Operating manual



SUNNY TRIPOWER X 60

STP 50-80 / STP 60-80

ENGLISH

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1 Information on this Document

1.1 Validity

This document is valid for:

- STP 50-80
- STP 60-80

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
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, regulations, standards, and directives
- Knowledge of and compliance with this document and all safety information

1.3 Content and Structure of this Document

This document describes the mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning 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
⚠ QUALIFIED PERSON	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 X 60	Sunny Tripower, inverter, product

1.8 Additional Information

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

Title and information content	Type of information
"Operation of the user interface of products powered by ennexOS"	User Manual
"PUBLIC CYBER SECURITY - Guidelines for a Secure PV System Communication"	Technical Information
"Efficiency and Derating" Efficiency and derating behavior of the SMA inverters	Technical Information
"Short-Circuit Currents"	Technical Information
"Arc-fault circuit interrupter"	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 ®-interface - ennexOS" Information on the SMA Modbus interface	Technical Information
"SunSpec Modbus ®-interface - ennexOS" Information about the SunSpec Modbus interface and supported information models	Technical Information
Answers to frequently asked questions	FAQ on product page

2 Safety

2.1 Intended Use

The Sunny Tripower is a transformerless PV inverter with 5 MPP trackers that converts the direct current of the PV modules to grid-compliant three-phase current and feeds it into the utility grid.

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

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

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

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

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

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

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

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

The type label must remain permanently attached to the product.

PV modules with a high capacity to ground must only be used if the coupling capacity of all PV modules does not exceed 6 µF.

2.2 IMPORTANT SAFETY INFORMATION

Keep the manual for future reference.

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

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

⚠ DANGER

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

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

- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.
- Only touch the cables of the PV modules on their insulation.
- Do not touch any parts of the substructure or frame of the PV array.
- Do not connect PV strings with ground faults to the inverter.

⚠ DANGER

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

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

- Ensure that all devices in the same network are integrated in the existing overvoltage protection.
- When laying the network cable outdoors, ensure that there is suitable surge protection at the network cable transition from the product outdoors to the network inside the building.
- The Ethernet interface of the product is classified as "TNV-1" and offers protection against overvoltages of up to 1.5 kV.

⚠ WARNING

Danger to life due to fire and deflagration

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

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

⚠ WARNING

Risk of injury due to toxic substances, gases and dusts

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

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

⚠ WARNING

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

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

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

⚠ CAUTION

Risk of burns due to hot enclosure parts

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

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

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.

Communication disturbances in the local network

The IP address range 192.168.12.0 to 192.168.12.255 is reserved for internal communication and direct access between SMA products and cannot be used for system communication within the local network.

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.

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

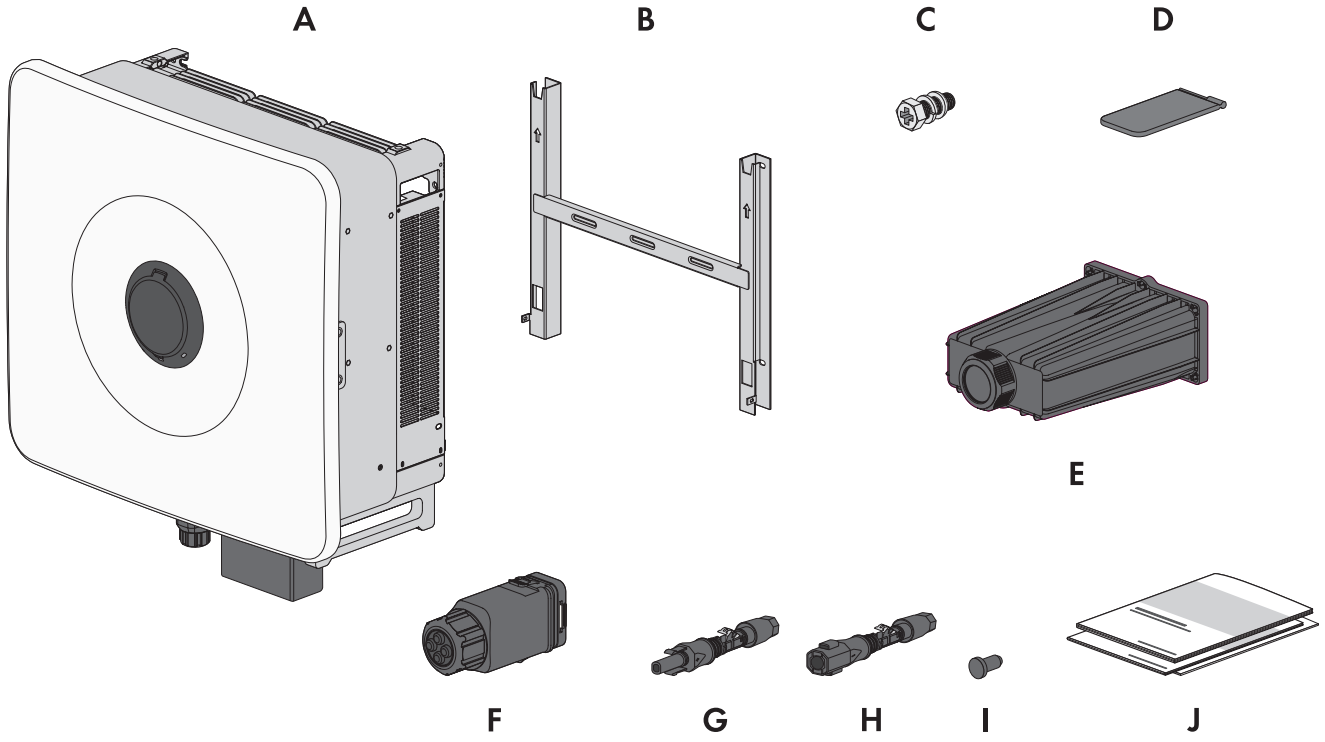
A country data set must be set (e.g. via the product commissioning wizard or a System Manager) in order for the inverter to start feed-in operation during commissioning.

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.

3 Scope of Delivery

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



Position	Quantity	Designation
A	1	Inverter
B	1	Mounting bracket
C	2	Flanged hex head screw (M8x60) for attaching to the mounting bracket
D	4	Protection against contact for cables
E	1	Cover of the AC connection area
F	1	Cable gland with assembly for connection to the communication
G	10	Positive DC connector
H	10	Negative DC connector

Position	Quantity	Designation
I	20	Sealing plug for DC connectors
J	1	Documentation package consists of: • Safety information booklet • Quick reference guide poster with illustrated instructions for initial installation and commissioning • Supplementary sheet with password 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 – Wi-Fi password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the product via Wi-Fi – Device Key (DEV KEY) for resetting the administrator password

4 Product overview

4.1 Device function

It is possible to use and configure the inverter either as a system manager or as a subordinate device.

When using an inverter as a System Manager, ensure that the system size does not exceed 135 kVA and that a maximum of up to 5 additional devices (e.g., 3 inverters, 1 charging station and 1 energy meter) can be integrated into the system.

You can set the device function using the commissioning wizard.

Inverter as System Manager

If you configure the inverter as System Manager, the inverter as a main device in conjunction with an energy meter takes over the control at the point of interconnection and can receive control signals. The inverter can control other subordinate devices, takes over the monitoring of the system and the communication to the Sunny Portal powered by ennexOS.

Subordinate device

If you configure the inverter as a subordinate device, it does not take over control. The subordinate inverter receives specifications from the System Manager (e.g. an SMA Data Manager) and implements them. Before a subordinate device can be recorded in a System Manager, you must commission all subordinate devices.

4.2 Product Description

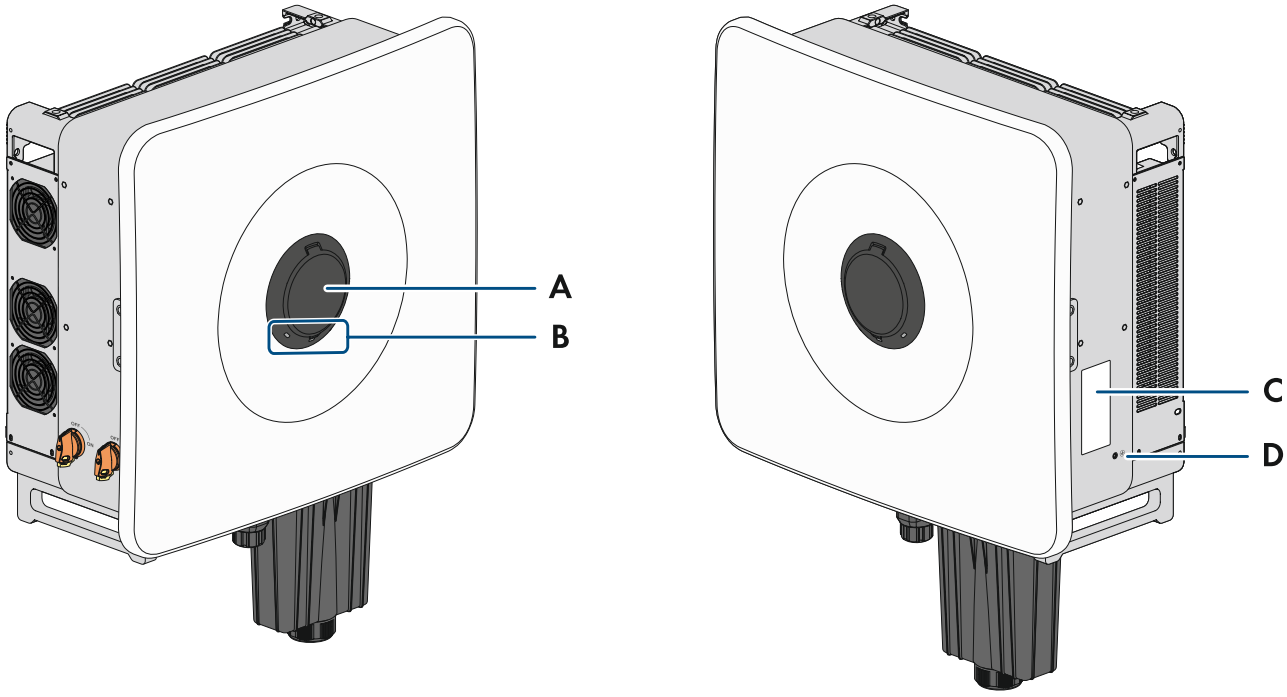


Figure 1: Design of the product

Position	Designation
A	SMA Easy Lock enclosure lock
B	LEDs The LEDs indicate the operating state of the product.

Position	Designation
C	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 • Device specific characteristics
D	External ground connection

4.3 Symbols on the Product

Symbol	Explanation
	Data transmission Together with the blue LED, this symbol indicates the status of the network connection.
	Three-phase alternating current with neutral conductor
	Direct current
	DC load-break switch
	The product has no galvanic isolation.
	The product is suitable for outdoor installation.
IP65	Degree of protection IP65 The product is protected against the penetration of dust and water that is directed as a jet against the enclosure from all directions.
	CE marking The product complies with the requirements of the applicable EU directives.
	RCM (Regulatory Compliance Mark) The product complies with the requirements of the applicable Australian standards.

