



SMA COMMERCIAL STORAGE SOLUTION 30 / 50

ESSX-30-20 / ESSX-50-20

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

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Status: 8/11/2023

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1 Information on this Document

1.1 Validity

This document is valid for:

- ESSX-30-20 (SMA Commercial Storage Solution 32 kWh)
- ESSX-50-20 (SMA Commercial Storage Solution 56 kWh)

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 an inverter works and is operated
- Knowledge of how batteries work and are operated
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices, batteries and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, regulations, standards, and directives
- Knowledge of and compliance with this document and all safety information
- Successful participation in a certification training program for the SMA Commercial Storage Solution

1.3 Content and Structure of this Document

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

You will find the latest version of this document and further information on the product in PDF format at www.SMA-Solar.com.

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

Icon	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 Typographical Elements in the Document

Typographical element	Use	Example
bold	<ul style="list-style-type: none"> • Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • Connect the insulated conductors to the terminals X703:1 to X703:6. • Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Go to Settings > Date.
[Button] [Key]	<ul style="list-style-type: none"> • Button or key to be selected or pressed 	<ul style="list-style-type: none"> • Select [Enter].
#	<ul style="list-style-type: none"> • Placeholder for variable components (e.g., parameter names) 	<ul style="list-style-type: none"> • Parameter WCtHz.Hz#

1.7 Designations in the Document

Complete designation	Designation in this document
SMA Commercial Storage Solution	Commercial Storage Solution, system, product
Sunny Tripower Storage X	Sunny Tripower Storage, battery inverter, inverter
SMA Commercial Storage	Battery cabinet
SMA Commercial Storage Extension	Battery module
BAT BREAKER	Battery fuse protection, DC distributor
Dynamic Battery Optimizer	DBO, DBO assembly
Active Power Unit	APU, battery management system

1.8 Explanation of Used Terms

Term	Explanation
Battery	A battery for the purposes of this document consists of at least one battery cabinet with one battery management system and a number of battery modules. Depending on the system configuration, up to four battery cabinets can be wired to form a battery.
Battery management system (BMS)	Central processing unit of the battery cabinet (Accelerated Processing Unit, APU).
Dynamic Battery Optimizer	The Dynamic Battery Optimizer (DPO) assembly is part of the battery management system. The DPO assembly controls and monitors the charging and discharging of the battery cells.
State of charge	The state of charge (SoC) indicates the amount of energy available in a battery, expressed as a percentage. A state of charge of 100% is equivalent to a fully charged battery. The battery management system is able to determine the state of charge of a cell or battery module based on parameters, and to terminate charging if required. This prevents overcharging of the battery. To prevent unnecessary stress on the cells, the software has the same function for discharging. The manufacturer defines battery limit conditions, at which the system terminates charging and discharging.
State of health	The state of health (SoH) indicates the condition of a battery. By closely monitoring the state of health, the battery management system is able to identify disparities in power at cell level and in this way detect damaged or defective cells. Depending on the severity of the fault, the battery inverter may become disconnected from the battery management system or the battery may be shut down.
Balancing	Balancing is a battery management system function. It ensures that the charge is split evenly between all battery cells within a battery module, all battery modules within a battery cabinet, and all battery cabinets within a battery.

1.9 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
"SunSpec Modbus ®-interface - ennexOS" Information on the SunSpec Modbus interface and on supported information models	Technical Information
"SMA SPEEDWIRE FIELDBUS"	Technical information

Title and information content	Type of information
"SMA DATA MANAGER M"	Operating manual
"System Configuration - SMA Commercial Storage Solution" Overview of permitted system configurations within the SMA Commercial Storage Solution (available in English only)	Technical Information

2 Safety

2.1 Intended Use

The SMA Commercial Storage Solution is an energy management system for commercial uses, e.g., increased self-consumption or peak shaving.

System requirements

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 product must only be used as stationary equipment.

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

The product must not be used as an uninterruptible power supply.

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

Communication cables, measuring lines, and control lines must always be laid separately from AC or DC cables to prevent electromagnetic coupling to interference during data transmission and any resulting malfunctions.

No additional loads or components in the DC intermediate circuit may be connected between the battery and inverter. Any changes to the system configuration must be agreed with SMA Solar Technology AG.

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

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

The product is intended exclusively for use in industrial environments.

The product must not be exposed to corrosive atmospheres.

Battery inverter requirements

The Sunny Tripower Storage is an AC coupled battery inverter for parallel grid operation. The Sunny Tripower Storage converts the direct current supplied by a battery into grid-compliant three-phase alternating current.

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

The inverter complies with DIN EN 55011 of class B, group 1 as well as IEC 61000-6-3 and IEC 61000-6-2.

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

The inverter is suitable for indoor and outdoor use.

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

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

The DC lines of the positive and negative pole must be shorter than 30 m. In systems with 1 battery cabinet only, the DC cabling between battery inverter and battery cabinet is secured at all poles through the battery management system in the battery cabinet. In systems with more than one battery cabinet, the DC cabling between the battery inverter and battery cabinet in the DC distributor must have all-pole fuse protection.

Battery requirements

SMA Commercial Storage is a lithium-ion battery. The battery components are designed in accordance with the state of the art and the product-specific standards.

The battery meets the requirements of IEC 61508 Parts 1 to 7 and complies with safety integrity level (SIL) 1.

The battery is designed for use at altitudes of up to 2000 m above mean sea level. Electrical safety cannot be guaranteed at altitudes above 2000 m.

The battery is suitable for indoor use only.

On flood plains, care must be taken to ensure that the battery is always installed in an elevated position and protected from contact with water.

In accordance with IEC 62619, the battery is certified to safety integrity level SIL 1, and must therefore be installed in a room with protection against fire. The locally applicable fire regulations must be observed.

Statutory warranty

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

Alterations to the SMA products, e.g., changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

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

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

This document does not replace 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.

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.

- Have the inverter and the battery mounted, installed and commissioned only by qualified persons with the appropriate skills.
- Disconnect the system from voltage sources and make sure it cannot be reconnected before working on the device.
- 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.
- Ground the battery-storage system as described in this document.
- 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 inverter or the battery outdoors to the inside of a building.

⚠ DANGER**Danger to life due to fire or explosion due to improper handling of the battery modules**

Improper handling can cause the lithium inside the battery to ignite. This can cause a fire or explosion. Death or lethal injuries due to hot or flying debris can result.

- Never use defective or damaged battery modules.
- Do not open, pierce, or drop battery modules.
- Do not install or operate the battery modules in potentially explosive atmospheres or areas of high humidity.
- Do not expose the battery modules to high temperatures.
- Never throw the battery modules on a fire.
- Store the battery modules dry and within the specified temperature range.
- If the battery goes on fire, use a CO₂ fire extinguisher.
- If a fire breaks out in the vicinity of the battery, use an ABC fire extinguisher.

⚠ DANGER**Danger to life due to electric shock due to touching live parts of the battery modules**

A high voltage is present at the DC terminals of each battery module. When the DC cables are installed within the battery cabinet, the DC voltages of the individual battery modules add up. Touching the DC terminals or connected DC cables results in death or lethal injuries due to electric shock.

- Do not touch any live components.
- Wear suitable personal protective equipment for all work on the product.
- Observe all warning messages on the product and in the documentation.
- Observe the local health and safety regulations.

⚠ DANGER**Danger to life due to electric shock due to touching live components or cables with insufficient or no grounding**

If there is insufficient or no earthing, high voltages can be present at the battery cabinet enclosure in the event of a fault. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Earth the battery cabinet.
- Earth the battery management system during installation.

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

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

- Do not expose the battery modules to severe jolts.
- Do not open, dismantle, or perform mechanical work on the battery modules.
- Only perform work on the inverter and battery (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 system.
- In case of contact with electrolyte, rinse the affected area immediately with water and consult a doctor without delay.

⚠ WARNING**Danger to life due to fire when failing to observe torque specifications on live bolted connections**

Failure to follow the specified 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 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 torques.

⚠ 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 inverter and battery from voltage sources before performing any work on the battery-storage system.
- 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 modules or battery management system.

⚠ WARNING**Risk of injury due to the weight of the battery components**

Injuries may result if the battery components are lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery components carefully. Take the weight of each individual component into account.
- Transport battery components individually only.
- Wear suitable personal protective equipment, at a minimum safety footwear with a non-slip sole and steel cap, for all work on the battery.

⚠ 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.
- Only use measuring devices with measurement ranges designed for the maximum DC voltage of the battery.

⚠ 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.

- Put the battery into operation no longer than six months after delivery.
- If the battery is not put into operation within six months, contact Service to request reconditioning of the battery-storage system.
- 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 Service.

⚠ CAUTION**Risk of injury due to the weight of the inverter**

Injuries may result if the inverter is lifted incorrectly or dropped while being transported or when mounting it to the wall mounting bracket.

- Transport and lift the inverter carefully. In doing so, keep in mind the weight of the inverter.
- Wear suitable personal protective equipment for all work on the product.
- Transport the inverter using the carrying handles or hoist. In doing so, keep in mind the weight of the inverter.
- 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 inverter to attach the hoist system.

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

Some parts of the inverter 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 burns due to hot battery modules**

The battery modules in the battery cabinet can get hot during operation. Touching hot battery modules can cause burns.

- Keep the battery cabinet closed at all times during operation.
- Before opening the battery cabinet, wait until the battery modules have cooled down.

⚠ CAUTION**Risk of injury due to sharp edges**

The battery components contain sheet metal parts with sharp edges. Touching the sharp-edged sheet metal parts may result in injuries.

- Wear safety gloves for mounting and disassembling the battery.

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

If you open the inverter when temperatures are below freezing, the enclosure seals can be damaged. This can lead to moisture entering the inverter.

- Only open the inverter 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 inverter (e.g. by melting the ice with warm air).

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

Sand, dust, and moisture penetration can damage the inverter and battery, thus impairing their functionality.

- Only open the inverter and battery cabinet if the humidity is within the thresholds and the environment is free of sand and dust.
- Do not open the inverter and battery cabinet during a dust storm or precipitation.
- Close the inverter and battery cabinet in case of interruption of work or after finishing work.

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 inverter and all its components only with a cloth moistened with clear water.
- Clean all battery components with a dry cloth only.

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 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.

NOTICE**Damage to the battery due to incorrect installation or connection**

The battery management system and battery modules can be damaged by incorrect installation or incorrect electrical connection.

- Install the battery management system and battery modules in accordance with the specifications in this manual only.
- Make all electrical connections on the battery management system and battery modules in accordance with the specifications in this manual only.

NOTICE**Damage to the battery due to short circuit**

Incorrect assembly of the DC cables can trigger a short circuit. High currents due to short circuit lead to damage to the battery modules or battery management system.

- Take the mechanical connector coding of the supplied DC cables into account. Do not use force when connecting the DC cables.
- Always connect red DC cables to the red DC terminals.
- Always connect black DC cables to the black DC terminals.
- Always replace damaged battery modules without delay.

NOTICE**Damage to the battery modules due to moisture or corrosive substances**

Moisture or corrosive substance penetration can damage the product and impair its functionality.

- Do not expose battery modules to rain and do not immerse in liquid.
- Do not expose battery cells to corrosive substances (e.g., ammonia, salt).

NOTICE**Property damage due to unauthorized access to the system on account of freely available switch cabinet key**

Parameters may be set incorrectly due to unauthorized access to the system on account of freely available switch cabinet key. When parameters are set incorrectly, technical thresholds are being exceeded. An exceeding of technical thresholds can lead to damage of the affected products.

- Remove the switch cabinet keys from the door locks.
- Store the switch cabinet keys in a safe place.
- Ensure that only qualified persons have access to the switch cabinet keys.

NOTICE**Damage to the display of the battery management system**

The display of the battery management system can be damaged by inappropriate operation.

- To activate the display or confirm something, simply tap with the fingers on the highlighted area beside the display.
- Do not tap directly on the display.
- Do not use objects to tap.

3 Scope of Delivery

3.1 Overview of the Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact the Service if the delivery is incomplete or damaged. Never commission the battery if components are damaged.

Quantity	Designation
1	Inverter (STPS30-20 or STPS50-20) ¹⁾
1	Energy meter: COM-EMETER-A-20 / COM-EMETER-B-20 / JANITZA-SP / CLCON-PWRSUPPLY ¹⁾
1	For STPS30-20: Storage-30-20 battery cabinet ¹⁾ For STPS50-20: Storage-50-20 battery cabinet ¹⁾
1	Battery management system
4 to 6	Battery modules for Storage-30-20 ¹⁾
7 to 10	Battery modules for Storage-50-20 ¹⁾
1	Accessory kit for battery
1	DC distributor ¹⁾
1	Accessory kit for DC distributor ¹⁾

Also see:

- [Scope of Delivery of the Battery Cabinet ⇒ page 22](#)
- [Scope of Delivery of the Battery Management System ⇒ page 23](#)
- [Scope of Delivery of a Battery Module ⇒ page 23](#)
- [Accessory Kit for Battery ⇒ page 24](#)
- [Optional: Scope of Delivery of the DC Distributor ⇒ page 26](#)
- [Scope of Delivery of the Inverter ⇒ page 20](#)

3.2 Scope of Delivery of the Inverter

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

¹⁾ Depending on order option

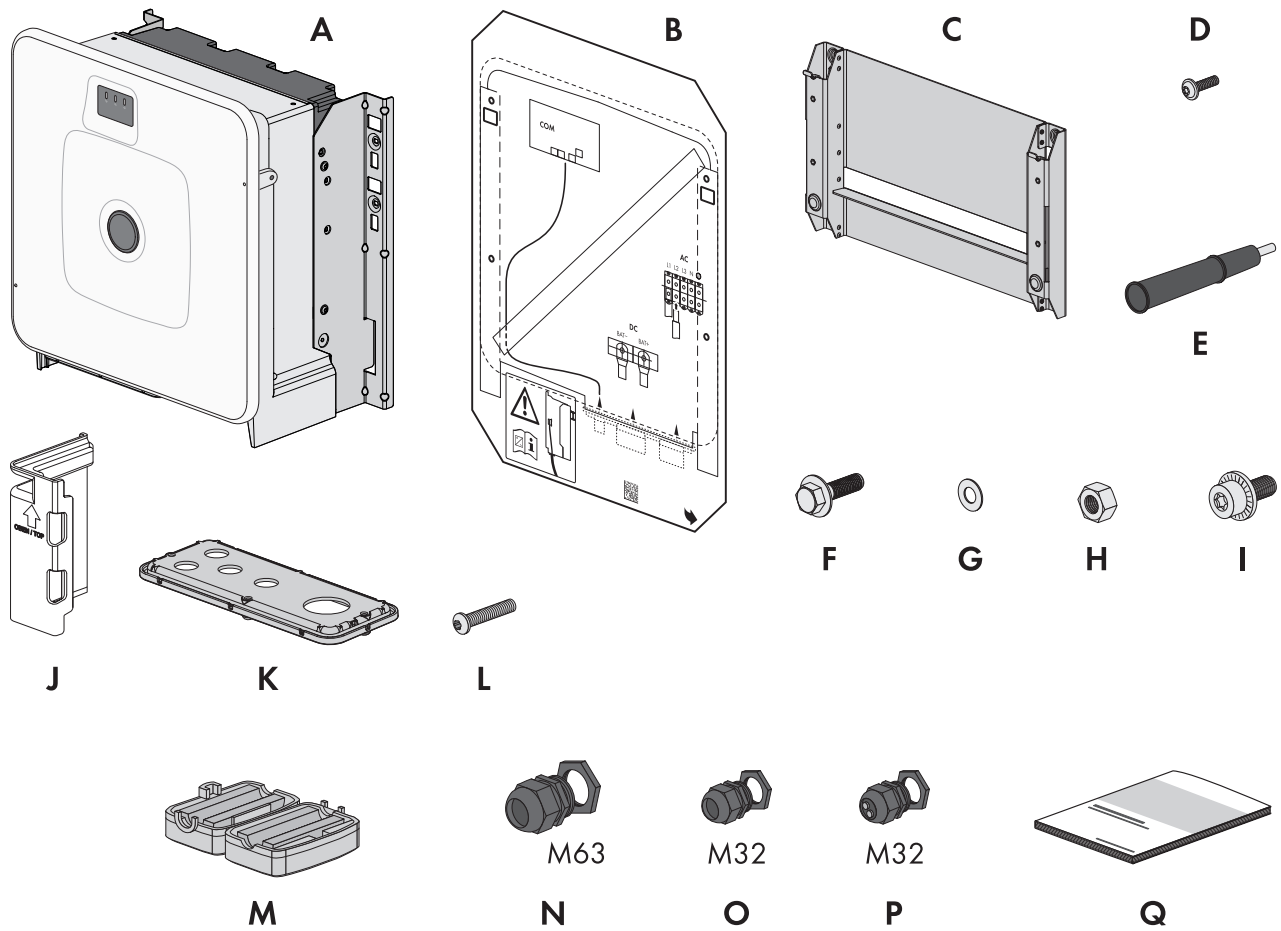


Figure 1: Components included in scope of delivery

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
L	3	Button head screw M8x70
M	3	Ferrite
N	1	Cable gland and counter nut M63x1.5

Position	Quantity	Designation
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: <ul style="list-style-type: none"> • 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

3.3 Scope of Delivery of the Battery Cabinet

Check the scope of delivery for completeness and any externally visible damage. Contact the Service if the delivery is incomplete or damaged. Never commission the battery if components are damaged.

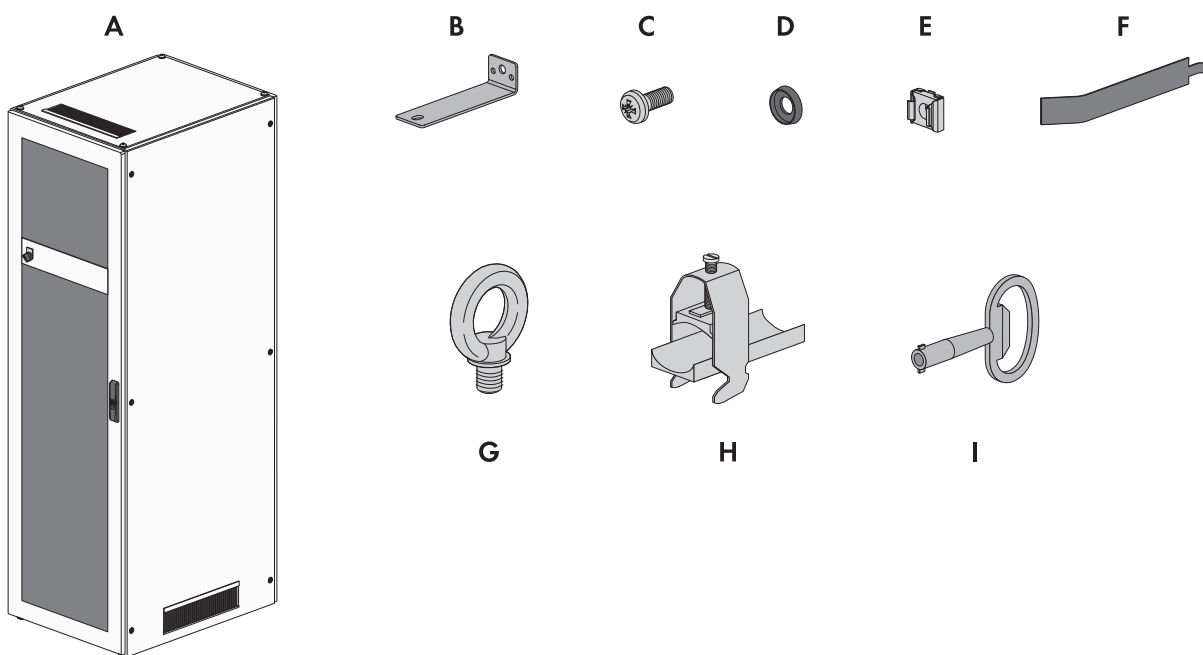


Figure 2: Components included in scope of delivery

Position	Quantity	Designation
A	1	Battery cabinet
B	2	Fixing bracket
C	50	Flat-head bolt M6x16
D	50	Plastic washer M6
E	50	Cage nut

Position	Quantity	Designation
F	1	Cage nut tool
G	4	Eye bolt (for optionally transporting the cabinet with a crane)
H	2	Cable clamp clip
I	1	Double-bit key

3.4 Scope of Delivery of the Battery Management System

Check the scope of delivery for completeness and any externally visible damage. Contact the Service if the delivery is incomplete or damaged. Never commission the battery if components are damaged.

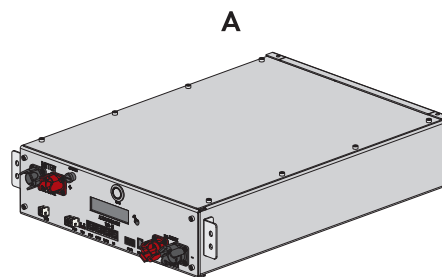


Figure 3: Components included in scope of delivery

Position	Quantity	Designation
A	1	Battery management system APU 1000-SX

3.5 Scope of Delivery of a Battery Module

Check the scope of delivery for completeness and any externally visible damage. Contact the Service if the delivery is incomplete or damaged. Never commission the battery if components are damaged.

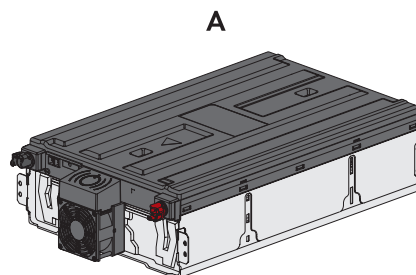


Figure 4: Components included in scope of delivery

Position	Quantity	Designation
A	1	Battery module Each battery module comes in a separate package.

3.6 Accessory Kit for Battery

Check the scope of delivery for completeness and any externally visible damage. Contact the Service if the delivery is incomplete or damaged. Never commission the battery if components are damaged.

