Operating manual

SUNNY ISLAND X 30 / 50

SI30-20 / SI50-20

ENGLISH

SIxx-20-BE-en-10 | Version 1.0

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1 Information on this Document

1.1 Validity

This document is valid for:

- SI30-20 (Sunny Island X 30) from firmware version 3.04.xxx.R
- SI50-20 (Sunny Island X 50) from firmware version 3.04.xxx.R

1.2 Target Group

This document is intended for qualified persons and operators. 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 operators. Qualified persons must have the following skills:

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

1.3 Content and Structure of this Document

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

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

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

1.4 Levels of Warning Messages

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

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

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

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

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

1.5 Symbols in the Document

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

1.6 Typographies in the document

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

1.7 Designations in the Document

Complete designation	Designation in this document
Sunny Island X	Sunny Island, inverter, product

1.8 Additional Information

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

Title and information content	Type of information
"PUBLIC CYBER SECURITY - Guidelines for a Secure PV System Communication"	Technical Information
"SMA GRID GUARD 10.0 - Grid Management Services via Inverter and System Controller"	Technical Information
"Efficiency and Derating" Efficiency and derating behavior of the SMA inverters	Technical Information
"SMA Modbus® Interface - ennexOS" Information on the SMA Modbus interface	Technical Information

Title and information content	Type of information
"SunSpec Modbus ®-interface - ennexOS" Information about the SunSpec Modbus interface and supported information models	Technical Information
"Approved Batteries and Information on Battery Communication Connection" Overview of approved batteries	Technical Information
"Parameters and Measured Values" Device-specific overview of all parameters and measured values and their setting options Information about the SMA Modbus registers	Technical Information
"SMA DATA MANAGER M (EDMM-20)"	Operating manual
"SMA DATA MANAGER M (EDMM-20)"	Operating manual
"SMA SPEEDWIRE FIELDBUS"	Technical information
"SMA HYBRID CONTROLLER"	User Manual
"WAGO-I/O-SYSTEM 750 with SMA DATA MANAGER M"	Installation Manual

2 Safety

2.1 Intended Use

The Sunny Island is an AC-coupled battery inverter and converts the direct current supplied by a battery into grid-compliant three-phase current.

The Sunny Island is used together with a battery and a system controller (e.g., SMA Hybrid Controller) in off-grid and battery-backup systems. With a battery and an energy meter, the Sunny Island X can form a system for commercial purposes, such as increased self-consumption or time of use.

The product is intended for use in residential and industrial environments.

The product complies with DIN EN 55011 of class B, group 1. The product also meets the requirements of the IEC 61000-6-3 and IEC 61000-6-2.

The product is suitable for operation in coastal installation according to IEC 61701 in corrosivity category C3.

The product must only be used as stationary equipment.

The product is suitable for indoor and outdoor use.

When used indoors, the ventilation system at the installation site must be able to dissipate the power loss that occurs.

With the product it is possible to feed the three-phase current directly into the low-voltage grid while complying with the locally applicable connection requirements. If the product is operated with a medium-voltage transformer, the low-voltage side must be configured in a star formation and the neutral point grounded.

The AC connection of the inverter must be installed with an external four-pole fuse protection (all line conductors and neutral conductors).

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

The product must only be operated in connection with an intrinsically safe lithium-ion battery approved by SMA Solar Technology AG. An updated list of batteries approved by SMA Solar Technology AG is available at www.SMA-Solar.com.

The battery must comply with the locally applicable standards and directives and must be intrinsically safe.

In order to support a black start, the battery modules must provide the DC voltage supply for the battery management system. If a black start is not required, the battery management system can be powered by an external AC voltage source.

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

The DC terminal of the inverter is exclusively intended for the connection of a battery with external all-pole battery fuse. The DC lines of the positive and negative pole must be shorter than 30 m.

Loads connected to the product must have an CE, RCM or UL identification label.

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

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

The grid configuration of the utility grid must be a TN or TT system. Cables with copper or aluminium conductors must be used for the installation.

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

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

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

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

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

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

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

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

The type label must remain permanently attached to the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

Keep the manual for future reference.

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

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

⚠ DANGER

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

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

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

⚠ DANGER

Danger to life due to electric shock when live components are touched because the battery grounding is connected to grounding conductor terminals

Due to the connection of the battery grounding to the grounding conductor terminals, high voltages might be present on the enclosure of the inverter. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Only the grounding conductors of the AC power cables may be connected to the grounding conductor terminals of the inverter.
- Observe all safety information of the battery manufacturer.
- Ground the battery according to the battery manufacturer's requirements.
- If the locally applicable standards and directives require battery grounding, connect the battery grounding to the grounding busbar in the distributor.

⚠ DANGER

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

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

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.

⚠ WARNING

Danger to life due to fire and deflagration

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

- In the event of a fault, do not perform any direct actions on the product.
- In the event of a fault, ensure that unauthorized persons have no access to the product.
- In the event of a fault, disconnect the battery from the product via an external disconnection service.
- In the event of a fault, disconnect the AC circuit breaker, or keep it disconnected in case it has already tripped, and secure it against reconnection.

⚠ WARNING

Risk of injury due to toxic substances, gases and dusts

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

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

⚠ WARNING

Danger to life due to fire when failing to observe tightening torque specifications on live bolted connections

Failure to follow the specified tightening torques reduces the ampacity of live bolted connections and the contact resistances increase. This can cause components to overheat and catch fire. Death or lethal injuries can result.

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

⚠ WARNING

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

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

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

⚠ WARNING

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

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

- Disconnect the battery from all voltages sources prior to performing any work on the battery.
- Remove watches, rings and other metal objects prior to carrying out any work on the battery.
- Use insulated tools and wear insulated gloves for all work on the battery.
- Do not place tools or metal parts on the battery.
- Observe all safety information of the battery manufacturer.

⚠ WARNING

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

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

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

⚠ CAUTION

Risk of burns due to hot enclosure parts

Some parts of the enclosure can get hot during operation. Touching hot enclosure parts can result in burn injuries.

- During operation, do not touch any parts other than the enclosure lid of the inverter.
- Wait until the inverter has cooled down before touching the enclosure.

⚠ 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).

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 to the inverter due to electrostatic discharge

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

- Ground yourself before touching any component.

NOTICE

Damage to the inverter due to switching operations on the transformer

If voltages are present in the inverter, switching operations on the transformer can lead to large fluctuations in the voltage in the inverter. Large fluctuations in voltage can damage components in the inverter.

- Disconnect the inverter from voltage sources before performing any switching operations on the transformer.

NOTICE

Damage to the product due to cleaning agents

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

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

NOTICE

Damage to assemblies caused by impact from test probes

When measuring voltages in the inverter, test probes must be used at measuring points within assemblies. The use of test probes may damage the assemblies.

- Test probes are to be used only at measuring points specified in this document. Other parts (e.g. components) must not be touched.
- Always move the test probes in the inverter slowly and carefully.

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.

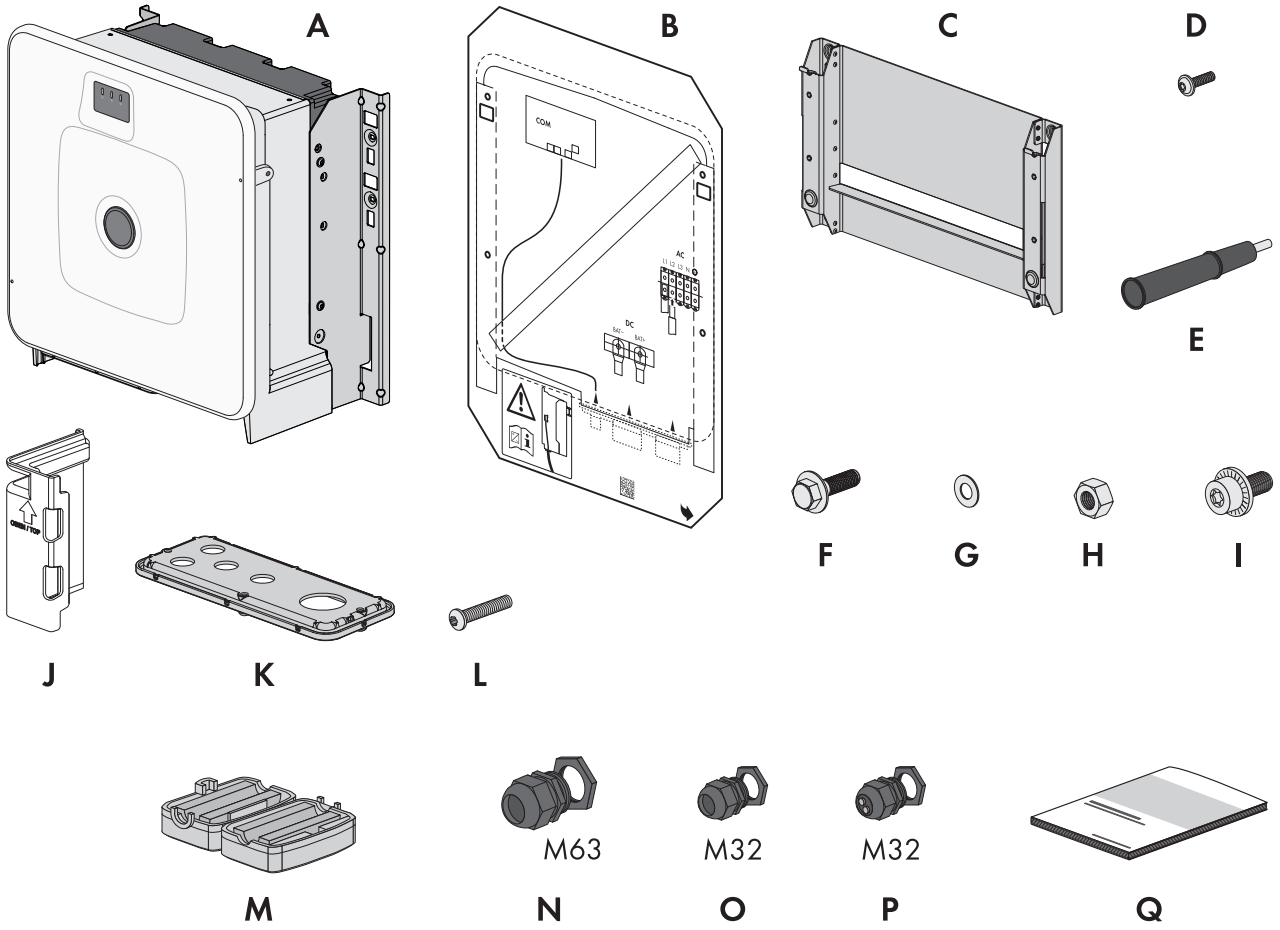


Figure 1: Components included in scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Mounting template
C	1	Wall mounting bracket
D	4	Button head screw M8x25
E	4	Carry handle
F	2	M10x40 combination hexagon head screw
G	2	Washer M10
H	2	Hex nut M10
I	2	M6x16 combined screw
J	4	Touch protection element for DC connection
K	1	Connecting plate

Position	Quantity	Designation
L	3	Button head screw M8x70
M	3	Ferrite
N	1	Cable gland and counter nut M63x1.5
O	2	Cable gland and counter nut M32x1.5
P	2	M32x1.5 cable gland and counter nut with two-hole seal insert and two sealing plugs
Q	1	Quick reference guide with password label on the rear side The label contains the following information: • PIC (Product Identification Code) identification key for registering the system in Sunny Portal • RID (Registration Identifier) registration ID for registering the system in Sunny Portal • Wi-Fi password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the product via Wi-Fi • Device Key (DEV KEY) for resetting the administrator password

4 Additionally Required Materials and Equipment

Material or equipment	Quantity	Explanation
Screws suitable for the mounting base	4	For attaching the wall mounting bracket to the mounting base
Washers suitable for the mounting base	4	For attaching the wall mounting bracket to the mounting base
Screw anchors suitable for the mounting base	4	For attaching the wall mounting bracket to the mounting base
Terminal lugs (flange hole: M10)	2	For connecting the DC cables
Field-assembly RJ45 connector with metal enclosure	1-2	Only required if the network cables are not equipped with RJ45 plugs
Means of transport (e.g. pallet truck)	1	Used to transport packed product to mounting location
Eye bolt (M10)	2	Only required if the product is to be transported with a hoist
Hoist	1	Only required if the product is to be transported with a hoist
Utility knife	1	Used to unpack the product
Torx screwdriver (TX25)	1	Used to attach and remove transport handles
Torx screwdriver (TX40)	1	Used to attach the mounting brackets, to attach the product to the mounting brackets, to attach the connection plate to the product, to connect additional grounding
Allen key (AF8)	1	Used to connect AC cables
Allen key (AF10)	1	Used to attach and remove cover of the enclosure
Measuring device with a measuring range designed for the maximum AC and DC voltage of the product	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)
Ripple control receiver	1	Only required if a ripple control receiver is to be installed
External I/O system for the ripple control receiver	1	Only required if a ripple control receiver is to be installed

Also see:

- Ripple control receiver and external I/O system ⇒ page 44

5 Product overview

5.1 Device function

It is possible to use and configure the Sunny Island X either as System Manager or as a subordinate inverter.

You carry out the device configuration via the commissioning wizards.

Inverter in Grid-Connected System as System Manager

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

Subordinate Inverter in Grid-Connected System

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

Also see:

- Sunny Island X as System Manager - System with Utility Grid ⇒ page 19
- SMA Data Manager M as System Manager - System with Utility Grid ⇒ page 20
- SMA Hybrid Controller as System Manager - System with a Generator ⇒ page 21
- SMA Hybrid Controller as System Manager - System with Utility Grid ⇒ page 22
- SMA Hybrid Controller as System Manager - System with Utility Grid and Generator ⇒ page 23
- SMA Hybrid Controller as System Manager - System with Multiple Generators ⇒ page 24

5.2 System overview

5.2.1 Sunny Island X as System Manager - System with Utility Grid

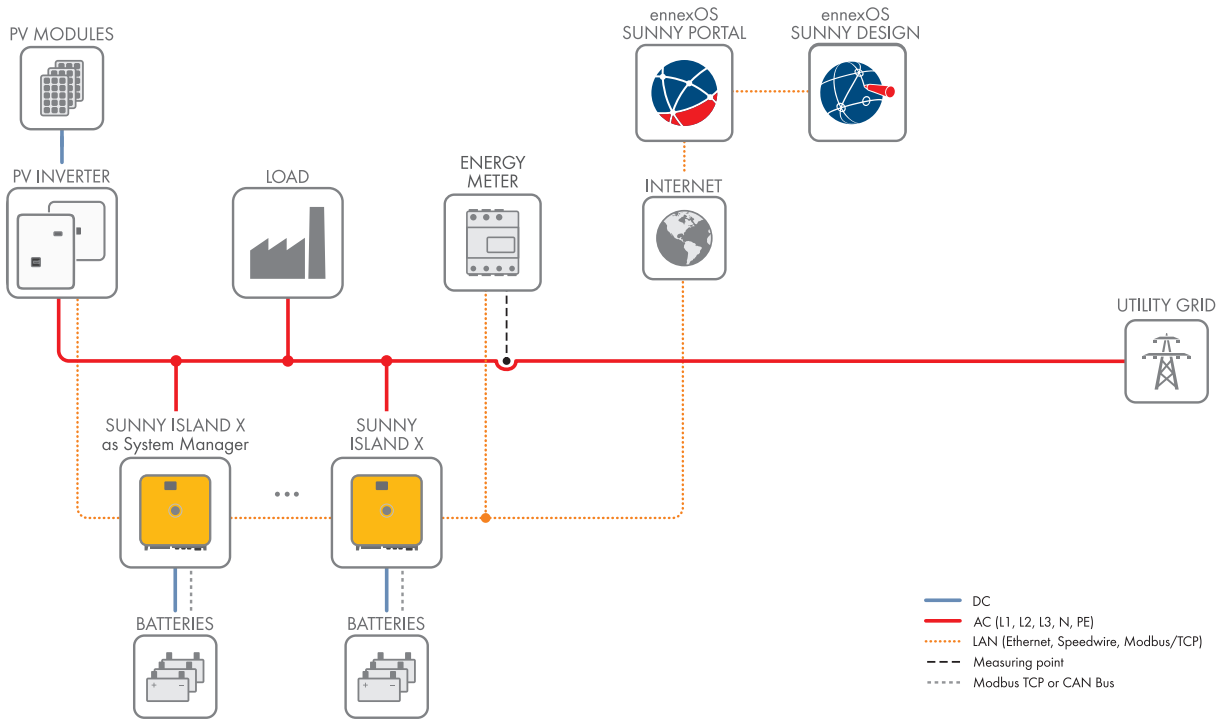


Figure 2: Sunny Island X as System Manager in a system with utility grid (example)

When using a Sunny Island X as System Manager, you can integrate up to 10 additional devices in a system (supported devices: SMA EV Charger Business, PV inverter, Sunny Tripower Storage and SMA Commercial Energy Meter).

The system serves as a battery storage system and must always be operated on the utility grid (no battery-backup function).

5.2.2 SMA Data Manager M as System Manager - System with Utility Grid

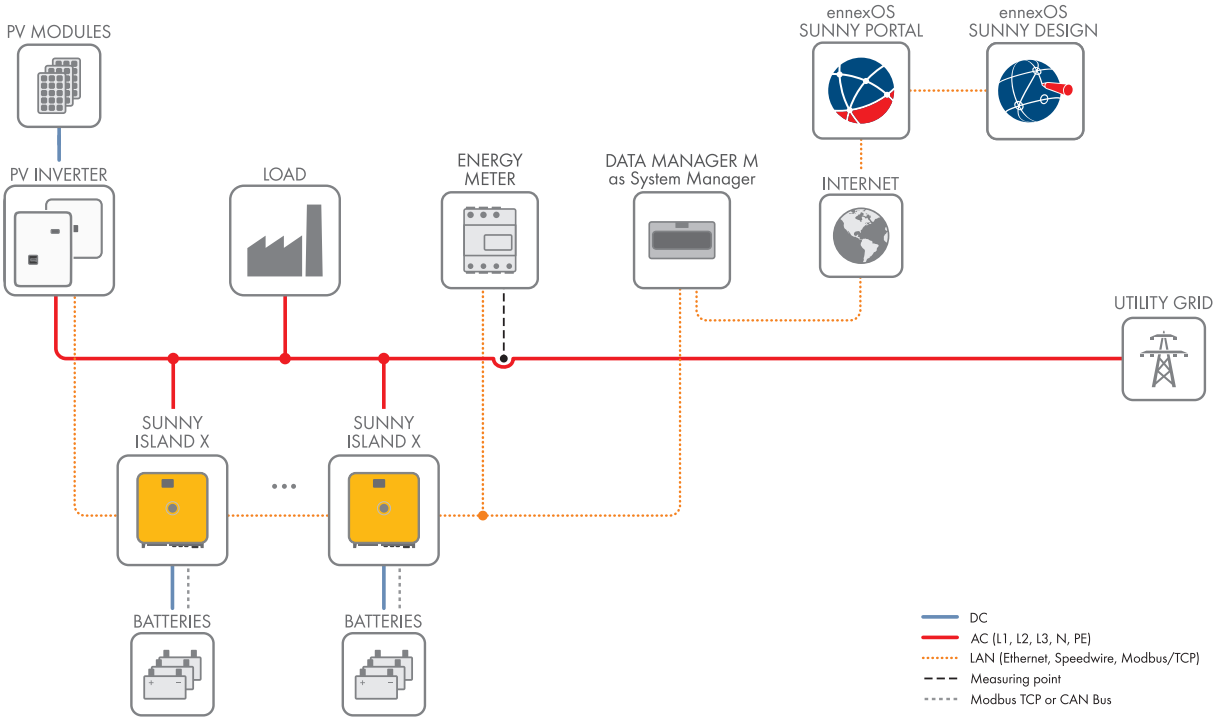


Figure 3: SMA Data Manager as System Manager in a system with utility grid (example)

The Sunny Island X is operated as a subordinate inverter.

The system serves as a battery storage system and must always be operated on the utility grid (no battery-backup function).

5.2.3 SMA Hybrid Controller as System Manager - System with a Generator

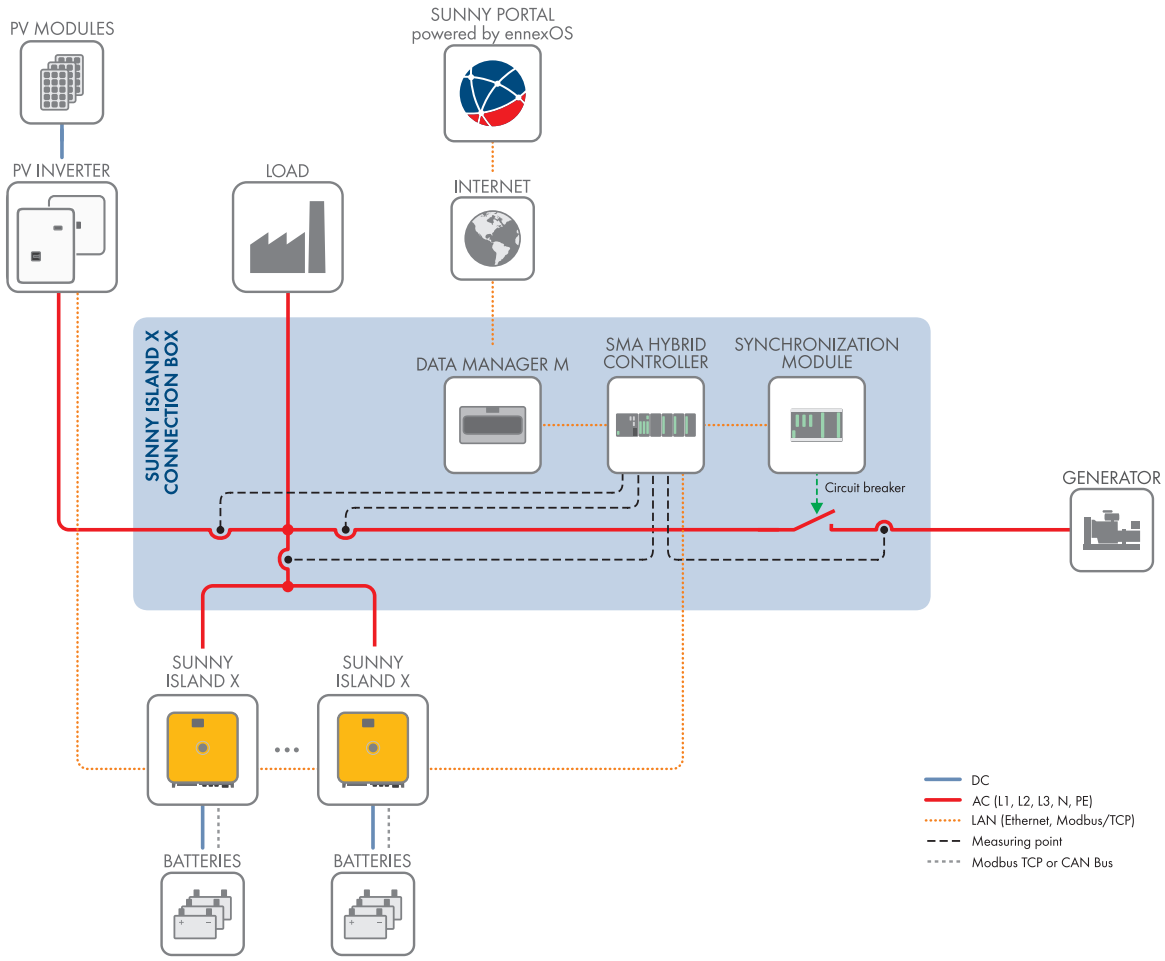


Figure 4: SMA Hybrid Controller as System Manager in a system with a generator (example)

The Sunny Island X is operated as a subordinate inverter.