4.4 System overview

4.4.1 Sunny Tripower as System Manager

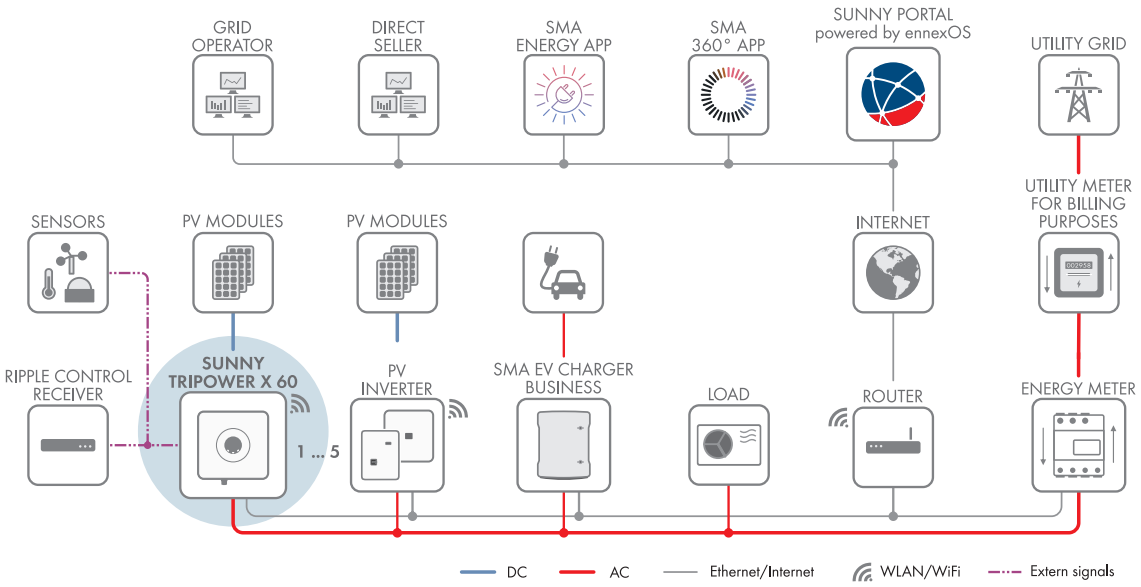


Figure 2: System with Sunny Tripower X as system manager and one energy meter

4.4.2 Sunny Tripower with SMA Data Manager as System Manager

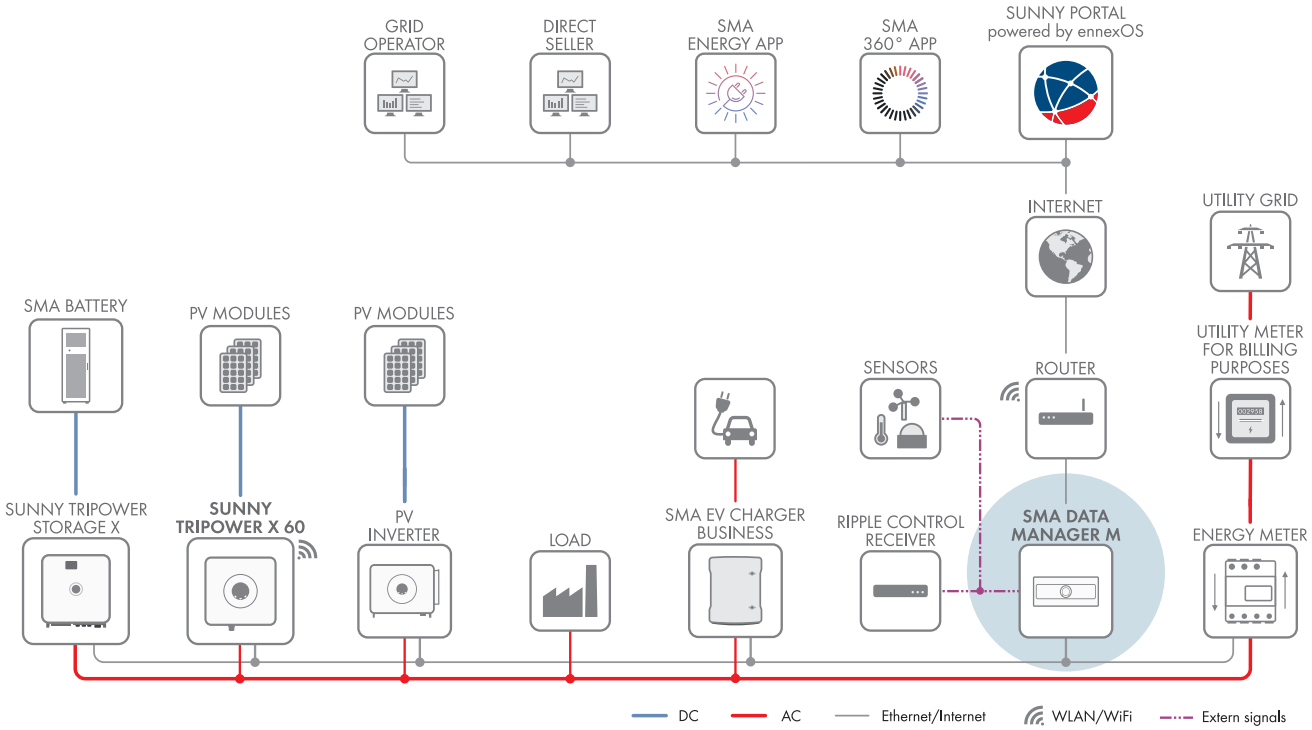


Figure 3: System with Sunny Tripower X and SMA Data Manager as system manager

4.5 Interfaces and Functions

4.5.1 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.

4.5.2 Device Key (DEV KEY)

If you have forgotten the administrator password for the product, you can reset the administrator account with the device key and assign a new password. The device key can be used to prove the identity of the product in digital communication. The Device Key is provided on a sheet with a password label supplied with the product. Keep the device key safe in case you forget the administrator password.

4.5.3 Digital inputs

The product is equipped with digital inputs by default (see Section 6.2.2, page 26).

4.5.4 Modbus

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

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

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

4.5.5 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.

4.5.6 Fast stop function

The fast stop function is a digital input on the inverter via which the inverter can be disconnected from the utility grid. It can be triggered by means of an external potential-free contact (break contact).

The inverter is equipped with 2 fast-stop inputs. Due to its response time of < 100 ms, the first input **FS1** can be connected with an external monitoring unit (e.g. for grid and PV system protection), for example. The second input **FS2** can be used for additional disconnection via an external switch. The reaction time there is < 1 s.

The digital input can, for example, be used to implement the grid and PV system protection as required by VDE-AR-N-4105. The inverter is suitable for grid disconnection due to its redundant and integrated interface switch. Here, the disconnection units integrated in the inverter can replace an external interface switch. An external, certified monitoring unit with an integrated potential-free PV system protection relay and an alarm contact configured as a break contact must be connected to the inverter's fast-stop input.

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

4.5.7 SMA ArcFix

SMA ArcFix is an Arc Fault Circuit Interrupter (AFCI). With this function, the inverter effectively detects arcs on the DC side and interrupts them.

A detected electric arc causes the inverter to interrupt feed-in operation. To restart feed-in operation, the operational disruption which has occurred, must be reset through a manual restart. Alternatively, the arc-fault circuit interrupter can be activated without inhibiting operation. Depending on the country data set, arc fault detection is activated or deactivated by default. If the installation conditions permit this, you can change the default setting.

SMA ArcFix complies with the requirements of the IEC 63027 and corresponds to the following installation classes:

- F-I-AFPE-1-10-1

4.5.8 SMA Dynamic Power Control

SMA Dynamic Power Control is a pre-installed software that allows a System Manager to control the active and reactive power of up to 5 inverters (including the System Manager).

4.5.9 SMA Dynamic Power Control

SMA Dynamic Power Control is a pre-installed software that allows a System Manager to control the active and reactive power of up to 5 inverters (including the System Manager).

4.5.10 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.

4.5.11 SMA Smart Connected

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

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

4.5.12 SMA Speedwire

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

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

4.5.13 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.

4.5.14 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.

4.6 LED Signals

The LEDs indicate the operating state of the product.

LED signal	Explanation
Green LED and red LED flash simultaneously (2 s on and 2 s off)	No country data set set Operation of the product is stopped because no country data set is set. The product 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 product will start feed-in operation.
The green LED is glowing	Operation The product is in operation.
The green LED is off	No DC voltage is present.
The red LED is glowing	Error Operation of the product has been stopped. In addition, a specific event message and the associated event number are displayed on the user interface of the product or the System Manager (e.g. SMA Data Manager) (see Section 10.1, page 47).
Red LED is flashing (0.25 s on, 0.25 s off, 0.25 s on, 1.25 s off)	Warning Communication with the System Manager failed. The inverter continues to operate with restricted function (e.g., with set fallback level). In addition, a specific event message and the associated event number are displayed on the user interface of the product or the System Manager (e.g. SMA Data Manager) (see Section 10.1, page 47).
The blue LED is flashing slowly (2 s on and 2 s off)	Communication connection is being established. The product 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 System Manager is requesting identification of the product.
The blue LED is glowing	There is an active connection with a local network or there is a direct connection with a smart device (e.g., smartphone, tablet or laptop).
Blue LED is off	There is no active connection.
All 3 LEDs are on	Product update or booting procedure.

5 Mounting

5.1 Requirements for Mounting

5.1.1 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 mounting location must be suitable for the weight and dimensions of the product.
- ☐ The installation site can be exposed to direct solar irradiation. There is, however, the possibility that the product reduces its power output to avoid overheating due to high temperatures.
- ☐ 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 switches of the product must always be freely accessible.
- ☐ All ambient conditions must be met.
- ☐ The ambient temperature should be 0°C to +45°C to ensure optimal operation.

5.1.2 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.

