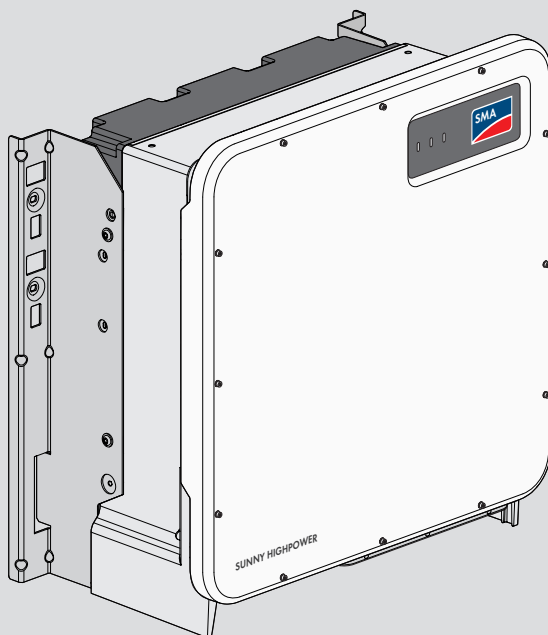


Operating manual

SUNNY HIGHPOWER PEAK3



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SMA Warranty

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

Software licenses

The licenses for the used software modules can be called up on the user interface of the product.

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Table of Contents

1	Information on this Document	5
1.1	Validity	5
1.2	Target Group	5
1.3	Content and Structure of this Document	5
1.4	Levels of Warning Messages	5
1.5	Symbols in the Document	6
1.6	Typographies in the Document.....	6
1.7	Designation in the document	6
1.8	Additional Information	6
2	Safety	8
2.1	Intended Use	8
2.2	IMPORTANT SAFETY INSTRUCTIONS.....	9
3	Scope of Delivery	13
4	Additionally Required Materials and Equipment.....	15
5	Product Overview	16
5.1	Product Description	16
5.2	Symbols on the Product	16
5.3	Interfaces and Functions	17
5.4	LED Signals.....	19
6	Mounting and Preparing the Connection.....	20
6.1	Requirements for Mounting	20
6.2	Connecting Plates Overview	22
6.3	Mounting the Product and Preparing the Connection	24
7	Electrical Connection	28
7.1	Overview of the Connection Area	28
7.2	Connecting the AC Cable	29
7.3	Connecting the Network Cables.....	30
7.4	Connecting the PV Array	32
8	Commissioning	35
8.1	Commissioning Procedure	35
8.2	Commissioning the Inverter.....	35
8.3	Selecting a configuration option	36

9	Operation	40
9.1	Establishing a connection to the user interface	40
9.1.1	Establishing a Direct Connection via Ethernet	40
9.1.2	Establishing a Connection via Ethernet in the local network	41
9.2	Logging In and Out of the User Interface.....	42
9.3	Start Page Design of the User Interface.....	43
9.4	Displaying and Downloading the Stored Data.....	45
9.5	Starting the Installation Assistant.....	45
9.6	Changing the Password.....	47
9.7	Changing Operating Parameters.....	47
9.8	Configuring the Country Data Set.....	48
9.9	Configuring the Modbus Function.....	48
9.10	Saving the Configuration in a File.....	49
9.11	Adopting a Configuration from a File.....	49
9.12	Updating the Firmware	50
10	Disconnecting the Inverter from Voltage Sources	52
11	Cleaning the Inverter	54
12	Troubleshooting.....	55
12.1	Forgotten Password.....	55
12.2	Event Messages	56
12.3	Checking the PV System for Ground Faults	71
12.4	Replacing the Surge Arrester.....	73
12.5	Activate the diagnostic function in the event of a defective Speedwire communication	73
12.6	Cleaning the Fans	74
13	Decommissioning the Inverter.....	76
14	Procedure for Receiving a Replacement Device.....	80
15	Technical Data	82
16	Contact	86
17	EU Declaration of Conformity	88

1 Information on this Document

1.1 Validity

This document is valid for:

- SHP 100-20 (Sunny Highpower PEAK3)
- SHP 150-20 (Sunny Highpower PEAK3)

1.2 Target Group

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

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

1.3 Content and Structure of this Document

This document describes the mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning of the product as well as the operation of the product user interface.

You will find the latest version of this document and further information on the product in PDF format and as 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
<input type="checkbox"/>	Indicates a requirement for meeting a specific goal
<input checked="" type="checkbox"/>	Desired result
x	A problem that might occur
	Example
▲ QUALIFIED PERSON	Sections describing activities to be performed by qualified persons only

1.6 Typographies in the Document

Typography	Use	Example
bold	<ul style="list-style-type: none"> Messages Terminals Elements on a user interface Elements to be selected Elements to be entered 	<ul style="list-style-type: none"> Connect the insulated conductors to the terminals X703:1 to X703:6. Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> Connects several elements to be selected 	<ul style="list-style-type: none"> Select Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> Button or key to be selected or pressed 	<ul style="list-style-type: none"> Select [Enter].

1.7 Designation in the document

Complete designation	Designation in this document
Sunny Highpower PEAK3	Inverter, product

1.8 Additional Information

For more information, please go to www.SMA-Solar.com.

Title and information content	Type of information
"Application for SMA Grid Guard Code"	Form

Title and information content	Type of information
"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
"Parameters and Measured Values" Overview of all inverter operating parameters and their configuration options	Technical Information
"SMA and SunSpec Modbus® Interface" Information on the Modbus interface	Technical Information
"Modbus® parameters and measured values" Device-specific register HTML file	Technical Information
"Temperature Derating"	Technical Information

2 Safety

2.1 Intended Use

The Sunny Highpower is a transformerless PV inverter that converts the direct current from the PV array into grid-compliant three-phase current. An external transformer fitted downstream feeds the alternating current generated into the utility grid.

The product is intended for use in industrial environments.

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

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

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

The product is not intended to be used in living areas and cannot provide protection of radio reception against interference signals in such environments.

The product complies with IEC 60721-3-4 as per Class 4C2 and is suitable for operation in a chemically active environment.

The product is suitable for indoor and outdoor use.

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

The product may only be operated in connection with a suitable medium-voltage transformer. The low-voltage side must be configured in a star formation and the neutral point must be grounded (for information about the requirements of the medium-voltage transformer, consult the technical information "Important Requirements for Medium-Voltage Transformers" under www.SMA-Solar.com).

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

PV modules with a high capacity to ground must only be used if their coupling capacity does not exceed $32 \mu\text{F}$ (for information on how to calculate the coupling capacity, see the Technical Information "Leading Leakage Currents" at www.SMA-Solar.com).

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

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

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

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

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

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

This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation, 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.

2.2 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

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 electronic devices, there are residual risks despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

DANGER

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

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

- Do not touch non-insulated parts or cables.
- Install external DC load-break switch (e.g., a PV junction box including a load-break switch) between the inverter and PV array.
- Disconnect the PV array from the inverter via an external DC load-break switch (e.g. via a PV junction including a load-break switch). Switch off and secure the DC load-break switch against reconnection.
- Disconnect the product from voltage sources and make sure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.

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

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

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

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

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

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

 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 inverter is classified as "TNV-1" and offers protection against overvoltages of up to 1.5 kV.

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

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

- In case of error, only carry out corrective measures specified by SMA Solar Technology AG (see Section 12 "Troubleshooting", page 55). If no corrective measures are specified, do not perform any actions on the product. Contact the Service.
- Ensure that unauthorized persons have no access to the product.
- Disconnect the AC circuit breaker and secure it against reconnection.
- Disconnect the PV array from the product via an external disconnection device.

⚠ WARNING**Risk of fire due to failure to observe torque specifications on live bolted connections**

Failure to follow the specified torques reduces the ampacity of live bolted connections so that the contact resistances increase. This can cause components to overheat and catch fire.

- Ensure that live bolted connections are always tightened with the exact torque specified in this document.
- When working on the device, use suitable tools only.
- Avoid repeated tightening of live bolted connections as this may result in inadmissibly high torques.

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

Some parts of the enclosure can get hot during operation.

- During operation, do not touch any parts other than the enclosure lid of the inverter.

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

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

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

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

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

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

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

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

- Only open the product if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the product during a dust storm or precipitation.
- Close tightly all enclosure openings.

NOTICE**Damage 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.

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

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

- Ground yourself before touching any component.

NOTICE**Destruction of the measuring device due to overvoltage**

- Only use measuring devices with a DC input voltage range of 1500 V or higher and an AC input voltage range of 600 V or higher.

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.

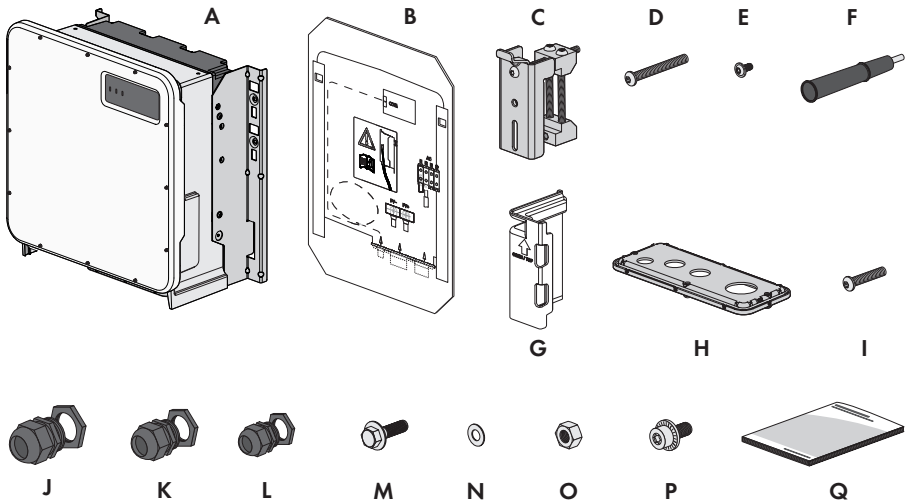


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Mounting template
C	2	Mounting bracket
D	2	Button head screw M8x105
E	2	Button head screw M8x16
F	4	Carry handle
G	4	Touch protection for DC connection
H	1	Connecting plate
I	3	Button head screw M8x70
J	1	Cable gland and counter nut M63x1.5
K	2	Cable gland and counter nut M40x1.5
L	1	Cable gland and counter nut M32x1.5
M	2	M10x40 combination hexagon head screw
N	2	Washer M10
O	2	Hexagon nut M10

Position	Quantity	Designation
P	2	M6x16 combined screw
Q	1	Quick Reference Guide

4 Additionally Required Materials and Equipment

Materials:

Material	Quantity	Explanation
Profile rail (length: min. 770 mm, depth: max. 60 mm, height: 50 mm to 80 mm)	2	For mounting the product
Terminal lugs (flange hole: M10)	2/4	For connecting the DC cables

Equipment:

Equipment	Quantity	Explanation
Means of transport (e.g. pallet truck)	1	Used to transport packed product to mounting location
Utility knife	1	Used to unpack the product
Torx screwdriver (TX25)	1	Used to attach and remove transport handles and enclosure lid
Torx screwdriver (TX40)	1	Used to attach mounting brackets, inverters to mounting brackets, connecting plate to inverter; used to connect equipment grounding conductor of PV array
Allen key (AF8)	1	Used to connect AC cables
Measuring device with AC input voltage range of at least 600 V or DC input voltage range of at least up to 1500 V	1	For verifying that no voltage is present
Current clamp	1	For verifying that no voltage is present
Press tool	1	Used to attach terminal lugs to DC cables
Clean cloth	1	Used to clean terminal lugs
Ethanol cleaning agent	1	Used to clean terminal lugs
Brush	1	Used to clean aluminum conductor (only necessary if cable is made of aluminum)
Protective grease	1	Used to apply to aluminum conductor (only necessary if cable is made of aluminum)

5 Product Overview

5.1 Product Description

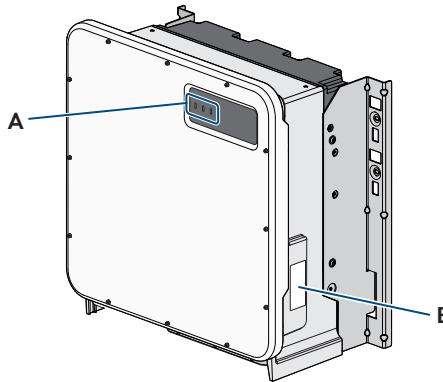














Figure 2: Design of the Product

Position	Designation
A	<p>LEDs</p> <p>The LEDs indicate the operating state of the inverter.</p>
B	<p>Type label</p> <p>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:</p> <ul style="list-style-type: none"> • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Device-specific characteristics

5.2 Symbols on the Product

Symbol	Explanation
	<p>Beware of a danger zone</p> <p>This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.</p>
	<p>Beware of electrical voltage</p> <p>The product operates at high voltages.</p>

Symbol	Explanation
	Beware of hot surface The product can get hot during operation.
	Observe the documentation Observe all documentation supplied with the product.
	Observe the documentation Together with the red LED, this symbol indicates an error.
	Inverter Together with the green LED, this symbol indicates the operating state of the inverter.
	Data transmission Together with the blue LED, this symbol indicates the status of the network connection.
AC 3 	Three-phase alternating current without neutral conductor
DC 	Direct current
	The product is has no galvanic isolation.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	The product is suitable for outdoor installation.
IP65	Degree of protection IP65 The product is protected against the penetration of dust and water that is directed as a jet against the enclosure from all directions.
CE	CE marking The product complies with the requirements of the applicable EU directives.