The system uses a generator as an external voltage source.

5.2.4 SMA Hybrid Controller as System Manager - System with Utility Grid

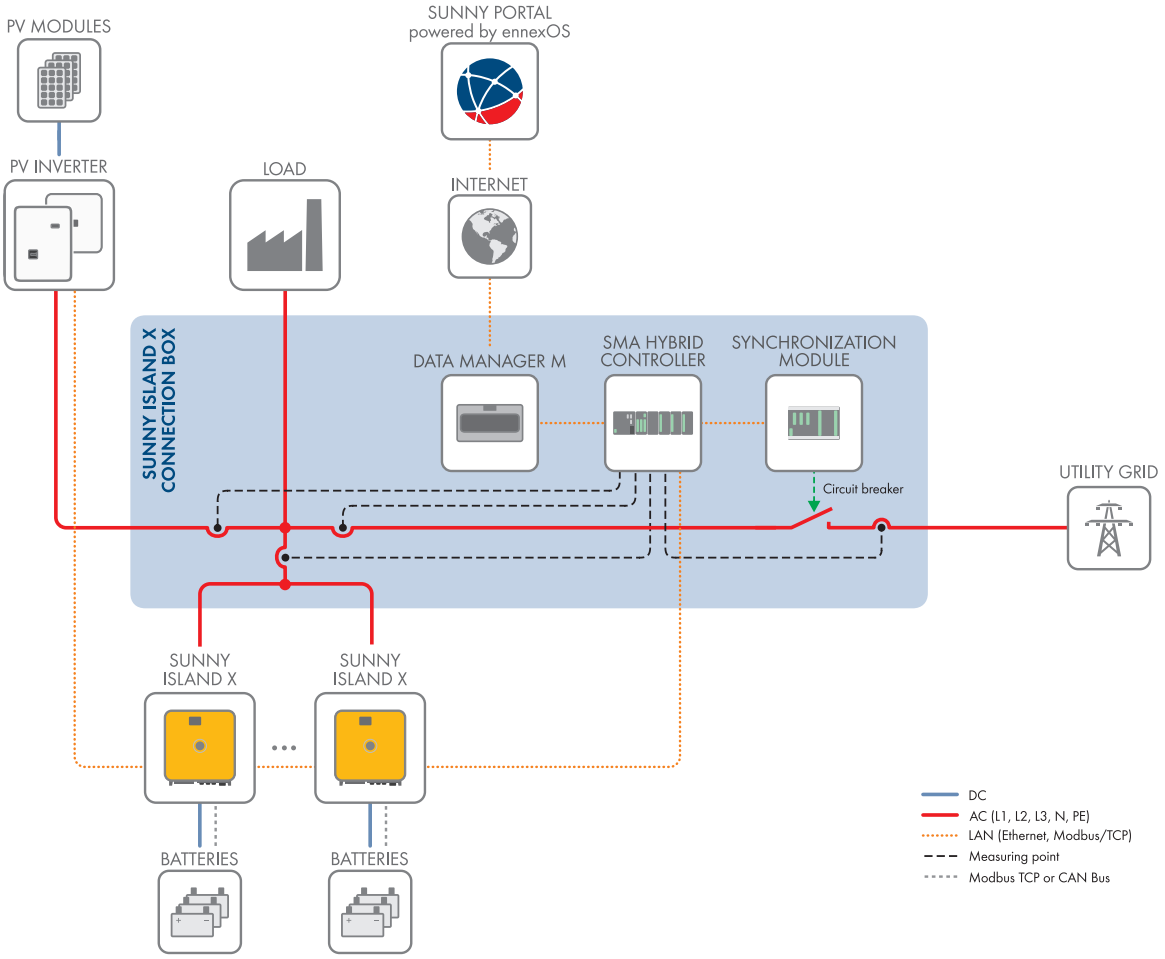


Figure 5: SMA Hybrid Controller as System Manager in a system with utility grid (example)

The Sunny Island X is operated as a subordinate inverter.

The system uses a public power source as an external voltage source. In the event of a grid failure, the inverter can create a battery-backup grid.

5.2.5 SMA Hybrid Controller as System Manager - System with Utility Grid and Generator

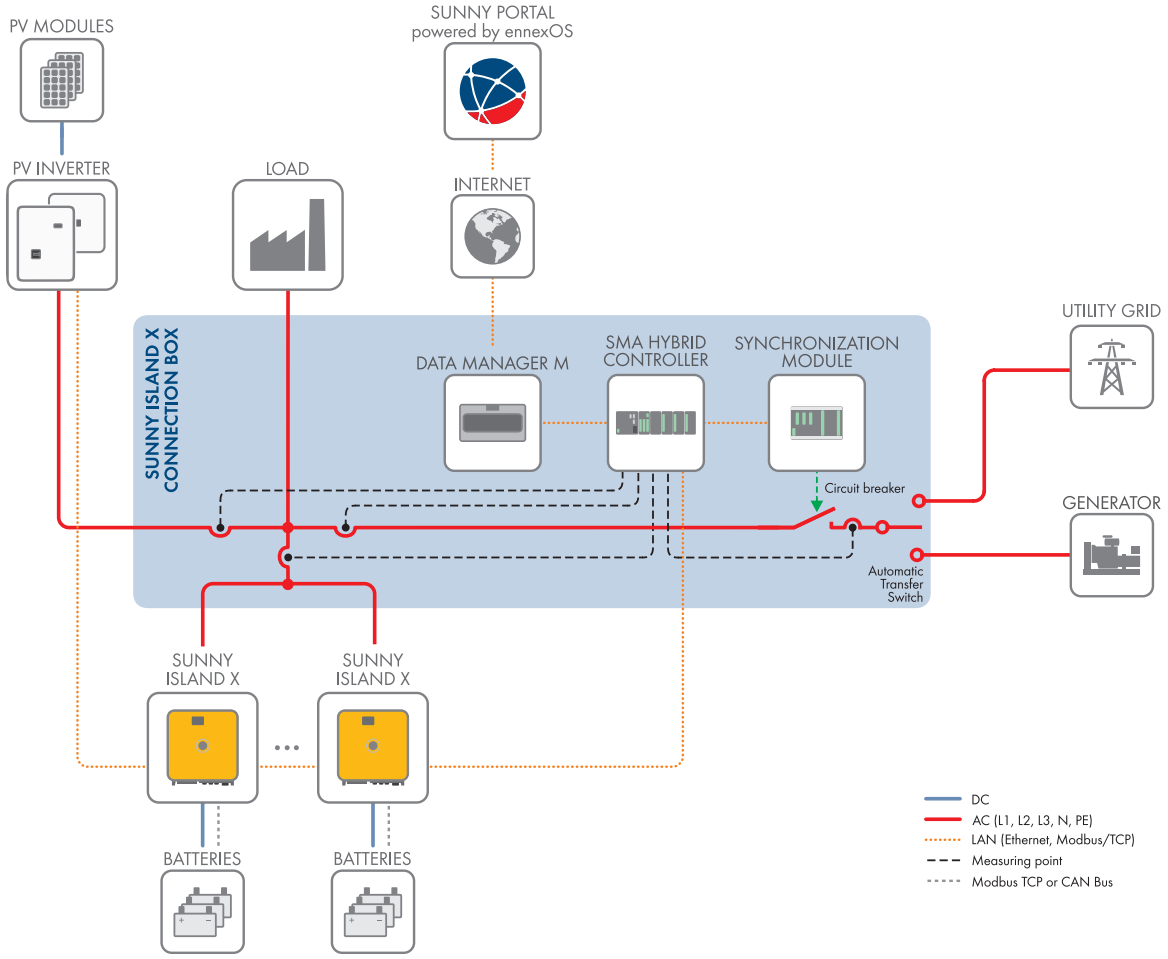


Figure 6: SMA Hybrid Controller as System Manager in a system with utility grid and generator (example)

The Sunny Island X is operated as a subordinate inverter.

The system uses both a generator and the utility grid as an external voltage source. The automatic transfer switching device in the SI X Connection Box ensures that only 1 external voltage source is active at a time, either the utility grid or the generator.

5.2.6 SMA Hybrid Controller as System Manager - System with Multiple Generators

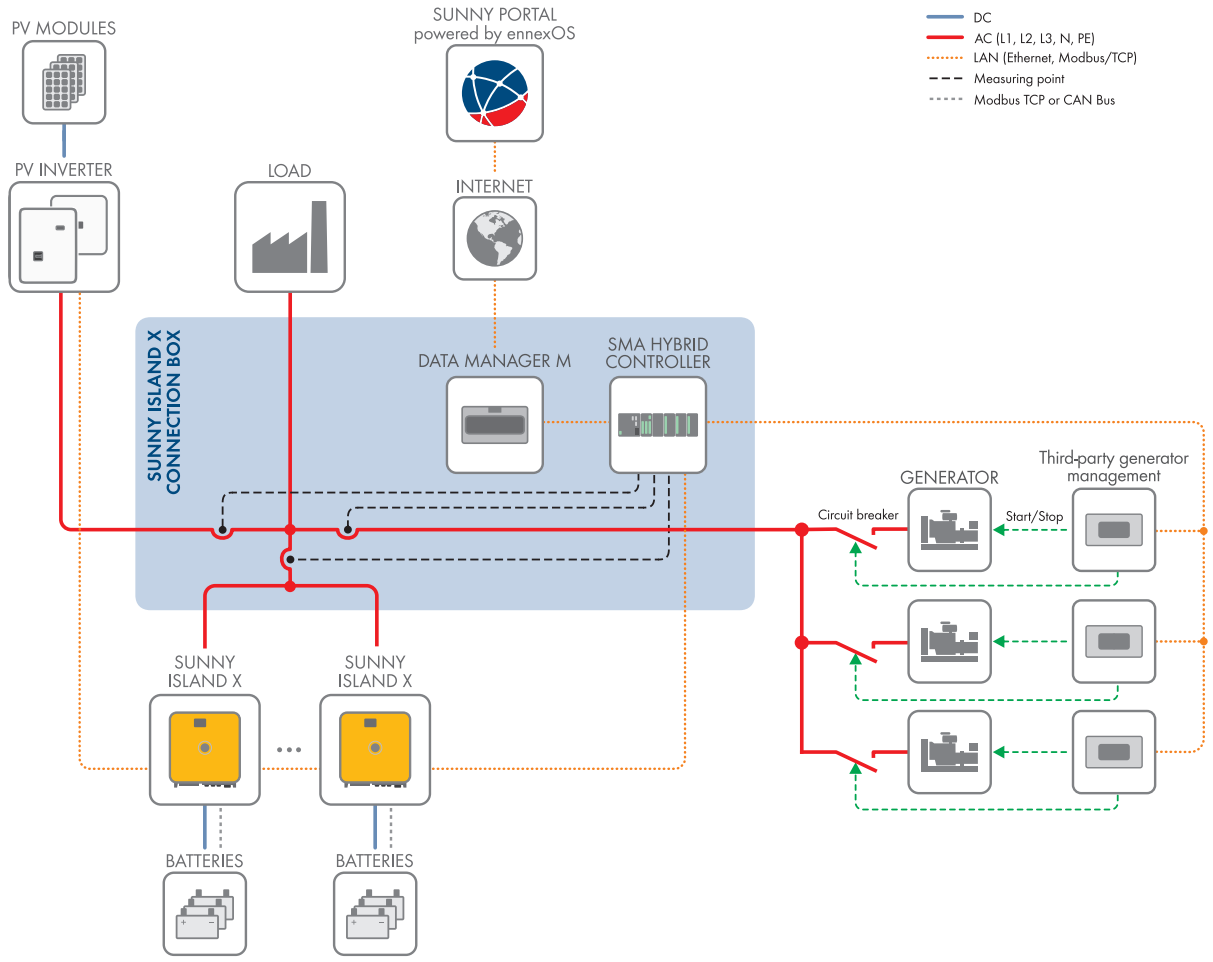


Figure 7: SMA Hybrid Controller as System Manager in a system with multiple generators (example)

The Sunny Island X is operated as a subordinate inverter.

The system uses up to 16 generators as an external voltage source. These generators must be integrated via a genset controller that is compatible with the SMA Hybrid Controller (see Technical Information "Use of Gensets in hybrid systems with SMA Hybrid Controller").

5.3 Product Description

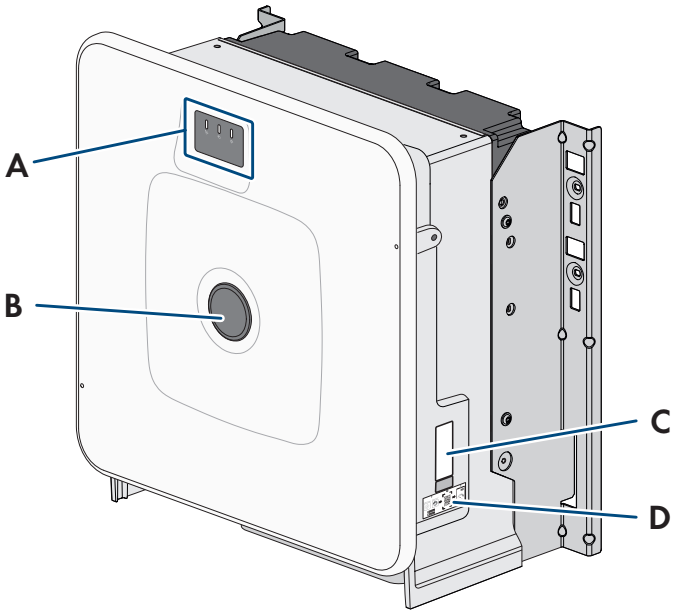


Figure 8: Design of the inverter

Position	Designation
A	LEDs and optional display The LEDs indicate the operating state. Additionally, the optional display shows current operating data and events or errors.
B	Cover
C	Type label The type label clearly identifies the product. The type label must be permanently attached to the inverter. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Device-specific characteristics
D	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via WLAN

Also see:

- LED Signals ⇒ page 31

5.4 Symbols on the Inverter

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

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

Symbol	Explanation
UKCA	UKCA marking The product complies with the regulations of the applicable laws of England, Wales and Scotland.
RoHS	RoHS labeling The product complies with the requirements of the applicable EU directives.

5.5 Interfaces and Functions

5.5.1 User Interface

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

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

Also see:

- Design of the User Interface ⇒ page 64
- Access rights to the user interface ⇒ page 66

5.5.2 SMA Speedwire

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

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

5.5.3 Wi-Fi connection to SMA 360° app and SMA Energy app

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

Also see:

- Direct connection via Wi-Fi ⇒ page 63

5.5.4 Device Key (DEV KEY)

If you have forgotten the administrator password for the product, you can reset the administrator account with the Device Key and assign a new password. The Device Key can be used to prove the identity of the product in digital communication. The Device Key is located on the back of the quick reference guide that comes with the product. Keep the Device Key safe in case you forget the administrator password.

5.5.5 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
- Controlling the battery

5.5.6 Grid Management Services

The product is equipped with service functions for grid management.

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

5.5.7 Integrated Plant Control

The inverter can display the Q(V) characteristic curve specified by the grid operator by means of Integrated Plant Control without measuring on the grid-connection point. The inverter can automatically compensate equipment installed between the inverter and the point of interconnection after having activated the function (for information on the system configuration refer to the Technical Information "Integrated Plant Control" at www.SMA-Solar.com).

5.5.8 Increased self-consumption

With increased self-consumption, the highest possible proportion of the power of a generator (e.g. a PV system) is consumed at the place where it is generated. With increased self-consumption, power output and power consumption at the point of interconnection are reduced.

The inverter supports the increased self-consumption through intermediate storage of energy from generators.

Also see:

- Predefined energy management profiles ⇒ page 66

5.5.9 Peak load shaving

With the "Peak Load Shaving" function, you can optimize the behavior of the battery inverter with respect to the power exchange at the point of interconnection. This is mostly useful when a higher supply of energy would lead to a higher electricity cost. With the "Peak Load Shaving" function, certain grid-exchange power outputs to which the battery inverter is adjusted depending on its power and battery capacity available can be set. Power peaks and additional costs can thus be avoided.

You can configure setpoints for the power drawn at the point of interconnection. When the loads require additional energy, the battery is discharged and the maximum value is kept constant at the grid-connection point. This is based on the prerequisite that the battery is sufficiently charged.

Also see:

- Predefined energy management profiles ⇒ page 66

5.5.10 Multiuse

Th multiuse function is a combination of increased self-consumption and peak load shaving. The total storage capacity of the battery is virtually distributed between increased self-consumption and peak load shaving.

With this function, it is also possible to increase the self-consumption rate and save further electricity costs.

Also see:

- Increased self-consumption ⇒ page 28
- Peak load shaving ⇒ page 28

5.5.11 Stand-alone grid function

Off-grid systems with Sunny Island are used to set up self-sufficient utility grids. The Sunny Island X forms the stand-alone grid as a voltage source. The Sunny Island X regulates the balance between the energy fed in and energy used and features a management system that manages the battery, generators and loads. AC sources (e.g., PV inverters) supply loads and are used by the Sunny Island X to recharge the battery. In order to be able to increase the availability of the off-grid system and reduce the battery capacity, the Sunny Island X can use an external energy source (e.g., a generator).

Also see:

- SMA Hybrid Controller as System Manager - System with a Generator ⇒ page 21
- SMA Hybrid Controller as System Manager - System with Utility Grid ⇒ page 22
- SMA Hybrid Controller as System Manager - System with Utility Grid and Generator ⇒ page 23
- SMA Hybrid Controller as System Manager - System with Multiple Generators ⇒ page 24

5.5.12 Module slot

The inverter is equipped as standard with a module slot for installing an additional module. From firmware version 3.02.xx.R, the inverter is compatible with the SMA I/O Module (MD.IO-41).

5.5.13 SMA I/O modules

The SMA I/O Module enables the inverter to perform grid management services. The SMA I/O Module can be retrofitted from firmware version 3.02.xx.R of the inverter.

Information on installation, connection and configuration can be found in the manual for the SMA I/O Module. The SMA I/O Module can be retrofitted.

Also see:

- Grid and PV system protection in accordance with VDE-AR-N 4105 ⇒ page 29
- Ripple control receiver ⇒ page 29
- Use of the Digital Input ⇒ page 74

5.5.14 Grid and PV system protection in accordance with VDE-AR-N 4105

The grid and PV system protection is a "type-tested protective device with a certificate of compliance" as per application guide VDE-AR-N 4105. This type-tested protective device with a certificate of compliance constantly monitors the voltage and frequency of the transmission line for compliance with the specified tolerances and prevents the formation of stand-alone grids.

For generating systems < 30 kW, the grid and PV system protection that is integrated into the inverters as standard is sufficient in Germany. For generating systems > 30 kW, however, external grid and PV system protection is required. Here it is absolutely necessary that an external monitoring unit with an integrated system protection relay is implemented. Whereas for systems up to 135 kW, the tie switch that disconnects the PV system from the utility grid does not necessarily have to be implemented externally, provided the standard requirements are complied with. Thus, the external grid and PV system protection consists of two components:

- Monitoring unit with a grid and system protection relay
- Tie switch that is switched via the system protection relay of the monitoring unit and disconnects the PV system in the event of a grid failure.

From firmware version 3.02.xx.R, the inverter offers the possibility to replace the external interface switch for disconnection from the grid with the optional SMA I/O Module.

5.5.15 Ripple control receiver

A ripple control receiver or remote terminal unit for closed-loop control by the grid operator can be connected via the optional SMA I/O Module (from firmware version 3.02.xx.R of the inverter).

5.5.16 SMA Smart Connected

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

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

5.6 Battery Use by the Inverter

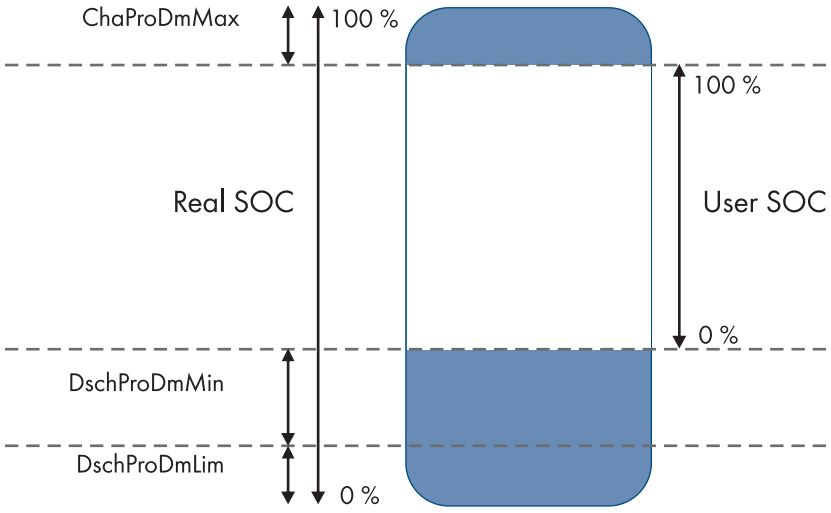


Figure 9: State of charge ranges of the battery

Range	Parameter	Inverter behavior
ChaProDMMax	**Permitted upper battery charge limit**	In this range, the inverter operates in protected mode to protect the battery from overcharging (charge stop mode).
DschProDMMin	**Minimum width of deep discharge protection area**	In this range, the inverter operates in protected mode to protect the battery from deep discharge (discharge stop mode).
DschProDmLim	**Lower lmt deep disch. protect area prior shutdown**	To protect the battery from deep discharge, the inverter switches off (deep discharge protection).
User SOC	-	User SOC is the range in the battery state of charge that is displayed via the user interface of the inverter. The inverter uses the battery within this range for increased self-consumption and for the functions that can be configured in the energy management profile (self-consumption range).
Real SOC	-	Real SOC is the maximum available range of the battery state of charge.

5.7 LED Signals

The LEDs indicate the operating state of the inverter.

LED signal	Explanation
Green LED and red LED are flashing slowly (2 s on and 2 s off)	No country data set set Operation of the inverter is stopped because no country data set is set. Once the configuration has been completed (for instance using the installation assistant or via a communication product), the inverter will start operation automatically.
The green LED is flashing slowly (2 seconds on and 2 seconds off)	Waiting for valid operating conditions The conditions for charging and discharge mode are not yet met. As soon as the conditions are met, the inverter will start charging and discharging.
The green LED is glowing	Charge and discharge mode The inverter charges or discharges the battery in current-controlled operation (e.g., on the utility grid).
The green LED flashes asymmetrically (1.5 s on and 0.5 s off)	Stand-alone grid or battery-backup operation The inverter charges or discharges the battery in voltage-suppling mode.
The green LED is off	No battery voltage is applied.
The red LED is glowing	Error Inverter operation has been stopped. In addition, a distinct event message and the corresponding event number are displayed on the user interface of the inverter or System Manager (e.g., SMA Data Manager M). **Only when used as System Manager**: A fault in the lower-level PV inverter (e.g., Sunny Tripower X) can also be indicated by the red LED lighting up. In this case, a specific event message and the associated event number are displayed on the user interface of the PV inverter or System Manager .
Red LED flashes with double blink code (0.25 s on, 0.25 s off and 0.25 s on) and pause (1.25 s off)	Warning Communication with the System Manager failed. The inverter continues to operate with restricted function (e.g., with set fallback level). In addition, a distinct event message and the corresponding event number are displayed on the user interface of the inverter or System Manager (e.g., SMA Data Manager M).
The blue LED is flashing slowly (2 seconds on and 2 seconds off)	Communication connection is being established. The inverter is establishing a connection to a local network (Ethernet/Wi-Fi) or is establishing a direct connection (Ethernet/Wi-Fi) to an end device (e.g., computer, tablet PC or smartphone).
The blue LED is flashing fast (0.25 s on and 0.25 s off)	A communication product requests identification of the inverter.
The blue LED is glowing	There is an active connection with a local network (Ethernet/Wi-Fi) or a direct connection (Ethernet/Wi-Fi) with an end device (e.g., computer, tablet PC or smartphone).

