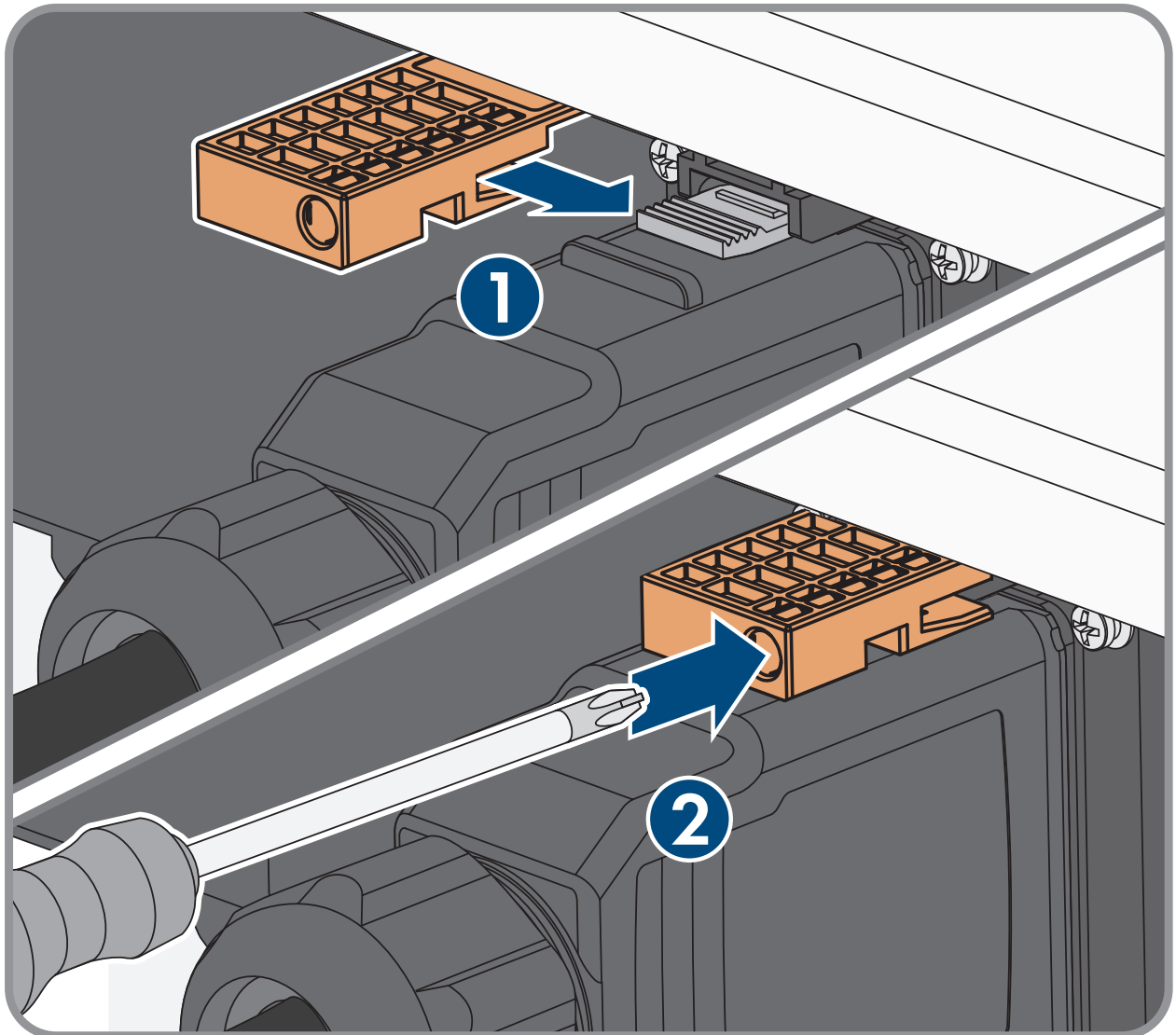
14. Tighten the swivel nut on the connector enclosure.



15. Remove the protective cap from the **AC-BACKUP** socket.



16. Insert the AC connector into the **AC-BACKUP** socket. The AC connector must snap audibly into place.



17. Slide the fuse terminal block onto the bracket of the AC connector from the left and screw tight (PH1, tightening torque: 0.5 Nm).
18. Ensure that the grounding conductors of the electric circuits of the battery-backup appliances are connected to the grounding busbar of the house connection box. Otherwise the backup loads cannot be supplied with power.

1.27 Mounting the WLAN Antenna

⚠ QUALIFIED PERSON

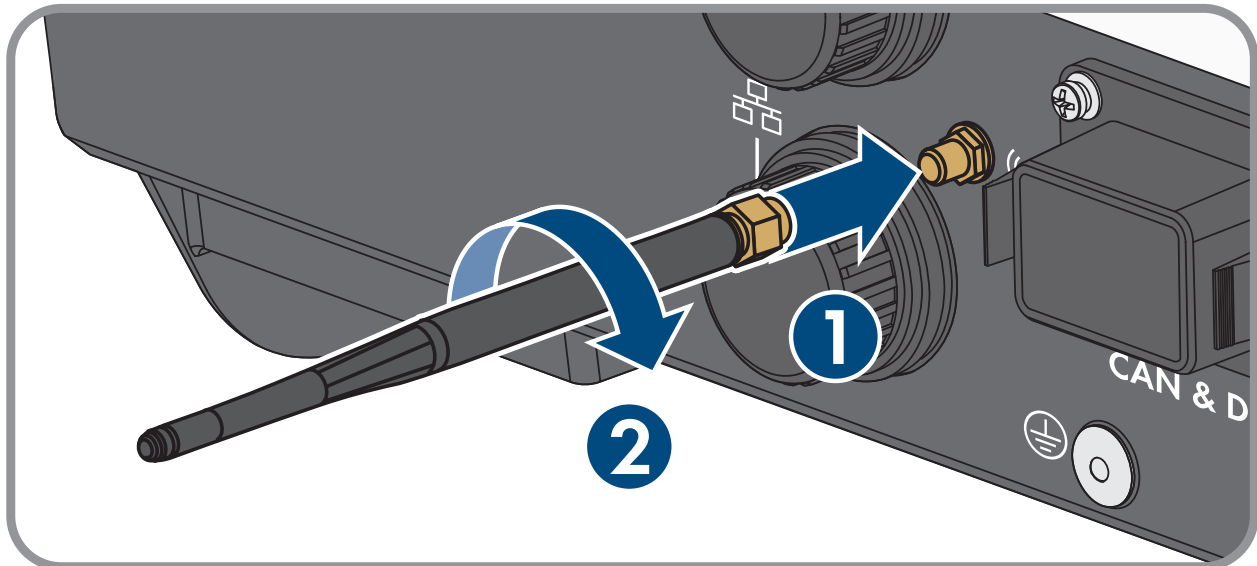
The Wi-Fi antenna must be mounted. Otherwise, the degree of protection of the product cannot be guaranteed.

Requirements:

- ☐ The Wi-Fi antenna supplied must be used.

Procedure:

1. Disconnect the product from voltage sources (see Section 10, page 97)
2. Remove the protective cap from the jack on the inverter.



3. Plug the Wi-Fi antenna into the jack and screw tight (torque: 1 Nm).
4. Pull on the Wi-Fi antenna to ensure that the Wi-Fi antenna is securely in place.

1.28 Connecting the Network Cables

⚠ QUALIFIED PERSON

⚠ DANGER

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

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

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

NOTICE

Product damage due to moisture penetration

Moisture penetration can damage the product and impair its functionality of the product.

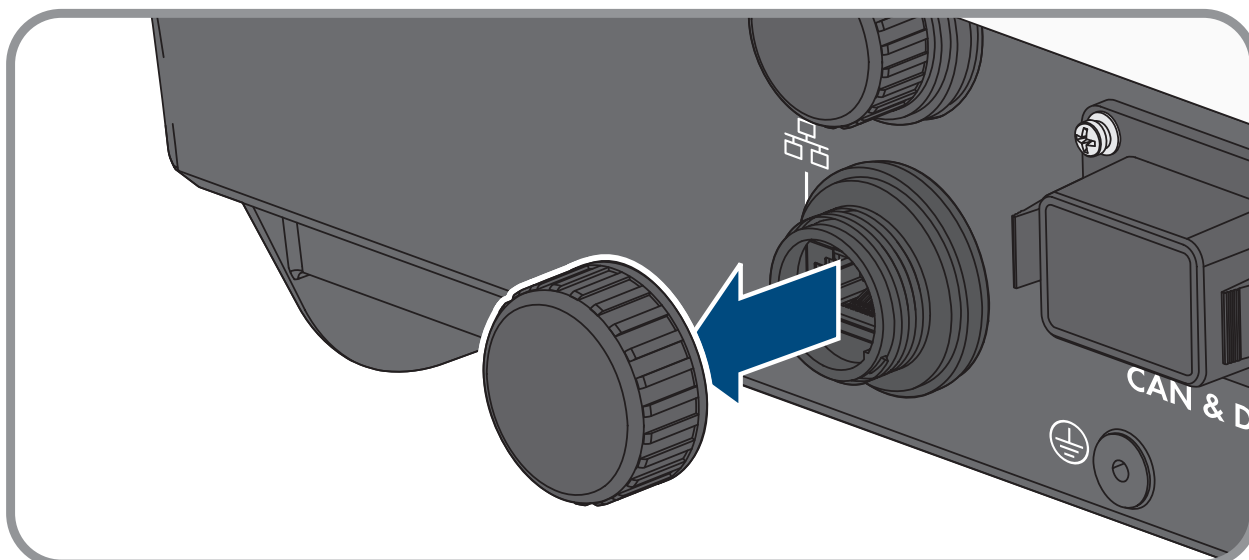
- Connect the network cable with the supplied RJ45 protective sleeve to the product.

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

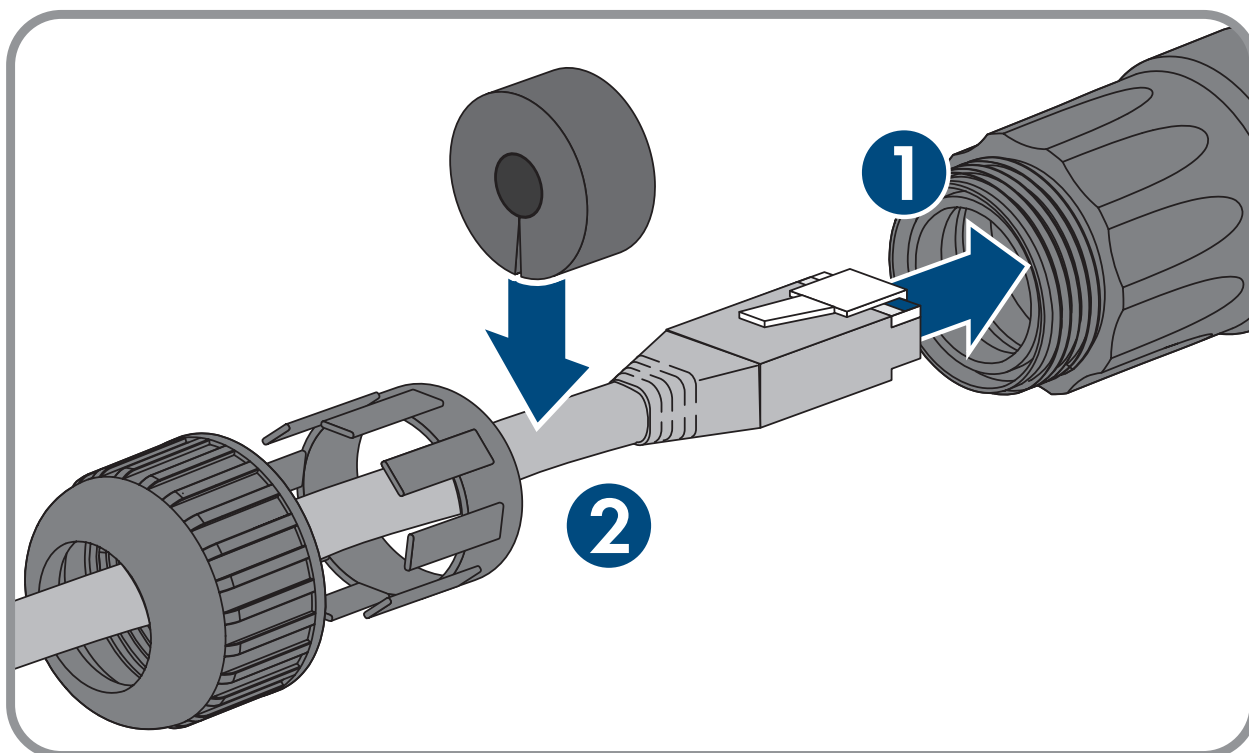
- ☐ One or two network cables

Procedure:

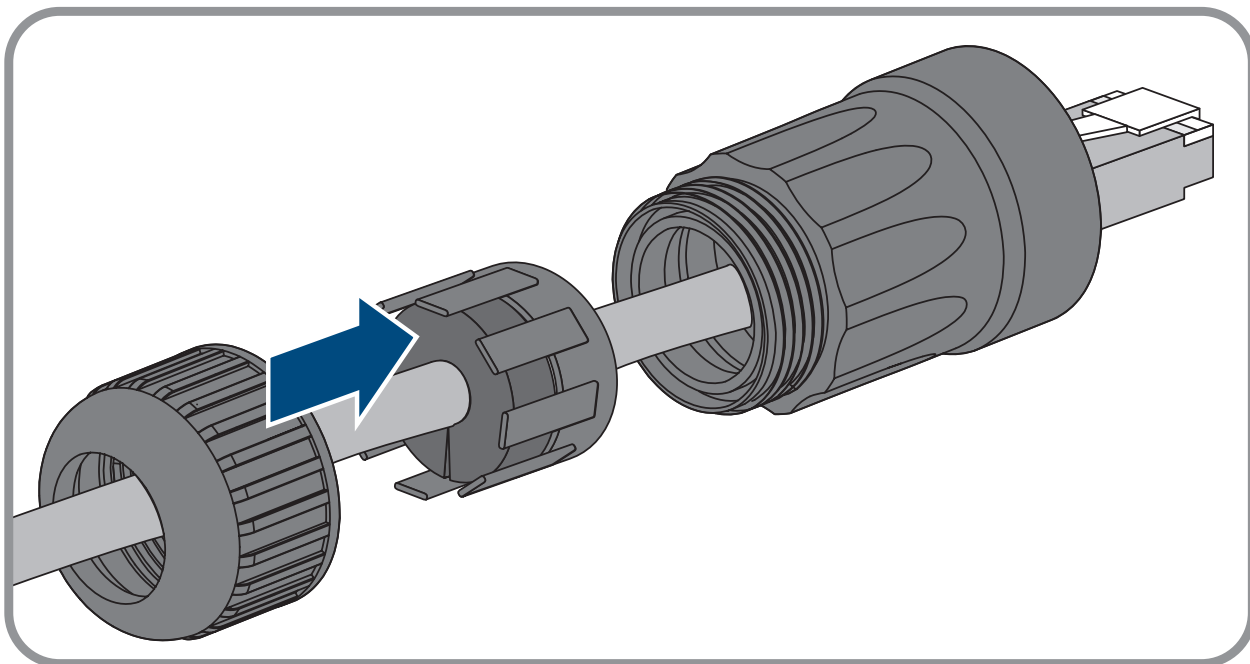
1. Disconnect the product from voltage sources (see Section 10, page 97).



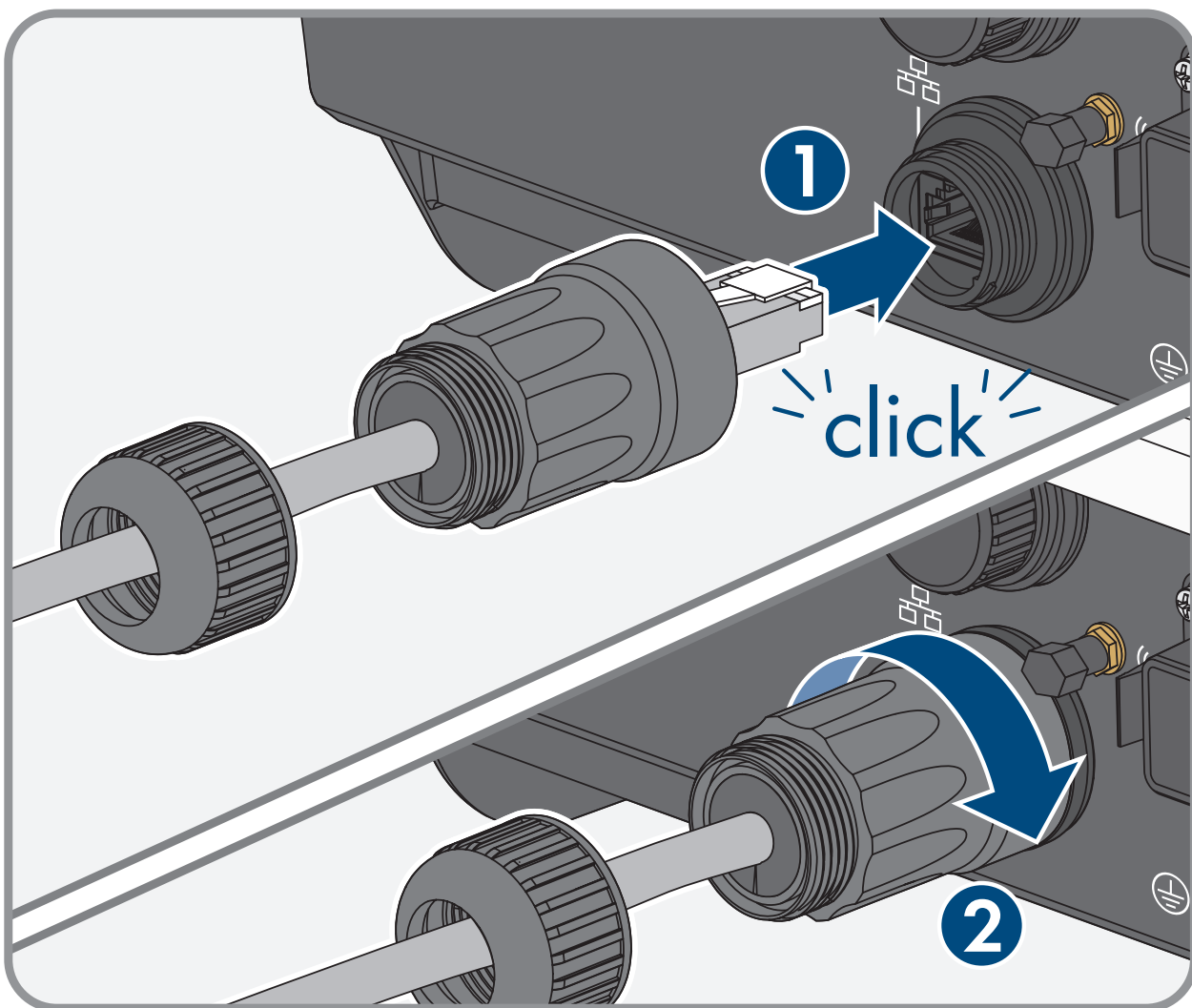
2. Unscrew the protective cap from the network port.
3. Press the cable support sleeve out of the threaded sleeve.



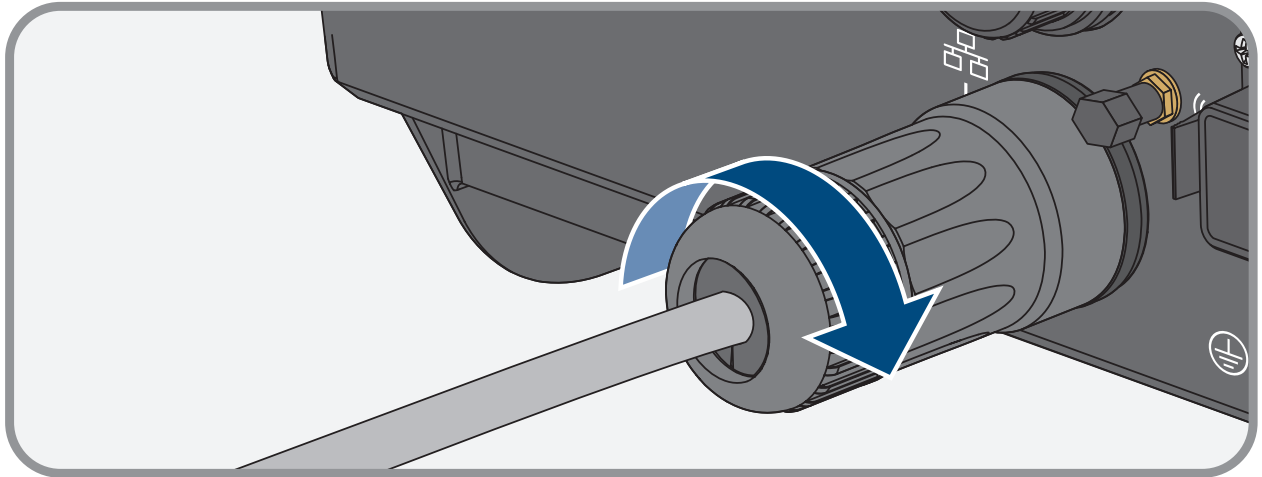
4. Feed the network cable through the swivel nut and threaded sleeve. Attach the cable support sleeve to the network cable.



5. Press the cable support sleeve into the threaded sleeve.



6. Insert the network plug of cable into the product's network port. Ensure that the cable is correctly locked in place. Turn the threaded sleeve onto the thread of the network port on the product.



7. Screw the swivel nut onto the threaded sleeve.
8. If you would like to establish a direct connection, connect the other end of the network cable directly to the end device.
9. If you would like to integrate the product into a local network, connect the other end of the network cable to the local network (e.g. via a router).
10. If you want to connect the product to a communication product (e.g., Energy Meter, Sunny Home Manager), connect a second network cable to the second network socket as described in this section. Connect the other end of the second network cable to the communication product.

1.29 Communication Connection

1.29.1 Assignment of Terminal Block of COM Connector

The COM connector is used for battery communication via CAN. Furthermore, a ripple control receiver and a fast-stop switch can be connected via the digital inputs and outputs. A potential-free switching contact is available for controlling loads up to 30 V/1 A.

⚠ DANGER

Danger to life due to electric shock

When connecting signals with voltages above 30 V to the COM connector, there is a risk of life-threatening electric shock.

- Only connect signals with protective extra-low voltage (< 30 V).

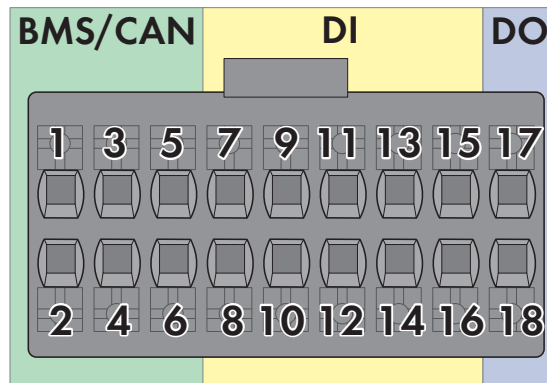


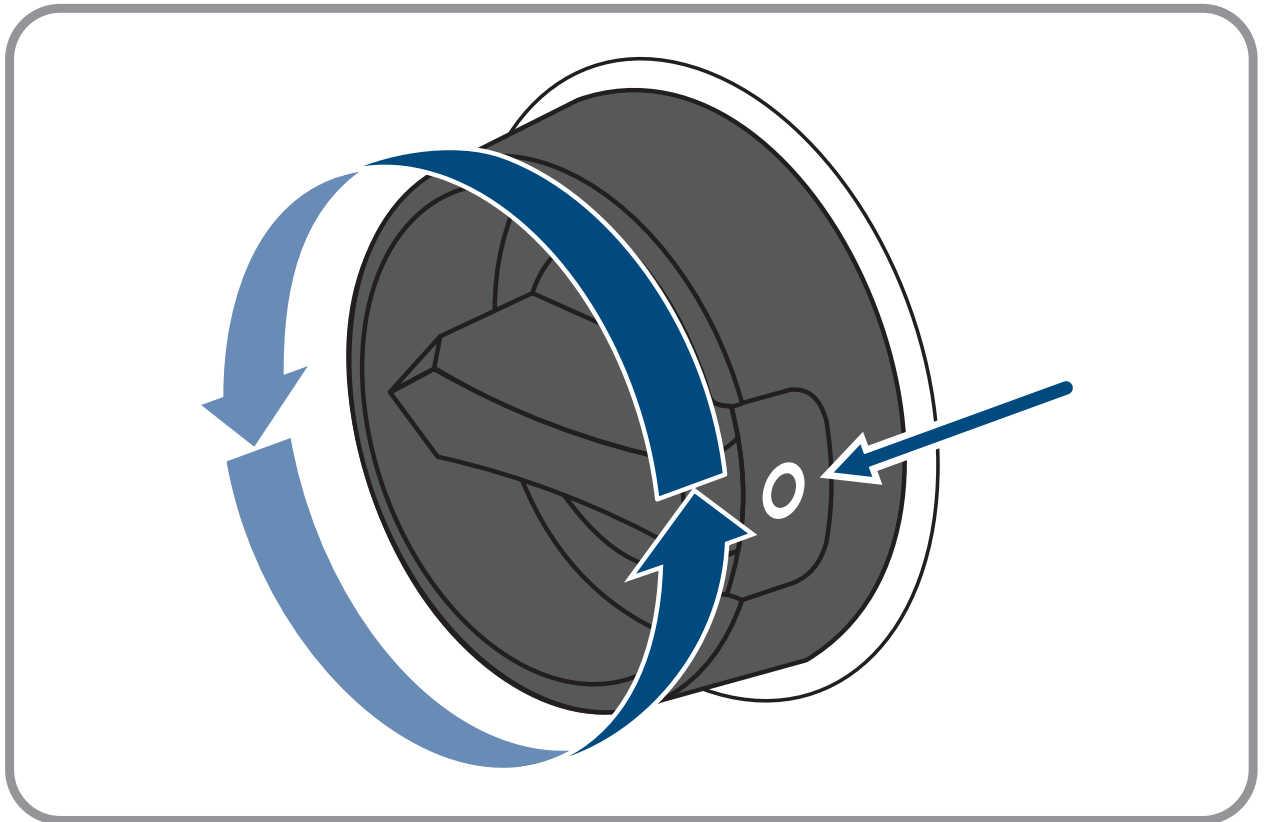
Figure 16: PIN overview

Pin	Pin assignment
BMS/CAN	
1	CAN H
2	Enable signal
3	CAN L
4	Enable ground
5	Not assigned
6	Shielding
DI	
7	Not assigned
8	Shielding
9	DI2
10	DI1
11	DI4
12	DI3
13	Fast stop
14	12 V
15	Not assigned
16	Not assigned
DO	
17	NO (Normally Open)
18	COM

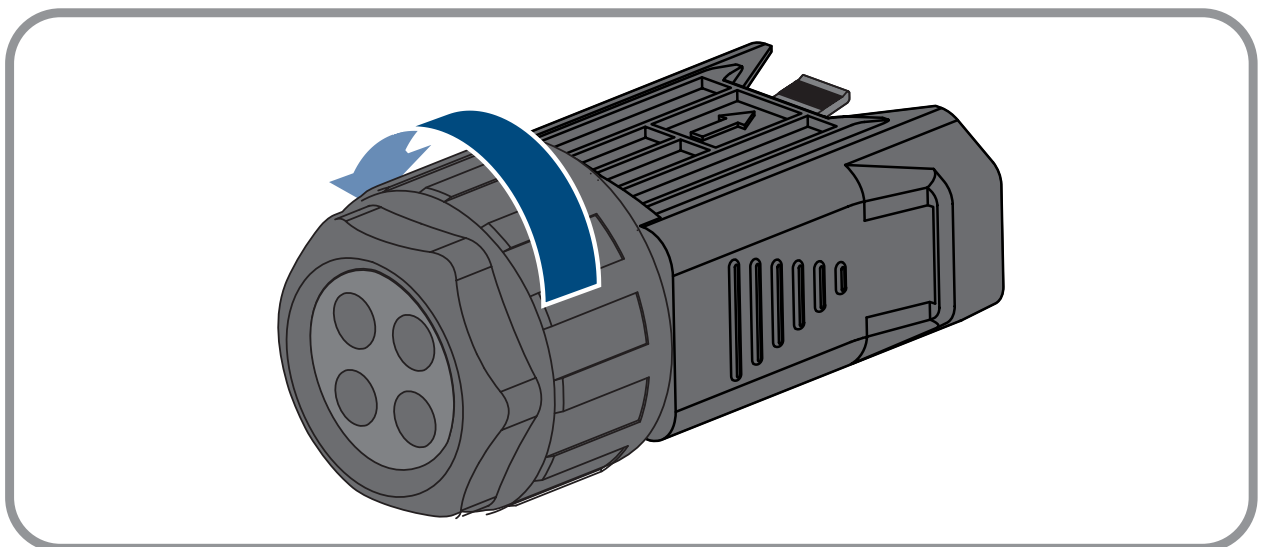
1.29.2 Connecting the COM Connector

⚠ QUALIFIED PERSON

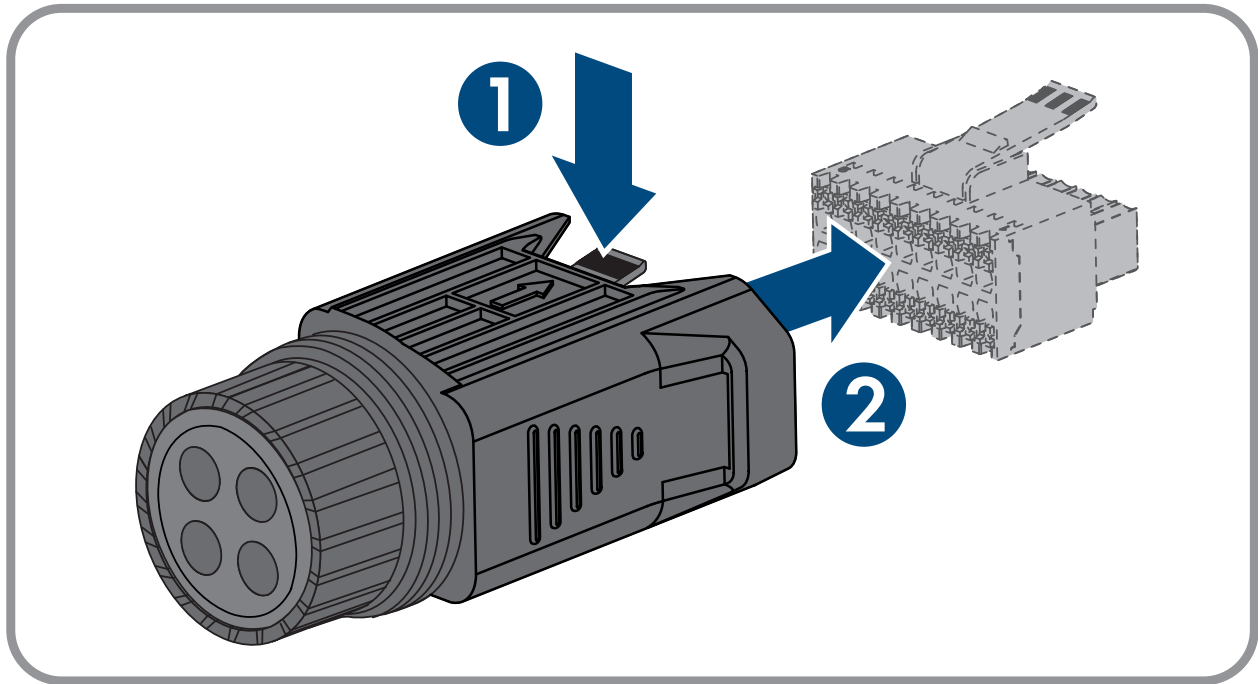
1. Disconnect the AC miniature circuit breaker from all 3 line conductors and secure against reconnection.