5.3 Interfaces and Functions

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

User interface for monitoring and configuration

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

Smart Inverter Screen

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

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

SMA Speedwire

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

SMA Webconnect

The inverter is equipped with a Webconnect function as standard. The Webconnect function enables direct data transmission between the inverter and Sunny Portal without any additional communication device and for a maximum of 4 inverters per visualized system. In PV systems with more than 4 inverters, there is the option of establishing data transmission between the inverters and Sunny Portal via the data logger (e.g., SMA Data Manager) or distributing the inverters over several systems. You can directly access your visualized system via the web browser on your end device.

Modbus

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

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

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

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.

SMA Smart Connected

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

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

5.4 LED Signals

The LEDs indicate the operating state of the inverter.

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

6 Mounting and Preparing the Connection

6.1 Requirements for Mounting

Requirements for the Mounting Location:

WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires.

- Do not mount the product in areas containing highly flammable materials or gases.
 - Do not mount the product in potentially explosive atmospheres.
-
- Do not mount the inverter in living areas.
 - 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.
 - All ambient conditions must be met (see Section 15, page 82).
 - At least two profile rails must be available for mounting.
 - The support surface of the frame to which the profile rails are attached should be firm and level (e.g. concrete). Non-fulfillment of these criteria may restrict servicing.

Requirements for the profile rails:

- The profile rails must be designed for the load and orientation of the inverters in the PV system. The profile rails might need to be reinforced.
- The profile rails must be designed for the clamping range of the mounting bracket.

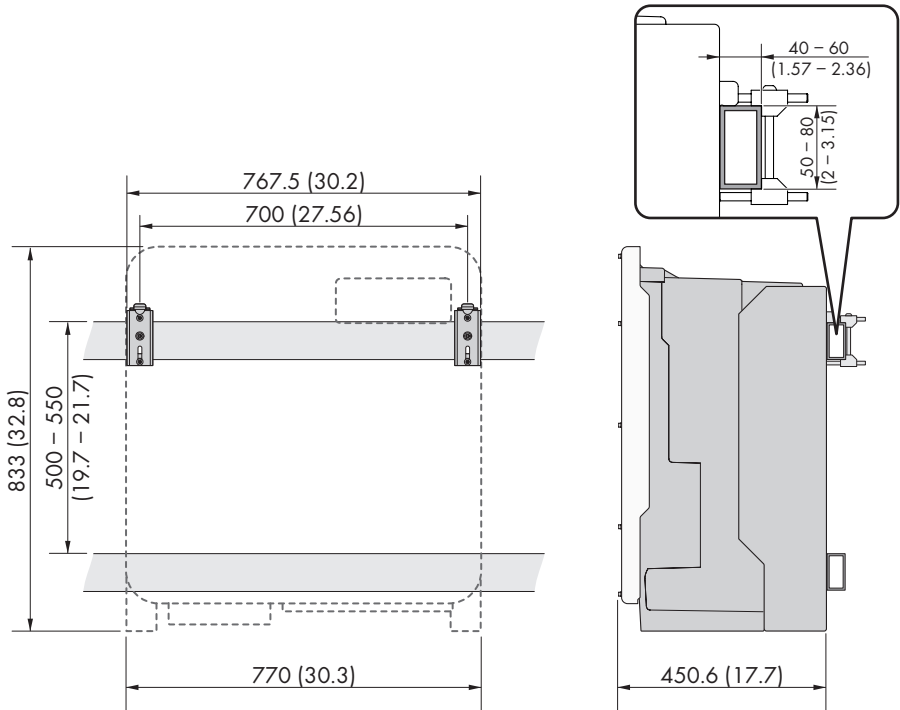


Figure 3: Dimensions of the profile rails and the clamping range of the mounting bracket (dimensions in mm (in))

Center of gravity:

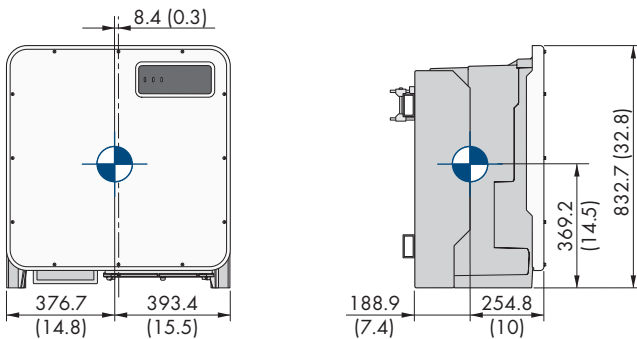


Figure 4: Dimensions of the center of gravity of the product (dimensions in mm (in))

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.

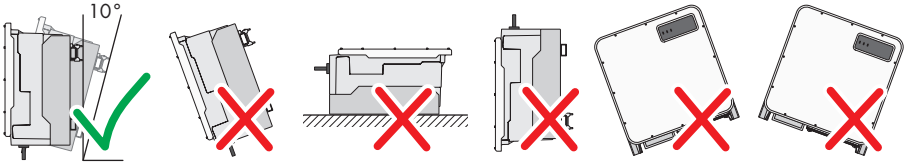


Figure 5: Permitted and prohibited mounting positions

Recommended Clearances:

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

- Maintain the recommended clearances to walls as well as to other inverters or objects.

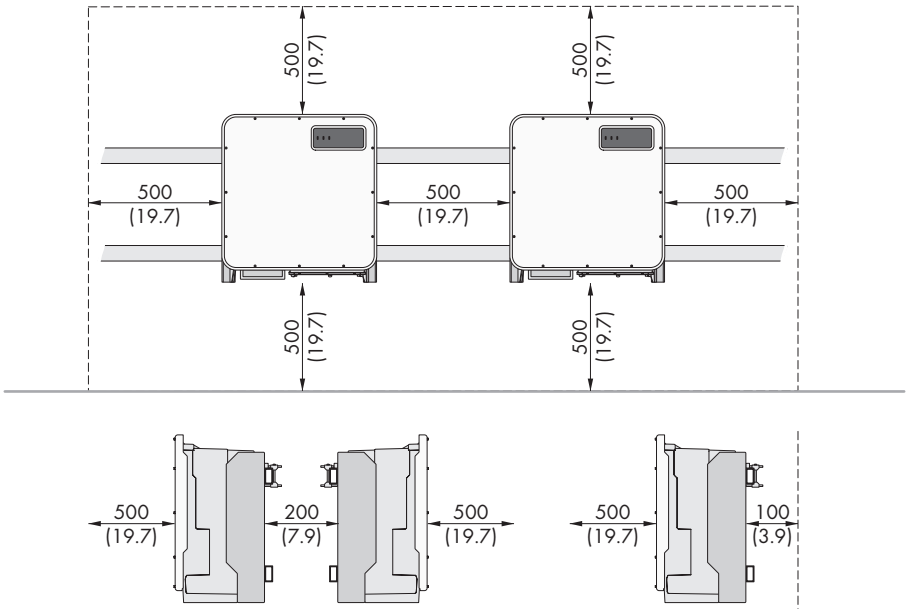
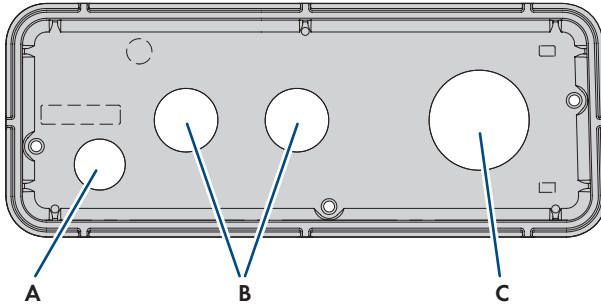


Figure 6: Recommended clearances(Dimensions in mm)

6.2 Connecting Plates Overview

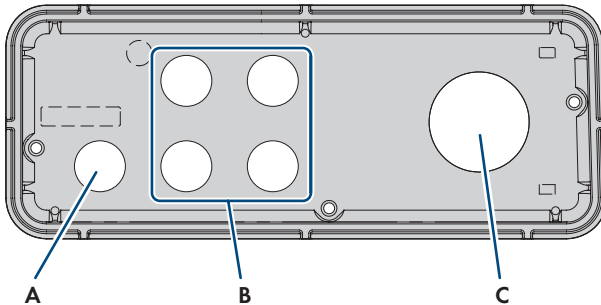
A standard connecting plate is included in the scope of delivery. Another alternative connecting plate can be purchased optionally.

Standard connecting plate



Position	Designation
A	Entry for network cable (M32)
B	Entry for DC cable (M40)
C	Entry for AC cable (M63)

Optionally available connecting plate



Position	Designation
A	Entry for network cable (M32)
B	Entry for DC cable (M32)
C	Entry for AC cable (M63)

6.3 Mounting the Product and Preparing the Connection

QUALIFIED PERSON

DANGER

Danger to life due to electric shock when live cables are touched

High voltages are present on the AC and DC cables. Touching live cables results in death or lethal injuries due to electric shock.

- Do not touch non-insulated parts or cables.
- Disconnect the AC circuit breaker and secure it against reconnection.
- Disconnect the PV array from the inverter via an external DC load-break switch (e.g. via a PV junction including a load-break switch). Switch off and secure the DC load-break switch against reconnection.
- Ensure that all cables to be connected are de-energized.
- Wear suitable personal protective equipment for all work on the product.

CAUTION

Risk of injury due to weight of product

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

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

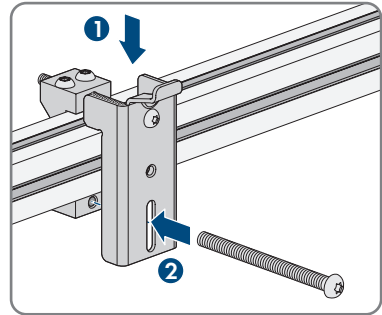
Additionally required material (not included in the scope of delivery):

- For transport with a hoist: 2 eye bolts (M10)

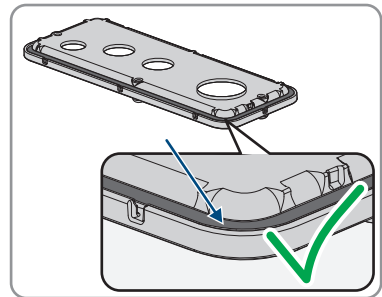
Procedure:

1. Mark the position for the mounting brackets.

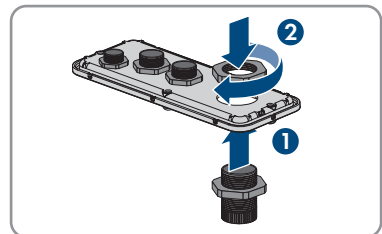
- Hook the mounting bracket onto the mounting rail and insert the screw (M8x105).



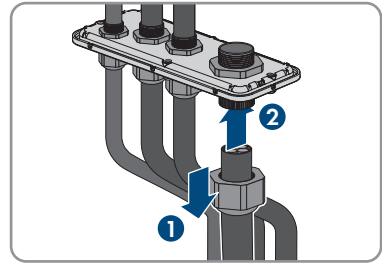
- Fasten all four screws of each mounting bracket hand-tight.
- Ensure the correct position of the mounting brackets by hooking in the mounting template.
- Tighten all four screws of each mounting bracket (TX40, torque: $12 \text{ Nm} \pm 2 \text{ Nm}$).
- Clip the mounting template into the mounting brackets.
- Align the cables by means of the mounting template and shorten if necessary. Take the product depth of 400 mm into account.
- Thread the swivel nuts of the cable glands over the cables.
- Pick up the connection plate and check whether the seal is present and undamaged.



- Attach the cable glands to the connecting plate.

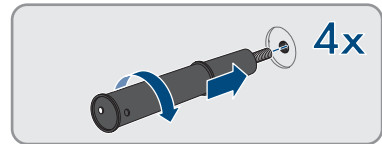


11. Lead the cables through the cable glands in the connecting plate and align the connecting plate by means of the mounting template.

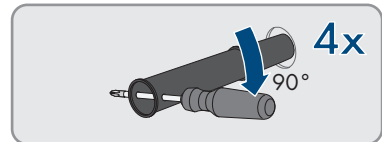


12. Align the connecting plate by means of the mounting template.
13. Remove the mounting template.

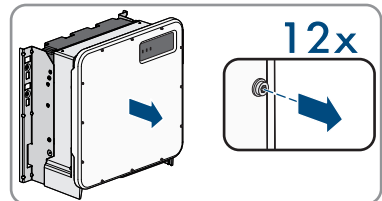
14. Screw the transport handles as far as they will go into the taps on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the transport handles are screwed into the taps so that they are perfectly straight. If the transport handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the taps to the extent that transport handles can no longer be screwed into them.



15. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90°. This ensures that the transport handles are securely tightened.

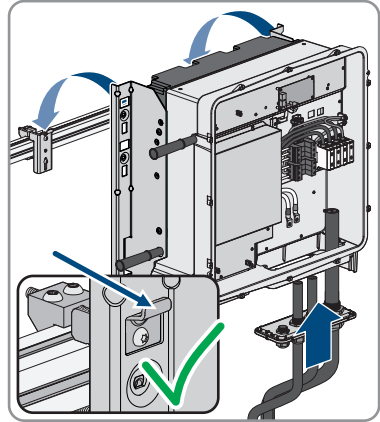


16. If the inverter is to be hooked into the mounting brackets by means of a hoist, screw the eye bolts into the threads on the top of the inverter and attach the hoist to them. The hoist must be suitable to take the weight of the inverter.
17. Unscrew all screws of the enclosure lid (TX25) and remove it.

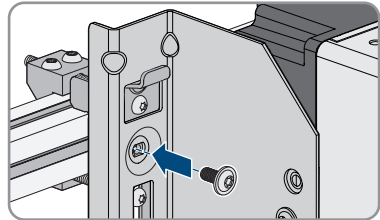


18. Set the screws and the enclosure lid aside and store safely.

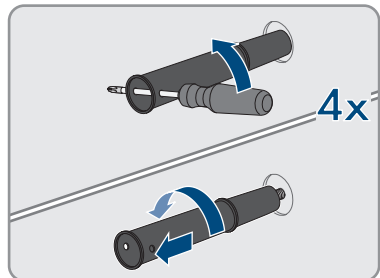
19. Hook the product into the mounting brackets. To do this, guide the product over the cables and the connecting plate so that the cables protrude through the opening into the product and the connecting plate sits under the opening. The bracket must protrude through the upper opening.