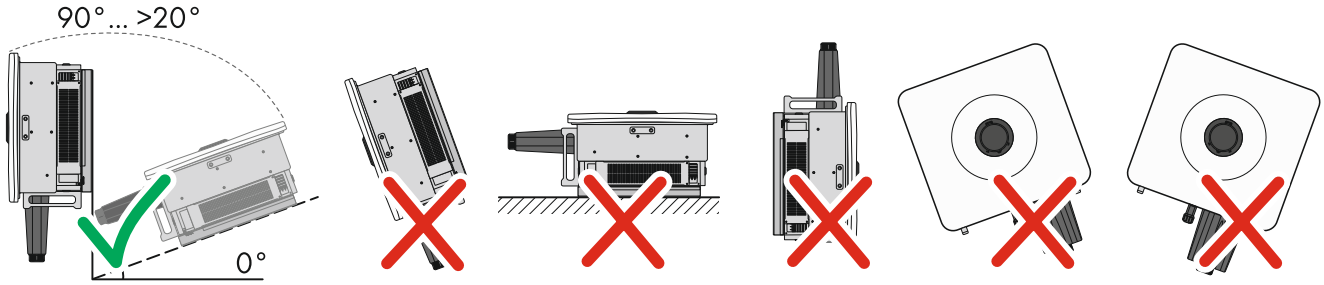


Figure 4: Permitted and prohibited mounting positions

5.1.3 Dimensions for Mounting

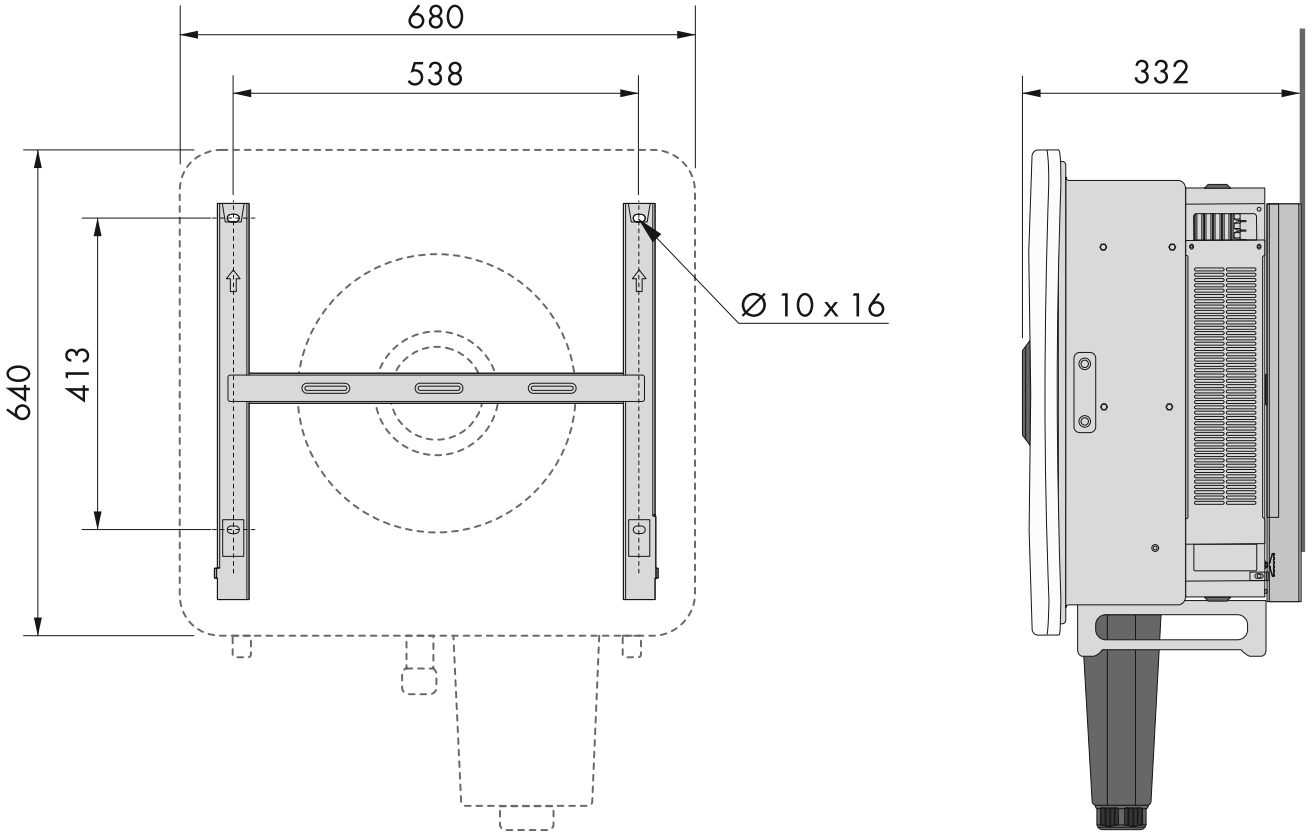
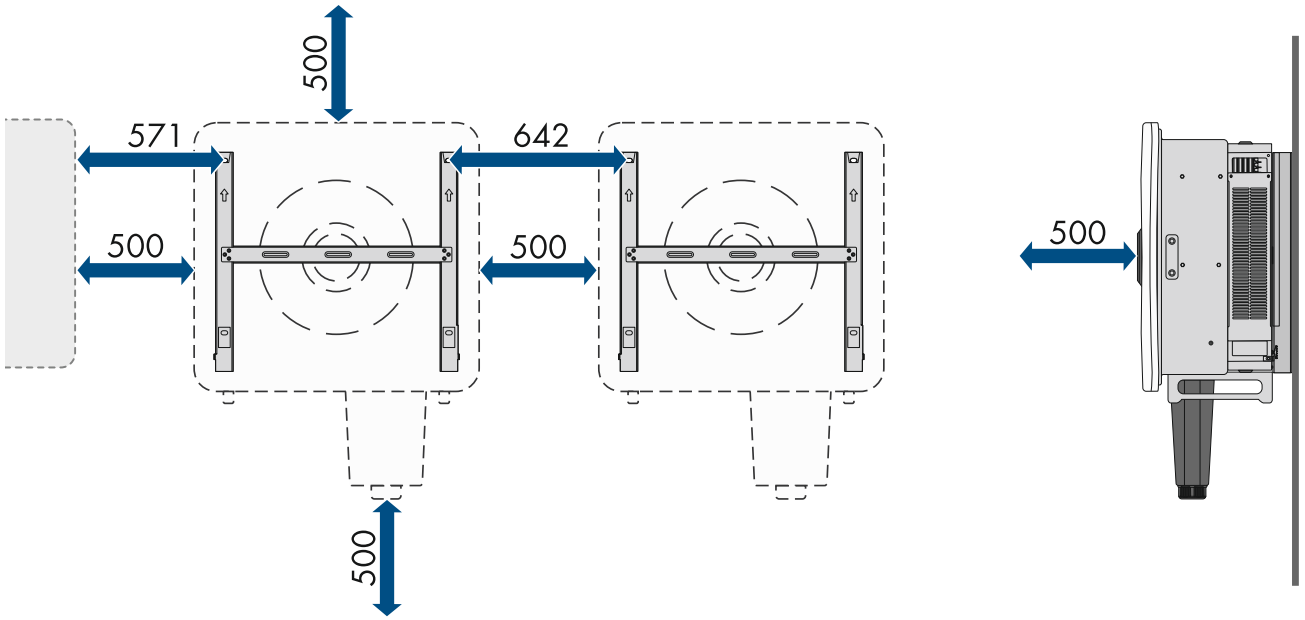


Figure 5: Position of the anchoring points (dimensions in mm)

5.1.4 Recommended clearances for mounting

☐ Recommended distances to walls, other devices and objects should be maintained.

☐ If multiple products are mounted in areas with high ambient temperatures, increase the clearances between the products and ensure sufficient fresh-air supply.



5.2 Mounting the Inverter

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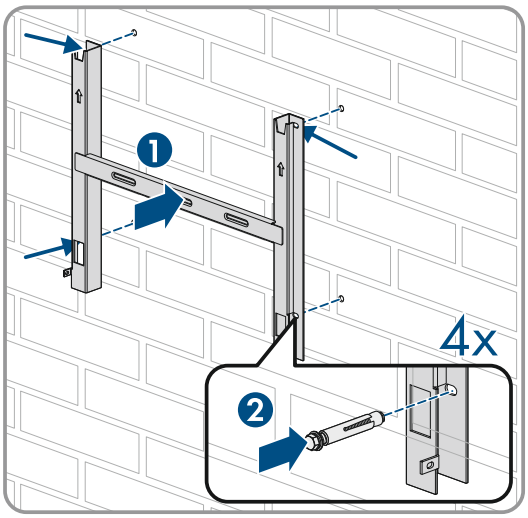
Additionally required mounting material (not included in the scope of delivery):

☐ For mounting:
- 4 screws that are suitable for the support surface and the weight of the inverter
- 4 washers suitable for the screws
- Where necessary, 4 screw anchors suitable for the support surface and the screws

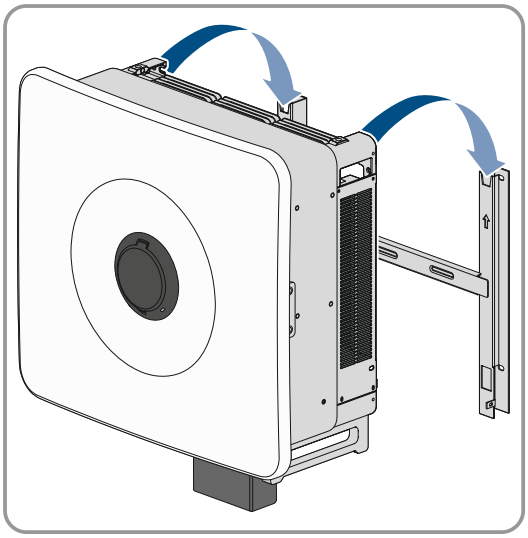
☐ For the transport:
- 2 eye bolts (M12)

Procedure:

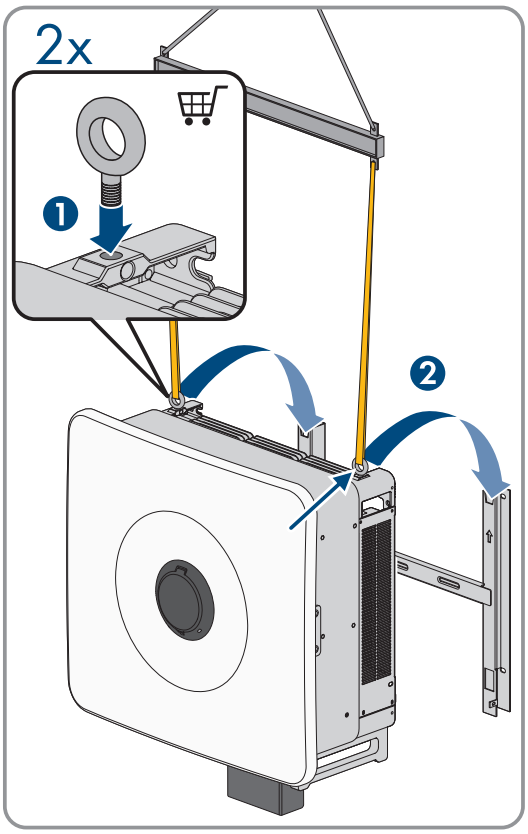
1. Align the mounting bracket using a spirit level and mark the drilling positions on the profile rails.
2. Drill the drill holes at the marked positions (Ø=12 mm).
3. Attach the mounting bracket to the wall using the heavy-duty anchors.



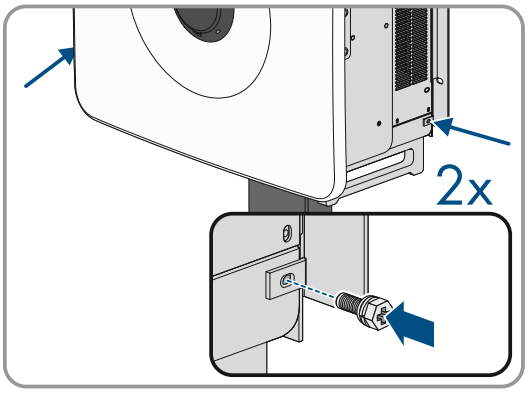
4. If the inverter is to be hooked into the mounting bracket without using lifting gear, lift the inverter into the mounting bracket.



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



6. Attach the inverter to the mounting bracket (M5x12, tightening torque: 2.5 Nm).



6 Electrical Connection

6.1 Requirements for the electrical connection

6.1.1 Equipotential Bonding

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

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

6.1.2 Load-break switch and cable protection

NOTICE

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

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

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

☐ In PV systems with multiple inverters, protect each inverter with a separate three-phase circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 13, page 63). This will prevent residual voltage from being present at the corresponding cable after disconnection.

☐ Loads installed between the inverter and the circuit breaker must be fused separately.

6.1.3 Network cable requirements

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

☐ Cable type: 100BaseTx

☐ Cable category: minimum CAT5e

☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP

☐ Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.22 mm²

☐ Maximum cable length between 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.

6.1.4 AC cable requirements

☐ Conductor type: copper wire or aluminum wire

☐ External diameter: 30 mm to 60 mm

☐ Conductor cross-section of grounding conductor:
For copper wire: 16 mm² to 70 mm²
For aluminum wire: 16 mm² to 70 mm²

☐ Conductor cross-section of line conductor and neutral conductor:
For copper wire: 35 mm² to 70 mm²
For aluminum wire: 35 mm² to 70 mm²

☐ Insulation stripping length: 18 mm to 20 mm

☐ Sheath stripping length: 120 mm to 150 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)." 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).

6.1.5 DC cable requirements

☐ Outer diameter: 5.5 mm to 8 mm

☐ Conductor cross-section: 2.5 mm² to 6 mm²

☐ Qty single wires: minimum 7

☐ Nominal voltage: minimum 1100 V

☐ Using bootlace ferrules is not allowed.