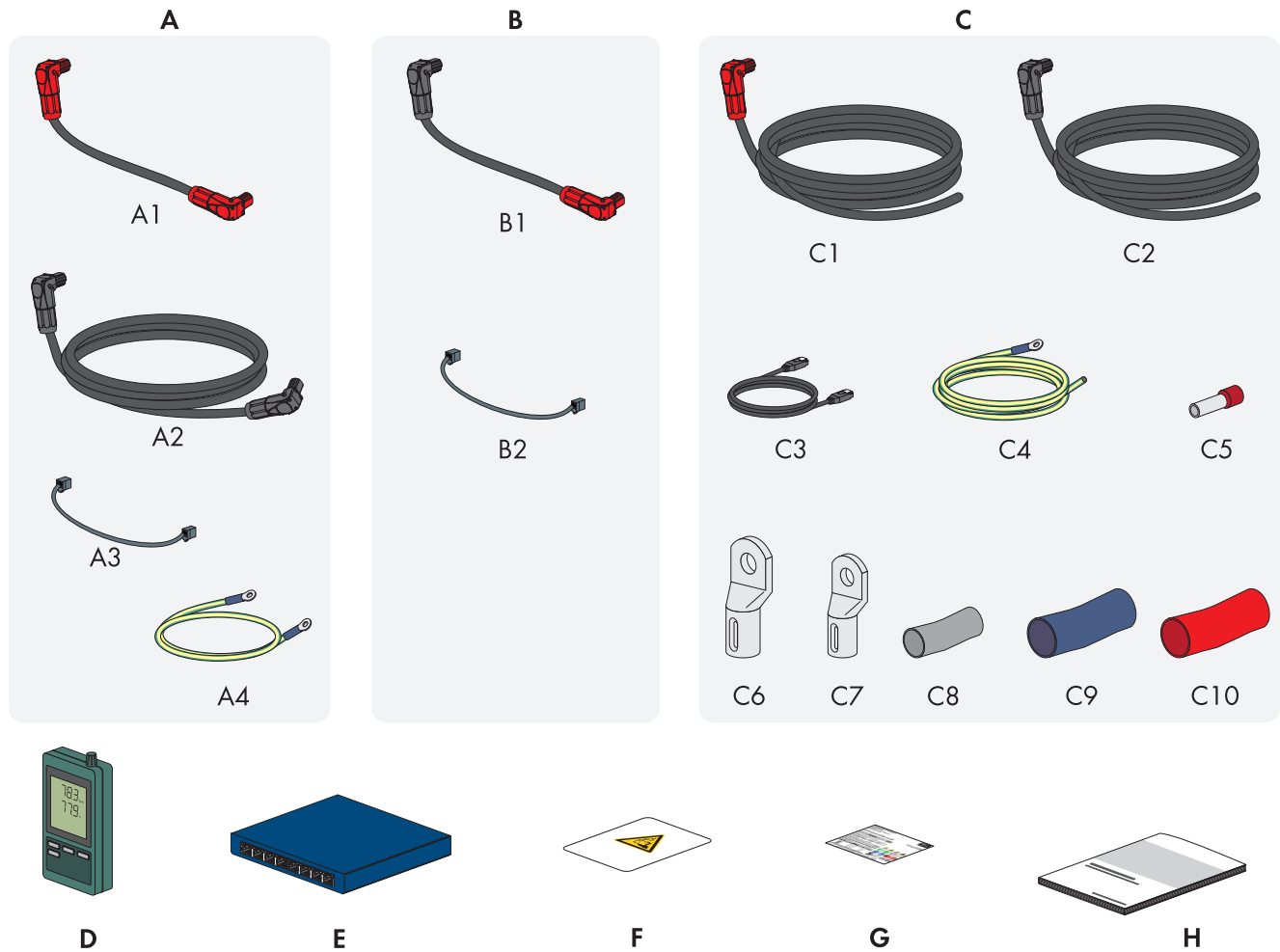


Figure 5: Components included with accessory kit

Position	Quantity	Designation
A	1	APU connector set for grounding the battery cabinet and for connecting the battery management system (APU) to the battery modules
B	3 to 9	Module connector set for wiring the battery modules in the battery cabinet ²⁾
C	1	DC connector set for connecting the battery cabinet to the inverter If using more than one battery cabinet, the DC connector set is used to connect the battery cabinet to the superordinate DC distributor
D	1	Temperature and humidity sensor (model SD500 from Extech Instruments)
E	1	Switch
F	1	Battery room label

²⁾ The number of module connector sets supplied is determined by the number of battery modules: Number of battery modules - 1 = number of module connector sets supplied

Position	Quantity	Designation
G	1	Type label
H	1	Quick reference guide for SMA Commercial Storage

APU connector set

Position	Quantity	Designation
A1	1	DC cable (with two red connectors)
A2	1	DC cable (with two black connectors)
A3	1	Communication cable
A4	1	Grounding cable for grounding the battery management system

Module connector set

Position	Quantity	Designation
B1	1	DC cable (with one red connector and one black connector)
B2	1	Communication cable

DC connector set

Position	Quantity	Designation
C1	1	DC cable (with one red connector), length: 5 m, 10 m, or 15 m ³⁾
C2	1	DC cable (with one black connector), length: 5 m, 10 m, or 15 m ³⁾
C3	1	Communication cable, length: 5 m, 10 m, or 15 m ³⁾
C4	1	Grounding cable, length: 5 m, 10 m, or 15 m ³⁾
C5	2	Insulated bootlace ferrule (35 mm ²)
C6	2	Tube terminal lug (35 mm ² , M10)
C7	1	Tube terminal lug (16 mm ² , M8)
C8	1	Heat-shrink tubing (16 mm ²)
C9	1	Heat-shrink tubing (35 mm ² , blue)
C10	1	Heat-shrink tubing (35 mm ² , red)

³⁾ Depending on order option

3.7 Optional: Scope of Delivery of the DC Distributor

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

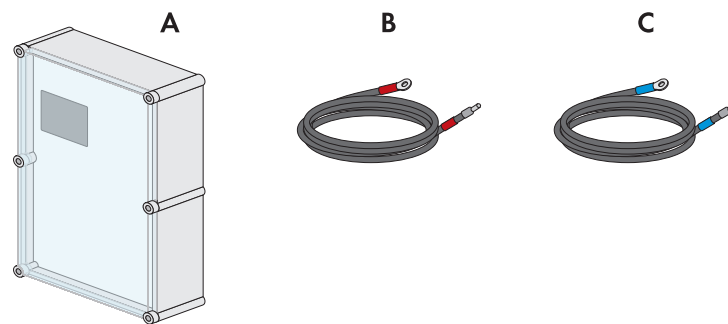


Figure 6: Components included in scope of delivery

Position	Quantity	Designation
A	1	DC distributor Bat Breaker (160-4x-HV100)
B	1	DC connector set between DC distributor and battery inverter (1.5 m, 5 m, or 10 m): DC+ cable with red marking (50 mm ²)
C	1	DC connector set between DC distributor and battery inverter (1.5 m, 5 m, or 10 m): DC- cable with blue marking (50 mm ²)

4 Additionally Required Materials and Equipment

Material or equipment	Quantity	Explanation
Screws suitable for the inverter mounting base	4	For attaching the wall mounting bracket to the inverter mounting base
Washers suitable for the inverter mounting base	4	For attaching the wall mounting bracket to the inverter mounting base
Screw anchors suitable for the inverter mounting base	4	For attaching the wall mounting bracket to the inverter mounting base
Screws suitable for the battery cabinet mounting base	2	For attaching the fixing brackets to the battery cabinet mounting base
Screw anchors suitable for the battery cabinet mounting base	2	For attaching the fixing brackets to the battery cabinet mounting base
Screws suitable for the temperature and humidity sensor mounting base	2	For attaching the temperature and humidity sensor (max. shaft 3 mm, head width 5 mm to 8 mm)
Screw anchors suitable for the temperature and humidity sensor mounting base	2	For attaching the temperature and humidity sensor (max. shaft 3 mm, head width 5 mm to 8 mm)
Field-assembly RJ45 connector with metal enclosure	1-2	Only required if the network cables for the inverter are not equipped with RJ45 connectors
Means of transport (e.g., pallet truck or hand truck)	1	Used to transport packed components to the installation site
Eye bolt (M10)	2	Only required if the inverter is to be transported with a hoist
Hoist	1	Only required if the inverter is to be transported with a hoist
Utility knife	1	Used to unpack the product
Torx screwdriver (TX25)	1	Used to attach and remove carrying handles on the inverter and to mount the battery
Torx screwdriver (TX30)	1	Used to mount the battery
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
Cross-head screwdriver (PH2)	1	Used to attach the battery modules and the battery management system in the battery cabinet
Allen key (AF8)	1	Used to connect the AC cables to the inverter
Allen key (AF10)	1	Used to attach and remove the cover of the inverter enclosure
3 Nm to 30 Nm torque wrench	1	Used to tighten bolted connections
10 mm and 13 mm socket	1	Example: For tightening grounding connections

Material or equipment	Quantity	Explanation
8 mm hexagonal socket (recommended minimum length: 120 mm)	1	Used to assemble and disassemble pan head screws in the battery cabinet cover when replacing them with eye bolts
Measuring device with a measurement range designed for the maximum AC and DC voltage of the inverter	1	Used to verify that no voltage is present at the inverter
Measuring device with a measurement range up to at least 1000 V DC	(1)	Used to verify that no voltage is present at the battery
Current clamp	1	For verifying that no voltage is present
Press tool	1	Used to attach terminal lugs/bootlace ferrules to the 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
Laptop with two patch cables and one USB Ethernet adapter	1	Used for commissioning
DIN rail	1	Used to mount the energy meter
Only when using the JANITZA-SP / CLCON-PWRSUPPLY: external current transformers	1	Used to connect the energy meter

Also see:

- [Technical Data for Energy Meter](#) ⇒ page 190

5 Product Overview

5.1 System Components

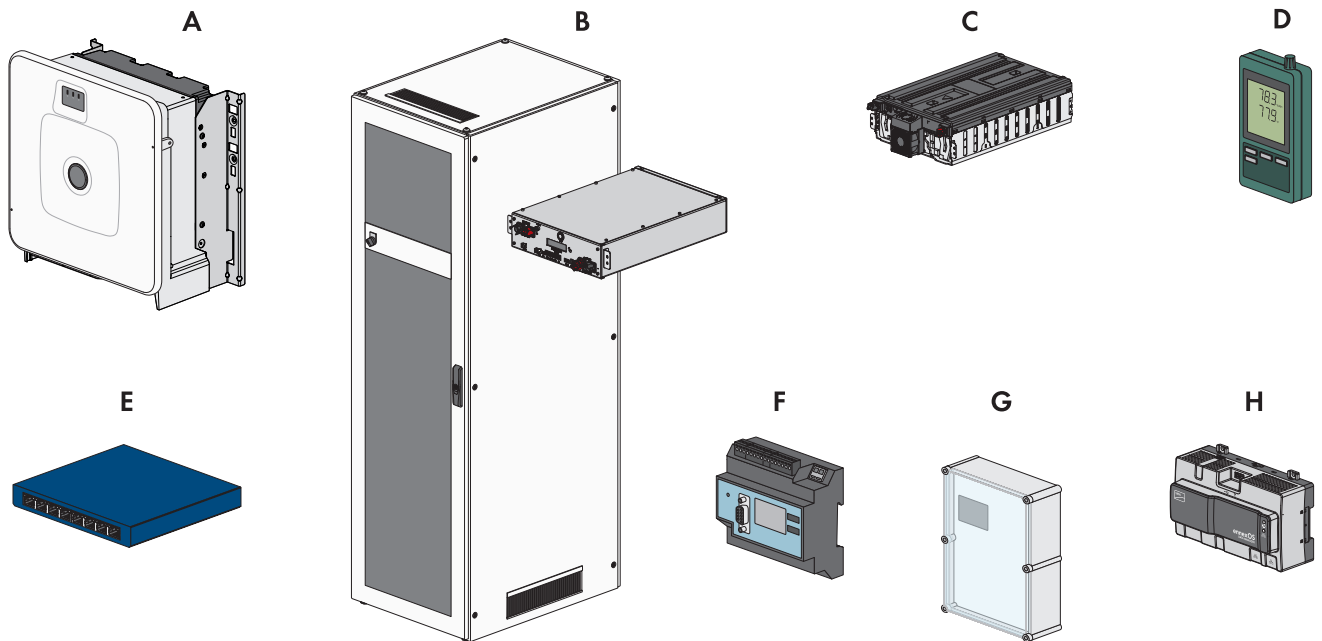


Figure 7: Main system components

Position	Designation
A	<p>Sunny Tripower Storage X 30 (STPS30-20) / Sunny Tripower Storage X 50 (STPS50-20)</p> <p>Battery inverter for parallel grid operation that converts the direct current supplied by a battery into grid-compliant three-phase current.</p> <p>When used as System Manager, the battery inverter in conjunction with an energy meter can take over the closed-loop control at the point of interconnection and provide open or closed-loop control of subordinate devices. The System Manager also takes over system monitoring and communication to the Sunny Portal powered by ennexOS.</p>
B	<p>For Sunny Tripower Storage X 30: SMA Commercial Storage 30 (Storage-30-20)</p> <p>For Sunny Tripower Storage X 50: SMA Commercial Storage 50 (Storage-50-20)</p> <p>Battery cabinet with battery management system: The battery management system contains the necessary all-pole fuse protection for one battery cabinet.</p>
C	<p>SMA Commercial Storage Extension</p> <p>Battery module</p>
D	<p>Temperature and humidity sensor</p> <p>The supplied temperature and humidity sensor continuously records the ambient temperature and humidity in the installation room. The collection of this data is a prerequisite for any warranty claims.</p> <p>The temperature and humidity sensor is included in the scope of delivery of the battery cabinet.</p>

Position	Designation
E	<p>Switch</p> <p>Optionally, communication between the battery and battery inverter can be conducted via this switch. This simplifies the connection of a service PC to the battery monitoring software BatMon, for example.</p> <p>The switch is included in the scope of delivery of the battery cabinet.</p>
F	<p>COM-EMETER-A-20 / COM-EMETER-B-20 (optional) / JANITZA-SP (optional)</p> <p>The energy meter determines electric measured values at the point of interconnection and transmits the measured data to the System Manager.</p>
G	<p>Only in systems with more than one battery cabinet: DC distributor including circuit breaker as fuse protection for the battery system</p> <p>The DC distributor allows up to four battery cabinets to be connected to a battery inverter. The DC distributor contains the necessary fuse protection for the battery if there is more than one battery cabinet.</p>
H	<p>Optional: SMA Data Manager M (EDMM-10)</p> <p>Data logger for monitoring and controlling the system. In systems with more than ten devices, the SMA Data Manager performs the role of the System Manager.</p>

5.2 System overview

5.2.1 Sunny Tripower Storage X as System Manager

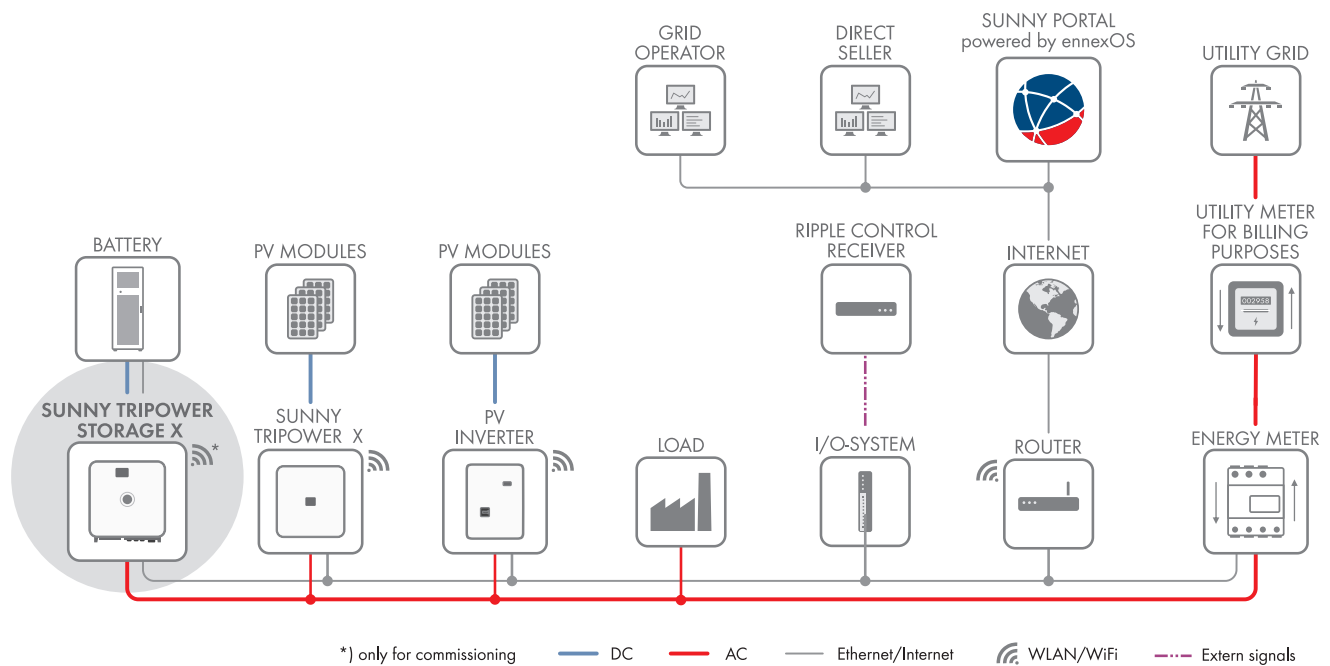


Figure 8: Sunny Tripower Storage X as System Manager (example)

5.2.2 Sunny Tripower Storage X with SMA DATA MANAGER M

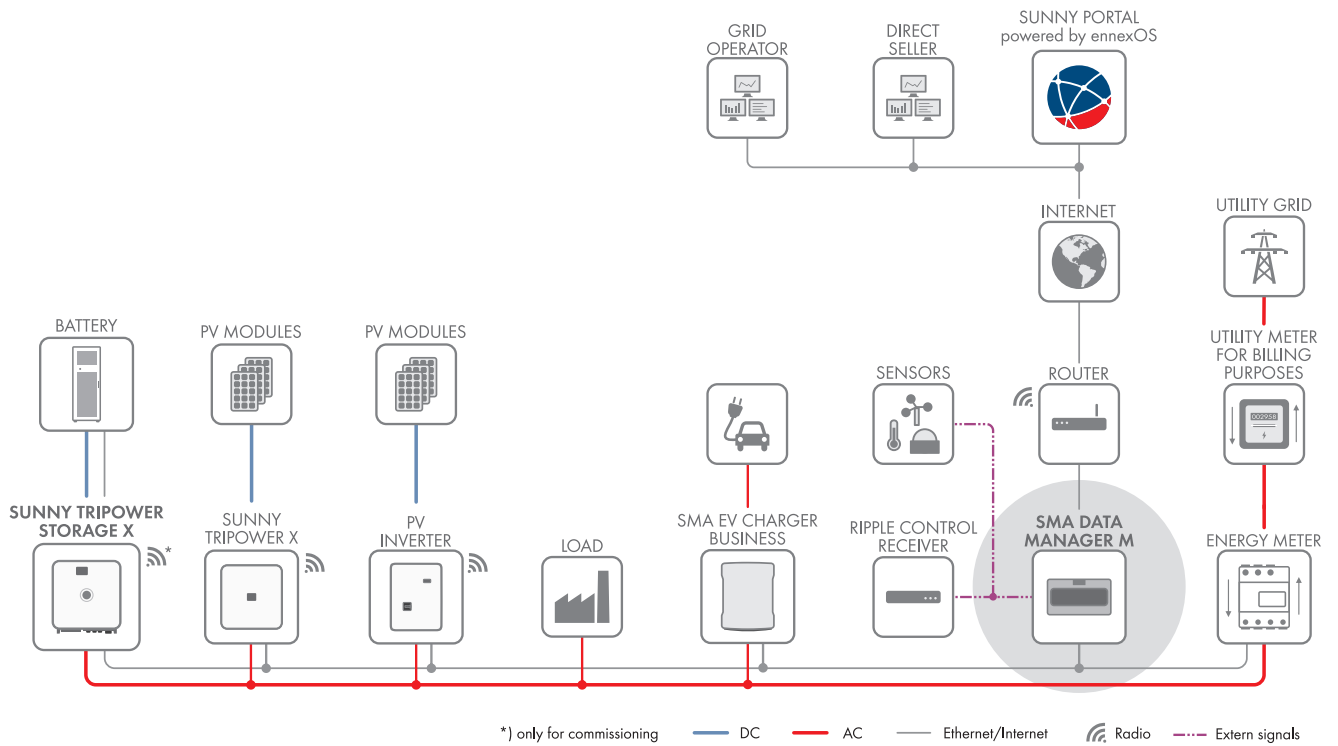


Figure 9: In preparation: Sunny Tripower Storage X with SMA DATA MANAGER M as System Manager (example)

5.3 Design of the Inverter

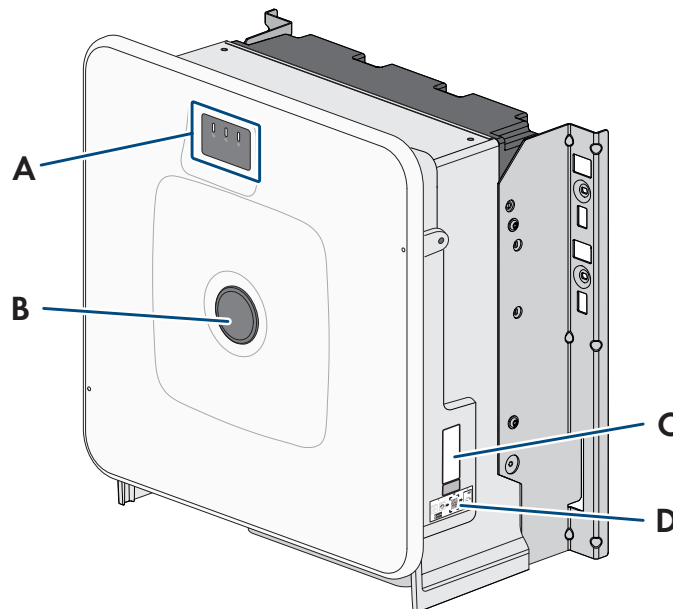


Figure 10: Design of the inverter

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.

Position	Designation
B	Cover
C	<p>Type label</p> <p>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:</p> <ul style="list-style-type: none"> • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Device-specific characteristics • 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
D	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via WLAN

5.4 Interfaces and Functions of the Inverter

5.4.1 Sunny Tripower Storage as System Manager

The Sunny Tripower Storage can be used as the system manager for energy management. When used as system manager, the Sunny Tripower Storage in conjunction with an energy meter can take over the closed-loop control at the point of interconnection and can open or closed-loop control subordinate devices (e.g. further Sunny Tripower Storage inverters). The System Manager also takes over system monitoring and communication to the Sunny Portal powered by ennexOS.

Also see:

- [System Limits](#) ⇒ page 187

5.4.2 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 106

5.4.3 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.

5.4.4 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 105](#)

5.4.5 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.

5.4.6 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
- Transmission of the control inputs of a ripple control receiver

5.4.7 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.

5.4.8 Communication with the SMA Data Manager M/L

The inverter can directly communicate with the SMA Data Manager M/L when the SMA Data Manager M/L is installed in the system. The SMA Data Manager M/L allows an intelligent energy management to optimize self-consumption and energy self-sufficiency of PV energy.

5.4.9 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).

5.4.10 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:

- [Home page of the energy management](#) ⇒ page 109

5.4.11 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:

- [Home page of the energy management](#) ⇒ page 109













5.5 LED Signals of the Inverter



The LEDs indicate the operating state of the inverter.

LED signal	Explanation
Green LED and red LED flash simultaneously (2 s on and 2 s off)	No country data set set Operation of the inverter is stopped because no country data set is set. 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 (2 s on and 2 s 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	Charging and discharge mode The inverter charges or discharges the battery in current-controlled operation (e.g. on the utility grid).
The green LED is off	No battery voltage
The red LED is glowing	Error Inverter operation has been stopped. In addition, a distinct event message and the corresponding event number will be displayed on the inverter user interface or in the communication product (e.g. SMA Data Manager).
Red LED is flashing (0.25 s on, 0.25 s off, 0.25 s on, 1.25 s off)	Warning Communication with a higher-level plant controller has failed. The inverter continues to operate with restricted function (e.g. with set fallback level). In addition, a distinct event message and the corresponding event number will be displayed on the inverter user interface or in the communication product (e.g. SMA Data Manager).
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.

LED signal	Explanation
The blue LED is glowing	There is an active connection with a local network (Ethernet/Wi-Fi) or there is a direct connection (Ethernet/Wi-Fi) with an end device (e.g. computer, tablet PC or smartphone).
Blue LED is off	There is no active connection.
All 3 LEDs are on	Inverter update or booting procedure

5.6 Symbols on the Inverter

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

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

5.7 Design of the Battery Cabinet

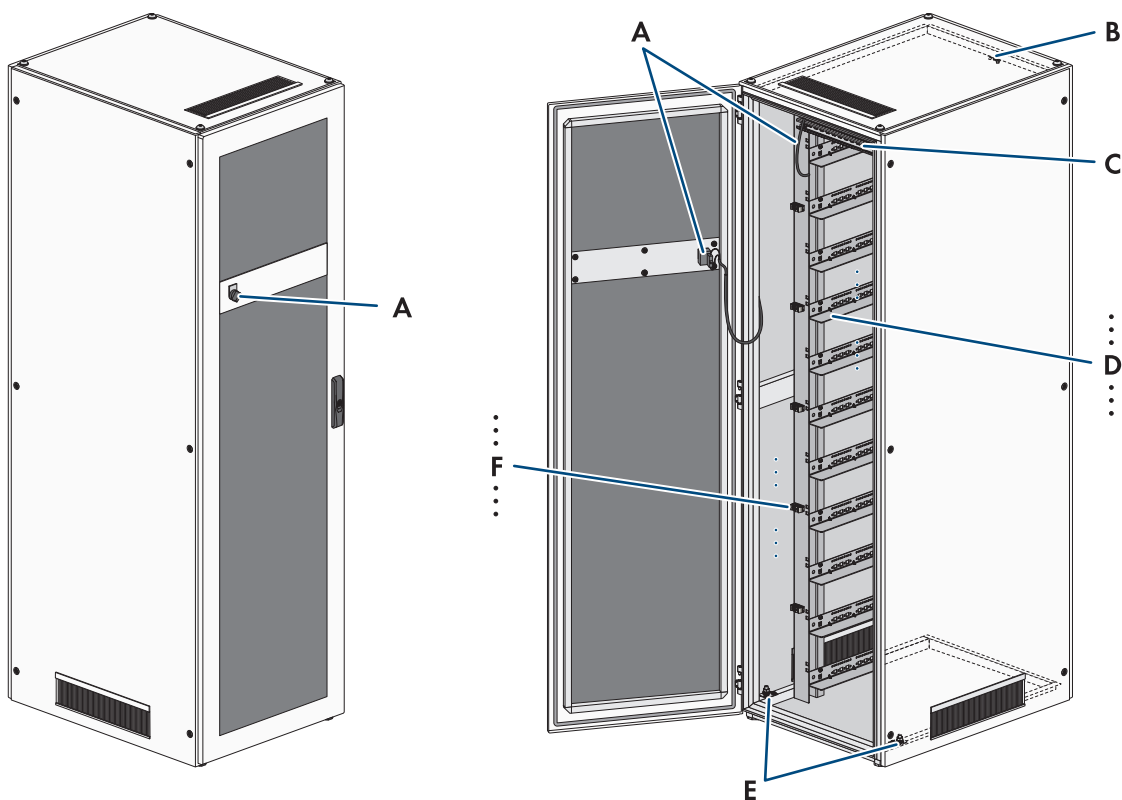


Figure 11: Design of the battery cabinet

Position	Designation
A	External switch with connection cable
B	Grounding point for the battery management system
C	C rail
D	Sliding rails

Position	Designation
E	Grounding points for the battery cabinet
F	Cable clamps

5.8 Modular Extension of the Battery

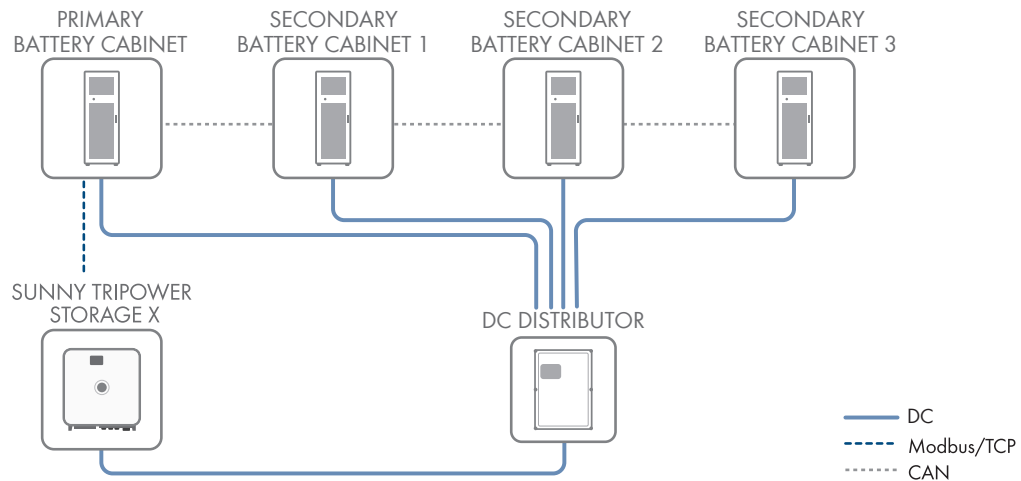


Figure 12: Modular design of the battery

The storage system can be extended both in terms of the energy content and the charging and discharging capacity. Take the specifications relating to the possible system configurations into account (see Technical Information "System Configuration - SMA Commercial Storage Solution").