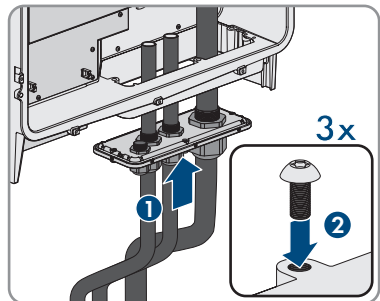
20. Align the cables according to the corresponding terminals and shorten the cables if necessary.
 21. Secure the product with one screw each on the right and left on the mounting bracket (M8x16, TX40, 12 Nm \pm 2 Nm).



22. Remove all four transport handles from the threaded holes. If necessary, insert a screwdriver into the holes on the transport handle and use the screwdriver to remove the transport handle.



23. Fasten the connecting plate to the enclosure using three screws (M8x70, TX40, torque: 8 Nm \pm 0.5 Nm).



7 Electrical Connection

7.1 Overview of the Connection Area

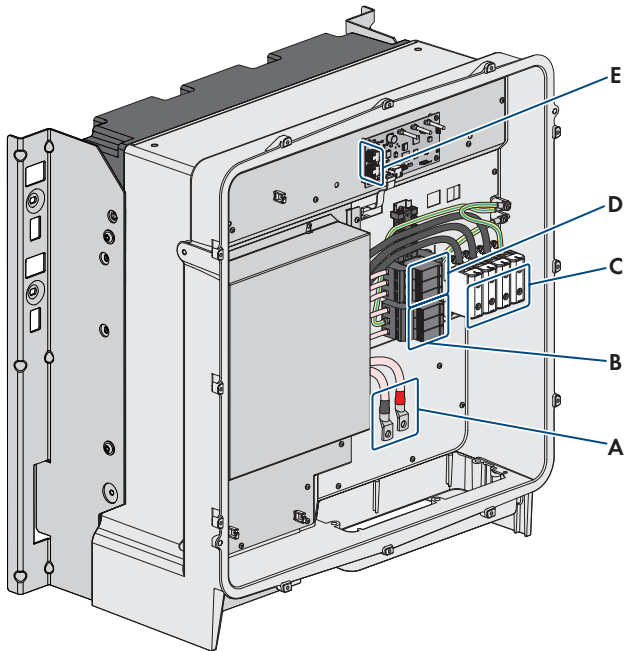


Figure 7: Connection areas in the interior of the product

Position	Designation
A	Cable for DC connection
B	DC overvoltage protection elements
C	Terminal blocks for AC connection
D	AC overvoltage protection elements
E	Network Ports

7.2 Connecting the AC Cable

▲ QUALIFIED PERSON

AC cable requirements:

- Aluminum or copper cables must be used.
- The cable must be made of stranded wire or fine-stranded wire. When using fine stranded wire, bootlace ferrules must be used.
- Cable cross-section: 50 mm² to 150 mm²
- External diameter: 27 mm to 48 mm

Requirements:

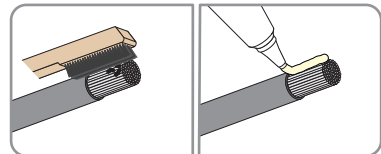
- A suitable medium-voltage transformer must be available.

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

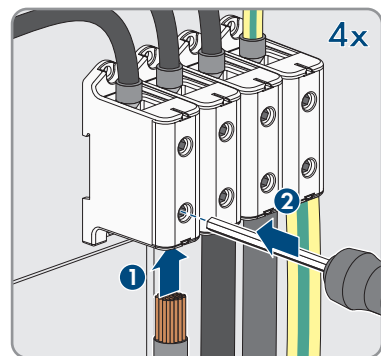
- Protective grease (only for conductors made of aluminum)

Procedure:

1. Ensure that the AC circuit breaker is switched off and that it cannot be reconnected.
2. Shorten the cable if necessary.
3. Strip the cable.
4. Strip off the insulation of L1, L2, L3 and grounding conductor by 30 mm (1.18 in) each.
5. Remove any cable remnants from the product.
6. For conductors made of aluminum, remove any oxide film and apply protective grease to the conductors.



7. Connect PE, L1, L2 and L3 to the terminals according to the label. To do so, position each conductor as far as they will go into the corresponding terminal and tighten the screw of the terminal (AF 8, torque for a conductor cross-section of 50 mm² to 95 mm²: 20 Nm; torque for a cable cross-section of 120 mm² to 150 mm²: 30 Nm).



8. Ensure that the correct conductors are assigned to the terminals.
9. Make sure that all conductors are securely in place.
10. Firmly tighten the swivel nut on the cable gland.

7.3 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.
- The Ethernet interface of the inverter is classified as "TNV-1" and offers protection against overvoltages of up to 1.5 kV.

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

- Network cables
- Where required: Field-assembly RJ45 connector.

Laying the cables:

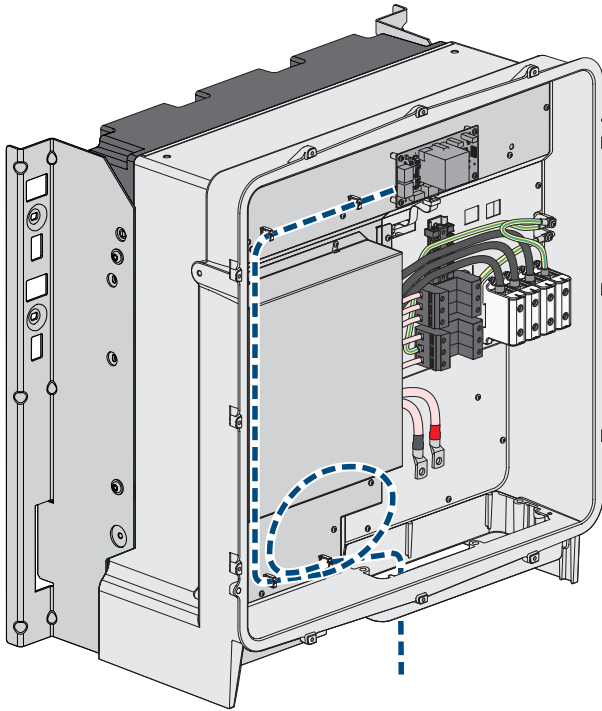


Figure 8: Interior view of the product with laying plan for network cables

Procedure:

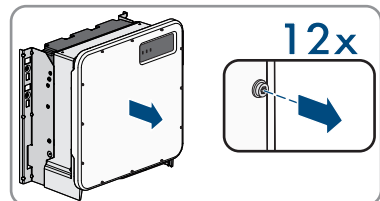
1.

⚠ DANGER

Danger to life due to electric shock

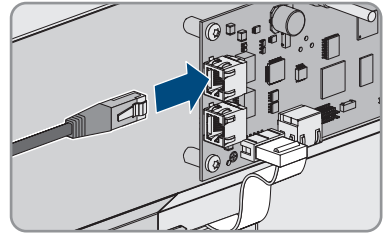
- Disconnect the inverter from all voltage sources (see Section 10, page 52).

2. If the enclosure lid is closed, remove the screws of the enclosure lid (TX 25) and remove the enclosure lid.



3. When using a self-assembly network cable, assemble the RJ45 connectors and connect them to the network cable (see connector documentation).
4. Mount the cable gland to the connecting plate.

5. Route the network cable through the cable gland in the connecting plate into the inverter and lay it in the inverter and fasten to the brackets.
6. Put the RJ45 plug of the cable into one of the network sockets of the communication assembly.



7. Ensure that the RJ45 plug is securely in place by pulling slightly on the cable.
8. Tighten the swivel nut on the cable gland hand-tight. This will secure the network cable in place.
9. If the inverter is installed outdoors, install overvoltage protection for all components in the network.
10. Either connect the other end of the network cable directly to the local network (e.g. via a router) or connect all present inverters in the system to each other in line topology and connect the first or last inverter in the line to the local network.

7.4 Connecting the PV Array

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NOTICE

Damage to the inverter 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.

DC cable requirements:

- Aluminum or copper cables must be used.
- Cable cross-section for connecting a PV combiner box: 95 mm² to 300 mm²
- Maximum cable cross-section for connecting two PV combiner boxes: 95 mm² to 185 mm²
- External diameter for connecting one PV combiner box: 16 mm to 28 mm
- External diameter for connecting two PV combiner boxes: 18 mm to 25 mm
- The cables must be equipped with terminal lugs.

Requirements:

- Depending on the design, one or two PV combiner boxes must be present.
- The DC cables have been inserted into the product.

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

- Clean cloth
- Ethanol cleaning agent
- Two or four terminal lugs (flange hole: M10, cross-section: appropriate to DC cables used)
- Press tool

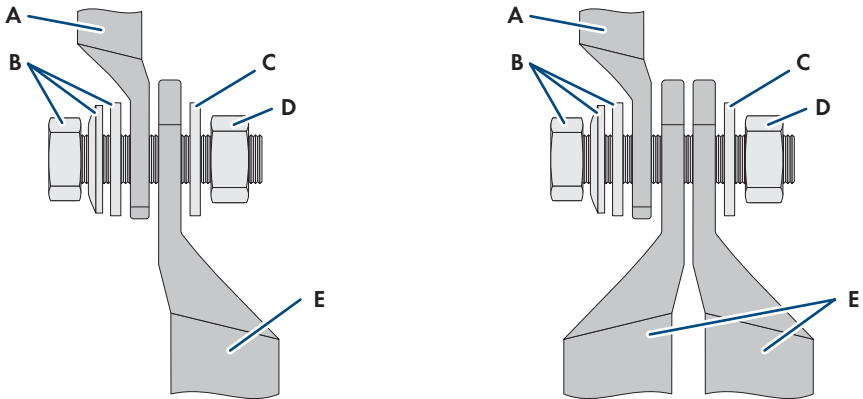
DC connection overview

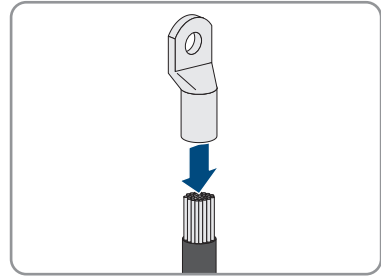
Figure 9: DC connection overview for the connection of one PV combiner box or of two PV combiner boxes

Position	Designation
A	Pre-harnessed connection cable with terminal lug for DC connection (installed in the product)
B	M10x40 combination hexagon head screw (AF16)
C	Washer M10
D	Hexagon nut M10
E	DC-cable with terminal lug (provided by customer)

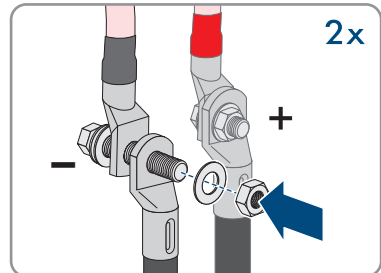
Procedure:

1. Ensure that no voltage is present on the DC cables.
 - Dismantle the equipment grounding conductor.
 - Attach equipment grounding conductor to terminal lug.
 - Connect the equipment grounding conductor to the equipment grounding terminal using the hexagon socket screw M6x16 (TX20, torque: 6 Nm ± 0.3 Nm).

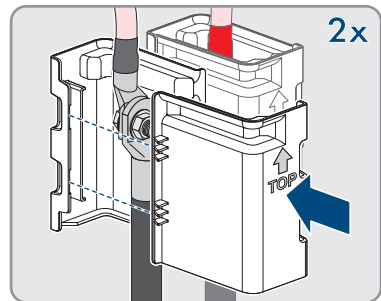
2. Dismantle the DC cables.
3. Fit terminal lugs to the DC conductors.



4. Remove any cable remnants from the product.
5. Remove the fixing of the pre-harnessed DC cables from the product.
6. Clean the contact surfaces of all terminal lugs using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.
7. Connect the DC cables with each other. To do this, tighten the terminal lugs with washer and screw (AF16, torque: $24 \text{ Nm} \pm 2 \text{ Nm}$). Ensure correct polarity.



8. Place the touch protection elements around the terminal lugs and plug together until they audibly click into place.



9. Firmly tighten the swivel nuts of the cable glands.

8 Commissioning

8.1 Commissioning Procedure

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

Procedure	See
1. Commission the inverter.	Section 8.2, page 35
2. Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: <ul style="list-style-type: none"> • Direct connection via Ethernet • Connection via Ethernet in the local network 	Section 9.1, page 40
3. Log into the user interface.	Section 9.2, page 42
4. Select the inverter configuration option. Please note that the SMA Grid Guard code for changing the grid-relevant parameters must be available after completion of the first ten feed-in hours or installation assistant (see "Application for the SMA Grid Guard code" available at www.SMA-Solar.com).	Section 8.3, page 36
5. Ensure that the country data set has been configured correctly.	Section 9.8, page 48
6. Make further inverter settings as needed.	Section 9, page 40

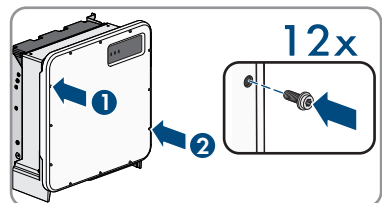
8.2 Commissioning the Inverter

⚠ QUALIFIED PERSON

- A means of disconnecting the inverter from the PV array must be present.
- The AC circuit breaker must be correctly rated and mounted.
- The inverter must be correctly mounted.
- All cables must be correctly connected.

Procedure:

1. Position the enclosure lid and first tighten the upper-left and lower-right screws, and then the remaining screws crosswise (TX25, torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$).