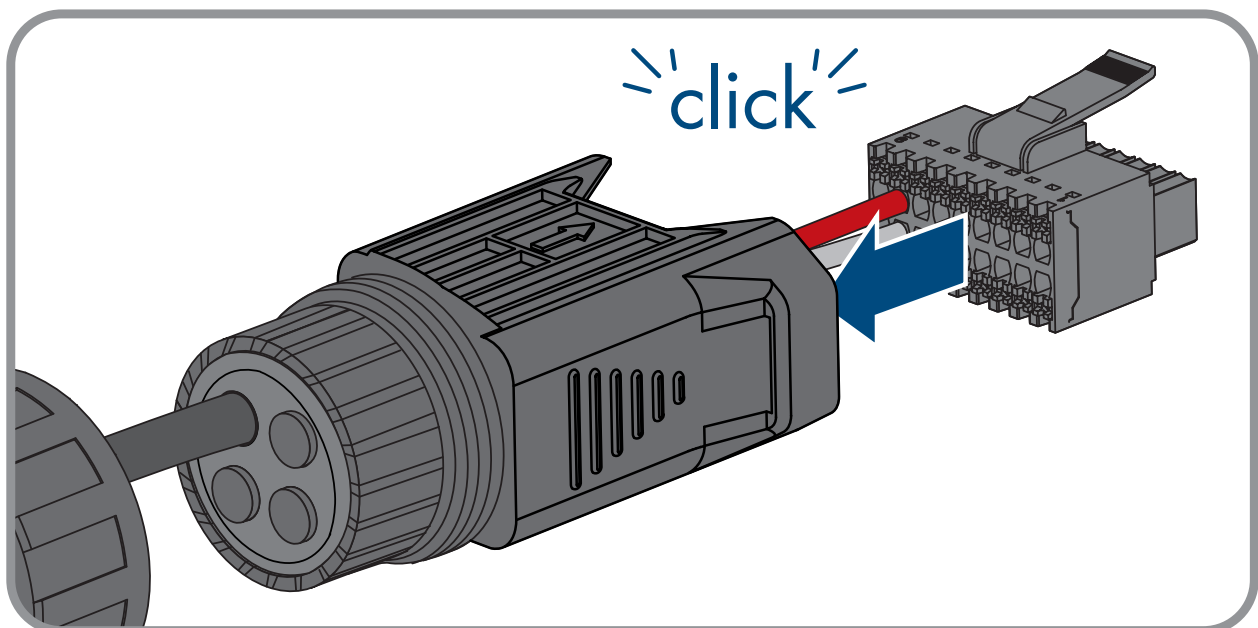
2. Ensure that the DC load-break switch has been switched off and secured against reconnection.
3. Ensure that the battery is switched off.



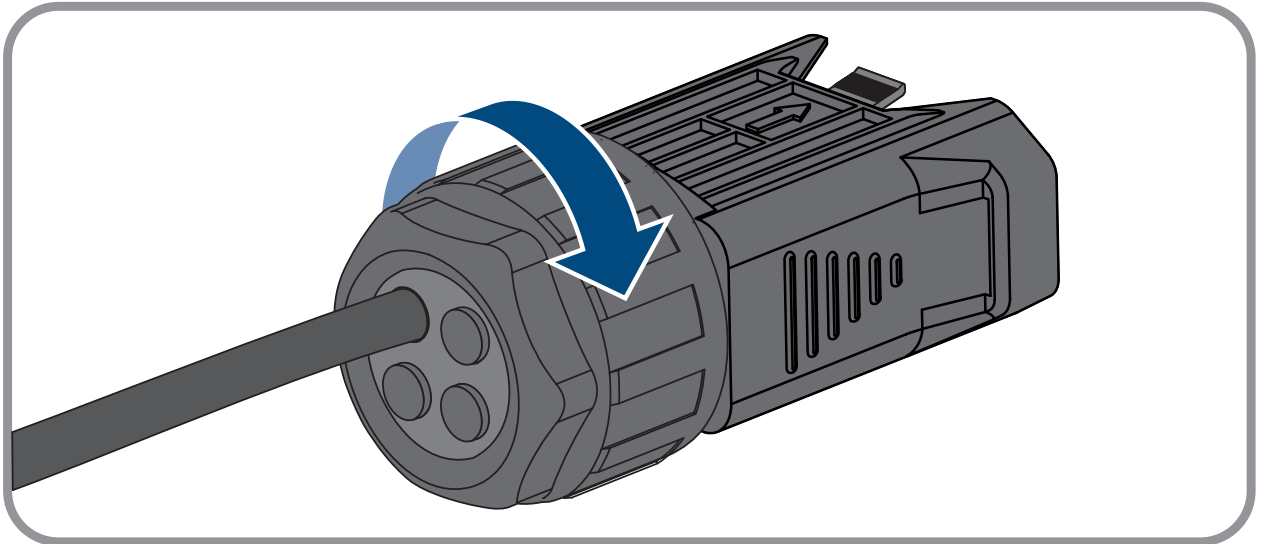
4. Unscrew the swivel nut from the threaded sleeve of the COM connector.



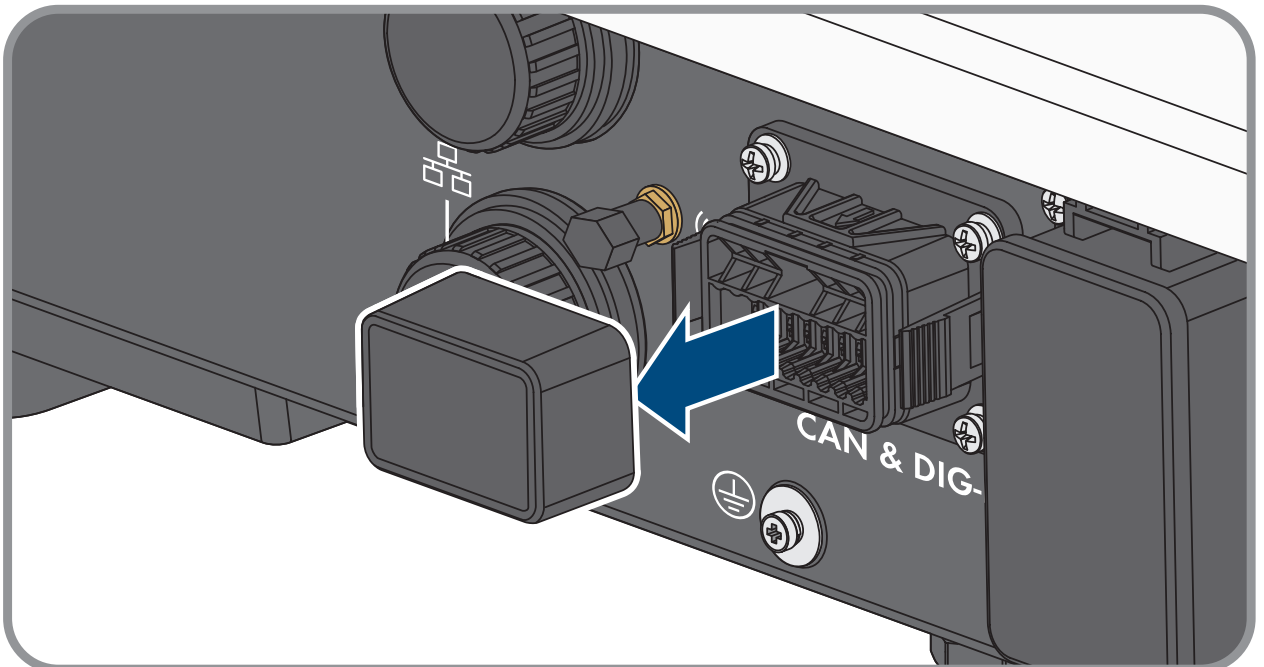
5. Remove the terminal from the threaded sleeve.
6. Connect the CAN communication cable Connecting CAN communication cable.
7. Connect signal source to digital input Connecting Signal Source to Digital Input.
8. Connect the display device or external fan to the multifunction relay Connecting the Multifunction Relay.
9. Ensure that all conductors are plugged into the terminal points tightly by pulling slightly on the conductors.



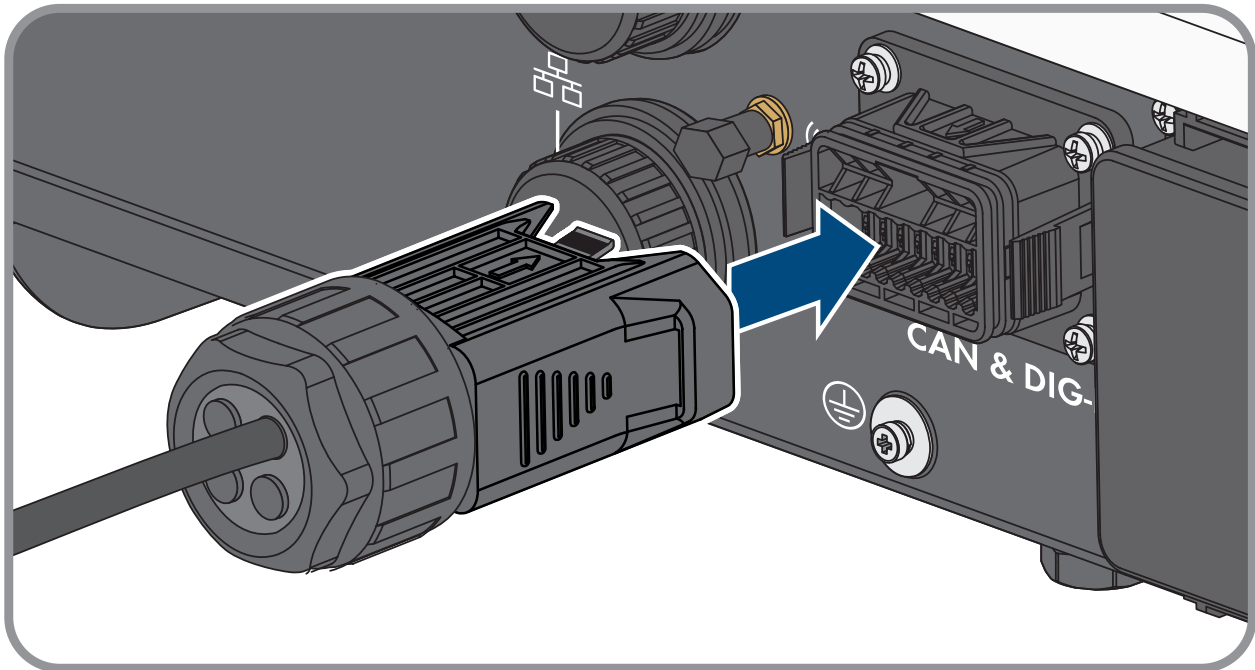
10. Insert the terminal into the threaded sleeve. The terminal must snap audibly into place.



11. Tighten the swivel nut.



12. Remove the protective cap from the **CAN & DIG-I/O** socket.



13. Insert the connector for battery communication connection into the **CAN & DIG-I/O** socket. The connector must snap audibly into place on both sides.

1.29.3 Connecting the CAN Communication Cable

⚠ QUALIFIED PERSON

i Communication between inverter and battery

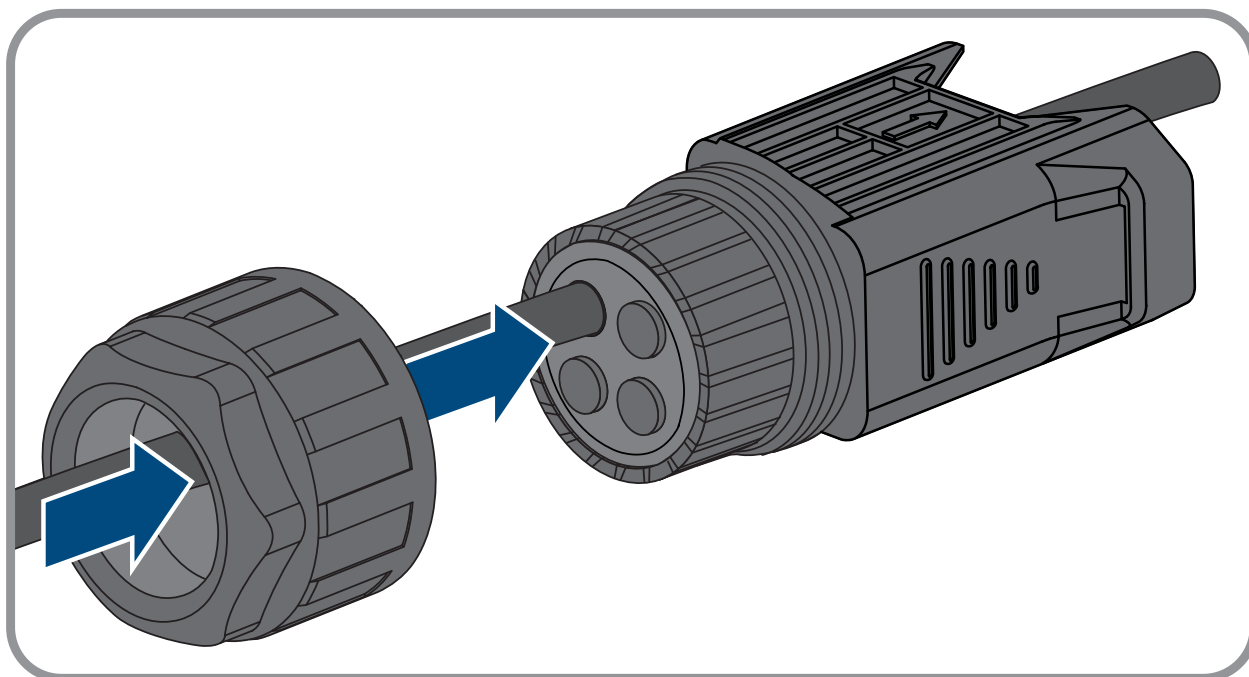
- Communication between the inverter and the battery takes place via the battery communication cable via CAN bus.

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

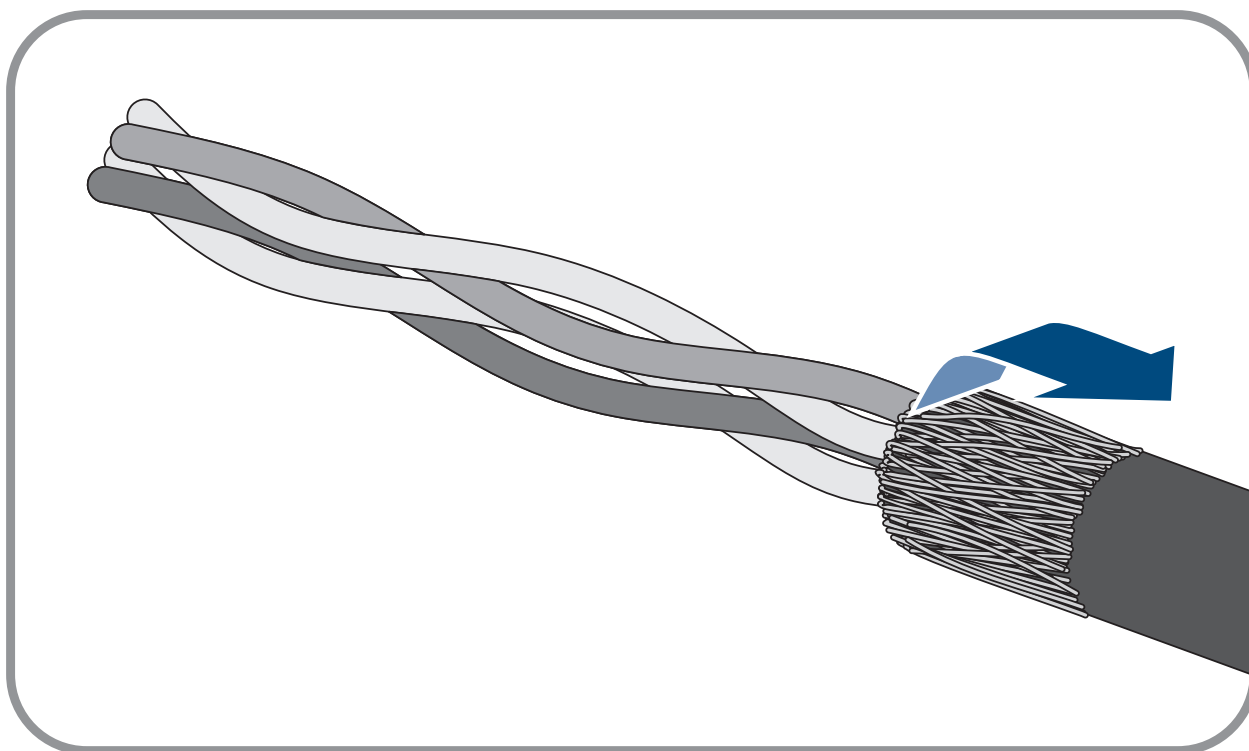
- ☐ 1 battery communication cable for the communication between inverter and battery.
- ☐ Alternatively, 1 pre-assembled battery communication cable (SMA order number: HS-COMCBL-3-10) when using SMA Home Storage.
- ☐ Bootlace ferrules (only for multi-core stranded wire, usable length of the ferrule at least 12 mm).

Procedure:

1. Remove 1 sealing plug from the cable support sleeve.



2. Lead the communication cable through the swivel nut and threaded sleeve.
3. Strip the communication cable 40 mm to 50 mm.



4. Trim the cable shield to a length of 15 mm and fold it over the cable sheath.
5. Strip the insulation on the insulated conductors each by 12 mm. The **CAN L** and **CAN H** must be a twisted pair.
6. If necessary, trim unused insulated conductors flush with the cable sheath or fold it over the cable sheath.
7. When using a multi-core stranded wire, provide the conductors with bootlace ferrules.
8. Connect the conductors of the communication cables to the terminal. Pay attention to the assignment of the terminal and communication connection on the battery and make sure that **CAN L** and **CAN H** consist of a pair of conductors. For additional information on how to connect the battery, see Technical Information "Approved Batteries and Information on Battery Communication Connection" at www.SMA-Solar.com.

1.29.4 Circuitry overview for digital input

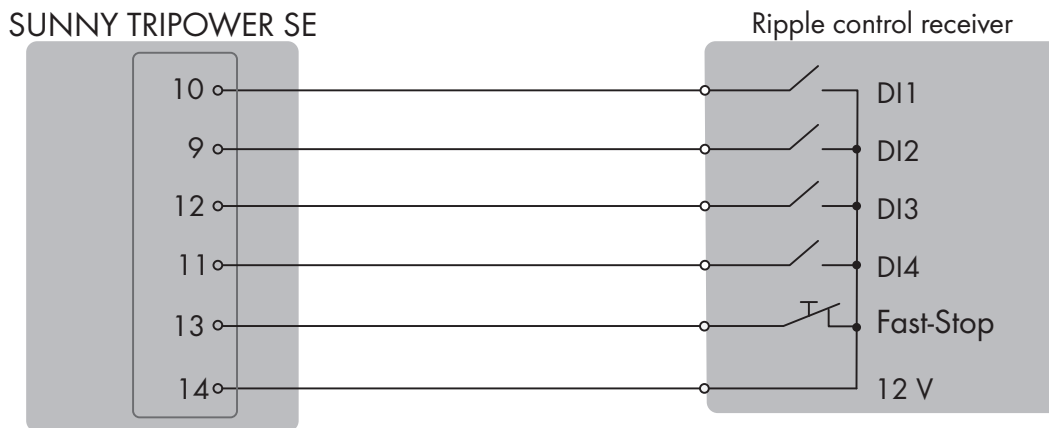


Figure 17: Connection of a Ripple Control Receiver

1.29.5 Connecting Signal Source to Digital Input

⚠ QUALIFIED PERSON

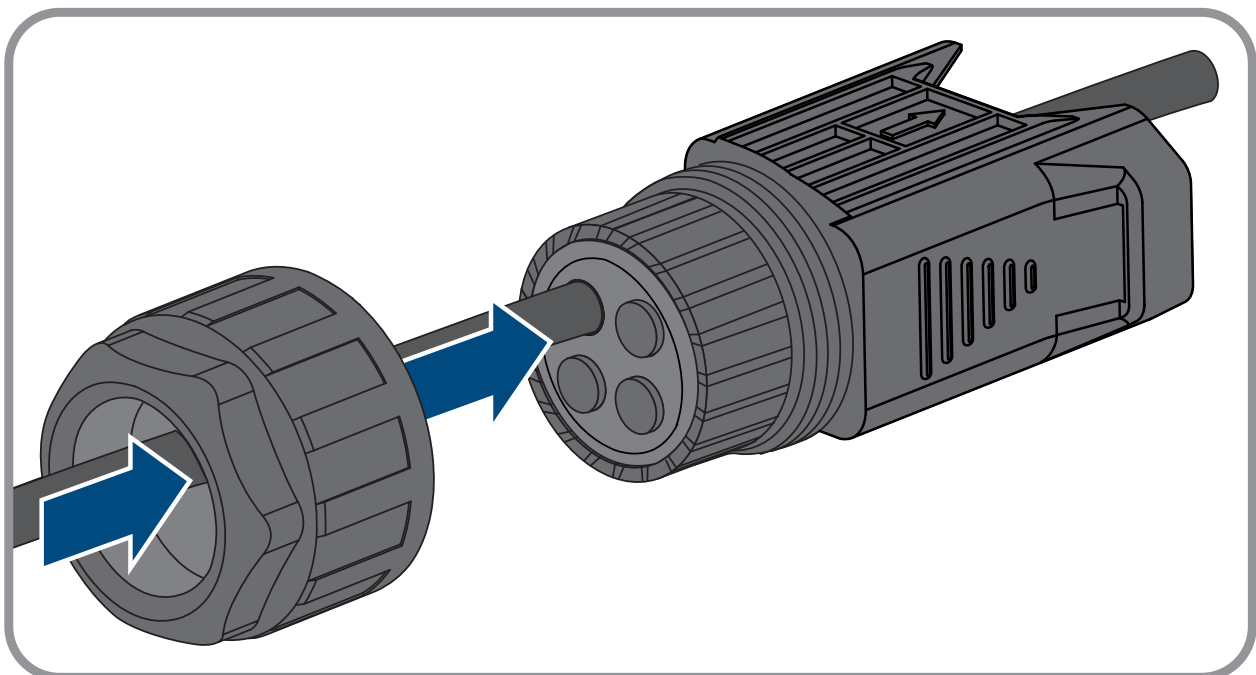
It is possible to connect a digital signal source (e.g. ripple control receiver or remote terminal unit) to the digital input of the product. This must be connected if it is prescribed by the grid operator.

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

- ☐ Connection cable
- ☐ Bootlace ferrules (only for multi-core stranded wire, usable length of the ferrule at least 12 mm)

Procedure:

1. Connect the connection cable to the digital signal source (see the manual from manufacturer).
2. Remove 1 sealing plug from the cable support sleeve.



3. Lead the connection cable into the threaded sleeve.
4. Dismantle the connection cable 40 mm to 50 mm.

5. Strip the insulation on the insulated conductors each by 12 mm.
6. When using a multi-core stranded wire, provide the conductors with bootlace ferrules.
7. Connect the connection cable to the terminal block of the COM connector according to the assignment of the terminal block.

1.29.6 Procedure for connecting the multifunction relay

Procedure	See
1. Select for which operating mode you would like to use the multifunction relay.	Operating Modes of the Multifunction Relay
2. Connect to the multifunction relay according to the operating mode and the associated connection variant.	Connection Options Connection to the Multifunction Relay
3. After commissioning the inverter, change the operating mode of the multifunction relay, if necessary.	User manual under www.SMA-Solar.com

1.29.7 Connecting the Multifunction Relay

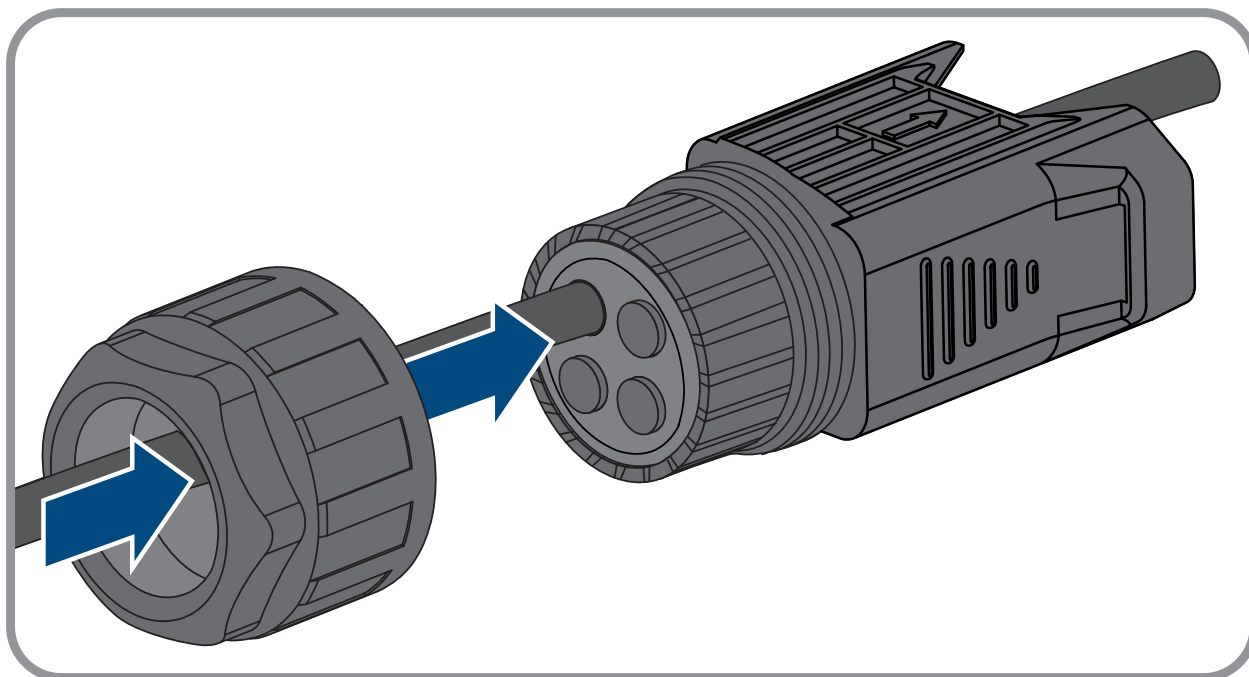
⚠ QUALIFIED PERSON

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

- ☐ Connection cable
- ☐ Bootlace ferrules (only for multi-core stranded wire, usable length of the ferrule at least 12 mm)

Procedure:

1. Remove 1 sealing plug from the cable support sleeve.



2. Lead the connection cable into the threaded sleeve.
3. Dismantle the connection cable 40 mm to 50 mm.
4. Strip the insulation on the insulated conductors each by 12 mm.

5. When using a multi-core stranded wire, provide the conductors with bootlace ferrules.
6. Connect the connection cable to the digital output of the inverter according to the assignment of the terminal block of the COM connector (see Section 7.8.1, page 57).

1.30 Connecting the power cable of the battery

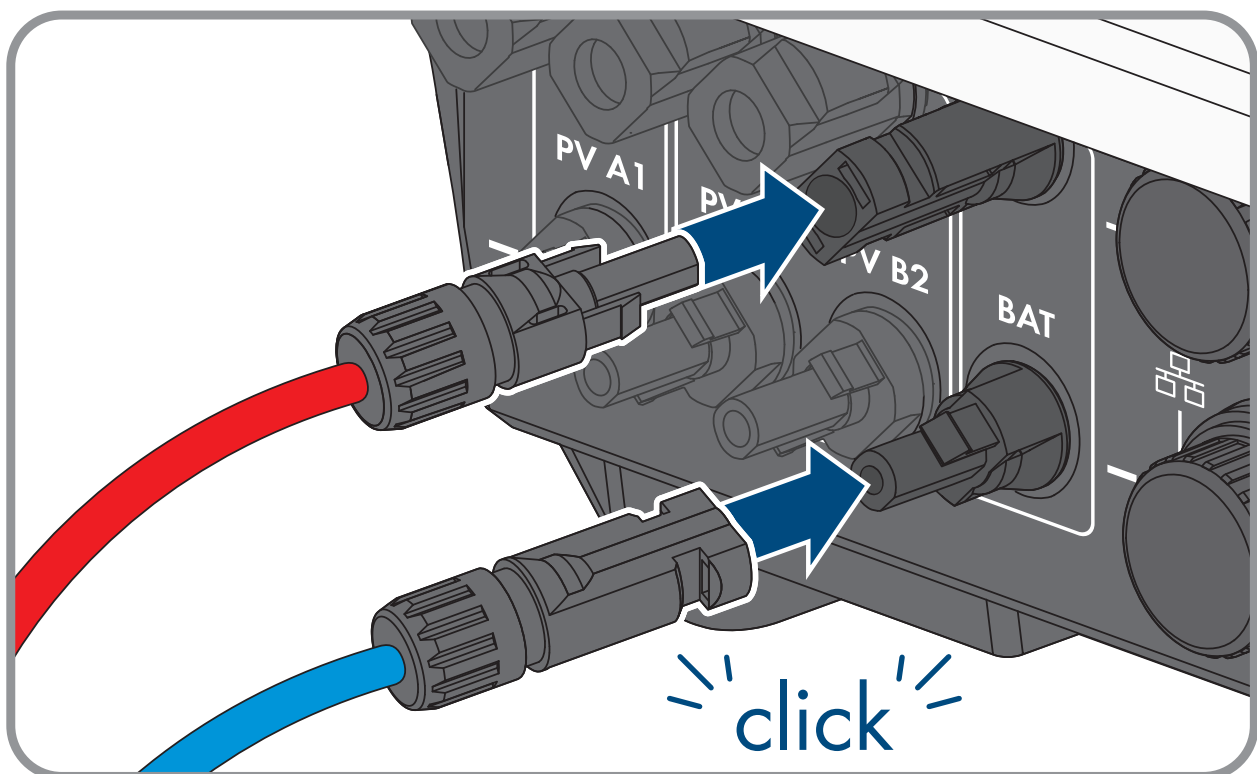
⚠ QUALIFIED PERSON

NOTICE

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

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

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



1. Connect the DC connectors to the inverter.
 - ☑ The DC connectors snap into place.
2. Tighten the swivel nuts of the DC connectors to ensure strain relief of the DC cables and compliance with the degree of protection.
3. Ensure that all DC connectors are securely in place.

1.31 DC connection

1.31.1 Overview of DC connectors

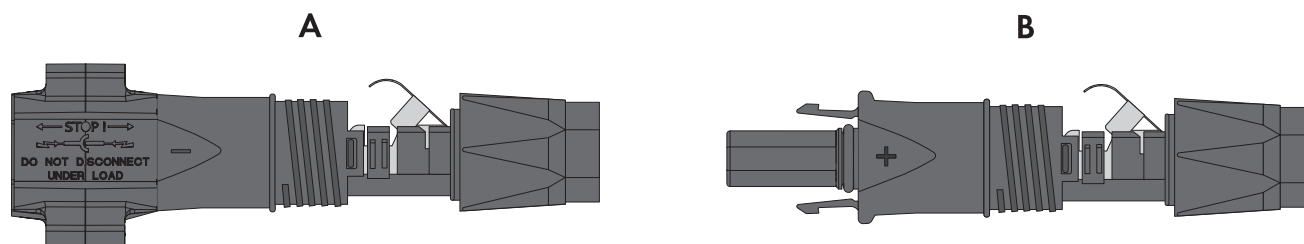


Figure 18: Negative (A) and positive (B) DC connectors

1.31.2 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 "-".