The energy content can be extended by operating up to four battery cabinets via a common DC distributor and connecting them to the inverter. The battery management system of one battery cabinet controls and monitors the entire battery-storage system and thus acts as the primary battery cabinet. The battery management systems of the other battery cabinets act as secondary battery cabinets and follow the instructions of the primary battery cabinet.

Additional battery cabinets may be installed in this battery cabinet a maximum of six months after the battery cabinet is first commissioned.

The storage system can be extended in terms of the charging and discharging capacity by connecting a number of Sunny Tripower Storage X systems to an SMA Data Manager M via a local network. Observe the system limits of the Sunny Tripower Storage X.

Also see:

- [Defaults for Addresses and Terminators](#) ⇒ page 93
- [Overview of the CAN Communication System](#) ⇒ page 81
- [System Limits](#) ⇒ page 187

5.9 LED Signals of the Battery







The LED in the **SWITCH** control element on the battery management system indicates the battery operating state.

LED signal	Explanation
LED glowing	Battery is in operating mode (OK). Battery is activated and connected to the inverter.
LED off	Battery is deactivated.

LED signal	Explanation
LED flashing slowly	Battery is in commissioning mode (INIT). Battery is not connected to the inverter.
LED flashing quickly	Battery is in precharging mode (PRECH).

5.10 Symbols on the battery

Icon	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.
	Beware of electrical voltage The product operates at high voltages.
	Potentially explosive substances warning Improper handling or fire can cause the product to ignite or explode.
	Corrosive substances warning The product contains corrosive substances that can cause severe injury if they come into direct contact with the skin.
	No open flame Handling an open flame and sources of ignition is forbidden in the immediate vicinity of the product.
	Do not insert objects into openings Objects, e.g., screwdrivers, must not be inserted into openings in the product.
	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. Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document.
	Observe the documentations Observe all documentations supplied with the product.
	Use eye protection Wear eye protection for all work on the device.
	First aid If electrolyte or vapors get onto the skin or into the eyes, perform first aid measures and consult a doctor without delay.

Icon	Explanation
	<p>Eye rinsing</p> <p>In case of contact with spilled electrolyte, rinse off the electrolyte immediately. If spilled electrolyte gets into the eye, rinse the affected eye immediately with lots of water. Rinse under the eyelids as well.</p>
	<p>WEEE designation</p> <p>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.</p>
	<p>Recycle the entire battery system including all components.</p>
	<p>Recycling lithium-ion batteries</p> <p>Never dispose of the battery modules as household waste – recycle them.</p>
	<p>CE marking</p> <p>The product complies with the requirements of the applicable EU directives.</p>
	<p>UKCA marking</p> <p>The product complies with the regulations of the applicable laws of England, Wales and Scotland.</p>

6 Transporting the battery

⚠ QUALIFIED PERSON

This section contains safety information that must be observed at all times when transporting the battery.

⚠ WARNING

Risk of injury due to the weight of the battery components

Injuries may result if the battery components are lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery components carefully. Take the weight of each individual component into account.
- Transport battery components individually only.
- Wear suitable personal protective equipment, at a minimum safety footwear with a non-slip sole and steel cap, for all work on the battery.

⚠ CAUTION

Risk of injury due to inappropriate transport of the battery cabinet

Inappropriate transport or insufficient transport securing devices can cause the battery cabinet to slip or tip over. The battery cabinet can cause injuries if it slips or tips over during transport.

- Transport and lift the battery cabinet carefully. Take the weight of the battery cabinet into account.
- Wear suitable personal protective equipment, at a minimum safety footwear with a non-slip sole and steel cap, for all work on the battery.
- Position the battery cabinet upright in the vehicle and prevent it from slipping.
- Secure the battery cabinet against slipping and tipping over with restraining straps.

NOTICE

Damage to the battery due to transporting the battery cabinet with battery modules installed

Transporting the battery cabinet with battery modules installed can cause mechanical overload. Mechanical overload can damage the battery.

- Always transport the battery cabinet and battery modules separately.
- Never move the battery cabinet with battery modules installed.

i Transport and installation with at least two people

The battery components weigh up to 150 kg and therefore are not suitable for transport by one person.

- Transport and install the battery components with at least two people.
- Use suitable transport means of transport, e.g., hand truck or crane. Do not damage the enclosure of the battery components.

All requirements of the Dangerous Goods Ordinance on Road, Rail, and Inland Navigation and the Convention on the International Carriage of Dangerous Goods by Road must always be complied with:

- Only trained and instructed personnel are allowed to transport the battery modules on public roads. The instruction must be documented and repeated.
- Smoking is not permitted in the vehicle during the journey.
- Smoking is not permitted in the vehicle itself or in the immediate vicinity during loading and unloading.
- Two tested fire class D metal fire extinguishers (minimum capacity 2 kg) and one set of hazardous goods equipment in accordance with the Convention on the International Carriage of Dangerous Goods by Road must be carried in the vehicle.

- The outer packaging of the battery module must not be opened during transport.

Also see:

- [Storage](#) ⇒ page 182

7 Mounting and Preparing the Connection

7.1 Requirements for Mounting

7.1.1 Product Mechanical Data

Product	Dimensions	Weight	Operating temperature
Inverter: STPS30-20	1150 mm x 850 mm x 630 mm	97 kg ⁴⁾ 104 kg ⁵⁾	-25 °C to +60 °C
Inverter: STPS50-20	1150 mm x 850 mm x 630 mm	97 kg ⁴⁾ 104 kg ⁴⁾	-25 °C to +60 °C
Battery cabinet: STOR-RACK-6-20 (configured with four to six battery modules)	608 mm x 1400 mm x 990 mm	119 kg ⁶⁾ 356 kg ⁷⁾	0 °C to 50 °C ⁸⁾
Battery cabinet: STOR-Rack-10-20 (configured with seven to ten battery modules)	608 mm x 2008 mm x 990 mm	150 kg ⁶⁾ 555 kg ⁷⁾	0 °C to 50 °C ⁸⁾
Battery module (mounted in battery cabinet)	-	56 kg	0 °C to 50 °C ⁸⁾
Battery management system (mounted in battery cabinet)	-	13 kg	0 °C to 50 °C ⁸⁾
Energy meter: COM-EMETER-A-20 ⁹⁾	88 mm x 70 mm x 65 mm	< 0.2 kg	-15 °C to +55 °C
Energy meter: COM-EMETER-B-20 ⁹⁾	88 mm x 70 mm x 65 mm	< 0.2 kg	-15 °C to +55 °C
Energy meter: JANITZA-SPJANITZA-S ⁹⁾	107.5 mm x 90 mm x 82 mm	0.35 kg	-10 °C to +55 °C
DC distributor: BatBreaker (only if there is more than one battery cabinet)	360 mm x 540 mm x 171 mm	approx. 4.54 kg	-25 °C to +40 °C

7.1.2 Installation Plans

i Do not place a battery cabinet under an inverter

If a battery cabinet is placed under an inverter, the waste heat produced by the battery inverter may be blown behind the battery cabinet. It is therefore not permitted to place a battery cabinet under an inverter.

⁴⁾ Without enclosure cover and connecting plate

⁵⁾ With enclosure cover and connecting plate

⁶⁾ Without battery management system and without battery modules

⁷⁾ With battery management system and with maximum number of battery modules

⁸⁾ Operating temperature for 10 year capacity warranty: 10 °C to 45 °C

⁹⁾ Depending on order option

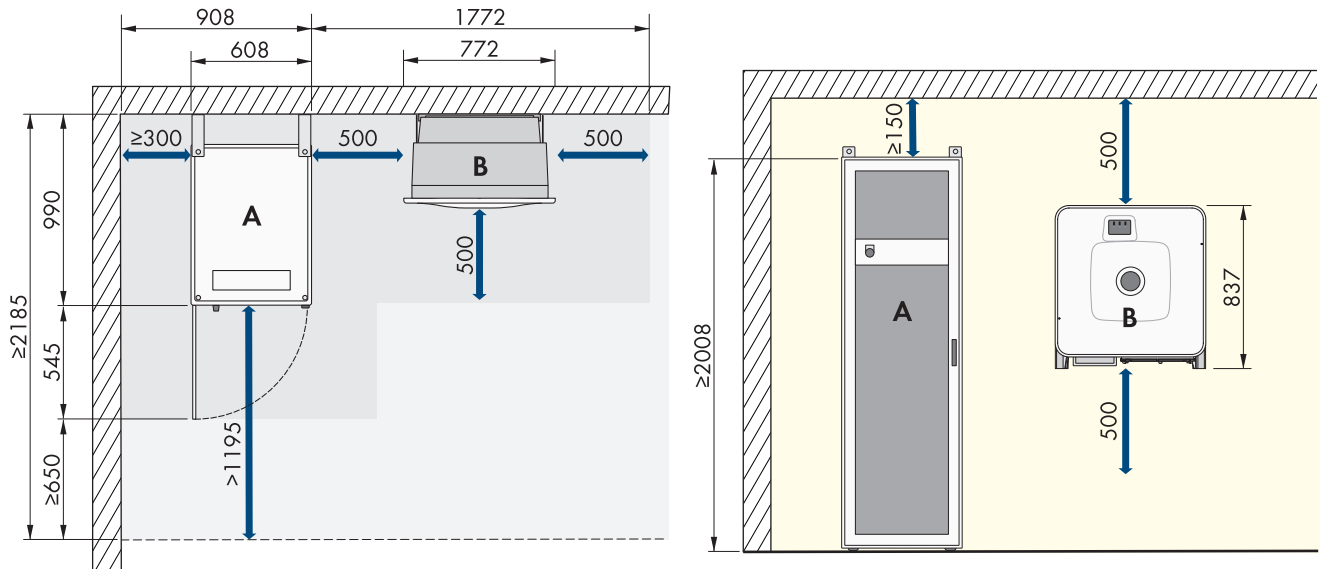


Figure 13: Example for installation of a system with one battery cabinet

The standard system configuration uses cable lengths of 5 m.

Position	
A	Battery cabinet
B	Battery inverter

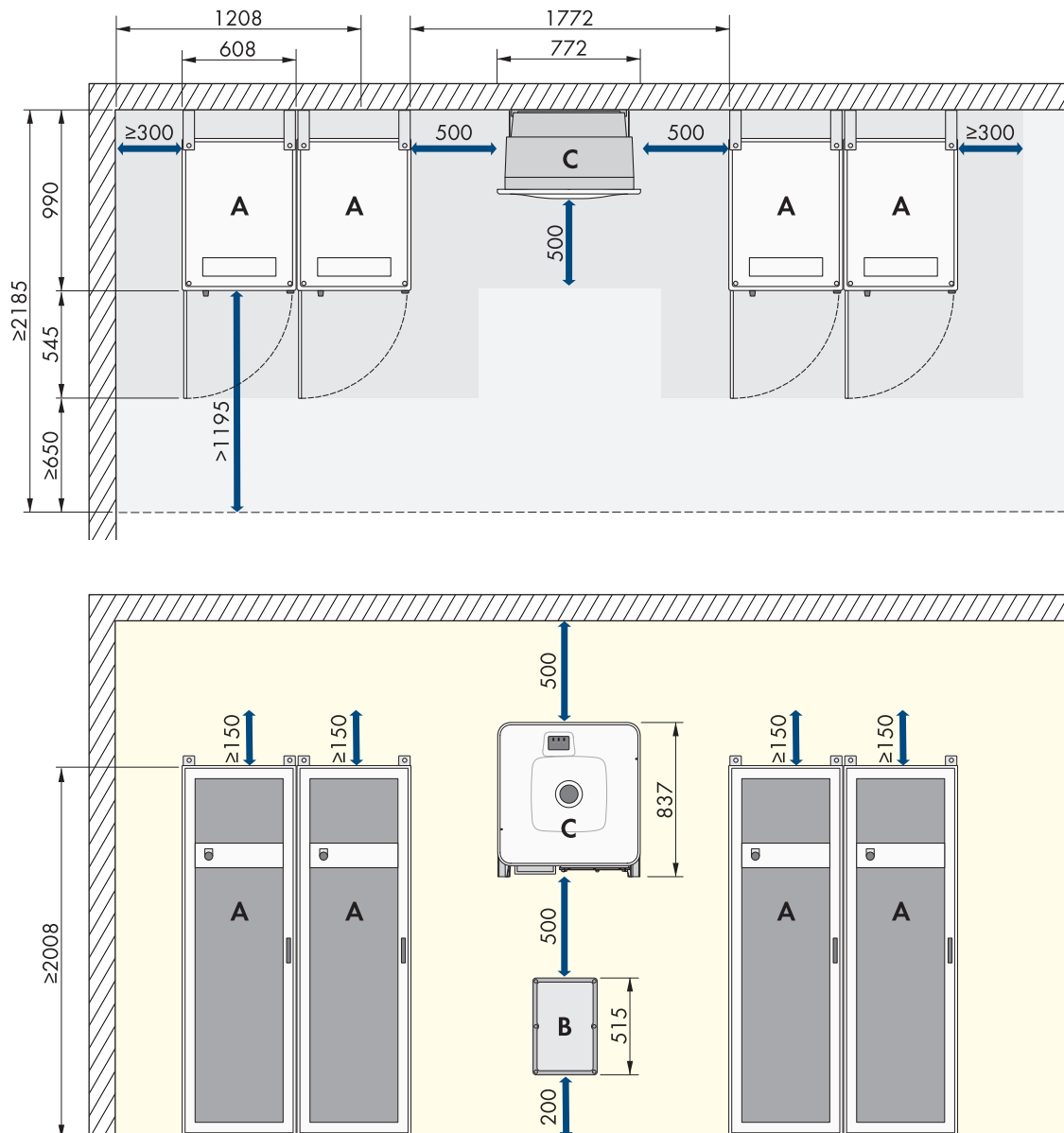


Figure 14: Example for installation of a system with four battery cabinets

Position	
A	Battery cabinet
B	DC distributor
C	Battery inverter

In a system configuration with a number of battery cabinets, it is recommended to install the DC distributor centrally between the battery cabinets so that the DC cables to each battery cabinet can be kept as short as possible and the same length. Take the length of the supplied DC cables into account.

Up to four battery cabinets can be placed directly next to each other without any clearance required between them. If more than four battery cabinets are to be placed beside each other, a minimum clearance of 600 mm to the next battery cabinet must be observed after four battery cabinets.

7.1.3 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.

7.1.4 Permitted and Prohibited Inverter 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.

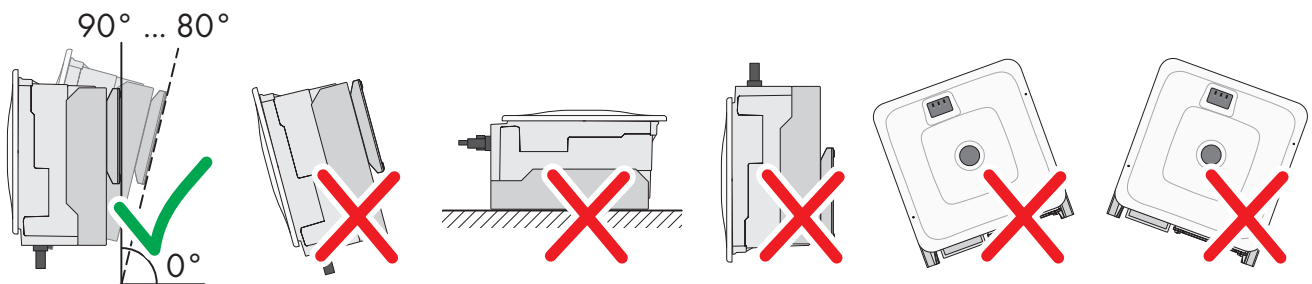


Figure 15: Permitted and prohibited mounting positions

7.1.5 Inverter Mounting Dimensions

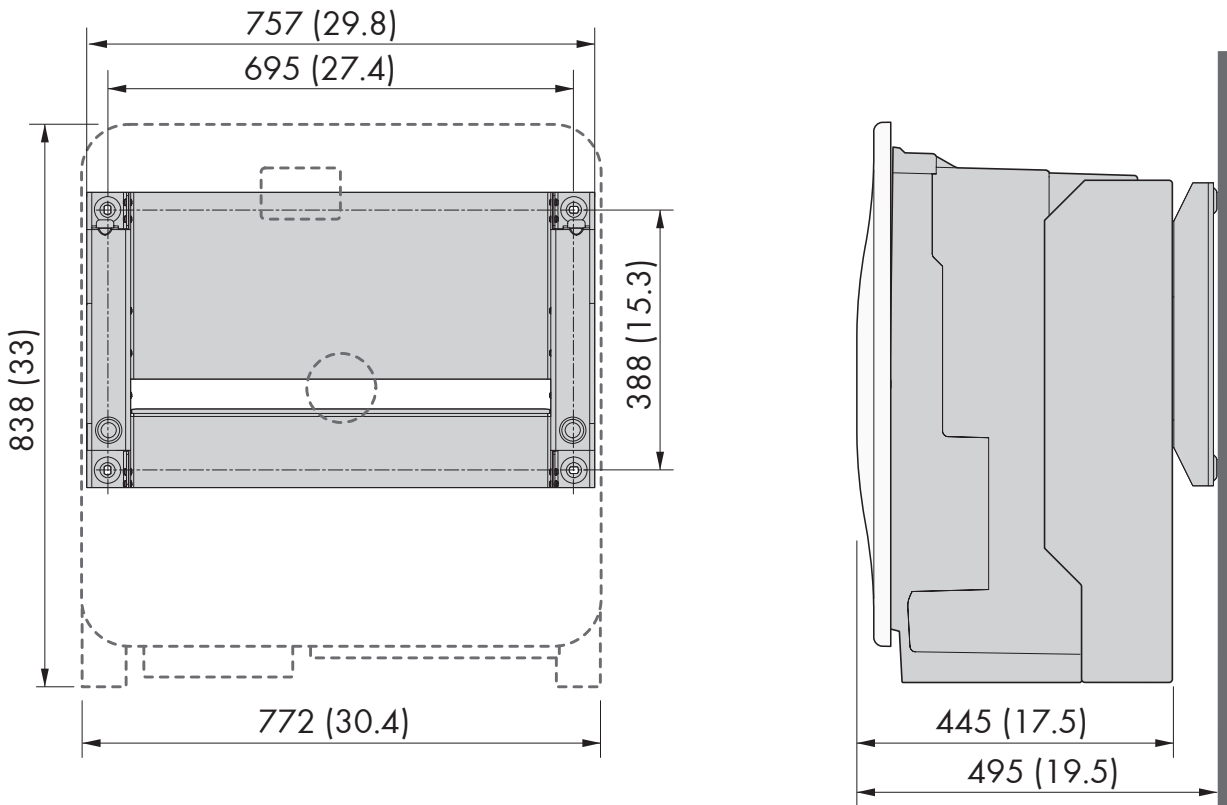


Figure 16: Position of the anchoring points (dimensions in mm (in))

7.1.6 Recommended Inverter Mounting Clearances

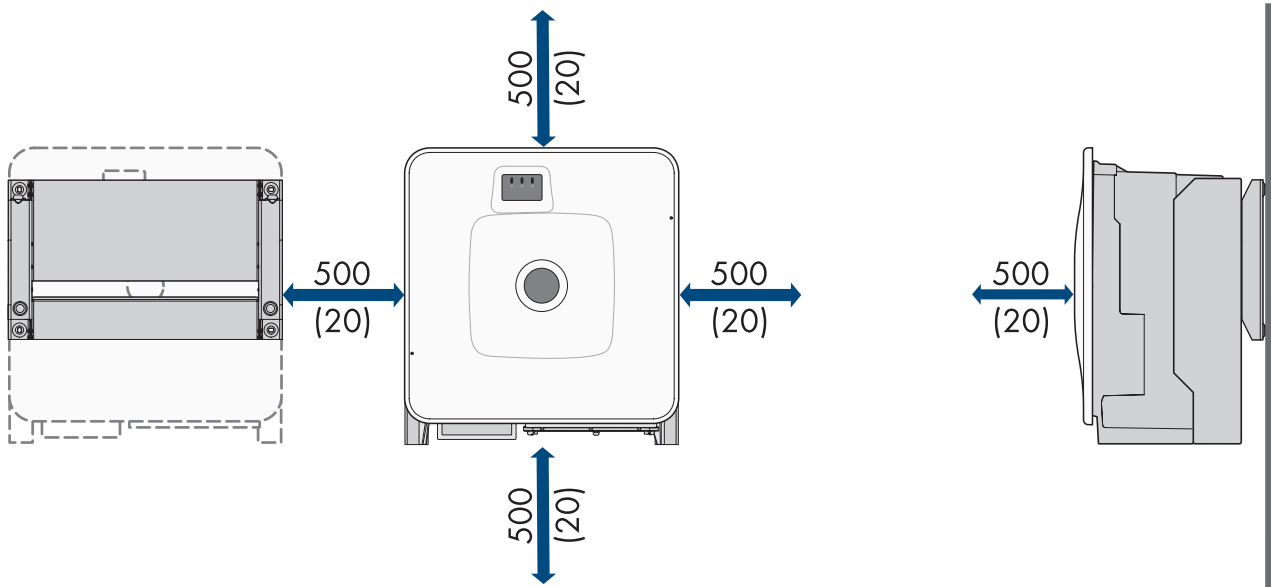


Figure 17: Recommended clearances (dimensions in mm (in))

7.1.7 Requirements for the Battery Installation Site

⚠ 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.

- The mounting location must be suitable for the weight and dimensions of the product.
- The surface at the installation site must be sufficiently dry, horizontal and flat.
- The installation site can be exposed to direct solar irradiation.
- There must be no heat sources in the immediate vicinity of the installation site.
- All ambient conditions must be met.
- A homogeneous temperature distribution within the battery room must be guaranteed.
- The installation site must be less than 2000 m above mean sea level. If you would like to use the battery at altitudes above 2000 m, contact Service.
- The installation site must be in a fire-protected room in accordance with IEC 62619. The fire-protected room must be equipped with an independent fire alarm unit in accordance with local regulations and industry standards and be free of fire loads. The room must be separated from other rooms by at least class T60 fire doors and class F60 fire walls.
- On flood plains, the installation site must be elevated and always protected from contact with water.
- The installation site must meet the requirements of the local fire protection regulations.
- During transport, the available height must always be greater than the tilt dimension of the battery cabinet.