6.1.6 Signal cable requirements

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

☐ Conductor cross-section: from 0.2 mm² to 1.5 mm²

☐ External outer diameter: max. 8 mm

☐ Maximum cable length: 200 m

☐ Insulation stripping length: 6 mm

☐ Sheath stripping length: 150 mm

☐ UV-resistant for outdoor use

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

6.2 Overview of the Connection Area

6.2.1 View from Below

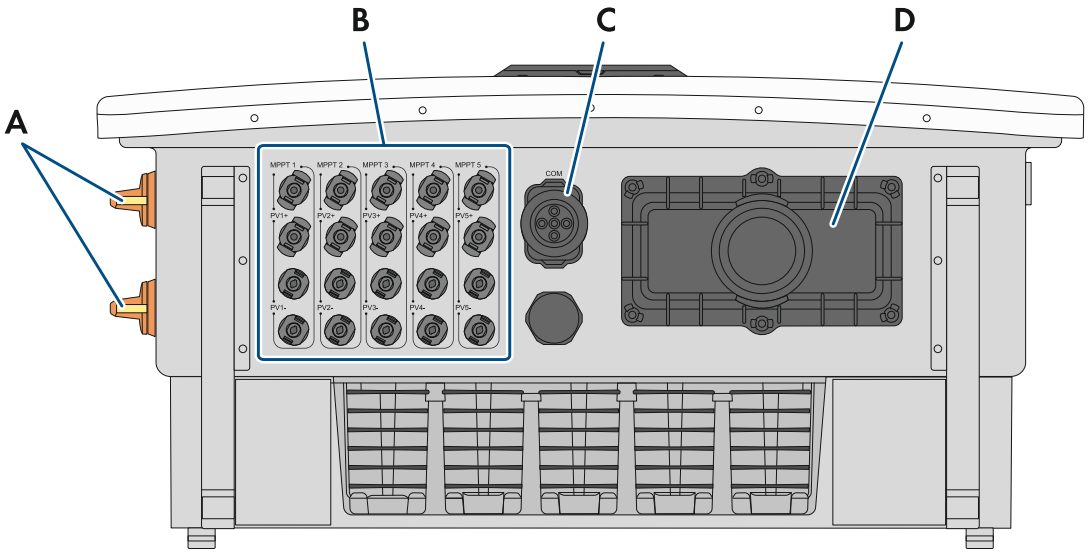
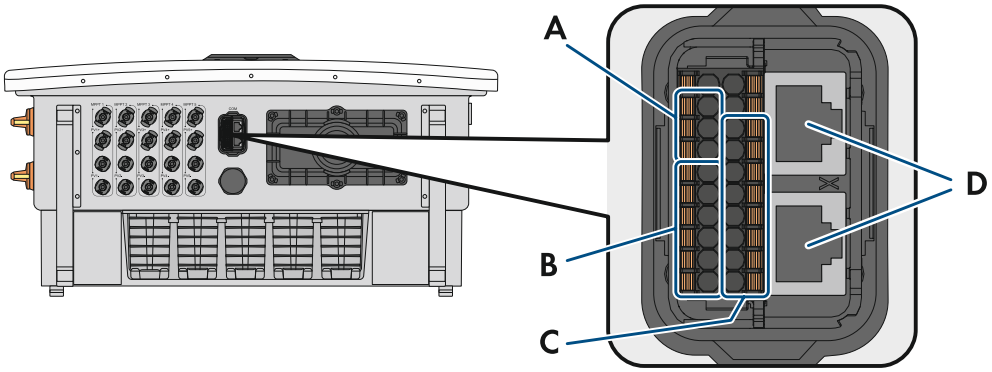


Figure 6: Enclosure openings at the bottom of the inverter

Position	Designation
A	DC load-break switch

Position	Designation
B	Positive and negative connectors for DC connection
C	Cable gland for connecting the communication
D	AC connection area

6.2.2 Overview of the COM assembly connections



Position	Designation
A	Connection for the multifunction relay
B	Terminal for digital inputs for curtailment
C	Connections for digital fast-stop inputs
D	Ethernet connections

6.3 Electrical connection procedure

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

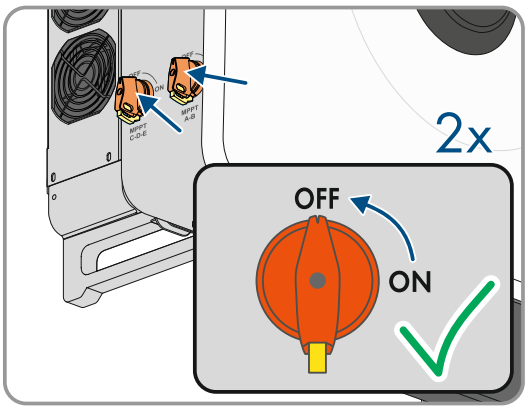
Procedure		See
1.	Ensure that the requirements for the electrical connection are fulfilled.	Requirements for the electrical connection
2.	Connect the inverter to the utility grid.	Section 6.4, page 26
3.	Connect protective grounding.	Section 6.6, page 29
4.	Connect the network cables.	Section 6.7, page 30
5.	Connect the PV modules.	DC connection

6.4 Connecting the Inverter to the Utility Grid

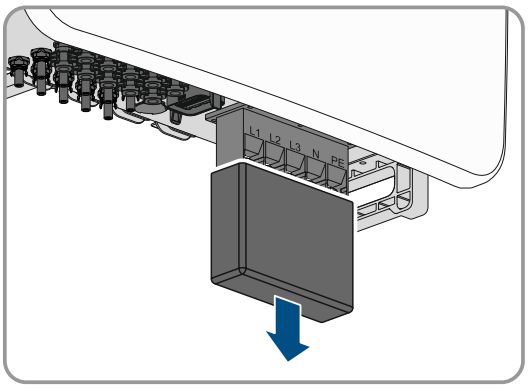
⚠ QUALIFIED PERSON

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

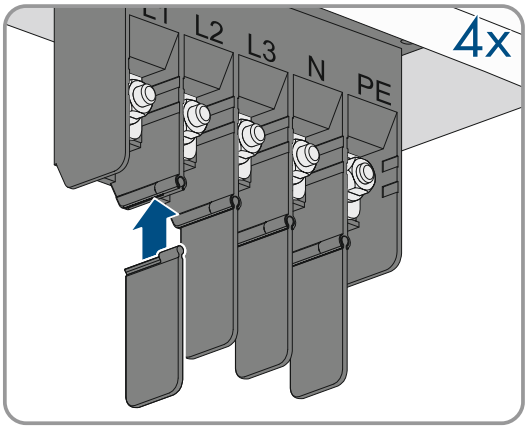
2. Make sure that all DC load-break switches have been switched off and secured against reconnection.



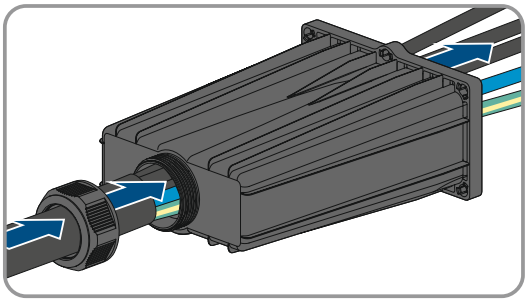
3. Remove the cover from the AC connection area.



4. Retrieve the 4 cable touch guards of the conductors from the scope of delivery and push them into the recess in the connection area.

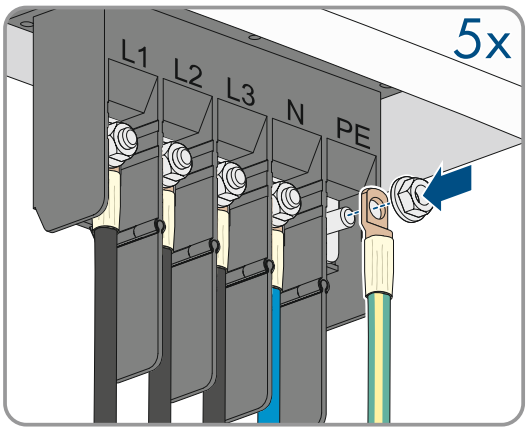


5. Remove the cover of the AC connection area from the scope of delivery of the inverter.
6. Thread the AC cable through the cable gland into the AC Connection Unit. If necessary, slightly loosen the swivel nut of the cable gland. In case of AC cables that require a clamping area < 35 mm, replace the seal insert of the cable gland by the seal insert with reduced clamping range.

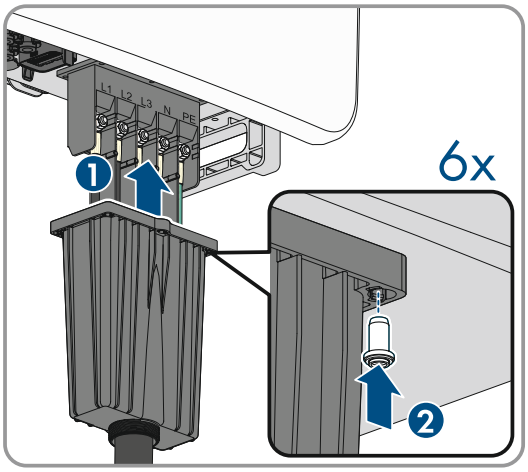


7. Dismantle the AC cable.
8. Strip off the insulation of L1, L2, L3, N and PE by 30 mm.
9. For conductors made of aluminum, remove the oxide film and apply protective grease to the conductors.
10. Pull 1 heat-shrink tubing each over conductor L1, L2, L3, N and PE (grounding conductor) and crimp the ring terminal lug (see Section 6.5, page 28).

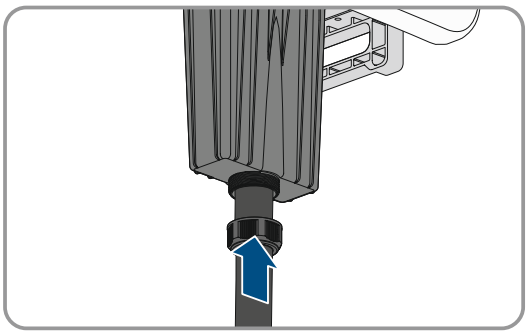
11. Place the conductors with the ring terminal lugs (max. Ø=26 mm) according to the labeling for L1, L2, L3, N and PE onto the stud bolts (M10, tightening torque: 12 Nm) in the upper area, each with 1 washer and hex nut, and tighten them using a ratchet.



12. Ensure that the correct conductors are assigned to all the terminals.
13. Ensure that all conductors are securely in place.
14. Ensure that the AC cable is not under tension.
15. Attach the AC-Connection Unit of the AC connection area using the 6 screws (M4x8, tightening torque: 1.6 Nm) to the enclosure of the inverter.



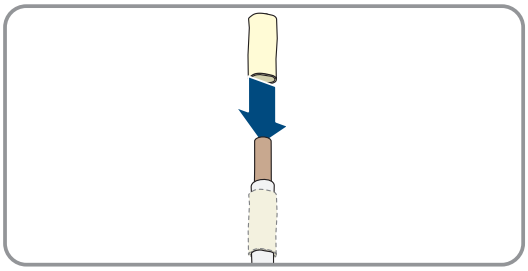
16. Tighten the swivel nut on the cable gland hand-tight.



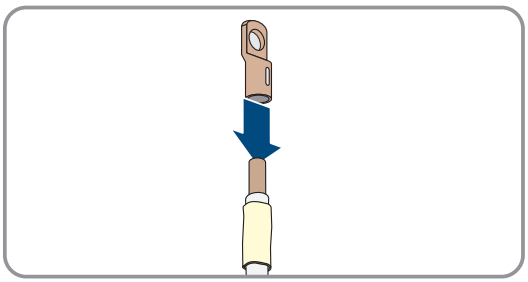
6.5 Crimping of Ring Terminal Lug

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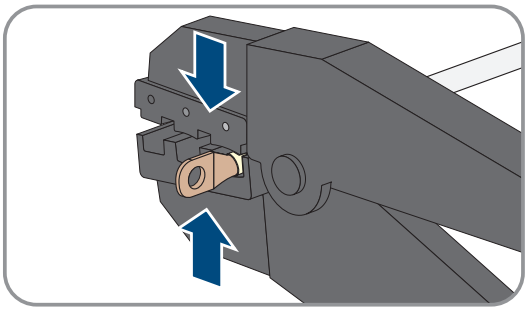
1. Pull the heat-shrink tubing over the conductor. The heat-shrink tubing must be below the stripped conductor section.



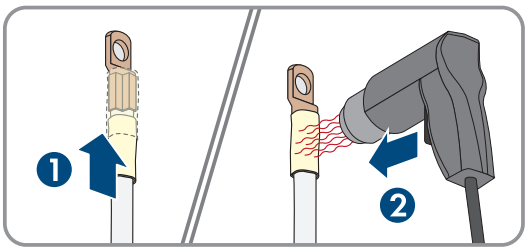
2. Plug the terminal lug onto the conductor.



3. Insert the stripped section of the insulated conductor into the ring terminal lug and crimp using a crimping tool.



4. Pull the heat-shrink tubing onto the crimped section of the ring terminal lug. Use a hot-air blower to shrink the heat-shrink tubing so that it is in firm contact with the ring terminal lug.