NOTICE

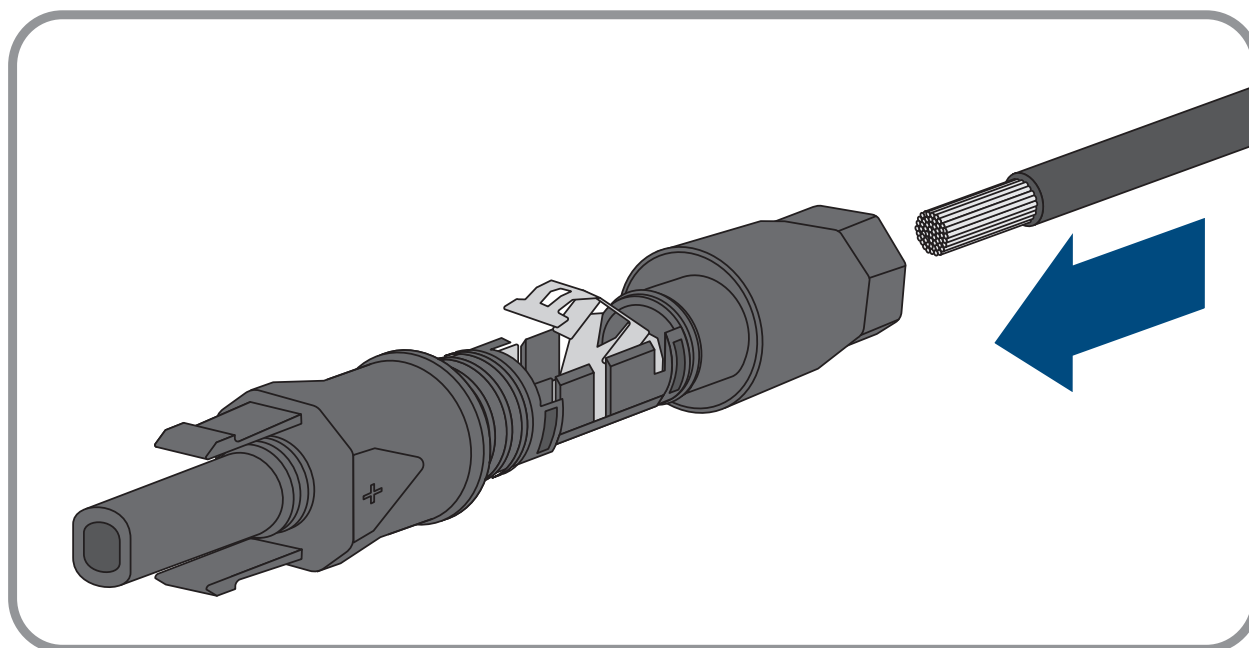
Destruction of the inverter due to overvoltage

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.

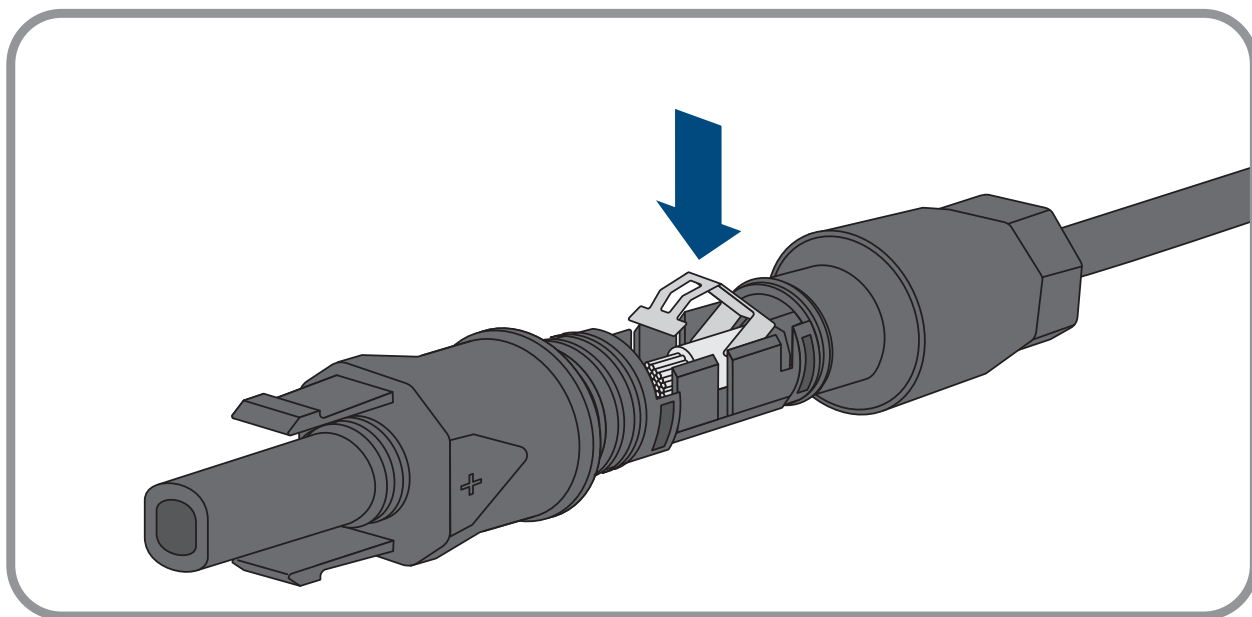
- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

Procedure:

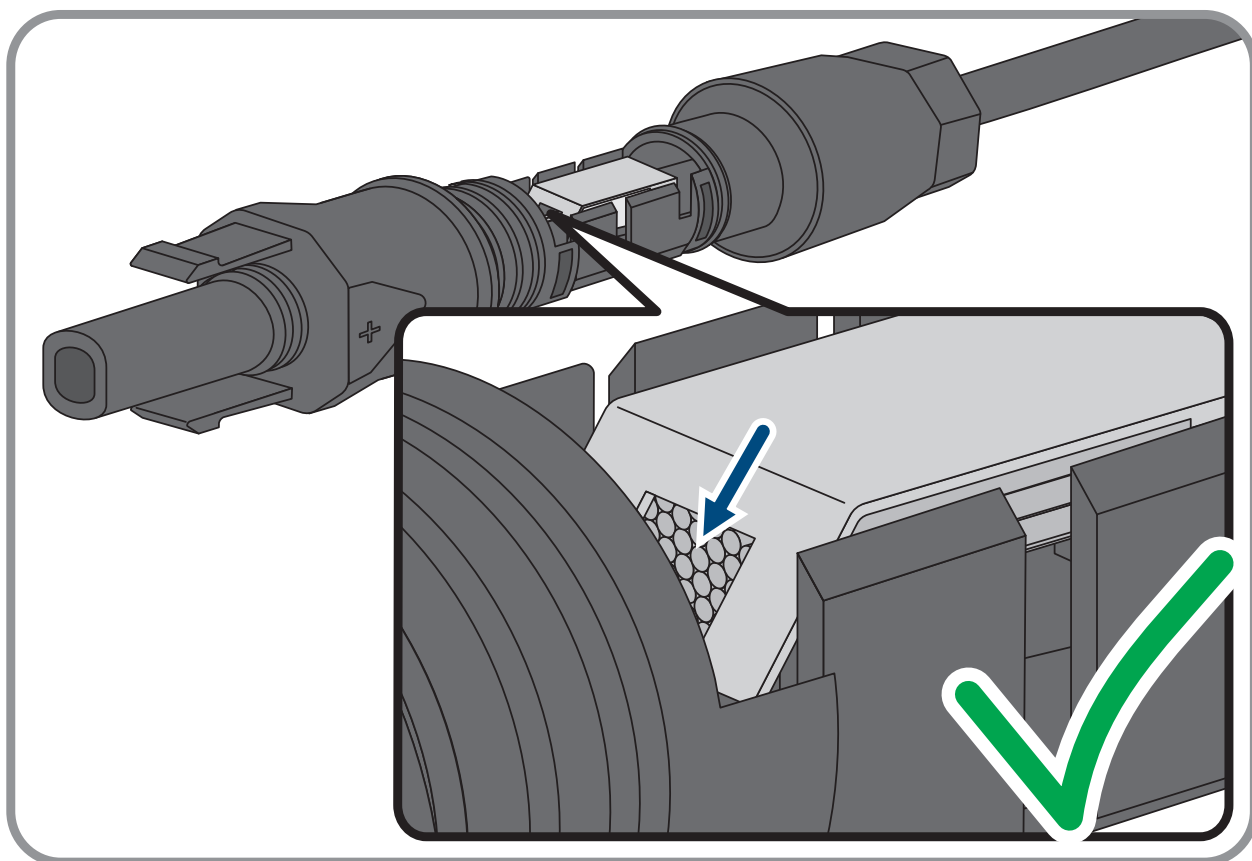
1. Strip approx. 15 mm of the cable insulation.



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.

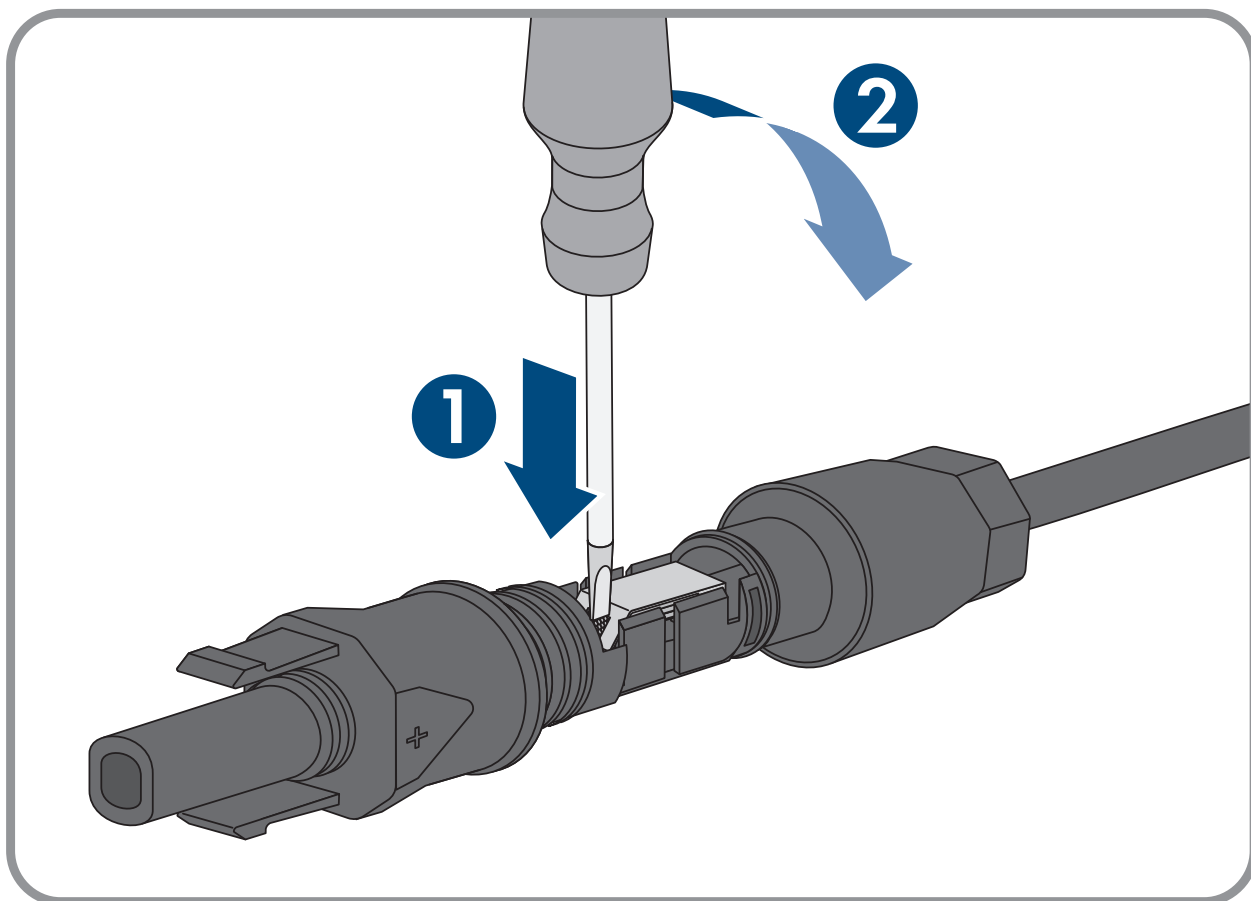


3. Press the clamping bracket down until it audibly snaps into place.

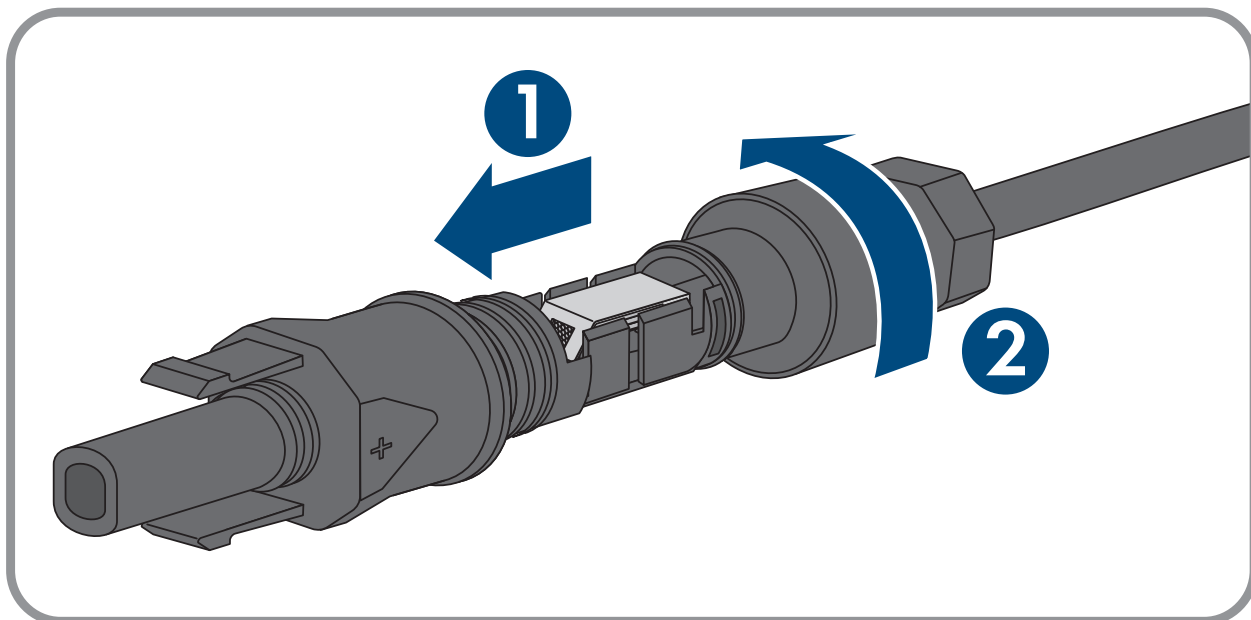


- ☑ The stranded wire can be seen inside the clamping bracket chamber.

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).

1.31.3 Connecting the PV Array

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WARNING

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

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

- Only use measuring devices with a DC input voltage range of 1000 V or higher.

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

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

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

NOTICE

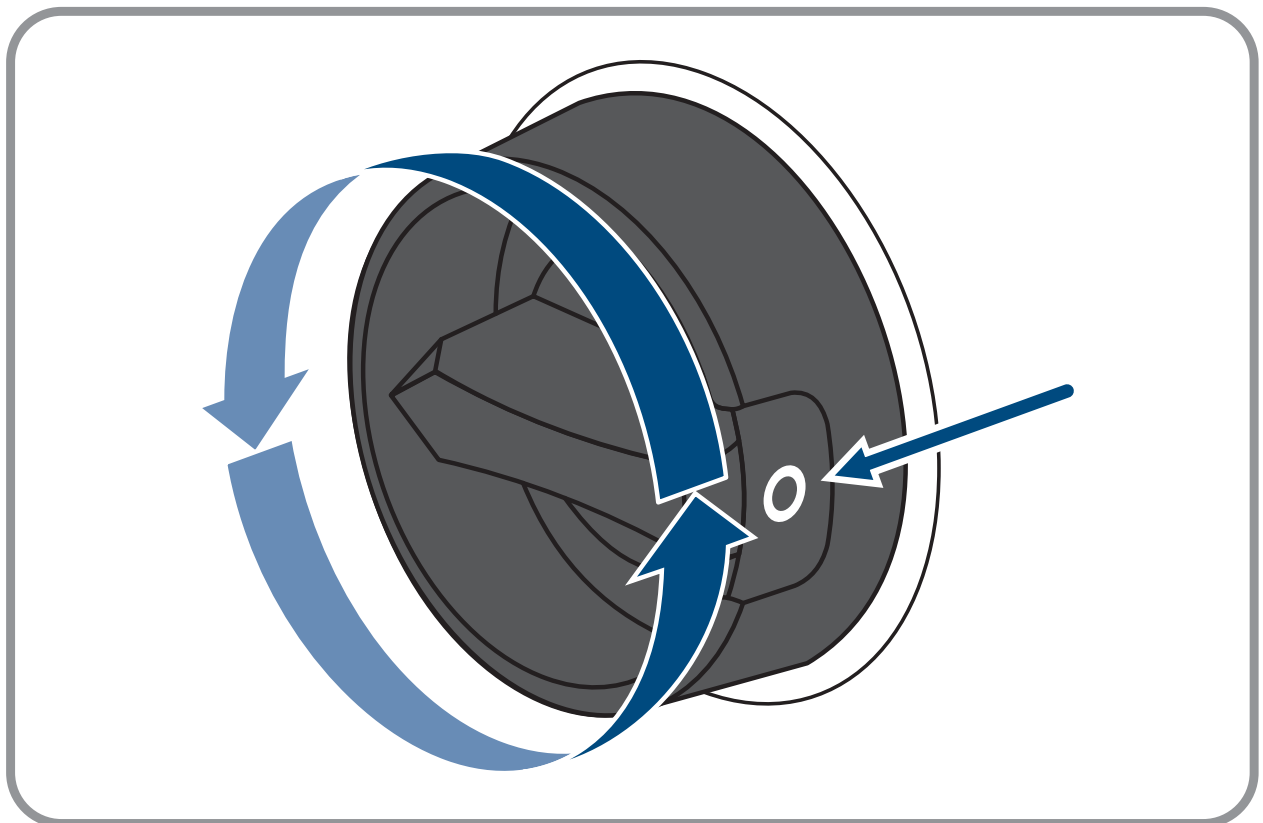
Damage to the product due to ground fault on DC side during operation

Due to the transformerless topology of the product, the occurrence of ground faults on DC side during operation can lead to irreparable damage. Damages to the product due to a faulty or damaged DC installation are not covered by warranty. The product is equipped with a protective device that checks whether a ground fault is present during the starting sequence. The product is not protected during operation.

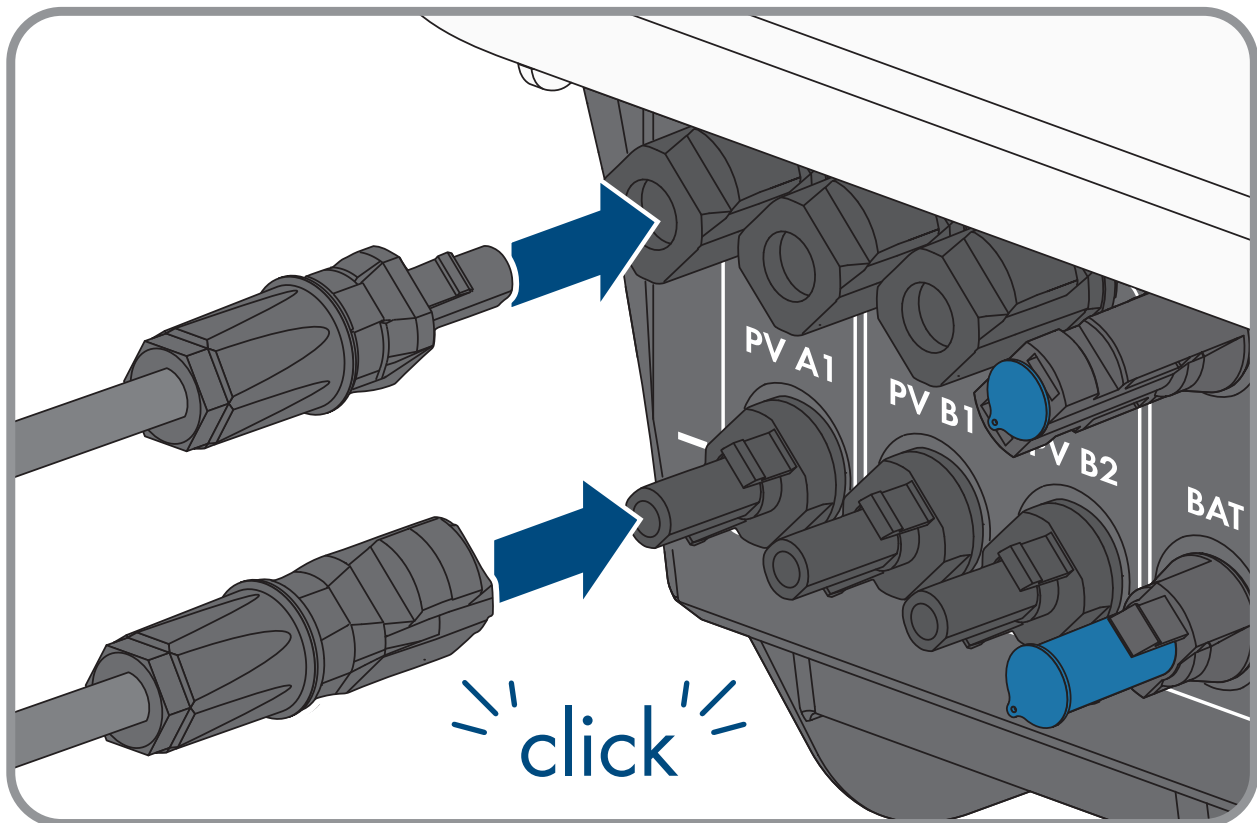
- Ensure that the DC installation is carried out correctly and no ground fault occurs during operation.

Procedure:

1. Disconnect the AC miniature circuit breaker from all 3 line conductors and secure against reconnection.
2. If an external DC load-break switch is installed, disconnect the external DC load-break switch from all voltage sources.



3. Turn the DC load-break switch of the inverter to position **O**.
4. Ensure that the battery is switched off.
5. Measuring the voltage of the PV array. Ensure that the maximum input voltage of the inverter is adhered to and that there is no ground fault in the PV system.
6. Check whether the DC connectors have the correct polarity.
7. 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 DC cable must always have the same polarity as the DC connector.
8. Ensure that the whole open-circuit voltage of the PV array does not exceed the maximum input voltage of the inverter.



9. Connect the assembled DC connectors to the inverter.

- ☑ The DC connectors snap into place.

10. Ensure that all DC connectors are securely in place.

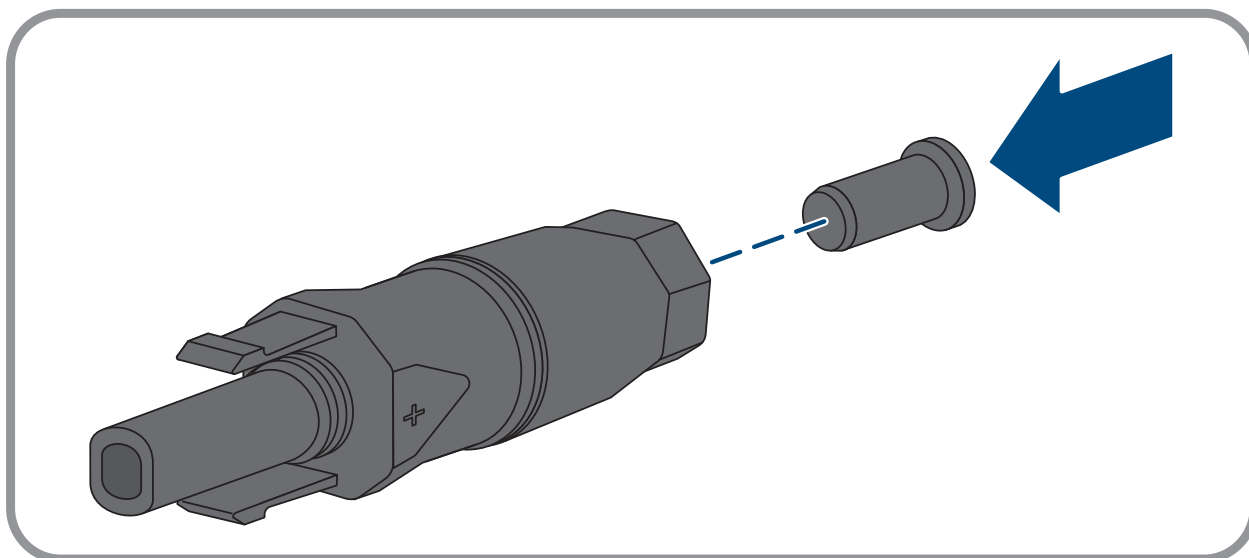
11. **NOTICE**

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

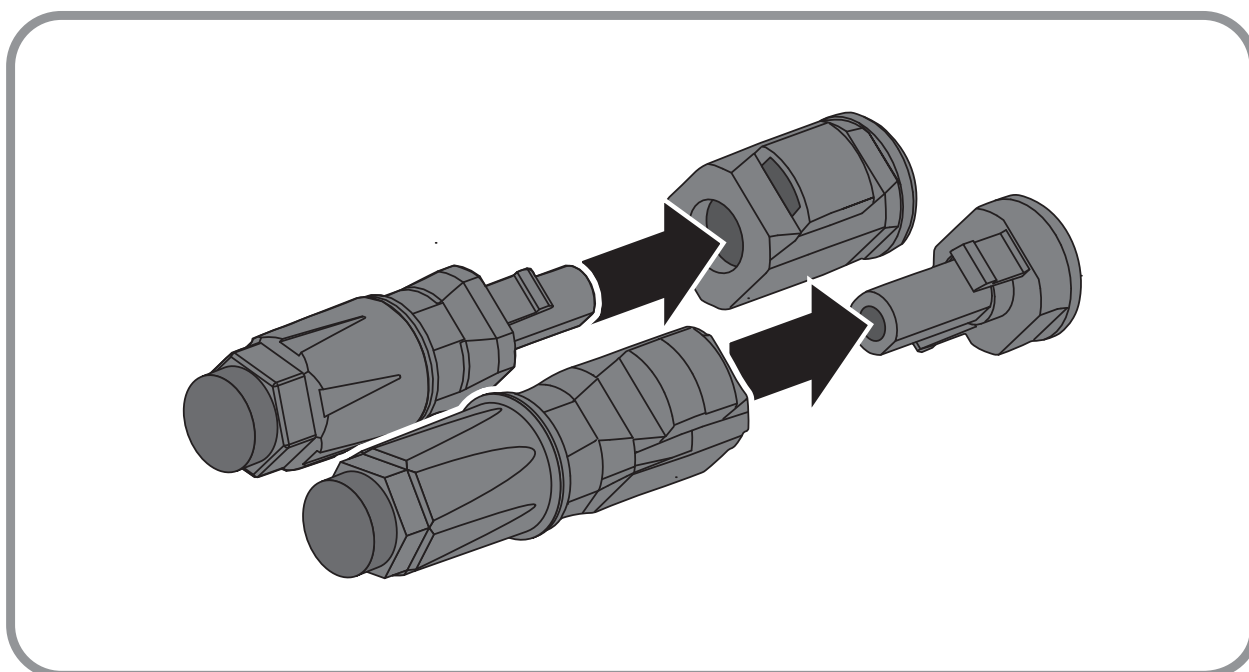
The product is only properly sealed when all unused DC inputs are closed with DC connectors and sealing plugs. Sand, dust and moisture penetration can damage the product and impair its functionality.

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

12. For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.



13. Insert the sealing plug into the DC plug connector.



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

☑ The DC connectors snap into place.

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

1.32 Commissioning Procedure

⚠ QUALIFIED PERSON

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

i Carry out the commissioning procedure as described in the enclosure

If your product was supplied with a supplementary sheet in addition to the quick reference guide, perform commissioning according to the description in the supplementary sheet.

- Perform a firmware update before commissioning the product. You can find the update file and the manual on performing the update at the link on the supplementary sheet.

Commissioning an inverter that is captured in a communication device

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

- Commission the inverter Commissioning the Inverter.
- The initial configuration of the inverter is made via the communication device. The configuration is transferred to the inverter and the settings of the inverter are overwritten.
- Deactivate the Webconnect function of the inverter via the Sunny Portal. This prevents unnecessary connection attempts of the inverter with Sunny Portal.

Procedure	See
1. Commission the inverter.	Section 8.3, page 74
2. Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: • Direct connection via Wi-Fi • Direct connection via Ethernet • Connection via Wi-Fi in the local network • Connection via Ethernet in the local network	Section 9.1, page 78
3. Log into the user interface.	Section 9.3, page 82
4. Select the inverter configuration option.	Section 8.7, page 77
5. Configure the product and set country data set. Then the product will begin operation.	Section 9.17, page 89
6. Make further inverter settings as needed.	Section 9, page 78

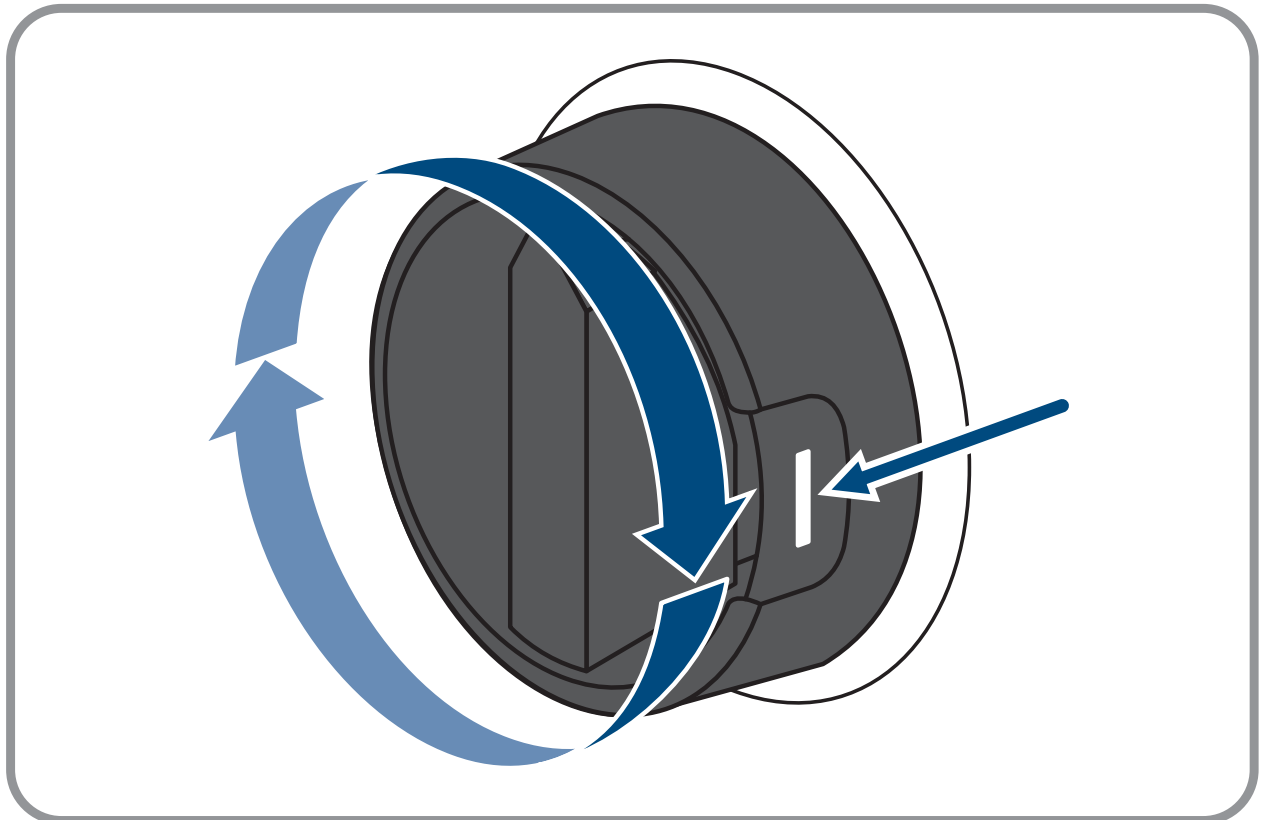
1.33 Requirements for Commissioning

- ☐ The AC circuit breaker must be correctly rated and mounted.
- ☐ The AC grid and AC backup must be connected correctly and must not be interchanged.
- ☐ The product must be correctly mounted.
- ☐ All cables must be correctly connected.
- ☐ The Wi-Fi antenna must be mounted.
- ☐ The battery must be commissioned and the latest firmware must be installed (see battery manufacturer's documentation).

1.34 Switching the Inverter On

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1. Switch on the AC miniature circuit breaker.
2. Switch on the battery or the load-break switch of the battery (see documentation of the battery manufacturer).



3. Turn the DC load-break switch of the inverter to the position I.
 - ☑ After 1 to 2 minutes, all 3 LEDs light up. The start-up phase begins.
 - ☑ All 3 LEDs go out again after approximately 90 seconds.
 - ☑ The green LED starts to flash and, if the inverter is connected via Speedwire, the blue LED also starts to flash.
4. If the green and red LEDs flash simultaneously during initial commissioning, operation is stopped because no country data set has been set yet. For the inverter to begin operation, the configuration must be completed and a country data set must be set.
5. If the green LED is still flashing, the conditions for activating feed-in operation are not yet met. As soon as the conditions are met, the product will start feed-in operation.
6. If the red LED lights up, an event is displayed. Find out which event has occurred and, if necessary, initiate countermeasures.