2. Switch on DC via the PV combiner box or the external DC switch.
3. Switch on the AC circuit breaker.
 - ☑ All three LEDs light up. The start-up phase begins.
 - ☑ All three LEDs go out again after approximately 90 seconds.
 - ☑ Depending on the available power, the green LED pulses or is continuously illuminated. The inverter is feeding in.
4. 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.
5. If the red LED lights up, an event has occurred. Find out which event has occurred and, if necessary, initiate countermeasures.

8.3 Selecting a configuration option

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After you have logged onto the user interface as **Installer**, the **Configuring the Inverter** page opens.

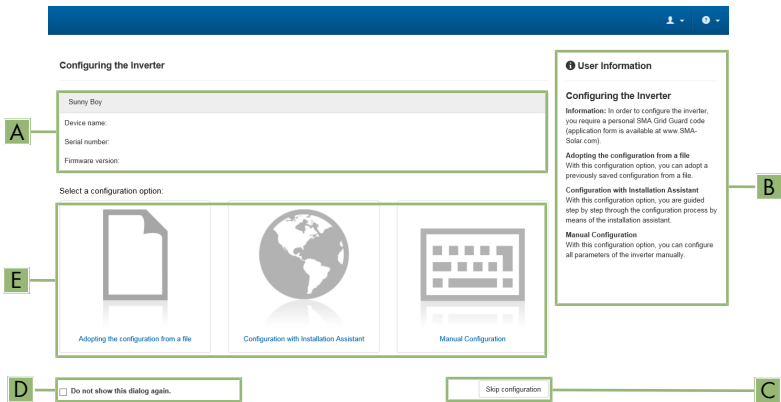


Figure 10: Layout of the **Configuring the Inverter** page

Position	Designation	Description
A	Device information	Provides the following information: <ul style="list-style-type: none"> • Device name • Inverter serial number • Inverter firmware version
B	User information	Provides brief information on the listed configuration options

Position	Designation	Description
C	Skip configuration	Offers the option of skipping the inverter configuration and go directly to the user interface (not recommended)
D	Checkbox	Allows you to choose not to have the displayed page displayed again when the user interface is called up again
E	Configuration options	Provides a selection of the various configuration options

Procedure:

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

- Adoption of configuration from a file
- Configuration with the installation assistant (recommended)
- Manual configuration

Accepting the settings

Saving the made settings is indicated by an hourglass symbol on the user interface. If the DC voltage is sufficient, the data is transferred directly to the inverter and accepted. If the DC voltage is too low (e. g. in the evening), the settings are saved, but they cannot be directly transferred to or accepted by the inverter. As long as the inverter has not yet received and accepted the settings, the hourglass symbol will continue to be displayed on the user interface. The settings will be accepted when there is sufficient DC voltage applied and the inverter restarts. As soon as the hourglass symbol appears on the user interface, the settings have been saved. The settings will not be lost. You can log off of the user interface and leave the system.

Adopting the Configuration from a File

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

Procedure:

1. Select the configuration option **Adopting configuration from a file**.
2. Select [**Browse...**] and select the desired file.
3. Select [**Import file**].

Configuring the Installation Assistant (Recommended)

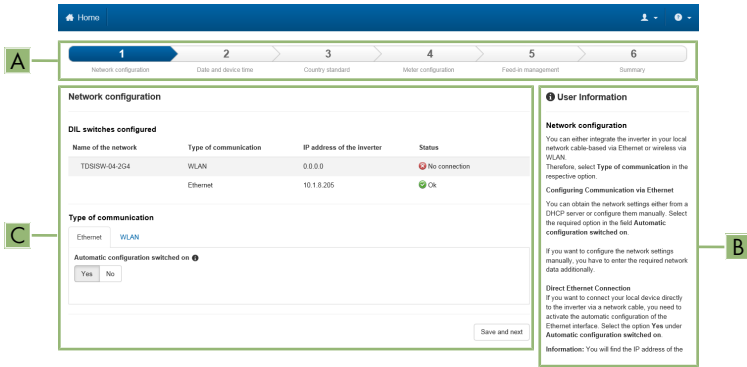


Figure 11: Layout of the installation assistant (example)

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

Procedure:

- Select the configuration option **Configuration with Installation Assistant**.
 - The installation assistant will open.
- Follow the installation assistant steps and make the settings appropriate for your system.
- For every setting made in a step, select [**Save and next**].
 - In the last step, all made settings are listed in a summary.
- To save the settings to a file, select [**Export a summary**] and save the file on your computer, tablet PC or smartphone.
- To export all parameters and their settings, select [**Export all parameters**]. This exports all parameters and their settings into an HTML file.
- To correct settings you made, select [**Back**], navigate to the desired step, correct settings and select [**Save and continue**].
- Once all settings are correct, select [**Next**] in the summary.
 - The start page of the user interface opens.

Manual configuration

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

Procedure:

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

9 Operation

9.1 Establishing a connection to the user interface

9.1.1 Establishing a Direct Connection via Ethernet

Requirements:

- The product must be commissioned.
- An end device (e.g. computer) with an Ethernet interface must be available.
- The product must be connected directly to the end device.
- The respective latest version of one of the following web browsers must be installed: Chrome, Edge, Firefox, Internet Explorer or Safari.
- The SMA Grid Guard code of the Installer must be available for the changing of grid-relevant settings after completion of the first ten feed-in hours or installation assistant (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

i IP address of the inverter

- Standard inverter IP address for direct connection via Ethernet: 169.254.12.3

Procedure:

1. Open the web browser of your device, enter the IP address **169.254.12.3** in the address line and press the enter key.
 2. **i** **Web browser signals a security vulnerability**

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

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

9.1.2 Establishing a Connection via Ethernet in the local network

i New IP address for connecting with a local network

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

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

Requirements:

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

Procedure:

1. Open the web browser of your end device, enter the IP address of the inverter in the address line of the web browser and press the enter key.
 2. **i** **Web browser signals a security vulnerability**

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

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

9.2 Logging In and Out of the User Interface

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

Usage of cookies

For the correct display of the user interface, cookies are required. The cookies are used for convenience only. By using this user interface you agree to the placement of cookies.

Log in as Installer or User for the First Time

Password for PV systems that are registered in a communication product

The password for the user group **Installer** is also the system password. If you assign a password for the user group **Installer** via the user interface of the inverter, the password must match the PV system password. If the new password for logging onto the user interface does not match the system password in the communication product, the inverter cannot be reached by the communication product.

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

Procedure:

1. In the drop-down list **Language**, select the desired language.
 2. In the **User group** drop-down list, select the entry **Installer** or **User**.
 3. In the **New password** field, enter a new password for the selected user group.
 4. In the **Repeat password** field, enter the new password again.
 5. Select **Login**.
- The **Configuring the Inverter** page opens.

Log in as the User or Installer

1. In the drop-down list **Language**, select the desired language.
 2. In the **User group** drop-down list, select the entry **Installer** or **User**.
 3. Enter the password in the field **Password**.
 4. Select **Login**.
- The start page of the user interface opens.

Log Out as the User or Installer

1. On the right-hand side of the menu bar, select the menu **User Settings**.
 2. In the subsequent context menu, select [**Logout**].
- The login page of the user interface opens. The logout was successful.

9.3 Start Page Design of the User Interface

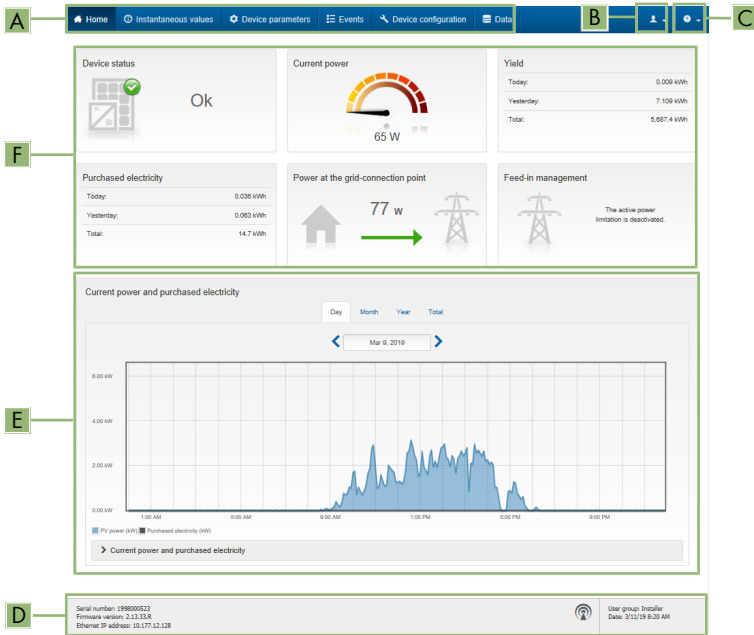


Figure 12: Design of the user interface's start page (example)

Position	Designation	Description
A	Menu	<p>Provides the following functions:</p> <ul style="list-style-type: none"> • Home Opens the user interface homepage • Instantaneous values Current measured values of the inverter • Device Parameters The various operating parameters of the inverter can be viewed and configured here depending on the user group. • Events All events that have occurred in the selected time period are displayed here. The event types are Information, Warning and Error. Currently existing events of the types Error and Warning will be additionally displayed in the Device status viewlet. However, only the higher-priority event is displayed. If, for example, there is a Warning and an Error present at the same time, only the Error will be displayed. • Device configuration Various settings for the inverter can be made here. The selection available is dependent on which user group you are logged in as and the operating system of the device with which the user interface has been called up. • Data You will find all data that is saved in the internal memory of the inverter or on an external storage medium on this page.
B	User settings	<p>Provides the following functions, depending on the user group logged in:</p> <ul style="list-style-type: none"> • Starting the installation assistant • SMA Grid Guard login • Logout
C	Help	<p>Provides the following functions:</p> <ul style="list-style-type: none"> • Displaying information on Open Source licenses used • Link to the website of SMA Solar Technology AG
D	Status bar	<p>Displays the following information:</p> <ul style="list-style-type: none"> • Inverter serial number • Inverter firmware version • IP address of the inverter in the local network • User group logged in • Date and device time of the inverter

Position	Designation	Description
E	Current power and current consumption	Temporal progression of the PV power and the power consumption of the household over the selected time period. Please note, the power consumption will only be displayed if an energy meter is installed in the PV system.
F	Status display	<p>The various areas display information on the current status of the PV system.</p> <ul style="list-style-type: none"> • Device status Displays whether the inverter is currently in a fault-free operating state or whether there is an Error or Warning present. • Current power Displays the power currently being generated by the inverter. • Yield Displays the energy yield of the inverter. • Grid supply Displays the energy supply from the utility grid. • Power at the grid-connection point Indicates which power is currently fed in or obtained at the grid-connection point. • Feed-in management Displays whether the inverter is currently limiting its active power or whether the active power limitation is switched off.

9.4 Displaying and Downloading the Stored Data

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Select the menu **Data**.
4. Select the folder **Data**.
5. To call up the data, select the respective folder and click on the required file.
6. To download the data, select the data type to be exported in the drop-down list. Then apply the time filter and select **Data export**.

9.5 Starting the Installation Assistant

QUALIFIED PERSON

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

Layout of the installation assistant

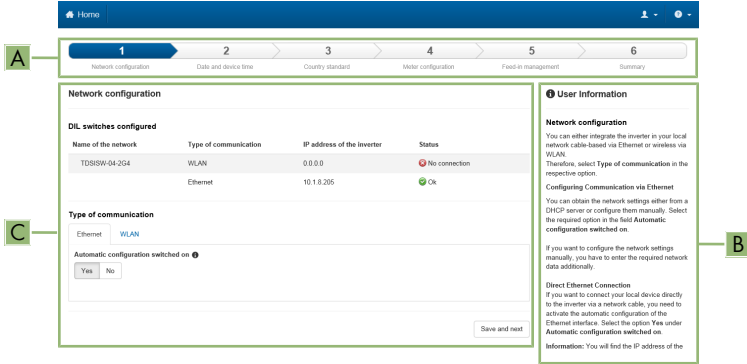


Figure 13: Layout of the installation assistant (example)

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

Requirement:

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
 2. Log in as **Installer**.
 3. Select the menu **User Settings** (see Section 9.3, page 43) on the start page of the user interface.
 4. In the context menu, select [**Starting the installation assistant**].
- ☑ The installation assistant will open.

9.6 Changing the Password

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

i PV systems registered in a communication product

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

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Call up the menu **Device Parameters**.
4. Select [**Edit parameters**].
5. In the parameter group **User Rights > Access Control** change the password of the desired user group.
6. Select [**Save all**] to save the changes.

9.7 Changing Operating Parameters

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

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

Requirements:

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Call up the menu **Device Parameters**.
4. Select [**Edit parameters**].
5. Log in using the SMA Grid Guard code to change those parameters designated by a lock (only for installers):
 - Select the menu **User Settings** (see Section 9.3, page 43).

- In the subsequent context menu, select [**SMA Grid Guard login**].
 - Enter the SMA Grid Guard code and select [**Login**].
6. Expand the parameter group that contains the parameter which is to be configured.
 7. Change the desired parameters.
 8. Select [**Save all**] to save the changes.
- The inverter parameters are set.

i Accepting the settings

Saving the made settings is indicated by an hourglass symbol on the user interface. If the DC voltage is sufficient, the data is transferred directly to the inverter and accepted. If the DC voltage is too low (e. g. in the evening), the settings are saved, but they cannot be directly transferred to or accepted by the inverter. As long as the inverter has not yet received and accepted the settings, the hourglass symbol will continue to be displayed on the user interface. The settings will be accepted when there is sufficient DC voltage applied and the inverter restarts. As soon as the hourglass symbol appears on the user interface, the settings have been saved. The settings will not be lost. You can log off of the user interface and leave the system.