7.1.8 Battery Cabinet Mounting Dimensions

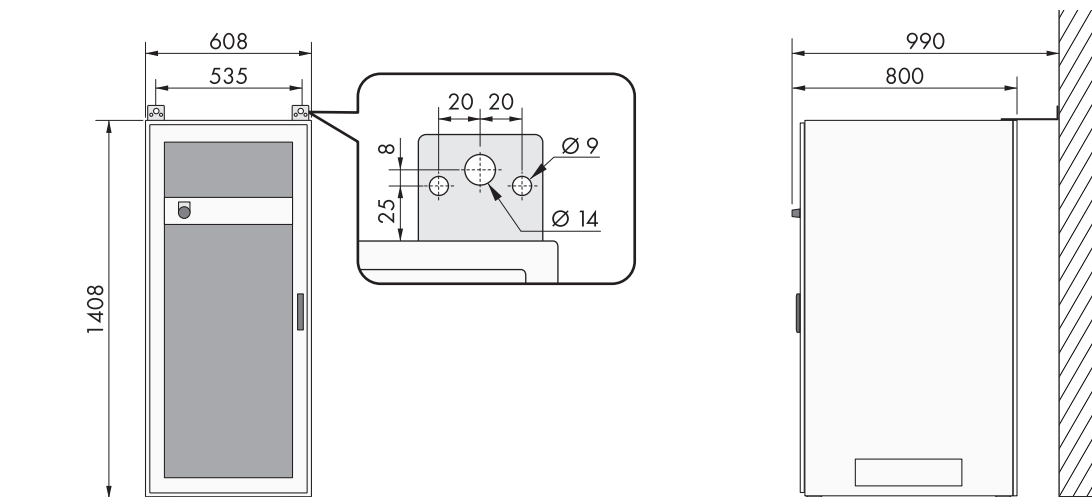


Figure 18: **Storage-30-20**: Battery cabinet mounting dimensions

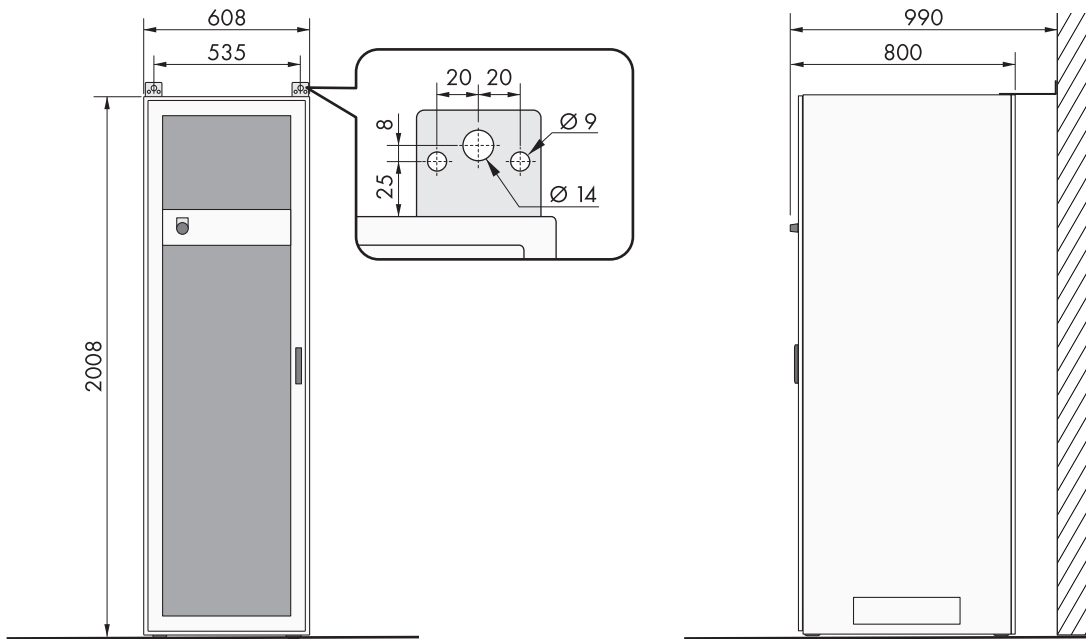


Figure 19: Storage-50-20: Battery cabinet mounting dimensions

7.1.9 Recommended Battery Mounting Clearances

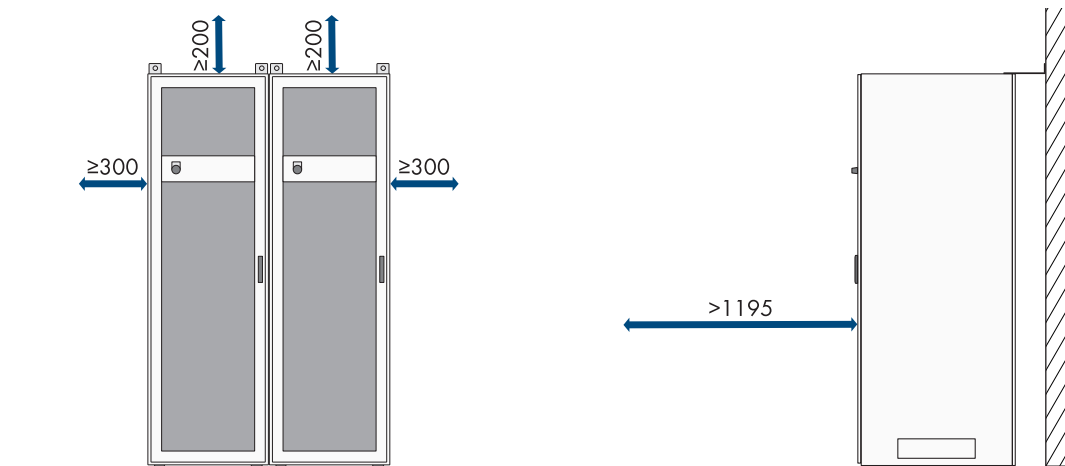


Figure 20: Recommended battery cabinet clearances

7.1.10 Requirements for the Temperature and Humidity Sensor Installation Site

⚠ WARNING

Danger to life due to fire or explosion

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

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

- A temperature and humidity sensor must be installed wherever a battery cabinet is installed.
- Clearance between temperature and humidity sensor and battery cabinet: 1 m to 5 m
- Clearance between temperature and humidity sensor and mains connection (AC 230 V): < 1200 mm
- There must be no electrical devices at the temperature and humidity sensor installation site.
- There must be no heat and cold sources at the temperature and humidity sensor installation site.

7.2 Inverter Connecting Plate

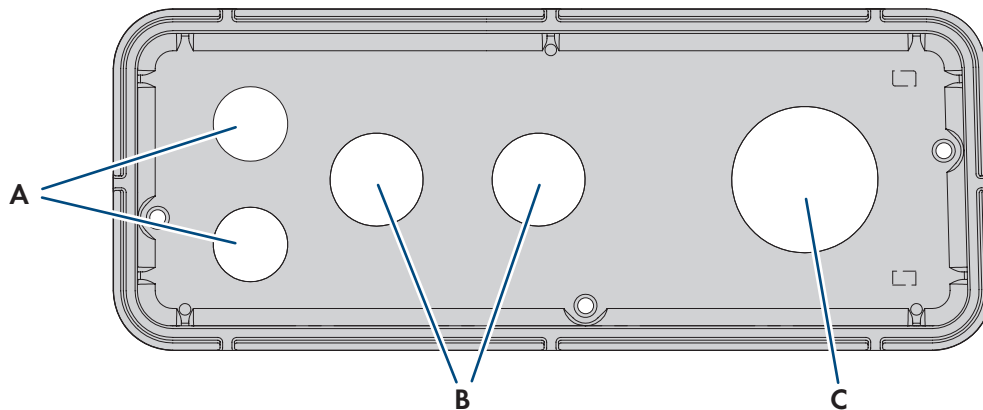


Figure 21: Position of enclosure openings

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

7.3 Inverter Center of Gravity

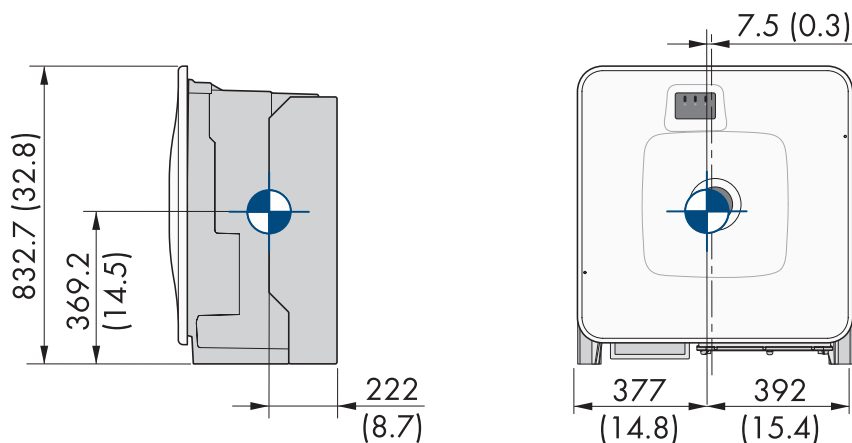


Figure 22: Dimensions of the center of gravity of the product (dimensions in mm (in))

7.4 Mounting Procedure

This section describes the procedure for mounting the components of an SMA Commercial Storage Solution. It provides an overview of the steps, which must be performed in the prescribed sequence.

Procedure	See
1. Prepare for mounting and connection of the inverter	Section 7.5.1, page 50
2. Mounting the Inverter	Section 7.5.2, page 51
3. Install the battery cabinet	Section 7.6.1, page 54
4. Mount the battery management system	Section 7.6.2, page 55
5. Mount the battery modules	Section 7.6.3, page 57

Procedure		See
6.	Mount the supplied temperature and humidity sensor	See manual for the temperature and humidity sensor
7.	Mount the supplied energy meter	See manual for the energy meter
8.	Mount the supplied DC distributor	Section 7.7, page 58

7.5 Mounting the Inverter

7.5.1 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.

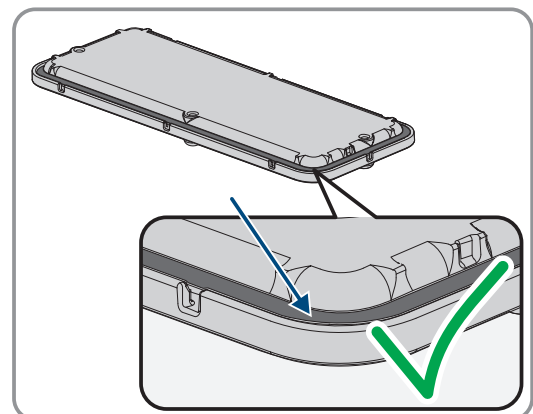
- Do not touch non-insulated parts or cables.
- Disconnect the AC circuit breaker and secure it against reconnection.
- Disconnect the battery from the inverter via the load-break switch of the battery fuse. To do this, turn off the load-break switch of the battery fuse and secure against reconnection.
- Wear suitable personal protective equipment for all work on the product.

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

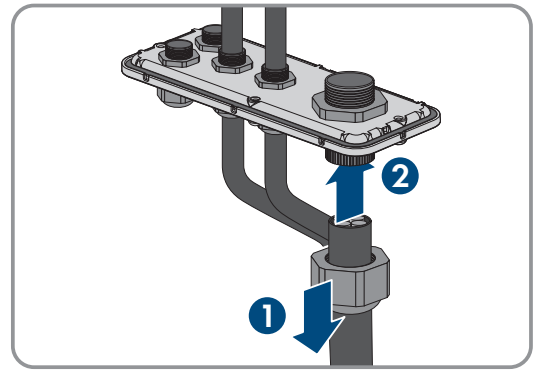
- At least 4 screws that are suitable for the support surface.
- At least 4 washers that are suitable for the screws.
- At least 4 screw anchors that are suitable for the support surface and the screws.

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. Ensure on the connection plate that the seal is present and undamaged.



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



7. Attach the cable glands to the connecting plate.

8. Remove the mounting template.

9. Mount the product (see Section 7.5.2, page 51).

Also see:

- Requirements for the mounting location of the inverter ⇒ page 45
- Permitted and Prohibited Inverter Mounting Positions ⇒ page 45
- Inverter Mounting Dimensions ⇒ page 46
- Recommended Inverter Mounting Clearances ⇒ page 46
- Inverter Center of Gravity ⇒ page 49
- Inverter Connecting Plate ⇒ page 49

7.5.2 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 the weight of the inverter

Injuries may result if the inverter is lifted incorrectly or dropped while being transported or when mounting it to the wall mounting bracket.

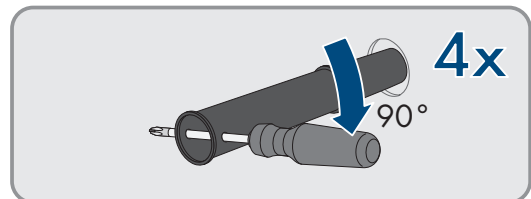
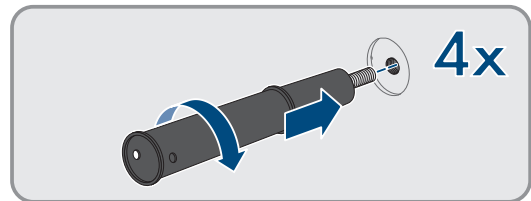
- Transport and lift the inverter carefully. In doing so, keep in mind the weight of the inverter.
- Wear suitable personal protective equipment for all work on the product.
- Transport the inverter using the carrying handles or hoist. In doing so, keep in mind the weight of the inverter.
- Use all carrying 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 inverter to attach the hoist system.

Requirements:

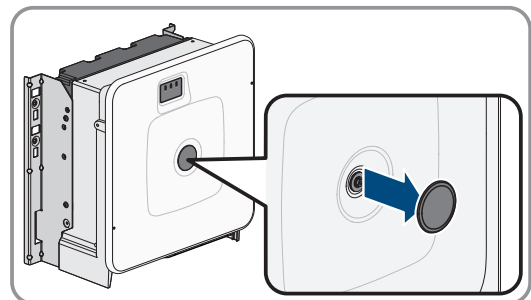
- Mounting and connection are prepared (see Section 7.5.1, page 50).

Procedure:

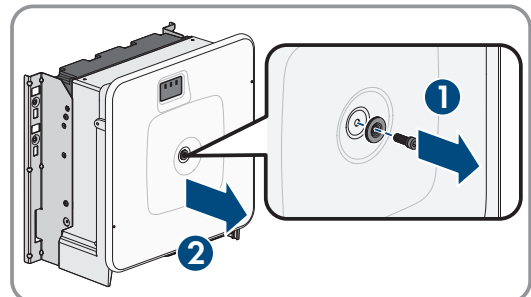
1. Screw the transport handles as far as they will go into the tapped holes on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the transport handles are screwed into the tapped holes so that they are perfectly straight. If the transport handles are not screwed in straight, this can make it more difficult or even impossible to unscrew them later on and can damage the tapped holes to the extent that transport 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 hoist must be suitable to take the weight of the inverter.
4. Remove the cover from the enclosure lid.

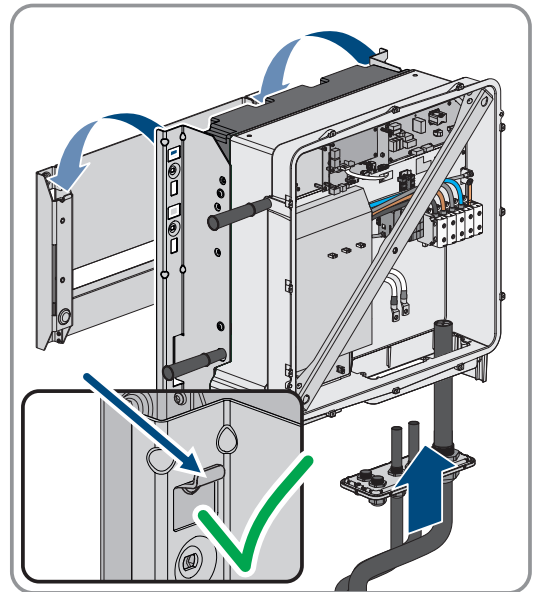


5. Unscrew the screw on the enclosure lid (hex socket, AF8) and remove the enclosure lid.

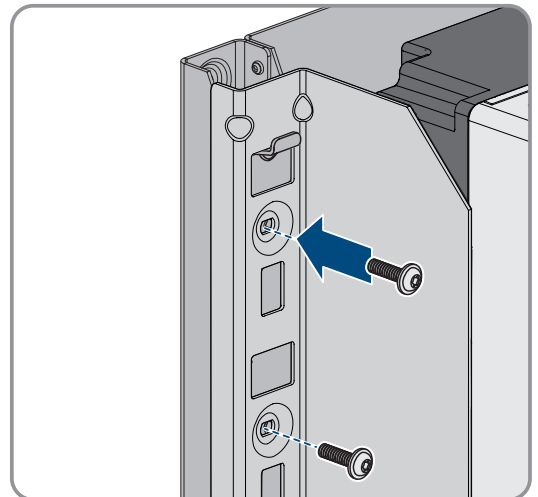


6. Set the cover, screw with seal, washer with seal and enclosure lid aside and store safely.

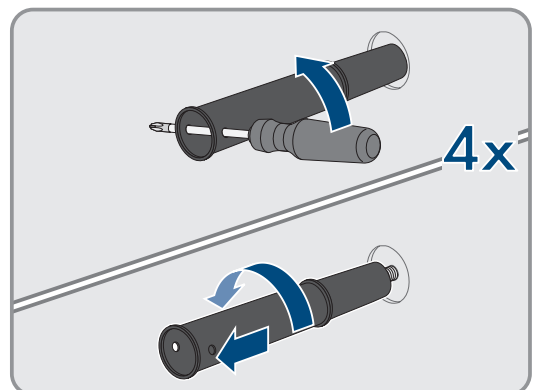
7. Hook the product into the wall mounting bracket. To do this, guide the product over the cables and the connecting plate so that the cables protrude through the opening into the product and the connecting plate sits under the opening. The bracket must protrude through the upper opening.



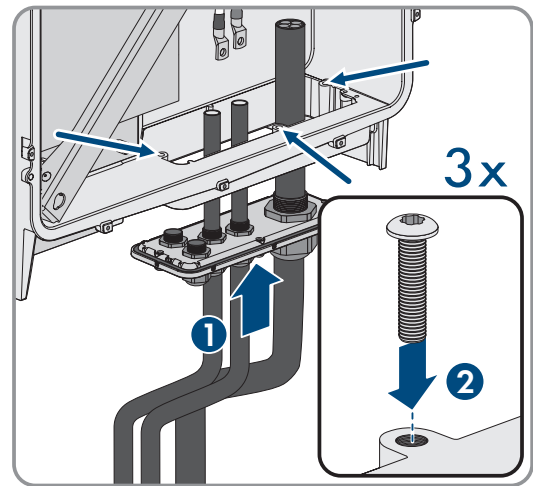
8. Secure the product with 2 screws each on the right and left on the wall mounting bracket (M8x25, TX40, 12 Nm \pm 2 Nm).



9. 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.



10. Fasten the connecting plate to the enclosure using three screws (M8x70, TX40, torque: $8 \text{ Nm} \pm 0.5 \text{ Nm}$).



Also see:

- Inverter Center of Gravity ⇒ page 49

7.6 Mounting the Battery

7.6.1 Positioning the battery cabinet

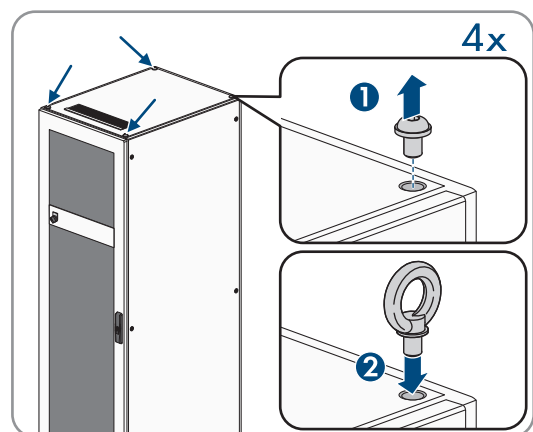
⚠ QUALIFIED PERSON

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

- Two suitable screw anchors for attaching the battery cabinet to the wall
- Two suitable screws for attaching the battery cabinet to the wall

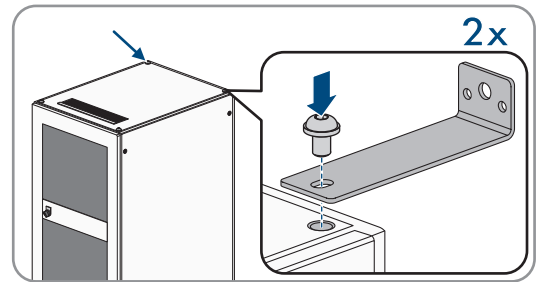
Procedure:

1. At the desired installation site, mark two drill holes for attaching the battery cabinet to the wall.
2. Drill holes at the marked positions.
3. Use screw anchors that are suitable for the support surface.
4. Remove packaging and transport locks from the battery cabinet.
5. To transport the battery cabinet with a crane, remove the four fastening screws (TX55) on the cabinet cover and attach the four supplied eye bolts to the battery cabinet.

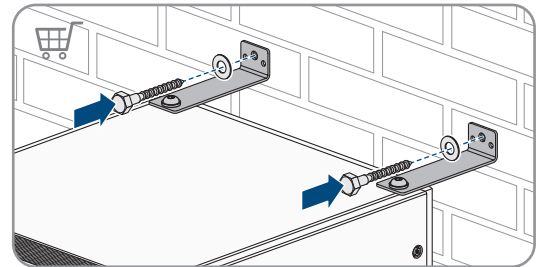


6. Transport the battery cabinet to the desired installation site.
7. If eye bolts are installed, remove them and reinsert the two fastening screws on the front of the cabinet (TX55).

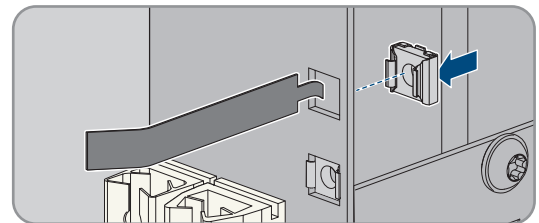
8. Attach the supplied fixing brackets to the cabinet cover. Use two of the four fastening screws on the cabinet cover for this.



9. Tighten all fastening screws on the cabinet cover (TX55, torque: 20 Nm to 35 Nm).
10. Attach the battery cabinet fixing brackets to the wall. Use two screws suitable for the mounting base for this.



11. For each mounting level in the battery cabinet, attach four of the supplied cage nuts to the sliding rails.



12. Attach the type label to a side panel on the battery cabinet where it will be clearly visible.
13. Attach the battery room label to the access door for the battery room where it will be clearly visible.

Also see:

- Transporting the battery ⇒ page 40
- Requirements for the Battery Installation Site ⇒ page 47
- Recommended Battery Mounting Clearances ⇒ page 48
- Battery Cabinet Mounting Dimensions ⇒ page 47

7.6.2 Installing the battery management system

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life due to electric shock due to touching live components or cables with insufficient or no grounding

If there is insufficient or no earthing, high voltages can be present at the battery cabinet enclosure in the event of a fault. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Earth the battery cabinet.
- Earth the battery management system during installation.

i Performing system registration

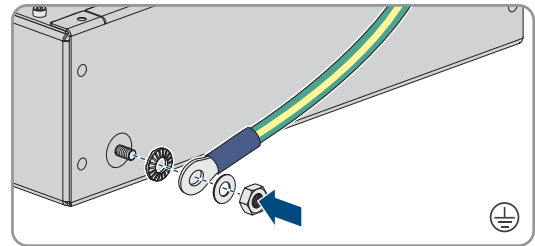
To complete commissioning, a system registration must be performed

- Use the following link for the system registration: <https://my.sma-service.com/>.

Procedure:

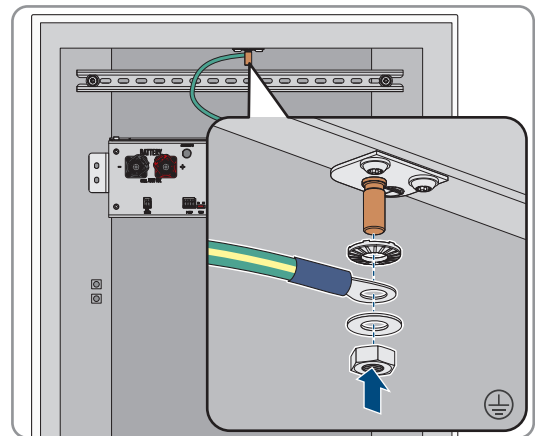
1. Before mounting the battery management system, record its serial number in the commissioning report. The serial number can be found on a label on the bottom of the battery management system.

2. To ground the battery management system, attach the supplied battery management system grounding cable to the grounding bolt on the back of the battery management system. To do this, fasten the M6 terminal lug in place. (Tool: hexagon socket, AF10, torque: 6 Nm).