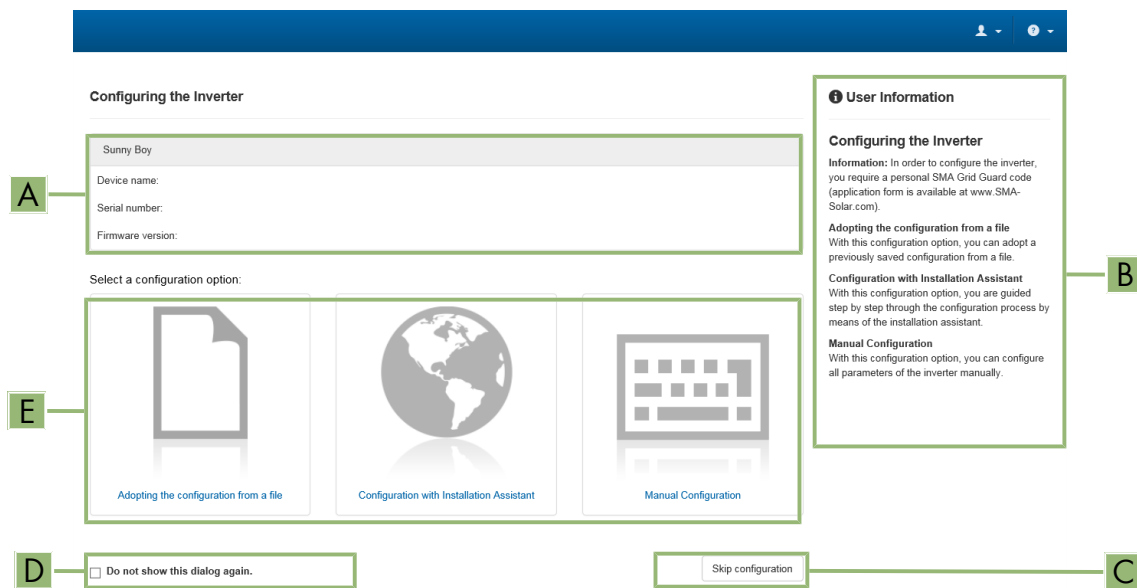
1.35 Layout of the 'Configuring the Inverter' page

⚠ 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 19: Layout of the **Configuring the Inverter** page

Position	Designation	Description
A	Device information	Provides the following information: • Device name • Inverter serial number • Inverter firmware version
B	User information	Provides brief information on the listed configuration options
C	Skip configuration	Offers the option of skipping the inverter configuration and 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

1.36 Configuration Options

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

- Adopt the configuration from a file
- Configuring the Installation Assistant (Recommended)
- Manual configuration

1.37 Adopting the 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:

- [Interfaces and Functions](#) ⇒ page 15

1.38 Configuration using the installation assistant (recommended)

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. Once all settings are correct, select [**Next**] in the summary.
 6. To save the settings to a file, select [**Export a summary**] and save the file on your smart device.
 7. To export all parameters and their settings, select [**Export all parameters**]. This exports all parameters and their settings into an HTML file.
- ☒ The start page of the user interface opens.

1.39 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. Select [**Edit parameters**].

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

Also see:

- [Interfaces and Functions ⇒ page 15](#)

1.40 Establishing a Connection to the User Interface

1.40.1 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 82](#)

1.40.2 Connection options via Wi-Fi

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

The following connection options are available:

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

1.40.3 Direct connection via Wi-Fi

1.40.3.1 Requirements for Direct Connection via Wi-Fi

- ☐ The product must be commissioned.
- ☐ A smart device (e.g., smartphone, tablet or laptop) must be available.

- ☐ The respective latest version of one of the following web browsers must be installed on the smart terminal device: Chrome, Edge, Firefox or Safari.
- ☐ JavaScript must be enabled in the web browser of the smart device.

1.40.3.2 Access information for direct Wi-Fi connection

Access information for the direct WiFi connection can be found below:

- SSID: **https://SMA[serial number]** (e.g. **https://SMA0123456789**)
- Device-specific Wi-Fi password: WPA2-PSK (see type label of the product or the rear side of the supplied manual)
- Default access address: **https://smalogin.net** or **https://192.168.12.3**

1.40.3.3 Establishing a direct Wi-Fi connection with the 360° app

Requirements:

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

Procedure:

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

1.40.4 Connection in the local network

1.40.4.1 Requirements for the connection via Ethernet in the local network

- ☐ The product must be connected to the local network via a network cable (e.g. via a router).
- ☐ The inverter is not integrated into a local network with IP address 192.168.12.x.
- ☐ The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- ☐ A smart device (e.g., smartphone, tablet or laptop) must be available.
- ☐ The smart terminal device must be in the same local network as the product.
- ☐ The respective latest version of one of the following web browsers must be installed on the smart terminal device: Chrome, Edge, Firefox or Safari.

1.40.4.2 Establishing a Connection via Ethernet in the local network

i New IP address for connecting with a local network

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

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

i 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.

Procedure:

1. Open the web browser of your smart terminal device.
2. Enter the IP address of the product in the address bar of the web browser.

3. **i** Web browser displays warning

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

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

☒ The login page of the user interface opens.

1.40.4.3 Requirements for the connection via Wi-Fi in the local network

- ☐ The product must be commissioned.
- ☐ The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- ☐ A smart device (e.g., smartphone, tablet or laptop) must be available.
- ☐ The smart terminal device must be in the same local network as the product.
- ☐ The respective latest version of one of the following web browsers must be installed on the smart terminal device: Chrome, Edge, Firefox or Safari.

1.40.4.4 Establishing a connection via Wi-Fi in the local network

New IP address for connecting with a local network

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

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

Procedure:

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

1.41 Logging into the user interface for the first time

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

Password assignment for user and installer

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

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

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

To be able to register the inverter in a communication device (e.g., Sunny Home 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 78

1.42 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.

1.43 Logging out of the user interface

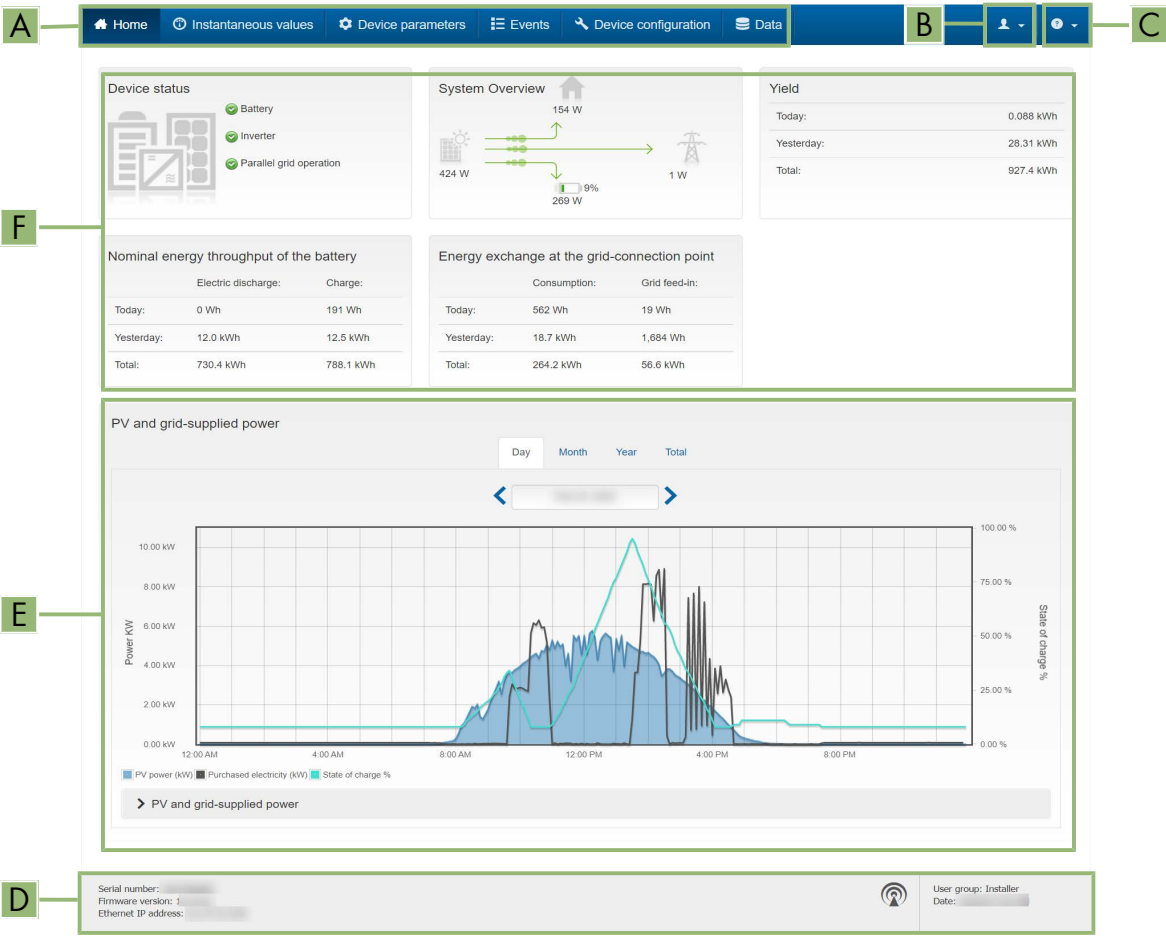
Requirement:

- ☐ 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.

1.44 Start Page Design of the User Interface



Position	Designation	Description
A	Menu	Provides the following functions: • Home Opens the user interface home page • Instantaneous Values Current measured values of the inverter • Device Parameters The various operating parameters of the inverter can be viewed and configured here depending on the user group. • Events All events that have occurred in the selected time period are displayed here. The event types are Information, Warning and Error. Currently existing events of the types Error and Warning will be additionally displayed in the Device status viewlet. However, only the higher-priority event is displayed. If, for example, there is a Warning and an Error present at the same time, only the error will be displayed. • Device Configuration Various settings for the inverter can be made here. The selection available is dependent on which user group you are logged in as and the operating system of the device with which the user interface has been called up. • Data You will find all data that is saved in the internal memory of the inverter on this page.
B	User settings	Provides the following functions, depending on the user group logged in: • Starting the Installation Assistant • Activating and Deactivating the Smart Inverter Screen • Logout
C	Help	Provides the following functions: • Displaying information on Open Source licenses used • Link to the website of SMA Solar Technology AG
D	Status bar	Displays the following information: • Serial number of the inverter • Inverter firmware version • IP address of the inverter within the local network and/or IP address of the inverter during WLAN connection • With WLAN connection: Signal strength of WLAN connection • User group logged in • Date and device time of the inverter

Position	Designation	Description
E	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. • Device status Displays whether the inverter is currently in a fault-free operating state or whether there is an Error or Warning present. • System overview Shows the current power flows between the components of the system. • Yield Displays the energy yield of the inverter. • Nominal energy throughput of the battery Indicates how much energy has been charged to the battery and how much has been discharged from the battery. • Power at the grid connection point Indicates which power is currently fed in or obtained at the grid-connection point.

1.45 Displaying and Downloading the Stored Data

When a smart device is connected to the product via LAN or Wi-Fi, you can view and download the stored data.

Procedure:

1. Open the user interface (see Section 9.1, page 78).
2. Log into the user interface (see Section 9.3, page 82).
3. Select the menu **Data**.
4. Select the folder **Data**.
5. To call up the data, select the respective folder and click on the required file.
6. To download the data, select the data type to be exported in the drop-down list. Then apply the time filter and select **Data export**.

1.46 Activating the Smart Inverter Screen

With the Smart Inverter Screen, the most important inverter data is displayed directly on the user interface login page. To activate the Smart Inverter Screen, proceed as listed in the following.

Procedure:

1. Open the user interface (see Section 9.1, page 78).
2. Log in as **Installer** or **User**.

3. Select the menu **User Settings** (see Section 9.5, page 83) on the start page of the user interface.
 4. Select **[Smart Inverter Screen]**.
- ☑ The Smart Inverter Screen has been activated.

1.47 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.

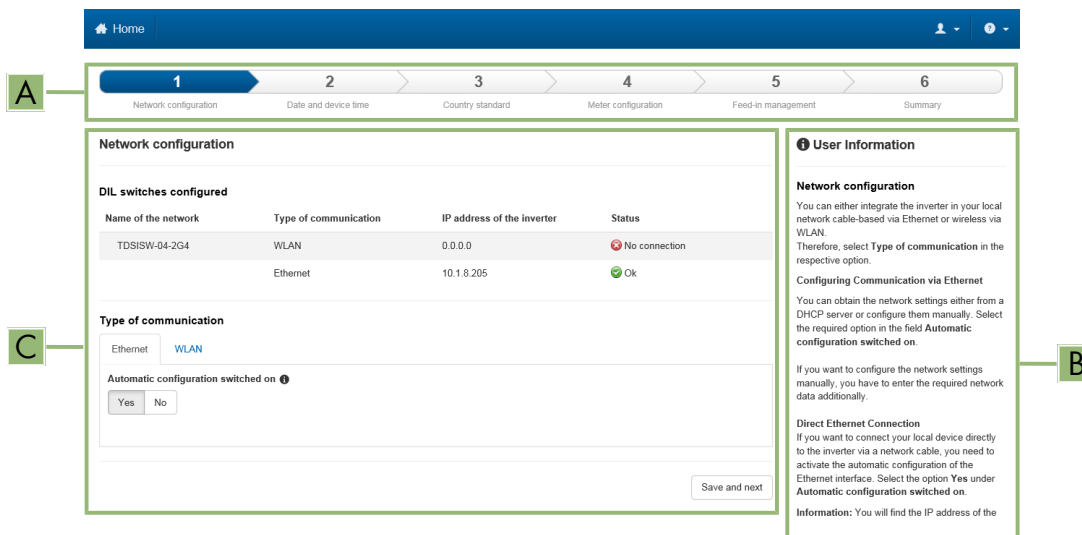


Figure 20: Layout of the installation assistant (example)

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 78

1.48 Start the installation wizard

⚠ QUALIFIED PERSON

1. Open the user interface (see Section 9.1, page 78).
 2. Log in as Installer.
 3. Select the menu **User Settings** (see Section 9.5, page 83) on the start page of the user interface.
 4. In the context menu, select **[Starting the installation assistant]**.
- ☑ The installation assistant will open.

1.49 Switching WLAN Off

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

i Switching on the WLAN function only possible via Ethernet connection

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

The basic procedure for changing operating parameters is explained in another section Changing parameters.

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:

1. 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**.
2. 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**.

1.50 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:

1. 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**.
2. To switch on the Wi-Fi connection in the local network, in the parameter group **PV system communication > Wi-Fi**, select the parameter **Wi-Fi is turned on** and set this to **Yes**.

1.51 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

1.52 Changing the Password

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

Procedure:

1. Open the user interface (see Section 9.1, page 78).
2. Log into the user interface (see Section 9.3, page 82).
3. Call up the menu **Device parameters**.
4. Select **[Edit parameters]**.
5. In the parameter group **User Rights > Access Control** change the password of the desired user group.
6. Select **[Save all]** to save the changes.

1.53 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 78](#)
- [Logging Into the User Interface ⇒ page 82](#)

1.54 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 78
- [Logging Into the User Interface](#) ⇒ page 82

1.55 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.

Requirements:

- ☐ You are logged in on the user interface.
- ☐ Changes to grid-relevant parameters must be approved by the responsible grid operator.
- ☐ Modifications of factory-set parameters for the battery configuration must be approved by the battery manufacturer.

Procedure:

1. 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 78

1.56 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.

1.57 Configuring the active power mode for systems with external setpoint

QUALIFIED PERSON

Requirements:

- ☐ You are logged in on the user interface as **Installer**.
- ☐ Installation assistant has been started.
- ☐ A communication product is present in the system.

Procedure:

1. Select [**Save and continue**] after each step up until the step **Grid management service**.
2. Set the **Grid connection point regulation** to [**Off**].
3. In the tab **Active power mode** set the switch **Active power setpoint** to [**On**].
4. In the drop-down list **Operating mode active power setpoint**, select the entry **External setpoint**.
5. In the drop-down list **Fallback behavior**, select the entry **Apply fallback values**.
6. In the field **Fallback value of the maximum active power** enter the value to which the inverter is to limit its nominal power in case of a communication failure to the higher control unit at the end of the timeout time.
7. In the field **Timeout**, enter the time that the inverter is to wait before it limits its nominal power to the set fallback value.
8. 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.

1.58 Configuring the active power mode for systems with manual setpoint

QUALIFIED PERSON

Requirements:

- ☐ You are logged in on the user interface as **Installer**.
- ☐ 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 point of interconnection, enter the value to which the active power at the point of interconnection is to be limited. The value must be set to **0** for zero power output.
6. Set the **Active power setpoint** to [**On**].

7. In the **Operating mode active power setpoint** drop-down list, select **Manual setpoint in %** or **Manual setpoint in W** for the manual preset and enter the respective default value in the **Active power** field.
8. If the inverter itself is to control the active power at the point of interconnection, select **External setpoint** in the **Active power default operating mode** drop-down list, select **Apply fallback values** in the **Fallback behavior** drop-down list, and select **No** in the **Grid disconnection** drop-down list for active power setpoint of 0%.

1.59 Set reactive and active power characteristic curves

1.59.1 Setting the Q(V) characteristic curve

The characteristic curve is preset according to country data set. You can make adjustments via parameter settings. Coordinate the configuration with your grid operator. The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

1. Set the parameter **Number of used interpolation points** in the parameter group **System and device control > Inverter > Reactive power mode > Q(V) characteristic curve > Characteristic curve**.
2. Set the values for the interpolation points.

1.59.2 Setting the P(V) characteristic curve

The characteristic curve is preset according to country data set. You can make adjustments via parameter settings. Coordinate the configuration with your grid operator. The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

1. Set the parameter **Number of used interpolation points** in the parameter group **System and device control > Inverter > Active power mode > Voltage-dependent active power adjustment P(V) > Characteristic curve**.
2. Set the values for the interpolation points.

1.59.3 Setting the P(f) characteristic curve

The characteristic curve is preset according to country data set. You can make adjustments via parameter settings. Coordinate the configuration with your grid operator. The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

1. Set the parameter **Number of used interpolation points** in the parameter group **System and device control > Inverter > Conf. of the grid integr. characteristic curves > Characteristic curve**.
2. Enter the values for the interpolation points in the parameter group **System and device control > Inverter > Conf. of the grid integr. characteristic curves > Interpolation points of the characteristic curve 3**.

1.60 Operating Modes of the Multifunction Relay

Operating mode of multifunction relay (Mlt.OpMode)	Description
Deactivated	The multifunction relay is deactivated.
Switching state Backup current active (BckOpModActI)	The multifunction relay controls a display device (e.g. an indicator light) which signals whether the battery-backup operation is active.

Operating mode of multifunction relay (Mlt.OpMode)	Description
Fan control (FanCtl)	The multifunction relay controls an external fan, depending on the temperature of the inverter. If the temperature of the inverter rises above a limiting value defined by SMA, the fan starts automatically. If the temperature falls below the limiting value, the fan is switched off again.
Control via communication	The multifunction relay controls other devices in the system (e.g. a heat pump) via the SG-Ready contact.
Fault indication (FltInd)	The multifunction relay closes when the current flow is interrupted and controls an indicator device (e.g. a warning light), which signals an inverter fault by the green LED going out.
Ground-fault detection	The multifunction relay signals whether there is a ground fault.

1.61 Changing the Operating Mode of the Multifunction Relay

QUALIFIED PERSON

The multifunction relay is set to **OFF** by default. If you decide to use an available operating mode Operating Modes of the Multifunction Relay and have established the correct electrical connection for this operating mode and the associated connection variant, you will have to change the operating mode of the multifunction relay and make other settings, if necessary.

The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

1. Call up the menu **Device parameters**.
2. Click on **[Edit parameters]**.
3. In the parameter group **Device > Multifunction relay > Operating mode** select the parameter **Operating mode of multifunction relay** or **Mlt.OpMode** and set the desired operating mode.
4. Select **[Save all]** to save the changes.

1.62 Operating modes for battery backup

You can adjust the battery-backup system using the following parameters.

Name	Group	Settings	Description
Backup mode operating mode	Device > Operation	Off	The function for battery backup is not used.
		Automatic	The battery-backup operation will be automatically activated in the event of a power outage.
		Manual Control	Usable from firmware version 3.05.26.R and if an optional transfer switch is present in the system. Setting this parameter reduces losses caused by the internal contactor. With this setting, keep in mind that the switch must be manually reset when the utility grid is active again (see Section 5.3.3, page 27).

1.63 Configuring the Battery-Backup System

The battery-backup operation mode is deactivated by default. To supply connected battery-backup appliances in the event of a power outage, the battery-backup operation mode must be activated. In addition, it is possible to set what proportion of the battery charge is to be retained for battery-backup operation.

The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

1. In the parameter group **Device > Operation**, select the parameter **Operating mode of the battery-backup system** and set it to the required operating mode (see Section 9.23, page 93).
2. Set the parameter **Minimum width of backup power area** in the parameter group **Battery > Areas of application**. The operating mode indicates the percentage of battery charge to be retained for battery-backup operation. This battery charge cannot be used in parallel grid operation. SMA Solar Technology AG recommends to set a value between 10 and 30.

1.64 Power Supply of Backup Loads in Parallel Grid Operation

In parallel grid operation, the backup loads can be supplied from the utility grid as long as the amperage and voltage of the backup loads' circuits are within the permitted range.

If the current exceeds 20 A, a Smart Connected message is sent in any case. If the current exceeds 22 A, the contactor between the backup loads and the utility grid is opened after a tripping time that depends on the level of the current. The contactor is then automatically tested. If the test is successful, the contactor is closed again and the backup loads can continue to be supplied from the utility grid.

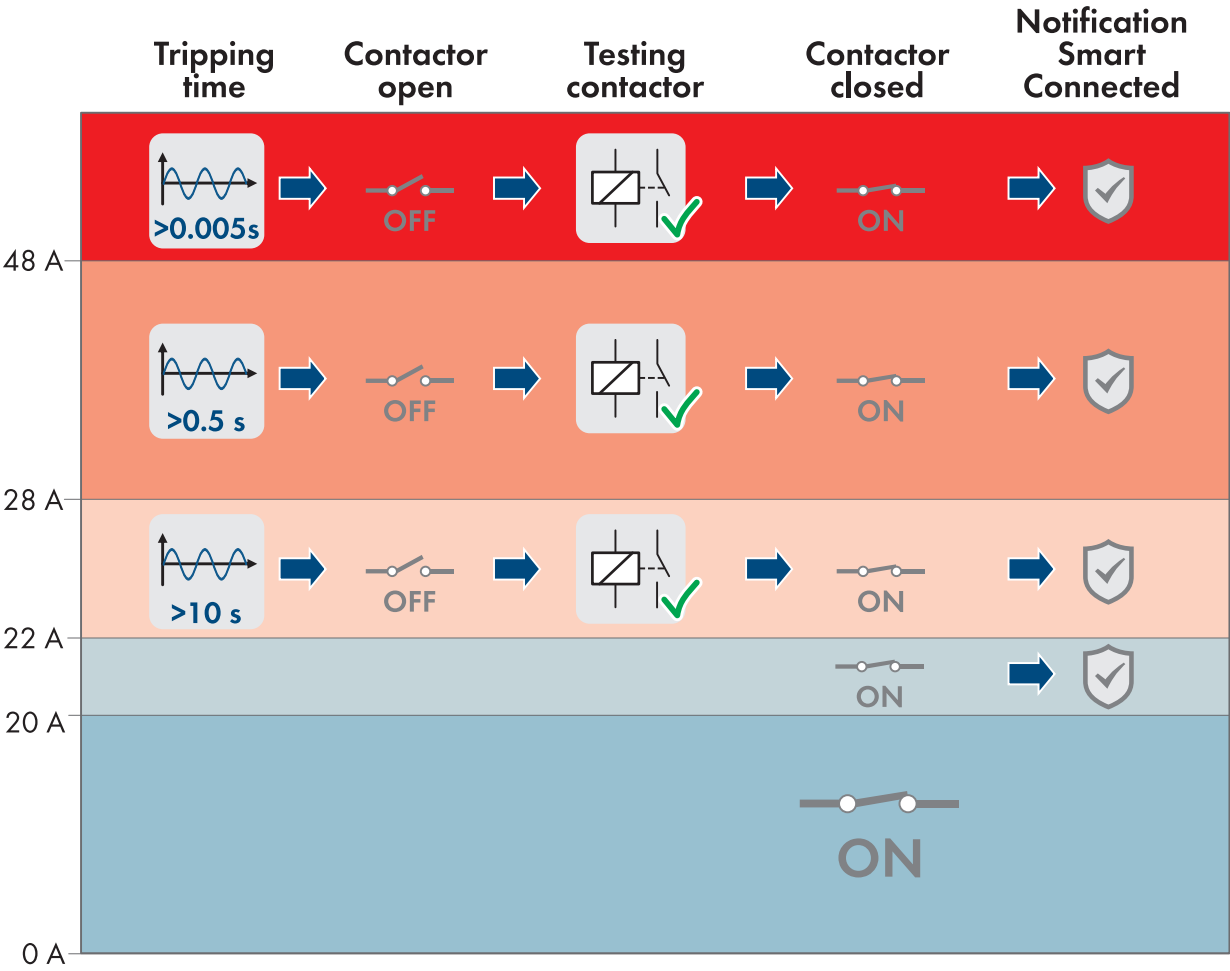


Figure 21: Behavior of the contactor between the AC backup terminal and the connection to the utility grid at increased current

If the voltage of the electrical circuits of the backup loads is not in the permitted range between 170 V and 277 V, the contactor opens. In order for the contactor to close again, the voltage must be in the permitted range for at least 20 s.

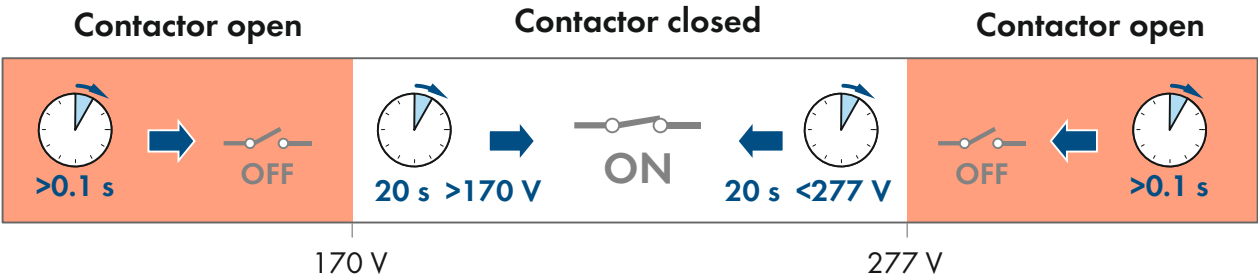


Figure 22: Behavior of the contactor between the AC backup terminal and the connection to the utility grid when the voltage is too high or too low

1.65 Configuring the Modbus Function

The Modbus interface is deactivated by default. In addition, the communication port 502 is set.

To access SMA products with SMA Modbus® or SunSpec® Modbus®, the Modbus interface must be activated. After enabling the interface, the communication ports of both IP protocols can be changed. For information on commissioning and configuration of the Modbus interface, see the Technical Information "SMA and SunSpec Modbus® Interface" at www.SMA-Solar.com.

For information on which Modbus registers are supported, see the Technical Information "Modbus® Parameters and Measured Values" at www.SMA-Solar.com.

Measures for data security during activated Modbus interface

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

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

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

Procedure:

- Activate the Modbus interface and adjust the communication ports if necessary (see the technical information "SMA MODBUS" or "SUNSPEC MODBUS" at www.SMA-Solar.com).

1.66 Setting SMA ShadeFix

QUALIFIED PERSON

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. If you do not want to use SMA ShadeFix, you can disable the feature.

In battery-backup operation mode, SMA ShadeFix is automatically deactivated.

The basic procedure for changing operating parameters is explained in another section Changing Operating Parameters.

Procedure:

- In the parameter group **DC-side > DC settings > SMA ShadeFix**, set the parameter **Time interval of SMA ShadeFix** and set the required time interval. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.
- In order to disable the SMA ShadeFix feature, in the parameter group **DC-side > DC settings > SMA ShadeFix**, set the parameter **SMA ShadeFix switched on** to **Off**.

1.67 Saving the Configuration in a File

QUALIFIED PERSON

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

Procedure:

1. Open the user interface (see Section 9.1, page 78).
2. Log into the user interface (see Section 9.3, page 82).
3. Select the menu **Device Configuration**.
4. Select [**Settings**].

5. In the context menu, select [**Saving the configuration in a file**].
6. Follow the instructions in the dialog.

1.68 Activating automatic firmware updates

QUALIFIED PERSON

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

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

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

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

The basic procedure for changing operating parameters is explained in another section (see Section 9.16, page 89).

Procedure:

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

1.69 Options for manual firmware updates

If no automatic update is set for the inverter in the communication product (e.g. Sunny Home Manager) or in Sunny Portal, you have the option of carrying out a manual firmware update for the inverter. You have the following options to update the firmware:

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

1.70 Update the firmware with the existing update file via the user interface of the inverter.

QUALIFIED PERSON

Requirements:

- ☐ An update file with the desired firmware of the product must be available. You can download the update file, for example, from the product page under www.SMA-Solar.com.

Procedure:

1. Open the user interface .(see Section 9.1, page 78)
2. Log into the user interface as an Installer (see Section 9.3, page 82).
3. Select the menu **Device Configuration**.
4. In the product row, click on the gear icon and select **Update firmware**.
5. Select [**Browse**] and select the update file for the product.
6. Select **Update firmware**.
7. Follow the instructions in the dialog.
 - ☒ The firmware update is installed. The installation takes about 15 minutes.
8. Open the user interface and check the events to see whether the firmware update has been completed successfully.

1.71 Searching and updating firmware via the user interface

QUALIFIED PERSON

Requirements:

- ☐ The inverter must be connected to the Internet.

Procedure:

1. Open the user interface (see Section 9.1, page 78).
 2. Log into the user interface as an Installer (see Section 9.3, page 82).
 3. Select the menu **Device Parameters**.
 4. Click on **[Edit parameters]**.
 5. Select **Device > Update**.
 6. Select the parameter **Check for update and install it** and set it to **Execute**.
 7. Click on **[Save all]**.
- ☒ The firmware is updated in the background.