9.8 Configuring the Country Data Set

⚠ QUALIFIED PERSON

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

i The country data set must be set correctly.

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

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

The basic procedure for changing operating parameters is explained in another section (see Section 9.7 "Changing Operating Parameters", page 47).

Procedure:

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

9.9 Configuring the Modbus Function

⚠ QUALIFIED PERSON

The Modbus interface is deactivated by default and the communication ports 502 set.

In order to access SMA inverters with SMA Modbus® or SunSpec® Modbus®, the Modbus interface must be activated. After activating the interface, the communication ports of both IP protocols can be changed. For information on commissioning and configuration of the Modbus interface, see the technical information "SMA and SunSpec Modbus® Interface" at www.SMA-Solar.com.

For information on which Modbus registers are supported, see the technical information "Modbus® parameters and measured values" at www.SMA-Solar.com.

Data security during activated Modbus interface

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

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

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

Procedure:

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

9.10 Saving the Configuration in a File

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Saving the configuration in a file**].
6. Follow the instructions in the dialog.

9.11 Adopting a Configuration from a File

QUALIFIED PERSON

To configure the inverter, you can adopt the configuration from a file. To be able to do this, you must first save the configuration of another inverter from the same type or device family in a file (see Section 9.10 "Saving the Configuration in a File", page 49). When saving, only the device parameters will be adopted, not any passwords.

Requirements:

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

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface as an **Installer**.
3. Select the menu **Device Configuration**.
4. Select [**Settings**].
5. In the context menu, select [**Adopting the configuration from a file**].
6. Follow the instructions in the dialog.

9.12 Updating the Firmware

QUALIFIED PERSON

If no automatic update is set for the inverter in the communication product (e.g. SMA Data Manager, Cluster Controller, Sunny Portal) or via the user interface of the inverter, you have the option of carrying out a manual firmware update.

You have the following options to update the firmware:

- Update the firmware with the existing update file via the user interface of the inverter.
- Search and install the firmware via the user interface of the inverter.

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

Requirements:

- An update file with the desired inverter firmware must be available. The update file is, for example, available for download on the product page of the inverter at www.SMA-Solar.com.

Procedure:

1. Activate the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Select the menu **Device Configuration**.
4. In the inverter row, click on the gear icon and select **Update firmware**.
5. Select [**Browse**] and select the update file for the inverter.
6. Select **Update firmware**.
7. Follow the instructions in the dialog.

Search and install the firmware via the user interface of the inverter.

Requirements:

- The inverter must be connected to the Internet.

Procedure:

1. Open the user interface (see Section 9.1, page 40).
2. Log into the user interface (see Section 9.2, page 42).
3. Click on [**Edit parameters**].

4. Go to **Device > Update**.
 5. Select the parameter **Check for update and install it** and set it to **Execute**.
 6. Click on [**Save all**].
- The firmware is updated in the background.

10 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

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

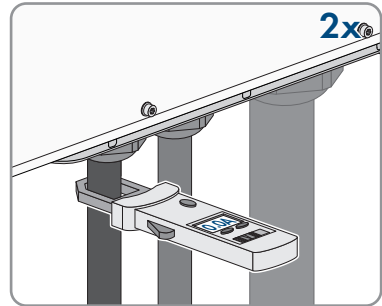
NOTICE

Destruction of the measuring device due to overvoltage

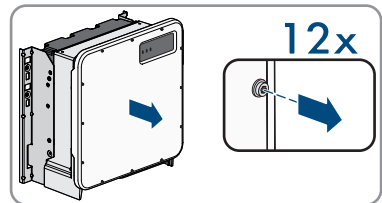
- Only use measuring devices with a DC input voltage range of 1500 V or higher and an AC input voltage range of 600 V or higher.

Procedure:

1. Disconnect the AC circuit breaker and secure it against reconnection.
2. Disconnect the DC terminal of the inverter via the PV combiner box or the external DC switch.
3. Wait five minutes.
4. Wait until the LEDs have gone out.
5. Use a current clamp to ensure that no current is present in the DC cables. As a result, a possible residual current can be detected.

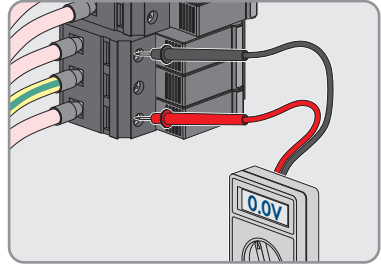


6. Unscrew all screws of the enclosure lid (TX25) and remove it.

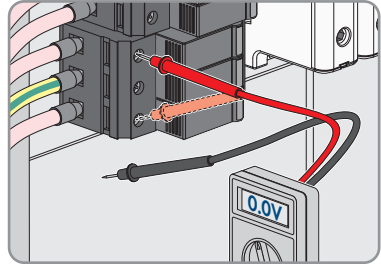


7. Set the screws and the enclosure lid aside and store safely.

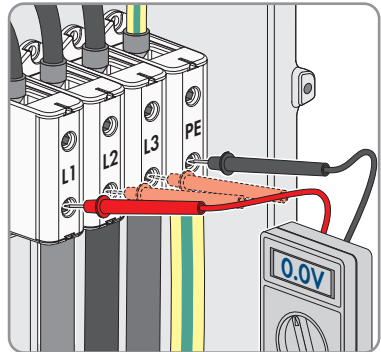
8. Ensure that no voltage is present between the positive terminal and negative terminal on the DC surge protection devices using a suitable measuring device. To do so, insert the test probe (maximum diameter: 2.5 mm) into the measuring points of the DC surge protection devices.



9. Ensure that no voltage is present between the positive terminal and ground as well as between the negative terminal and ground on the DC surge protection devices using a suitable measuring device. To do so, insert a test probe (maximum diameter: 2.5 mm) into the measuring points of the DC surge protection devices and hold the other one, for example, on the enclosure.



10. Ensure that there is no voltage on the AC terminal block between L1 and grounding conductor, L2 and grounding conductor, and L3 and grounding conductor using a suitable measuring device. To do so, insert the test probe (maximum diameter: 2.5 mm) into the measuring points of the respective terminal blocks.



11 Cleaning the Inverter

NOTICE

Damage 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.
- Ensure that the inverter is free of dust, foliage and other dirt.

12 Troubleshooting

12.1 Forgotten Password

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

Procedure:

1. Request PUK (application form available at www.SMA-Solar.com).
2. Activate the user interface (see Section 9.1, page 40).
3. Enter the PUK instead of the password into the field **Password**.
4. Select **Login**.
5. Call up the menu **Device Parameters**.
6. Select [**Edit parameters**].
7. In the parameter group **User Rights > Access Control** change the password of the desired user group.
8. Select [**Save all**] to save the changes.

PV Systems in Sunny Portal

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

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

12.2 Event Messages

Event number	Message, cause and corrective measures
101 102 103 105 202 203 206	<p data-bbox="314 236 594 268">⚠ QUALIFIED PERSON</p> <p data-bbox="292 284 393 309">Grid fault</p> <p data-bbox="292 320 981 376">The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid.</p> <p data-bbox="292 387 508 413">Corrective measures:</p> <ul data-bbox="311 424 994 659" style="list-style-type: none"> <li data-bbox="311 424 994 595">• 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 Service.
301	<p data-bbox="314 675 594 707">⚠ QUALIFIED PERSON</p> <p data-bbox="292 722 393 748">Grid fault</p> <p data-bbox="292 759 994 871">The ten-minute average value of the grid voltage is no longer within the permissible range. The grid voltage or grid impedance at the connection point is too high. The inverter disconnects from the utility grid to maintain power quality.</p> <p data-bbox="292 882 508 908">Corrective measures:</p> <ul data-bbox="311 919 994 1158" style="list-style-type: none"> <li data-bbox="311 919 994 1158">• 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 Service.

Event number	Message, cause and corrective measures
302	<p data-bbox="311 183 599 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 621 263">Active power limited AC voltage</p> <p data-bbox="288 271 974 327">The inverter has reduced its power due to a too-high grid voltage to ensure grid stability.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 1008 534" style="list-style-type: none"> • If possible, check the grid voltage and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 16, page 86).
401 404	<p data-bbox="311 550 599 582">⚠ QUALIFIED PERSON</p> <p data-bbox="288 598 392 630">Grid fault</p> <p data-bbox="288 638 1008 694">The inverter has disconnected from the utility grid. A stand-alone grid or a very large change in the power frequency was detected.</p> <p data-bbox="288 702 509 726">Corrective measures:</p> <ul data-bbox="311 734 1008 758" style="list-style-type: none"> • Check the grid connection for significant short-term frequency fluctuations.
501	<p data-bbox="311 774 599 805">⚠ QUALIFIED PERSON</p> <p data-bbox="288 821 392 853">Grid fault</p> <p data-bbox="288 861 991 917">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 925 509 949">Corrective measures:</p> <ul data-bbox="311 957 996 1165" style="list-style-type: none"> • If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the Service.

Event number	Message, cause and corrective measures
507	<p data-bbox="311 185 594 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 650 263">Active power limited AC frequency</p> <p data-bbox="288 272 986 327">The inverter has reduced its power due to a too-high power frequency to ensure grid stability.</p> <p data-bbox="288 336 508 360">Corrective measures:</p> <ul data-bbox="311 370 1005 539" style="list-style-type: none"> <li data-bbox="311 370 1005 539">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 16, page 86).
601	<p data-bbox="311 552 594 587">⚠ QUALIFIED PERSON</p> <p data-bbox="288 603 393 630">Grid fault</p> <p data-bbox="288 639 978 694">The inverter has detected an excessively high proportion of direct current in the grid current.</p> <p data-bbox="288 703 508 727">Corrective measures:</p> <ul data-bbox="311 737 967 826" style="list-style-type: none"> <li data-bbox="311 737 736 764">• Check the grid connection for direct current. <li data-bbox="311 774 967 826">• If this message is displayed frequently, contact the grid operator and check whether the monitoring threshold on the inverter can be raised.
701	<p data-bbox="311 839 594 874">⚠ QUALIFIED PERSON</p> <p data-bbox="288 890 676 917">Frq. not permitted > Check parameter</p> <p data-bbox="288 927 992 981">The power frequency is not within the permissible range. The inverter has disconnected from the utility grid.</p> <p data-bbox="288 991 508 1015">Corrective measures:</p> <ul data-bbox="311 1024 997 1240" style="list-style-type: none"> <li data-bbox="311 1024 997 1240">• If possible, check the power frequency and observe how often fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator and request approval to change the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with Service (see Section 16, page 86).

Event number	Message, cause and corrective measures
1302	<p data-bbox="311 183 599 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 1002 295">Waiting for grid voltage > Installation failure grid connection > Check grid and fuses</p> <p data-bbox="288 300 442 327">L not connected.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 935 486" style="list-style-type: none"> • Ensure that L is connected. • Ensure that the circuit breaker is switched on. • Ensure that the AC cable is not damaged and that it is connected correctly.
1501	<p data-bbox="311 502 599 534">⚠ QUALIFIED PERSON</p> <p data-bbox="288 550 532 582">Reconnection fault grid</p> <p data-bbox="288 590 996 678">The changed country data set or the value of a parameter you have set does not correspond to the local requirements. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 686 509 710">Corrective measures:</p> <ul data-bbox="311 718 1008 774" style="list-style-type: none"> • Ensure that the country data set has been configured correctly. To do this, select the parameter Set country standard and check the value.
3302 3303	<p data-bbox="311 790 599 821">⚠ QUALIFIED PERSON</p> <p data-bbox="288 837 492 869">Unstable operation</p> <p data-bbox="288 877 1002 933">There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.</p> <p data-bbox="288 941 509 965">Corrective measures:</p> <ul data-bbox="311 973 968 1069" style="list-style-type: none"> • Ensure that the PV array is designed correctly. • Ensure that the PV array is not covered by snow or otherwise shaded. • Ensure that the PV array is free of errors.

Event number	Message, cause and corrective measures
3401	<p data-bbox="311 188 595 220">⚠ QUALIFIED PERSON</p> <p data-bbox="288 236 696 263">DC overvoltage > Disconnect generator</p> <p data-bbox="288 272 822 300">Overvoltage at the DC input. This can destroy the inverter.</p> <p data-bbox="288 308 916 335">This message is signaled additionally by rapid flashing of the LEDs.</p> <p data-bbox="288 343 508 370">Corrective measures:</p> <ul data-bbox="311 378 996 619" style="list-style-type: none"> <li data-bbox="311 378 904 405">• Immediately disconnect the inverter from all voltage sources. <li data-bbox="311 413 996 496">• Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC connectors to the inverter. <li data-bbox="311 504 992 587">• If the DC voltage exceeds the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the installer of the PV array. <li data-bbox="311 595 864 622">• If this message is repeated frequently, contact the Service.
3501	<p data-bbox="311 635 595 667">⚠ QUALIFIED PERSON</p> <p data-bbox="288 683 658 710">Insulation failure > Check generator</p> <p data-bbox="288 719 801 746">The inverter has detected a ground fault in the PV array.</p> <p data-bbox="288 754 508 782">Corrective measures:</p> <ul data-bbox="311 790 687 817" style="list-style-type: none"> <li data-bbox="311 790 687 817">• Check the PV system for ground faults.
3601	<p data-bbox="311 834 595 866">⚠ QUALIFIED PERSON</p> <p data-bbox="288 882 696 909">High discharge curr. > Check generator</p> <p data-bbox="288 919 965 973">The leakage current of the inverter and the PV array is too high. There is a ground fault, a residual current or a malfunction.</p> <p data-bbox="288 981 996 1064">The inverter interrupts feed-in operation immediately after exceeding a threshold. When the fault is eliminated, the inverter automatically reconnects to the utility grid.</p> <p data-bbox="288 1072 508 1099">Corrective measures:</p> <ul data-bbox="311 1107 687 1134" style="list-style-type: none"> <li data-bbox="311 1107 687 1134">• Check the PV system for ground faults.
3701	<p data-bbox="311 1153 595 1185">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1201 680 1228">Resid.curr.too.high > Check generator</p> <p data-bbox="288 1238 1008 1292">The inverter has detected a residual current due to temporary grounding of the PV array.</p> <p data-bbox="288 1300 508 1327">Corrective measures:</p> <ul data-bbox="311 1335 687 1362" style="list-style-type: none"> <li data-bbox="311 1335 687 1362">• Check the PV system for ground faults.