6.6 Connecting the external protective grounding

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

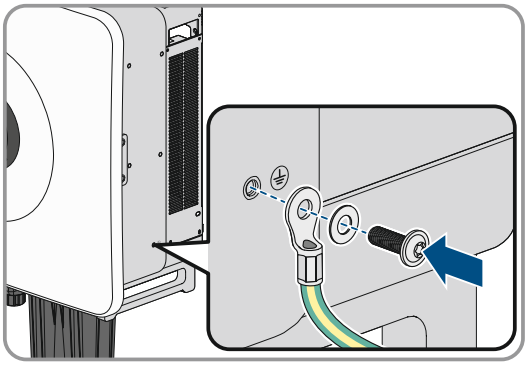
The inverter features a ground connection with two connection points for grounding (e.g., when using a grounding electrode).

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

The required screw and washer are pre-assembled on the inverter.

Procedure:

- Screw the grounding cable to the ground connection with washer and screw (M6x12, tightening torque: 4.5 Nm) using a screwdriver.



6.7 Connecting the Network Cables

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⚠ DANGER

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

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

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

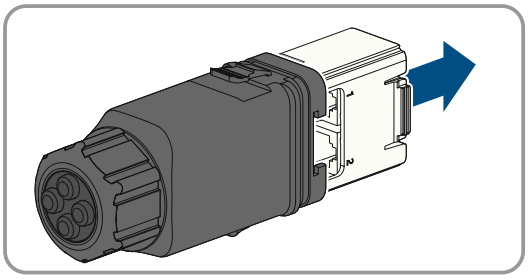
Additionally required material (not included in the scope of delivery):

☐ Network cable

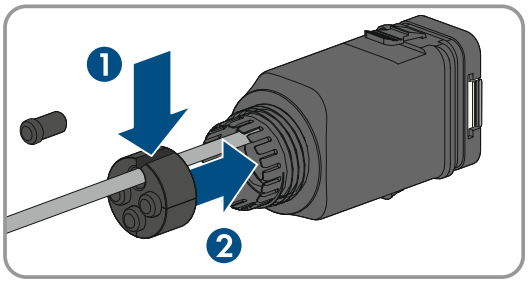
☐ Where required: Field-assembly RJ45 connector.

Procedure:

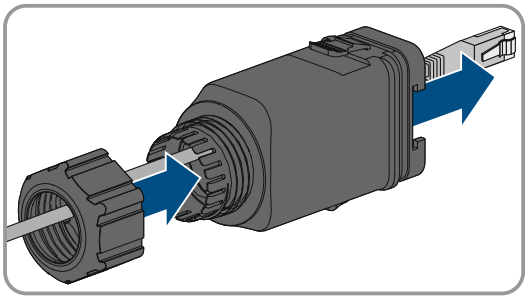
1. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 9, page 46).
2. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
3. Remove the communication assembly with the cable gland from the scope of delivery.
4. Pull the communication assembly out of the cable gland.



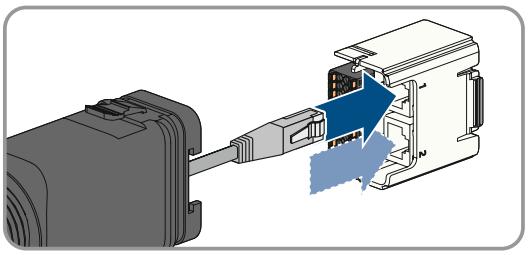
5. Unscrew the swivel nut from the cable gland.
6. Remove the four-hole cable support sleeve from the cable gland and remove one of the plugs from the enclosure openings and cut into each enclosure opening with a utility knife.



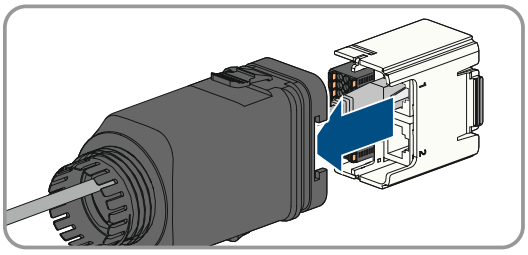
7. Thread the network cable through the union nut and the cover of the communication connection.
8. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to each network cable (see connector documentation).



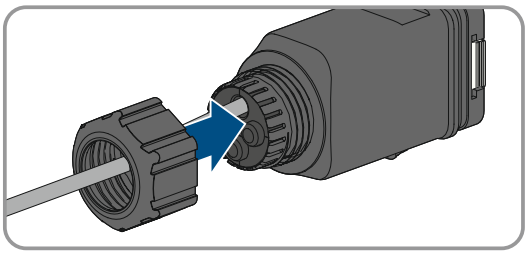
9. Put the RJ45 plug of the cable into one of the network jacks of the communication assembly.



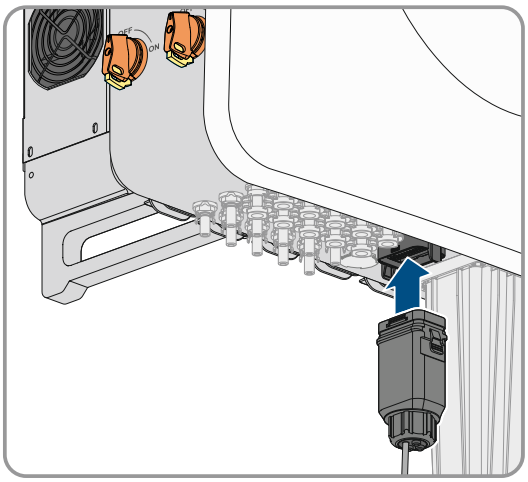
10. Tug lightly to ensure that the network cable is secure.
11. Plug the communication assembly onto the cable gland.



12. Press the four-hole cable support sleeve into the cable gland.
13. Fasten the union nut on the cable gland and screw hand-tight.



14. Plug the communication assembly with the cable gland into the terminal on the inverter.



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

6.8 Connection for Active Power Limitation

6.8.1 Procedure for Connecting the Active Power Limitation

Procedure		See
1.	Select the function depending on the application.	Section 4.5.5, page 17

Procedure		See
2.	Connect to the digital input.	Section 6.8.5, page 32
3.	Configure the settings for each application during commissioning.	• For systems with external setpoint • For systems with manual setpoint

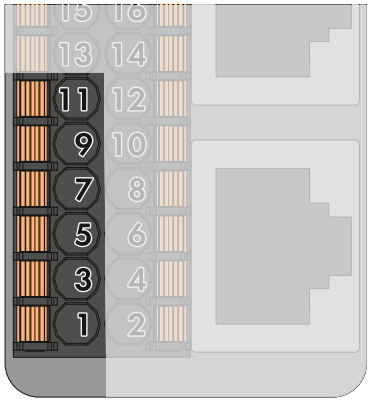
Also see:

- Use of the user interface powered by ennexOS ⇒ page 45

6.8.2 Digital input DI: D1-D4, Vcc

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

6.8.3 Pin assignment DI: D1-D4, Vcc

Digital input D1-4	Pin	Assignment
	1	Digital input 1
	3	Digital input 2
	5	Digital input 3
	7	Digital input 4
	9	Voltage supply output (12 V)
	11	Voltage supply output (12 V)

6.8.4 Circuitry overview DI: D1-D4, Vcc



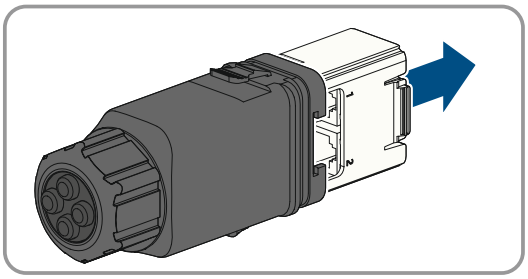
Figure 7: Connection of a remote terminal unit to the digital input DI D1-D4, Vcc of the Sunny Tripower.

6.8.5 Connecting the Digital Input

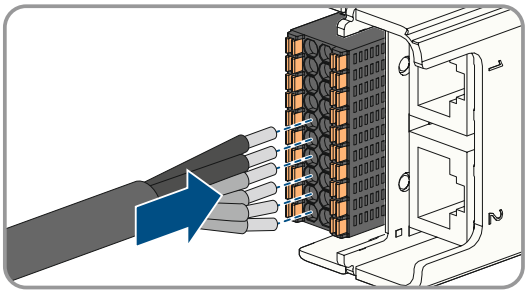
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1. Connect the connection cable to the ripple control receiver or the remote terminal unit (see the manual from manufacturer).

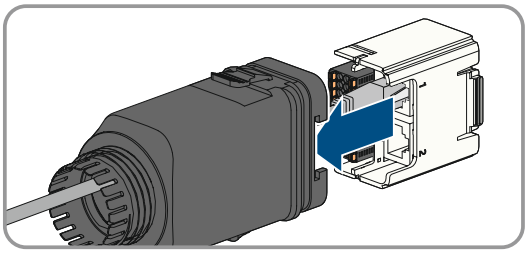
2. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 9, page 46).
3. Remove the connector with cable gland.
4. Pull the communication assembly out of the cable gland.



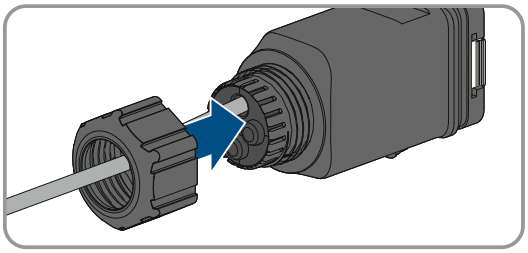
5. Unscrew the swivel nut from the cable gland.
6. Thread the swivel nut over the cable.
7. Remove the four-hole cable support sleeve from the cable gland.
8. Remove the plug from one of the enclosure openings and cut into the enclosure opening with a utility knife.
9. Insert the cable into the enclosure opening.
10. Strip off a maximum of 6 mm of the cable insulation.
11. Connect the conductors of the connection cable to the digital inputs **DI: D1-D4, Vcc**. To do so, plug the conductors into the conductor entries and close the conductor entries. Observe the connector assignment.



12. Ensure that all conductors are correctly connected.
13. Ensure that the conductors sit securely in the terminal points.
14. Plug the communication assembly onto the cable gland.



15. Fasten the union nut on the cable gland and screw hand-tight.



16. Plug the communication assembly with the cable gland into the terminal on the inverter.

6.9 Connection for Digital Fast-Stop Inputs

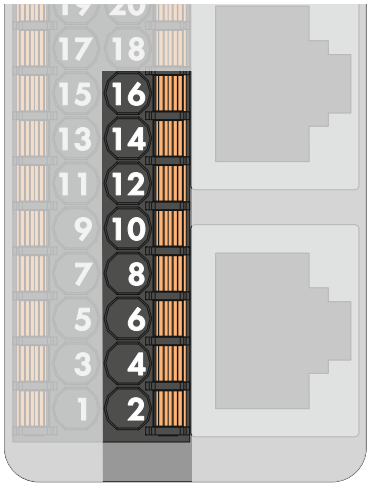
6.9.1 Procedure for Connecting to the Fast-Stop Input

Procedure		See
1.	Select the function depending on the application.	• Section 4.5.6, page 17
2.	Connect the contact for fast stop to the digital input.	• Section 6.9.5, page 35
3.	Activate the function either during commissioning in the **Grid Management Service** step of the inverter's installation assistant or subsequently via the settings in the inverter's user interface.	• Configuration using the commissioning wizard • Settings via the user interface of the inverter for fast stop • Settings via the user interface of the inverter for grid and PV system protection

Also see:

- Use of the user interface powered by ennexOS ⇒ page 45

6.9.2 Pin assignment for fast stop

Digital input	Pin	Assignment
	2	FS1
	4	FS2
	6	Vcc
	8	Vcc
	10	FS1
	12	FS2
	14	Vcc
	16	Vcc

6.9.3 Fast stop circuitry overview

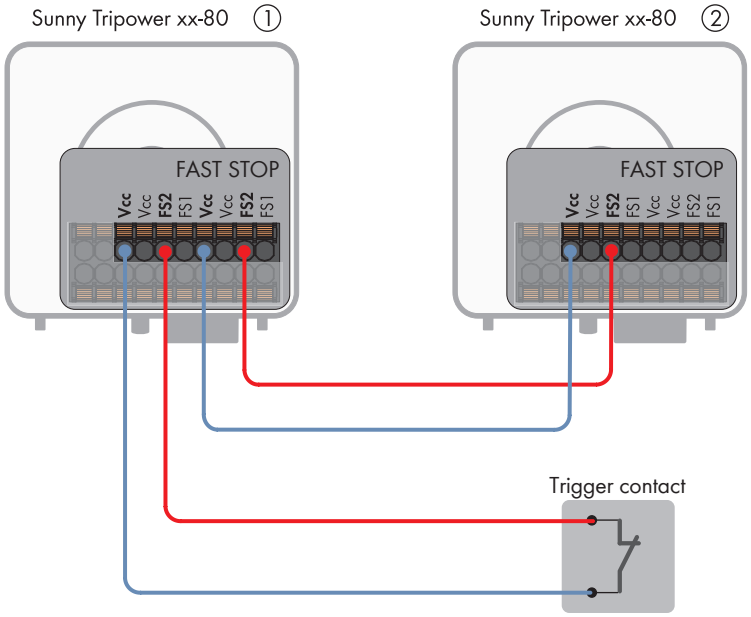


Figure 8: Example of the circuitry for connecting a trigger contact for the fast-stop function and linking multiple inverters.