QUALIFIED PERSON

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

WARNING

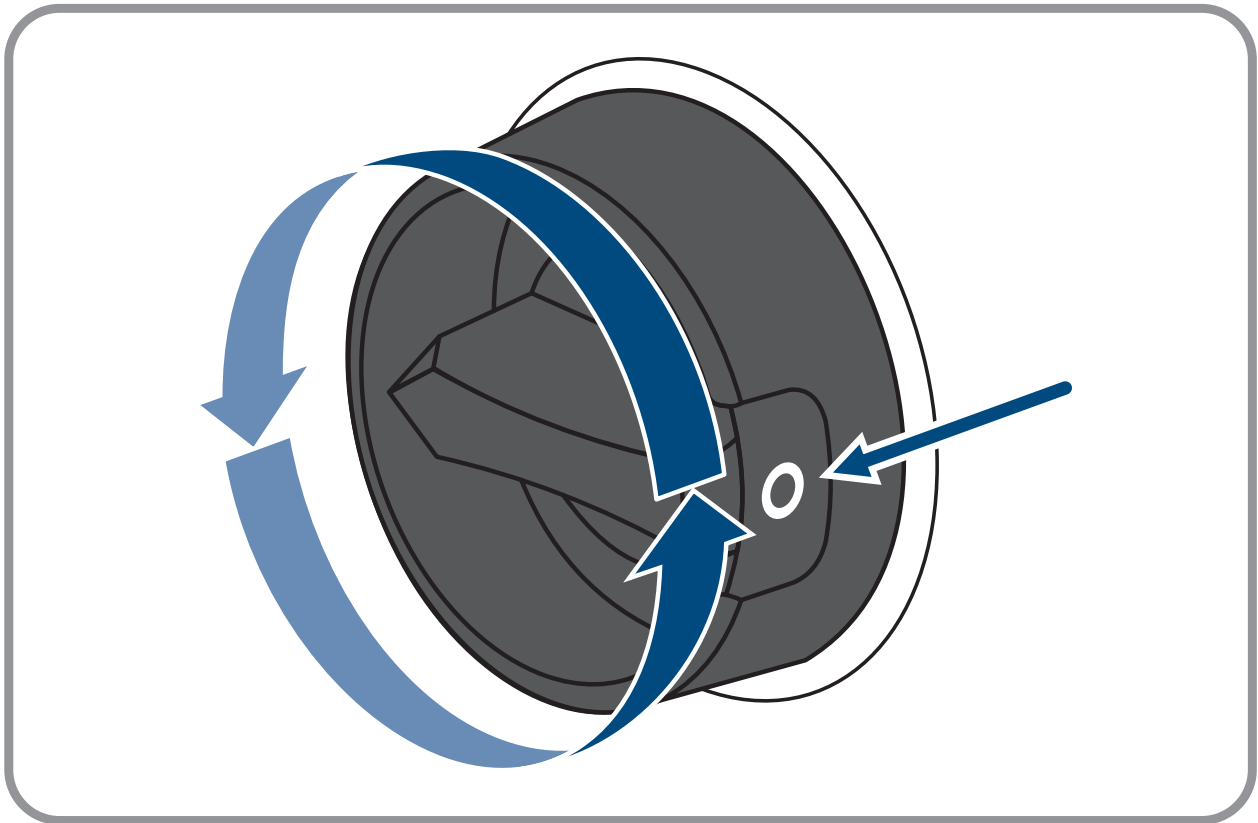
Danger to life due to electric shock from destruction of the measuring device due to overvoltage

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

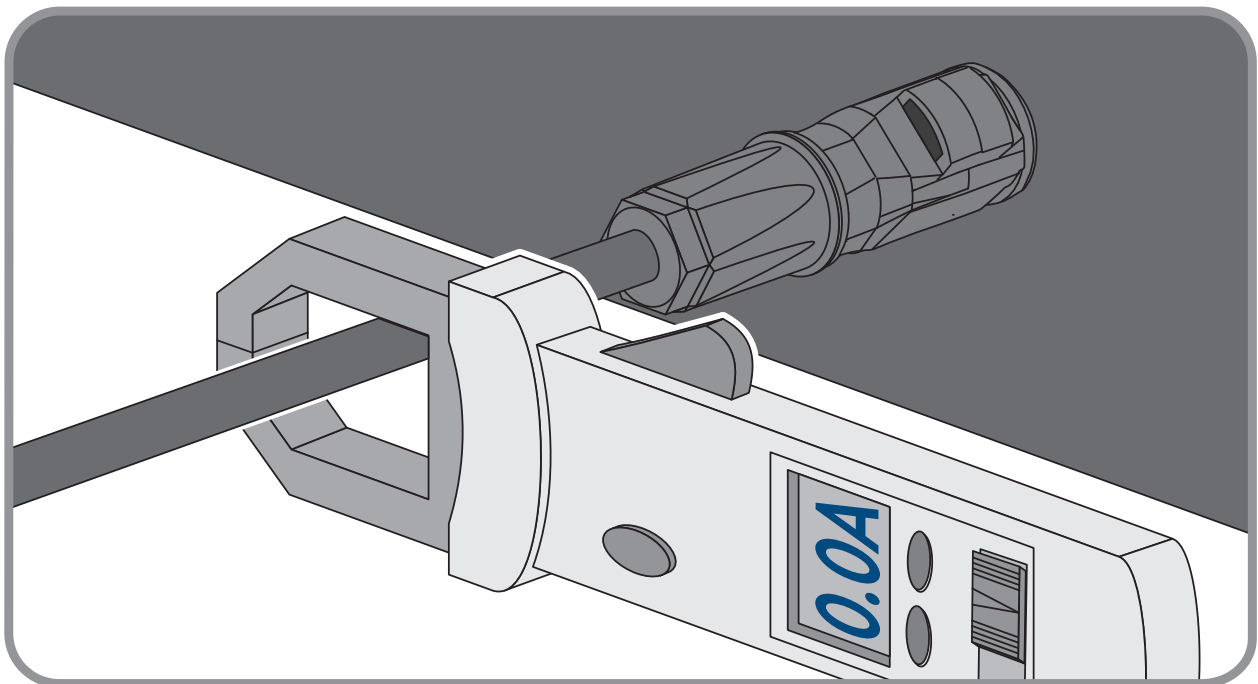
- Only use measuring devices with a DC input voltage range of 1000 V or higher.

Procedure:

1. Disconnect the AC and backup miniature circuit breaker from all 3 line conductors and secure against reconnection.



2. Turn the DC load-break switch of the inverter to position 0.
3. Switch off the battery or the load-break switch of the battery (see documentation of the battery manufacturer).
4. Wait until the LEDs have gone out.
5. Wait 10 minutes. This will ensure that the capacitors are discharged.



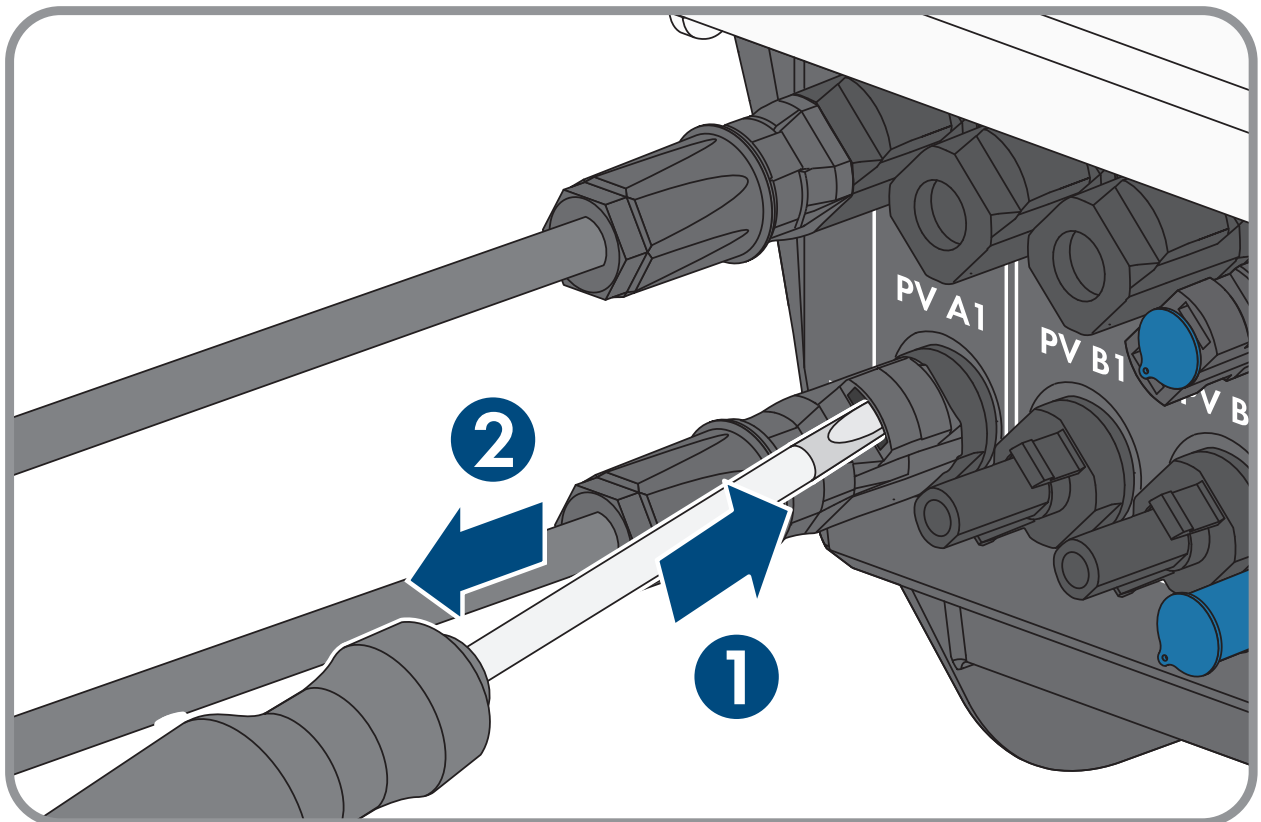
6. Use a current clamp to ensure that no current is present in the DC cables.

7.

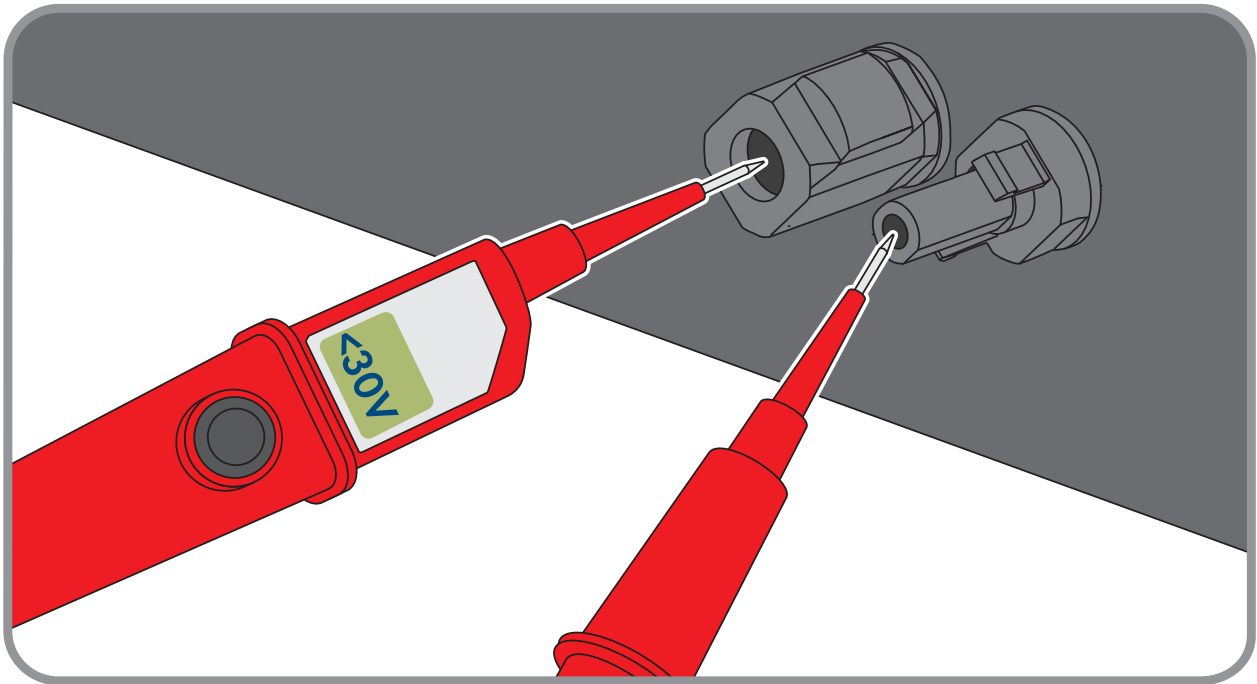
⚠ DANGER**Danger to life due to electric shock when touching exposed DC conductors or DC plug contacts if the DC connectors are damaged or loose**

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.

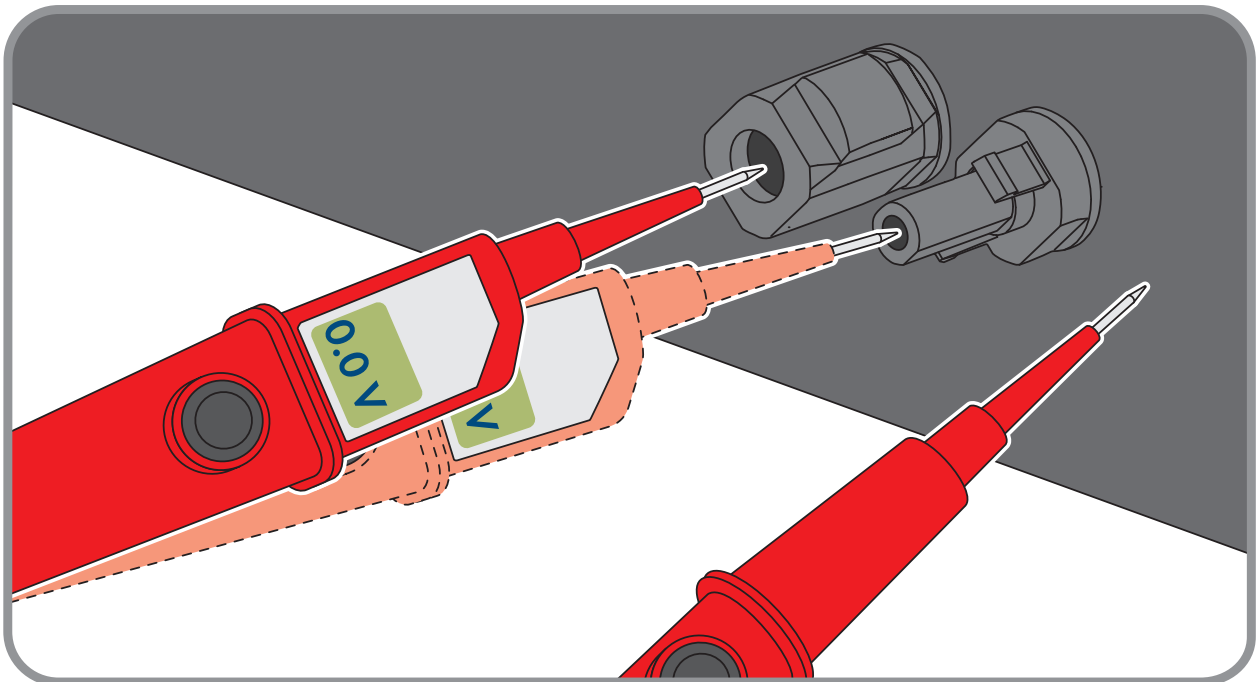
- Wear insulated gloves and use insulated tools when working on the DC connectors.
- Ensure that the DC connectors are in perfect condition and that none of the DC conductors or DC plug contacts are exposed.
- Carefully release and remove the DC connectors as described in the following.



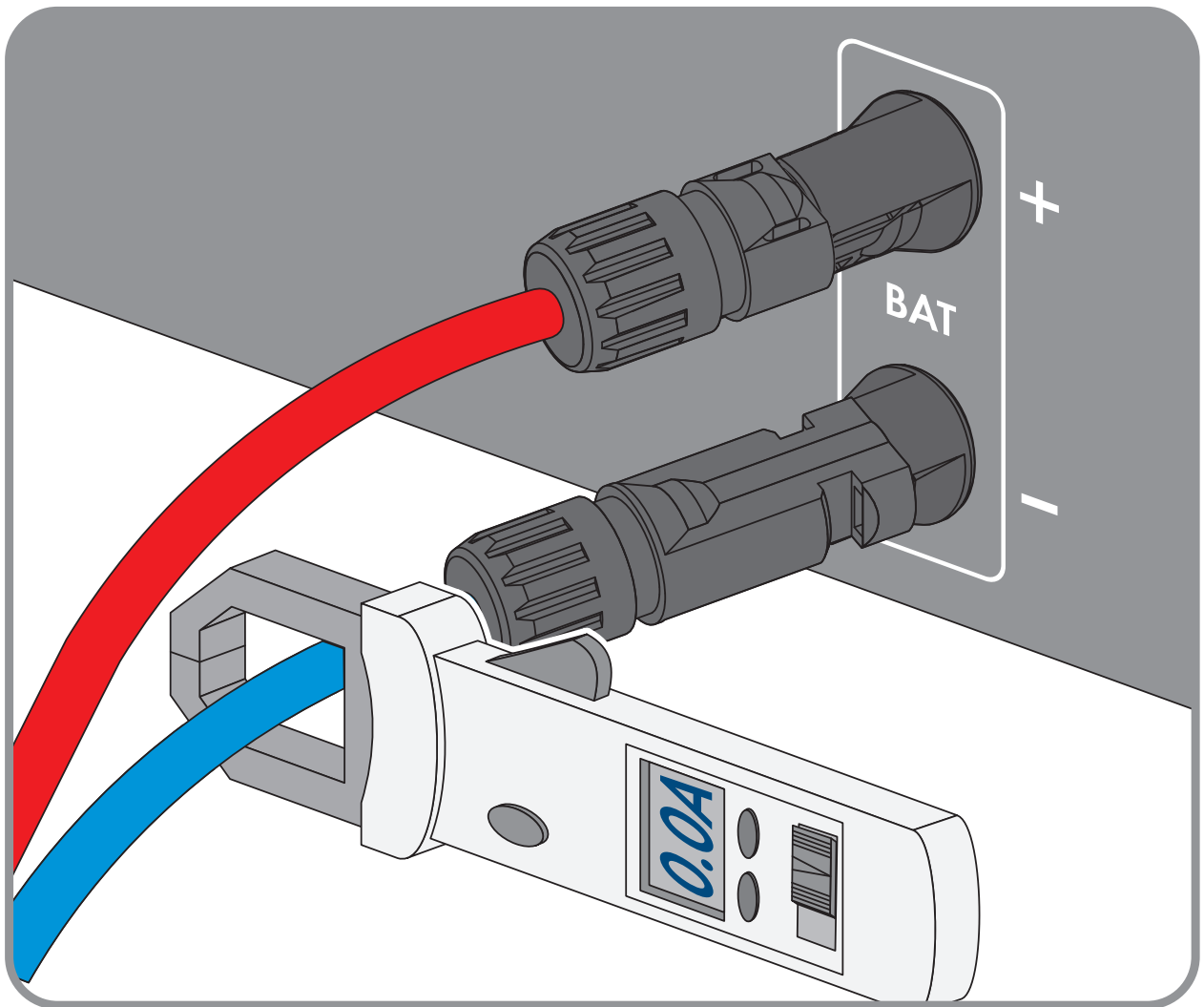
8. Release and remove the DC connectors. To do so, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors out. When doing so, do not lever the DC connectors out, but insert the tool into one of the side slots only to release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



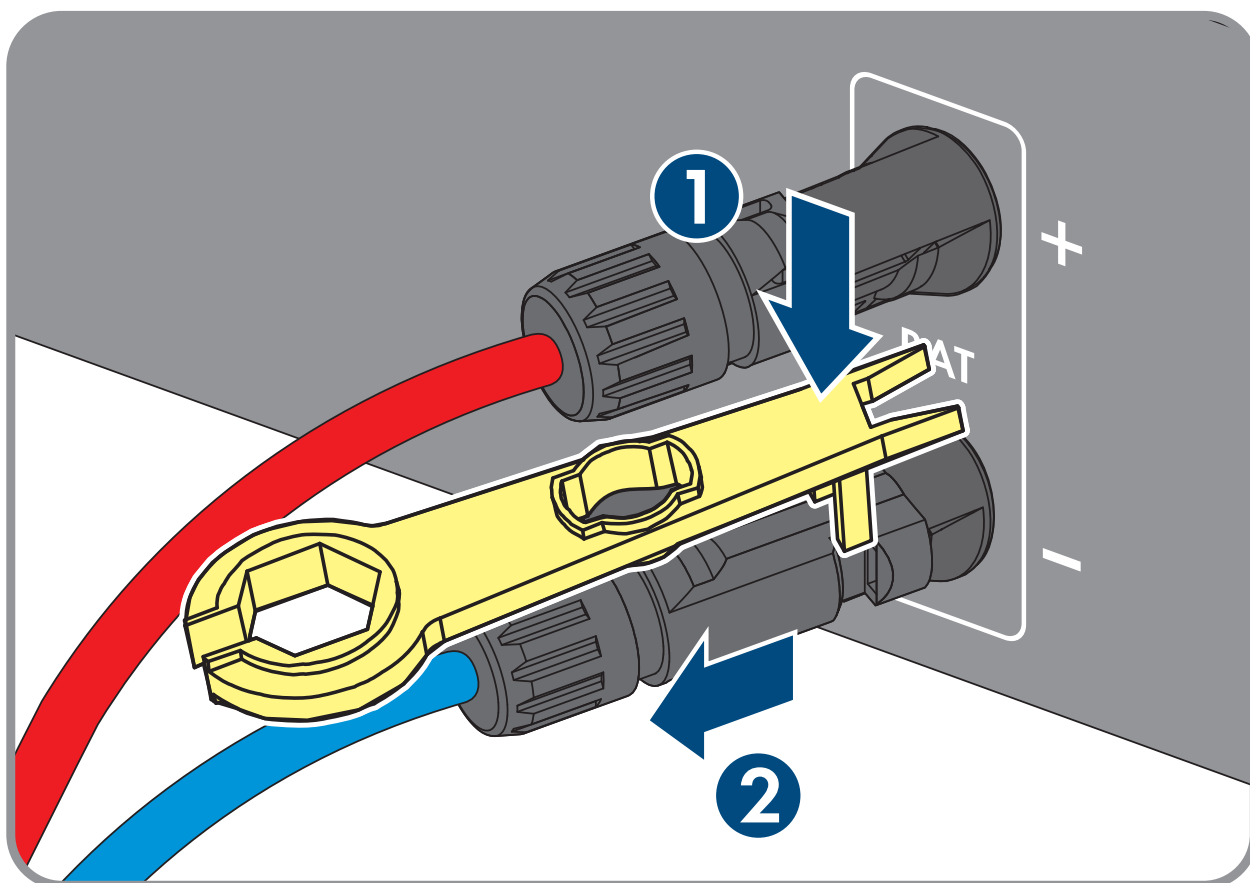
9. Ensure that no voltage is present between the positive terminal and negative terminal at the DC inputs using a suitable measuring device.



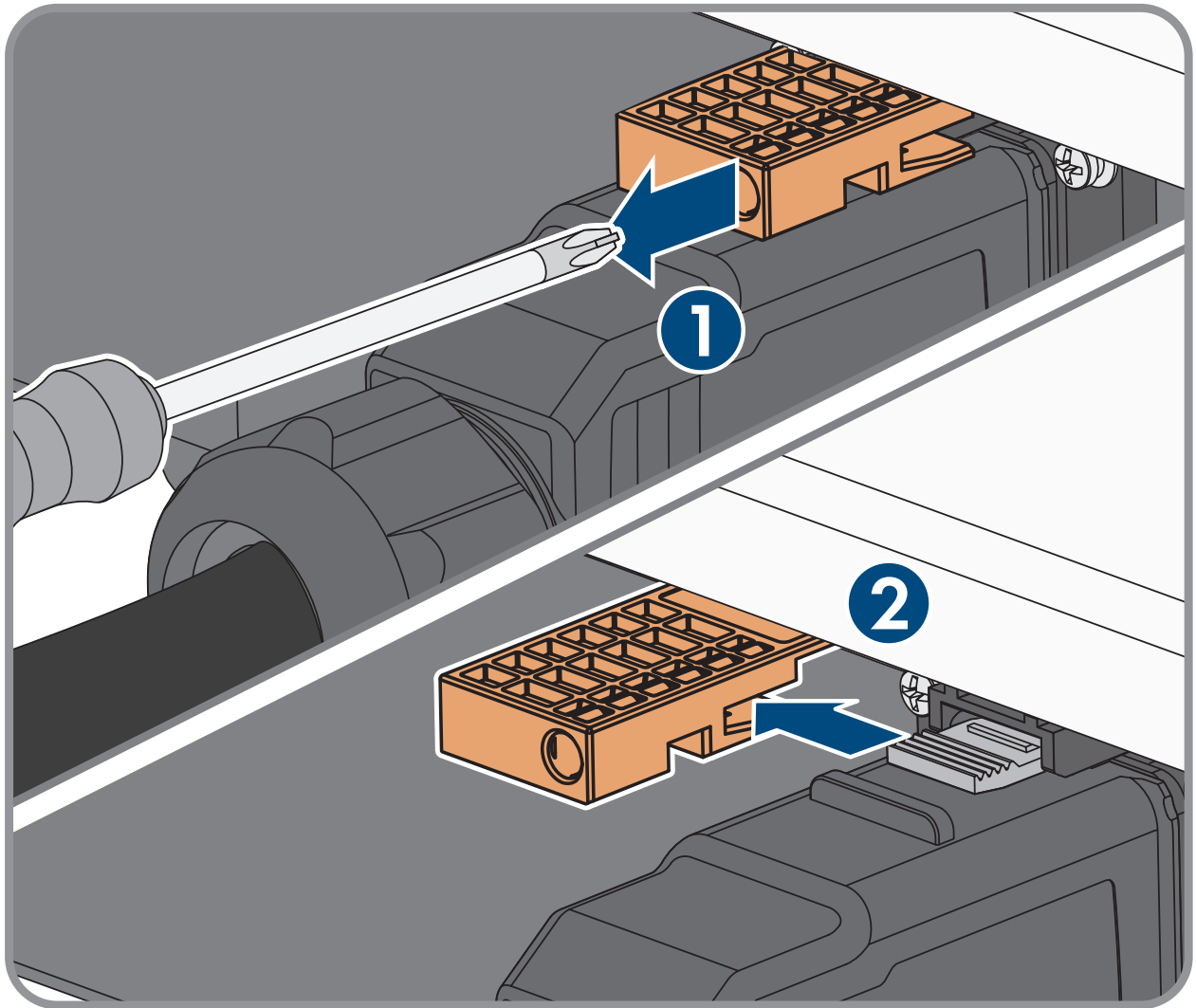
10. Ensure that no voltage is present between the positive terminal and ground as well as between the negative terminal and ground on the DC inputs using a suitable measuring device.



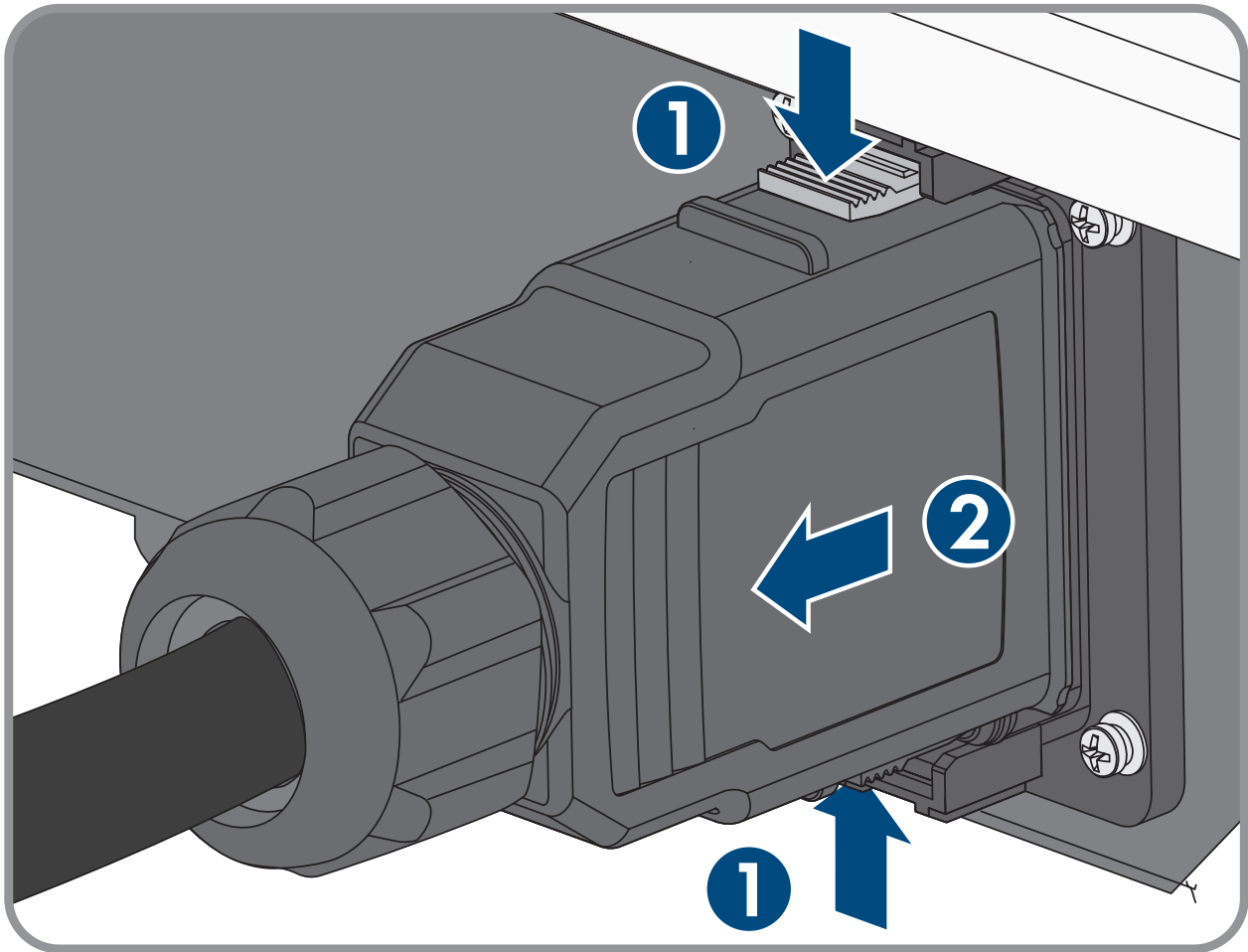
11. Ensure that no electric currents are present between the positive terminal and negative terminal at the battery inputs using a suitable measuring device.



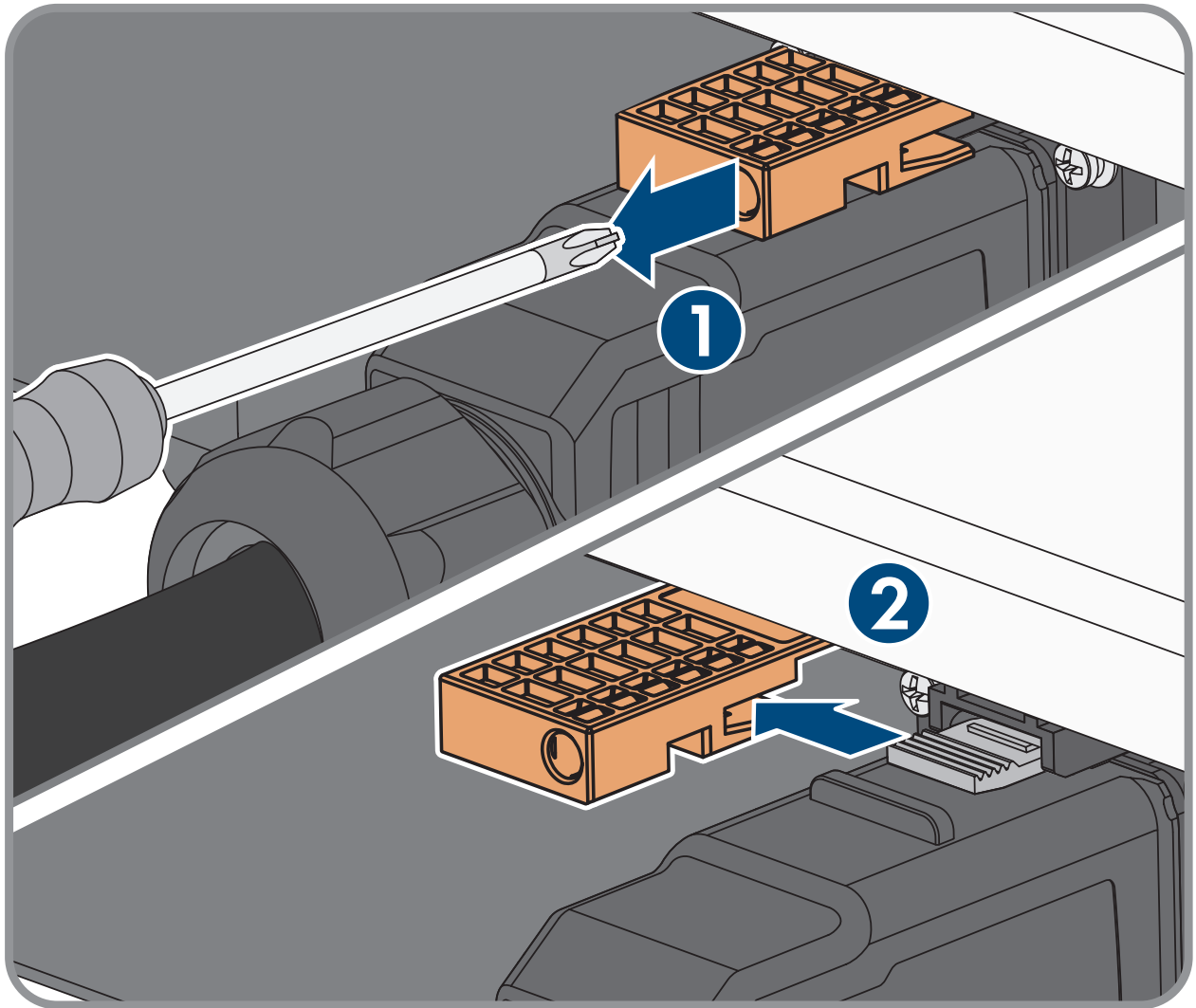
12. Insert an MC4 wrench (not included in the scope of delivery) into the notch of the DC connectors of the battery connection cables and pull slightly to remove the DC connectors.
13. If AC backup loads are connected, ensure that the AC connectors for connection to the utility grid and for connection of the AC backup loads are marked so that they cannot be reversed when reconnected.