Event number	Message, cause and corrective measures
3901 3902	<p data-bbox="314 188 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 824 263">Waiting for DC start conditions > Start cond. not met</p> <p data-bbox="292 272 829 300">The feed-in conditions for the utility grid are not yet fulfilled.</p> <p data-bbox="292 309 508 336">Corrective measures:</p> <ul data-bbox="311 344 975 560" style="list-style-type: none"> <li data-bbox="311 344 975 371">• Ensure that the PV array is not covered by snow or otherwise shaded. <li data-bbox="311 379 580 406">• Wait for higher irradiation. <li data-bbox="311 414 975 496">• If this message is displayed frequently in the morning, increase the voltage limit for starting grid feed-in. Change the parameter Critical voltage to start feed-in. <li data-bbox="311 504 975 560">• If this message is displayed frequently with medium irradiation, ensure that the PV array is correctly rated.
6001 to 6438	<p data-bbox="314 574 596 606">⚠ QUALIFIED PERSON</p> <p data-bbox="292 622 652 649">Self diagnosis > Interference device</p> <p data-bbox="292 659 708 686">The cause must be determined by the Service.</p> <p data-bbox="292 695 508 722">Corrective measures:</p> <ul data-bbox="311 730 519 758" style="list-style-type: none"> <li data-bbox="311 730 519 758">• Contact the Service.
6501 6502	<p data-bbox="314 770 596 802">⚠ QUALIFIED PERSON</p> <p data-bbox="292 818 637 845">Self-diagnosis > Overtemperature</p> <p data-bbox="292 855 826 882">The inverter has switched off due to excessive temperature.</p> <p data-bbox="292 892 508 919">Corrective measures:</p> <ul data-bbox="311 927 983 1050" style="list-style-type: none"> <li data-bbox="311 927 983 983">• Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush. <li data-bbox="311 991 770 1018">• Ensure that the inverter has sufficient ventilation. <li data-bbox="311 1026 919 1050">• Ensure that the inverter is not exposed to direct solar irradiation.
6511	<p data-bbox="314 1069 596 1101">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1117 471 1144">Overtemperature</p> <p data-bbox="292 1153 818 1181">An overtemperature has been detected in the choke area.</p> <p data-bbox="292 1190 508 1217">Corrective measures:</p> <ul data-bbox="311 1225 983 1348" style="list-style-type: none"> <li data-bbox="311 1225 983 1281">• Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush. <li data-bbox="311 1289 770 1316">• Ensure that the inverter has sufficient ventilation. <li data-bbox="311 1324 919 1348">• Ensure that the inverter is not exposed to direct solar irradiation.
6512	<p data-bbox="292 1361 757 1388">Minimum operating temperature not reached</p> <p data-bbox="292 1398 949 1447">The inverter will only recommence grid feed-in once the temperature has reached at least -25°C.</p>

Event number	Message, cause and corrective measures
6701 6702	<p>⚠ QUALIFIED PERSON</p> <p>Communication disturbed</p> <p>Error in the communication processor, the inverter continues feeding in, however. The cause must be determined by the Service.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • If this message is displayed frequently, contact the Service.
7001 7002 7015	<p>Fault sensor interior temperature</p> <p>The cause must be determined by the Service.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
7102	<p>⚠ QUALIFIED PERSON</p> <p>Parameter file not found or defective</p> <p>The parameter file was not found or is defective. Loading the parameter file has failed. The inverter continues to feed in.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Copy the parameter file to the correct folder again.
7106	<p>Update file defect.</p> <p>The update file is defective. The update failed. The inverter continues to feed in.</p>
7110	<p>No update file found</p> <p>No new update file was found on the SD memory card. The update failed. The inverter continues to feed in.</p>
7112	<p>Update file successfully copied</p>
7113	<p>The memory card is full or write-protected</p>
7201 7202	<p>Data storage not possible</p>
7303	<p>⚠ QUALIFIED PERSON</p> <p>Update main CPU failed</p> <p>The cause must be determined by the Service.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Contact the Service.
7320	<p>The device with serial number [xx] was successfully updated to firmware version [xxx].</p> <p>The firmware update was completed successfully.</p>

Event number	Message, cause and corrective measures
7324	<p data-bbox="311 181 594 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 566 261">Wait for update conditions</p> <p data-bbox="292 272 990 325">The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p> <p data-bbox="292 336 508 362">Corrective measures:</p> <ul data-bbox="311 368 897 464" style="list-style-type: none"> <li data-bbox="311 368 460 394">• Retry update. <li data-bbox="311 400 897 426">• Ensure that the selected update file is suitable for this inverter. <li data-bbox="311 432 833 464">• If this message is displayed again, contact the Service.
7330	<p data-bbox="292 475 497 501">Condition test failed</p> <p data-bbox="292 512 990 564">The testing of the update conditions was not successful. The firmware update package is not suitable for this inverter.</p>
7331	<p data-bbox="292 582 546 608">Update transport started</p> <p data-bbox="292 619 546 644">Update file is being copied.</p>
7332	<p data-bbox="292 657 575 683">Update transport successful</p> <p data-bbox="292 694 919 719">Update file was copied successfully to the inverter's internal memory.</p>
7333	<p data-bbox="311 732 594 770">⚠ QUALIFIED PERSON</p> <p data-bbox="292 786 533 812">Update transport failed</p> <p data-bbox="292 823 883 849">Update file could not be copied to the inverter's internal memory.</p> <p data-bbox="292 860 508 885">Corrective measures:</p> <ul data-bbox="311 892 833 956" style="list-style-type: none"> <li data-bbox="311 892 460 917">• Retry update. <li data-bbox="311 924 833 956">• If this message is displayed again, contact the Service.
7340	Update communication failed
7347	<p data-bbox="311 1005 594 1043">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1059 463 1085">Incompatible file</p> <p data-bbox="292 1096 758 1121">The configuration file is not suitable for this inverter.</p> <p data-bbox="292 1133 508 1158">Corrective measures:</p> <ul data-bbox="311 1165 953 1225" style="list-style-type: none"> <li data-bbox="311 1165 953 1190">• Ensure that the selected configuration file is suitable for this inverter. <li data-bbox="311 1197 452 1225">• Retry import.

Event number	Message, cause and corrective measures
7348	<p data-bbox="292 181 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 493 260">Incorrect file format</p> <p data-bbox="292 272 885 296">The configuration file is not of the required format or is damaged.</p> <p data-bbox="292 309 508 333">Corrective measures:</p> <ul data-bbox="311 341 997 429" style="list-style-type: none"> <li data-bbox="311 341 997 397">• Ensure that the selected configuration file is of the required format and is not damaged. <li data-bbox="311 405 452 429">• Retry import.
7349	<p data-bbox="292 442 717 466">Incorrect login rights for configuration file</p> <p data-bbox="292 478 986 534">The user group logged in does not have the user rights necessary to be able to import a configuration.</p> <p data-bbox="292 547 508 571">Corrective measures:</p> <ul data-bbox="311 579 620 639" style="list-style-type: none"> <li data-bbox="311 579 508 603">• Log in as Installer. <li data-bbox="311 611 620 639">• Import configuration file again.
7350	<p data-bbox="292 649 721 673">Transfer of a configuration file has started</p> <p data-bbox="292 686 669 710">The configuration file is being transferred.</p>
7353	<p data-bbox="292 729 577 753">Update time zone database</p> <p data-bbox="292 766 729 790">The inverter is updating the time zone database.</p>
7619	<p data-bbox="292 801 596 839">⚠ QUALIFIED PERSON</p> <p data-bbox="292 855 1003 879">Communication fault with meter unit > Check communication to meter</p> <p data-bbox="292 892 841 916">The inverter is not receiving any data from the energy meter.</p> <p data-bbox="292 928 508 952">Corrective measures:</p> <ul data-bbox="311 960 1006 1015" style="list-style-type: none"> <li data-bbox="311 960 1006 1015">• Ensure that the energy meter is correctly integrated into the same network as the inverter (see energy meter manual).
7702 7703	<p data-bbox="292 1024 596 1062">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1078 654 1102">Self diagnosis > Interference device</p> <p data-bbox="292 1115 706 1139">The cause must be determined by the Service.</p> <p data-bbox="292 1152 508 1176">Corrective measures:</p> <ul data-bbox="311 1184 519 1208" style="list-style-type: none"> <li data-bbox="311 1184 519 1208">• Contact the Service.

Event number	Message, cause and corrective measures
7801	<p data-bbox="311 183 593 215">⚠ QUALIFIED PERSON</p> <p data-bbox="288 231 576 263">Error overvoltage protector</p> <p data-bbox="288 271 991 327">One or more surge arresters have tripped or one or more surge arresters are not inserted correctly.</p> <p data-bbox="288 335 509 359">Corrective measures:</p> <ul data-bbox="311 367 980 454" style="list-style-type: none"> • Make sure that the surge arrester is inserted correctly. • If surge arresters have tripped, replace the tripped surge arresters with new surge arresters.
8003	<p data-bbox="311 470 593 502">⚠ QUALIFIED PERSON</p> <p data-bbox="288 518 599 550">Active power limited derating</p> <p data-bbox="288 558 1002 614">The inverter has reduced its power output for more than ten minutes due to excessive temperature.</p> <p data-bbox="288 622 509 646">Corrective measures:</p> <ul data-bbox="311 654 980 813" style="list-style-type: none"> • Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush. • Ensure that the inverter has sufficient ventilation. • Ensure that the ambient temperature +35 °C has not been exceeded. • Ensure that the inverter is not exposed to direct solar irradiation.
8101 8102 8103 8104	<p data-bbox="311 829 593 861">⚠ QUALIFIED PERSON</p> <p data-bbox="288 877 554 901">Communication disturbed</p> <p data-bbox="288 909 711 933">The cause must be determined by the Service.</p> <p data-bbox="288 949 509 973">Corrective measures:</p> <ul data-bbox="311 981 520 1005" style="list-style-type: none"> • Contact the Service.
8708	<p data-bbox="311 1021 593 1053">⚠ QUALIFIED PERSON</p> <p data-bbox="288 1077 834 1101">Timeout in communication for active power limitation</p> <p data-bbox="288 1109 1002 1197">Communication to the system control absent. Depending on the fall-back setting, either the last received values will be retained or the active power will be limited to the set percentage value of the inverter nominal power.</p> <p data-bbox="288 1204 509 1228">Corrective measures:</p> <ul data-bbox="311 1236 974 1292" style="list-style-type: none"> • Ensure that the connection to the system manager is intact and that no cables are damaged or that no plugs have been pulled.

Event number	Message, cause and corrective measures
8709	<p data-bbox="292 181 596 220">⚠ QUALIFIED PERSON</p> <p data-bbox="292 236 813 261">Timeout in communication for reactive power spec.</p> <p data-bbox="292 272 698 298">Communication to the system control absent.</p> <p data-bbox="292 309 508 335">Corrective measures:</p> <ul data-bbox="311 344 973 395" style="list-style-type: none"> <li data-bbox="311 344 973 395">• Ensure that the connection to the system manager is intact and that no cables are damaged or that no plugs have been pulled.
8710	<p data-bbox="292 410 596 448">⚠ QUALIFIED PERSON</p> <p data-bbox="292 464 729 489">Timeout in communication for cos-Phi spec.</p> <p data-bbox="292 501 698 526">Communication to the system control absent.</p> <p data-bbox="292 537 508 563">Corrective measures:</p> <ul data-bbox="311 572 973 624" style="list-style-type: none"> <li data-bbox="311 572 973 624">• Ensure that the connection to the system manager is intact and that no cables are damaged or that no plugs have been pulled.
9002	<p data-bbox="292 638 596 676">⚠ QUALIFIED PERSON</p> <p data-bbox="292 692 598 718">SMA Grid Guard code invalid</p> <p data-bbox="292 729 1006 780">The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.</p> <p data-bbox="292 791 508 817">Corrective measures:</p> <ul data-bbox="311 826 710 852" style="list-style-type: none"> <li data-bbox="311 826 710 852">• Enter the correct SMA Grid Guard code.
9003	<p data-bbox="292 866 527 892">Grid parameter locked</p> <p data-bbox="292 903 1006 979">Changes to the grid parameters are now blocked. In order to be able to make changes to the grid parameters, from now on you must log in using the SMA Grid Guard code.</p>
9007	<p data-bbox="292 1000 596 1038">⚠ QUALIFIED PERSON</p> <p data-bbox="292 1054 434 1080">Abort self-test</p> <p data-bbox="292 1091 650 1117">The self-test (Italy only) was terminated.</p> <p data-bbox="292 1128 508 1153">Corrective measures:</p> <ul data-bbox="311 1163 706 1214" style="list-style-type: none"> <li data-bbox="311 1163 706 1189">• Ensure that the AC connection is correct. <li data-bbox="311 1193 508 1219">• Restart the self-test.
10108	Time adjusted / old time
10109	Time adjusted / new time

Event number	Message, cause and corrective measures
10110	<p>⚠ QUALIFIED PERSON</p> <p>Time synchronization failed: xx </p> <p>No time information could be called up from the set NTP server.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that the NTP server was configured correctly. • Ensure that the inverter is integrated into a local network with Internet connection.
10118	<p>Parameter upload complete</p> <p>The configuration file was loaded successfully.</p>
10248	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: network busy</p> <p>The network is busy. Data exchange between the devices is not at an optimum and is greatly delayed.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Increase the query intervals. • If necessary, reduce the number of devices in the network.
10249	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: network overloaded</p> <p>The network is overloaded. There is no data exchange between the devices.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Reduce the number of devices in the network. • If necessary, increase the data query intervals.
10250	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: package error rate [ok / high]</p> <p>The package error rate has changed. If the package error rate is high, the network is overloaded or the connection to the network switch or DHCP server (router) is disturbed.</p> <p>Corrective measures if the package error rate is high:</p> <ul style="list-style-type: none"> • Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. • If necessary, increase the data query intervals. • If necessary, reduce the number of devices in the network.