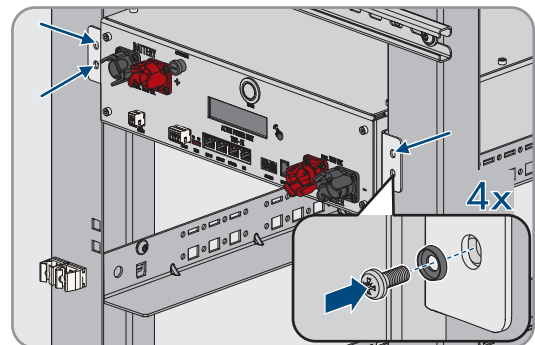


3. Insert the battery management system at the topmost sliding rail in the battery cabinet. Slide in the battery management system carefully so the preassembled cage nuts do not become dislodged.

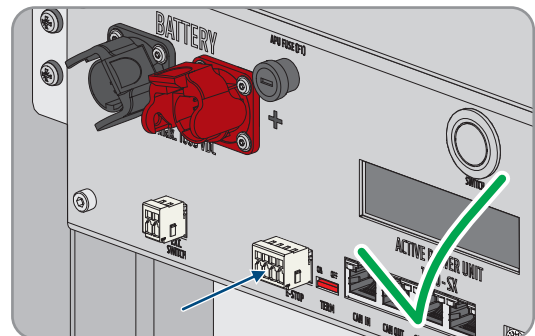
4. Attach the grounding cable to the grounding point for the grounding cable. To do this, fasten the M8 terminal lug in place (hexagon socket, AF13, torque: 8 Nm).



5. Fasten the battery management system in place at the preassembled cage nuts (PH2, torque: 3 Nm). Use four of the supplied flat head screws and four of the supplied plastic washers for this.



6. Ensure that the 4-pole connector for the E-STOP connection on the battery management system is plugged in for operation. The battery management system will not work without this connector.

**Also see:**

- Earthing the battery cabinet ⇒ page 79
- Design of the Battery Cabinet ⇒ page 36

7.6.3 Installing the battery modules

⚠ QUALIFIED PERSON

NOTICE

Potential for damage to sliding rails and cage nuts due to battery modules

The battery modules can knock against sliding rails and cage nuts when inserting the battery modules into the battery cabinet. This can damage the sliding rails. The cage nuts can become loose and fall down.

- Always move the battery modules slowly and carefully when inserting them into the battery cabinet.

NOTICE

Potential for damage to battery modules due to incorrect insertion of battery modules

The weight of a battery module may lead to a mechanical overload of another battery module. This overload will result in damage to the battery module.

- Never rest battery modules on already mounted battery modules during installation.
- Use a suitable lifting aid to mount the battery modules.

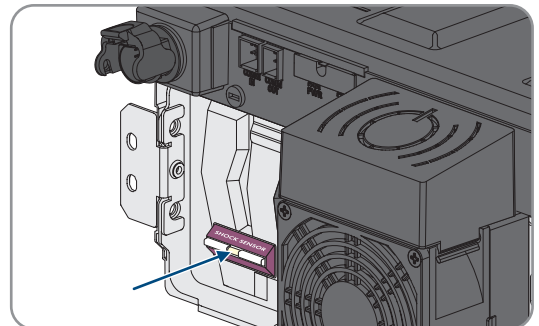
i Performing system registration

To complete commissioning, a system registration must be performed

- Use the following link for the system registration: <https://my.sma-service.com/>.

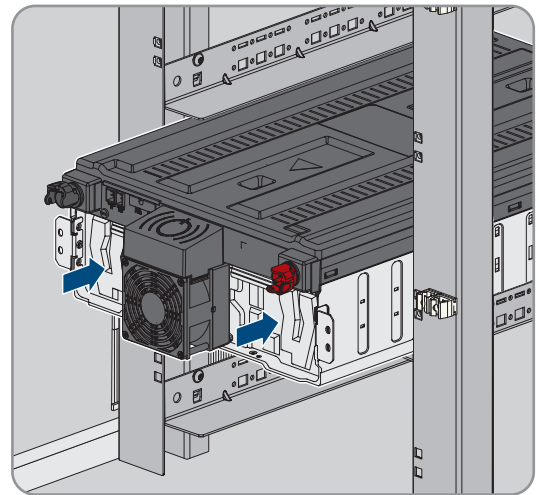
Procedure:

1. Before mounting the battery modules, record their serial numbers in the commissioning report. The serial numbers can be found on labels on the bottom of the battery modules.
2. On each battery module, check whether the shock sensor on the front of the battery module has tripped. Tripping of the shock sensor is indicated by a red color in the indication panel.

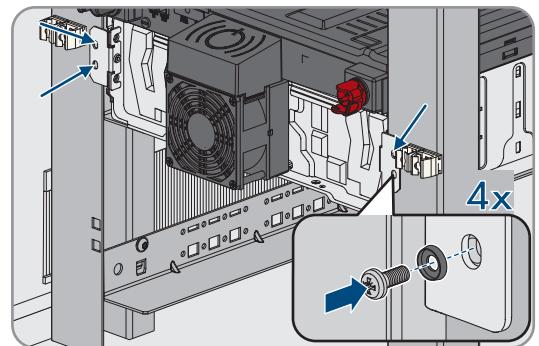


3. If the shock sensor on a battery module has tripped, document the battery module condition using photographs and contact Service. Do not install the affected battery module.
4. By measuring the voltage at **-POL** and **+POL**, verify whether the DC output voltage of each battery module is between 78.4 V and 78.6 V.
5. If the DC output voltage of a battery module is not between 78.4 V and 78.6 V, contact Service. Do not use the affected battery module under any circumstances.

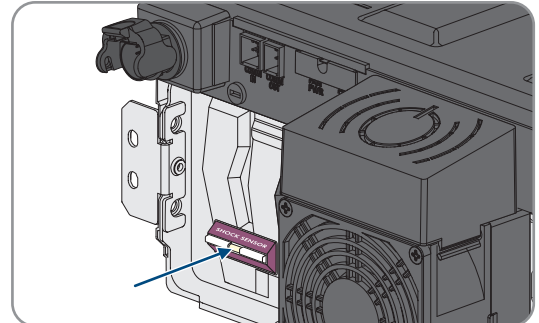
6. Determine the lowermost mounting level for inserting the first battery module. Note that the battery modules are mounted one below the other in the battery cabinet. The final battery module is mounted directly under the battery management system.



7. Insert the first battery module in the two sliding rails of the lowermost mounting level. Slide in the battery module carefully so the preassembled cage nuts do not become dislodged.
8. Fasten the first battery module in place at the preassembled cage nuts (PH2, torque: 3 Nm). Use four of the supplied flat head screws and four of the supplied plastic washers for this.



9. On the first battery module, check once again whether the shock sensor on the front of the battery module has tripped. Tripping of the shock sensor is indicated by a red color in the indication panel.



10. If the shock sensor on the first battery module has tripped, document the battery module condition using photographs and contact Service. Do not install this battery module.
11. Mount the rest of the battery modules, working from the bottom to the top. Proceed as described for the first battery module.

7.7 Mounting the DC Distributor

Up to four battery cabinets can be connected to one inverter. In systems with more than one battery cabinet, the DC cables of the individual battery cabinets must be connected to the DC distributor. The DC distributor is connected to the battery inverter.

⚠ CAUTION

Risk of injury due to weight of product

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

- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.

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

- Four screws, washers and fastening material suitable for the support surface

Procedure:

1. Pick a suitable position for mounting the DC distributor. Take the minimum clearances specified in the installation plan and the length of the supplied DC cables into account.
2. Mark the position of the four drill holes and drill the holes. Use the recesses for the upper wall mounting brackets and the holes for the lower wall mounting brackets.
3. If necessary, provide the 4 drill holes with suitable screw anchors.
4. Mount the DC distributor on the wall.
5. Ensure that the DC distributor is firmly attached.

Also see:

- [Installation Plans](#) ⇒ page 42

8 Electrical Connection

8.1 Wiring Overview with One Battery Inverter

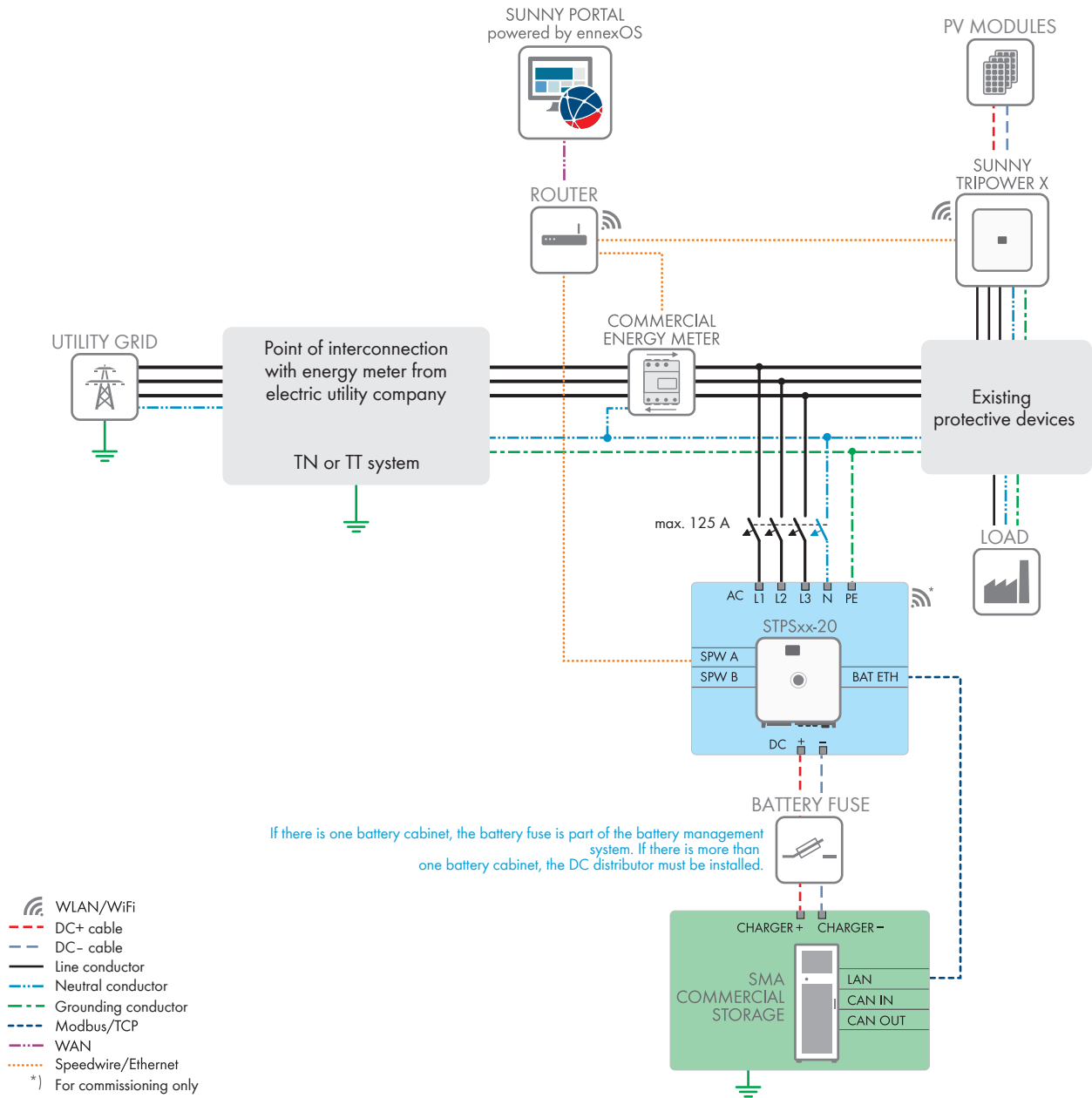


Figure 23: SMA Commercial Storage Solution with one battery inverter and one battery cabinet (example)

8.2 Wiring Overview with Two Battery Inverters

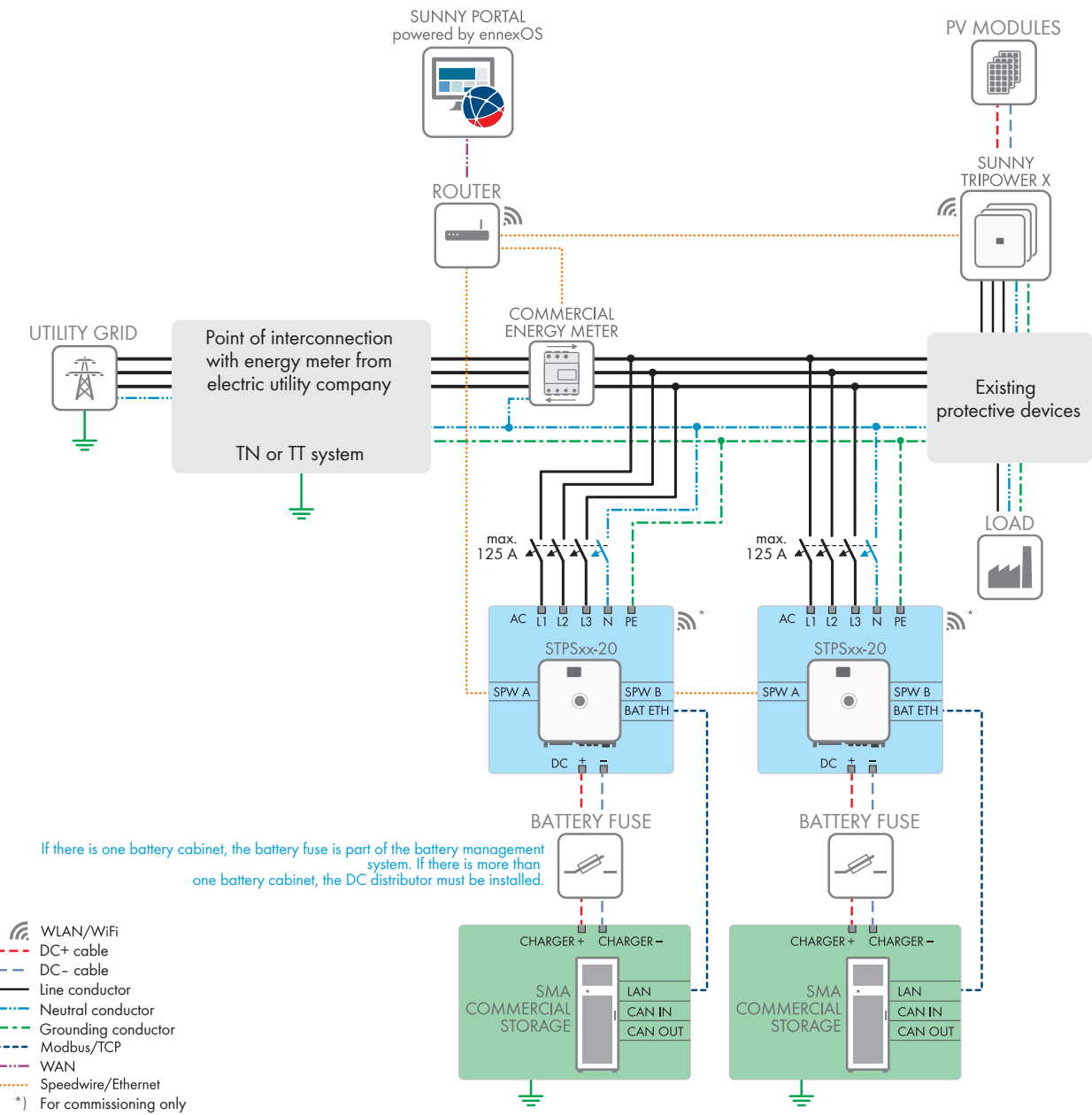


Figure 24: SMA Commercial Storage Solution with two battery inverters and one battery cabinet each (example)

8.3 Connecting the Battery via a DC Distributor

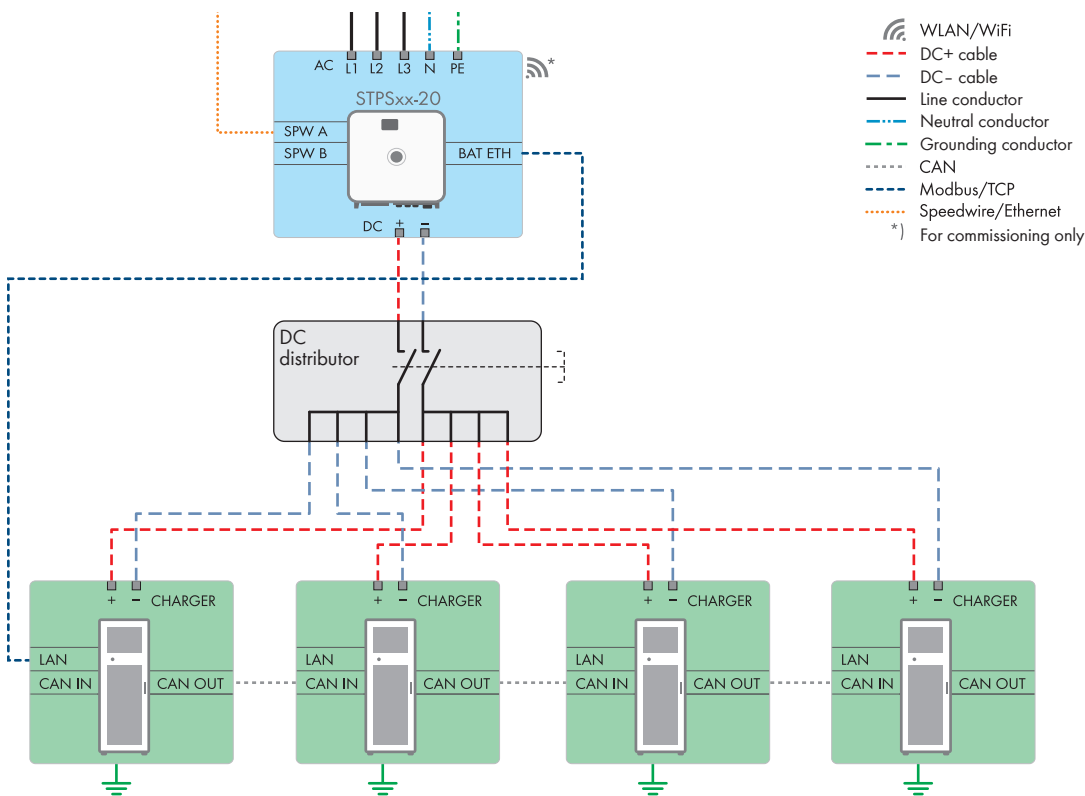


Figure 25: Connecting the battery to the battery inverter via a DC distributor (maximum configuration with four battery cabinets)

Also see:

- [Connection Area of the DC Distributor](#) ⇒ page 86

8.4 Requirements for the electrical connection

8.4.1 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.

8.4.2 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).

8.4.3 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

Also see:

- [Connecting the AC Cable ⇒ page 67](#)

8.4.4 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 2 nodes when using patch cables: 50 m
- Maximum cable length between 2 nodes when using installation cables: 100 m
- UV-resistant for outdoor use.

8.4.5 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 Data Cable of the Battery ⇒ page 71](#)

8.4.6 Laying plan for network and battery data cables

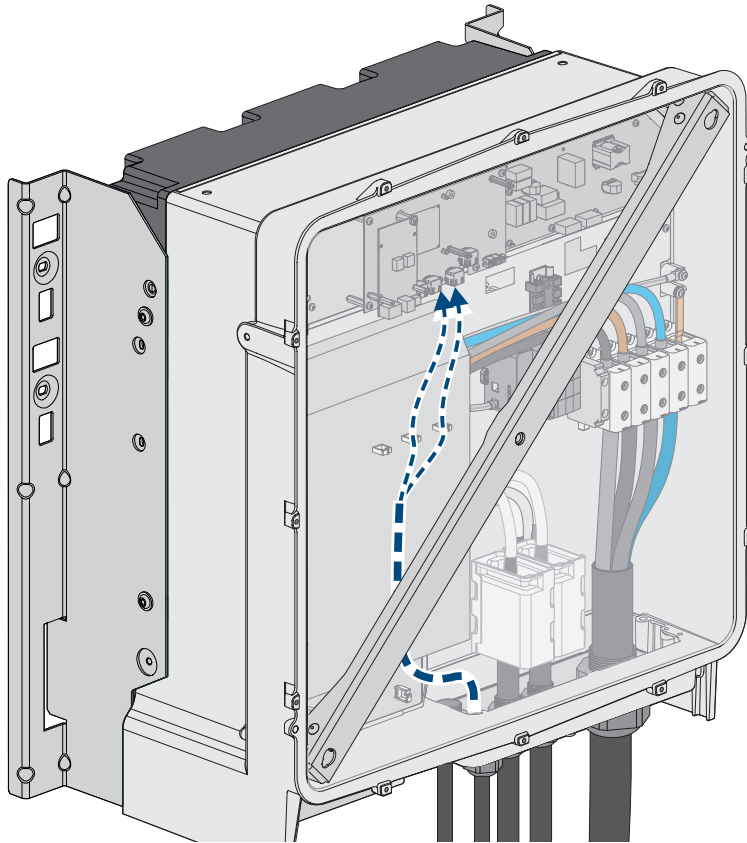


Figure 26: Interior view of the inverter with laying plan for network cables / battery data cables

Also see:

- [Overview of the Connection Area](#) ⇒ page 66

8.4.7 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:

- [Sunny Tripower Storage X as System Manager](#) ⇒ page 30
- [Accessories](#) ⇒ page 192

8.4.8 DC cable requirements

- Aluminum or copper wires must be used.
- Connectable conductor cross-section: 50 mm² to 95 mm²
- Conductor cross-section when the battery inverter is connected to the battery management system in the battery cabinet: 35 mm²
- Conductor cross-section when the battery inverter is connected to the DC distributor: 50 mm²
- External diameter of the battery power cable: 12 mm to 20 mm
- The DC cables must be rated for the maximum battery voltage and the maximum battery current.

- The DC cables must be equipped with suitable terminal lugs for DC connection in the inverter. The DC cables in the inverter are equipped with terminal lugs made of tinned copper.