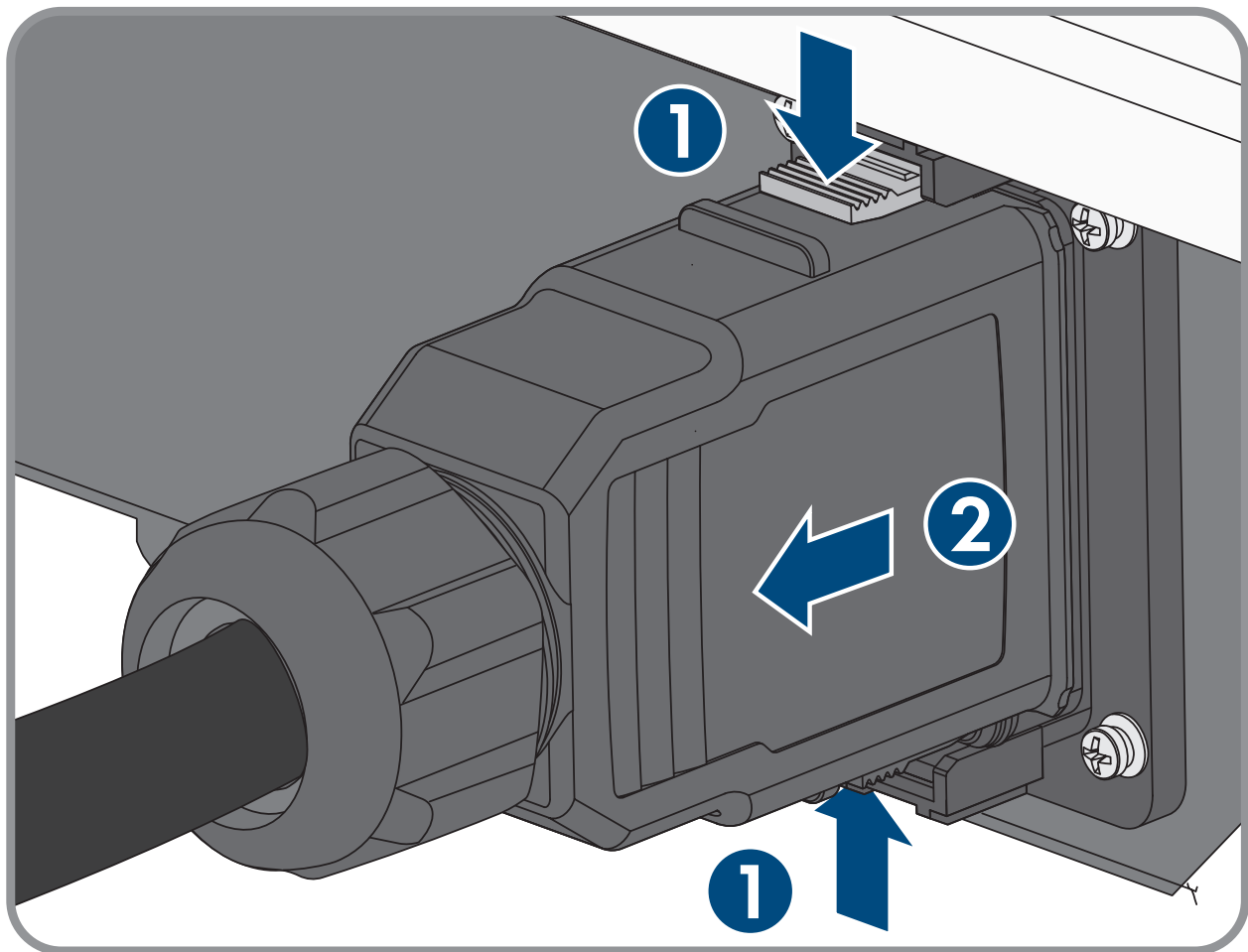
14. Remove the screw of the fuse terminal of the AC connector for connecting the AC backup loads (PH1) and slide the fuse terminal to the left.



15. Squeeze the brackets on the top and bottom of the AC connector for connecting the AC backup loads and apply slight pressure. Pull the AC connector at the same time to remove the AC connector.



16. Remove the screw of the fuse terminal of the AC connector for connecting the utility grid (PH1) and slide the fuse terminal to the left.



17. Squeeze the tabs on the top and bottom of the AC connector for connecting the utility grid and apply slight pressure. Pull the AC connector at the same time to remove the AC connector.

System components exposed to soiling must be cleaned regularly to ensure that all products are 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.

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

1.72 Restoring the password

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

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

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

If you have forgotten the password for the inverter, you can unlock the inverter with a Personal Unlocking Key (PUK). For each inverter, there is 1 PUK for each user group (**User** and **Installer**).

Tipp: With PV systems that are registered in a communication product, you can also assign a new password for the user group **Installer** via the communication product. The password for the user group **Installer** is the same as the system password in the communication product.

1. Request PUK (application form available at <http://www.SMA-Solar.com>).
2. Open the user interface (see (see Section 9.3, page 82)).
3. Enter the PUK instead of the password into the field **Password**.
4. Select **Login**.
5. Call up the menu **Device parameters**.
6. Click on **[Edit parameters]**.
7. In the parameter group **User Rights > Access Control** change the password of the desired user group.
8. Select **[Save all]** to save the changes.

1.73 Event messages

1.73.1 Event 101

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.

1.73.2 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.

1.73.3 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.

1.73.4 Event 104

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.

1.73.5 Event 105

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.

1.73.6 Event 202**⚠ 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.

1.73.7 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.

1.73.8 Event 205

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.

1.73.9 Event 206

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.

1.73.10 Event 501

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.

1.73.11 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.

1.73.12 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.

1.73.13 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.

1.73.14 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.

1.73.15 Event 1302

QUALIFIED PERSON

Event message:

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

Explanation:

The grid monitor of the inverter has detected that one or more line conductors or the neutral conductor are not connected. This may be due to the absence of neutral point grounding for the grid transformer or the absence of grounding for the main grounding busbar. The inverter cannot connect to the AC grid. The event message may also occur if the inverter cannot identify the connected AC grid. In these cases, an incorrectly configured country data set may be the cause.

Corrective measures:

- Ensure that the miniature circuit breaker is switched on.
- Ensure that the correct country data set has been configured in the inverter.
- Ensure that the AC connection at the inverter and at the point of interconnection is correctly executed. Repair or replace defective terminal points and fuses.

- Ensure that the AC voltage at the AC connection of the inverter and in the subdistributor is in the permissible range. There should only be a few volts of difference between the values. For three-phase inverters, perform the measurements for all connection line conductors.
- If the inverter is connected to a TN-C system, ensure that the voltage between N and PE is less than 0.3 V.
- If the inverter is connected to a TT system, ensure that the voltage between N and PE is less than 10 V.
- Ensure that the voltage between the line conductor and protective conductor is the same as the mains voltage and in the permissible range. For three-phase inverters, perform the measurements for all connection line conductors.
- Ensure that the voltage between the line conductor and neutral conductor is the same as the mains voltage and in the permissible range. For three-phase inverters, perform the measurements for all connection line conductors.
- Ensure that all grounding measures are correctly executed. If necessary, check that the neutral point grounding of the system transformer is correct.

1.73.16 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.

1.73.17 Event 3403

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 all voltage sources.
- Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum 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 module has been correctly rated or contact the installer of the PV module.
- If this message is repeated frequently, contact the Service.

1.73.18 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.

1.73.19 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.

1.73.20 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.

1.73.21 Event 3412

QUALIFIED PERSON

Event message:

- DC overvoltage
- Disconnecting generator

Explanation:

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

This message is signaled 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.

1.73.22 Event 3413

QUALIFIED PERSON

Event message:

- DC overvoltage
- Disconnecting generator

Explanation:

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

This message is signaled 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.

1.73.23 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.

1.73.24 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.

1.73.25 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.

1.73.26 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.

1.73.27 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.

1.73.28 Event 3503

QUALIFIED PERSON

Event message:

- Insulation failure
- Check generator

Explanation:

The insulation resistance of the DC installation is or was too low. The inverter disconnects from the utility grid for safety reasons and/or fails to connect during self-test mode. The cause is often defective insulation or a faulty plug connection on the PV modules or within the DC wiring. The event message can occur temporarily as it is influenced by ambient conditions such as rain or dew. In addition, mechanical influences (e.g. strong wind) can cause live DC cables to come into contact with grounded system parts if the cable insulation is defective. Inverters without a transformer can be destroyed by an ground fault during operation.

Corrective measures:

- Check the frequency and duration of the event message in the inverter's user interface or in the Sunny Portal. The measurements listed below should be performed under the same ambient conditions and at the same time of day as when the error occurred—ideally while an event message is active.
- If module electronic components, such as SunSpec-compatible module disconnectors, are present, an additional device is required to maintain the SunSpec PLC signal.
- Verify through measurement of the open-circuit voltage of the PV strings that the measured values correspond to the system design and prevailing irradiation conditions.
- Measure the voltage of each PV string between DC+ and PE, and between DC– and PE, using a suitable measuring device. If a stable voltage is measured that approximately equals the string voltage, this indicates a ground fault. Correct the ground fault on the relevant PV string and only then reconnect.
- Measure the insulation resistance of each PV string using an insulation resistance meter. Ensure that the PV string is short-circuited during these measurements and that the maximum permissible system voltage of the PV modules is not exceeded. If the insulation resistance is too low, it indicates a ground fault. Correct the ground fault on the relevant PV string and only then reconnect.
- Visually inspect the entire DC installation (PV modules, cables, plug connections, and any existing components such as module optimizers or disconnectors) to ensure there are no signs of damage, such as porosity, cracks, crushing, deformation, or discoloration. Replace or repair any defective components.

Tip: Use an IR camera for support.

1.73.29 Event 3601**⚠ QUALIFIED PERSON****Event message:**

- **High leakage 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.

1.73.30 Event 3800**⚠ QUALIFIED PERSON****Event message:**

- **DC overcurrent/DcAmpMax**

- **Check generator**

Explanation:

Overcurrent at the PV input. The inverter briefly interrupts feed-in operation or charging of the battery system. Depending on the design, irradiation or temperature conditions, this message may occur infrequently or sporadically. The inverter resumes feed-in operation as soon as the DC current is back in the permissible range.

Corrective measures:

- Ensure that the current firmware version is installed.
- If the event message is displayed frequently, ensure that the PV modules have been correctly rated and wired using Sunny Design.
- Ensure that the technical data for the DC input of the inverter is observed.

1.73.31 Event 3802**⚠ 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.

1.73.32 Event 3803**Event message:**

- **DC overcurrent / DcAmpMax / EvtDcAmpMaxIn**
- **Check generator**

Explanation:

Overcurrent at the DC input. The inverter briefly interrupts feed-in operation. Depending on the design, irradiation or temperature conditions, this message may occur infrequently or sporadically. The inverter resumes feed-in operation as soon as the DC current is back in the permissible range.

Corrective measures:

- If the event message is displayed frequently, ensure that the PV modules have been correctly rated and wired using Sunny Design.
- Ensure that the technical data for the DC input of the inverter is observed.
- Ensure that the current firmware version is installed.

1.73.33 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.

1.73.34 Event 3805**⚠ 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.

1.73.35 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.

1.73.36 Event 3902**⚠ 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.

1.73.37 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.

1.73.38 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.

1.73.39 Event 6001-6499

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.40 Event 6101**⚠ QUALIFIED PERSON****Event message:**

- **Interference device / DevFlt**
- **Self-diagnosis/ SlfDiag**

Explanation:

The event message indicates an error in the program sequence of the inverter or a corrupt record. The red LED on the inverter lights up and the inverter discontinues feed-in.

Corrective measures:

- If the event message occurs briefly during starting in the morning or briefly before disconnection in the evening, no further measures are required. In this case, the cause is voltage supply instability due to low radiation conditions.
- If the event message occurs after a parameter change, ensure that the parameter settings are correct.
- If the event message is permanently present, disconnect the inverter from the voltage source and then restart it.
- If the event message persists after the restart, the assembly or inverter needs to be replaced.

1.73.41 Event 6404**⚠ QUALIFIED PERSON****Event message:**

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

Explanation:

The inverter has detected an overcurrent on the AC grid side and disconnected from the utility grid.

Corrective measures:

- If the event message occurs once or rarely, no further measures are required.
- If the event message is permanently present, the assembly or inverter needs to be replaced.

1.73.42 Event 6405**⚠ QUALIFIED PERSON****Event message:**

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

Explanation:

The inverter has detected DC overvoltage in the DC link. This fault can have internal or external causes.

Corrective measures:

- If the event message occurs once or rarely, no further measures are required.
- In the inverter event memory, check whether event message 3801/3802 is additionally displayed.

- If the event message is displayed frequently, ensure that the PV modules have been correctly rated and wired using Sunny Design.
- Ensure that the technical data for the DC input of the inverter is observed.
- Ensure that the DC connection is correctly executed. Possible error sources: DC plug connections, DC cabling, PV modules.
- If the event message persists despite successful checks, the assembly or inverter needs to be replaced.

1.73.43 Event 6406

QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has detected that the current at input A has exceeded the maximum values as laid down in the technical specifications.

Corrective measures:

- If the event message occurs once or rarely, no further measures are required.
- In the inverter event memory, check whether event message 3801/3802 is additionally displayed.
- If the event message is displayed frequently, ensure that the PV modules have been correctly rated and wired using Sunny Design.
- Ensure that the technical data for the DC input of the inverter is observed.
- Ensure that the DC connection is correctly executed. Possible error sources: DC plug connections, DC cabling, PV modules.
- If the event message persists despite successful checks, the assembly or inverter needs to be replaced.

1.73.44 Event 6407

QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has detected that the hardware threshold for overcurrent has been exceeded at the DC input in question.

Corrective measures:

- If the event message occurs once or rarely, no further measures are required.
- If the event message is displayed frequently, ensure that the PV modules have been correctly rated and wired using Sunny Design.
- Ensure that the technical data for the DC input of the inverter is observed.
- If the event message is permanently present, the assembly or inverter needs to be replaced.

1.73.45 Event 6411

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Interference device

Explanation:

The inverter has determined that the requirement (stand-alone grid formation) for grid connection is not met. There will be temporary disconnections from the utility grid on the part of the inverter as a result.

This event rarely occurs before the inverter is connected. The inverter repeats the test and then connects to the utility grid.

Corrective measures:

- Check whether the selected country data set meets the local standards and guidelines of the electric utility company.
- Check whether the grid voltage is in the permissible range.
- Check whether the voltage difference between neutral conductor N and protective grounding PE is < 10 V. Check the AC installation path for loose or detached electrical connections.

1.73.46 Event 6422

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Interference device

Explanation:

The inverter has detected a device fault.

Corrective measures:

- Connect to the inverter user interface and perform a restart.
- If the event message persists, disconnect the inverter from the voltage source.
- Wait until all LEDs are off.
- Recommission the inverter.
- If the event message persists, the assembly or inverter needs to be replaced.

1.73.47 Event 6438

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Interference device

Explanation:

The conditions for operation of the internal AC converter stage of the inverter have not been met. The inverter disconnects from the utility grid for safety reasons.

If the event message occurs frequently or is permanently present, perform the following corrective measures.

Corrective measures:

- Disconnect the inverter from all voltage sources.
- Wait until the LEDs have gone out.
- Ensure that the technical data for the DC input of the inverter is observed.
- Ensure that the mains voltage at the AC connection of the inverter and in the subdistributor is in the permissible range.
- Recommission the inverter and make sure that the internal relays audibly switch.
- If the event message persists or the relays do not audibly switch and the inverter possibly reports event message 7702, the inverter needs to be replaced.

1.73.48 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 that the inverter is not exposed to direct solar irradiation.
- Ensure the maximum ambient temperature is not exceeded.

1.73.49 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 inverter is not exposed to direct solar irradiation.
- Ensure that the maximum permissible ambient temperature is complied with.

1.73.50 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 that the inverter is not exposed to direct solar irradiation.
- Ensure the maximum ambient temperature is not exceeded.

1.73.51 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 .

1.73.52 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.

1.73.53 Event 6603

QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.54 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.

1.73.55 Event 6607

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Battery overcurrent

Corrective measures:

- Disconnect the inverter from voltage sources and wait 15 minutes before recommissioning the inverter.
- If this message is displayed again, contact the Service.

1.73.56 Event 6608

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Battery overcurrent

Corrective measures:

- Disconnect the inverter from voltage sources and wait 15 minutes before recommissioning the inverter.
- If this message is displayed again, contact the Service.

1.73.57 Event 6609

QUALIFIED PERSON

Event message:

- Battery undervoltage/EvtUnVBat

Explanation:

The inverter displays a battery undervoltage. Regarding inverters with a firmware version < 3.04.16.R, the instantaneous value displayed is not actually a measured value of the inverter, but a value transmitted from the battery via the CAN communication cable. Inverters with a firmware version ≥ 3.04.16.R display a value measured by the inverter. If the event message occurs during commissioning, the cause may be reverse polarity of the power cables of the battery connection or an error in connecting the cable for battery communication.

Corrective measures:**During commissioning:**

- If the instantaneous values displayed are not correct, ensure that the assignment of the terminal of the COM connector for battery communication is correct.
- If the instantaneous values displayed are not correct, ensure that the COM connector is properly connected to the inverter.
- Ensure that the connection of the battery module to the inverter and to the battery module is correctly executed. Rule out reverse polarity.
- Ensure that the correct DC connectors (MC4) are used. To do this, use the battery connection cables supplied with the inverter and the DC connectors supplied with the SMA Home Storage.

For existing systems:

- Disconnect the inverter from voltage sources and wait 15 minutes before recommissioning the inverter.
- Check the battery voltage according to the manufacturer's specifications.
- If this event message is displayed again after the corrective measures, contact Service.

1.73.58 Event 6610**⚠ QUALIFIED PERSON****Event message:**

- **Battery overvoltage (SW) / EvtOvVBat**

Explanation:

The inverter reports a battery overvoltage.

Corrective measures:

- Check the condition of the battery using the battery manufacturer's documentation and contact them if necessary.

1.73.59 Event 6701**⚠ QUALIFIED PERSON****Event message:**

- **Communication impaired**

Explanation:

Error in the communication processor, the inverter continues feeding in, however. The cause must be determined by the Service.

Corrective measures:

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

1.73.60 Event 6702**⚠ QUALIFIED PERSON****Event message:**

- **Communication impaired**

Explanation:

Error in the communication processor, the inverter continues feeding in, however. The cause must be determined by the Service.

Corrective measures:

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

1.73.61 Event 6801**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis/SlfDiag
- Input A defective/StringAFlt

Explanation:

The inverter has detected an error at DC input A.

Corrective measures:

- Disconnect the inverter from all voltage sources.
- Wait until the LEDs have gone out.
- Recommission the inverter.
- Check DC input A on the inverter for correct connection.
- Only regarding new installations: Check whether the cables on DC input A are properly connected. Ensure that no reverse polarity is present.
- If the event message persists after the corrective measures, the device needs to be replaced.

1.73.62 Event 6802**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Input A defective

Explanation:

The inverter has detected an error at DC input A.

Corrective measures:

- Disconnect the inverter from voltage sources and wait 15 minutes before recommissioning the inverter.
- Check DC input A on the inverter for correct connection.
- Only regarding new installations: Check whether the cables on DC input A are properly connected. Ensure that no reverse polarity is present.
- If the event message persists after the corrective measures, the device needs to be replaced.

1.73.63 Event 6901**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis

- **Input B defective**

Explanation:

The inverter has detected an error at DC input B.

Corrective measures:

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

1.73.64 Event 6902**⚠ QUALIFIED PERSON****Event message:**

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

Explanation:

The inverter has detected an error at DC input B.

Corrective measures:

- Disconnect the inverter from voltage sources and wait 15 minutes before recommissioning the inverter.
- Check DC input B on the inverter for correct connection.
- If the event message persists after the corrective measures, the device needs to be replaced.
- Only regarding new installations: Check whether the cables on DC input B are properly connected. Ensure that no reverse polarity is present.

1.73.65 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.

Corrective measures:

- Disconnect the inverter from voltage sources.
- Wait 15 minutes.
- Recommission the inverter.
- If the event message is no longer present, no further measures are required.
- If the event message persists, the inverter must be replaced.

1.73.66 Event 7002**⚠ QUALIFIED PERSON****Explanation:**

The inverter has detected an error in an internal measuring device.

Corrective measures:

- Disconnect the inverter from voltage sources.
- Wait 15 minutes.
- Recommission the inverter.
- If the event message is no longer present, no further measures are required.
- If the event message persists, the inverter must be replaced.

1.73.67 Event 7003** 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.

1.73.68 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.

1.73.69 Event 7014** QUALIFIED PERSON****Event message:**

- **Fault boost converter temperature sensor**

Explanation:

Fan is always on.

Corrective measures:

- Contact Service.

1.73.70 Event 7106

QUALIFIED PERSON

Event message:

- Update file defective
- Replace SD card with a functional one

Explanation:

The update file is defective. The update failed. The inverter continues to feed power into the grid.

1.73.71 Event 7110

QUALIFIED PERSON

Event message:

- No update file found

Explanation:

No new update file was found on the SD memory card. The update failed. The inverter continues to feed power into the grid.

1.73.72 Event 7112

QUALIFIED PERSON

Event message:

- Update file successfully copied

1.73.73 Event 7113

QUALIFIED PERSON

Event message:

- The memory card is full or write-protected

1.73.74 Event 7201

QUALIFIED PERSON

Event message:

- Data storage not possible

1.73.75 Event 7202

QUALIFIED PERSON

Event message:

- Data storage not possible

1.73.76 Event 7303

QUALIFIED PERSON

Event message:

- Update main CPU failed

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.77 Event 7320

QUALIFIED PERSON

Event message:

- The device was successfully updated

Explanation:

The firmware update was completed successfully.

1.73.78 Event 7324

QUALIFIED PERSON

Event message:

- Wait for update conditions

Explanation:

The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.

Corrective measures:

- Retry update.
- Ensure that the selected update file is suitable for this inverter.
- If this message is displayed again, contact the Service.

1.73.79 Event 7330

Event message:

- Wait for update conditions

Explanation:

The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.

1.73.80 Event 7333

QUALIFIED PERSON

Event message:

- Update transport failed

Explanation:

The update file could not be copied to the internal memory of the product. In the event of a connection to the product via Wi-Fi, poor connection quality may be the cause.

Corrective measures:

- Retry update.
- For Wi-Fi connection: Improve the Wi-Fi connection quality (e.g., via Wi-Fi repeater) or establish connection with the product via Ethernet.
- If this message is displayed again, contact the Service.

1.73.81 Event 7337**⚠ QUALIFIED PERSON****Event message:**

- Battery management system update unsuccessful (|d0|)

Explanation:

Update file could not be copied to the inverter's internal memory.

Corrective measures:

- Retry update.
- Ensure that the selected update file is suitable for this inverter and the battery.
- For Wi-Fi connection: Improve the Wi-Fi connection quality (e.g., via Wi-Fi repeater) or establish connection with the inverter via Ethernet.
- If this message is displayed again, contact the Service.

1.73.82 Event 7340**⚠ QUALIFIED PERSON****Event message:**

- Update communication failed

Explanation:

Update file could not be copied to the inverter's internal memory.

Corrective measures:

- Retry update.
- Ensure that the selected update file is suitable for the inverter.
- If this message is displayed again, contact the Service.

1.73.83 Event 7347**⚠ QUALIFIED PERSON****Event message:**

- Incompatible file

Explanation:

The configuration file is not suitable for this product.

Corrective measures:

- Ensure that the selected configuration file is suitable for this product.
- Retry import.

1.73.84 Event 7348**⚠ QUALIFIED PERSON****Event message:**

- **Incorrect file format**

Explanation:

The configuration file is not of the required format or is damaged.

Corrective measures:

- Ensure that the selected configuration file is of the required format and is not damaged.
- Retry import.

1.73.85 Event 7349**⚠ QUALIFIED PERSON****Event message:**

- **Incorrect login rights for configuration file**

Explanation:

The user group logged in does not have the user rights necessary to be able to import a configuration.

Corrective measures:

- Log in as **Installer**.
- Import configuration file again.

1.73.86 Event 7350**⚠ QUALIFIED PERSON****Event message:**

- Transfer of a configuration file has started

Explanation:

The configuration file is being transferred.

1.73.87 Event 7357**⚠ QUALIFIED PERSON****Event message:**

- Update BIM

Explanation:

The Battery Interface Module on the communication assembly has been successfully updated.

1.73.88 Event 7359

QUALIFIED PERSON

Event message:

- Update BUC

Explanation:

The SMA Backup Unit Controller that is installed in the automatic transfer switch has been updated successfully.

1.73.89 Event 7360

QUALIFIED PERSON

Event message:

- Update BUC failed

Corrective measures:

- Ensure that the communication between SMA Backup Unit Controller and the inverter functions perfectly.
- Ensure that the cable requirements of the communication cable for the communication between the SMA Backup Unit Controller and the inverter have been met.
- Retry update.
- If this message is displayed again, contact the Service.

1.73.90 Event 7361

QUALIFIED PERSON

Event message:

- Update SMA Gateway Interface Module

1.73.91 Event 7362

QUALIFIED PERSON

Event message:

- Update SMA Gateway Interface Module failed

Corrective measures:

- Retry update.
- If this message is displayed again, contact the Service.

1.73.92 Event 7363

QUALIFIED PERSON

Event message:

- Update of PV module electronics

1.73.93 Event 7364

QUALIFIED PERSON

Event message:

- Update of PV module electronics not successful

Corrective measures:

- Retry update.
- If this message is displayed again, contact the Service.

1.73.94 Event 7500

QUALIFIED PERSON

Event message:

- Sensor error

Explanation:

Measurement error

Corrective measures:

- Contact Service.

1.73.95 Event 7600

QUALIFIED PERSON

Event message:

- Self-diagnosis > Communication error

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.96 Event 7613

QUALIFIED PERSON

Event message:

- Communication with meter faulty > Check communication to meter

Explanation:

Communication with an energy meter is faulty.

Corrective measures:

- Ensure that the data cables are correctly installed.

1.73.97 Event 7619

QUALIFIED PERSON

Event message:

- **Communication fault with meter unit**
- **Check communication to meter**

Explanation:

The inverter is not receiving any data from the energy meter.

Corrective measures:

- Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual).

1.73.98 Event 7702

QUALIFIED PERSON

Event message:

- **Relay defect**
- **Self-diagnosis / SlfDiag**
- **Interference device / DevFlt**

Explanation:

Error during the relay test. An internal relay can no longer be opened or closed. This means that the inverter cannot connect to the utility grid. The cause may be a faulty relay. The relay contacts can be damaged by transient overvoltages in the AC grid or a ground fault in the DC installation. The event message may also occur temporarily in the event of fluctuations in the utility grid.

Corrective measures:

- Ensure that the AC connection at the inverter and at the point of interconnection is correctly executed. Repair or replace defective terminal points and fuses.
- Ensure that screw-type fuses are not used as load-break switches.
- Check the system's AC grid. Do this by measuring the voltage between N and the individual line conductors. The voltage should be the same as the mains voltage and almost identical for all conductors. Also measure the voltage between N and PE. This should be less than 10 V.
Greater voltage differences may indicate a displaced neutral point due to faulty or insufficient grounding measures.
- If the event message persists after the corrective measures, the assembly or inverter needs to be replaced.

1.73.99 Event 7712

QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.100 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.

1.73.101 Event 7802**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.102 Event 7803**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.103 Event 8903**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.104 Event 8904**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.105 Event 8905**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

1.73.106 Event 9223**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Interference device

Explanation:

The inverter has switched to battery-backup operation. In this operating mode, the inverter acts as a regulated voltage source and supplies the grid voltage.

1.73.107 Event 9301**⚠ QUALIFIED PERSON****Event message:**

- New battery identified

1.73.108 Event 9304**⚠ QUALIFIED PERSON****Event message:**

- Unauthorized battery system

Corrective measures:

- Contact Service.

1.73.109 Event 9305**⚠ QUALIFIED PERSON****Event message:**

- Battery connection fault

Corrective measures:

- Check the battery connection.

1.73.110 Event 9306**⚠ QUALIFIED PERSON****Event message:**

- Battery voltage deviation

Corrective measures:

- Check the battery connection.

1.73.111 Event 9307**⚠ QUALIFIED PERSON****Event message:**

- Defective battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.112 Event 9308**⚠ QUALIFIED PERSON****Event message:**

- Battery system communication error

Explanation:

Event 9308 indicates a communication error in the battery system.

Corrective measures:

- Ensure that the battery system is switched on correctly.

- Check that the battery communication cable is connected correctly and that the CAN bus is wired correctly. Make sure that:
 - correct connection of the Enable and GND lines
 - Cable category is at least Cat 5e, twisted pair
 - maximum cable length: 10 m
 - Sufficient stripping of 12 mm. If multi-core stranded wires are used, use bootlace ferrules (12 mm).
- Check the grounding of the inverter and the battery system.
- Perform communication test via the user interface.
- Check the condition of the battery using the battery manufacturer's documentation and contact them if necessary.

1.73.113 Event 9311

QUALIFIED PERSON

Event message:

- Battery cell overvoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.114 Event 9312

QUALIFIED PERSON

Event message:

- Battery cell undervoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.115 Event 9313

QUALIFIED PERSON

Event message:

- Battery overtemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.116 Event 9314**⚠ QUALIFIED PERSON****Event message:**

- Battery undertemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.117 Event 9316**⚠ QUALIFIED PERSON****Event message:**

- Internal battery hardware fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.118 Event 9334**⚠ QUALIFIED PERSON****Event message:**

- Battery test charge

Explanation:

The battery test for charging the battery is carried out.

1.73.119 Event 9335**⚠ QUALIFIED PERSON****Event message:**

- Battery test discharge

Explanation:

The battery test for discharging the battery is carried out.

1.73.120 Event 9336**⚠ QUALIFIED PERSON****Event message:**

- Start conditions battery test not fulfilled

Explanation:

The state of charge of the battery is too low or too high for carrying out the test.

Corrective measures:

- Perform the test that has not been performed yet.

1.73.121 Event 9337**⚠ QUALIFIED PERSON****Event message:**

- Charge battery test successful

1.73.122 Event 9338**⚠ QUALIFIED PERSON****Event message:**

- Battery test discharge successful

1.73.123 Event 9339**⚠ QUALIFIED PERSON****Event message:**

- Battery charging test failed

Corrective measures:

- Check the installation of the battery.
- Perform the test that has not been performed yet.

1.73.124 Event 9340**⚠ QUALIFIED PERSON****Event message:**

- Battery test discharge failed

Corrective measures:

- Check the installation of the battery.
- Perform the test that has not been performed yet.

1.73.125 Event 9346**⚠ QUALIFIED PERSON****Event message:**

- Battery not configured

Corrective measures:

- Start the installation assistant on the inverter user interface and perform the battery configuration.

1.73.126 Event 9347

QUALIFIED PERSON

Event message:

- Battery |b0| reports event: 0x|x5| |x4|, 0x|x7| |x6|, 0x|x9| |x8|, 0x|xB| |xA|

Corrective measures:

- Contact the battery manufacturer.

1.73.127 Event 9351

QUALIFIED PERSON

Event message:

- Incorrect switch position for the battery disconnection point

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.128 Event 9352

QUALIFIED PERSON

Event message:

- Battery system short circuit

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.129 Event 9353

QUALIFIED PERSON

Event message:

- Thermal management of battery system

Explanation:

Thermal management of battery system is defective.

Corrective measures:

- Check whether there is a new firmware version available for the battery. If a newer version is available, perform the firmware update.
- If this message is displayed again, contact the Service.

1.73.130 Event 9354**⚠ QUALIFIED PERSON****Event message:**

- Battery system heating procedure unsuccessful

Corrective measures:

- Contact the battery manufacturer.