6.9.4 Circuitry Overview of Grid and Pv System Protection

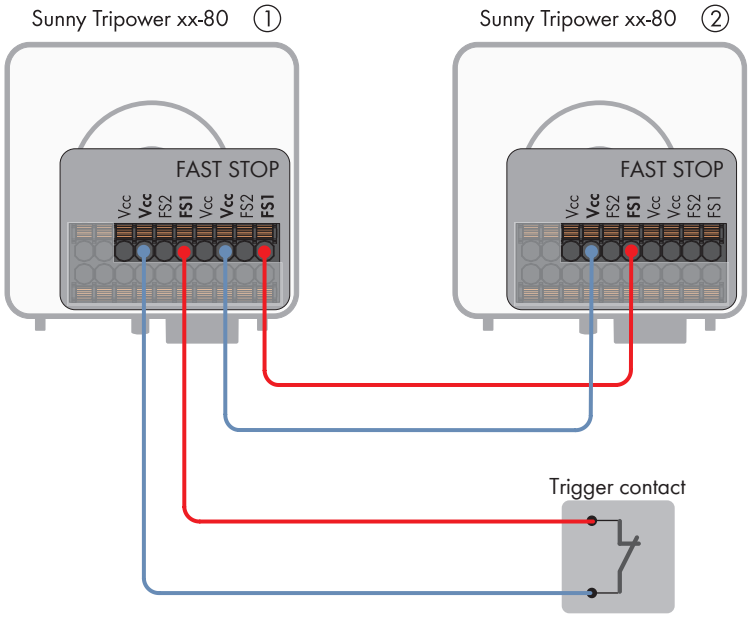


Figure 9: Example of the wiring for connecting a trigger contact for implementing grid and PV system protection and connecting several inverters.

6.9.5 Connecting contact for fast stop

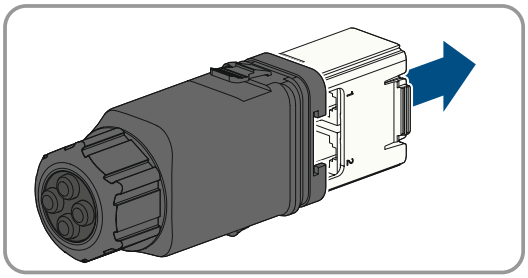
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Observe pin assignment for grid and PV system protection

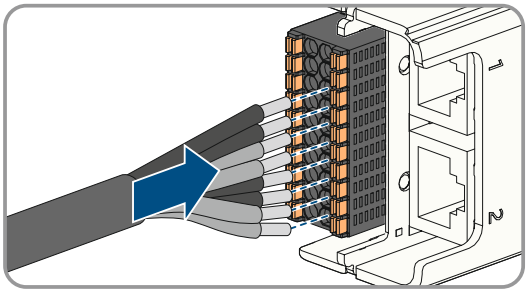
Note that when connecting the grid and PV system protection required by VDE-AR-N-4105, the connection must be made to the pin with the **FS1** assignment. The pin with the **FS2** assignment is considered a universal connection and is unsuitable for implementing grid and PV system protection. It is used for the connection of an external switch, for example.

Procedure:

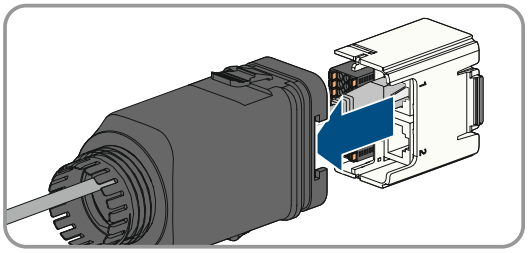
1. Connect the connection cable to the ripple control receiver or the remote terminal unit (see the manual from manufacturer).
2. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 9, page 46).
3. Remove the connector with cable gland.
4. Pull the communication assembly out of the cable gland.



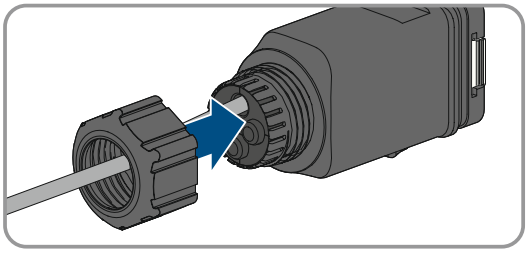
5. Unscrew the swivel nut from the cable gland.
6. Thread the swivel nut over the cable.
7. Remove the four-hole cable support sleeve from the cable gland.
8. Remove the plug from one of the enclosure openings and cut into the enclosure opening with a utility knife.
9. Insert the cable into the enclosure opening.
10. Strip off a maximum of 6 mm of the cable insulation.
11. Connect the conductors of the connection cable to the digital inputs of the fast stop. To do so, plug the conductors into the conductor entries and close the conductor entries. Observe the connector assignment.



12. Ensure that all conductors are correctly connected.
13. Ensure that the conductors sit securely in the terminal points.
14. Plug the communication assembly onto the cable gland.



15. Fasten the union nut on the cable gland and screw hand-tight.



16. Plug the communication assembly with the cable gland into the terminal on the inverter.

6.10 Connection to the Multifunction Relay

6.10.1 Procedure for Connecting the Multifunction Relay

Procedure		See
1.	Select the operating mode of the multifunction relay according to the application.	Use of the digital output (MFR)
2.	Connect to the multifunction relay according to the operating mode and the associated connection variant.	Section 6.10.5, page 37
3.	Change the operating mode after commissioning the inverter via the settings in the inverter user interface.	• Configure the digital output (MFR)

Also see:

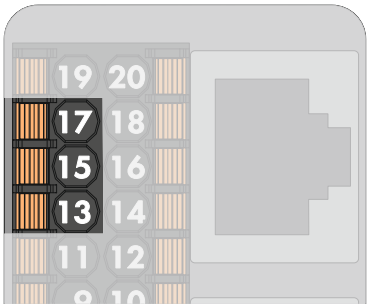
- Use of the user interface powered by ennexOS ⇒ page 45

6.10.2 Digital output (MFR)

The multifunction relay (MFR) is a digital output that can be specifically configured to the system.

In a system with multiple inverters, you must carry out the connection to the multifunction relay of the System Manager.

6.10.3 Pin assignment for multifunction relay

Digital input	Pin	Assignment
	13	COM
	15	NC
	17	NO

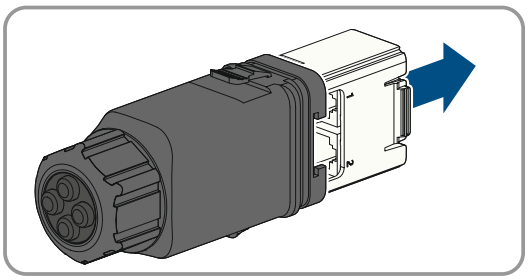
6.10.4 Circuitry Overview

6.10.5 Connecting the Multifunction Relay

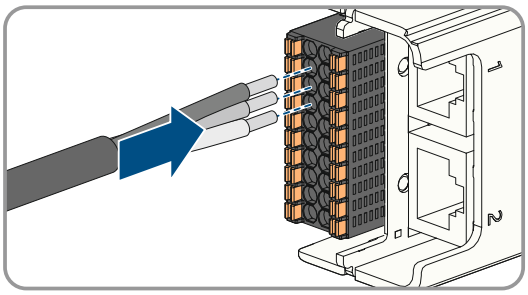
⚠ QUALIFIED PERSON

1. Connect the connection cable to the ripple control receiver or the remote terminal unit (see the manual from manufacturer).
2. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 9, page 46).
3. Remove the connector with cable gland.

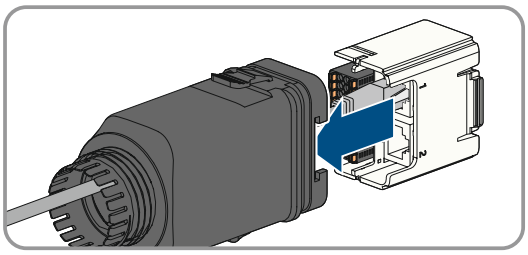
4. Pull the communication assembly out of the cable gland.



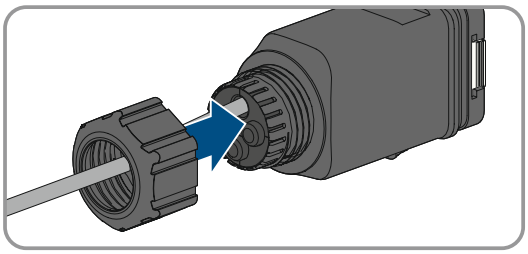
5. Unscrew the swivel nut from the cable gland.
6. Thread the swivel nut over the cable.
7. Remove the four-hole cable support sleeve from the cable gland.
8. Remove the plug from one of the enclosure openings and cut into the enclosure opening with a utility knife.
9. Insert the cable into the enclosure opening.
10. Strip off a maximum of 6 mm of the cable insulation.
11. Connect the conductors of the connection cable to the digital inputs **COM, NC, NO**. To do so, plug the conductors into the conductor entries and close the conductor entries. Observe the connector assignment.



12. Ensure that all conductors are correctly connected.
13. Ensure that the conductors sit securely in the terminal points.
14. Plug the communication assembly onto the cable gland.



15. Fasten the union nut on the cable gland and screw hand-tight.



16. Plug the communication assembly with the cable gland into the terminal on the inverter.

6.11 DC connection

6.11.1 Overview of DC connectors

6.11.2 Assembling the DC Connectors

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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

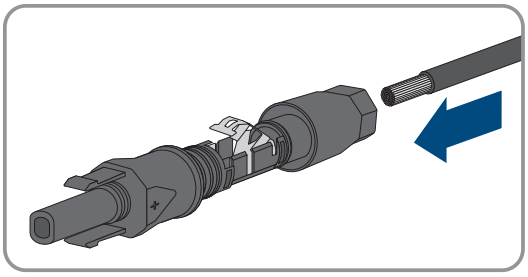
Destruction of the inverter due to overvoltage

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.

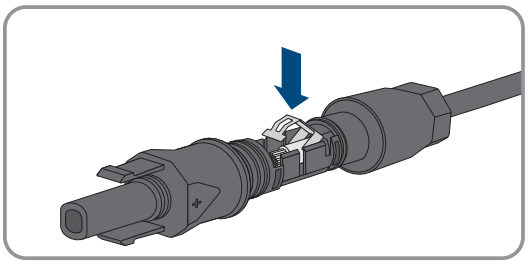
- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

Procedure:

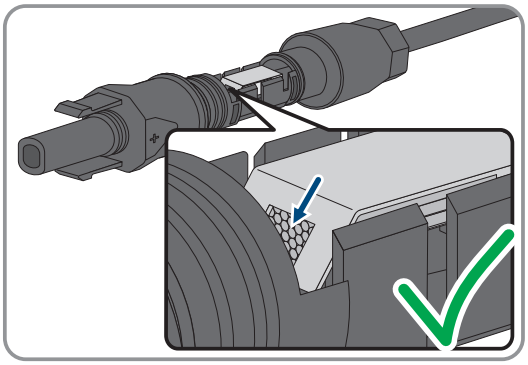
1. Strip approx. 15 mm of the cable insulation.
2. Insert the stripped cable into the DC connector up to the stop. When doing so, ensure that the stripped cable and the DC connector are of the same polarity.