Also see:

- [Connecting the DC Cables](#) ⇒ page 74

8.5 Electrical Connection Procedure

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

Procedure	See
1. Ensure that the requirements for the electrical connection are fulfilled.	Section 8.4, page 62
2. Ground the battery cabinet.	Section 8.7.5, page 79
3. Connect the battery communication system within the battery cabinet.	Section 8.7.6.1, page 80
4. Connect the DC cables within the battery cabinet.	Section 8.7.7.2, page 83
5. Route the DC cables to the inverter or DC distributor in the battery cabinet.	Section 8.7.7.3, page 84
6. Connect the external switch to the battery cabinet.	Section 8.7.8, page 85
7. Connect the AC cables to the inverter.	Section 8.6.3, page 67
8. Connect the network cables to the inverter.	
9. Connect the battery communication cables to the inverter.	Section 8.6.5, page 71
10. Connect the DC cables to the inverter. Record the device type and serial number of the inverter in the commissioning report.	Section 8.6.6, page 74
11. In systems with more than one battery cabinet: Connect the DC cables to the DC distributor. Record the device type and serial number of the DC distributor in the commissioning report.	Section 8.8.2, page 86
12. Connect the DC cables to the inverter or DC distributor in the battery cabinet.	Section 8.7.7.4, page 85
13. Connect the battery communication system to the inverter.	Section 8.7.6.2, page 81
14. In systems with more than one battery cabinet: Connect the CAN communication system.	Section 8.7.6.4, page 81
15. In systems with more than one battery cabinet: Set the address and terminator on the battery management system.	Section 9.4.5, page 94
16. Connect the energy meter.	See manual for the energy meter
17. Optional: Connect the SMA Data Manager.	See operating manual for the SMA Data Manager M

8.6 Connecting the Inverter

8.6.1 Overview of the Connection Area

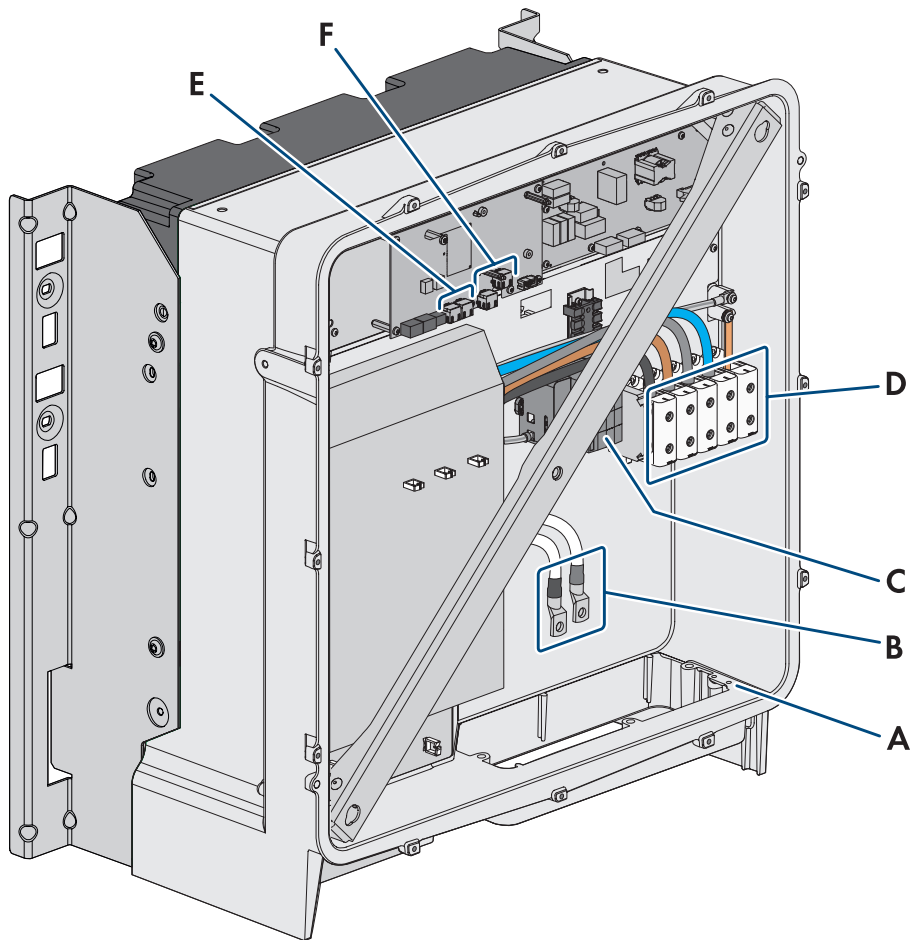
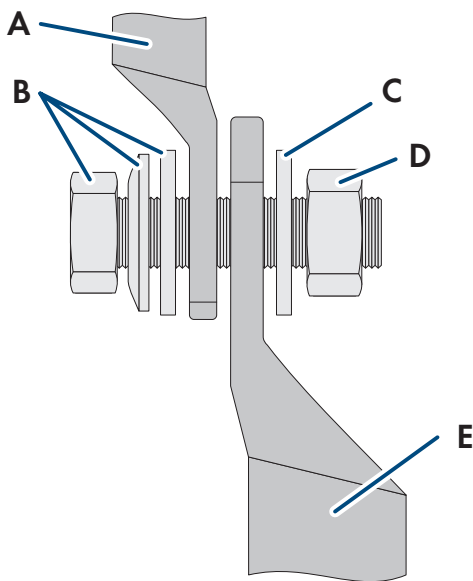


Figure 27: Connection areas in the interior of the product

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 network connection
F	Socket for battery communication connection
G	Slot DIN (reserved for future applications)

8.6.2 DC connection overview

1 DC-Kabel



2 DC-Kabel

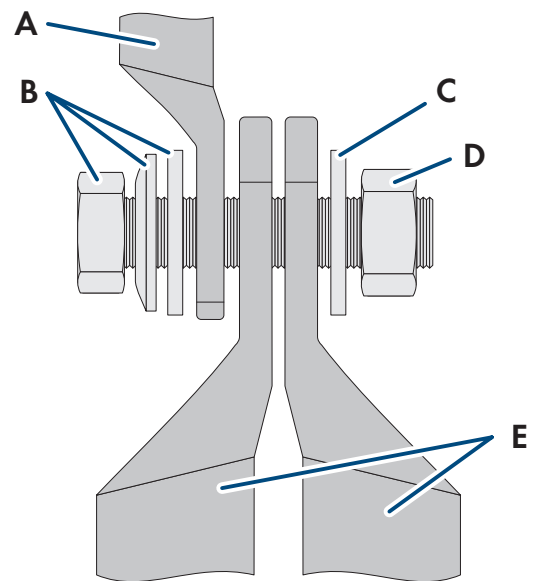


Figure 28: DC connection overview

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

8.6.3 Connecting the AC Cable

⚠ QUALIFIED PERSON

Requirements:

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

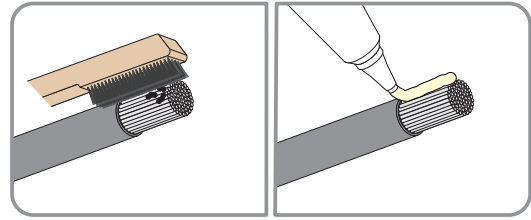
Additionally required material (not included in the scope of delivery):

- Protective grease (only for conductors made of aluminum)

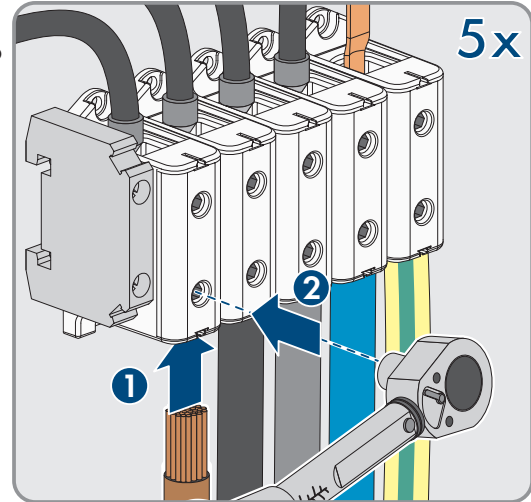
Procedure:

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.

Also see:

- AC cable requirements ⇒ page 63
- Overvoltage category ⇒ page 63

8.6.4 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 inverter or the battery outdoors to the inside of a building.

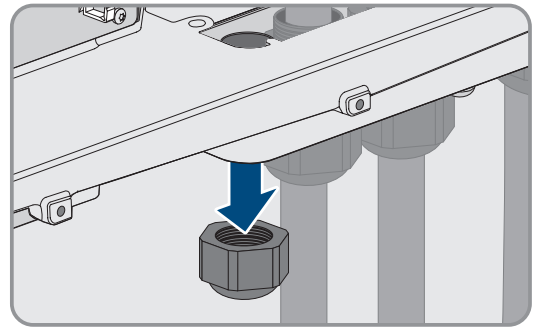
Additionally required material (not included in the scope of delivery):

- Network cables
- Where required: Field-assembly RJ45 connector with metal enclosure

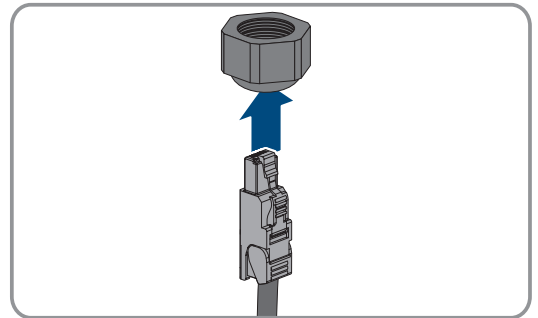
Procedure:

1. Disconnect the product from voltage sources (see Section 11.1, page 119).

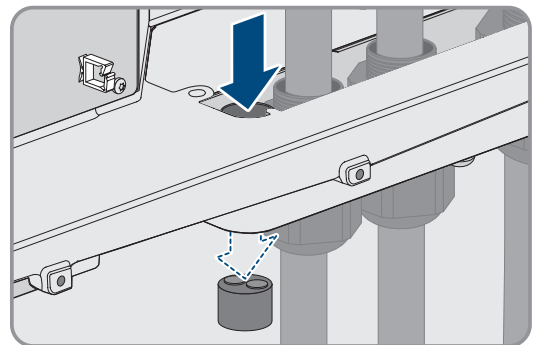
2. Unscrew the swivel nut from the cable gland.



3. Thread a swivel nut over each network cable.



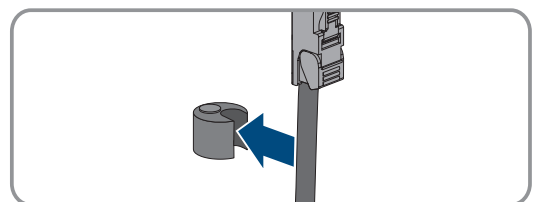
4. Remove the two-hole cable support sleeve from the cable gland.



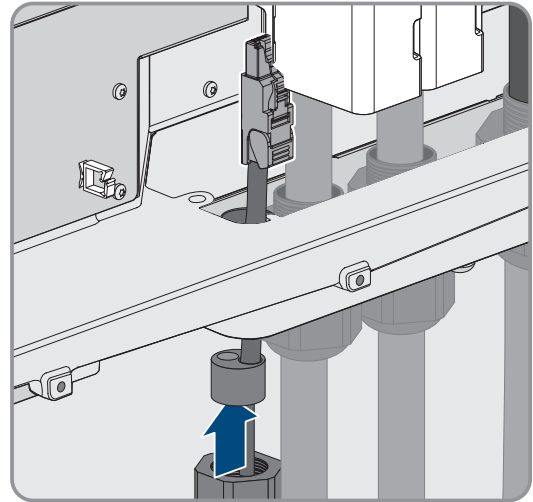
5. For each network cable, remove one of the plugs from the enclosure openings and for each network cable cut an enclosure opening with a utility knife.



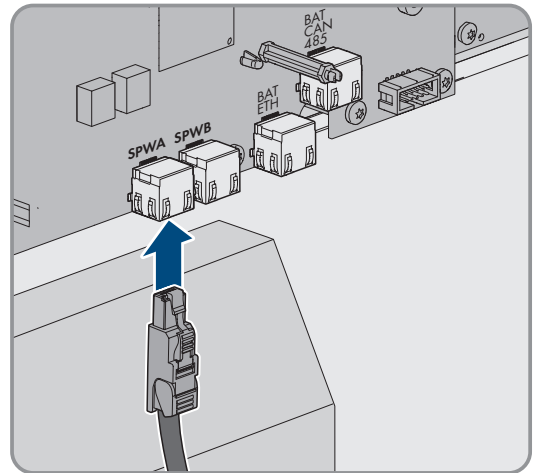
6. Insert each network cable into a 2-hole cable support sleeve.



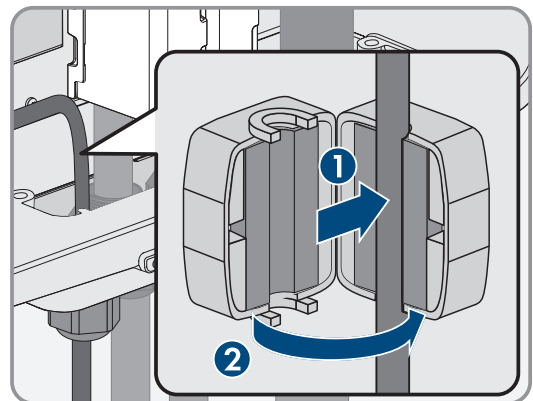
7. Press the 2-hole cable support sleeve into the cable gland and guide each network cable to the network port. Lay each cable according to the installation plan and attach it to the brackets.



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.

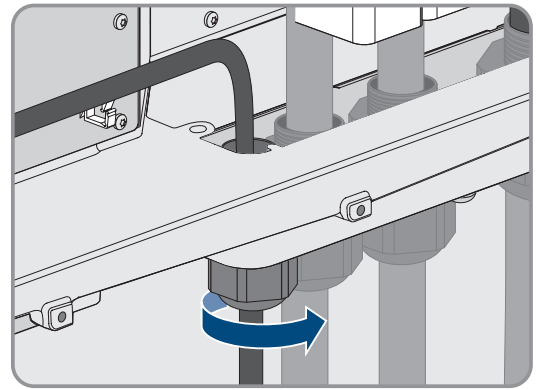


10. Attach one ferrite included in the scope of delivery to each network cable.



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 64
- [Network cable requirements](#) ⇒ page 63

8.6.5 Connecting the Data Cable of the Battery

⚠ QUALIFIED PERSON

The optional **BAT CAN** interface is intended for later applications. To connect the data cables of the battery, always use the **BAT ETH** socket.

⚠ 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 inverter or the battery outdoors to the inside of a building.

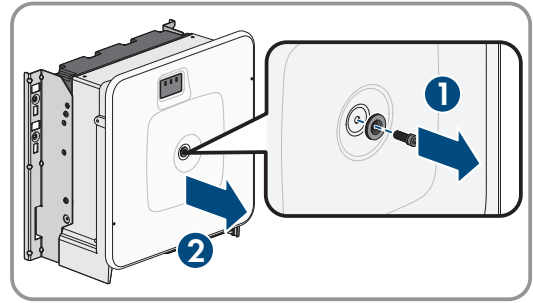
Additionally required material (not included in the scope of delivery):

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

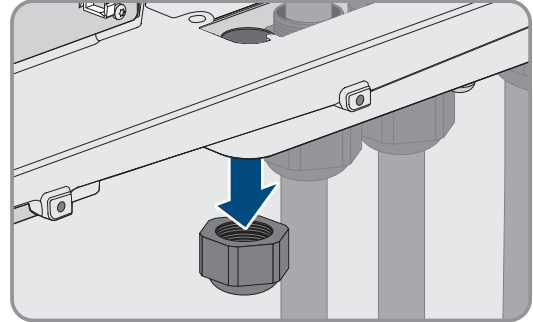
Procedure:

1. Disconnect the product from voltage sources (see Section 11.1, page 119).

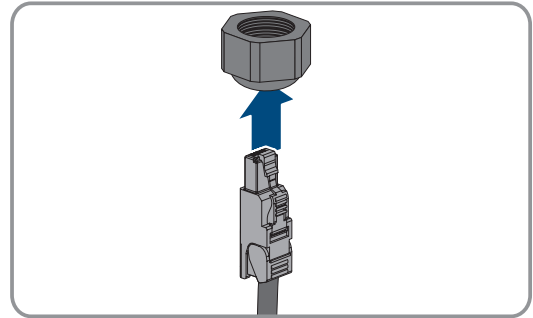
2. When cover of the enclosure is closed: unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.



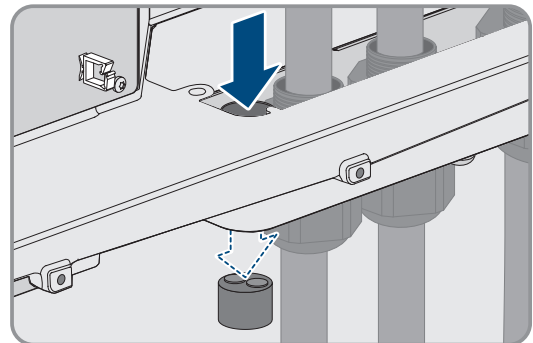
3. Unscrew the swivel nut from the cable gland.



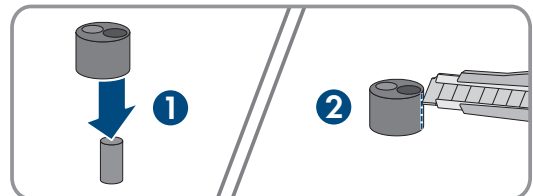
4. Thread the swivel nut over the data cable of the battery.



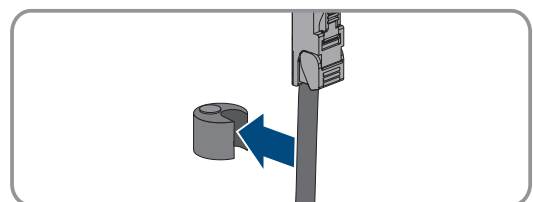
5. Remove the two-hole cable support sleeve from the cable gland.



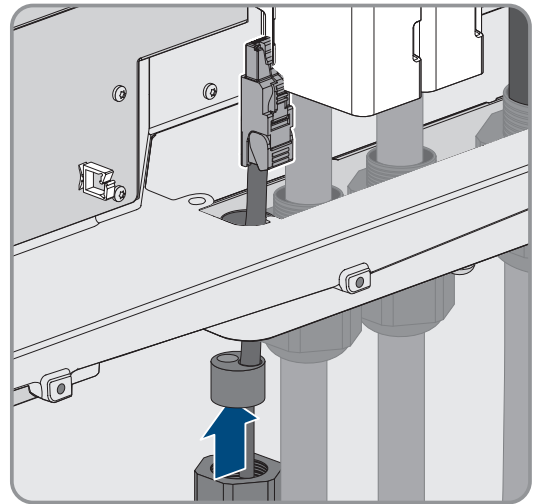
6. For the battery data cable, remove a plug from one of the enclosure openings and for the battery data cable cut an enclosure opening with a utility knife.



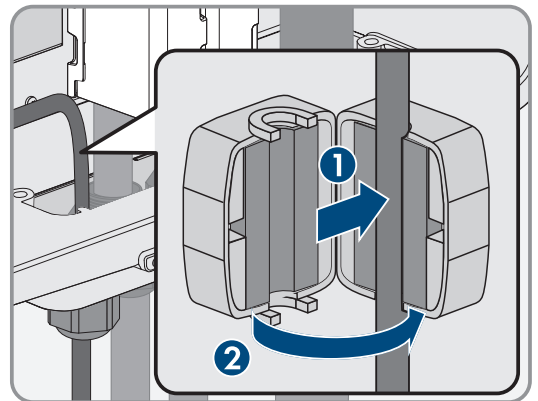
7. Insert the battery data cable into an enclosure opening.



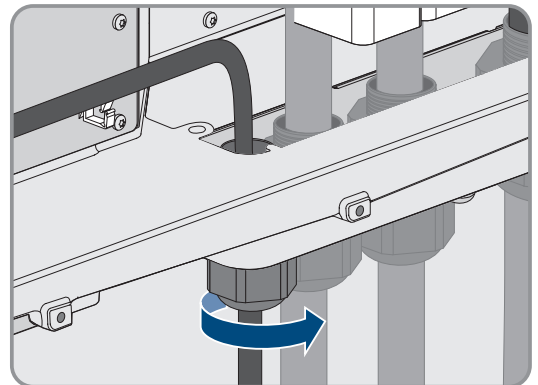
8. Press the cable support sleeve into the 2-hole cable gland and guide the battery data cable to the socket **BAT ETH**. Lay the battery data cable according to the installation plan and attach it to the brackets.



9. When using self-assembly cables, assemble the RJ45 connectors and connect them to the cable (refer to the documentation of the connector).
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:

- [Laying plan for network and battery data cables](#) ⇒ page 64

8.6.6 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:

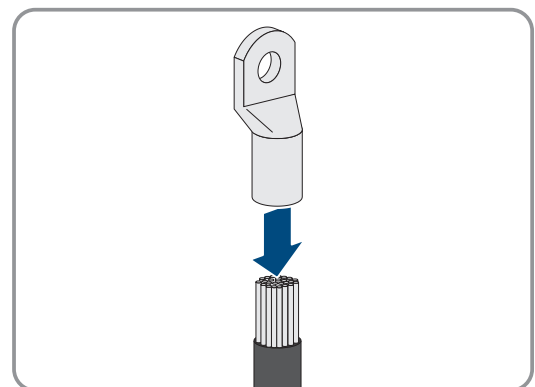
- An external DC load-break switch must be installed (e.g. an integrated DC load-break switch in the battery cabinet).
- The batteries must be protected at all poles.
- The DC cables must be inserted into the product.

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

- Clean cloth
- Ethanol cleaning agent
- Press tool

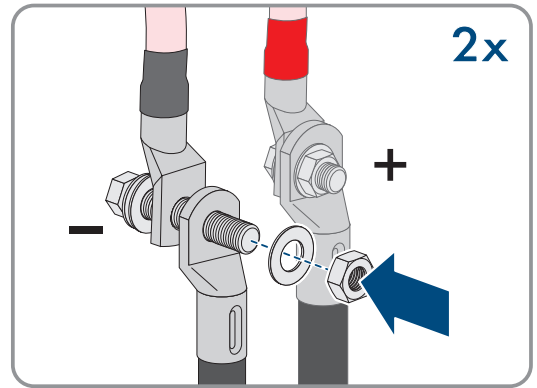
Procedure:

1. Ensure that no voltage is present on the DC cables.
2. Dismantle the DC cables.
3. Pull the supplied blue heat-shrink tubing onto the DC- cable. The heat-shrink tubing must be below the stripped conductor section.
4. Pull the supplied red heat-shrink tubing onto the DC+ cable. The heat-shrink tubing must be below the stripped conductor section.
5. Fit terminal lugs to the DC conductors.

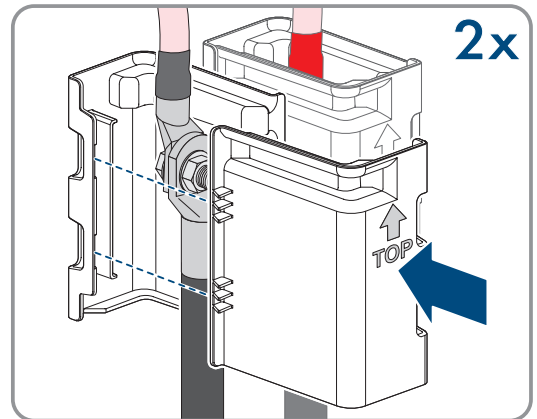


6. Pull the heat-shrink tubings onto the crimped section of the terminal lugs and using a hot-air blower shrink them so that they are in firm contact with the terminal lugs.
7. Remove any cable remnants from the product.
8. Remove the fixing of the pre-harnessed DC cables from the product.
9. Clean the contact surfaces of all terminal lugs using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.

10. 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.