1.73.131 Event 9385**⚠ QUALIFIED PERSON****Event message:**

- Internal battery hardware fault

Corrective measures:

- Contact the battery manufacturer.

1.73.132 Event 9392**⚠ QUALIFIED PERSON****Event message:**

- Overcurrent battery charging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.133 Event 9393**⚠ QUALIFIED PERSON****Event message:**

- Overcurrent battery discharging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.134 Event 9398**⚠ QUALIFIED PERSON****Event message:**

- Battery overcurrent charge/discharge

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

1.73.135 Event 10108**⚠ QUALIFIED PERSON****Event message:**

- Time adjusted / old time

1.73.136 Event 10109**⚠ QUALIFIED PERSON****Event message:**

- Time adjusted / new time

1.73.137 Event 10110**⚠ QUALIFIED PERSON****Event message:**

- Time synchronization failed |d0|

Explanation:

No time information could be called up from the set NTP server.

Corrective measures:

- Ensure that the NTP server was configured correctly.
- Ensure that the inverter is integrated into a local network with Internet connection.

1.73.138 Event 10118**⚠ QUALIFIED PERSON****Event message:**

- Parameter upload complete

Description:

The configuration file was loaded successfully.

1.73.139 Event 10248**⚠ QUALIFIED PERSON****Event message:**

- |tn4|: network busy

Explanation:

The network is busy. Data exchange between the devices is not at an optimum and is greatly delayed.

Corrective measures:

- Increase the query intervals.
- If necessary, reduce the number of devices in the network.

1.73.140 Event 10249**⚠ QUALIFIED PERSON****Event message:**

- |tn4|: network busy

Explanation:

The network is overloaded. There is no data exchange between the devices.

Corrective measures:

- Reduce the number of devices in the network.
- If necessary, increase the data query intervals.

1.73.141 Event 10250**⚠ QUALIFIED PERSON****Event message:**

- |tn4|: faulty data packages |tn8|

Explanation:

The package error rate has changed. If the package error rate is high, the network is overloaded or the connection to the network switch or DHCP server (router) is impaired.

Corrective measures:

- Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged.
- If necessary, increase the data query intervals.
- If necessary, reduce the number of devices in the network.

1.73.142 Event 10251**⚠ QUALIFIED PERSON****Event message:**

- [Interface]: communication status goes to [OK / Warning / Error / Not connected]

Description:

The communication status to the network switch or DHCP server (router) has changed. An additional error message may be displayed.

1.73.143 Event 10252**⚠ QUALIFIED PERSON****Event message:**

- [|tn4|: communication disrupted

Explanation:

There is no valid signal on the network line.

Corrective measures:

- Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged.
- Ensure that the DHCP server (router) and any network switches are signaling correct operation.

1.73.144 Event 10253** QUALIFIED PERSON****Event message:**

- **|tn4|: connection speed goes to |tn8|**

Explanation:

The data transfer rate has changed. The cause for the status [10 Mbit] can be a defective plug, a defective cable or the pulling or plugging of the network connector.

Corrective measures:

- Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged.
- Ensure that the DHCP server (router) and any network switches are signaling correct operation.

1.73.145 Event 10254** QUALIFIED PERSON****Event message:**

- **|tn4|: duplex mode goes to |tn8|**

Explanation:

The duplex mode (data transfer mode) has changed. The cause for the status [Half] can be a defective plug, a defective cable or the pulling or plugging of the network connector.

Corrective measures:

- Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged.
- Ensure that the DHCP server (router) and any network switches are signaling correct operation.

1.73.146 Event 10255** QUALIFIED PERSON****Event message:**

- **[Interface]: Network load OK**

Explanation:

The network load has returned to a normal range after being busy.

1.73.147 Event 10270** QUALIFIED PERSON****Event message:**

- **No communication with SHM > Check connection**

Explanation:

The inverter is not receiving any data from the Sunny Home Manager.

Corrective measures:

- Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual).
- Connect the energy meter directly to the 2nd Ethernet port of the inverter.
- For Wi-Fi connection: Improve the Wi-Fi connection quality (e.g., via Wi-Fi repeater) or connect the inverter with the DHCP server (router) via Ethernet.

1.73.148 Event 10282** QUALIFIED PERSON****Event message:**

- |tn0|-Login via |tn4| locked

Explanation:

After several incorrect login attempts, login has been blocked for a limited time. In this case, the User login will be blocked for 15 minutes, the Grid Guard login for 12 hours.

Corrective measures:

- Wait until the given time has expired and then retry login.

1.73.149 Event 10283** QUALIFIED PERSON****Event message:**

- WiFi module faulty

Explanation:

The Wi-Fi module integrated in the product is defective.

Corrective measures:

- Contact Service.

1.73.150 Event 10284** QUALIFIED PERSON****Event message:**

- No WiFi connection possible

Explanation:

The inverter does not currently have a Wi-Fi connection to the selected network.

Corrective measures:

- Ensure that the SSID, the Wi-Fi password and the encryption method have been entered correctly. The encryption method is specified by your Wi-Fi router or Wi-Fi access point and can be changed there.
- Ensure that the Wi-Fi router or Wi-Fi access point is in range and is signaling correct operation.
- If this message is displayed often, improve the Wi-Fi connection by using a Wi-Fi repeater.

1.73.151 Event 10285

QUALIFIED PERSON

Event message:

- WiFi connection established

Description:

Connection to the selected Wi-Fi network has been established.

1.73.152 Event 10286

QUALIFIED PERSON

Event message:

- Wi-Fi connection lost

Explanation:

The inverter has lost Wi-Fi connection to the selected network.

Corrective measures:

- Ensure that the Wi-Fi router or Wi-Fi access point is still active.
- Ensure that the Wi-Fi router or Wi-Fi access point is in range and is signaling correct operation.
- If this message is displayed often, improve the Wi-Fi connection by using a Wi-Fi repeater.

1.73.153 Event 10339

QUALIFIED PERSON

Event message:

- Webconnect enabled

Description:

The Webconnect function has been enabled.

1.73.154 Event 10340

QUALIFIED PERSON

Event message:

- Webconnect disabled

Description:

The Webconnect function has been disabled.

1.73.155 Event 10341

QUALIFIED PERSON

Event message:

- Webconnect error: no connection

Description:

It is likely that there is an error in the network settings.

Corrective measures:

- Check the network components (DLAN, WLAN Access Point etc.).
- Ensure that the following ports are not blocked:
 - Registrar: ied.sma.de:9523
 - Proxy: ied.sma.de:9523
 - Stun: stun.sma.de:3478
 - Domain: ied.sma.de (for SIP URI)

1.73.156 Event 10343**⚠ QUALIFIED PERSON****Event message:**

- Webconnect error: Default gateway not configured

Description:

It is likely that there is an error in the network settings.

Corrective measures:

- Check the network components (DLAN, WLAN Access Point etc.).
- Ensure that the following ports are not blocked:
 - Registrar: ied.sma.de:9523
 - Proxy: ied.sma.de:9523
 - Stun: stun.sma.de:3478
 - Domain: ied.sma.de (for SIP URI)

1.73.157 Event 10344**⚠ QUALIFIED PERSON****Event message:**

- Webconnect error: DNS server not configured

Description:

It is likely that there is an error in the network settings.

Corrective measures:

- Check the network components (DLAN, WLAN Access Point etc.).
- Ensure that the following ports are not blocked:
 - Registrar: ied.sma.de:9523
 - Proxy: ied.sma.de:9523
 - Stun: stun.sma.de:3478
 - Domain: ied.sma.de (for SIP URI)

1.73.158 Event 10345**⚠ QUALIFIED PERSON****Event message:**

- No reply to DNS request

Description:

It is likely that there is an error in the network settings.

Corrective measures:

- Check the network components (DLAN, WLAN Access Point etc.).
- Ensure that the following ports are not blocked:
 - Registrar: ied.sma.de:9523
 - Proxy: ied.sma.de:9523
 - Stun: stun.sma.de:3478
 - Domain: ied.sma.de (for SIP URI)

1.73.159 Event 10352**⚠ QUALIFIED PERSON****Event message:**

- Webconnect error: Faulty communication

Description:

It is likely that there is an error in the network settings or a Sunny Portal maintenance message is present.

Corrective measures:

- If a Sunny Portal maintenance message is present, wait until the maintenance has been completed.
- Check the network components (DLAN, WLAN Access Point etc.).
- Ensure that the following ports are not blocked:
 - Registrar: ied.sma.de:9523
 - Proxy: ied.sma.de:9523
 - Stun: stun.sma.de:3478
 - Domain: ied.sma.de (for SIP URI)

1.73.160 Event 10420**Event message:**

- Self-consumption control started

1.73.161 Event 10421**Event message:**

- Self-consumption control stopped

1.73.162 Event 10517**Event message:**

- Dynamic active power limitation started.

Explanation:

The inverter limits the active power of the PV inverters to the set limit.

1.73.163 Event 10518

Event message:

- Dynamic active power limitation terminated.

Explanation:

The inverter terminated the active power limitation of the PV inverters.

1.73.164 Event 10520

Event message:

- Supplied power: [xx] W (permitted value: [xx] W)

Explanation:

The set active power limitation cannot be met.

Corrective measures:

- Ensure that the correct active power limitation has been configured.
- Ensure that the PV inverters have been configured correctly.
- Ensure that the communication between battery inverter and PV inverter functions perfectly.
- Ensure that no external feeders are in the system.
- Ensure that parameter **Inverter.WModCfg.Wmod** (Operating mode active power) is set to **External active power setpoint**

1.73.165 Event 10521

Event message:

- Active power was limited today for [xx] minutes.

Explanation:

The active power limitation of the PV inverters was limited for the specified time.

1.73.166 Event 10525

Event message:

- Inverter fails to respond to act. power limitation

1.73.167 Event 10528

Event message:

- Login for NSD function on device |s0| failed

1.73.168 Event 27107

Event message:

- Update file OK

Description:

The update file found is valid.

1.73.169 Event 27108

Event message:

- Memory card is read

1.73.170 Event 27109**Event message:**

- No new update on the memory card

1.73.171 Event 27301**Event message:**

- Update communication

Description:

The inverter is updating the communication component.

1.73.172 Event 27302**Event message:**

- Update main CPU

Description:

The inverter is updating the inverter component.

1.73.173 Event 27312**Event message:**

- Update completed

Description:

The inverter has successfully completed the update.

1.73.174 Event 27329**Event message:**

- Condition test successful

Description:

The testing of the update conditions was successful. The firmware update package is suitable for this inverter.

1.73.175 Event 27331**Event message:**

- Update transport started

Description:

Update file is being copied.

1.73.176 Event 27332**Event message:**

- Update transport successful

Description:

Update file was copied successfully to the inverter's internal memory.

1.73.177 Event 27336**Event message:**

- Update battery management syst.

1.73.178 Event 29004**Event message:**

- Grid parameter unchanged

Description:

Changing the grid parameters is not possible.

1.73.179 Event 29006**Event message:**

- Self-test

1.73.180 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.

1.73.181 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.

1.73.182 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.

1.74 Checking the PV System for Ground Faults

QUALIFIED PERSON

If the red LED is glowing and the event number 3501, 3601 or 3701 is being displayed in the **Results** menu on the inverter user interface, there may be a ground fault present. The electrical insulation from the PV system to ground is defective or insufficient.

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 and battery from voltage sources and make sure 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.

WARNING

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

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

- Only use measuring devices with a DC input voltage range of 1000 V or higher.

Procedure:

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

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

1.75 Check the PV system for ground faults by measuring the voltage

QUALIFIED PERSON

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

Procedure:

1.

DANGER

Danger to life due to high voltages

- Disconnect the inverter from all voltage sources.

2. Measure the voltage between the positive terminal and the ground potential (PE).
3. Measure the voltage between the negative terminal and the ground potential (PE).
4. Measure the voltage between the positive and negative terminals.

5. If the following results are present at the same time, there is a ground fault in the PV system:

- ☑ All measured voltages are stable.
- ☑ The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.

6. If a ground fault is present, determine the location of the ground fault via the ratio of the two measured voltages and eliminate the ground fault.

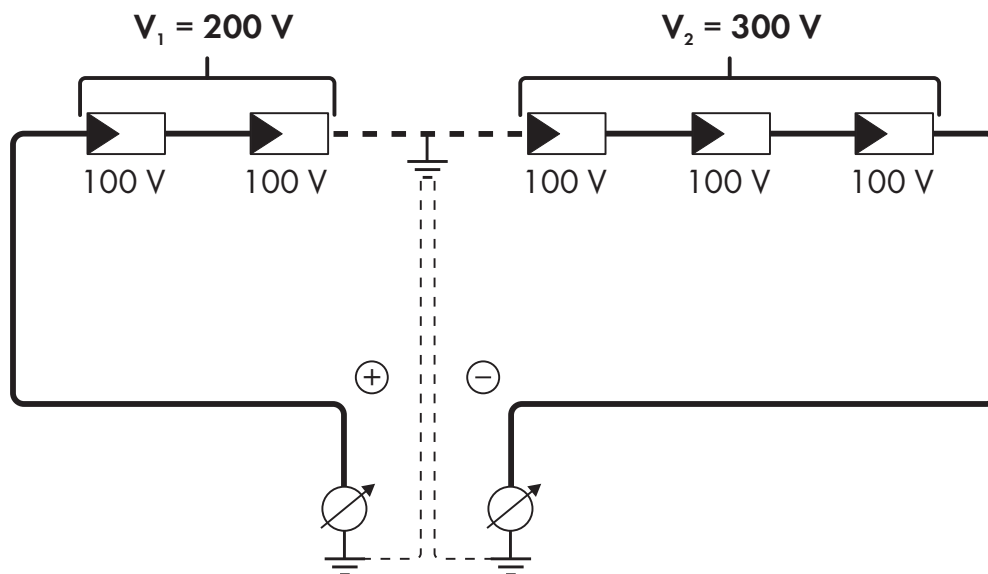
7. If a definite ground fault cannot be measured and the message is still displayed, measure the insulation resistance

8. Reconnect the strings without ground faults to the inverter and recommission the inverter (see inverter installation inverter).



Location of the ground fault

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



1.76 Check the PV system via insulation resistance measurement for ground faults

⚠ QUALIFIED PERSON

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

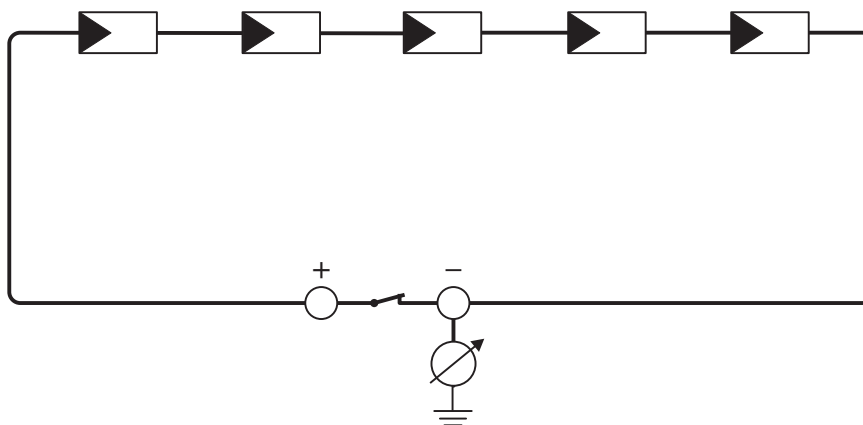


Figure 23: Schematic diagram of the measurement

Required devices:

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

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

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

Procedure:

1. Calculate the expected insulation resistance per string.

- 2.

⚠ DANGER

Danger to life due to high voltages

- Disconnect the inverter from all voltage sources.

3. Install the short circuit device.
4. Connect the measuring device for insulation resistance.
5. Short-circuit the first string.
6. Set the test voltage. The test voltage should be as close as possible to the maximum system voltage of the PV modules but must not exceed it (see datasheet of the PV modules).
7. Measure the insulation resistance.
8. Eliminate the short circuit.
9. Measure the remaining strings in the same manner.
 - ☒ If the insulation resistance of a string deviates considerably from the theoretically calculated value, there is a ground fault present in that string.
10. Reconnect to the inverter only those strings from which the ground fault has been eliminated.
11. Reconnect all other strings to the inverter.
12. Recommission the inverter.
13. If the inverter still displays an insulation error, contact the Service. The PV modules might not be suitable for the inverter in the present quantity.

Also see:

- [Calculating the insulation resistance](#) ⇒ page 159

1.77 Calculating the insulation resistance

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

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

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

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

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

1.78 Problems with streaming services

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

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

1.79 Disconnecting the Terminals from the Inverter

⚠ QUALIFIED PERSON

To decommission the inverter completely upon completion of its service life, proceed as described in this Section. If the inverter is defective and you have received a replacement device, observe the information on (see Section 15, page 168).

Procedure:

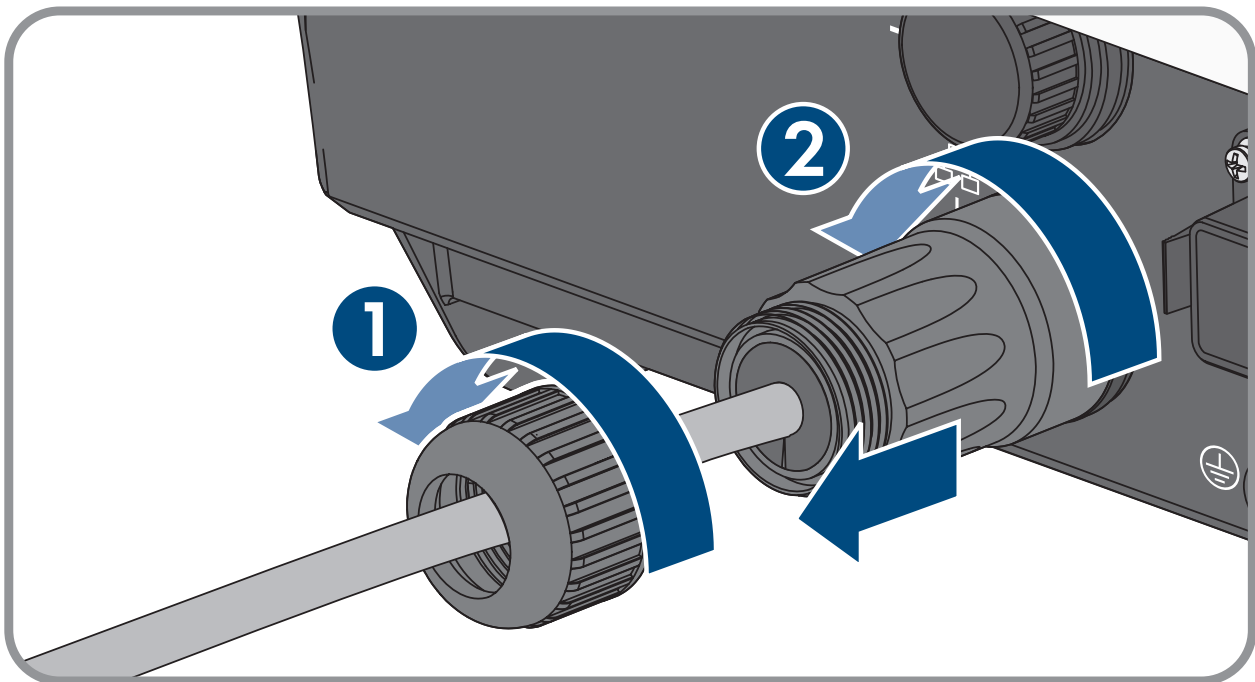
1. Disconnect the inverter from all voltage sources (see Section 10, page 97).

2. **⚠ CAUTION**

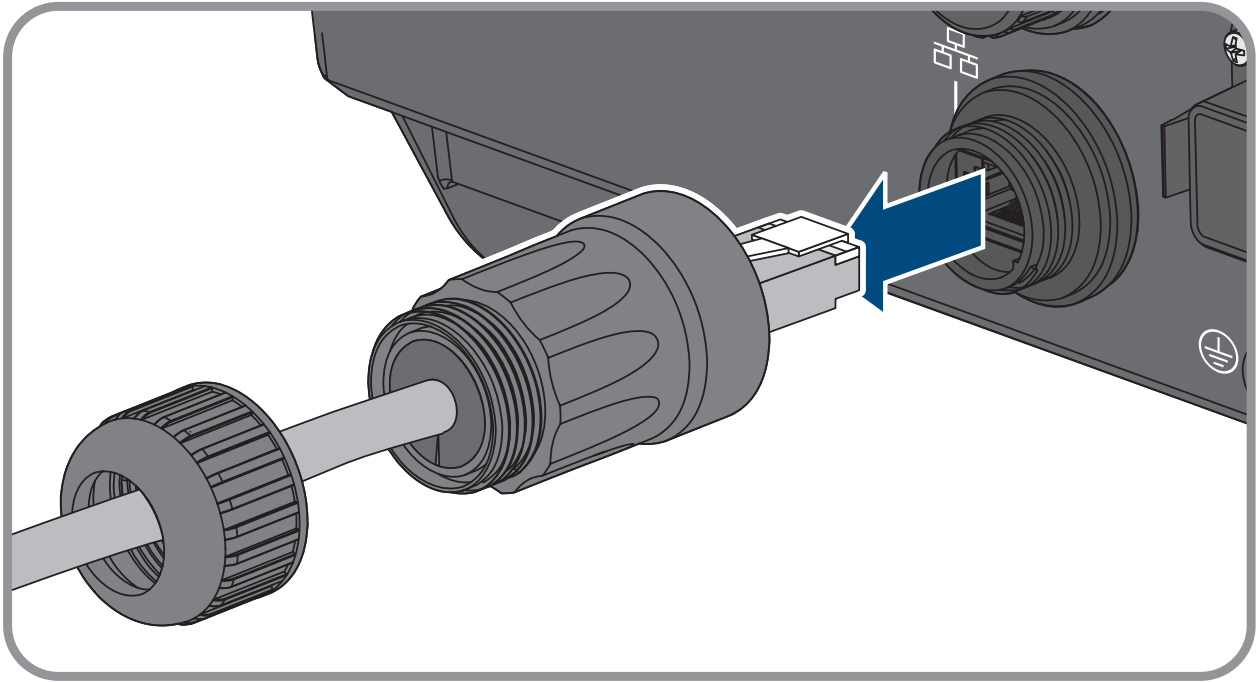
Risk of burns due to hot enclosure parts

- Wait 30 minutes for the enclosure to cool down.

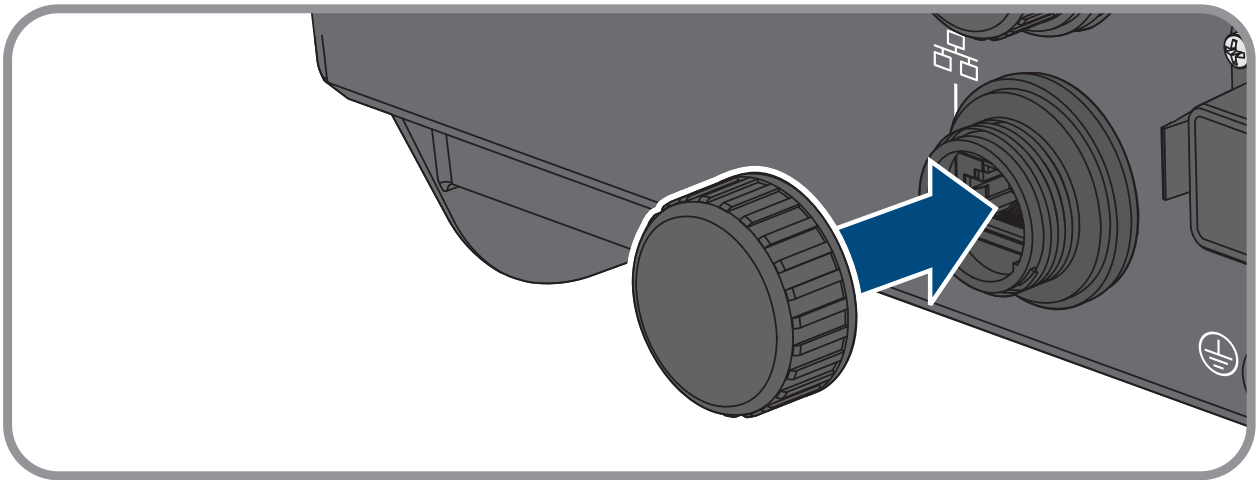
3. Unscrew the swivel nut from the threaded sleeve for the network cable.



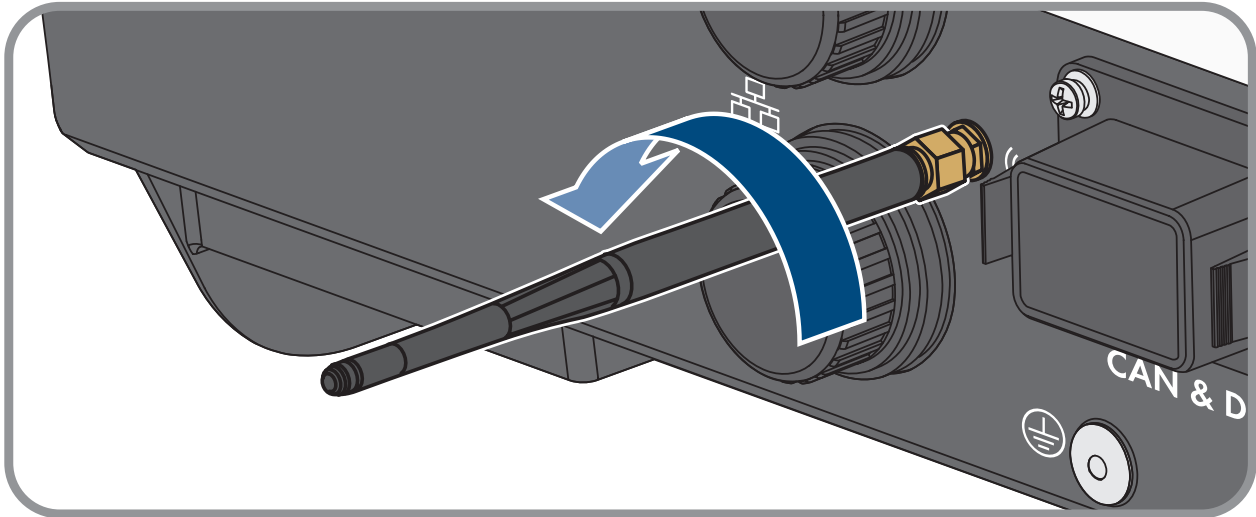
4. Unscrew and remove the threaded sleeve from the network port thread on the inverter.



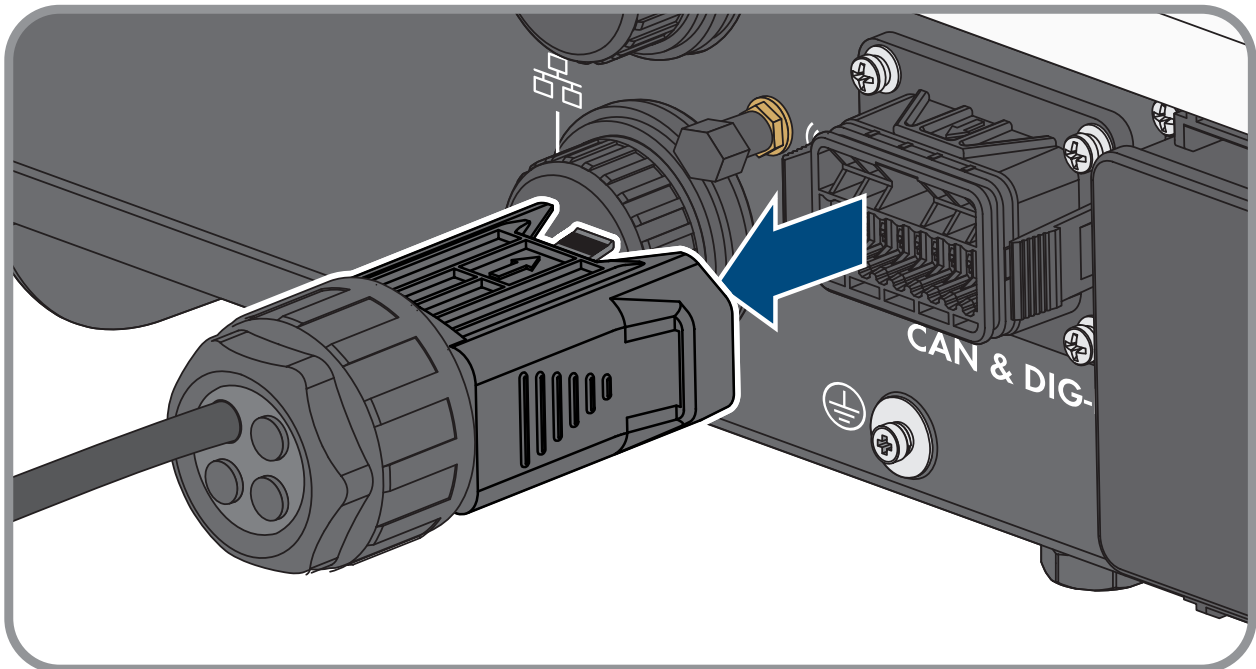
5. Release the network cable plug and pull it out of the jack on the inverter.
6. Take the cable support sleeve out of the threaded sleeve and remove the network cable from the cable support sleeve.
7. Lead the network cable out of the threaded sleeve and the swivel nut.



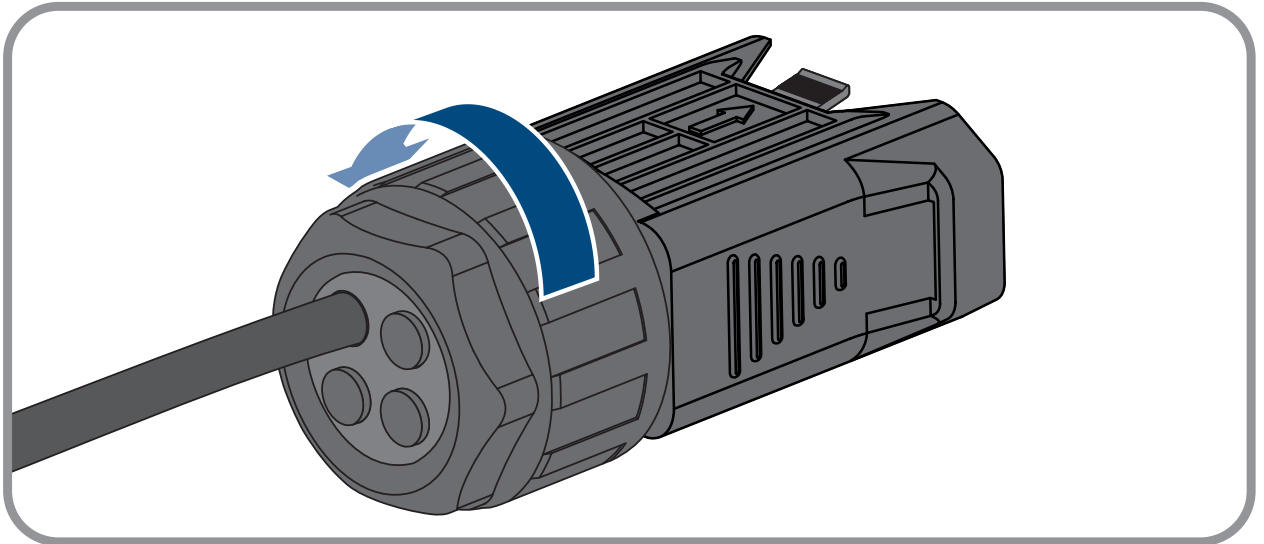
8. Put the protective cap on the network port.