LED signal	Explanation
Blue LED is off	There is no active connection.
All 3 LEDs are on	Inverter update or booting procedure

6 Mounting and Preparing the Connection

6.1 Requirements for Mounting

6.1.1 Requirements for the mounting location of the inverter

⚠ WARNING

Danger to life due to fire or explosion

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

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

☐ Do not mount the inverter in living areas

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

☐ The mounting location must be inaccessible to children.

☐ The installation site can be exposed to direct solar irradiation. There is, however, the possibility that the product reduces its power output to avoid overheating due to high temperatures.

☐ The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.

☐ All ambient conditions must be met.

6.1.2 Permitted and prohibited mounting positions

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

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

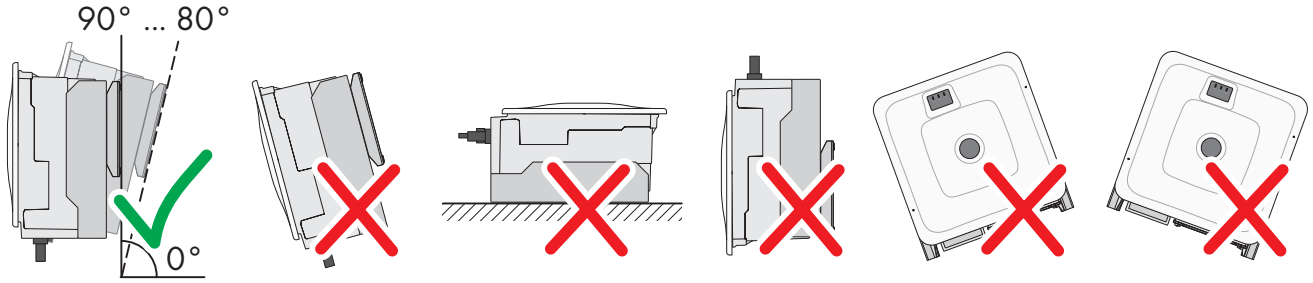


Figure 10: Permitted and prohibited mounting positions

6.1.3 Dimensions for mounting

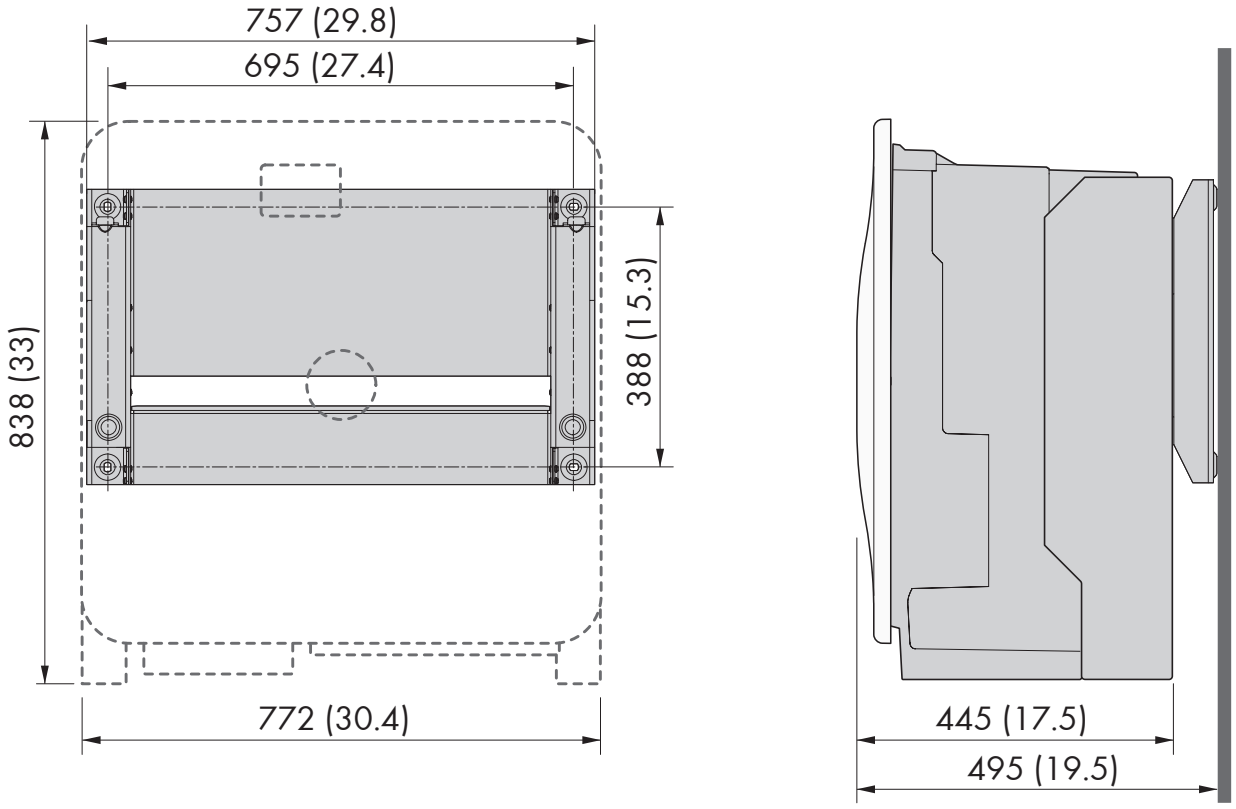


Figure 11: Position of the anchoring points (dimensions in mm (in))

6.1.4 Recommended clearances for mounting

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

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

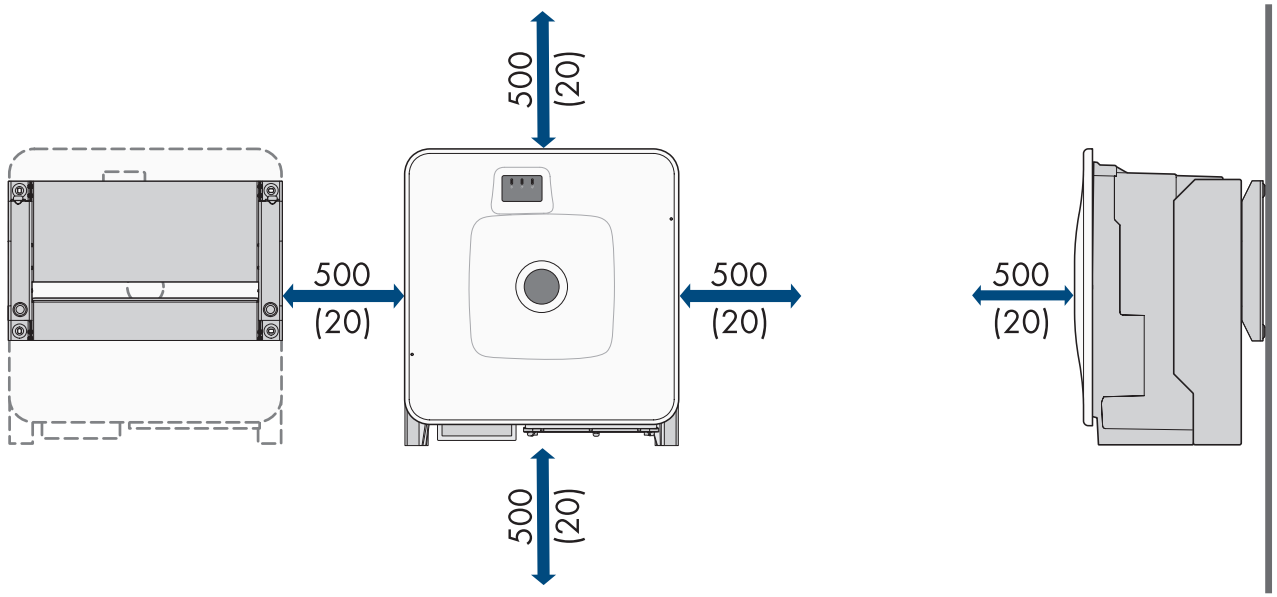


Figure 12: Recommended clearances (dimensions in mm (in))

6.2 Overview of Connecting Plate

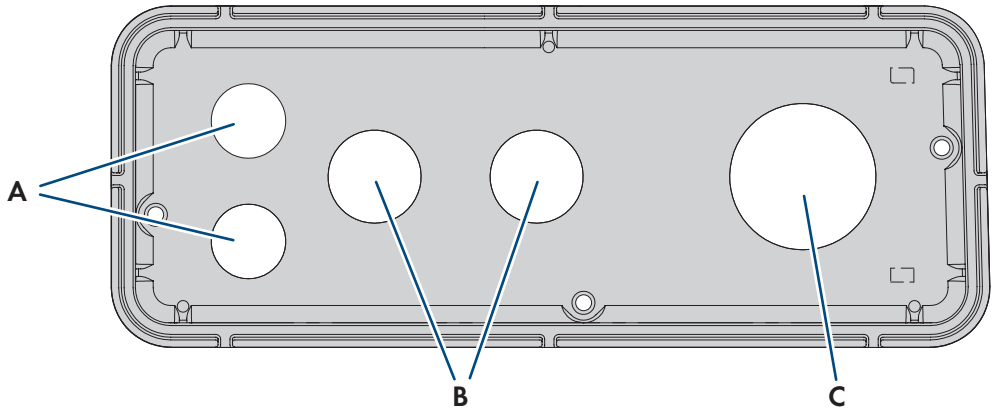


Figure 13: Position of enclosure openings

Position	Designation
A	Entry for network cables and battery communication cables (M32)
B	Entry for DC cable (M32)
C	Entry for AC cable (M63)

6.3 Center of gravity

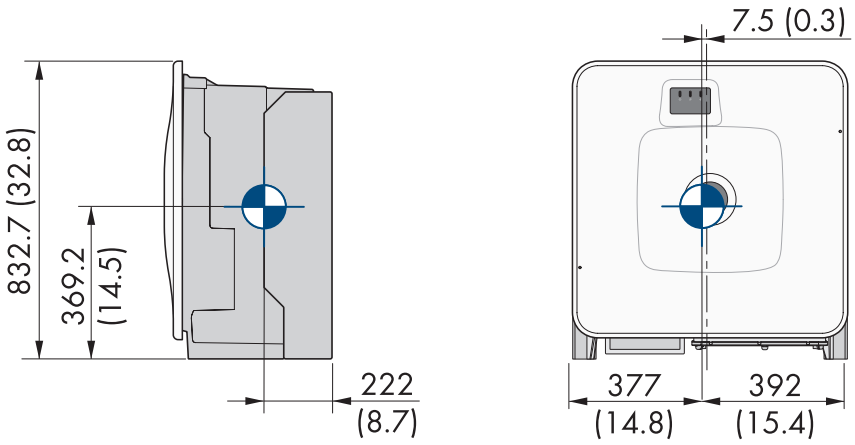


Figure 14: Dimensions of the center of gravity of the product (Dimensions in mm)

6.4 Preparing for mounting and 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 battery from the inverter via the load-break switch of the battery fuse. To do this, turn off the load-break switch of the battery fuse and secure against reconnection.
- Wear suitable personal protective equipment for all work on the product.

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

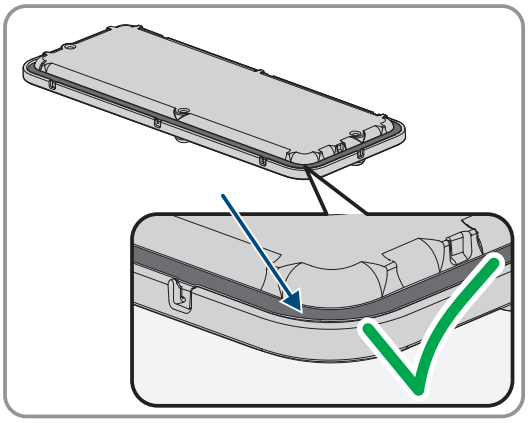
☐ At least 4 screws that are suitable for the support surface.

☐ At least 4 washers that are suitable for the screws.

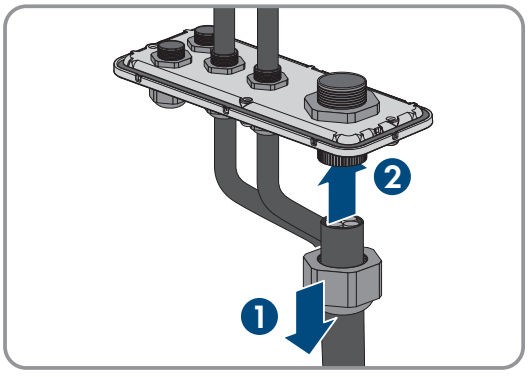
☐ At least 4 screw anchors that are suitable for the support surface and the screws.

Procedure:

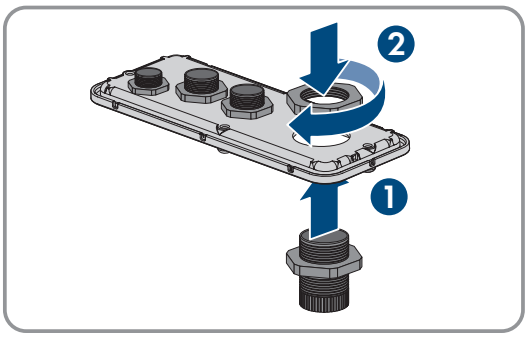
1. Mark the position of the drill holes using the wall mounting bracket.
2. Drill the holes and insert the screw anchors.
3. Secure the wall mounting bracket horizontally on the wall using screws and washers.
4. Hang the mounting template in the wall mounting bracket.
5. Align the cables by means of the mounting template and shorten if necessary. Take the product depth of 400 mm into account.
6. Ensure on the connection plate that the seal is present and undamaged.



7. Thread the swivel nuts of the cable glands over the cables.



8. Attach the cable glands to the connecting plate.



9. Lead the cables through the cable glands in the connecting plate and align the connecting plate by means of the mounting template.
10. Remove the mounting template.
11. Mount the product (see Section 6.5, page 37).

Also see:

- Overview of Connecting Plate ⇒ page 35
- Permitted and prohibited mounting positions ⇒ page 33
- Dimensions for mounting ⇒ page 34
- Recommended clearances for mounting ⇒ page 34
- Center of gravity ⇒ page 35
- Requirements for the mounting location of the inverter ⇒ page 33

6.5 Mounting the Inverter

⚠ 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 battery from the inverter via the load-break switch of the battery fuse. To do this, turn off the load-break switch of the battery fuse and secure against reconnection.
- 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.

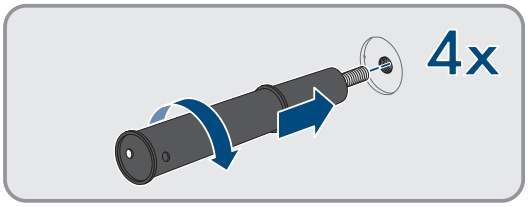
- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.
- Transport the product using the carrying handles or hoist. Take the weight of the product into account.
- Use all carrying handles provided 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.

Requirements:

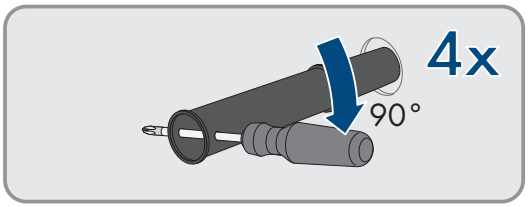
- Mounting and connection are prepared.

Procedure:

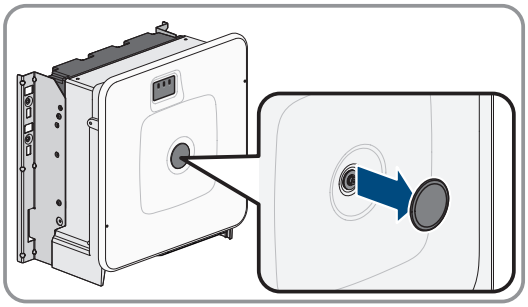
1. Screw the transport handles as far as they will go into the tapped holes on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the carrying handles are not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



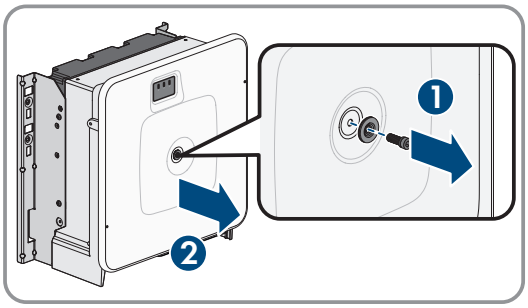
2. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90°. This ensures that the transport handles are securely tightened.



3. If the inverter is to be hooked into the wall mounting bracket 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 lifting gear must be suitable to take the weight of the inverter.
4. Remove the cover from the enclosure lid.

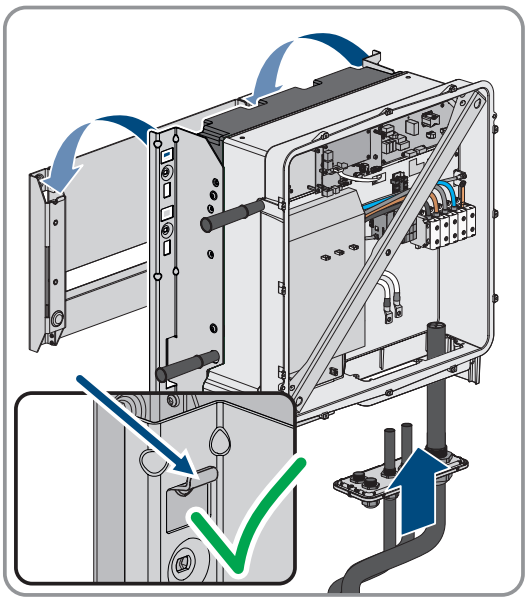


5. Unscrew the screw on the enclosure lid (hex socket, AF8) and remove the enclosure lid.

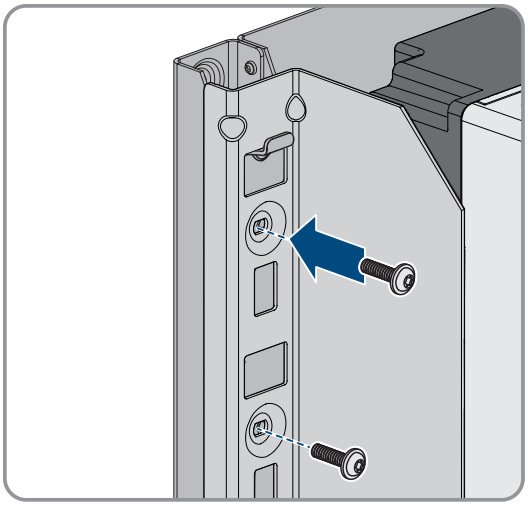


6. Set the cover, screw with seal, washer with seal and enclosure lid aside and store safely.

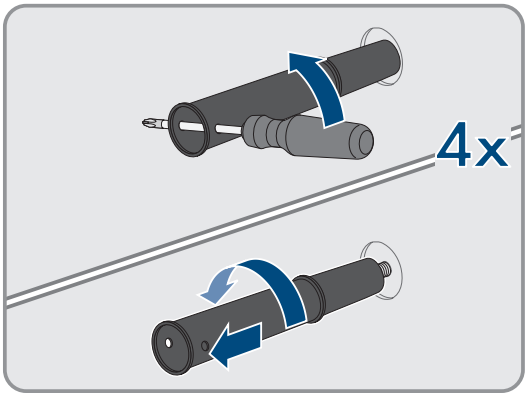
7. Hook the product into the wall mounting bracket. To do this, guide the product over the cables and the connecting plate so that the cables protrude through the opening into the product and the connecting plate sits under the opening. The bracket must protrude through the upper opening.



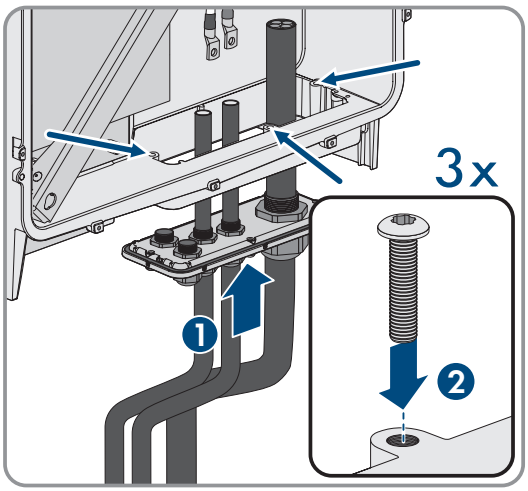
8. Align the cables by means of the mounting template and shorten if necessary. Take the product depth of 400 mm into account.
9. Secure the product with 2 screws each on the right and left on the wall mounting bracket (M8x25, TX40, 12 Nm ± 2 Nm).



10. Remove all 4 transport handles from the tapped holes. If necessary, insert a screwdriver into the holes on the transport handle and use the screwdriver to remove the transport handle.



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



Also see:

- Preparing for mounting and connection ⇒ page 36
- Center of gravity ⇒ page 35

7 Electrical Connection

7.1 Requirements for the electrical connection

7.1.1 Residual-current monitoring unit (RCMU)

The product is equipped with an all-pole sensitive residual-current monitoring unit in accordance with IEC/EN 62109-2 and VDE 0126-1-1. The all-pole sensitive residual-current monitoring unit monitors AC and DC residual currents and redundantly disconnects the product from the utility grid if residual current jumps of > 30 mA occur. If the residual-current monitoring unit malfunctions, all poles of the product are immediately disconnected from the utility grid. If the protection provided by automatic disconnection of the power supply in accordance with DIN VDE 0100-410 is fulfilled by an appropriate overcurrent protective device, the product does not require an external residual-current device to operate safely. If local regulations require the use of a residual-current device, the following must be observed:

- The product is compatible with type B residual-current devices. The rated residual current of the residual-current device must be 500 mA or higher (for information on selecting a residual-current device, see Technical Information "Criteria for Selecting a Residual-Current Device" under www.SMA-Solar.com). Each inverter in the system must be connected to the utility grid via a separate residual-current device.
- When using residual-current device with a lower rated residual current, there is a risk of false tripping of the residual-current device, depending on the system design.

7.1.2 Overvoltage category

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

7.1.3 Load-break switch and cable protection

NOTICE

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

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

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

☐ In PV systems with multiple inverters, protect each inverter with a separate all-pole circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 16, page 110). This will prevent residual voltage from being present at the corresponding cable after disconnection.

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

7.1.4 Equipotential Bonding

If components are used in a system that require equipotential bonding (e.g. battery cabinets), these must be connected to a central equipotential panel provided for this purpose.

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

7.1.5 AC cable requirements

☐ Conductor type: aluminum or copper wire

- ☐ The conductors must be solid, stranded or fine-stranded. When using fine-stranded wire, bootlace ferrules must be used.
- ☐ Conductor cross-section: 16 mm² to 95 mm²
- ☐ External diameter: 35 mm to 48 mm
- ☐ Insulation stripping length: 30 mm
- ☐ Sheath stripping length: ≤ 375 mm
- ☐ The cable and conductor cross-sections must always be dimensioned according to the local and national directives and within the range specified by the manufacturer (SMA Solar Technology AG)." If the manufacturer (SMA Solar Technology AG) requires a higher conductor cross-section than the standard, the range of the manufacturer must be observed. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

Also see:

- Connecting the AC Cable ⇒ page 47

7.1.6 Network cable requirements

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

- ☐ Cable type: 100BaseTx
- ☐ Cable category: minimum CAT5e
- ☐ Plug type: RJ45 of Cat5, Cat5e or higher
- ☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP
- ☐ Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.22 mm²
- ☐ Maximum cable length between two nodes when using patch cables: 50 m
- ☐ Maximum cable length between two nodes when using installation cables: 100 m
- ☐ UV-resistant if installed outdoors.