Event number	Message, cause and corrective measures
10251	<p>[Interface]: communication status goes to [OK / Warning / Error / Not connected]</p> <p>The communication status to the network switch or DHCP server (router) has changed. An additional error message may be displayed.</p>
10252	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: communication disrupted</p> <p>There is no valid signal on the network line.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. • Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10253	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: connection speed goes to [100 Mbit / 10 Mbit]</p> <p>The data transfer rate has changed. The cause for the status [10 Mbit] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p>Corrective measures if the status is [10 Mbit]:</p> <ul style="list-style-type: none"> • Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. • Ensure that the DHCP server (router) and any network switches are signaling correct operation.
10254	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: duplex mode goes to [Full / Half]</p> <p>The duplex mode (data transfer mode) has changed. The cause for the status [Half] can be a defective plug, a defective cable or the pulling or plugging of the network connector.</p> <p>Corrective measures if the status is [Half]:</p> <ul style="list-style-type: none"> • Ensure that with an Ethernet connection, the network cable and the network connector are not damaged and that the network connectors are correctly plugged. • Ensure that the DHCP server (router) and any network switches are signaling correct operation.

Event number	Message, cause and corrective measures
10255	<p>⚠ QUALIFIED PERSON</p> <p>[Interface]: Network load OK The network load has returned to a normal range after being busy.</p>
10282	<p>[User group]-Login via [protocol] locked After several incorrect login attempts, login has been blocked for a limited time. In this case, the User login will be blocked for 15 minutes, the Grid Guard login for 12 hours.</p> <p>Corrective measures:</p> <ul style="list-style-type: none"> • Wait until the given time has expired and then retry login.
10339	Webconnect enabled
10340	Webconnect disabled
10341	Webconnect error: no connection
10343	Webconnect error: Default gateway not configured
10344	Webconnect error: DNS server not configured
10345	Webconnect error: No reply to DNS request [xx]
10346	Webconnect error: Unknown SIP proxy [xx]
10347	Webconnect error: Unknown STUN server [xx]
10348	Webconnect error: No reply to request to STUN server
10349	Webconnect error: No reply to SIP option packs
10350	Webconnect error: Registration rejected by SIP registrar
10351	Webconnect error: Unknown SIP registrar [xx]
10352	Webconnect error: Faulty communication
10353	Webconnect error: registration of the SIP registry has not responded
10502	Active power limited AC frequency
10517	Dynamic active power limitation started.
10518	Dynamic active power limitation terminated.
10520	Supplied power: [xx] W (permitted value: [xx] W)
10521	Active power was limited today for [xx] minutes.
10525	Inverter does not respond to active power limitation.
10528	Login for NSD function on device [xx] failed
10901	Start self-test [xx]
10902	Uac RPro [xxx] V

Event number	Message, cause and corrective measures
10903	Uac Max [xxx] V
10904	Uac Min [xxx] V
10905	Uac Min Fast [xxx] V
10906	Fac SwMax [xxx] Hz
10907	Fac SwMin [xxx] Hz
10908	Fac Max [xxx] Hz
10909	Fac Min [xxx] Hz
10910	Disconn. threshold [xxx] [xx]
10911	Stand. Val. [xxx] [xx]
10912	Disconn. time [xx] s
27103	Set parameter The parameter changes are being adopted.
27104	Parameters set successfully The parameter changes were successfully adopted.
27107	Update file OK The update file found is valid.
27301	Update communication The inverter is updating the communication component.
27302	Update main CPU The inverter is updating the inverter component.
27312	Update completed The inverter has successfully completed the update.
27329	Condition test successful
29001	Inst. code valid The entered Grid Guard code is valid. Protected parameters have now been unlocked and you can adjust the parameters. The parameters will be automatically locked again after ten feed-in hours.
29004	Grid parameters unchanged Changing the grid parameters is not possible.

12.3 Checking the PV System for Ground Faults

⚠ QUALIFIED PERSON

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

⚠ DANGER

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

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

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

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range of 1500 V or higher and an AC input voltage range of 600 V or higher.

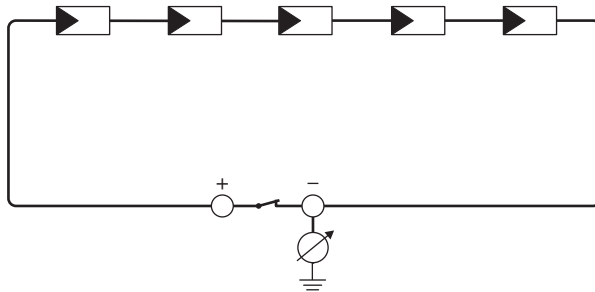


Figure 14: Schematic diagram of the measurement

i Calculating the insulation resistance

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

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

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

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

Required devices:

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

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

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

Procedure:

1. Calculate the expected insulation resistance per string.

- 2.

⚠ DANGER

Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 10, page 52).

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

12. Recommission the inverter.
13. If the inverter still displays an insulation error, contact the Service (see Section 16, page 86).
The PV modules might not be suitable for the inverter in the present quantity.

12.4 Replacing the Surge Arrester

⚠ QUALIFIED PERSON

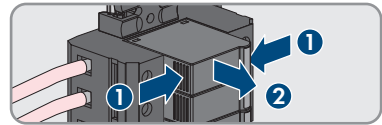
1.

⚠ DANGER

Danger to life due to high voltages

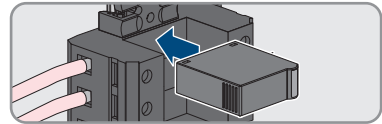
- Disconnect the inverter from all voltage sources (see Section 10, page 52).

2. Pull all surge arresters out of the slots.



3. Dispose of all surge arresters in accordance with the locally applicable disposal regulations for electronic waste.

4. Insert new surge arresters.



5. Ensure that each surge arrester is securely inserted into its slot.

6. Recommission the inverter (see Section 8.2, page 35).

12.5 Activate the diagnostic function in the event of a defective Speedwire communication

If several Speedwire devices in line topology are connected to each other in the system and the Speedwire communication does not function properly, you have the option of activating diagnostic functions for simple troubleshooting.

The following diagnostic functions are available:

- Activate Speedwire communication display on the inverter
- Test Speedwire communication via SMA Data Manager

Activate Speedwire communication display on the inverter

By activating this diagnostic function, the inverter can signal that one network cable is connected by the blue LED flashing. This allows you to quickly check whether the network cable is plugged in for inverters where only one network cable is to be connected, and whether only one rather than two network cables are connected for inverters where two network cables are to be connected.

Procedure:

- In the parameter group **Device > Operation**, select the parameter **Ethernet link diagnostic via LED** and set this to **On**.
 - Blue LED flashes (2 s on and 250 ms off): one network cable is connected to the inverter.
 - If the blue LED is not flashing, no network cable is connected.
- Check whether for the inverters where the blue LED is flashing there really should only be one network cable connected or whether two network cables should be connected here.
- Check whether for the inverters where the blue LED is not flashing there really should not be a network cable connected.

Test Speedwire communication via SMA Data Manager

If there is a SMA Data Manager in the system, the inverter can indicate signal whether the Speedwire communication is working properly or if there is a problem by the red LED flashing. The diagnostic function can only be activated via the user interface of the SMA Data Manager.

Procedure:

- Select the **Communication diagnostic** parameter via the Data Manager user interface and set it to **On**.
 - The red LED of the inverter flashes (250 ms on and 250 ms off): The communication of the Speedwire devices connected in line topology is working perfectly.
- If the inverter's red LED does not flash, the Speedwire communication is defective. The communication path must be checked.

12.6 Cleaning the Fans

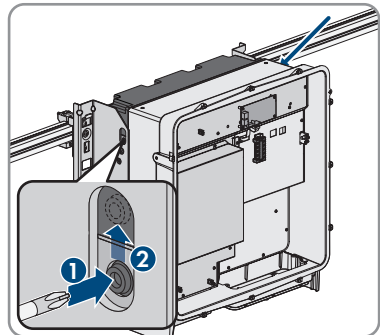
⚠ QUALIFIED PERSON

1.

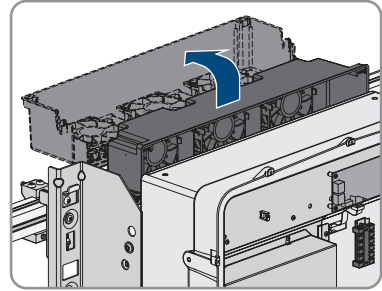
⚠ DANGER**Danger to life due to high voltages**

- Disconnect the inverter from all voltage sources (see Section 10, page 52).

- Release the fan bracket on the right and left of the inverter. To do so, press in the locking tabs and push them upwards.



3. Move the fan bracket upwards and fold it backwards. Note that the fan bracket cannot be removed completely because it is connected to the inverter by the fan cable.

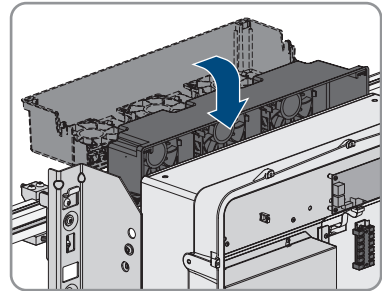


4. NOTICE

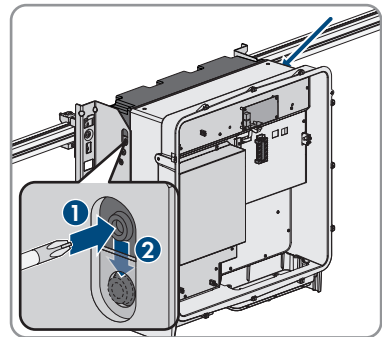
Damage to the fan due to compressed air

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

5. If the cooling fins are dirty, clean them using a soft brush.
6. Insert the locking tabs on the left and right of the fan bracket into the recesses and the top into the suspensions.



7. Press the fan bracket firmly downwards so that the locking tabs engage on the right and left.



13 Decommissioning the Inverter

QUALIFIED PERSON

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

CAUTION

Risk of injury due to weight of product

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

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

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 (e.g. tie-down straps)
- All transport handles must be in place.

Procedure:

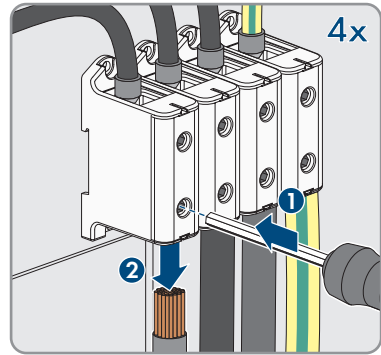
1.

DANGER

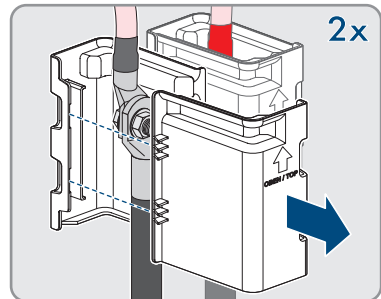
Danger to life due to high voltages

- Disconnect the inverter from all voltage sources (see Section 10, page 52).

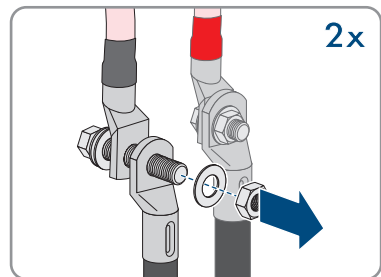
2. Remove the AC cable from the inverter. To do so, loosen the screws (AF8) and pull the cables out of the terminal.



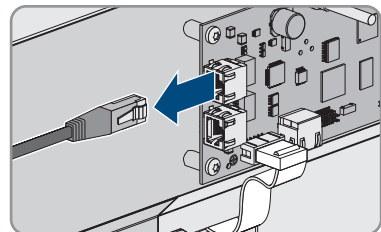
3. Remove the AC cable from the inverter.
 4. Remove the protection elements against contact from the terminal lugs for the DC connection. To do so, unlock the side brackets.



5. Remove the DC cable connection. Loosen the hex nuts (AF10) and remove the combined hexagon head screw (AF16).

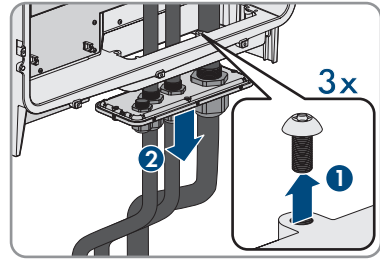


6. Remove the DC cables from the inverter.
 7. Remove the network cables from the network ports and remove them from the inverter.

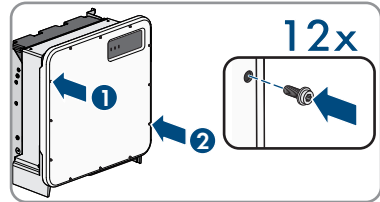


8. Remove all cable glands from the connecting plate. To do so, unscrew the counter nuts from inside and remove the cable glands from the opening.