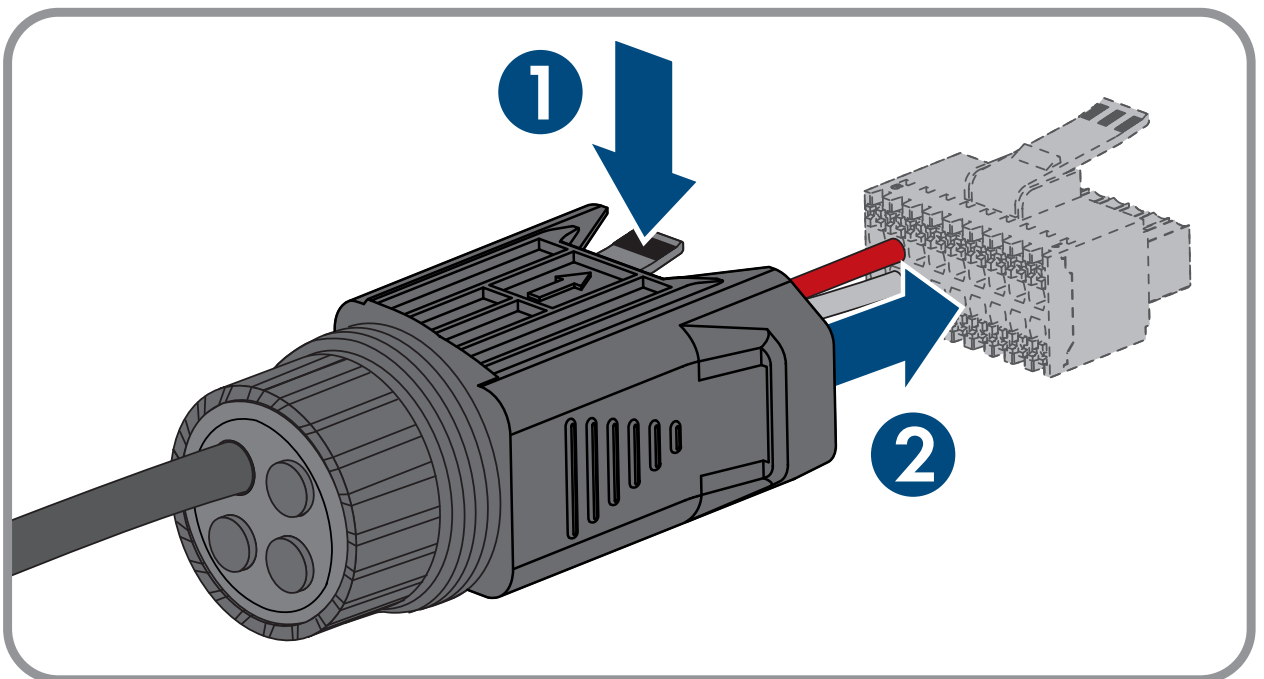
9. Unscrew and remove the antenna.
10. If there is a protective cap available, plug the protective cap onto the jack for connecting the antenna.



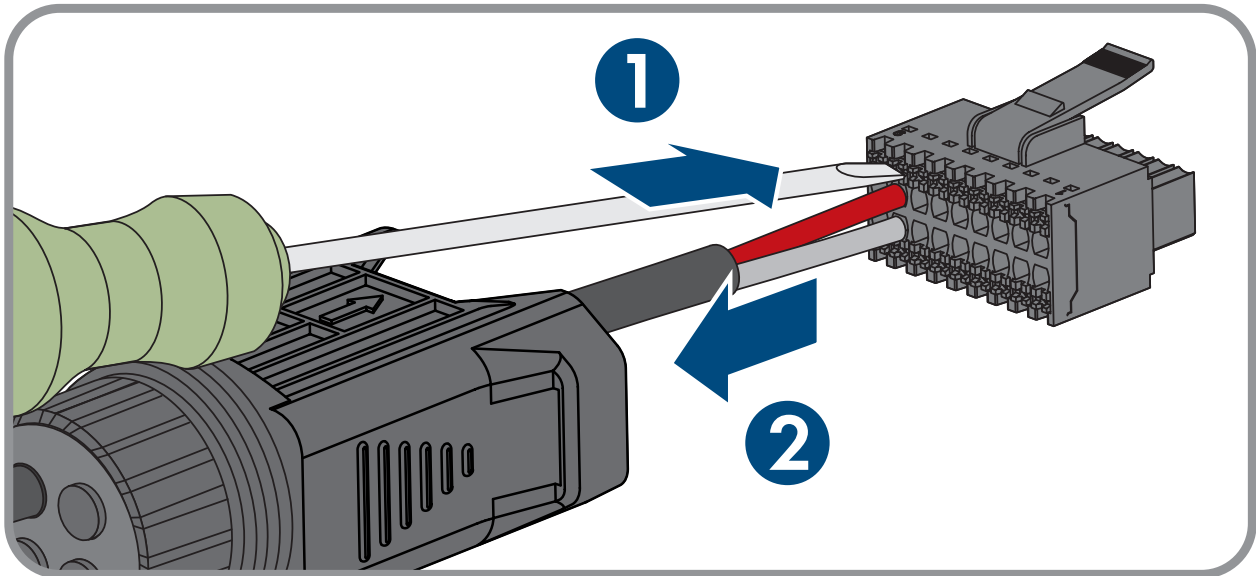
11. Remove connector from COM socket.



12. Remove the swivel nut from the threaded sleeve.

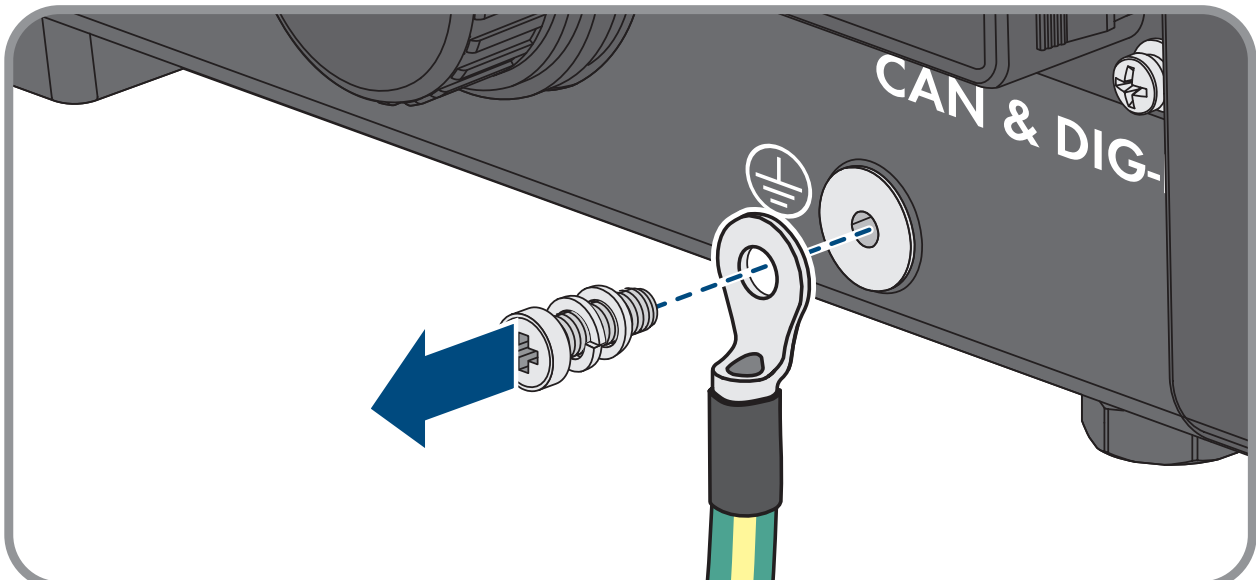


13. Remove the terminal from the threaded sleeve.



14. Remove all conductors from the terminal points using a screwdriver (blade width: 2.5 mm).

15. Put the protective cap on the socket.



16. Remove the AC grounding conductor and, if present, the grounding cable of the PV array frame. For this purpose, unscrew the pan head screw M5x12 (PH2) at each connection point and remove the grounding cable.

Also see:

- [Replacing the Product with a Replacement Device](#) ⇒ page 168

1.80 Disassembling the DC Connectors

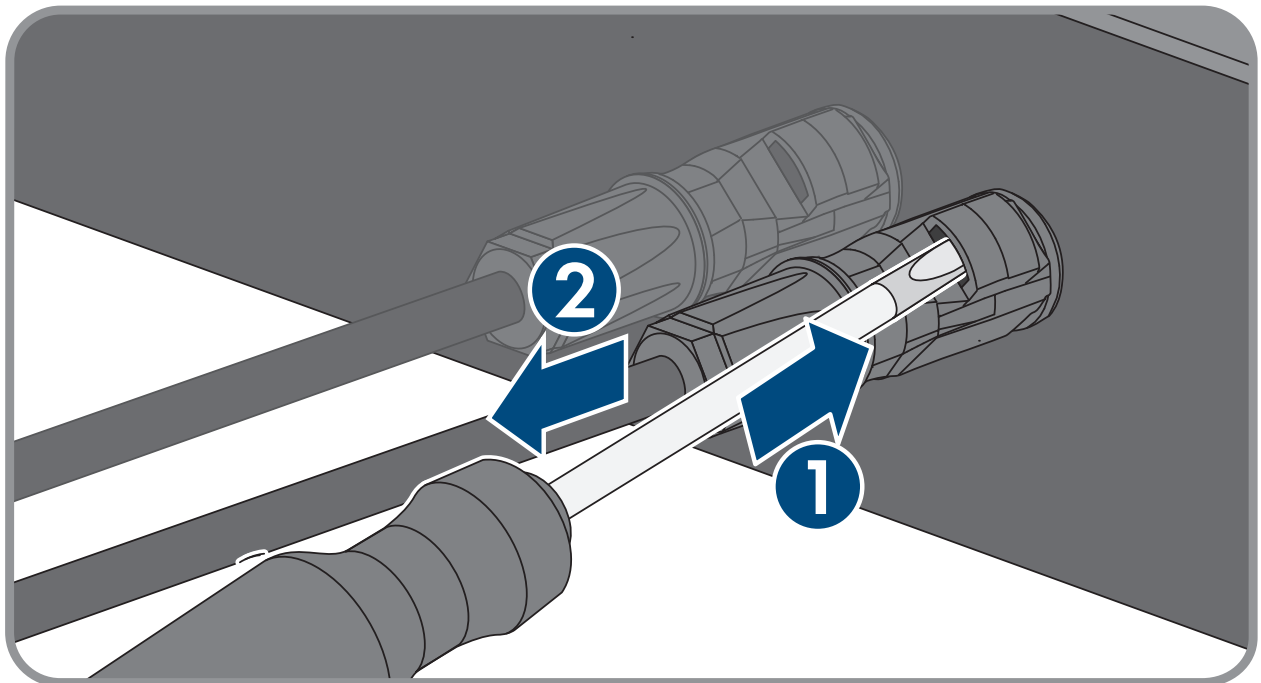
⚠ QUALIFIED PERSON

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

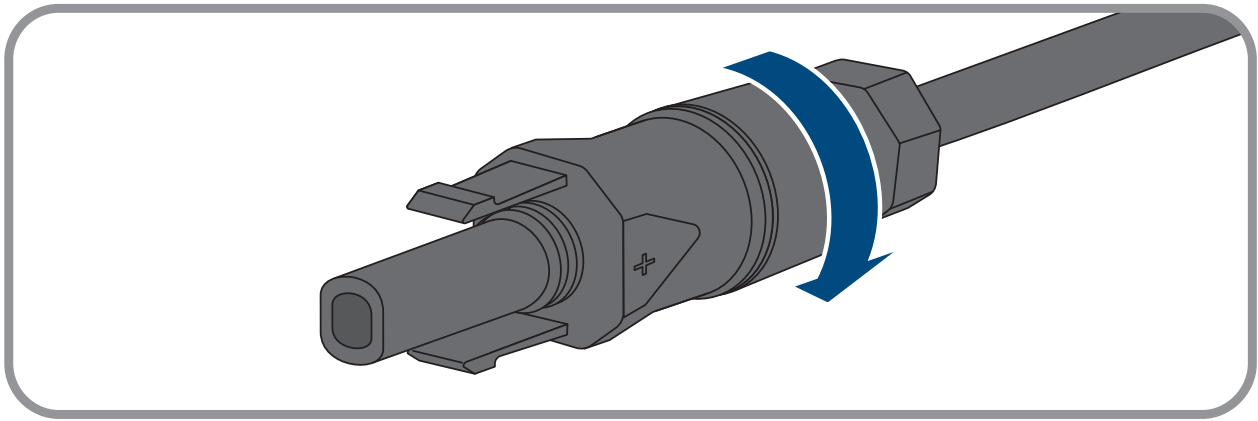
⚠ DANGER**Danger to life due to electric shock when touching exposed DC conductors or DC plug contacts if the DC connectors are damaged or loose**

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.

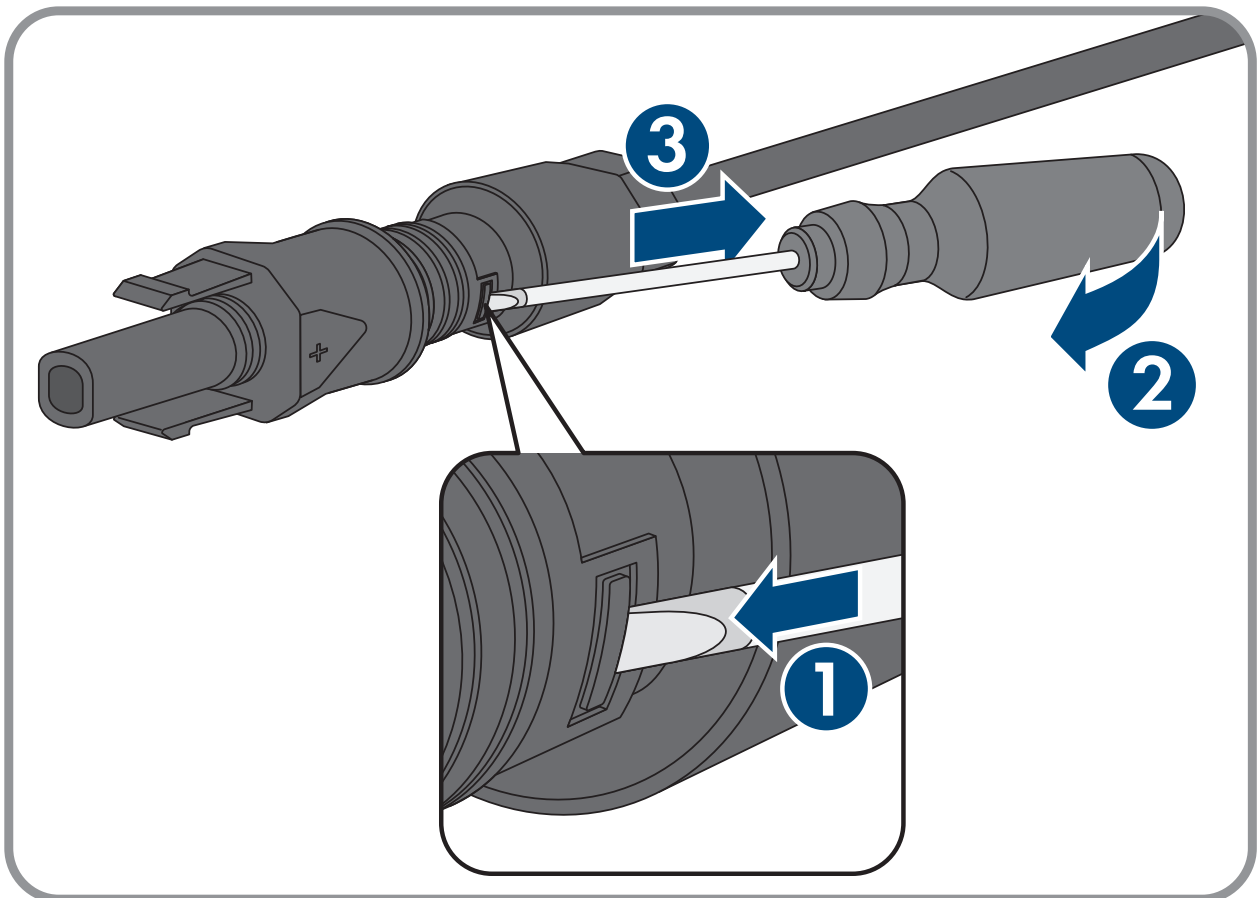
- Wear insulated gloves and use insulated tools when working on the DC connectors.
- Ensure that the DC connectors are in perfect condition and that none of the DC conductors or DC plug contacts are exposed.
- Carefully release and remove the DC connectors as described in the following.

Procedure:

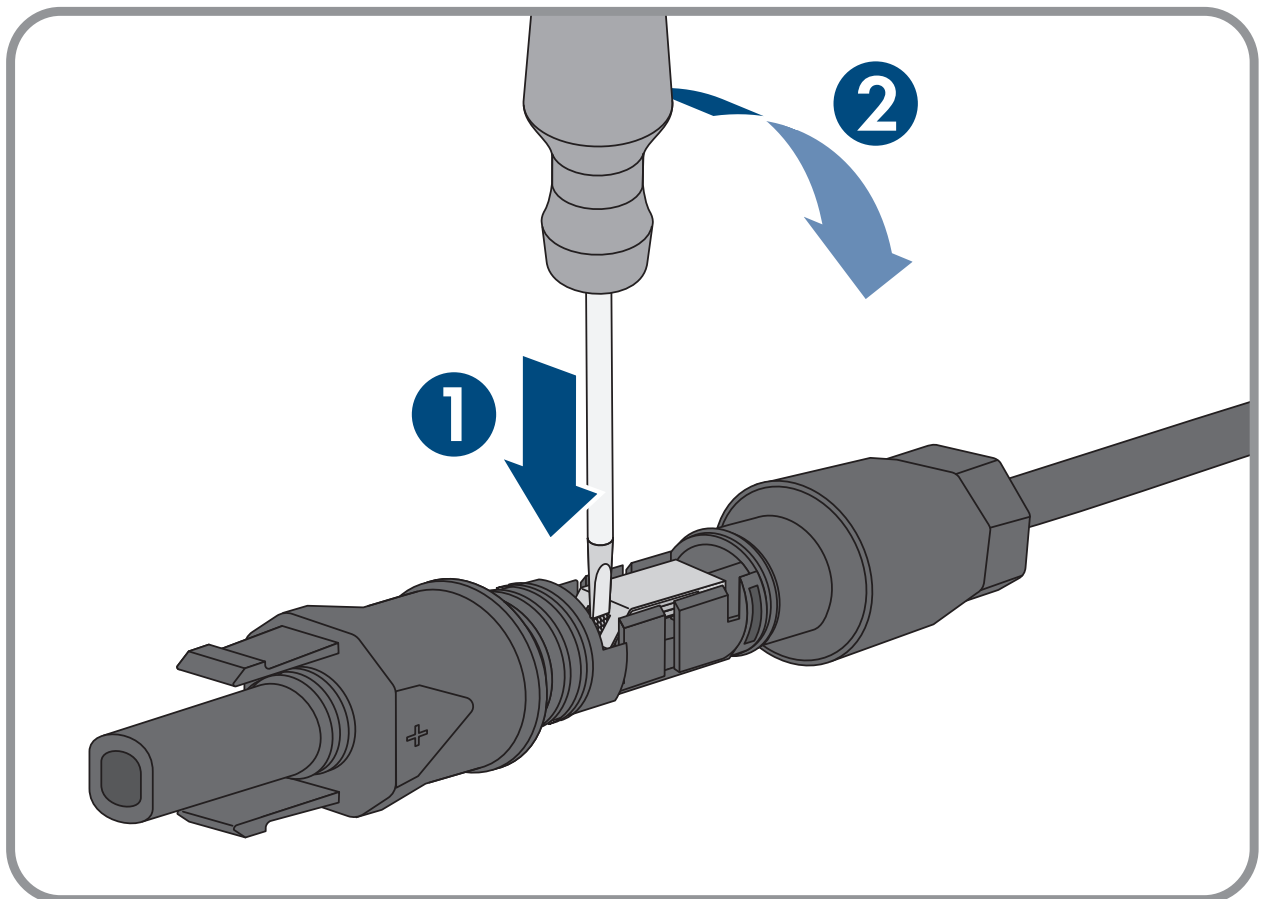
1. Release and remove the DC connectors. To do so, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors out. When doing so, do not lever the DC connectors out, but insert the tool into one of the side slots only to release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

1.81 Disassembling the Inverter

⚠ QUALIFIED PERSON

To decommission the inverter completely upon completion of its service life, proceed as described in this Section. If the inverter is defective and you have received a replacement device, observe the information on (see Section 15, page 168)

⚠ CAUTION

Risk of injury due to weight of product

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

- Transport and lift the product carefully. Take the weight of the product into account.
- Always have two persons mount and disassemble the product.
- Wear suitable personal protective equipment for all work on the product.

Procedure:

1. Unscrew the left- and right-hand pan head screws M4x14 used to secure the inverter to the wall mounting bracket (PH2).
2. If the protective cover for the connection area is still in place, reattach the protective cover to the inverter. Otherwise, protect the connection area with another sturdy cover.
3. Remove the inverter by lifting it vertically up and off the wall mounting bracket. Remove the wall mounting bracket.

4. Unscrew the screws for fastening the wall mounting bracket and remove the wall mounting bracket. Ship or store the inverter.
5. If the inverter is to be stored or shipped, pack the inverter, the AC connectors, the DC connectors, the antenna, the RJ45 protective sleeve, the battery connection cables, the connector for connecting the battery communication and the digital inputs and outputs, and the wall bracket. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter. Dispose of the inverter.
6. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste (see Section 16, page 169).

Also see:

- [Disconnecting the Inverter from Voltage Sources ⇒ page 97](#)

QUALIFIED PERSON

When a connected battery is replaced by a new battery or more modules are added to the battery, the battery configuration must be performed.

Procedure:

1. Disconnect the inverter from all voltage sources (see Section 10, page 97).
2. Connect new battery (see (see Section 7.9, page 66) and (see Section 7.8.3, page 62)).
3. Recommission the inverter (see Section 8.3, page 74).
4. Open the user interface (see Section 9.1, page 78).
5. Log in as **Installer**.
6. Start the installation assistant (see Section 9.9, page 86).
7. Click on **[Save and next]** for each step up to the step **Battery configuration**.
 - ☒ The new battery has been automatically detected and is already configured.
8. Select **Save and next** until the Summary is displayed.
9. Check the configuration in the summary.
10. Select **Next**.
 - ☒ The battery configuration is being updated. The new battery is captured.

QUALIFIED PERSON

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

Procedure:

1. Decommission the defective product (see Section 13.3, page 167).
2. Mount the replacement device (see Section 6, page 30) and make the electrical connections (see Section 7, page 35).
3. Commission the replacement device (see Section 8, page 73).
4. Establish a connection to the user interface of the inverter (see Section 9.1, page 78).
5. Configure the country data set (see Section 9.17, page 89).
6. If the defective product was registered in a System Manager, replace it with the new product in the System Manager (see manual for System Manager).
7. Pack the defective product in the packaging of the replacement device and arrange with SMA Solar Technology AG for it to be picked up.

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



1.82 General Data

Width x height x depth	500 mm x 598 mm x 173 mm
Weight	30 kg
Length x width x height of the packaging	595 mm x 795 mm x 250 mm
Weight including packaging	37 kg
Climatic category in accordance with IEC 60721-3-4	4K26
Environmental category	Outdoors
Pollution degree outside the inverter	3
Pollution degree inside the inverter	2
Operating temperature range	-25°C to +60°C
Max. permissible value for relative humidity (condensing)	100%
Maximum operating altitude above MSL	3000 m
Noise emission, typical	30 dB(A)
Self-consumption (at night)	44 W
Power control	Communication via Modbus interface
Topology	Transformerless (Non-isolated)
Cooling method	Convection
Degree of protection in accordance with IEC 60529 with mounted Wi-Fi antenna	IP65
Protection class in accordance with IEC 62103	I
Radio technology	WLAN 802.11 b/g/n
Radio spectrum	2.4 GHz
Maximum transmission power	100 mW
Wi-Fi range in free-field conditions	100 m
Quantity maximum detectable Wi-Fi networks	32

1.83 AC grid connection

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Rated power at 230 V, 50 Hz	5000 W	6000 W	8000 W	10000 W
Maximum apparent power at $\cos \varphi = 1$	5000 VA	6000 VA	8000 VA	10000 VA
Rated apparent power at $\cos \varphi = 1$	5000 VA	6000 VA	8000 VA	10000 VA
Nominal grid voltage	3/N/grounding conductor; 220 V / 380 V	3/N/grounding conductor; 220 V / 380 V	3/N/grounding conductor; 220 V / 380 V	3/N/grounding conductor; 220 V / 380 V
	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V
	3/N/grounding conductor; 240 V / 415 V	3/N/grounding conductor; 240 V / 415 V	3/N/grounding conductor; 240 V / 415 V	3/N/grounding conductor; 240 V / 415 V
Rated grid voltage	230 V	230 V	230 V	230 V
Voltage range	156 V to 277 V	156 V to 277 V	156 V to 277 V	156 V to 277 V
Rated current at 230 V	3 x 7.3 A	3 x 8.7 A	3 x 11.6 A	3 x 14.5 A
Maximum output current	3 x 7.6 A	3 x 9.1 A	3 x 12.1 A	3 x 15.2 A
Maximum input power for backup loads in parallel grid operation	13800 W	13800 W	13800 W	13800 W
Maximum input current for backup loads in parallel grid operation	3 x 20 A	3 x 20 A	3 x 20 A	3 x 20 A
Rated grid frequency	50 Hz	50 Hz	50 Hz	50 Hz
Operating range at grid frequency 50 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz
Power factor at rated power	1	1	1	1
Displacement power factor $\cos \varphi$, adjustable	0.8 overexcited to 0.8 underexcited	0.8 overexcited to 0.8 underexcited	0.8 overexcited to 0.8 underexcited	0.8 overexcited to 0.8 underexcited
Feed-in phases	3	3	3	3
Connection phases	3	3	3	3

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Grid configurations	TN-C, TN-S, TN-C-S, TT (if $U_{N_PE} < 20 \text{ V}$)	TN-C, TN-S, TN-C-S, TT (if $U_{N_PE} < 20 \text{ V}$)	TN-C, TN-S, TN-C-S, TT (if $U_{N_PE} < 20 \text{ V}$)	TN-C, TN-S, TN-C-S, TT (if $U_{N_PE} < 20 \text{ V}$)
Overvoltage category as per IEC 60664-1	III	III	III	III

1.84 DC input of PV

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Maximum power of PV array	7500 W _p	9,000 W _p	12,000 W _p	15000 W _p
Maximum usable input power at Input A	4500 W	5400 W	7200 W	6000 W
Maximum usable input power at Input B	4500 W	5400 W	7200 W	12000 W
Maximum input voltage	1000 V	1000 V	1000 V	1000 V
MPP voltage range	210 V to 800 V	250 V to 800 V	330 V to 800 V	280 V to 800 V
Rated input voltage	600 V	600 V	600 V	600 V
Minimum input voltage	150 V	150 V	150 V	150 V
Initial input voltage	180 V	180 V	180 V	180 V
Maximum usable input current at Input A	12.5 A	12.5 A	12.5 A	12.5 A
Maximum usable input current at Input B	12.5 A	12.5 A	12.5 A	25 A
Maximum short-circuit current / Input A	20 A	20 A	20 A	20 A
Maximum short-circuit current / Input B	20 A	20 A	20 A	40 A
Number of independent MPP inputs	2	2	2	2
Strings per MPP input	A:1, B:1	A:1, B:1	A:1, B:1	A:1, B:2
Overvoltage category as per IEC 62109-1	II	II	II	II

1.85 DC output of battery

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Maximum DC voltage	600 V	600 V	600 V	600 V
Voltage range	150 V to 600 V	150 V to 600 V	150 V to 600 V	150 V to 600 V
Rated DC voltage	600 V	600 V	600 V	600 V
Maximum charging current	30 A	30 A	30 A	30 A
Maximum discharging current	30 A	30 A	30 A	30 A
Maximum charging power	7500 W	9000 W	10600 W	10600 W
Maximum discharge power	6000 W	7200 W	10600 W	10600 W
Number of connectable batteries	1	1	1	1
Battery type ¹⁾	Li-ion	Li-ion	Li-ion	Li-ion
Overvoltage category as per IEC 60664-1	II	II	II	II

1.86 DC connection during battery-backup operation

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Maximum DC voltage	600 V	600 V	600 V	600 V
Voltage range	150 V to 600 V	150 V to 600 V	150 V to 600 V	150 V to 600 V
Rated DC voltage	600 V	600 V	600 V	600 V
Maximum charging current	30 A	30 A	30 A	30 A
Maximum discharging current	30 A	30 A	30 A	30 A
Maximum charging power	7500 W	9000 W	10600 W	10600 W
Maximum discharge power	6000 W	7200 W	10600 W	10600 W
Number of connectable batteries	1	1	1	1

¹⁾ Warning! Danger of fire due to use of non-approved batteries. Only use batteries approved by SMA Solar Technology AG (technical information with list of approved batteries at www.SMA-Solar.com).

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Battery type ²⁾	Li-ion	Li-ion	Li-ion	Li-ion
Overvoltage category as per IEC 60664-1	II	II	II	II

1.87 AC backup connection during battery-backup operation

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Rated power at 230 V, 50 Hz	5000 W	6000 W	8000 W	10000 W
Maximum apparent AC power	5000 VA	6000 VA	8000 VA	10000 VA
Output power < 5 min	6000 W	7200 W	12000 W	12000 W
Output apparent power < 5 min	6000 VA	7200 VA	12000 VA	12000 VA
Output power < 10 s	10000 W	10000 W	12000 W	12000 W
Output apparent power < 10 s	10000 VA	10000 VA	12000 VA	12000 VA
Nominal AC voltage	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V	3/N/grounding conductor; 230 V / 400 V
AC grid frequency	50 Hz	50 Hz	50 Hz	50 Hz
Switching time to battery-backup operation ³⁾	< 50 ms	< 50 ms	< 50 ms	< 50 ms
Grid configuration	TN-S	TN-S	TN-S	TN-S

1.88 Protective Devices

DC reverse polarity protection at PV input	Available
AC short-circuit current capability	Available
Ground fault monitoring	Available
Grid monitoring	Available
Maximal output overcurrent protection	32 A
All-pole sensitive residual-current monitoring unit	Available

²⁾ Warning! Danger of fire due to use of non-approved batteries. Only use batteries approved by SMA Solar Technology AG (technical information with list of approved batteries at www.SMA-Solar.com).

³⁾ Depending on the configured country data set

Overvoltage protection	DC Type II / AC Type II
Active islanding detection	Frequency shift

1.89 Climatic Conditions

Installation in accordance with IEC 60721-3-4, Class 4K26

Extended temperature range	-25 °C to +60 °C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

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

Extended temperature range	-25 °C to +70 °C
Storage temperature	-40 °C to +60 °C

1.90 Equipment

DC terminal for PV	SUNCLIX
DC connection for battery	MC4
AC terminal	AC connector
Battery communication	CAN bus
Speedwire interface	As standard
Webconnect function	As standard
Wi-Fi interface	As standard

1.91 Torques

Screw M5x12 for securing the inverter to the wall mounting bracket	2.5 Nm
Screw for additional grounding	1.5 Nm
Attaching the fuse terminal blocks to the AC connectors	0.5 Nm
Attaching the Wi-Fi antenna in a fixed position	1 Nm
Swivel nut of the DC connector	2 Nm

1.92 Data storage capacity

Daily yields	30 years
Event messages for users	1000 events
Event messages for installers	1000 events

1.93 Multifunction relay

Maximum AC switching voltage	30 V
------------------------------	------

Maximum DC switching voltage	30 V
Maximum AC switching current	1.0 A
Maximum DC switching current	1.0 A
Minimum load	0.1 W
Minimum electrical endurance when the maximum switching voltage and maximum switching current are complied with ⁴⁾	100000 switching cycles

1.94 Efficiency (PV to AC side)

	STP5.0-3SE-40	STP6.0-3SE-40	STP8.0-3SE-40	STP10.0-3SE-40
Maximum efficiency, $\eta_{\max}$	98.2%	98.2%	98.2%	98.1%
European weighted efficiency, η_{EU}	97.3%	97.5%	97.8%	97.5%

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

- Device type
- Serial number
- Firmware version
- Device configuration (System Manager or subordinate device)
- Special country-specific settings (if available)
- Event message
- Installation site and mounting height
- Type and number of PV modules
- Optional equipment (e.g. accessories used)
- Use the name of the system in Sunny Portal (if available)
- Access data for Sunny Portal (if available)
- Information on the ripple control receiver (if available)
- Operating mode of the multifunction relay (if used)
- Detailed description of the problem

⁴⁾ Corresponds to 20 years at 12 switching operations per day

You can find your country's contact information at:



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

within the scope of the EU directives



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

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

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

according to the regulations of England, Wales and Scotland



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

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

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

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ENERGY
THAT
CHANGES



www.SMA-Solar.com