7.1.7 Battery data cable requirements

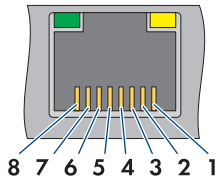
The cable length and quality affect the quality of the signal. Observe the following cable requirements:

- ☐ Cable type: 100BaseTx
- ☐ Cable category: minimum CAT5e
- ☐ Plug type: RJ45 of Cat5, Cat5e or higher
- ☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP
- ☐ Maximum cable length between 2 nodes when using patch cables: 50 m
- ☐ UV-resistant for outdoor use

Also see:

- Connecting the battery communication cable for CAN ⇒ page 53
- Connecting the battery communication cable for Modbus ⇒ page 50

7.1.8 Pin assignment of RJ45 plug connector for battery communication via CAN bus

RJ45 plug	Pin	Signal
	1	-
	2	EN_GND
	3	-
	4	CAN_H
	5	CAN_L
	6	-
	7	Reserved
	8	-

Also see:

- Battery data cable requirements ⇒ page 42
- Connecting the battery communication cable for CAN ⇒ page 53

7.1.9 Laying plan for network and battery data cables

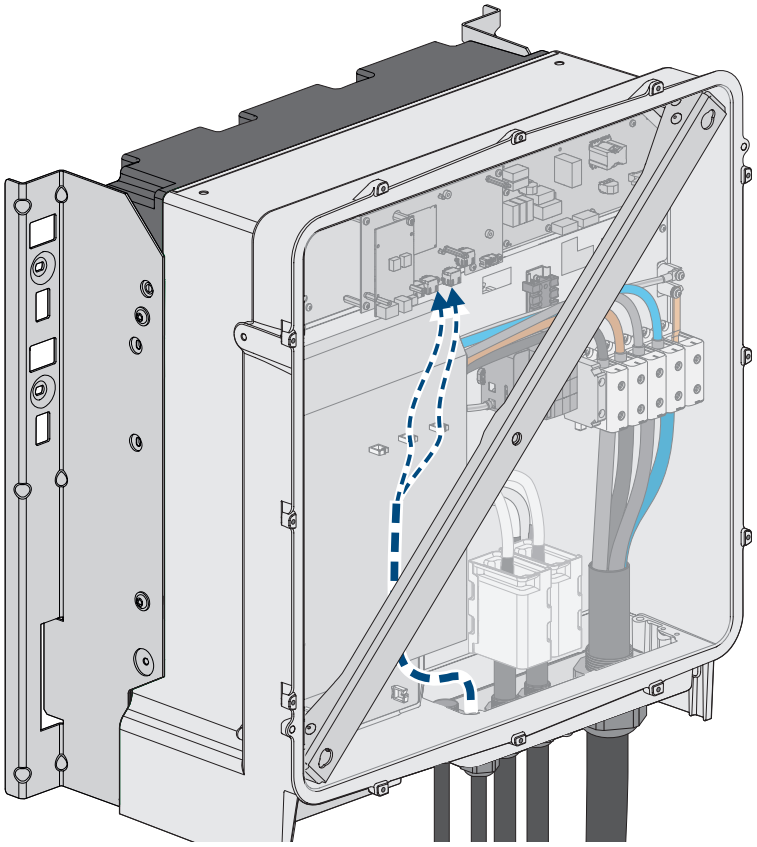


Figure 15: Interior view of the inverter with laying plan for network cables / battery data cables

Also see:

- Overview of the Connection Area ⇒ page 45

7.1.10 Ripple control receiver and external I/O system

These external I/O systems support the connection of a ripple control receiver with the inverter via the local network:

- ioLogik E1214
- ioLogik E1242
- WAGO-I/O-SYSTEM 750

Also see:

- Accessories ⇒ page 114
- Connecting the Network Cables ⇒ page 48
- Network cable requirements ⇒ page 42

7.1.11 DC cable requirements

- Aluminum or copper wires must be used.
- Connectable conductor cross-section: 50 mm² to 95 mm²
- External diameter of the battery power cable: 12 mm to 20 mm
- The DC cables must be sized for the maximum battery voltage and the maximum battery current (see battery manufacturer documentation).
- The DC cables must be equipped with suitable terminal lugs made of tin-plated copper for DC connection in the inverter.

Also see:

- DC connection overview ⇒ page 46
- Connecting the DC Cables ⇒ page 56

7.2 Overview of the Connection Area

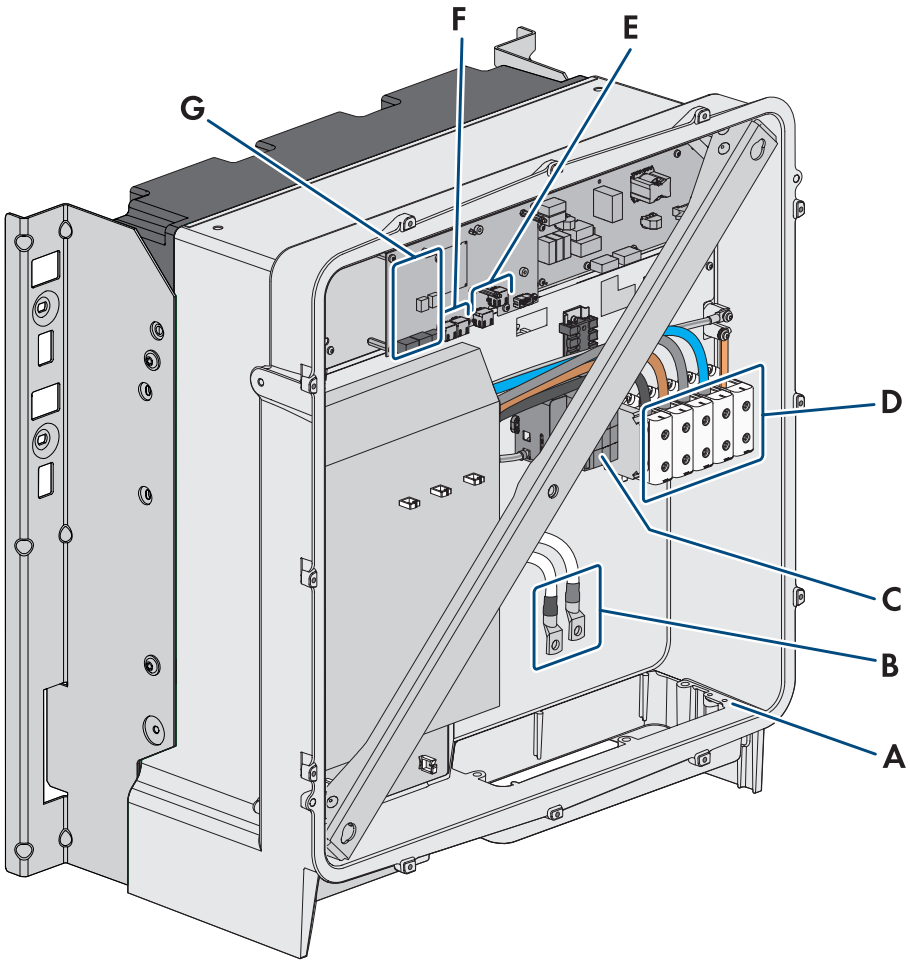
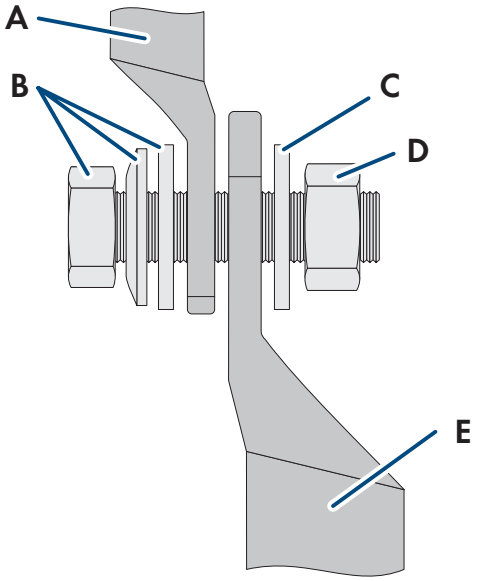


Figure 16: Connection areas in the interior of the product

Position	Designation
A	Optional connection for additional grounding or equipotential bonding The two bolt and washer assemblies M6x16 supplied are provided for this connection.
B	Cable for DC connection with tin-plated copper terminal lugs
C	AC overvoltage protection elements
D	Terminal blocks for AC connection
E	Sockets for battery communication connection
F	Sockets for network connection
G	Module slot

7.3 DC connection overview

1 DC cable



2 DC cable

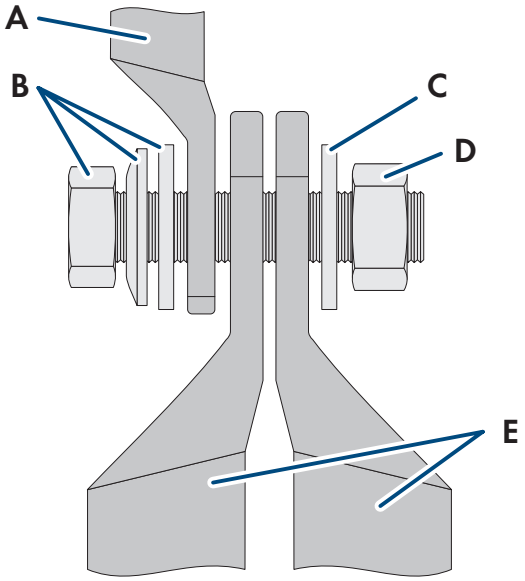


Figure 17: DC connection overview

Position	Designation
A	DC cable with tin-plated copper terminal lugs (installed in the product)
B	M10x40 combination hexagon head screw (AF16)
C	Washer M10
D	Hex nut M10
E	DC cable with terminal lug (not included in the scope of delivery)

7.4 Electrical connection procedure

⚠ QUALIFIED PERSON

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

Procedure		See
1.	Ensure that the requirements for the electrical connection are fulfilled.	Section 7.1, page 41
2.	Optional: Installing and Connecting SMA I/O Module	See manual for the SMA I/O Module
3.	Connect the AC cables.	Section 7.5, page 47
4.	Connect the network cables.	Section 7.6, page 48
5.	Connect the data cables of the battery.	Section 7.7, page 50
6.	Connect the DC cables.	Section 7.9, page 56

7.5 Connecting the AC Cable

⚠ QUALIFIED PERSON

Requirements:

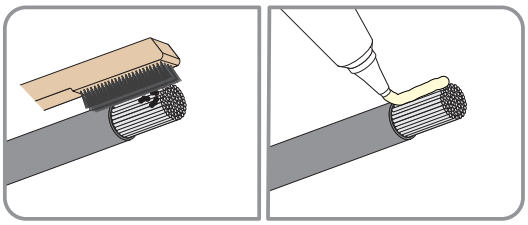
☐ The medium-voltage transformer used must be suitable for the product.

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

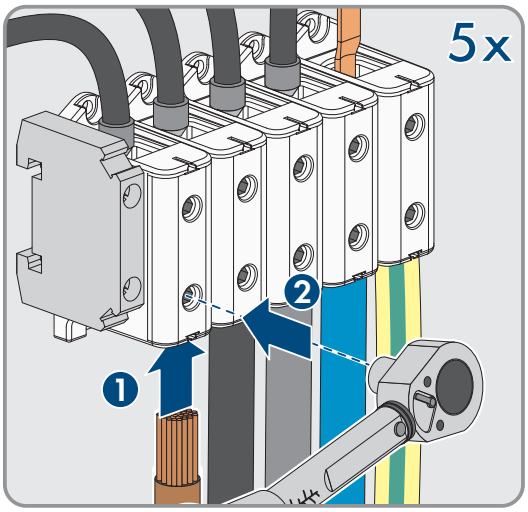
☐ Protective grease (only for conductors made of aluminum)

Procedure:

1. Ensure that the AC miniature circuit breaker is switched off and that it cannot be reconnected.
2. Shorten the cable if necessary.
3. Dismantle the cable.
4. Strip the insulation on the insulated conductors each by 30 mm.
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, N, 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 (hex socket AF 5, torque for a conductor cross-section of 16 mm² to 95 mm²: 20 Nm).



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

Also see:

- Residual-current monitoring unit (RCMU) ⇒ page 41
- Load-break switch and cable protection ⇒ page 41
- Overvoltage category ⇒ page 41

7.6 Connecting the Network Cables

⚠ QUALIFIED PERSON

⚠ DANGER

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

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

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.

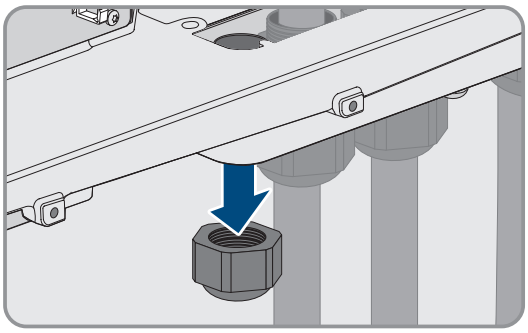
Additionally required material (not included in the scope of delivery):

☐ Network cables

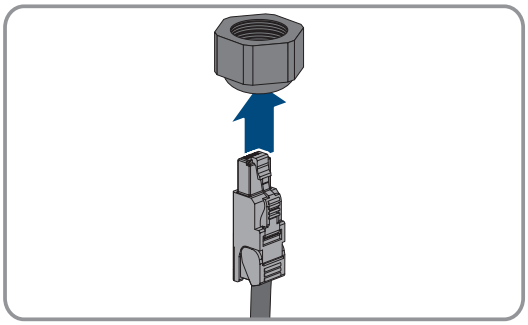
☐ Where required: Field-assembly RJ45 connector with metal enclosure

Procedure:

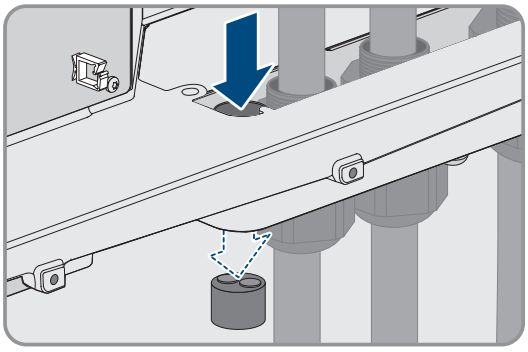
1. Disconnect the product from voltage sources (see Section 10, page 76).
2. Unscrew the swivel nut from the cable gland.



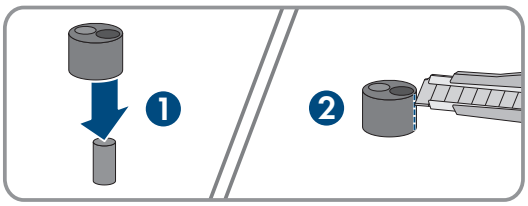
3. Thread a swivel nut over each network cable.



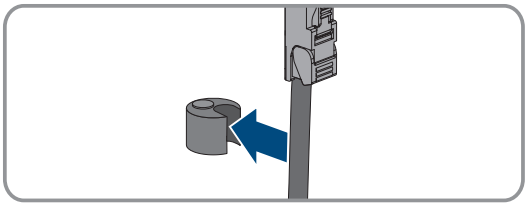
4. Remove the two-hole cable support sleeve from the cable gland.



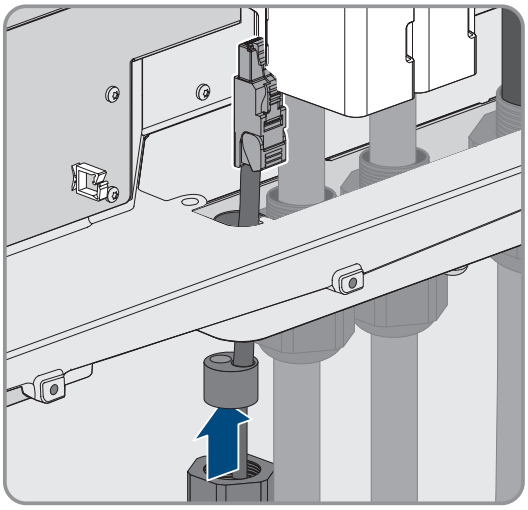
5. For each network cable, remove one of the plugs from the enclosure openings and for each network cable cut an enclosure opening with a utility knife.



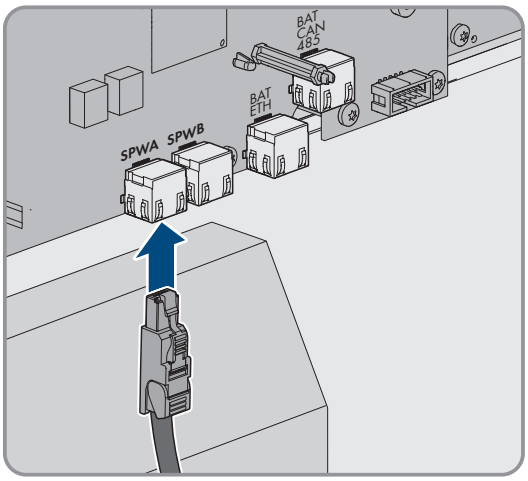
6. Insert each network cable into a 2-hole cable support sleeve.



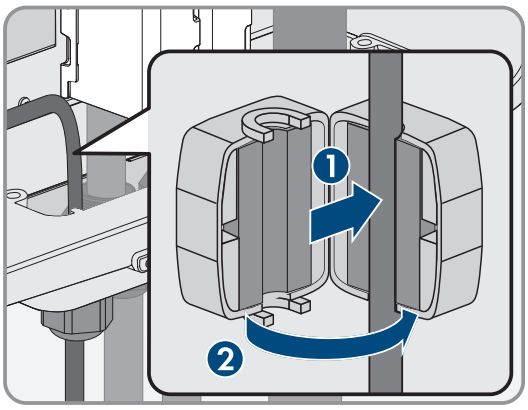
7. Press the 2-hole cable support sleeve into the cable gland and guide each network cable to the network port. Lay each cable according to the installation plan and attach it to the brackets.



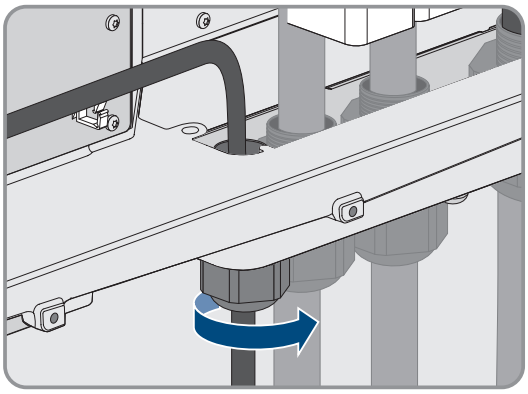
8. When using self-assembly cables, assemble the RJ45 connectors and connect them to the cable (refer to the documentation of the connector).
9. Plug the RJ45 connector of the network cable into the socket **SPWA** or **SPWB** of the communication assembly.



10. Attach one ferrite included in the scope of delivery to each network cable.



11. Firmly tighten the swivel nut on each cable gland.
12. Ensure that the network cables are securely in place by pulling slightly on each of them.
13. Tighten the swivel nut on the cable gland hand-tight. This will secure the network cables in place.



14. If the product is installed outdoors, install overvoltage protection for all components in the network.
15. Either connect the other end of the network cable directly to the local network (e.g., via a router) or connect all present converters in the system to each other in line topology and connect the first or last converter in the line to the local network.

Also see:

- Laying plan for network and battery data cables ⇒ page 43
- Network cable requirements ⇒ page 42

7.7 Connecting the battery communication cable for Modbus

⚠ QUALIFIED PERSON

If the Modbus interface of the inverter is to be used for battery communication, use the **BAT ETH** socket to connect the battery communication cable.

⚠ DANGER

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

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

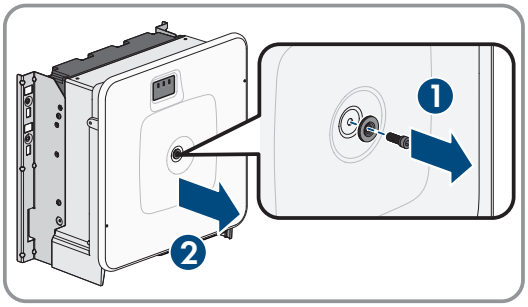
- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.

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

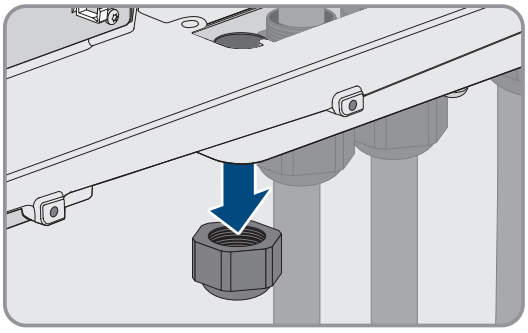
- ☐ Battery data cable(s)
- ☐ Where required: Field-assembly RJ45 connector with metal enclosure

Procedure:

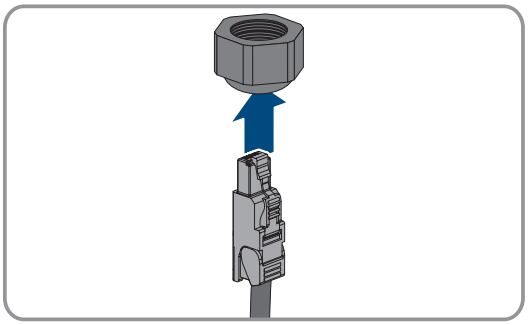
1. Disconnect the product from voltage sources (see Section 10, page 76).
2. When cover of the enclosure is closed: unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.



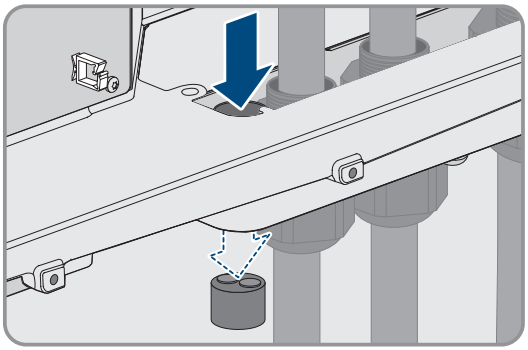
3. Unscrew the swivel nut from the cable gland.



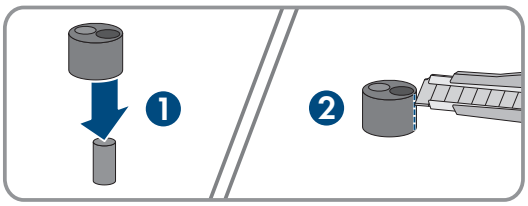
4. Thread the swivel nut over the data cable of the battery.



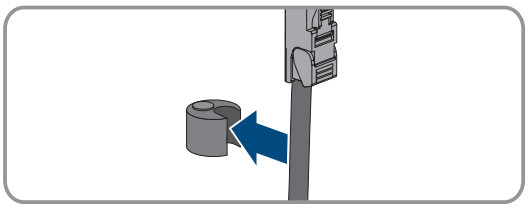
5. Remove the two-hole cable support sleeve from the cable gland.