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



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

Also see:

- [DC connection overview](#) ⇒ page 67

8.7 Connecting the Battery

8.7.1 Connection Area of the Battery Management System

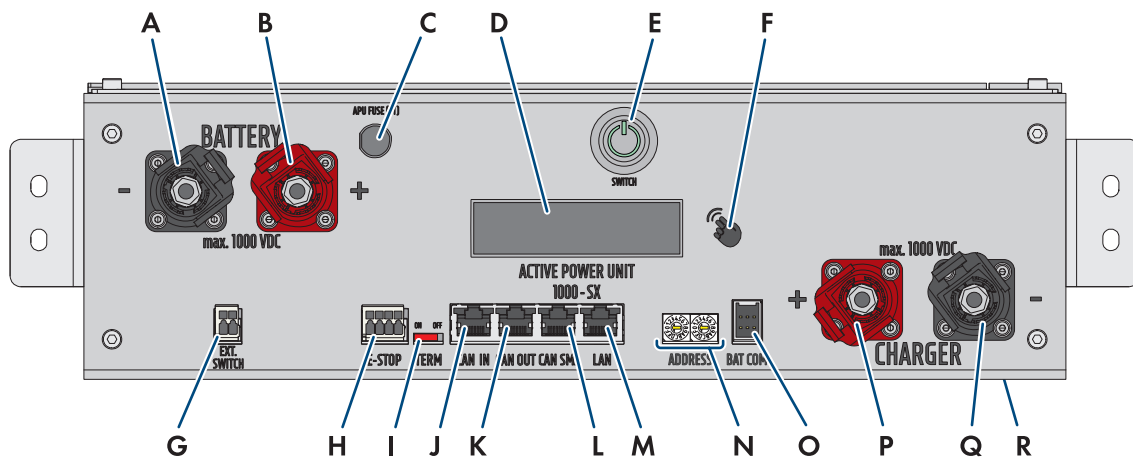


Figure 29: Connections on the battery management system

Position	Designation
A	BATTERY - : DC connection on the battery for the negative pole (black)
B	BATTERY + : DC connection on the battery for the positive pole (red)

Position	Designation
C	APU Fuse (F1): Fuse element for protecting the battery management system Operation is not possible if the fuse is defective.
D	DISPLAY: Display for information, warnings, and errors
E	SWITCH: On/off locking button on the battery management system
F	MARKIERUNG: Marking for activating the display and switching the display by tapping
G	EXT SWITCH: Connection of the external switch to the control cabinet door of the battery cabinet
H	E-STOP: 4-pole connector for the optional connection of an OFF switch for fast shutdown (already pre-mounted with bridge in default setting)
I	TERM: Slider for setting the address on the battery management system (only for systems with more than one battery cabinet)
J	CAN IN: Input for communication between primary and secondary battery cabinets (only for systems with more than one battery cabinet)
K	CAN OUT: Input for communication between primary and secondary battery cabinets (only for systems with more than one battery cabinet)
L	CAN SMA: Not used
M	LAN: Modbus TCP/IP transfer for communication between battery and inverter
N	ADDRESS: Two rotary switches for setting the address on the battery management system (only for systems with more than one battery cabinet)
O	BAT COM: Communication connection to the first battery module, 6-pole
P	CHARGER +: DC connection of the inverter or DC distributor for the positive pole (red)
Q	CHARGER -: DC connection of the inverter or DC distributor for the negative pole (black)
R	GROUND: Ground connection (stud bolt M6 on the back of the device)

8.7.2 Connection Area of a Battery Module

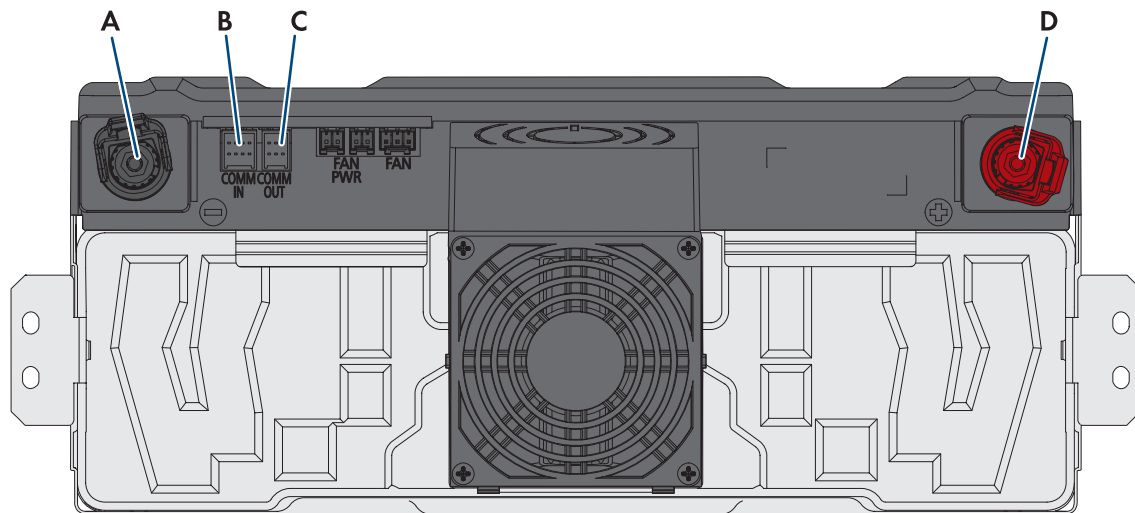


Figure 30: Connections on a battery module

Position	Designation
A	- POL Minus-Pol: DC connection (black)
B	COMM IN: Battery communication (input), 8-pole
C	COMM OUT: Battery communication (output), 6-pole
D	+ POL Plus-Pol: DC connection (red)

8.7.3 Wiring of the Battery Modules

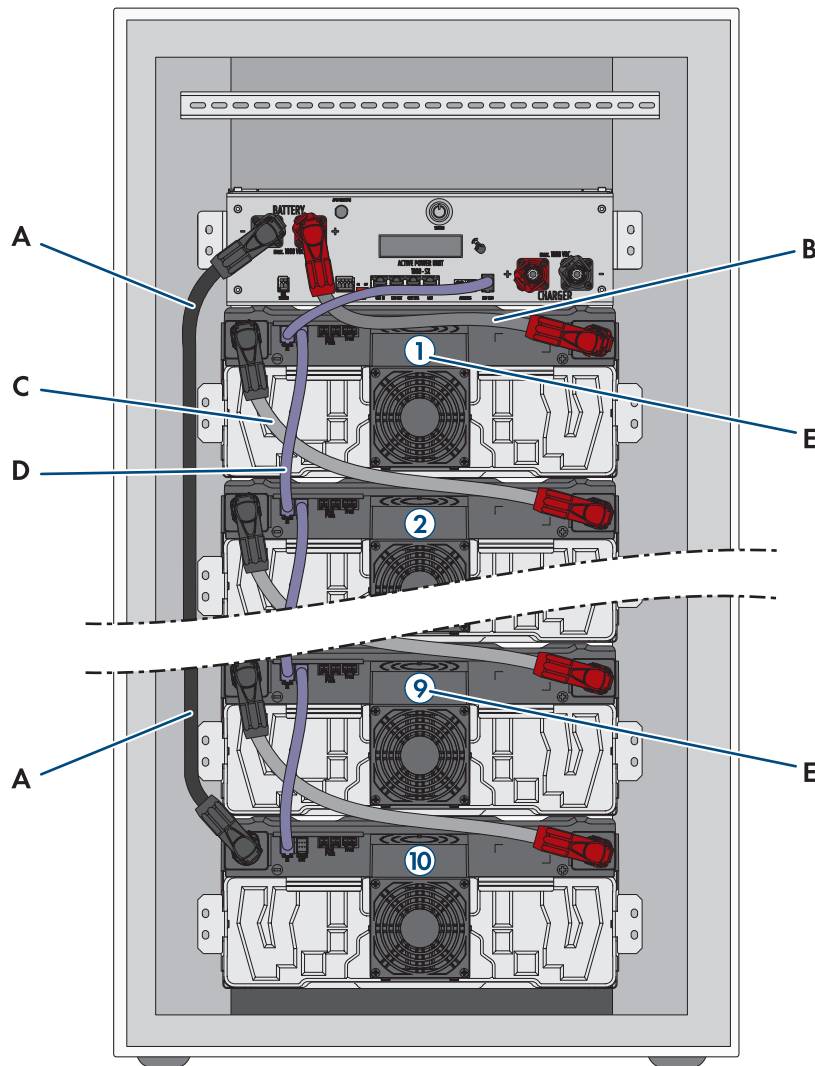


Figure 31: Wiring of the battery modules within the battery cabinet (example with ten battery modules)

Position	Designation
A	DC cable for connecting the battery management system (BATTERY-) to the lowermost battery module
B	DC cable for connecting the battery management system (BATTERY+) to the uppermost battery module
C	DC cable for serial wiring of the individual battery modules
D	Battery communication
E	Order in the battery string

8.7.4 Overview of Cable Entries

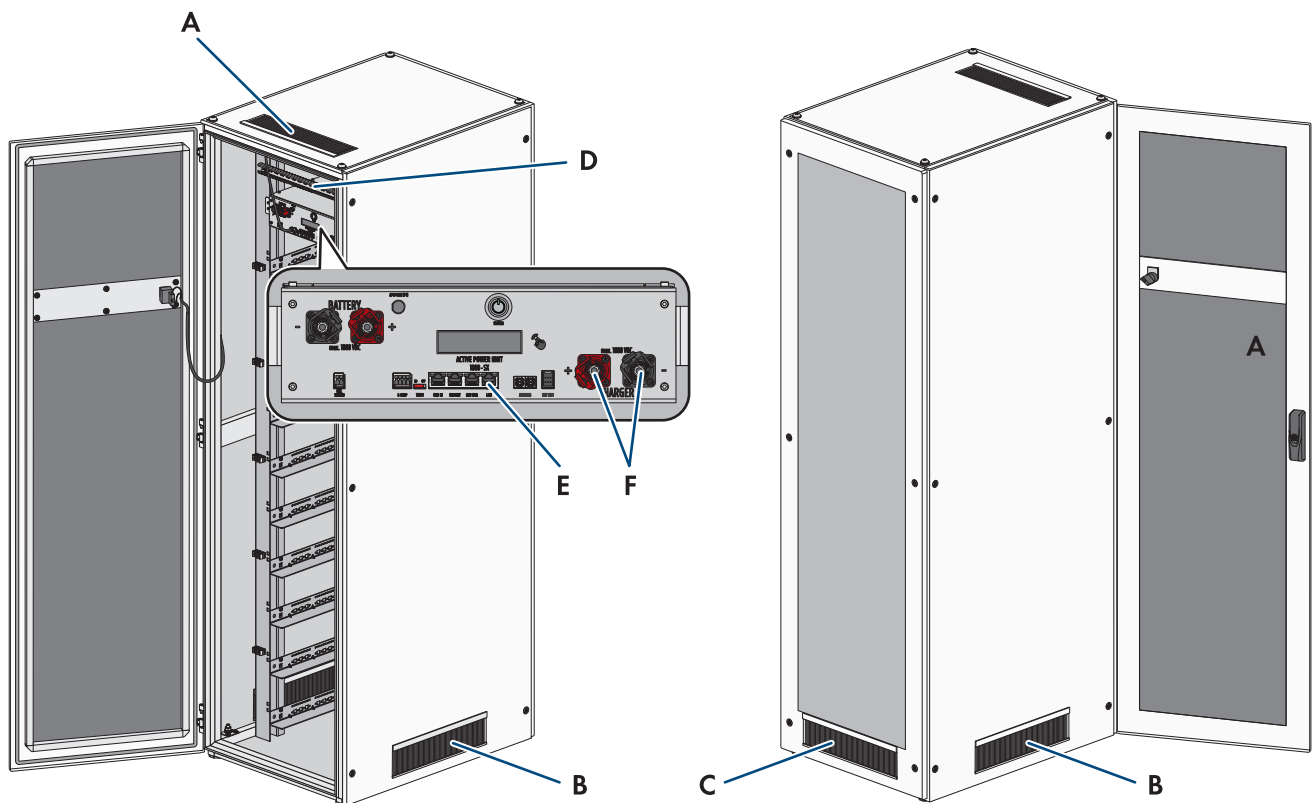


Figure 32: Cable entries in the battery cabinet

Position	Designations
A	Brush openings in battery cabinet cover
B	Brush openings in both battery cabinet side panels
C	Brush openings in battery cabinet rear panel
D	Preassembled C rail and cable clamp clips
E	LAN connection on the battery management system
F	CHARGER+ and CHARGER- connections on the battery management system

8.7.5 Earthing the battery cabinet

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⚠ DANGER

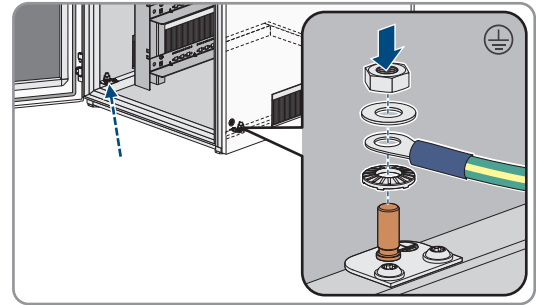
Danger to life due to electric shock due to touching live components or cables with insufficient or no grounding

If there is insufficient or no earthing, high voltages can be present at the battery cabinet enclosure in the event of a fault. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Earth the battery cabinet.
- Earth the battery management system during installation.

Procedure:

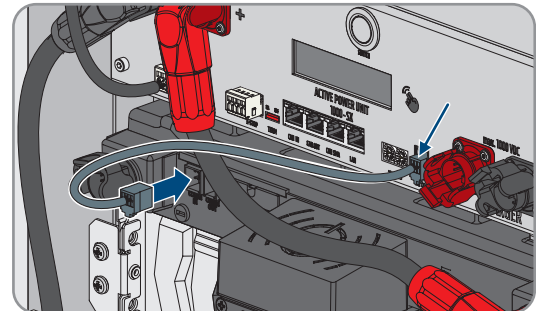
- Connect the supplied grounding cable to the battery cabinet grounding point (hexagon socket, AF13, torque: 8 Nm).

**Also see:**

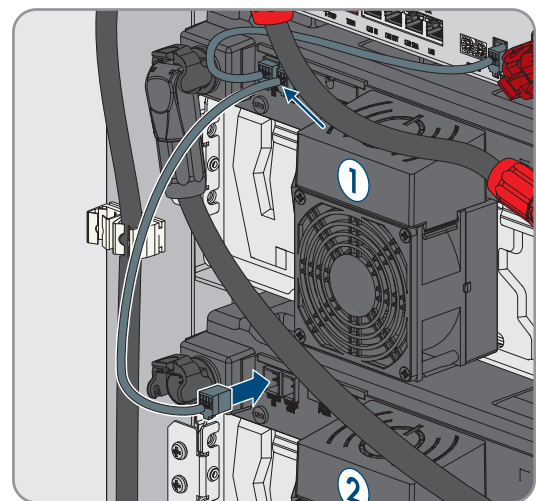
- Design of the Battery Cabinet ⇒ page 36
- Installing the battery management system ⇒ page 55

8.7.6 Communication Connection**8.7.6.1 Connecting the Battery Communication System within the Battery Cabinet****⚠ QUALIFIED PERSON**

1. Plug the 6-pole connector of the communication cable from the supplied APU connector set into the **BAT COM** socket on the battery management system.
2. Plug the 8-pole connector of this communication cable into the **COMM IN** socket on the uppermost battery module. Lay the communication cable over the DC cable.



3. Plug the 6-pole connector of a communication cable from the supplied module connector set into the **COMM OUT** socket on the uppermost battery module.
4. Plug the 8-pole connector of this communication cable into the **COMM IN** socket on the next battery module. Lay the communication cable over the DC cable.



5. Incorporate the rest of the battery modules into the communication cabling within the battery cabinet, working from top to bottom.

Also see:

- Accessory Kit for Battery ⇒ page 24

- Connection Area of the Battery Management System ⇒ page 75
- Connection Area of a Battery Module ⇒ page 77
- Wiring of the Battery Modules ⇒ page 78

8.7.6.2 Connecting the battery communication system to the inverter

⚠ QUALIFIED PERSON

Optionally, the battery communication system can be routed to the inverter via the supplied switch. This simplifies the connection of a service PC to the battery monitoring software BatMon, for example.

Procedure:

1. Plug in one connector of the communication cable from the supplied DC connector set at the **LAN** connection on the battery management system. In systems with more than one battery cabinet, always use the battery management system in the primary battery cabinet.
2. Plug in the other connector of the communication cable at the **BAT ETH** connection on the inverter.

Also see:

- Accessory Kit for Battery ⇒ page 24
- Connection Area of the Battery Management System ⇒ page 75
- Overview of the CAN Communication System ⇒ page 81

8.7.6.3 Overview of the CAN Communication System

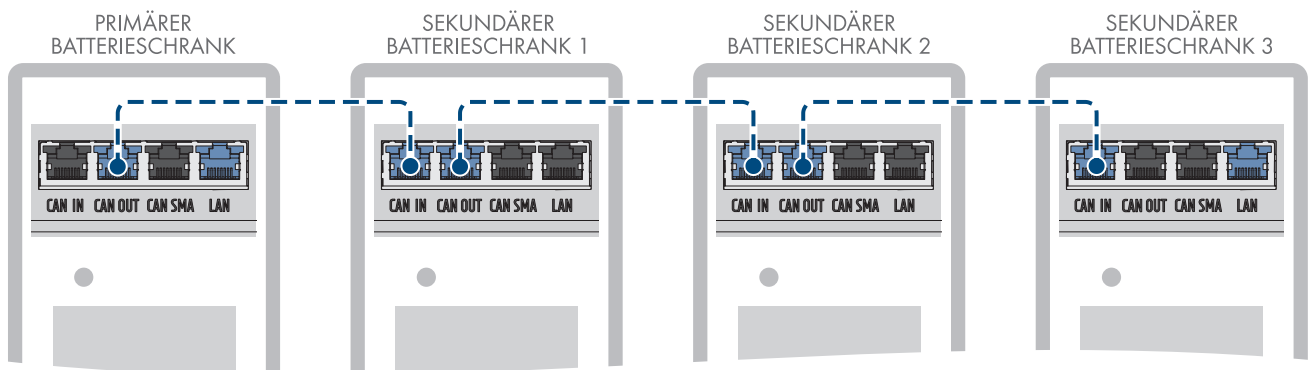


Figure 33: Design of the CAN communication system using the example of a system with one primary battery cabinet and three secondary battery cabinets

8.7.6.4 Connecting the CAN Communication System

⚠ QUALIFIED PERSON

An inverter can have up to four battery cabinets connected to it. For systems with more than one battery cabinet, the battery management systems of the individual battery cabinets must be connected to each other via a CAN communication bus.

Procedure:

1. Plug the first connector of a communication cable from the supplied accessory kit of the DC distributor on the battery management system of the primary battery cabinet into the **CAN OUT** socket.
2. Plug the second connector of this communication cable on the battery management system of the first secondary battery cabinet into the **CAN IN** socket.
3. If there is a second secondary battery cabinet, plug the first connector of a further communication cable from the supplied accessory kit of the DC distributor on the battery management system of the first secondary battery cabinet into the **CAN OUT** socket.

4. Plug the second connector of this communication cable on the battery management system of the second secondary battery cabinet into the **CAN IN** socket.
5. If there is a third secondary battery cabinet, plug the first connector of the last communication cable from the supplied accessory kit of the DC distributor on the battery management system of the second secondary battery cabinet into the **CAN OUT** socket.
6. Plug the second connector of this communication cable on the battery management system of the third secondary battery cabinet into the **CAN IN** socket.

Also see:

- [Overview of the CAN Communication System](#) ⇒ page 81
- [Setting the Address and Terminator](#) ⇒ page 94

8.7.7 Connecting the DC Cables**8.7.7.1 Safety when Connecting the DC Cables****⚠ DANGER****Danger to life due to electric shock due to touching live parts of the battery modules**

A high voltage is present at the DC terminals of each battery module. When the DC cables are installed within the battery cabinet, the DC voltages of the individual battery modules add up. Touching the DC terminals or connected DC cables results in death or lethal injuries due to electric shock.

- Do not touch any live components.
- Wear suitable personal protective equipment for all work on the product.
- Observe all warning messages on the product and in the documentation.
- Observe the local health and safety regulations.

NOTICE**Damage to the battery due to short circuit**

Incorrect assembly of the DC cables can trigger a short circuit. High currents due to short circuit lead to damage to the battery modules or battery management system.

- Take the mechanical connector coding of the supplied DC cables into account. Do not use force when connecting the DC cables.
- Always connect red DC cables to the red DC terminals.
- Always connect black DC cables to the black DC terminals.
- Always replace damaged battery modules without delay.

i Securing the DC Connections with Locking Levers

The DC connection sockets on the battery management system and on the battery modules are equipped with locking levers.

- The locking levers on the DC connection sockets must always engage audibly with the connectors of the DC cables.

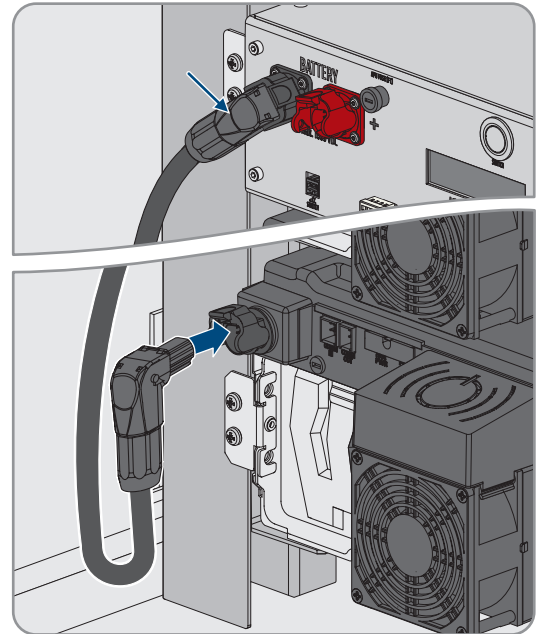
Also see:

- [Connecting DC Cables within the Battery Cabinet](#) ⇒ page 83
- [Routing DC Cables to the Inverter or DC Distributor in the Battery Cabinet](#) ⇒ page 84
- [Connecting DC Cables to the Inverter or DC Distributor in the Battery Cabinet](#) ⇒ page 85

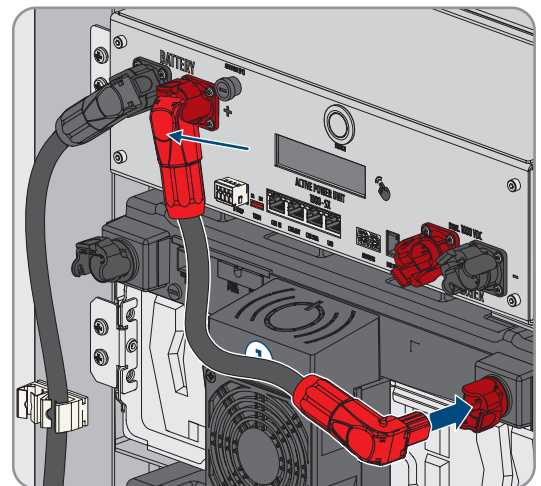
8.7.7.2 Connecting DC Cables within the Battery Cabinet

⚠ QUALIFIED PERSON

1. Plug a connector of the supplied black DC cable from the APU connector set into the **BATTERY-** socket on the battery management system. The locking lever on the socket must engage audibly with the connector.
2. Plug the other connector of the black DC cable into the **-POL** socket on the lowermost battery module. The locking lever on the socket must engage audibly with the connector.

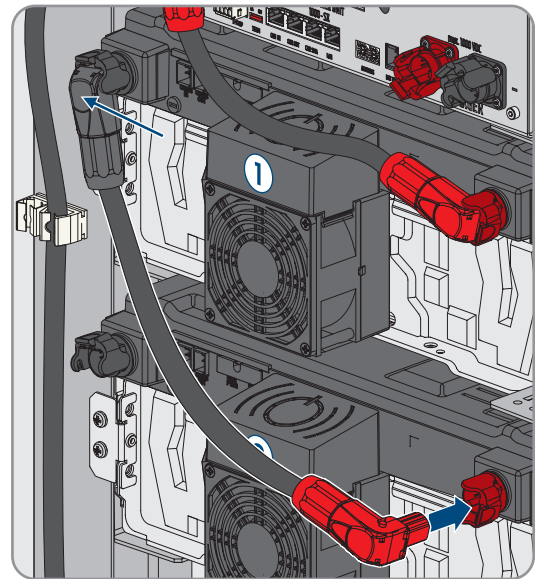


3. Secure the black DC cable on the left-hand side of the battery cabinet. Use the preassembled cable clamps for this.
4. Plug a connector of the supplied red DC cable from the APU connector set into the **BATTERY+** socket on the battery management system. The locking lever on the socket must engage audibly with the connector.
5. Plug the other connector of the red DC cable into the **+POL** socket on the uppermost battery module. The locking lever on the socket must engage audibly with the connector.



6. Plug the black connector of a DC cable from the module connector set into the **-POL** socket on the uppermost battery module. The locking lever on the socket must engage audibly with the connector.

7. Plug the red connector of this DC cable into the **+POL** socket on the next battery module. Lay the DC cable over the communication cable and do not cover the ventilation slots in the fan housing. The locking lever on the socket must engage audibly with the connector.



8. Incorporate the rest of the battery modules into the DC cabling within the battery cabinet, working from top to bottom.
9. Ensure that no DC cables cover the ventilation slots in any fan housings.

Also see:

- [Safety when Connecting the DC Cables](#) ⇒ page 82
- [Connection Area of the Battery Management System](#) ⇒ page 75
- [Connection Area of a Battery Module](#) ⇒ page 77
- [Wiring of the Battery Modules](#) ⇒ page 78
- [Accessory Kit for Battery](#) ⇒ page 24

8.7.7.3 Routing DC Cables to the Inverter or DC Distributor in the Battery Cabinet

⚠ QUALIFIED PERSON

The power connection between the battery and inverter or DC distributor is established using the DC cables from the supplied DC connector set. These DC cables can be shortened only at the inverter or at the DC distributor. Therefore, before connecting the inverter or DC distributor and the battery cabinet, route the DC cables required for this as described in this section. The **CHARGER+** and **CHARGER-** connections on the battery management system must not be wired during this.

Procedure:

1. Pick a brush opening for leading the DC cables out of the battery cabinet. To lead out the DC cables in a downward direction, use the lower brush openings in the two side panels or in the rear panel of the cabinet. To lead out the DC cables in an upward direction, use the brush opening in the cabinet cover as well as the preassembled C rails and the cable clamp clips.
2. Lead the DC cable with red connector from the supplied DC connector set starting from the **CHARGER+** connection to the chosen brush opening and out of the battery cabinet.
3. Lead the DC cable with black connector from the supplied DC connector set starting from the **CHARGER-** connection to the chosen brush opening and out of the battery cabinet.
4. Secure the DC cables in the battery cabinet. Use the preassembled cable clamps on the right-hand side or the cable clamp clips for this.
5. Route the DC cables to the inverter or DC distributor.

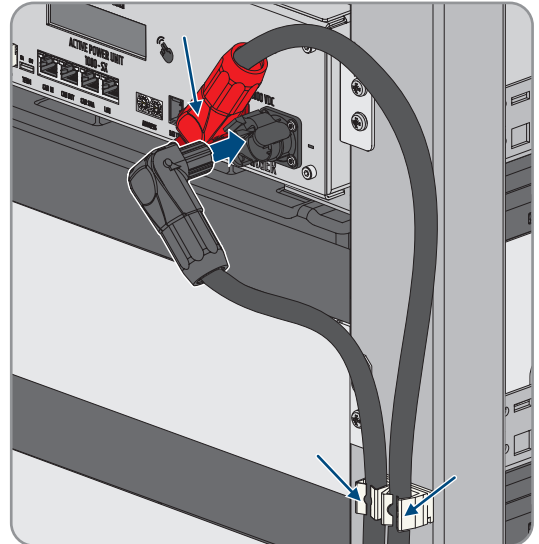
Also see:

- Overview of Cable Entries ⇒ page 79
- Safety when Connecting the DC Cables ⇒ page 82
- Connection Area of the Battery Management System ⇒ page 75
- Accessory Kit for Battery ⇒ page 24

8.7.7.4 Connecting DC Cables to the Inverter or DC Distributor in the Battery Cabinet

⚠ QUALIFIED PERSON

1. Connect the red connector of the DC cable from the supplied DC connector set to **CHARGER+**. The locking lever on the socket must engage audibly with the connector.
2. Connect the black connector of the DC cable from the supplied DC connector set to **CHARGER-**. The locking lever on the socket must engage audibly with the connector.