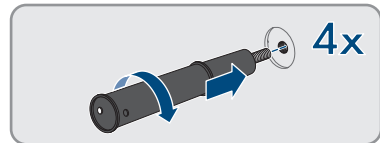
9. Dismantle the connecting plate. To do so, unscrew the three screws (TX40).



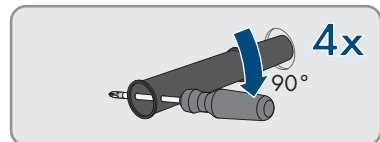
10. Position the enclosure lid and first tighten the upper-left and lower-right screws, and then the remaining screws crosswise (TX25, torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$).



11. Screw the transport handles as far as they will go into the taps on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the transport handles are screwed into the taps so that they are perfectly straight. If the transport handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the taps to the extent that transport handles can no longer be screwed into them.

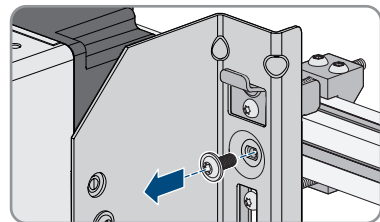


12. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90° . This ensures that the transport handles are securely tightened.

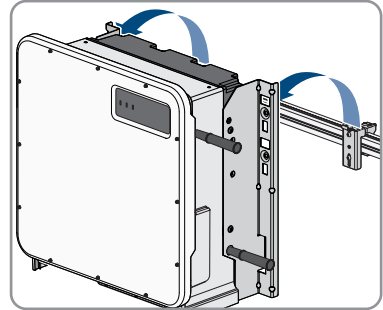


13. If the inverter is to be hooked into the mounting brackets by means of a hoist, screw the eye bolts into the threads on the top of the inverter and attach the hoist to them. The hoist must be suitable to take the weight of the inverter.

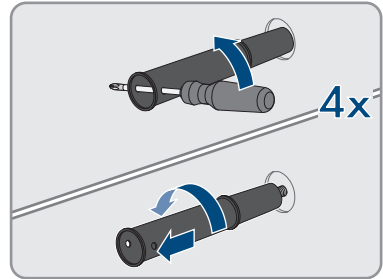
14. Unscrew the screw for securing the product to the mounting brackets on the right and left (TX40).



15. Remove the inverter from the mounting lugs of the mounting brackets by moving it upward.



16. Remove all four transport handles from the threaded holes. If necessary, insert a screwdriver into the holes on the transport handle and use the screwdriver to remove the transport handle.

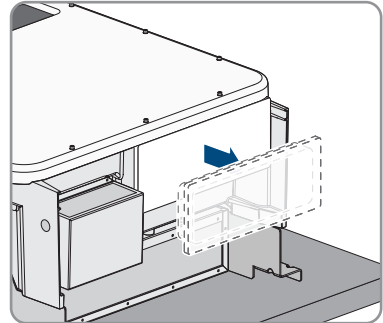


17. If the inverter is to be stored or shipped, pack the inverter and the wall mounting bracket. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter and secure with tie-down straps on the Euro pallet.
18. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

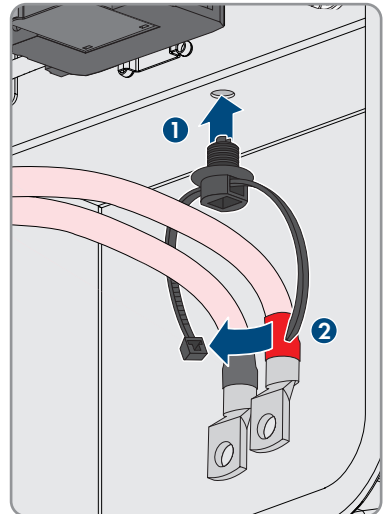
14 Procedure for Receiving a Replacement Device

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

1. To simplify the configuration of the replacement device, save the configuration data of the defective product to a file (see Section 9.10, page 49).
2. Decommission the defective product (see Section 13, page 76).
3. Remove the transport cover, which is located in the housing opening of the replacement unit instead of the connecting plate, and use it for the defective product.

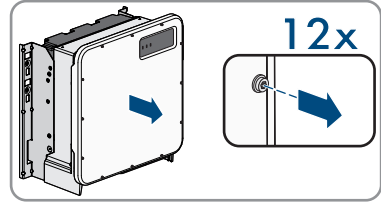


4. Secure the pre-configured DC connection cables in the defective product for transport. To do so, screw the supplied cable tie into the hole below the DC surge protection devices and place and tighten the cable tie around the DC connection cables.

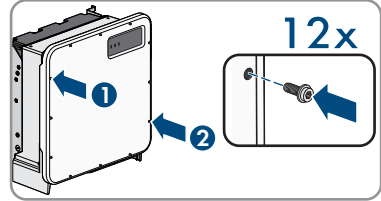


5. Mount the replacement device and make the electrical connections as described in this document. Use the connection plate and the DC protection elements against contact of the defective product.
6. If the enclosure lid of the replacement device is a transport lid (see information on the enclosure lid), replace the transport lid of the replacement device with the enclosure lid of the defective inverter:

- Unscrew the screws of the enclosure lid (TX25) and remove it.



- Position the enclosure lid and first tighten the upper-left and lower-right screws, and then the remaining screws crosswise (TX25, torque: $6 \text{ Nm} \pm 0.3 \text{ Nm}$).



7. Commission the replacement device (see Section 8.2, page 35).
8. Establish a connection to the user interface (see Section 9.1, page 40).
9. On the **Configure inverter** page, select the **Adopt configuration from file** configuration option and load the saved configuration file of the defective product (see Section 8.3, page 36).
10. If the defective inverter had been registered by a communication product, replace it with the new product in the communication product.
11. Pack the defective product in the packaging of the replacement device.
12. Fasten the packaging to the pallet on which the replacement device was supplied using the reusable lashing straps.
13. Arrange for pick-up with SMA Solar Technology AG.

15 Technical Data

DC input

	SHP 100-20	SHP 150-20
Maximum PV array power	150000 W _p	225000 W _p
Maximum input voltage	1000 V	1500 V
MPP voltage range	590 V to 1000 V	880 V to 1450 V
Rated input voltage	693 V	960 V
Minimum input voltage	570 V	855 V
Initial input voltage	625 V	940 V
Maximum input current	180 A	180 A
Maximum short-circuit current*	325 A	325 A
Maximum reverse current into the PV array**	0 A	0 A
Number of independent MPP trackers	1	1
Number of inputs	1 or 2 (optional) for external PV combiner boxes	1 or 2 (optional) for external PV combiner boxes
Surge category in accordance with IEC 62109-1	II	II

* In accordance with IEC 62109-2: $I_{SC\ PV}$

** The topology prevents a reverse current from the inverter in the system

AC output

	SHP 100-20	SHP 150-20
Rated power at nominal AC voltage, 50 Hz	100000 W	150000 W
Maximum apparent AC power	100000 VA	150000 VA
Rated grid voltage	400 V	600 V
Nominal AC voltage	400 V	600 V
AC voltage range*	304 V to 477 V	480 V to 690 V
Nominal AC current at nominal AC voltage	145 A	145 A
Maximum output current	151 A	151 A
Maximum residual output current	662.8 A	662.8 A

	SHP 100-20	SHP 150-20
Duration of the maximum residual output current	446.7 ms	446.7 ms
Total harmonic distortion	< 3 %	< 3 %
Inrush current	< 10% of the nominal AC current for a maximum of 10 ms	< 10% of the nominal AC current for a maximum of 10 ms
Rated power frequency	50 Hz	50 Hz
AC power frequency*	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	44 Hz to 55 Hz	44 Hz to 55 Hz
Operating range at AC power frequency 60 Hz	54 Hz to 66 Hz	54 Hz to 66 Hz
Power factor at rated power	1	1
Displacement power factor, adjustable	0.0 overexcited to 0.0 underexcited	0.0 overexcited to 0.0 underexcited
Feed-in phases	3	3
Phase connection	3 grounding conductor	3 grounding conductor
Surge category in accordance with IEC 62109-1	III	III

* Depending on the configured country data set

Efficiency

	SHP 100-20	SHP 150-20
Maximum efficiency, η_{\max}	98.8 %	99.1 %
European weighted efficiency, η_{EU}	98.6 %	98.8 %

Protective Devices

DC reverse polarity protection	Available
AC overvoltage protection"	Surge arrester type 2
DC overvoltage protection	Surge arrester type 2
AC short-circuit current capability	Current control
Grid monitoring	SMA Grid Guard 4
Maximum overcurrent protection	250 A
Ground-fault monitoring for SHP 100-20	Insulation monitoring: $R_{\text{iso}} > 33 \text{ k}\Omega$

Ground-fault monitoring for SHP 150-20	Insulation monitoring: $R_{i_{iso}} > 50 \text{ k}\Omega$
All-pole sensitive residual-current monitoring unit	Available

General data

Width x height x depth, without feet or DC load-break switch	770 mm x 830 mm x 444 mm
Weight with enclosure lid and connecting plate	98 kg
Weight without enclosure lid and connecting plate	90 kg
Length x width x height of the packaging	1150 mm x 850mm x 625 mm
Transport weight	115 kg
Climatic category in accordance with IEC 60721-3-4	4K4H
Environmental category	Outdoors
Pollution degree of all enclosure parts	2
Operating temperature range	-25 °C to +60 °C
Maximum permissible value for relative humidity, condensing	100 %
Maximum operating altitude above mean sea level (MSL)	3000 m
Typical noise emission	69 dB(A)
Power loss in night mode	5.58 W
Topology	Transformerless
Cooling method	SMA OptiCool
Number of fans	3
Degree of protection for electronics in accordance with IEC 60529	IP65
Protection class in accordance with IEC 62109-1	I
Approvals, as at March 2019*	CE, IEC 62109-1/-2, EN 55011 class A, group 1, IEC 61000-6-2

* **IEC 62109-2:** In order to meet the requirements of this standard, the fault alert must be activated in Sunny Portal.

Climatic Conditions

Installation in accordance with IEC 60721-3-4, Class 4K4H

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 2K3

Temperature range	-40 °C to +70 °C
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Equipment

DC connection	Terminal lugs
AC terminal	Screw terminals

Torques

Screws of mounting bracket (M8x105, TX40)	12 Nm ± 2 Nm
Screws for attaching the inverter to the mounting brackets (M8x16, TX40)	12 Nm ± 2 Nm
Screws for attaching the connecting plate to the inverter (M8x70, TX40)	8 Nm ± 0.5 Nm
Screws for AC terminals with conductor cross-section of 50 mm ² to 150 mm ²	20 Nm
Screws for AC terminals with conductor cross-section of 120 mm ² to 150 mm ²	30 Nm
Screws for DC connection (SW16)	24 Nm ± 2 Nm
Enclosure lid screws (TX25)	6 Nm ± 0.3 Nm

Data Storage Capacity

Daily energy yields	63 days
Daily yields	30 years
Event messages for users	1024 events
Event messages for installers	1024 events

16 Contact

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

- Device type
- Serial number
- Firmware version
- Mounting location and mounting height
- Type and number of PV modules
- Use the name of the system in Sunny Portal (if available)
- Access data for Sunny Portal (if available)
- Special country-specific settings (if available)
- Detailed description of the problem

Deutschland	SMA Solar Technology AG	Belgien	SMA Benelux BVBA/SPRL
Österreich	Niestetal	Belgique	Mechelen
Schweiz	Sunny Boy, Sunny Mini Central, Sunny Tripower, Sunny High- power: +49 561 9522-1499 Monitoring Systems (Kommunikationsprodukte): +49 561 9522-2499 Hybrid Controller: +49 561 9522-3199 Sunny Island, Sunny Boy Stor- age, Sunny Backup: +49 561 9522-399 Sunny Central, Sunny Central Storage: +49 561 9522-299 SMA Online Service Center: www.SMA-Service.com	België	+32 15 286 730
		Luxemburg	for Netherlands: +31 30 2492 000
		Luxembourg	SMA Online Service Center: www.SMA-Service.com
		Nederland	
		Česko	SMA Service Partner TERMS a.s.
		Magyarország	+420 387 6 85 111
		Slovensko	SMA Online Service Center: www.SMA-Service.com
		Türkiye	SMA Service Partner DEKOM Ltd. Şti. +90 24 22430605 SMA Online Service Center: www.SMA-Service.com
France	SMA France S.A.S. Lyon +33 472 22 97 00 SMA Online Service Center : www.SMA-Service.com	Ελλάδα	SMA Service Partner AKTOR FM. Αθήνα +30 210 8184550 SMA Online Service Center: www.SMA-Service.com
		Κύπρος	

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Italia	SMA Italia S.r.l. Milano +39 02 8934-7299 SMA Online Service Center: www.SMA-Service.com	Australia	SMA Australia Pty Ltd. Sydney Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200
United Arab Emirates	SMA Middle East LLC Abu Dhabi +971 2234 6177 SMA Online Service Center: www.SMA-Service.com	India	SMA Solar India Pvt. Ltd. Mumbai +91 22 61713888
ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ +66 2 670 6999	대한민국	SMA Technology Korea Co., Ltd. 서울 +82-2-520-2666
South Africa	SMA Solar Technology South Africa Pty Ltd. Cape Town 08600SUNNY (08600 78669) International: +27 (0)21 826 0699 SMA Online Service Center: www.SMA-Service.com	Argentina Brasil Chile Perú	SMA South America SPA Santiago de Chile +562 2820 2101
Other coun- tries	International SMA Service Line Niestetal 00800 SMA SERVICE (+800 762 7378423) SMA Online Service Center: www.SMA-Service.com		

17 EU Declaration of Conformity

within the scope of the EU directives

- Electromagnetic compatibility 2014/30/EU (29.3.2014 L 96/79-106) (EMC)
- Low Voltage Directive 2014/35/EU (29.3.2014 L 96/357-374) (LVD)



SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EU Declaration of Conformity can be found at www.SMA-Solar.com.