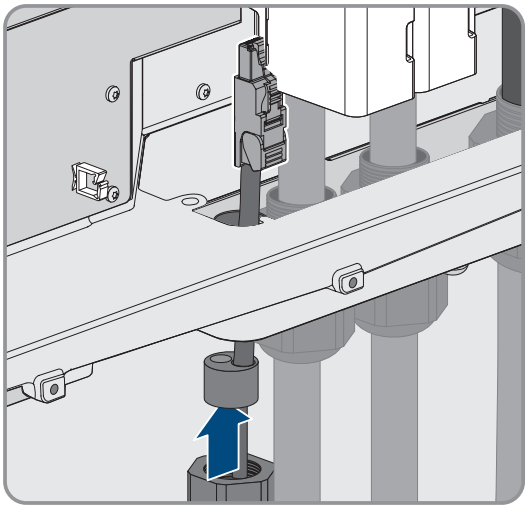
6. For the battery data cable, remove a plug from one of the enclosure openings and for the battery data cable cut an enclosure opening with a utility knife.



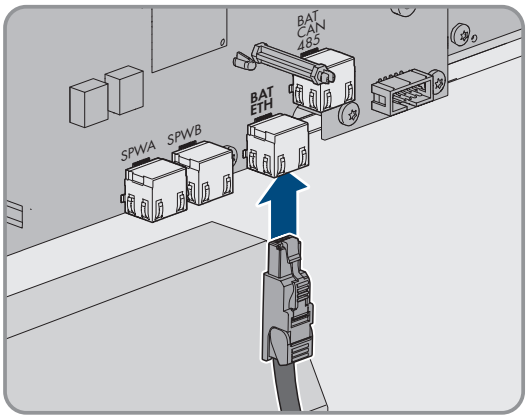
7. Insert the battery data cable into an enclosure opening.



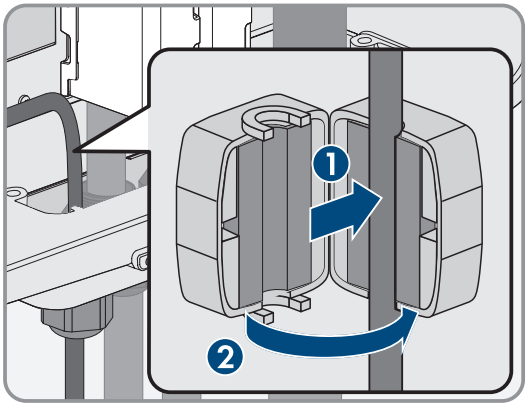
8. Press the cable support sleeve into the 2-hole cable gland and guide the battery data cable to the socket **BAT ETH**. Lay the battery data cable according to the installation plan and attach it to the brackets.



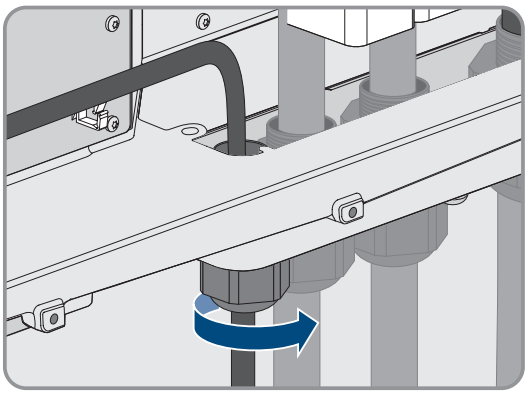
9. When using self-assembly cables, assemble the RJ45 connectors and connect them to the cable.
10. Plug the RJ45 connector of the battery data cable into the socket **BAT ETH** of the communication assembly.



11. Firmly tighten the swivel nut on the cable gland.
12. Ensure that the battery data cable is securely in place by pulling slightly on it.
13. Attach one ferrite included in the scope of delivery to each battery communication cable.



14. Tighten the swivel nut on the cable gland hand-tight. This will secure the battery data cables.



15. If the product is installed outdoors, install overvoltage protection for all components in the network.
16. Connect the other end of the battery data cable to the battery.

Also see:

- Battery data cable requirements ⇒ page 42
- Laying plan for network and battery data cables ⇒ page 43

7.8 Connecting the battery communication cable for CAN

⚠ DANGER

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

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

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the product or the battery outdoors to the inside of a building.

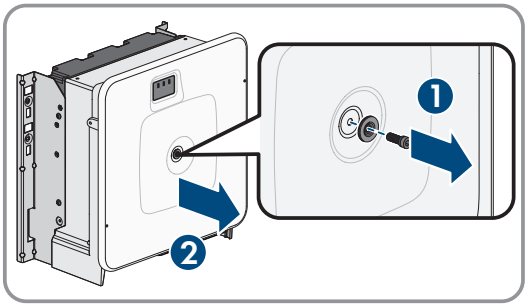
Additionally required material (not included in the scope of delivery):

☐ Battery data cable(s)

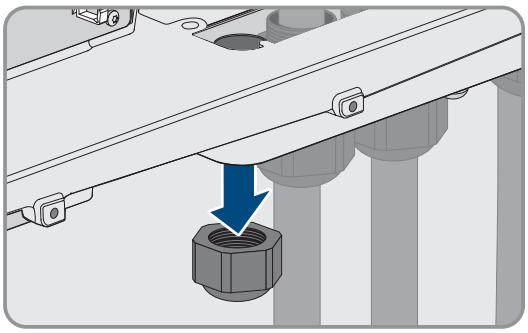
☐ Where required: Field-assembly RJ45 connector with metal enclosure

Procedure:

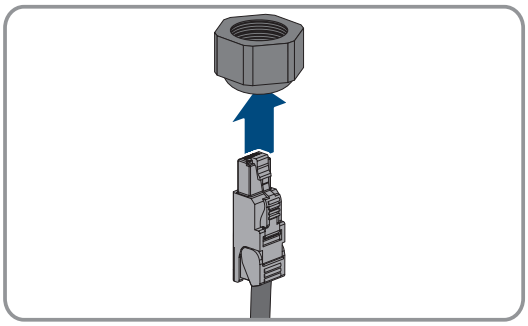
1. Disconnect the product from voltage sources (see Section 10, page 76).
2. When cover of the enclosure is closed: unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.



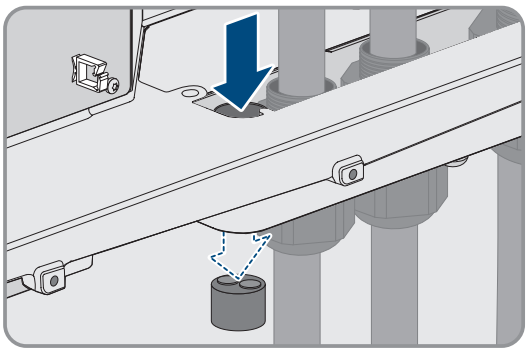
3. Unscrew the swivel nut from the cable gland.



4. Thread the swivel nut over the data cable of the battery.

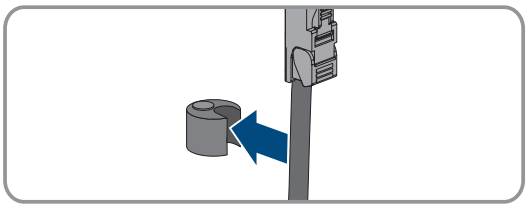


5. Remove the two-hole cable support sleeve from the cable gland.

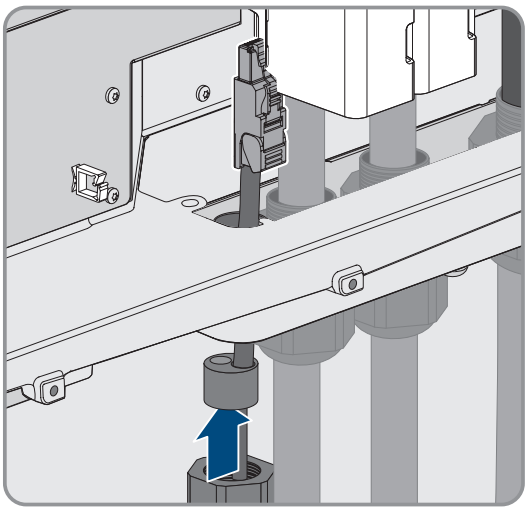


6. For the battery data cable, remove a plug from one of the enclosure openings and for the battery data cable cut an enclosure opening with a utility knife.

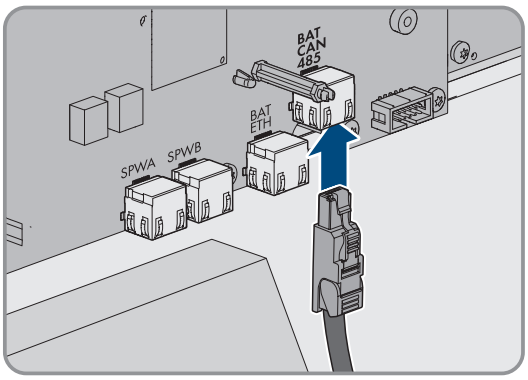
7. Insert the battery data cable into an enclosure opening.



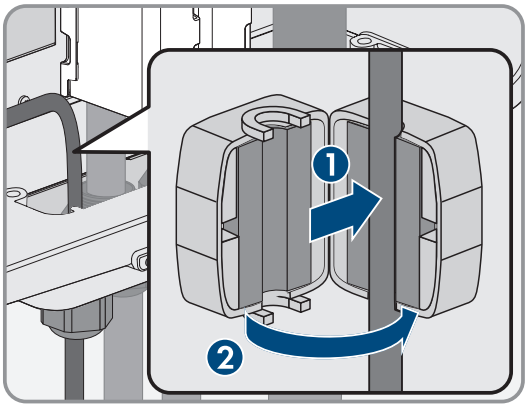
8. Press the two-hole cable support sleeve into the cable gland and guide the battery communication cable to the socket **BAT CAN**. Lay the battery data cable according to the installation plan and attach it to the brackets.



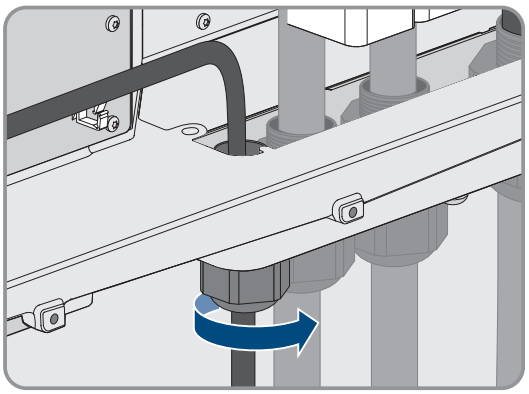
9. When using self-assembly cables: Assemble the RJ45 connectors according to the specified pin assignment and connect them to the cable.
10. Plug the RJ45 connector of the battery communication cable into the socket **BAT CAN** of the communication assembly.



11. Firmly tighten the swivel nut on the cable gland.
12. Ensure that the battery data cable is securely in place by pulling slightly on it.
13. Attach one ferrite included in the scope of delivery to each battery communication cable.



14. Tighten the swivel nut on the cable gland hand-tight. This will secure the battery data cables.



15. If the product is installed outdoors, install overvoltage protection for all components in the network.
16. Connect the other end of the battery data cable to the battery.

Also see:

- Pin assignment of RJ45 plug connector for battery communication via CAN bus ⇒ page 43
- Laying plan for network and battery data cables ⇒ page 43
- Battery data cable requirements ⇒ page 42

7.9 Connecting the DC Cables

⚠ QUALIFIED PERSON

NOTICE

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

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

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

Requirements:

☐ An external DC load break switch must be installed (e.g. battery fuse with load-break switch).

☐ The batteries must be protected at all poles. Adhere to the specifications of the battery manufacturer.

☐ The DC cables must be inserted into the product.

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

☐ 2 terminal lugs (flange hole: M10 or M12, cross-section: appropriate to DC cables used)

☐ Clean cloth

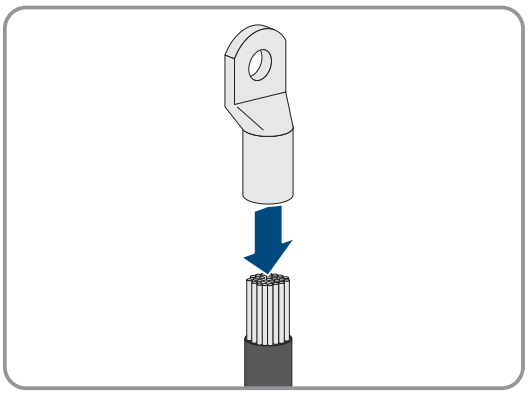
☐ Ethanol cleaning agent

☐ Press tool

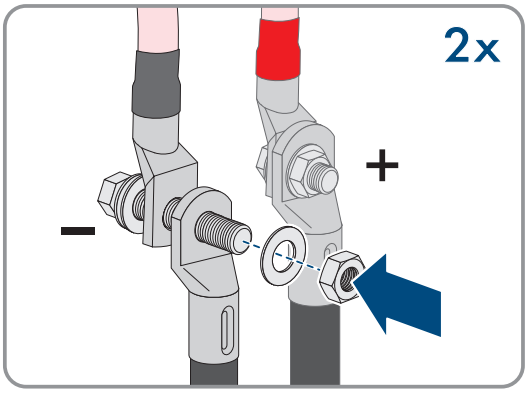
Procedure:

1. Ensure that no voltage is present on the DC cables.
2. Dismantle the DC cables.

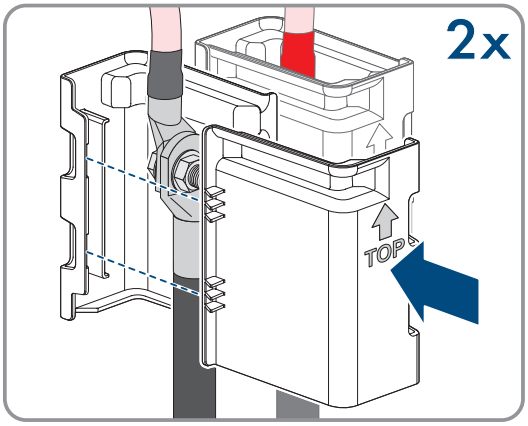
3. Fit terminal lugs to the DC conductors.



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, insert the screw and washer assembly (M10x40) from behind through the round holes in the terminal lugs and tighten it from the front with the washer (M10) and the hex nut (AF16, torque: 24 Nm ± 2 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.

Also see:

- DC cable requirements ⇒ page 44
- DC connection overview ⇒ page 46

8 Commissioning

8.1 Procedure for commissioning as System Manager

⚠ QUALIFIED PERSON

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

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

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

Procedure		See
1.	Switch on all SMA Speedwire devices that are to be subordinate to the System Manager (e.g., inverters, energy meters).	Manual of the devices
2.	Switch on the inverter that is to be configured as the System Manager.	Section 8.3, page 59
3.	Establish a connection to the user interface of the inverter that is to be configured as System Manager. There are various connection options to choose from for this: • Direct connection via Ethernet • Connection in the local network • Direct connection via Wi-Fi	Section 9.1.1, page 61 Section 9.1.2, page 63
4.	If required, change the network configuration on the welcome page.	Commissioning Assistant
5.	Carry out the configuration using the Commissioning Assistant. Select **Inverter as System Manager** in the device configuration.	Commissioning Assistant
6.	Make further settings if necessary: • Administrator registration • Device configuration (device name, device function) • Adding devices (e.g., energy meter, PV inverter) • Country standard • Meter at the grid connection point • Battery configuration • Energy management • Grid management services	Section 9, page 61
7.	To monitor the system in the Sunny Portal and view the data visually, create a user account in the Sunny Portal and create a system in the Sunny Portal or add devices to an existing system.	https://ennexOS.SunnyPortal.com

8.2 Procedure for commissioning as a subordinate device

⚠ QUALIFIED PERSON

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

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

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

Procedure		See
1.	Switch on the inverter.	Section 8.3, page 59
2.	Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: • Direct connection via Ethernet • Connection in the local network • Direct connection via Wi-Fi	Section 9.1.1, page 61 Section 9.1.2, page 63
3.	If required, change the network configuration on the welcome page.	Commissioning Assistant
4.	Carry out the configuration using the Commissioning Assistant. When doing so, select **Subordinate device** in the device configuration.	Commissioning Assistant
5.	Register the inverter as an SMA Speedwire device in the System Manager.	Commissioning Assistant of the System Manager

8.3 Switching the Inverter On

⚠ QUALIFIED PERSON

Requirements:

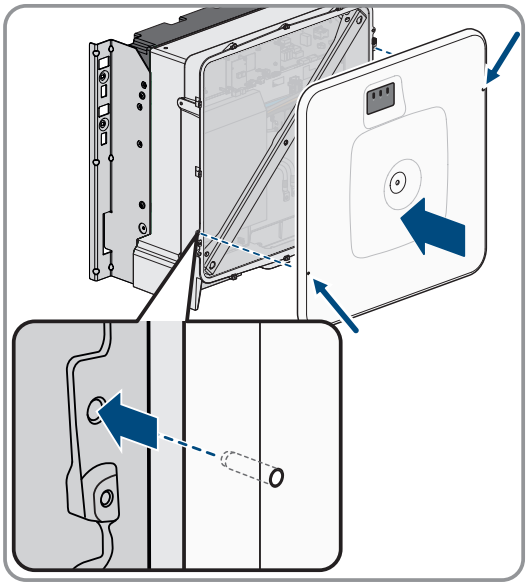
☐ The AC circuit breaker must be correctly rated and mounted.

☐ The inverter must be correctly mounted.

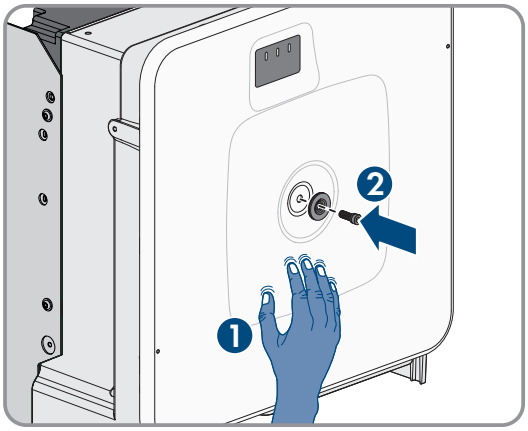
☐ All cables must be correctly connected.

Procedure:

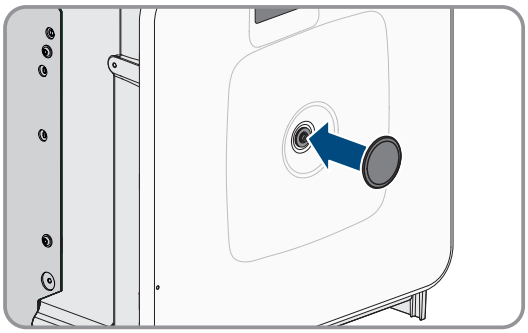
1. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure.



2. Ensure that the cover sits straight on the enclosure.
3. Hold the enclosure lid pressed against the enclosure and screw it tight. (Hex socket, AF 8, torque: 18 Nm).



4. Place the cover on the screw in the enclosure lid.



5. Connect the battery via the external DC switch.
6. Switch on the AC circuit breaker.
7. If the green and red LEDs flash simultaneously during initial commissioning, operation is stopped because no country data set has been set yet. For the inverter to begin operation, the configuration must be completed and a country data set must be set.
8. If the green LED is still flashing, the conditions for the discharge and charge mode are not yet met. As soon as the conditions for the discharge and charge mode are met, the inverter will start charging and discharging. Depending on the available power, the green LED is continuously illuminated or pulses.
9. If the red LED lights up, an event has occurred. Find out which event has occurred and, if necessary, initiate countermeasures.

9 Operation

9.1 Establishing a connection to the user interface

9.1.1 Connection in the local network

9.1.1.1 Access addresses for the product in the local network

Communication disturbances in the local network

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

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

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

If the product is connected to a local network (e.g. via an Internet router or Wi-Fi), 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 (Internet router) or manually by you.

Upon completion of the configuration, the product can only be reached via the listed access addresses in the local network:

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

9.1.1.2 Ports for data communication in the local network

In small local networks the use of certain ports is unrestricted. In industrial networks, the use of these ports may require authorization from the system administrator. For proper operation, the outgoing Internet connection must allow the use of the following ports and URLs:

Port and URL	Use
Port 80 and 443 (http/https) update.sunnyportal.de	Updates
Port 123 (NTP) ntp.sunny-portal.com	Time synchronization with Sunny Portal (if not provided by the Internet router)
Port 443 (https/TLS) ldm-devapi.sunnyportal.com	Data transmission
Port 443 (https/TLS) ennexos.sunnyportal.com	User interface
Port 9524 (TCP) wco.sunnyportal.com	SMA Webconnect 1.5 and SMA SPOT

9.1.1.3 Establishing a Connection via Ethernet in the local network

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: You can change the network configuration on the welcome page of the product.

☐ A smart device (e.g. laptop) must be available.

☐ The smart device must be in the same local network as the product.

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

Procedure:

1. Open the web browser of your smart device.
2. Enter the access address of the product in the address bar of the web browser.
3. **Web browser displays warning**
   After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.
   - Continue loading the user interface (scroll to bottom and click proceed/advance).

☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.

☑ The login page of the user interface opens if the product has already been configured.

Also see:

- SMA Speedwire ⇒ page 27
- Access addresses for the product in the local network ⇒ page 61
- Ports for data communication in the local network ⇒ page 61

9.1.1.4 Establishing a Connection via WLAN in the Local Network

Requirements:

☐ The product must be commissioned.

☐ The product must be integrated into the local network. Tip: You can change the network configuration on the welcome page of the product.

☐ A smart device (e.g. laptop) must be available.

☐ The smart device must be in the same local network as the product.

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

Procedure:

1. Open the web browser of your smart device.
2. Enter the access address of the product in the address bar of the web browser.
3. **Web browser displays warning**
   After the access address of the product has been entered, a message might appear indicating that the connection to the user interface of the product is not secure.
   - Continue loading the user interface (scroll to bottom and click proceed/advance).

☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.

☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access addresses for the product in the local network ⇒ page 61
- Ports for data communication in the local network ⇒ page 61

9.1.2 Direct connection via Wi-Fi

9.1.2.1 Connection options for Wi-Fi direct connection

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

The following connection options ar available:

- Direct Wi-Fi connection with 360° app (see Section 9.1.2.3, page 63)
- Direct Wi-Fi connection with WPS (see Section 9.1.2.4, page 63)
- Direct Wi-Fi connection with Wi-Fi network search (see Section 9.1.2.5, page 64)

Also see:

- Establishing a direct Wi-Fi connection with the 360° app ⇒ page 63

9.1.2.2 Access information for direct Wi-Fi connection

Communication disturbances in the local network

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

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

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

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

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

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

Requirements:

☐ A smart end device with camera must be available.

☐ The SMA 360° App must be installed on the smart device.

☐ An user account for Sunny Portal must already exist.

Procedure:

1. Open the SMA 360° App and login with the Sunny Portal account details.
2. Go to **Setup** > **Network setup** to establish a Wi-Fi connection with the inverter.
3. Scan the QR Code on you product via the SMA 360° App.
   ☑ The smart device automatically connects to the product. The login page of the user interface is displayed in the 360° App.
4. If the login page of the user interface is not displayed, open the web browser and enter **https://smalogin.net** in the address bar.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 63

9.1.2.4 Establishing a direct Wi-Fi connection with WPS

Requirements:

☐ A smart device with WPS function must be available.

Procedure:

1. Enable the WPS function on the inverter. To do this, tap on the enclosure lid of the inverter twice.
   ☑ The blue LED flashes quickly for approx. two minutes. The WPS function is active during this time.
2. Enable the WPS function on your smart device.
3. Open the web browser of your smart device and enter **https://smalogin.net** in the address bar.

☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.