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

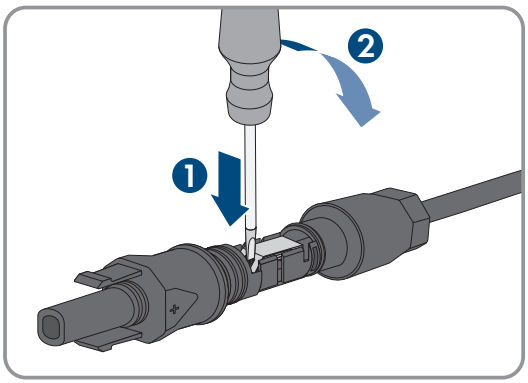


☑ The stranded wire can be seen inside the clamping bracket chamber.

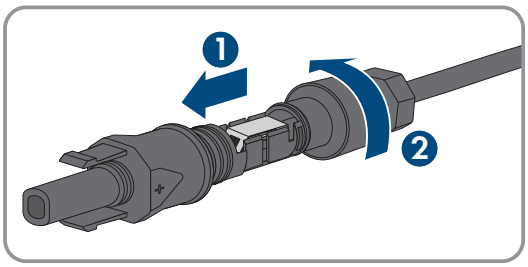


4. If the stranded wire is not visible in the chamber, the cable is not correctly inserted and the connector must be reassembled. To do this, the cable must be removed from the connector.

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).



6.11.3 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 measurement ranges designed for the maximum AC and DC voltage of the inverter.

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.

NOTICE

Destruction of the inverter due to overvoltage

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

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

NOTICE

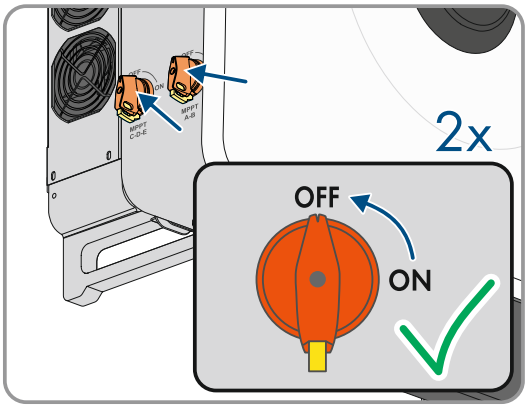
Damage to the product due to sand, dust and moisture ingress if the DC inputs are not closed

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

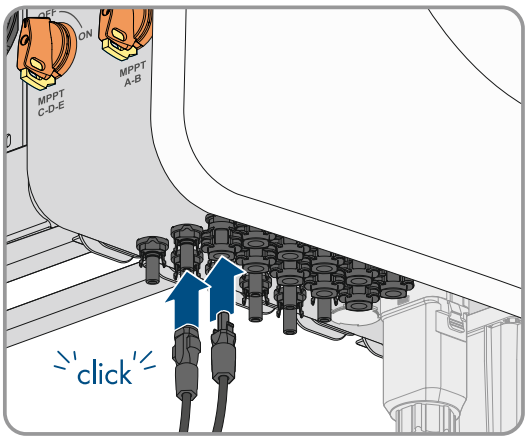
- Do not remove the sealing plugs from DC inputs that are not required.

Procedure:

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

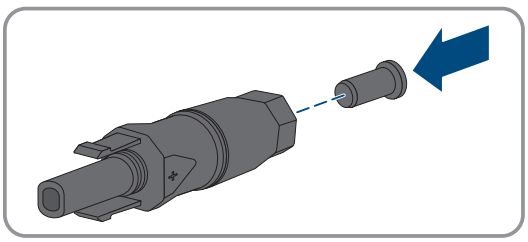


3. Measure the PV array voltage. Ensure that the maximum input voltage of the inverter is adhered to and that there is no ground fault in the PV array.
4. Check whether the DC connectors have the correct polarity. If the DC connector is equipped with a DC cable of the wrong polarity, the DC connector must be reassembled. When this is done, the respective DC cable must always have the same polarity as the DC connector.
5. Ensure that the open-circuit voltage of the PV array does not exceed the maximum input voltage of the inverter.
6. Connect the assembled DC connectors to the inverter.



☑ The DC connectors snap into place.

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



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

7 Commissioning

7.1 Procedure for commissioning as a subordinate device

This section describes the procedure of commissioning an inverter that is used in systems with or without System Manager.

In systems with System Manager, only 1 device can be used as System Manager at a time (e.g., SMA Data Manager or an inverter as System Manager). All other devices must be configured as a subordinate device and recorded in the System Manager.

It provides an overview of the steps, which must be performed in the prescribed sequence.

Procedure	
1.	Commission the inverter.
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 • Connection via Wi-Fi in the local network • Connection via Ethernet in the local network
3.	If required, change the network configuration on the welcome page. The automatic network configuration recommended by SMA Solar Technology AG via DHCP server is activated by default. Only change the network configurations if the default configuration is not suitable for your network.
4.	Carry out the configuration using the Commissioning Assistant. When doing so, select **Subordinate device** in the device function.
5.	Register the inverter as an SMA Speedwire device in the System Manager.

7.2 Procedure for commissioning as System Manager

This section describes the procedure of commissioning an inverter that is used in systems as System Manager.

Only 1 device in the system can be used as System Manager at a time (e.g., SMA Data Manager or an inverter as System Manager). All other devices must be configured as a subordinate device and recorded in the System Manager.

It provides an overview of the steps, which must be performed in the prescribed sequence.

Procedure	
1.	Commission all SMA Speedwire devices that are to be subordinate to the System Manager (e.g., inverters, energy meters).
2.	Commission the inverter that is to be configured as the System Manager.
3.	Establish a connection to the user interface of the inverter that is to be configured as System Manager. There are various connection options to choose from for this: • Direct connection via Wi-Fi • Connection via Wi-Fi in the local network • Connection via Ethernet in the local network

Procedure	
4.	If required, change the network configuration on the welcome page. The automatic network configuration recommended by SMA Solar Technology AG via DHCP server is activated by default. Only change the network configurations if the default configuration is not suitable for your network.
5.	Carry out the configuration using the Commissioning Assistant. Select **Inverter as System Manager** in the device function.
6.	Make further settings if necessary (e.g., configure multifunction relay, configure arc-fault circuit interrupter).
7.	To monitor the system in the Sunny Portal and view the data visually, create a user account in the Sunny Portal and create a system in the Sunny Portal or add devices to an existing system.

7.3 Switching the Inverter On

Requirements:

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

☐ The product must be correctly mounted.

☐ All cables for the AC connection, DC connection, and communication must be correctly connected.

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

Procedure:

1. Make sure that the AC cable compartment is closed.
2. Switch on the two DC load-break switches.
3. Switch the AC voltage supply on.
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 for feed-in operation are met, the inverter starts with feed-in operation and, depending on the available power, the green LED will light up continuously or it will pulse.
6. If the red LED lights up, an event has occurred. Find out which event has occurred and, if necessary, initiate countermeasures.
7. Ensure that the inverter feeds in correctly.

8 Operation

8.1 Use of the user interface powered by ennexOS

Products with an user interface powered by ennexOS offer cross-device functions and configuration options. To ensure consistent presentation and maintenance of these contents, general settings are not included in this document.

Descriptions of central functions such as network configuration, user management, software updates or visualization, are included in the higher-level "User manual for products with user interface powered by ennexOS" (link). This manual is available on the respective product page.

QR code:



Device-specific functions and features are described in the present documentation, if available.

9 Disconnecting the Inverter from Voltage Sources

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⚠ WARNING

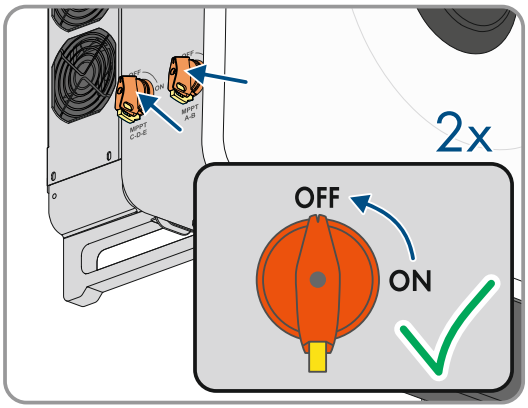
Danger to life due to electric shock from destruction of the measuring device due to overvoltage

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 measurement ranges designed for the maximum AC and DC voltage of the inverter.

Procedure:

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



3. Wait until the LEDs have gone out.
4. Use a current clamp to ensure that no current is present in the DC cables.
5. Note the position of the DC connectors.
6. Unlock the DC connector using the corresponding unlocking tool and remove (refer to the manufacturer manual for further information).
7. Ensure that the DC connectors on the product and those that are equipped with DC conductors are in perfect condition and that none of the DC conductors or DC plug contacts are exposed.
8. Ensure that no voltage is present at the DC inputs on the inverter using a suitable voltage detector.
9. **⚠ DANGER**

   Danger to life due to high voltages

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

   - Wait 5 minutes before proceeding.
10. Check that there is no voltage at the AC connection between L1 and L2, L2 and L3, L1 and L3 and L1 and grounding conductor, L2 and grounding conductor, L3 and grounding conductor and between L1 and N, L2 and N and L3 and N using a suitable voltage detector. For this purpose, hold the test prods to the conductors' ring terminal lugs.

10 Troubleshooting

10.1 Event messages

10.1.1 Event 102

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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.

10.1.2 Event 301

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

The ten-minute average value of the grid voltage is no longer within the permissible range. The grid voltage or grid impedance at the connection point is too high. The inverter disconnects from the utility grid to maintain power quality.

Corrective measures:

- During the feed-in operation, check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

10.1.3 Event 401

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

The inverter has disconnected from the utility grid. A stand-alone grid or a very large change in the grid frequency was detected.

Corrective measures:

- Make sure there is no power outage or work being done on the utility grid and contact a grid operator if necessary.
- Check the grid connection for significant short-term frequency fluctuations.

10.1.4 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.

10.1.5 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.

10.1.6 Event 701

⚠ QUALIFIED PERSON

Event message:

- **Frequency not permitted**
- **Check parameter**

Explanation:

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

Corrective measures:

- Check the AC wiring from the inverter to the feed-in meter.

- 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.

10.1.7 Event 901

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The grounding conductor is not correctly connected.

Corrective measures:

- Ensure that the grounding conductor is correctly connected.

10.1.8 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.

10.1.9 Event 1401

Event message:

- **Vac Fault**

Explanation:

The grid monitoring of the inverter has identified a grid overvoltage or grid undervoltage.

Corrective measures:

- Make sure there is no power outage or work being done on the utility grid and contact a grid operator if necessary.
- Check the grid connection for significant short-term frequency fluctuations.

10.1.10 Event 3401

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

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

Corrective measures:

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC cables to the inverter.
- If the DC voltage exceeds the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the installer of the PV array.
- If this message is repeated frequently, contact the Service.

10.1.11 Event 3402

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

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

Corrective measures:

- **Immediately** disconnect the inverter from voltage sources and secure it against being switched on again.
- Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC cables to the inverter.

- If the DC voltage exceeds the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the installer of the PV array.
- If this message is repeated frequently, contact the Service.

10.1.12 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.

10.1.13 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.

10.1.14 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.

10.1.15 Event 3501

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

Corrective measures:

- Check the PV system for ground faults.

10.1.16 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.

10.1.17 Event 3701

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has detected a residual current through brief grounding of the PV module.

Corrective measures:

- Check the PV system for ground faults.

10.1.18 Event 3801

⚠ 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.

10.1.19 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.

10.1.20 Event 4001

Event message:

- **Reverse currents or input X polarity reversed**

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.