☑ The login page of the user interface opens if the product has already been configured.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 63

9.1.2.5 Establishing direct Wi-Fi connection with Wi-Fi network search

1. Search for Wi-Fi networks with your smart device.
2. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
3. Enter the device-specific Wi-Fi password (see WPA2-PSK on the type label).
4. Open the web browser of your smart end device and enter **https://smalogin.net** in the address bar.
   ☑ When you connect to the user interface for the first time, the welcome page opens. The Commissioning Assistant for configuring the product can be started via the welcome page.
   ☑ The login page of the user interface opens if the product has already been configured.
5. If the login page of the user interface does not open, enter the IP address **192.168.12.3** or, if your smart terminal supports mDNS services, **SMA[serial number].local** or **https://SMA[serial number]** in the address bar of the web browser.

Also see:

- Access information for direct Wi-Fi connection ⇒ page 63

9.2 Design of the User Interface

The user interface of all SMA products powered by ennexOS and the user interface of Sunny Portal powered by ennexOS are uniform.

The number of functions and menus depends on whether you are on the local user interface of the product or in Sunny Portal.

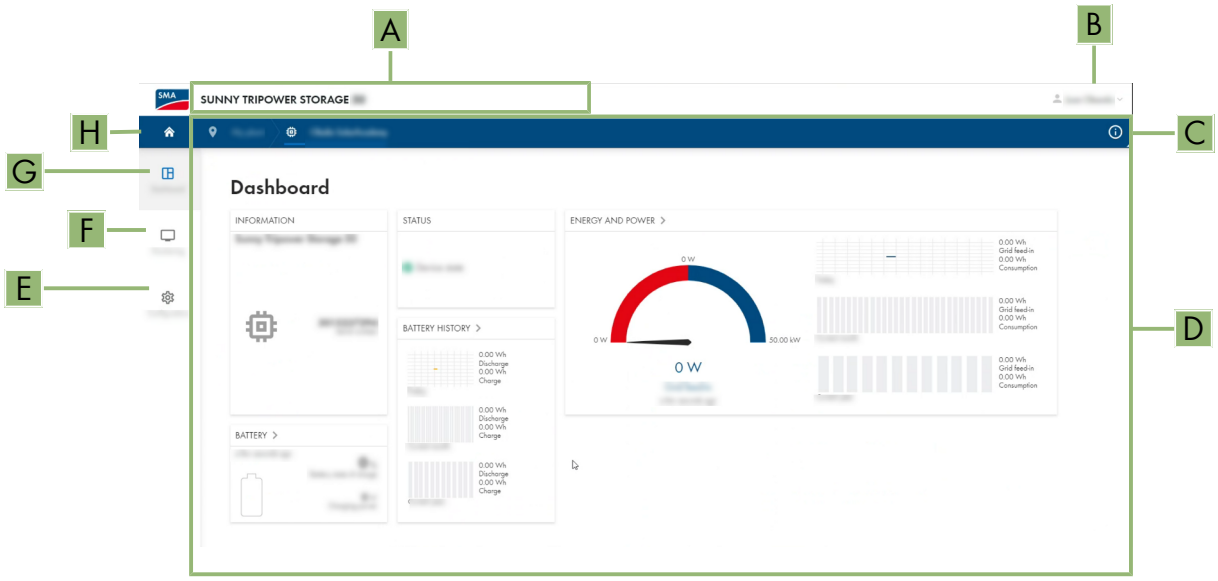


Figure 18: Design of the User Interface

Position	Designation	Description
A	Focus navigation	Enables the navigation between the following levels: • System • Device
B	User settings	Provides the following functions: • Configuring personal data • Logout
C	System information	Displays the following information: • System time • IP Address • Firmware version • Serial number • Licenses • Redirecting to help pages
D	Content Area	Displays the dashboard or content of the selected menu
E	Configuration	Offers different configuration options, depending on the scope of the connected devices and the selected level.
F	Monitoring	Displays depending on the selected device the following information on the current level and the superior levels: • Energy and power • Instantaneous values • Status list • Event monitor

Position	Designation	Description
G	Dashboard	Displays information and instantaneous values of the device or system currently selected.
H	Home	Opens the user interface home page

9.3 Access rights to the user interface

1 administrator is created during registration. As administrator, you can add further system users who can configure user rights or delete users.

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

You can assign the following rights for users:

- Administrator
- User
- Installer

9.4 Energy management

9.4.1 Predefined energy management profiles

The page of the user interface shows predefined energy management profiles that are stored in the product. These profiles form the basis for configuring the energy management.

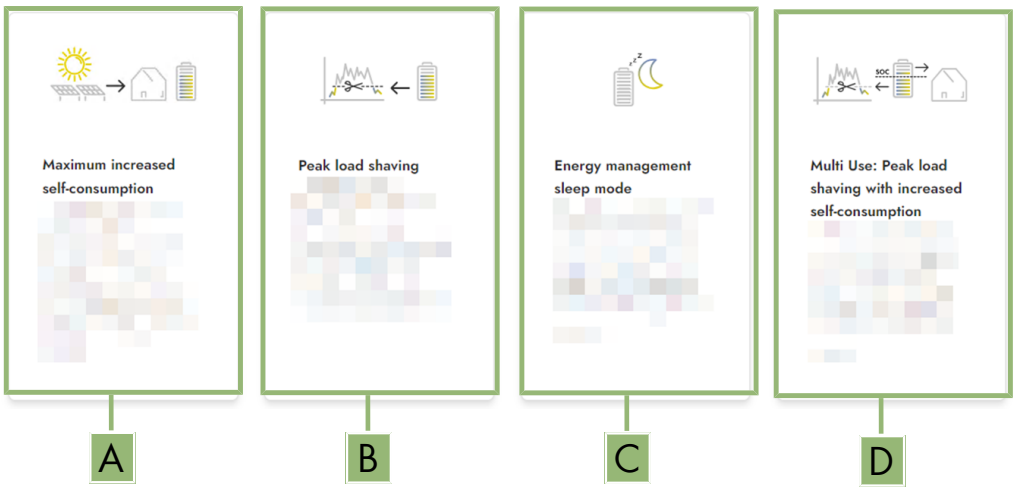


Figure 19: Overview of predefined energy management profiles

Position	Energy management profile
A	Maximum Increased Self-Consumption
B	Peak Shaving
C	Sleep mode
D	Multiuse (combination of increased self-consumption and peak load shaving)

Also see:

- Creating a new energy management profile ⇒ page 70

9.4.2 Used energy management profiles

This overview shows all energy management profiles that were activated at least once before. The energy management profile currently active is highlighted.

When the energy management is started for the first time after commissioning, no energy management profiles are displayed on this page.

Also see:

- Predefined energy management profiles ⇒ page 66
- Creating a new energy management profile ⇒ page 70
- Activating the energy management ⇒ page 71
- Deactivating the energy management ⇒ page 70
- Changing an energy management profile ⇒ page 71

9.4.3 Setting options for peak load shaving

Setting option	Explanation
Threshold value for peak load shaving	Limiting value for the grid supply from which the battery is to be used to reduce peak loads. Only whole numbers are accepted as an entry.
Billing interval in the tariff	Interval for billing the performance prices: If the tariff of your electric utility company does not specify an interval for billing the performance prices or if the interval for billing the performance prices is not known, select the **Unknown** option.
Adjustment	If no value is specified for the **Billing interval in the tariff**, the option **Immediate adjustment** is always active. In this case, peak load shaving is controlled according to the instantaneous value of the grid supply at the point of interconnection. If a value for the **Averaging interval in the tariff** is specified, the option **Averaging interval** can be selected. In this case, peak load shaving is controlled according to the averaging value of the grid supply at the point of interconnection. If a peak load that is too high cannot be curtailed, the resulting overload can be compensated for at another time in the averaging interval. It can happen that the inverter curtails the grid-supplied power even further than specified by the threshold for peak load shaving.

Setting option	Explanation
Automatic threshold adjustment	Only if a value for the **Averaging interval in the tariff** is specified, can the function **Autom. threshold adjustment** be used. If the option **Adaptively increase threshold** is activated and the threshold for peak load shaving could not be observed despite adjustment via the averaging interval, the threshold is automatically increased. Exceeding the original threshold specifies the measure for the adaptive increase. Optionally, the threshold for peak load shaving can be reset to the originally entered value at the end of the billing period.
Battery charge	The parameter **Battery charge** controls the charging behavior of the inverter during peak load shaving: If the state of charge of the battery should always be as high as possible, for example, activate or leave the option **Recharge start voltage corresponds to threshold for peak load shaving** activated for the parameter **Battery state of charge**. If recharging of the battery from the utility grid is to be avoided, for example, deactivate the option **Recharge start voltage corresponds to threshold for peak load shaving** and set the **Recharge start voltage** to 0 kW for the parameter **Battery state of charge**.

Also see:

- Creating a new energy management profile ⇒ page 70

9.4.4 Setting options for the multiuse function

Setting option	Explanation
Threshold value for peak load shaving	Limiting value for the grid supply from which the battery is to be used to reduce peak loads. The battery is only discharged if this threshold at the point of interconnection is exceeded. Only whole numbers are accepted as an entry.
Limit for switching operating modes (multiuse): battery state of charge (SoC)	Between the maximum state of charge of the battery and the **Limit for switching operating modes**, the battery is used solely for increased self-consumption. Between the **Limit for switching operating modes** and the minimum battery state of charge, the battery is only used for peak load shaving
Battery charging limit	The **Battery charge** controls the charging behavior of the inverter depending on the **Limit for switching operating modes**. If the **Battery charge** and the **Limit for switching operating modes** are set to the same value, the battery will be recharged with energy from both the PV system and the utility grid. For example, if the **Battery charge** is set to 50% and the **Limit for switching operating modes** is set to 59%, and when the state of charge is between 50% and 59%, the battery will be recharged only with energy from the PV system. If the battery state of charge is below 50%, the utility grid is also used to recharge the battery.

Setting option	Explanation
Billing interval in the tariff	Interval for billing the performance prices: If the tariff of your electric utility company does not specify an interval for billing the performance prices or if the interval for billing the performance prices is not known, select the **Unknown** option.
Adjustment	If no value is specified for the **Billing interval in the tariff**, the option **Immediate adjustment** is always active. In this case, peak load shaving is controlled according to the instantaneous value of the grid supply at the point of interconnection. If a value for the **Averaging interval in the tariff** is specified, the option **Averaging interval** can be selected. In this case, peak load shaving is controlled according to the averaging value of the grid supply at the point of interconnection. If a peak load that is too high cannot be curtailed, the resulting overload can be compensated for at another time in the averaging interval. It can happen that the inverter curtails the grid-supplied power even further than specified by the threshold for peak load shaving.
Automatic threshold adjustment	Only if a value for the **Averaging interval in the tariff** is specified, can the function **Autom. threshold adjustment** be used. If the option **Adaptively increase threshold** is activated and the threshold for peak load shaving could not be observed despite adjustment via the averaging interval, the threshold is automatically increased. Exceeding the original threshold specifies the measure for the adaptive increase. Optionally, the threshold for peak load shaving can be reset to the originally entered value at the end of the billing period.
Battery charge	The parameter **Battery charge** is the recharging threshold that controls the charging behavior of the inverter during peak load shaving. If the **Battery charge** and the **Limit for switching operating modes** are set to the same value, the battery will be recharged with energy from both the PV system and the utility grid. If different values are set, the recharging of the battery is subject to an algorithm: When the battery is discharged (starting from a higher state of charge) or charged (starting from a lower state of charge), this algorithm determines whether the battery is charged from the PV system only, or it is charged from the PV system and the utility grid: • For example, if the **Battery charge** is set to 59% and the **Limit for switching operating modes** is set to 50%, and the battery was discharged from a higher state of charge, only energy from the PV system will be used to recharge the battery. • For example, if the **Battery charge** is set to 59% and the **Limit for switching operating modes** is set to 50%, and the battery was charged from a lower state of charge, the battery will be charged from both the PV system and the utility grid.

Also see:

- Creating a new energy management profile ⇒ page 70
- Setting options for peak load shaving ⇒ page 67

9.4.5 Creating a new energy management profile

⚠ QUALIFIED PERSON

When an energy management profile is created, energy management activates automatically.

Requirement:

☐ A suitable energy meter is installed and configured at the point of interconnection within the system.

☐ A battery is available in the system and has been put into operation.

☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
   ☑ The overview of the used energy management profiles opens.
2. Select the [**Create new profile**] button.
   ☑ The overview of the predefined energy management profiles opens.
3. Click on the profile you want.
   ☑ In the energy management profiles **Maximum increased self-consumption** and **Sleep mode**, the selected energy management profile is activated automatically.
   ☑ In the energy management profiles **Peak load shaving** and **Multiuse**, the page to set the parameters opens.
4. To use peak load shaving, set the parameters for the peak load shaving. Take the parameter description for peak load shaving into account.
5. To use the multiuse function, set the parameters for the multiuse function. Take the parameter description for the multiuse function into account.

Also see:

- Setting options for the multiuse function ⇒ page 68
- Predefined energy management profiles ⇒ page 66
- Used energy management profiles ⇒ page 67
- Setting options for peak load shaving ⇒ page 67

9.4.6 Deactivating the energy management

⚠ QUALIFIED PERSON

A single energy management profile cannot be deactivated, only changed. To deactivate the entire energy management, proceed as described in this section.

Procedure:

1. Log into the user interface of the product.
2. Select the menu item **Energy management** in the menu **Configuration**.
3. Select the slider **Activate energy management**.

Also see:

- Used energy management profiles ⇒ page 67

9.4.7 Activating the energy management

⚠ QUALIFIED PERSON

Requirements:

☐ A suitable energy meter is installed and configured at the point of interconnection within the system.

☐ At least 1 energy management profile has already been created.

☐ The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
2. Select the slider **Activate energy management**.
3. If the required energy management profile is not activated, in the row of the energy management profile, select the button.
4. Select **Activate profile**.

Also see:

- Used energy management profiles ⇒ page 67

9.4.8 Changing an energy management profile

⚠ QUALIFIED PERSON

A single energy management profile cannot be deactivated, only changed.

Requirements:

☐ At least 1 energy management profile has already been created.

☐ The user interface is open and you are logged in.

Procedure:

1. Log into the user interface of the product.
2. Select the menu item **Energy management** in the menu **Configuration**.
3. In the row of the required energy management profile, select the button.
4. Select **Activate profile**.

Also see:

- Used energy management profiles ⇒ page 67

9.5 Configuring the battery

⚠ QUALIFIED PERSON

You have the option to change the configuration of your battery or restart it at any time, e.g., when using a new battery.

Requirement:

☐ The user interface of the inverter is open and you are logged in.

Procedure:

1. Select the menu item **Battery configuration** in the menu **Configuration**.
2. Follow the steps of the commissioning wizard and configure your battery. For every setting made in a step, click on [**Next**].

☑ When all settings are made, the inverter starts the communication connection with the battery.

☑ The user interface shows an overview of the current battery configuration.

9.6 Carry out a manual firmware update

⚠ QUALIFIED PERSON

Requirements:

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

☐ The user interface must be open and you must be logged in as **Installer** or **Administrator**.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Update and backup** menu item.
4. In the **Manual update** area, click [**Select file**] and select the update file for the product.
   ☑ The user interface confirms that the update file is compatible.
5. If the user interface does not confirm the compatibility of the update file, replace the update file.
6. Select [**Start update**].
7. Follow the instructions in the dialog.
   ☑ The product is performing a restart after the firmware update.
8. Select the **Monitoring** menu.
9. Select the menu item **Event monitor**.
10. Check the events to see whether the firmware update has been completed successfully.

9.7 Backup file

9.7.1 Function and content of the backup file

The backup file is used to transfer configuration information, e.g., when commissioning a replacement device or when restoring previously saved parameter settings.

The backup file includes the following system and device configuration data for your product:

- Grid management services
- Network
- Energy meter
- Sunny Portal setting
- Self-defined Modbus profiles
- System Password
- User interface login data
- List of connected devices

The following information is not included in the backup file:

- Notifications
- Historic energy and performance values

9.7.2 Creating a Backup File

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the **Update and backup** menu item.
4. Select the [**Create backup file**] button.
5. Enter a password to encrypt the backup file and confirm with [**Create and download backup file**]. Please note that the password will be needed later for importing the backup file.
   ☑ An Ibd file with all parameter settings is downloaded.

Also see:

- Function and content of the backup file ⇒ page 72

9.7.3 Upload backup file

⚠ QUALIFIED PERSON

Requirement:

☐ The backup file and the corresponding password must be available.

Procedure:

1. Open the user interface.
2. Log into the user interface.
   ☑ After you connect to the user interface of the inverter (e.g., a replacement device) for the first time, the commissioning wizard opens.
3. If the commissioning wizard does not open, reset the inverter to the default settings.
4. On the first page of the commissioning wizard in the row **Device function**, select the option [**Start restoration**].
5. Select the desired backup file and enter the backup file password.
6. Confirm with [**Upload backup file**].
   ☑ The Ibd file with all parameter settings will be uploaded to the product. The product restarts automatically. This process can take several minutes.

Also see:

- Resetting the product to default setting ⇒ page 73
- Function and content of the backup file ⇒ page 72

9.8 Resetting the product to default setting

ⓘ Loss of data due to replacement or due to resetting to default settings

If the product is reset to the default settings or replaced, all data saved in the product and the admin account will be deleted. Some of the data saved in Sunny Portal can be transmitted to the product after calling up the Sunny Portal system again.

Requirements:

☐ The user interface must be open and you must be logged in.

Procedure:

1. Select the product in the focus navigation.
2. Select the menu **Configuration**.
3. Select the menu item **Device properties**.
4. Select the button [**If you want to reset the device to the default settings, click here**].
5. Select [**Reset**].

Also see:

- Upload backup file ⇒ page 73

9.9 Deleting the Admin Account

⚠ QUALIFIED PERSON

In case the password gets lost, the admin account can be reset and newly created. All system data will be retained.

Requirements:

☐ The Device Key from the label on the back of the supplied manual must be present.

☐ The login page of the user interface must be open.

Procedure:

1. Select the [**Delete admin account?**] button.
2. Enter the Device Key from the label on the back of the supplied manual.
3. Select [**Delete**].

☑ The product is performing a restart. Then a new admin account can be created.

Also see:

- Device Key (DEV KEY) ⇒ page 27

9.10 Digital input

9.10.1 Use of the Digital Input

The digital input is made available by the optional SMA I/O Module. You have the following options for using the digital input:

Possible use	Assigning the inputs on the SMA I/O Module
Ripple control receiver or remote terminal unit for closed-loop control by the grid operator	**B2**, **B3**, **B4**, and **A2**
Grid and PV system protection according to VDE-AR-N 4105	**A4**

Also see:

- Enabling grid and PV system protection ⇒ page 75
- Set the digital input for a ripple control receiver or remote terminal unit ⇒ page 75

9.10.2 Set the digital input for a ripple control receiver or remote terminal unit

Requirements:

☐ The SMA I/O Module is mounted and connected (see manual for the SMA I/O Module)

☐ At least firmware version 3.02.xx.R must be installed on the inverter.

☐ The user interface of the inverter is open and you are logged in.

Procedure:

1. Select the menu item **I/O configurations** in the **Configuration** menu.
2. Follow the steps of the commissioning wizard. For every setting made in a step, click on [**Next**].
3. Enable the inputs **B2**, **B3**, **B4**, and **A2** required for connecting the ripple control receiver or remote terminal unit on the SMA I/O Module.

☑ When all settings are made, the inverter starts the communication connection with the ripple control receiver or remote terminal unit.

☑ The user interface shows the current digital input configuration.

9.10.3 Enabling grid and PV system protection

Requirement:

☐ The SMA I/O Module is mounted and connected (see manual for the SMA I/O Module)

☐ At least firmware version 3.02.xx.R must be installed on the inverter.

☐ The user interface of the inverter is open and you are logged in.

Procedure:

1. Select the inverter via the focus navigation.
2. Select **My device > Configuration > Parameters**.
3. Select the **Grid and system protection** parameter using the search function and set it to **On**.

9.11 Starting the inverter

⚠ QUALIFIED PERSON

1. Log into the user interface.
2. Select the inverter via the focus navigation.
3. Select **Configuration > Parameters > Device**.
4. Set the **General operating mode** to **Start**.

9.12 Stopping the inverter

⚠ QUALIFIED PERSON

1. Log into the user interface.
2. Select the inverter via the focus navigation.
3. Select **My device > Configuration > Parameters**.
4. Set the **General operating mode** to **Stop**.
5. Select **My device > Dashboard > My device**.
   ☑ The current AC output power of the inverter is shown.
6. Wait until the current AC output power of the inverter has reached 0 W.

10 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

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

⚠ WARNING

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

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

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

NOTICE

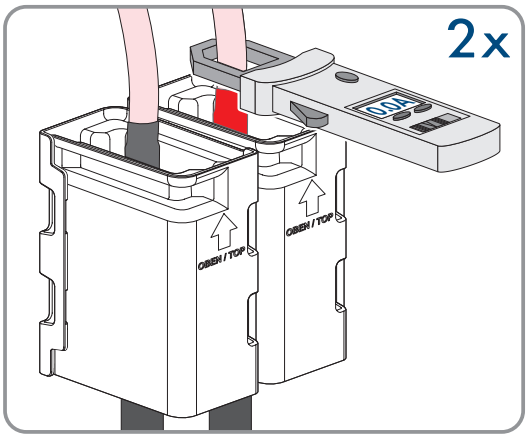
Damage to the inverter due to switching operations on the transformer

If voltages are present in the inverter, switching operations on the transformer can lead to large fluctuations in the voltage in the inverter. Large fluctuations in voltage can damage components in the inverter.

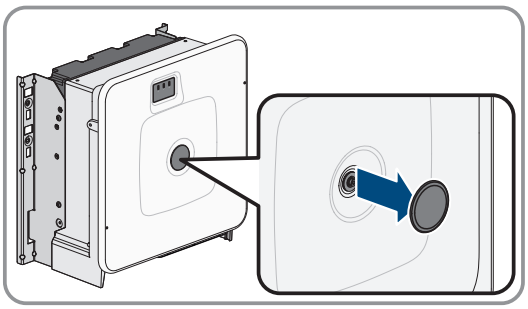
- Disconnect the inverter from voltage sources before performing any switching operations on the transformer.

Procedure:

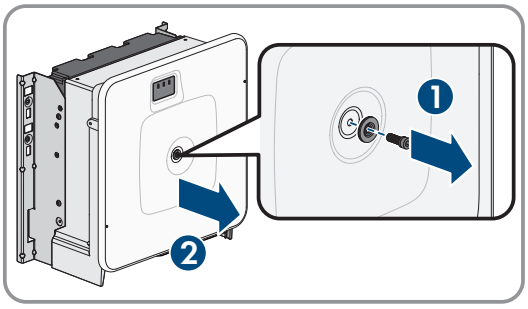
1. Reduce the AC output power of the inverter to 0 W. To do this, stop the inverter.
2. Disconnect the AC miniature circuit breaker and secure against reconnection.
3. Optional: Shut off the transformer.
4. Disconnect the DC connection of the inverter via the load-break switch of the battery or the external DC switch and secure against reconnection.
5. Wait 5 minutes.
6. Wait until the LEDs have gone out.
7. 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.



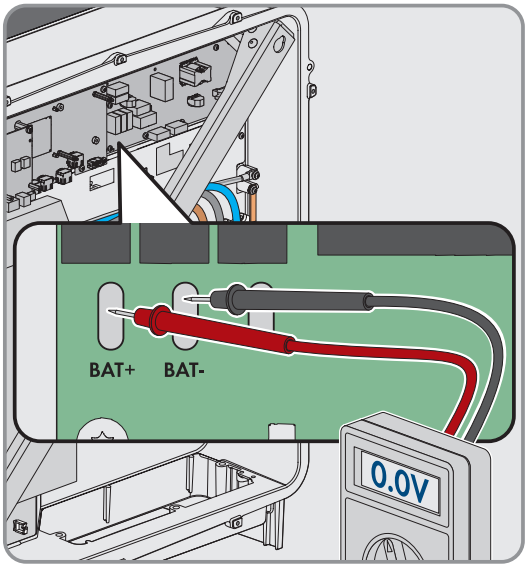
8. Remove the cover from the enclosure lid.



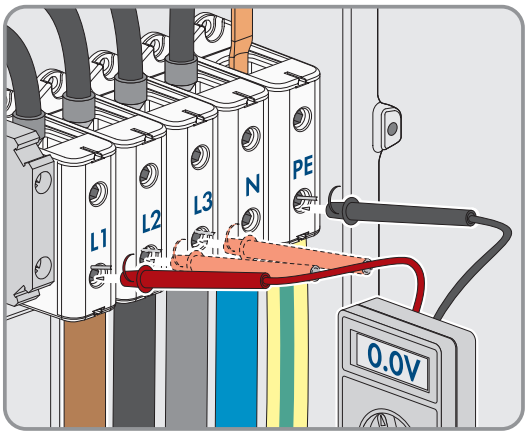
9. Unscrew the screw on the enclosure lid (hex socket, AF8) and remove the enclosure lid.



10. Set the screw, cover and cover of the enclosure aside and store safely.
11. Ensure that no voltage is present on the DC voltage measuring points of the pre-charge unit: between **BAT+** and **BAT-**, **BAT+** and **DST-** as well as **BAT-** and **DST-**.



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



13.

⚠ CAUTION
A residual voltage of 1000 V may still be present in the DC link.

Also see:

- Stopping the inverter ⇒ page 75

11 Cleaning

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

NOTICE

Damage to the product due to cleaning agents

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

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

12 Troubleshooting

12.1 Event messages

12.1.1 Event 301

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

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

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

12.1.2 Event 401

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

12.1.3 Event 404

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

12.1.4 Event 501

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

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

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

12.1.5 Event 502

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

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

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

12.1.6 Event 503

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

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

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

12.1.7 Event 601

⚠ QUALIFIED PERSON

Event message:

- **Grid incident**

Explanation:

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

Corrective measures:

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

12.1.8 Event 701

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

Corrective measures:

- Check the AC wiring from the inverter to the feed-in meter.
- If possible, check the grid frequency and observe how often fluctuations occur.

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

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

12.1.9 Event 1302

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

L or N not connected.

Corrective measures:

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

12.1.10 Event 3302

⚠ QUALIFIED PERSON

Event message:

- Unstable operation

Explanation:

There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.

Corrective measures:

- Ensure that the battery is fault-free.

12.1.11 Event 3303

⚠ QUALIFIED PERSON

Event message:

- Unstable operation

Explanation:

There is not enough power at the DC input of the inverter for stable operation. The inverter cannot connect to the utility grid.

Corrective measures:

- Ensure that the battery is fault-free.

12.1.12 Event 3501

⚠ QUALIFIED PERSON

Event message:

- Insulation error
- Checking the DC side

Explanation:

The inverter has detected a ground fault on the DC side.

Corrective measures:

- Check the battery and DC cabling for ground faults.

12.1.13 Event 3523

Event message:

- Start of cyclic insulation test

Explanation:

During the cyclic insulation test, it is tested whether the electric strength of the battery is within the safe range. The inverter will be restarted once during an insulation test.

12.1.14 Event 3601

⚠ QUALIFIED PERSON

Event message:

- High leakage current
- Checking the DC side

Explanation:

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

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

Corrective measures:

- Check the battery and DC cabling for ground faults.

12.1.15 Event 3701

⚠ QUALIFIED PERSON

Event message:

- Residual current too high
- Checking the DC side

Explanation:

The inverter detected a residual current due to brief grounding of the battery or the DC cabling.

Corrective measures:

- Check the battery and DC cabling for ground faults.

12.1.16 Event 3701

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

Corrective measures:

- Check the PV system for ground faults.

12.1.17 Event 3901

⚠ QUALIFIED PERSON

Event message:

- DC power too low

Explanation:

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

Corrective measures:

- Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update.
- If no new firmware version is available, check for other events. If there are other events, carry out the corrective measures for the other events.

12.1.18 Event 3902

⚠ QUALIFIED PERSON

Event message:

- DC voltage too low

Explanation:

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

Corrective measures:

- Check whether a new firmware version is available for the inverter and the battery. If a newer version is available, perform the firmware update.
- If a new firmware version is not available, check whether there are other event messages. If there are further event messages, perform the corrective measures of the further messages.

12.1.19 Event 6001-6499

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.20 Event 6501

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has switched off due to excessive temperature.

Corrective measures:

- Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.
- Ensure that the inverter has sufficient ventilation.

- Ensure the maximum ambient temperature is not exceeded.

12.1.21 Event 6502

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has switched off due to excessive temperature.

Corrective measures:

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

12.1.22 Event 6509

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The inverter has switched off due to excessive temperature.

Corrective measures:

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

12.1.23 Event 6511

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

An overtemperature has been detected in the choke area.

Corrective measures:

- Clean the cooling fins on the rear of the enclosure and the air ducts on the top using a soft brush.
- Ensure that the inverter has sufficient ventilation.

12.1.24 Event 6512

Event message:

- **Minimum operating temperature not reached**

Explanation:

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

12.1.25 Event 6602

⚠ QUALIFIED PERSON

Event message:

- **Overvoltage grid (SW)**

Explanation:

The effective value of the grid voltage is above the permitted voltage threshold values for a specified period of time (AF limit).

Corrective measures:

- Check the grid voltage and connection on the inverter.

  If the grid voltage lies outside the permissible range due to local grid conditions, ask your grid operator if the voltage can be adjusted at the feed-in point or if it would be acceptable to change the monitored operating limits.

12.1.26 Event 6603

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.27 Event 6802

⚠ QUALIFIED PERSON

Event message:

- Self-diagnosis > DC input defective

Explanation:

Polarity error on the inverter.

Corrective measures:

- Check whether a battery is connected to the DC input.
- Contact the Service.

12.1.28 Event 6804

Event message:

- Self-diagnosis > Device disturbance

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.29 Event 6805

Event message:

- Self-diagnosis > DC input defective

Explanation:

Polarity error on the inverter.

Corrective measures:

- Check whether a battery is connected to the DC input.
- Contact the Service.

12.1.30 Event 7001

⚠ QUALIFIED PERSON

Event message:

- **Fault sensor interior temperature**

Explanation:

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

Corrective measures:

- Contact Service.

12.1.31 Event 7702

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.32 Event 7703

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.33 Event 7727

⚠ QUALIFIED PERSON

Event message:

- DC relay opened unintentionally

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.34 Event 7728

⚠ QUALIFIED PERSON

Event message:

- DC relay defective. Does not close/open

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.35 Event 7801

⚠ QUALIFIED PERSON

Event message:

- **Fault overvoltage protector**

Explanation:

One or more surge arresters have tripped or one or more surge arresters are not inserted correctly.

Corrective measures:

- Ensure that the surge arrester is inserted correctly.
- If surge arresters have tripped, replace the tripped surge arresters with new surge arresters.

12.1.36 Event 8003

⚠ QUALIFIED PERSON

Event message:

- **Temperature derating**

Explanation:

The inverter has reduced its power output for more than 10 minutes due to excessive temperature.

Corrective measures:

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

12.1.37 Event 8104

⚠ QUALIFIED PERSON

Event message:

- Communication impaired

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.38 Event 8708

⚠ QUALIFIED PERSON

Event message:

- **Timeout in communication for active power limitation**

Explanation:

Communication to the system control absent. Depending on the fallback 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.

Corrective measures:

- Ensure that the connection to the System Manager is intact and that no cables are damaged or that no plugs have been pulled.

12.1.39 Event 8709

⚠ QUALIFIED PERSON

Event message:

- **Timeout in communication for reactive power spec.**

Explanation:

Communication to the system control absent.

Corrective measures:

- Ensure that the connection to the System Manager is intact and that no cables are damaged or that no plugs have been pulled.

12.1.40 Event 8710

⚠ QUALIFIED PERSON

Event number:

- **Timeout in communication for cos-Phi spec.**

Explanation:

Communication to the system control absent.

Corrective measures:

- Ensure that the connection to the System Manager is intact and that no cables are damaged or that no plugs have been pulled.

12.1.41 Event 9002

⚠ QUALIFIED PERSON

Event message:

- **Installer code invalid**

Explanation:

The SMA Grid Guard code entered is incorrect. The operating parameters are still protected and cannot be changed.

Corrective measures:

- Enter the correct SMA Grid Guard code.

12.1.42 Event 9003

⚠ QUALIFIED PERSON

Event message:

- **Grid parameter locked**

Explanation:

Changes to the grid parameters are now blocked.

Corrective measures:

- In order to be able to make changes to the grid parameters, you must be logged in as **Administrator** or **Installer** on the user interface. All changes to grid-relevant parameters should be coordinated with the grid operator.

12.1.43 Event 9007

⚠ QUALIFIED PERSON

Event message:

- **Abort self-test**

Explanation:

The self-test was terminated.

Corrective measures:

- Ensure that the AC connection is correct.
- Ensure that the country data set has been entered correctly.
- Restart the self-test.

12.1.44 Event 9101

⚠ QUALIFIED PERSON

Event message:

- AC voltage calibration failed.

Explanation:

An error has occurred during calibration. The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.45 Event 9102

⚠ QUALIFIED PERSON

Event message:

- Permanent operation inhibition

Explanation:

The charging and discharging operation of the inverter is permanently interrupted.

Corrective measures:

- Set the parameter **Operating mode** to **Start**.

12.1.46 Event 9107

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

12.1.47 Event 9206

⚠ QUALIFIED PERSON

Event message:

- Short-circuit fault

Explanation:

After a certain time, this error disappears automatically (self-healing error).

If the error occurs 3 times in succession, operation may be permanently inhibited (event 9102).

12.1.48 Event 9303

⚠ QUALIFIED PERSON

Event message:

- The service life of the battery is expiring

Explanation:

The battery can fail anytime.

Corrective measures:

- Procure new battery and exchange batteries.

12.1.49 Event 9307

⚠ QUALIFIED PERSON

Event message:

- Defective battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.50 Event 9308

⚠ QUALIFIED PERSON

Event message:

- **Timeout monitoring of battery management has triggered**

Explanation:

The timeout monitoring system of the battery management has triggered. This means that the external battery management cannot be reached.

-

Corrective measures:

- Ensure that the parameters for battery communication are set correctly (e.g., the IP address).
- Wait until the inverter switches back on after this event. This can take up to 10 minutes.

12.1.51 Event 9311

⚠ QUALIFIED PERSON

Event message:

- Battery cell overvoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.52 Event 9312

⚠ QUALIFIED PERSON

Event message:

- Battery cell undervoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.53 Event 9313

⚠ QUALIFIED PERSON

Event message:

- Battery overtemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.54 Event 9314

⚠ QUALIFIED PERSON

Event message:

- Battery undertemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.55 Event 9315

⚠ QUALIFIED PERSON

Event message:

- Battery imbalancing fault

Explanation:

Balancing error battery system or battery module. The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.56 Event 9316

⚠ QUALIFIED PERSON

Event message:

- Internal battery hardware fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.57 Event 9350

⚠ QUALIFIED PERSON

Event message:

- Timeout for battery status change

Explanation:

A requested status change of the battery did not occur within the specified time.

Corrective measures:

- Ensure that the battery is switched on.
- Ensure that the battery is fault-free.
- Ensure that the battery communication cable is correctly assembled and connected.

12.1.58 Event 9351

⚠ QUALIFIED PERSON

Event message:

- Incorrect switch position for the battery disconnection point

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.59 Event 9352

⚠ QUALIFIED PERSON

Event message:

- Battery system short circuit

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.60 Event 9353

⚠ QUALIFIED PERSON

Event message:

- Thermal management of battery system

Explanation:

Thermal management of battery system is defective.

Corrective measures:

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

12.1.61 Event 9369

⚠ QUALIFIED PERSON

Event message:

- Battery system xx defective

Explanation:

A battery management system has reported a fault.

Corrective measures:

- Find and eliminate the cause of the fault.

12.1.62 Event 9392

⚠ QUALIFIED PERSON

Event message:

- Overcurrent battery charging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.63 Event 9393

⚠ QUALIFIED PERSON

Event message:

- Overcurrent battery discharging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.64 Event 9394

Event message:

- Deep discharge protection activated

Explanation:

The battery management system has activated the deep discharge protection. For grid-connected systems, this message is an event message, not a warning message.

12.1.65 Event 9395

Event message:

- Battery separated externally

Explanation:

The DC power connection to the battery was disconnected.

12.1.66 Event 10816

⚠ QUALIFIED PERSON

Event message:

- Communication error within the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the battery manufacturer.

12.1.67 Event 10817

⚠ QUALIFIED PERSON

Event message:

- Sensor error within the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.68 Event 10818

⚠ QUALIFIED PERSON

Event message:

- Insulation error within the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.69 Event 10819

⚠ QUALIFIED PERSON

Event message:

- Error during pre-charging within the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

12.1.70 Event 10820

⚠ QUALIFIED PERSON

Event message:

- Disturbance battery rack

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

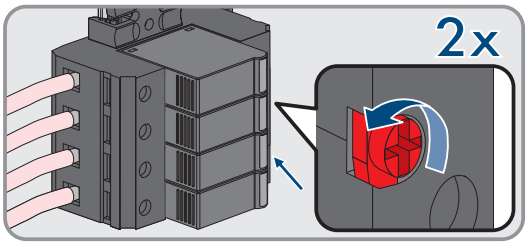
12.2 Replacing the Surge Arrester

⚠ QUALIFIED PERSON

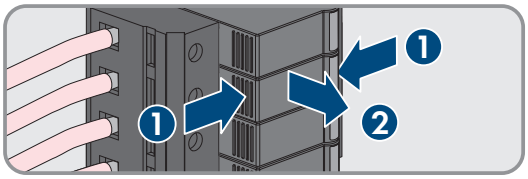
If the inverter displays event number 7801, an error is present in the surge arresters or the surge arresters have tripped. If the surge arresters have tripped, replace the tripped surge arresters with new surge arresters.

Procedure:

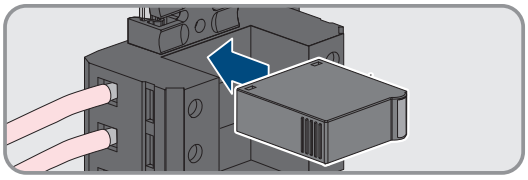
1. Disconnect the product from voltage sources (see Section 10, page 76).
2. Unlock the surge arresters by using a screwdriver to turn the latch to the open position.



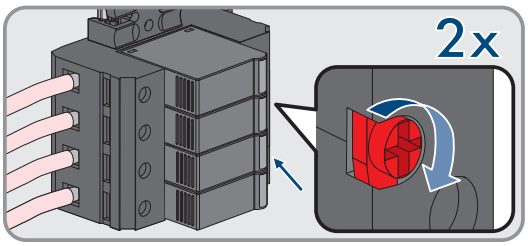
3. Pull the surge arresters out of the slots.



4. Dispose of the surge arresters in accordance with the locally applicable disposal regulations for electronic waste.
5. Insert new surge arresters.



6. Lock the surge arresters by using a screwdriver to turn the latch to the closed position.



7. Ensure that each surge arrester is securely inserted into its slot.
8. Switch on the product again.

Also see:

- Switching the Inverter On ⇒ page 59
- Disconnecting the Inverter from Voltage Sources ⇒ page 76

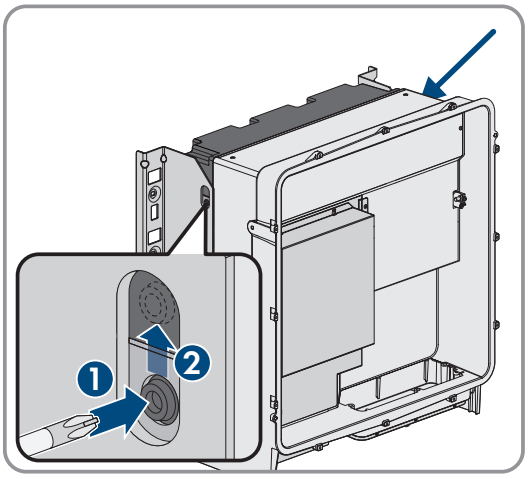
12.3 Cleaning the fans of the inverter

⚠ QUALIFIED PERSON

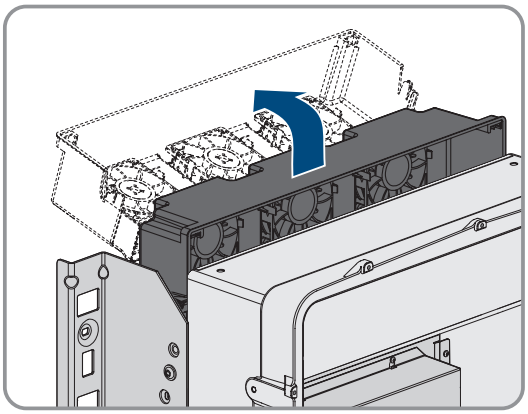
If the performance of the fans is decreasing, it can be restored by cleaning the fans. Indications of a reduction in fan performance are e.g., unusual fan noise or unusual derating behavior.

Procedure:

1. Disconnect the inverter from all voltage sources (see Section 10, page 76).
2. Unlock the fan bracket on the right and left of the product. To do so, press in the locking tabs and push them upwards.



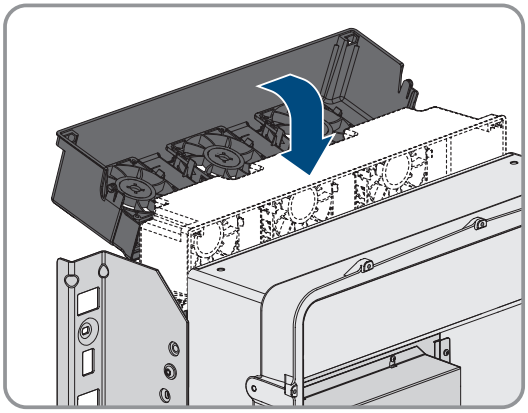
3. Move the fan bracket upwards and fold it backwards. When doing this, note that the fan bracket cannot be removed completely, because the fan cable connects it to the product.



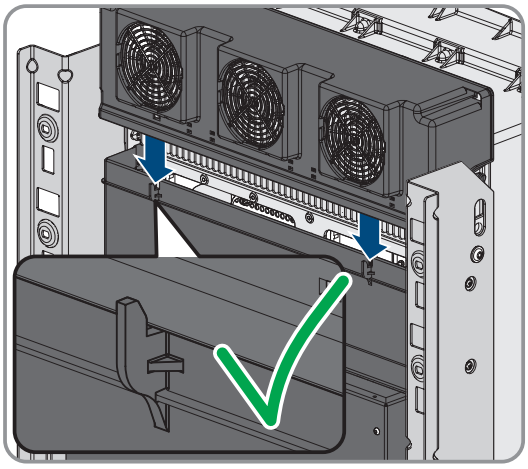
4. **NOTICE**

   Damage to the fans due to compressed air
   - Clean the fans with a soft brush, a paint brush, or a damp cloth.

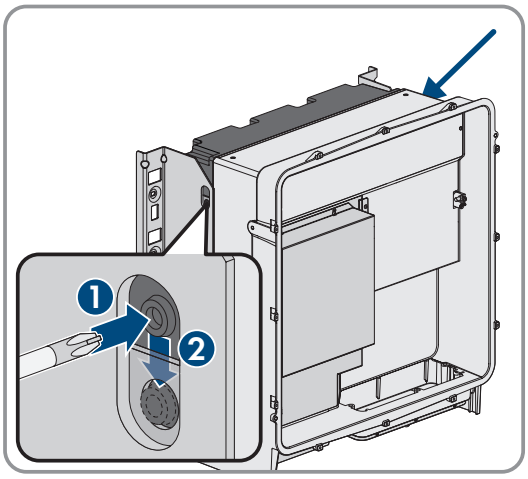
5. If the cooling fins are dirty, clean them using a soft brush.
6. Insert the locking tabs on the left and right of the fan bracket into the recesses and the top into the suspensions.



7. Guide the fan bracket on the enclosure vertically downwards into the enclosure brackets provided.



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



9. Switch on the inverter again.

Also see:

- Switching the Inverter On ⇒ page 59

12.4 Checking the fans of the inverter

⚠ QUALIFIED PERSON

You can test whether the fans in the inverter are working by setting a parameter.

Requirement:

☐ You are logged in on the user interface of the inverter.

Procedure:

1. Select the **Fan test** parameter and set it to **Fan heat sink**.
2. Save settings
3. Check whether the fans in the inverter are running and whether the fans are making any unusual noises.
4. Select the **Fan test** parameter and set it to **Off**.
5. Save settings.

13 Decommissioning

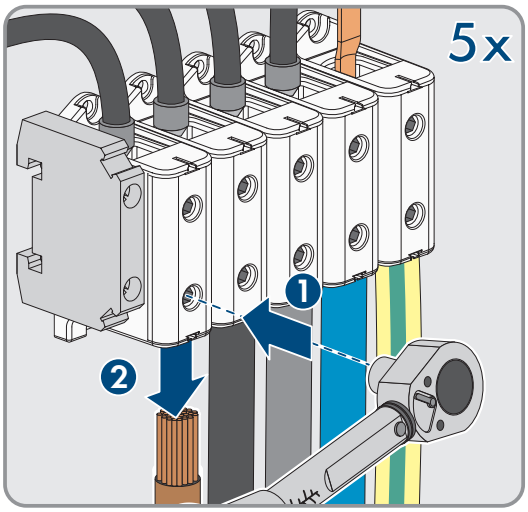
13.1 Disconnect the terminals on the inverter

⚠ QUALIFIED PERSON

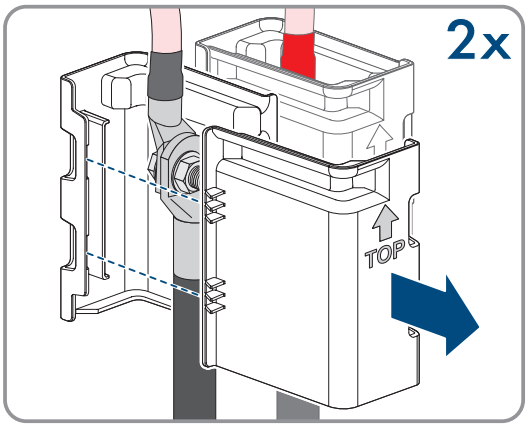
To decommission the product completely upon completion of its service life, first disconnect all connections from the product.

Procedure:

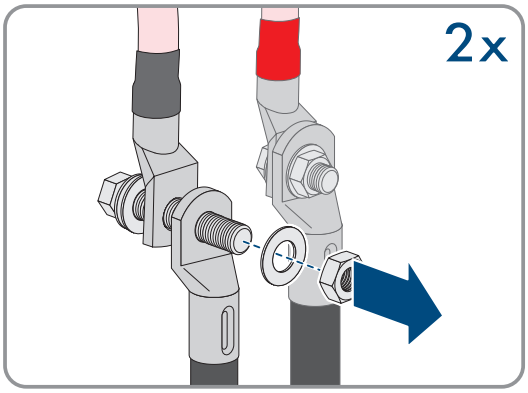
1. Disconnect the product from voltage sources (see Section 10, page 76).
2. Remove the AC cable from the inverter. To do so, loosen the screws (AF5) and pull the cables out of the terminal.