10.1.21 Event 4301

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

Corrective measures:

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

10.1.22 Event 6001-6499

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

10.1.23 Event 6155

⚠ QUALIFIED PERSON

Event message:

- Version test failed

Explanation:

Processor defective.

Corrective measures:

- Contact Service.

10.1.24 Event 6202

⚠ QUALIFIED PERSON

Event message:

- Self-diagnostics > DI converter fault

Explanation:

The external component DI converter reports an error.

Corrective measures:

- Only contact the service department if the problem persists.

10.1.25 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.

10.1.26 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.

10.1.27 Event 6501

⚠ QUALIFIED PERSON

Event message:

- **Self-diagnosis**

- **Overtemperature**

Explanation:

The inverter has switched off due to excessive temperature.

Corrective measures:

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

10.1.28 Event 6603

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

10.1.29 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.

10.1.30 Event 6606

⚠ QUALIFIED PERSON

Event message:

- Self-diagnosis
- Device fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

10.1.31 Event 7015

⚠ 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.

10.1.32 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.

10.1.33 Event 7703

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

10.2 Calculating the insulation resistance

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

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

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

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.

11 Decommissioning

11.1 Disconnecting the Terminals from the Inverter

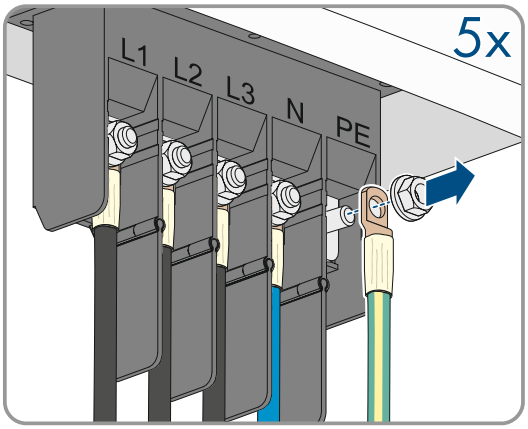
⚠ QUALIFIED PERSON

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

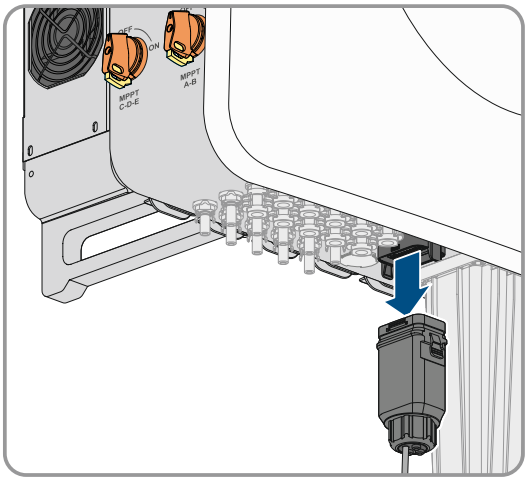
Procedure:

1. Disconnect the inverter from voltage sources and secure it against being switched on again (see Section 9, page 46).
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 cable gland.
4. Remove the 6 screws (M4x8, tightening torque 1.6 Nm) of the cover of the AC connection area and then pull it off the device.
5. Remove the cable from the cable gland.
6. Using a ratchet, loosen the conductors L1, L2, L3, N and PE (M10) with the ring terminal lugs from the threads in the upper area.

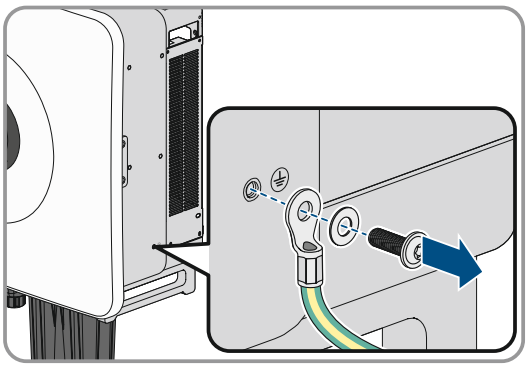


7. Loosen the fuse and cable gland at the communication connection area.
8. Remove all connection cables from the communication assembly.



9. Remove the connection cable from the cable gland.
10. Remove the DC connectors from the inputs.
11. Insert sealing plugs onto the DC inputs.

12. Remove the grounding cable of the external protective grounding (M6x12, tightening torque: 4.5 Nm).



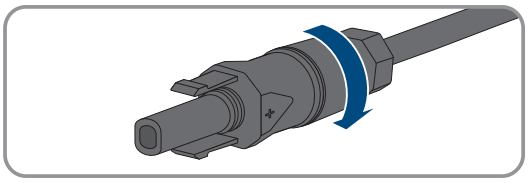
11.2 Disassembling the DC Connectors

⚠ QUALIFIED PERSON

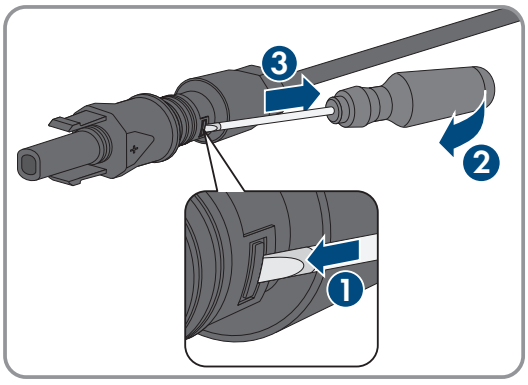
To disassemble the DC connectors for connection to the pv modules (e.g. due to faulty assembly), proceed as follows.

Procedure:

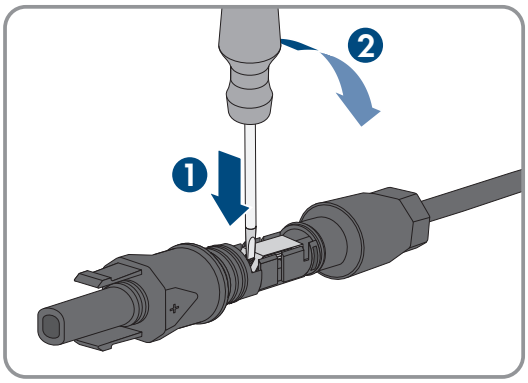
1. Release and remove the DC connectors. To do so, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors out. When doing so, do not lever the DC connectors out, but insert the tool into one of the side slots only to release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

11.3 Disassembling the Inverter

⚠ QUALIFIED PERSON

Requirements:

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

☐ A pallet must be available.

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

Procedure:

1. Remove the inverter from the mounting bracket (M5x12, tightening torque: 2.5 Nm).
2. Unhook the inverter from the mounting bracket.
3. If the inverter is to be shipped, pack the inverter according to its size and weight.
4. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

12 Disposal

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



13 Technical Data

13.1 General Data

Width x height x depth	680 mm x 717.5 mm x 332 mm
Weight	50.5 kg
Width x height x depth of packaging	1154 mm x 789 mm x 436 mm
Transport weight	64.5 kg
Way of attaching	Wall mounting bracket
Operating temperature range	-25°C to +60°C
Max. permissible value for relative humidity (condensing)	100%
Maximum operating altitude above mean sea level (MSL)	3000 m
Typical noise emission	63 dB
Power loss in night mode	15 W
Topology	Without transformers
Cooling method	Active cooling
Degree of protection for electronics in accordance with IEC 60529	IP65
Number of fans	3
Protection class in accordance with IEC 62109-1	I
Radio technology	Wi-Fi 802.11 b/g/n or Ethernet
Radio spectrum	2.4 GHz
Maximum transmission power	19 dBm
Wi-Fi range in free-field conditions	10 m
Quantity maximum detectable Wi-Fi networks	30
Grid conformity	C10/C11:2019 & V1:2020 LV&MV,CE, CEI 0-21/CEI 0-16, EIFS 2018:2, EN50549-1/-2:2018, EN50549-10:2022, EREC G99/1-8:2021 Type A & B, G99, IEC 60068-2-x, IEC61727, IEC 62109-1/-2, IEC62116, IEC 63027, NA/EEA-NE7, VDE-AR-N 4105:2018 incl. PAV,E/4110:2023/4120:2020, TED/749/2020 incl. NTS2.1 Type A & B, TOR Generator Type A:2022/B:2022, UNE 217001:2020, UNE 217002:2020
Grid configurations	TN-C, TN-S, TN-C-S, TT (if UN_PE < 20 V)
Power control / Demand response (DRED)	Communication via Modbus interface

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

13.2 DC Input

	STP 50-80	STP 60-80
Maximum power of PV array	75000 Wp STC	90000 Wp STC
Maximum input voltage	1100 V	1100 V
MPP voltage range for rated power	500 V to 850 V	500 V to 850 V
MPP voltage range	200 V to 1000 V	200 V to 1000 V
Rated input voltage	630 V	630 V
Minimum input voltage	200 V	200 V
Initial input voltage	250 V	250 V
Maximum input current per MPP tracker	40 A	40 A
Maximum input current per string	22 A	22 A
Maximum usable input current (per MPP tracker)	200 A (5*40 A)	
Maximum short-circuit current (per MPP tracker)[1)]	250 A (5*50 A)	
Maximum reverse current into the PV modules	50 A	50 A
Number of independent MPP inputs	5	5
Strings per MPP input	2	2
Overvoltage category as per IEC 62109-1	II	II

13.3 AC output

	STP 50-80	STP 60-80
Rated power at 230 V, 50 Hz	50000 W	60000 W
Maximum apparent power	50000 VA	60000 VA
Rated apparent power	50000 VA	60000 VA
Nominal grid voltage	400 V / 230 V	
Rated AC voltage	3 / N / PE, 230 V / 400 V	

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

	STP 50-80	STP 60-80
Voltage range[2)]	180 V to 305 V	
Rated current at 230 V	72.5 A	86.6 A
Maximum output current	79.5 A	95.3 A
The total harmonic distortion of the output current and AC voltage must each be <2%. This condition applies when the AC power is > 50% of the rated power.	< 3 %	< 3 %
Rated grid frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Grid frequency[2)]	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at grid frequency 50 Hz	45 Hz to 55 Hz	45 Hz to 55 Hz
Operating range at grid frequency 60 Hz	55 Hz to 65 Hz	55 Hz to 65 Hz
Power factor at rated power	>0.9	>0.9
Displacement power factor, adjustable	0.8 overexcited to 0.8 underexcited	
Feed-in phases	3	3
Connection phases	3-(N)-PE	3-(N)-PE
Overvoltage category as per IEC 62109-1	III	III

13.4 Data Storage Capacity

1-minute values	7 days
5-minute values	7 days
15-minute values	30 days
60-minute values	3 years
Event messages	1024 events

13.5 Communication

SMA devices	A maximum of 5 subordinate devices (inverters, charging stations and energy meters), 100 Mbit/s
I/O systems and meters	Ethernet, 10/100 Mbit/s, Modbus TCP

[2)] Depending on the configured country data set

13.6 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%
Threshold for relative humidity, non-condensing	100 %
Extended air pressure range	79.5 kPa to 106 kPa

Transport in accordance with IEC 60721-3-4, Class 2K12

Temperature range	-40°C to +70°C

13.7 Efficiency

	STP 50-80	STP 60-80
Maximum efficiency, η_{max}	98.1 %	98.1 %
European weighted efficiency, η_{EU}	97.7 %	97.8 %

13.8 Protective devices

DC reverse polarity protection	Short-circuit diode
Input-side disconnection point	DC load-break switch
DC overvoltage protection	Surge arrester type 1+2
AC short-circuit current capability	Current control
Grid monitoring	SMA Grid Guard 10.0
Maximal output overcurrent protection	125 A
Ground fault monitoring	Insulation monitoring: R_{iso} > 100 kΩ
All-pole sensitive residual-current monitoring unit	Available
SMA ArcFix arc-fault circuit interrupter	Available
Active anti-islanding method	Frequency shift

13.9 Equipment

DC connection	SUNCLIX DC connector
AC terminal	Ring terminal lug
Digital output (multifunction relay)	As standard
Digital inputs DI D1-D4	As standard

14 EU Declaration of Conformity

within the scope of the EU directives

CE

- 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.

15 Contact

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

You can find your country's contact information at:

https://go.sma.de/service