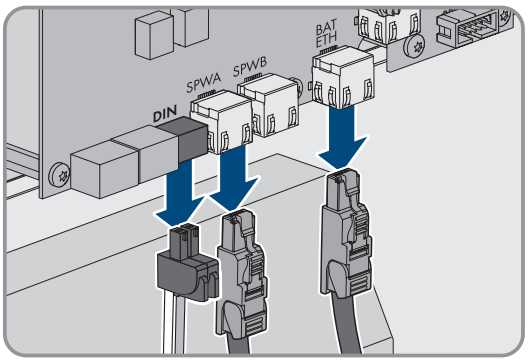
3. Remove the protection elements against contact from the terminal lugs for the DC connection. To do so, unlock the side brackets.



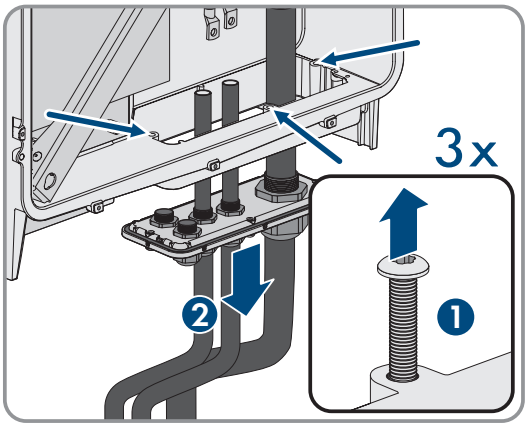
4. Remove the DC cable connection. Loosen the hex nuts (AF10) and remove the combined hexagon head screw (AF16).



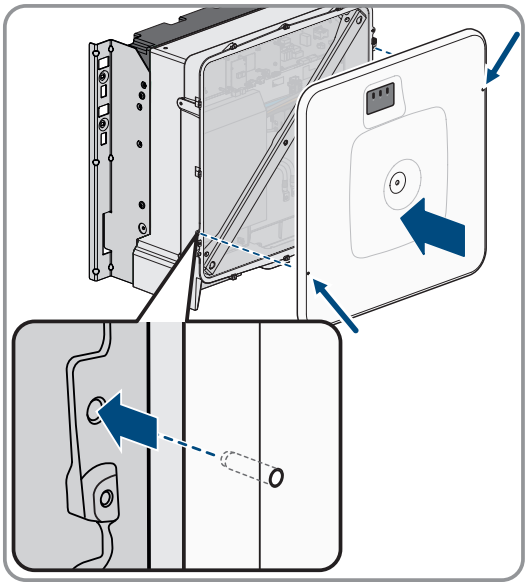
5. Remove the network cables, the battery data cables and the signal cables from the sockets.



6. 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.
7. Dismantle the connecting plate. To do so, unscrew the three screws (TX40).

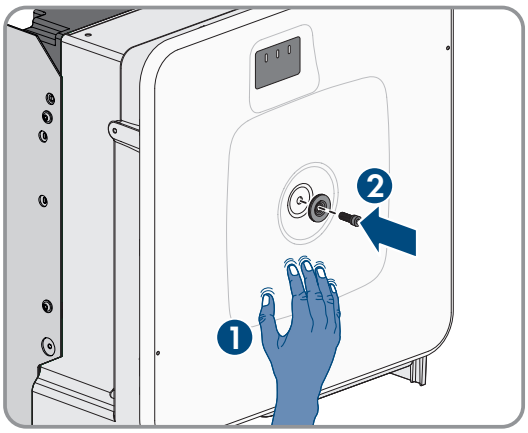


8. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure lid.

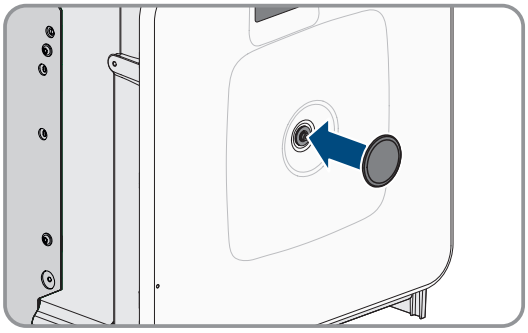


9. Ensure that the cover sits straight on the enclosure.

10. Hold the enclosure lid pressed against the enclosure and screw and tighten the screw (hex socket AF8, torque: 18 Nm).



11. Place the cover on the screw in the cover of the enclosure (see Section 13.2, page 104).



13.2 Disassembling the Inverter

⚠ QUALIFIED PERSON

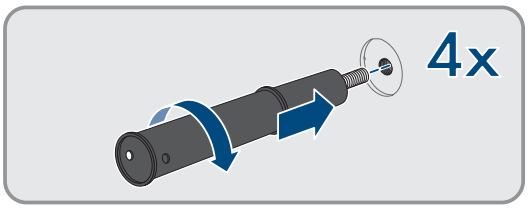
To decommission the inverter completely upon completion of its service life, disassemble the inverter as described in the following.

Requirements:

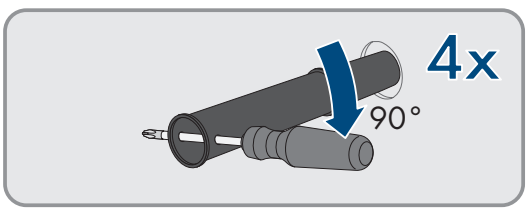
- ☐ All connections of the inverter are disconnected.
- ☐ Original packaging or packaging suitable for the weight and dimensions of the inverter is available.
- ☐ A pallet is available.
- ☐ Mounting material for attaching the packaging on the pallet is available (e.g. tie-down straps).
- ☐ All transport handles are in place.

Procedure:

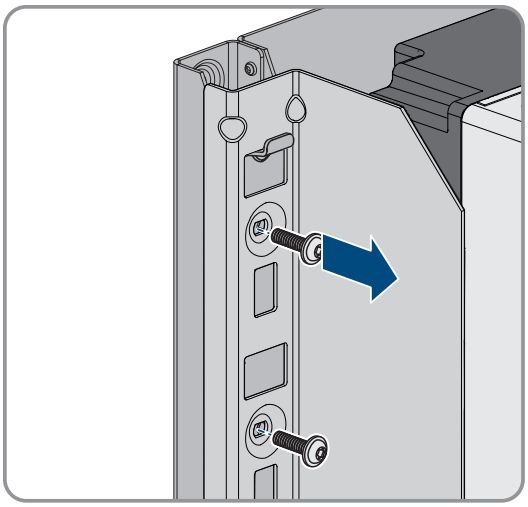
1. Screw the transport handles as far as they will go into the tapped holes on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the transport handles are screwed into the tapped holes so that they are perfectly straight. If the transport handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on. The tapped holes may get damaged, thus making it difficult to mount the transport handles again.



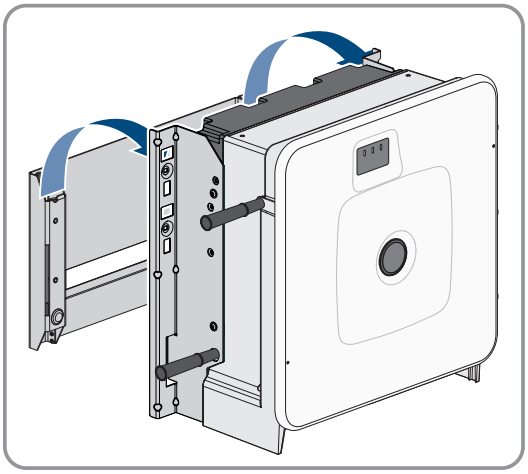
2. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90°. This ensures that the transport handles are securely tightened.



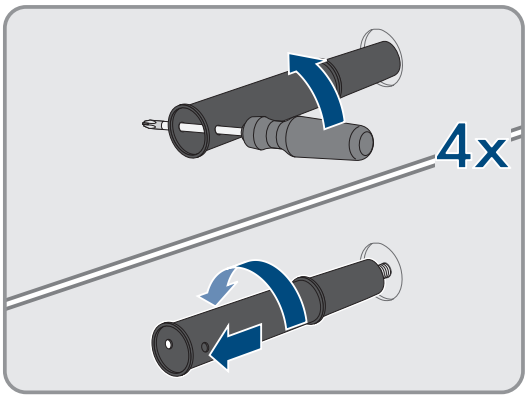
3. If the product should be lifted from the mounting bracket with the help of a hoist, screw the eye bolts into the threads on the top of the product and attach the hoist to them. The hoist must be suitable for the weight of the product.
4. Unscrew the screw for securing the product to the mounting brackets on the right and left (TX40).



5. Remove the product from the mounting lugs of the mounting brackets by moving it upward.



6. Remove all 4 transport handles from the tapped holes. If necessary, insert a screwdriver into the holes on the transport handle and use the screwdriver to remove the transport handle.



7. If the product should be stored or shipped: Package the product and the wall mounting bracket. To do this, use original packaging or packaging suitable for the weight and size of the product and secure the packaging to the pallet with tension straps.
8. Dispose of the inverter, if necessary.

Also see:

- Disposal ⇒ page 106
- Disconnect the terminals on the inverter ⇒ page 102

14 Disposal

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

15 Replace the inverter with a replacement device

⚠ QUALIFIED PERSON

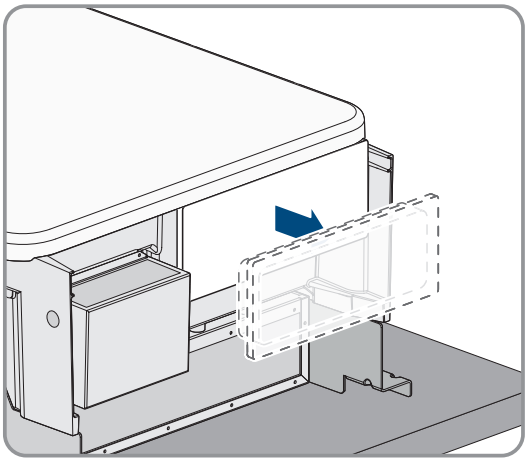
Under fault conditions, the inverter may need to be replaced. If this is the case, you will receive a replacement device from SMA Solar Technology AG. If you received a replacement device, replace the defective product with the replacement device as described below.

i Transport cover on the replacement device

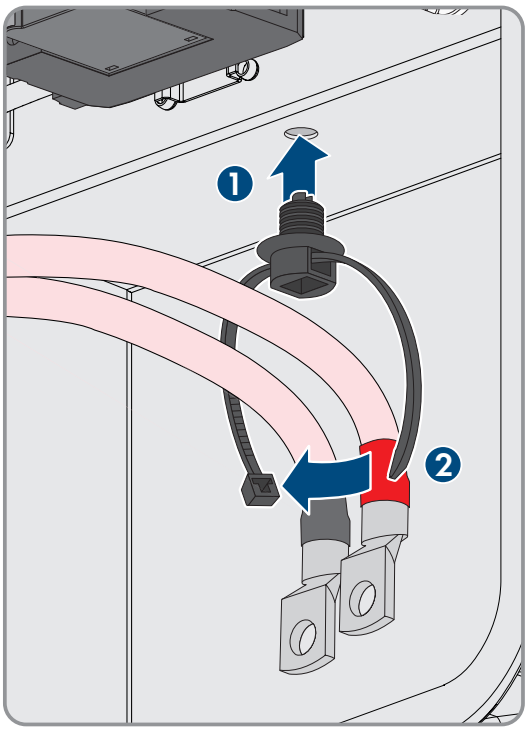
The cover of the enclosure of the replacement device can be a transport cover (see info on the cover of the enclosure). In this case, the transport cover must be exchanged for the cover of the enclosure of the defective product. The procedure for this is described below at the relevant point.

Procedure:

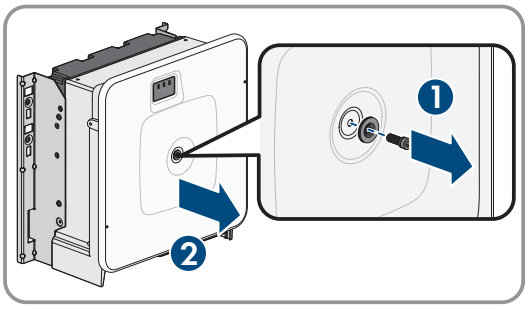
1. To simplify the configuration of the replacement device, create a backup file with the configuration of the defective product.
2. Reset defective product to default settings.
3. Disconnect the product connections of the defective product.
4. Disassemble the defective product.
5. Remove the transport cover, which is located in the enclosure opening of the replacement device instead of the connecting plate, and use it for the defective product.



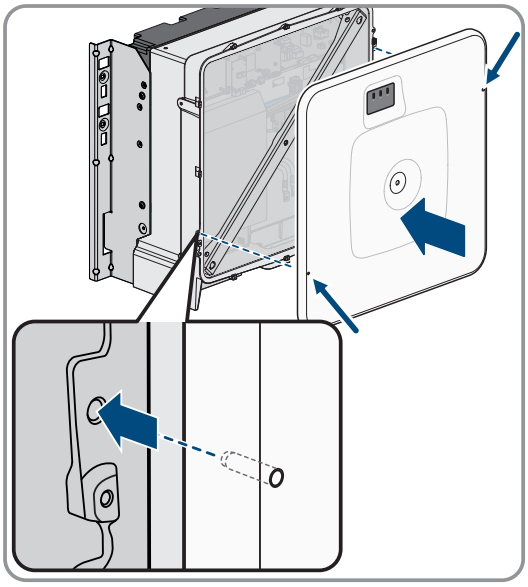
6. Secure the pre-configured DC connection cables in the defective product for transport. To do so, screw the supplied cable tie into the hole below the DC surge protection devices and place and tighten the cable tie around the DC connection cables.



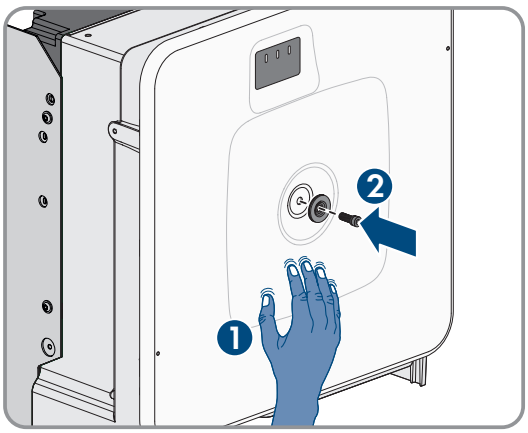
7. Mount the replacement device and make the electrical connections as described in this document. Use the connection plate and the DC protection elements against contact of the defective product.
8. If you have to replace the cover of the enclosure: Remove the cover from the cover of the enclosure.
9. If you have to replace the cover of the enclosure: Unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.



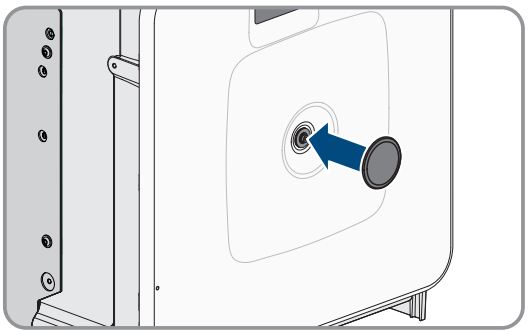
10. If you have to replace the cover of the enclosure: Carry out the following 4 steps.
11. Position the cover of the enclosure. The two guide pins on the cover of the enclosure must slide into the guide openings on the enclosure.



12. Ensure that the cover sits straight on the enclosure.
13. Hold the cover of the enclosure pressed against the enclosure and screw and tighten the screw (hex socket AF8, tightening torque: 18 Nm).



14. Place the cover on the screw in the cover of the enclosure.



15. Switch on the replacement device (see Section 8.3, page 59).
16. Establish a connection to the user interface.
17. For the configuration, upload the backup file with the configuration of the defective product to the replacement product.
18. If the defective product had been registered by a communication product, replace it with the new product in the communication product.
19. Pack the defective product in the packaging of the replacement device.
20. Fasten the packaging to the pallet on which the replacement device was supplied using the reusable lashing straps.
21. Arrange for pick-up by SMA Solar Technology AG.

Also see:

- Procedure for commissioning as System Manager ⇒ page 58
- Procedure for commissioning as a subordinate device ⇒ page 59
- Upload backup file ⇒ page 73
- Resetting the product to default setting ⇒ page 73
- Disconnect the terminals on the inverter ⇒ page 102
- Mounting the Inverter ⇒ page 37
- Disassembling the Inverter ⇒ page 104

16 Technical Data

16.1 General Data

	SI30-20 / SI50-20
Width x height x depth without feet and without disconnectors	772 mm x 837.8 mm x 443.8 mm
Weight with cover of the enclosure and connecting plate	104 kg
Weight without cover of the enclosure and connecting plate	97 kg
Length x width x height of the packaging	1150 mm x 850 mm x 630 mm
Transport weight (including pallet)	129.5 kg
Operating temperature range without derating	-25°C to +45°C
Operating temperature range with derating	-25°C to +60°C
Maximum permissible value for relative humidity (non-condensing)	95 %
Maximum operating altitude above mean sea level (MSL)	3000 m
Typical noise emission	69 dB(A)
Standby	25 W
Topology	Three-phase
Cooling method	Active
Number of external fans	3
Number of internal fans	2
Degree of protection (according to IEC 60529)	IP65
Climatic categories for the ongoing operation (as per IEC 60721-3-4)	4K4 / 4Z4 /4S2 / 4M3 / 4C2 / 4B2
Climatic category for storage (at a humidity range of 15% to 95%)	1K5
Climatic category for transport (as per IEC 60721-3-2)	2K3

Equipment

	STPS30-20 / STPS50-20
DC connection	Terminal lug
AC connection	Screw terminals

16.2 DC Input

	SI30-20	SI50-20
Maximum power DC power	30600 W	51000 W
Rated input voltage	750 V	750 V
Voltage range	200 V to 980 V	200 V to 980 V
DC voltage range at nominal power	200 V to 980 V	350 V to 980 V
Maximum usable input current	150 A	150 A
Maximum output current under fault conditions for 10 ms	491 A	491 A
Maximum inrush current	1 A	1 A
Battery type	Lithium-ion battery	Lithium-ion battery
Connectable conductor cross-section	50 mm² to 95 mm²	50 mm² to 95 mm²
Overvoltage category (according to IEC 60664-1)	II	II
Maximum fuse protection (all poles)	200 A	200 A

16.3 AC output

	SI30-20	SI50-20
Rated power at nominal voltage	30000 W	50000 W
Maximum apparent power	30000 VA	50000 VA
Maximum reactive power	30000 var	50000 var
Nominal grid voltage	400 V	400 V
Voltage range[1)]	340 V to 477 V	340 V to 477 V
Rated current per line conductor	43.3 A	72.2 A
Maximum current per line conductor	45.6 A	75.5 A
Rated grid frequency[1)]	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at grid frequency 50 Hz[1)]	44 Hz to 55 Hz	44 Hz to 55 Hz
Operating range at grid frequency 60 Hz[1)]	55 Hz to 66 Hz	55 Hz to 66 Hz
Required minimum grid short-circuit current	3 kA	3 kA
Permissible maximum grid short-circuit current	50 kA	50 kA
Power factor at rated power	1	1

[1)] Depending on the configured country data set

	SI30-20	SI50-20
Displacement power factor, adjustable	0 overexcited to 0 underexcited	0 overexcited to 0 underexcited
Charging and discharging phases	3	3
Connection phases	3-N-PE	3-N-PE
Protection class (according to IEC 62109-1)	I	I
Overvoltage category as per IEC 60664-1 for AC	III	III
Connectable conductor cross-section	16 mm² to 95 mm²	16 mm² to 95 mm²
External diameter of the connection cables	35 mm to 48 mm	35 mm to 48 mm
Grid configuration	TT / TN-C / TN-S / TN-C-S	TT / TN-C / TN-S / TN-C-S

16.4 Efficiency

	SI30-20	SI50-20
Maximum efficiency	98 %	98 %
European weighted efficiency	97.6 %	97.2 %

16.5 Protective Devices

	SI30-20 / SI50-20
Grid monitoring	Available
Overtemperature	Available
Battery discharging	Available
AC short-circuit current capability	Available
All-pole-sensitive residual-current monitoring unit	Available
Maximal output overcurrent protection	125 A

16.6 Climatic Conditions

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

	SI30-20 / SI50-20
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

	SI30-20 / SI50-20
Temperature range	-40°C to +70°C

16.7 Torques

	SI30-20 / SI50-20
Screws for attaching the inverter to the wall mounting bracket (M8x25, 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 L1, L2, L3, N and PE (AF5) with conductor cross-section of 16 mm² to 95 mm²	20 Nm
Screws for attaching terminal lugs to DC connection (M10x40, AF16)	24 Nm ± 2 Nm
Screw enclosure lid (AF8, torque: 18 Nm)	18 Nm
Optional connection for additional grounding or equipotential bonding (M6x16, TX20)	6 Nm

16.8 System Limits

	SI30-20 / SI50-20
Number of additionally supported devices if a Sunny Island X is the System Manager[2)]	10
Centralized commissioning of all devices in the system	Available
Remote parameterization of SMA devices with Sunny Portal powered by ennexOS	Available
Total number of supported devices when an EDMM-20 (SMA Data Manager M) is the System Manager[2)]	50
Total number of supported devices when a HYBRID-CONTROLLER (SMA Hybrid Controller) is the System Manager	120

[2)] Supported devices: Sunny Tripower Storage, PV inverter, EV Charger Business, and energy meter (Energy Meter or Power Quality Analyser)

17 Accessories

You will find the accessories for your product in the following overview:

Designation	Brief description	SMA order number
Janitza UMG 604Pro[3)]	Power Quality Analyser UMG 604 E from Janitza electronics	JANITZA-SP
ioLogik E1214[3)]	I/O system by Moxa Europe GmbH	124179-00.01
ioLogik E1242[4)]	I/O system by Moxa Europe GmbH	-
WAGO-I/O-SYSTEM 750[4)]	I/O system by WAGO Kontakttechnik GmbH & Co. KG	-
SI X Connection Box 500[4)]	Distribution box for up to 10 Sunny Island X with a nominal power of up to 500 kW	-
SI X Connection Box 800[4)]	Distribution box for up to 16 Sunny Island X with a nominal power of up to 800 kW	-
SMA I/O Module[3)]	Module for implementing grid management services	MD.IO-41
ES 100 L SCT4[3)]	SMA Commercial Energy Meter 600 A from TQ-Systems	COM-EMETER-A-20
ES 100 L SCT3[3)]	SMA Commercial Energy Meter 200 A from TQ-Systems	COM-EMETER-B-20

[3)] If required, this accessory can be ordered from SMA Solar Technology AG or your distributor.

[4)] If required, this accessory can be ordered from your distributor.

18 EU Declaration of Conformity

within the scope of the EU directives

CE

- 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)
- Restriction of the use of certain hazardous substances 2011/65/EU (L 174/88, June 8, 2011) and 2015/863/EU (L 137/10, March 31, 2015) (RoHS)

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

19 UK Declaration of Conformity

according to the regulations of England, Wales and Scotland

- Electromagnetic Compatibility Regulations 2016 (SI 2016/1091)
- Electrical Equipment (Safety) Regulations 2016 (SI 2016/1101)
- Radio Equipment Regulations 2017 (SI 2017/1206)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (SI 2012/3032)

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

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20 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:

- Battery inverters
  - Device type
  - Serial number
  - Firmware version
  - Event message
  - Mounting location and mounting height
  - Type of the communication products connected
  - Use the name of the system in Sunny Portal (if available)
  - Access data for Sunny Portal (if available)
  - Special country-specific settings (if available)
  - Information on the ripple control receiver (if available)
  - Detailed description of the problem
- Battery
  - Device type
  - Serial number / serial numbers
  - Firmware version
  - Event message
  - Mounting location and mounting height

You can find your country's contact information at:

https://go.sma.de/service

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