Also see:

- Safety when Connecting the DC Cables ⇒ page 82
- Connection Area of the Battery Management System ⇒ page 75
- Accessory Kit for Battery ⇒ page 24

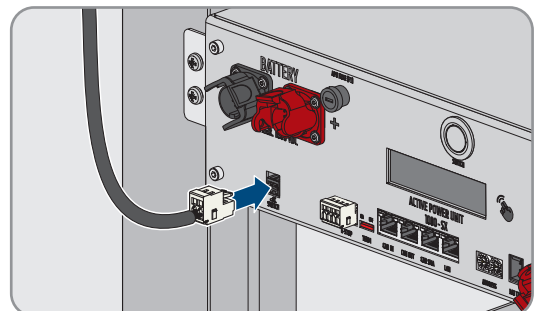
8.7.8 Connecting the External Switch to the Battery Management System

⚠ QUALIFIED PERSON

The external switch is on the outside of the battery cabinet door. The connection cables of the external switch and of the connectors are preassembled.

Procedure:

- Plug the connector of the connection cable into the **EXT SWITCH** socket on the battery management system.



8.8 Connecting the DC Distributor

8.8.1 Connection Area of the DC Distributor

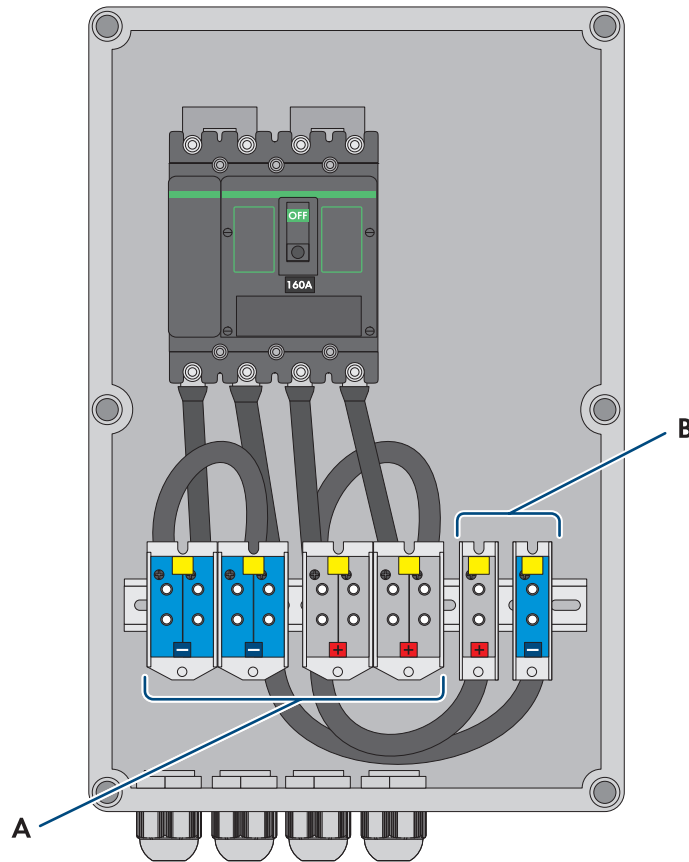


Figure 34: Overview of the connection area

Position	Designation
A	X3: Connection cable to the battery cabinet DC-
	X4: Connection cable to the battery cabinet DC+
B	X5: Connection cable to the battery inverter DC-
	X6: Connection cable to the battery inverter DC+

8.8.2 Connecting the DC Distributor

1. Disconnect the inverter from voltage sources (see Section 11.1, page 119).
2. Disconnect the battery from voltage sources (see Section 11.2, page 121).
3. Thread the supplied DC cables from the battery cabinets and the DC cables from the battery inverter through the cable glands provided on the bottom of the DC distributor.
4. If the DC cables are too long, shorten them.
5. Dismantle the DC cables and strip off the insulation.
6. Fit bootlace ferrules to the DC conductors.
7. Remove any cable remnants from the DC distributor.
8. Connect the DC cables from the battery cabinets to screw terminals X3 and X4. Ensure correct polarity.
9. Connect the DC cables from the battery inverter to screw terminals X5 and X6. Ensure correct polarity.

10. Tighten the cable glands of all DC cables (torque: 20 Nm).
11. Ensure that all conductors are securely in place.
12. Ensure that the circuit breaker of the DC distributor is switched on.

Also see:

- [DC cable requirements](#) ⇒ page 64
- [Optional: Scope of Delivery of the DC Distributor](#) ⇒ page 26
- [Connection Area of the DC Distributor](#) ⇒ page 86

9 Commissioning

9.1 Commissioning Procedure

This section describes the procedure for commissioning the SMA Commercial Storage Solution without System Manager (e.g., SMA Data Manager).

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

Procedure	See
1. For systems with more than four Sunny Tripower Storage X systems, make an appointment for a CMV measurement. Contact the Service.	Section 9.4.2, page 92
2. Check that all installed components have been correctly mounted and connected.	Section 9.2, page 89
3. If there is an SMA Data Manager installed, commission the SMA Data Manager.	See manual for the SMA Data Manager
4. If there is more than one battery cabinet installed, set the address and terminator on the battery management system of each battery cabinet.	Section 9.4.5, page 94
5. If there is more than one battery cabinet installed, commission the secondary battery cabinet or cabinets.	Section 9.4.7, page 96
6. Start commissioning of the primary battery cabinet.	Section 9.4.8, page 97
Start commissioning of the individual battery cabinet.	Section 9.4.6, page 95
7. Commission the inverter.	Section 9.3.1, page 90
8. Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: <ul style="list-style-type: none"> • Connection via WLAN in the local network • Direct connection via Ethernet • Connection via Ethernet in the local network 	Section 10.4, page 104
9. Change the network configuration, if necessary. The automatic network configuration recommended by SMA Solar Technology AG via DHCP server is activated by default.	Section 9.3.2, page 91

Procedure	See
10. Perform the configuration with the help of the installation assistant. Make the following settings: <ul style="list-style-type: none"> • Administrator registration • Device configuration (device name, device function) • Adding devices (e.g., energy meter, PV inverter) • Country data set • Energy meter at the point of interconnection • Battery configuration • Energy management • Grid management services 	Section 9.3.3, page 91
11. Complete commissioning of the primary battery cabinet.	Section 9.4.8, page 97
Complete commissioning of the individual battery cabinet.	Section 9.4.6, page 95
12. Configure the temperature and humidity sensor.	Section 9.5, page 99
13. Commission the energy meter.	See manual for the energy meter
14. To monitor the PV system and visualize the PV system data, register in the Sunny Portal and create the system in Sunny Portal or add devices to an existing system.	https://www.sunnyportal.com

9.2 Checking the Mounting and Connection Work

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Before commissioning or during setup, perform a thorough check of all mounting and connection work. The basis for the check is DIN VDE 0100-600.

Procedure:

1. Ensure that the inverter has been correctly mounted and connected.
2. Ensure that the battery has been correctly mounted and connected. In particular, ensure adherence to the requirements for the installation site and the local fire protection regulations.
3. If there is more than one battery cabinet: Ensure that the supplied DC distributor has been correctly mounted and connected.
4. If there is more than one battery cabinet: Ensure that the address and terminator has been correctly set on the battery management system of each battery cabinet.
5. Ensure that the supplied energy meter has been correctly mounted and connected (see manual for the energy meter).
6. Measure the ground resistance and continuity of the grounding conductor.
7. Measure the insulation resistance.
8. Check the polarity between the inverter and battery.
9. Ensure that the circuit breaker of the DC distributor is switched on.

Also see:

- [Connecting the Inverter](#) ⇒ page 66
- [Defaults for Addresses and Terminators](#) ⇒ page 93

9.3 Commissioning the Inverter

9.3.1 Commissioning the Inverter

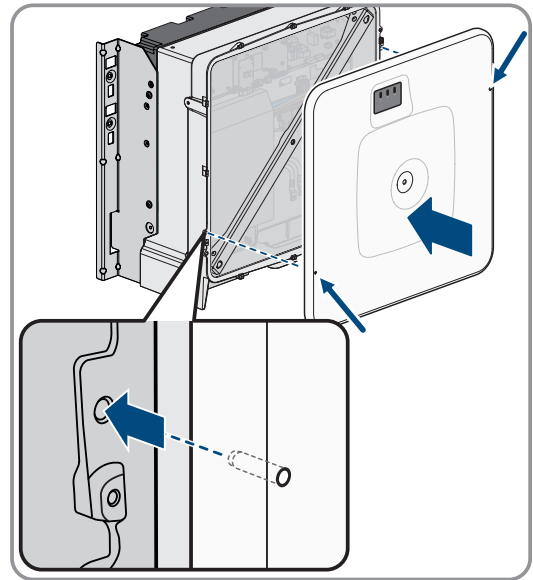
⚠ QUALIFIED PERSON

Requirements:

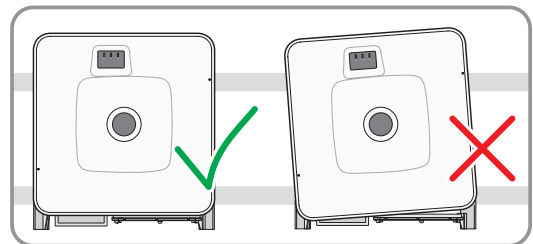
- The AC circuit breaker must be correctly rated and mounted.
- The inverter must be correctly mounted.
- All cables must be correctly connected.

Procedure:

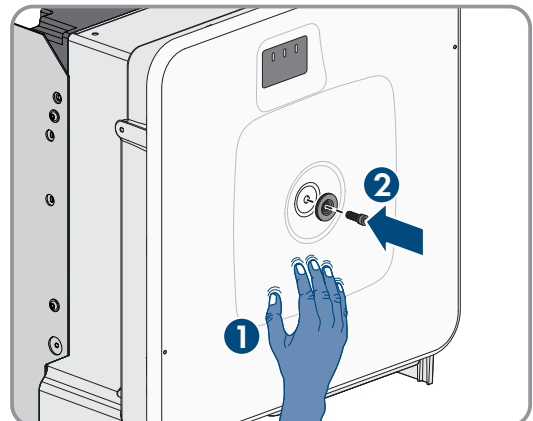
1. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure.



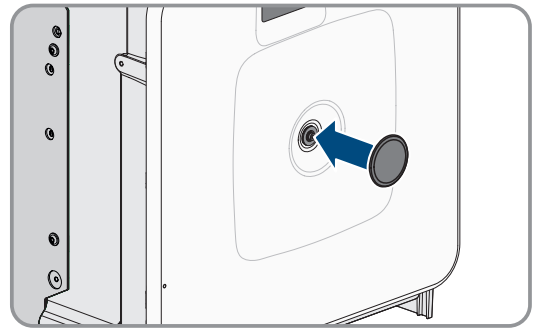
2. Ensure that the cover sits straight on the enclosure.



3. Hold the enclosure lid pressed against the enclosure and screw it tight. (Hex socket, AF 10, torque: 18 Nm).



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



- Connect the battery via the external DC switch.
- Switch on the AC circuit breaker.
- 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.
- If the green LED is still flashing, the conditions for the discharge and charging mode are not yet met. As soon as the conditions for the discharge and charging mode are met, the inverter will start charging and discharging. Depending on the available power, the green LED is continuously illuminated or pulses.
- If the red LED lights up, an event has occurred. Find out which event has occurred and, if necessary, initiate countermeasures.

9.3.2 Changing the Network Configuration

⚠ QUALIFIED PERSON

After you connect to the user interface for the first time, the welcome page opens.

On the welcome page, you can change the network configuration. The automatic network configuration recommended by SMA Solar Technology AG via DHCP server is activated by default. Only change the network configurations if the default configuration is not suitable for your network.

Procedure:

- Select **Change network configuration** on the welcome page.
- Carry out network configuration and confirm with [**Save**].

Also see:

- [Connecting to the Inverter User Interface ⇒ page 104](#)

9.3.3 Configuring the Inverter

⚠ QUALIFIED PERSON

After you connect to the user interface for the first time or have restarted the product, the welcome page opens.

If you click on [**Next**], the commissioning assistant starts. With the commissioning assistant, you can create an administrator account to access and configure the product.

Procedure:

- Click on [**Next**] on the welcome page.
- Enter the administrator account data and click on [**Next**]. Observe that only 1 user with administrator authorization can be created.
 - The administrator account has been created.

3. Follow the steps of the commissioning assistant and configure your system accordingly. For every setting made in a step, click on [**Next**].
 - When all steps are completed, the information page is displayed.
4. To open the user interface home page and view product data, click on [**Next**].

Also see:

- [Connecting to the Inverter User Interface](#) ⇒ page 104

9.4 Commissioning the Battery

9.4.1 Safety when Commissioning the Battery

This section contains safety information that must be observed at all times when commissioning the battery.

NOTICE

Damage to the battery due to incorrect installation or connection

The battery management system and battery modules can be damaged by incorrect installation or incorrect electrical connection.

- Install the battery management system and battery modules in accordance with the specifications in this manual only.
- Make all electrical connections on the battery management system and battery modules in accordance with the specifications in this manual only.

NOTICE

Damage to the battery due to incorrect settings

The set battery parameters influence the charging behavior of the inverter. The battery can be damaged by incorrect parameter settings.

- Set all battery parameters as specified in this manual.
- Ensure that the technical limit values of the battery are observed.

NOTICE

Damage to the display of the battery management system

The display of the battery management system can be damaged by inappropriate operation.

- To activate the display or confirm something, simply tap with the fingers on the highlighted area beside the display.
- Do not tap directly on the display.
- Do not use objects to tap.

9.4.2 CMV Measurement

To guarantee the safe and stable operation of an SMA Commercial Storage Solution storage system, the CMV requirements must be met (CMV: common-mode voltage, voltage between DC pole and ground). In storage systems with more than four Sunny Tripower Storage X inverters, a CMV measurement must be performed and the results recorded in the commissioning report (see system registration at www.SMA-Solar.com).

Evidence of the CMV requirements being met takes the form of a measurement in the entire system following installation during operation with the power electronics connected. The CMV measurement may only be performed by electrically qualified persons in compliance with the safety rules and in cooperation with Service. You must therefore contact Service to make an appointment if SMA Commercial Storage Solution storage systems with more than four Sunny Tripower Storage X inverters are to be commissioned.

9.4.3 Setting Option for Address and Terminator

Up to four battery cabinets can be connected to one inverter. In systems with more than one battery cabinet, the address and terminator must be set on the battery management system of each battery cabinet.

Set the address of the battery management system using the two **ADDRESS** rotary switches and the terminator using the **TERM** slider.

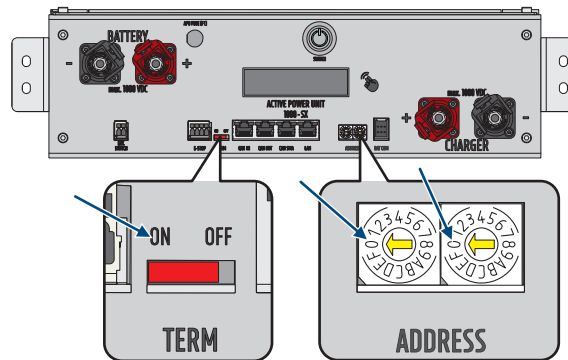


Figure 35: Setting the address and terminator using the example of the primary battery cabinet (**ADDRESS** set to 0/0, **TERM** set to **ON**)

Also see:

- [Defaults for Addresses and Terminators](#) ⇒ page 93
- [Setting the Address and Terminator](#) ⇒ page 94

9.4.4 Defaults for Addresses and Terminators

This section contains the defaults for addresses and terminators for a system with one inverter and two to four battery cabinets. For systems with more than one inverter, the same defaults apply for each inverter.

The defaults for address and terminator on each battery cabinet are based on the following system variants:

- System with one primary battery cabinet and one secondary battery cabinet
- System with one primary battery cabinet and two secondary battery cabinets
- System with one primary battery cabinet and three secondary battery cabinets

System with one primary battery cabinet and one secondary battery cabinet

Device	Address	Terminator
Primary battery cabinet	ADDRESS setting: 0/0 Left rotary switch to 0 Right rotary switch to 0	TERM switch to ON
Secondary battery cabinet 1	ADDRESS setting: 2/0 Left rotary switch to 2 Right rotary switch to 0	TERM switch to ON

System with one primary battery cabinet and two secondary battery cabinets

Device	Address	Terminator
Primary battery cabinet	ADDRESS setting: 0/0 Left rotary switch to 0 Right rotary switch to 0	TERM switch to ON
Secondary battery cabinet 1	ADDRESS setting: 2/0 Left rotary switch to 2 Right rotary switch to 0	TERM switch to OFF
Secondary battery cabinet 2	ADDRESS setting: 2/1 Left rotary switch to 2 Right rotary switch to 1	TERM switch to ON

System with one primary battery cabinet and three secondary battery cabinets

Device	Address	Terminator
Primary battery cabinet	ADDRESS setting: 0/0 Left rotary switch to 0 Right rotary switch to 0	TERM switch to ON
Secondary battery cabinet 1	ADDRESS setting: 2/0 Left rotary switch to 2 Right rotary switch to 0	TERM switch to OFF
Secondary battery cabinet 2	ADDRESS setting: 2/1 Left rotary switch to 2 Right rotary switch to 1	TERM switch to OFF
Secondary battery cabinet 3	ADDRESS setting: 2/2 Left rotary switch to 2 Right rotary switch to 2	TERM switch to ON

Also see:

- [Setting Option for Address and Terminator ⇒ page 93](#)
- [Setting the Address and Terminator ⇒ page 94](#)

9.4.5 Setting the Address and Terminator

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The address and terminator only need to be set on the battery management system in systems with more than one battery cabinet. Always set the address and terminator as described in this section.

Performing system registration

To complete commissioning, a system registration must be performed

- Use the following link for the system registration: <https://my.sma-service.com/>.

Procedure:

1. At the **ADDRESS** control, set the left and right rotary switch as specified for the device in the corresponding system.
2. Set the terminator at the **TERM** slider as specified for the device in the corresponding system.

Also see:

- Setting Option for Address and Terminator ⇒ page 93
- Defaults for Addresses and Terminators ⇒ page 93

9.4.6 Commissioning an Individual Battery Cabinet

⚠ QUALIFIED PERSON

i Performing system registration

To complete commissioning, a system registration must be performed

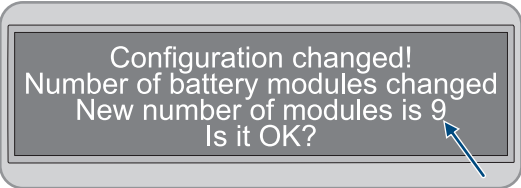
- Use the following link for the system registration: <https://my.sma-service.com/>.

Requirements:

- The inverter has been correctly mounted and connected.
- The inverter enclosure cover is securely closed.
- The battery has been correctly mounted and connected.
- The battery cabinet is securely closed.
- The supplied energy meter has been correctly mounted and connected.

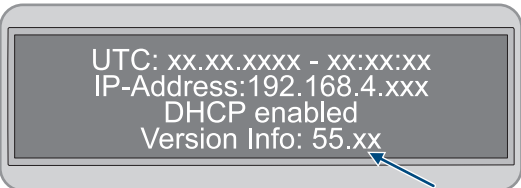
Procedure:

1. If a SMA Data Manager is available, activate the SMA Data Manager (see manual for the SMA Data Manager).
2. Press the external switch on the outside of the cabinet door.
3. Press the **SWITCH** control element on the battery management system.
4. Activate the display on the battery management system. To do this, tap with the fingers on the highlighted area beside the display.
 - The battery management system display shows the number of battery modules detected.
5. If the number of battery modules detected does not match the number of battery modules installed, disconnect the battery from the voltage source. Disconnecting from voltage sources and check all battery communication connections.



Configuration changed!
Number of battery modules changed
New number of modules is 9
Is it OK?

6. If the number of battery modules detected is still incorrect after eliminating any battery communication faults, contact Service.
7. If the number of battery modules detected matches the number of battery modules installed, confirm the correct number of battery modules. To do this, tap with the fingers on the highlighted area beside the display.
8. Activate the next menu item. To do this, tap with the fingers on the highlighted area beside the display.
 - The display shows the installed firmware version and the assigned IP address.
9. Check that the installed firmware version begins with **55.xx**.



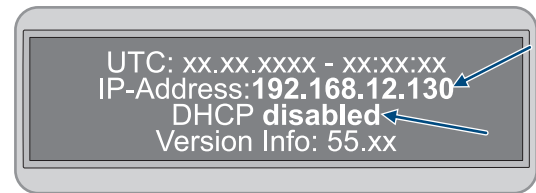
UTC: xx.xx.xxxx - xx:xx:xx
IP-Address: 192.168.4.xxx
DHCP enabled
Version Info: 55.xx

10. If the displayed firmware version is different, contact Service.

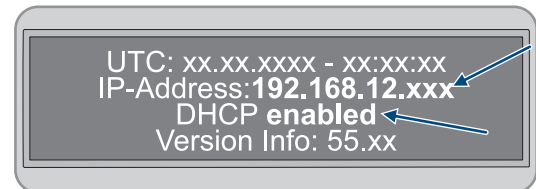
11. **i** **DHCP protocol disabled or enabled**

Performing the next step depends on whether the DHCP protocol for the inverter's battery communication interface is enabled or disabled.

12. If the DHCP protocol is disabled on the battery management system and the IP address is specified, set the IP address of the battery management system to **192.168.12.130** during commissioning of the inverter.



13. If the DHCP protocol is enabled on the battery management system and the IP address is variable, do not make any changes to the configuration of the battery communication during commissioning of the inverter. The default battery communication settings will be automatically used.



14. Activate the next menu item. To do this, tap with the fingers on the highlighted area beside the display.

- The display changes from the **Status** to **INIT** mode.
- The **SWITCH** control element flashes.

15. Commission the inverter.

- Once commissioning of the inverter is complete, the display changes from the **Status** to **PRECH** mode. This indicates that precharging mode of the battery has started.
- Precharging mode is complete once the display changes from the **Status** to **OK** mode. The battery is now ready for operation.

Also see:

- [Checking the Mounting and Connection Work](#) ⇒ page 89
- [Design of the Battery Cabinet](#) ⇒ page 36
- [Connection Area of the Battery Management System](#) ⇒ page 75
- [Commissioning the Inverter](#) ⇒ page 90
- [Safety when Commissioning the Battery](#) ⇒ page 92
- [Wiring of the Battery Modules](#) ⇒ page 78
- [Battery Event Messages](#) ⇒ page 152

9.4.7 Commissioning Secondary Battery Cabinets

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i **Order for commissioning the individual battery cabinets**

In the battery cabinet order, each secondary battery cabinet is assigned a specific position. The battery cabinets are commissioned in the opposite order. If there are three secondary battery cabinets, for example, the procedure is as follows:

- First, commission the third secondary battery cabinet.
- Next, commission the second secondary battery cabinet.
- Finally, commission the first secondary battery cabinet.

i **Performing system registration**

To complete commissioning, a system registration must be performed

- Use the following link for the system registration: <https://my.sma-service.com/>.

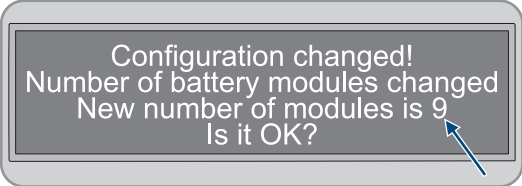
Requirements:

- The inverter has been correctly mounted and connected.
- The inverter enclosure cover is securely closed.
- The battery has been correctly mounted and connected.
- All battery cabinets are securely closed.
- The supplied energy meter has been correctly mounted and connected (see manufacturer's manual).
- The DC distributor has been correctly mounted and connected (see manufacturer's manual).

Procedure:

1. If a SMA Data Manager is available, activate the SMA Data Manager (see manual for the SMA Data Manager).
2. On a secondary battery cabinet, press the external switch on the outside of the cabinet door.
3. On the battery management system of this secondary battery cabinet, press the **SWITCH** control element.
4. Activate the display on the battery management system. To do this, tap with the fingers on the highlighted area beside the display.
 - The battery management system display shows the number of battery modules detected.
5. If the number of battery modules detected does not match the number of battery modules installed, disconnect the battery from the voltage source and check all battery communication connections.

Configuration changed!
Number of battery modules changed
New number of modules is 9
Is it OK?


6. If the number of battery modules detected is still incorrect after eliminating any battery communication faults, contact Service.
7. If the number of battery modules detected matches the number of battery modules installed, confirm the correct number of battery modules. To do this, tap with the fingers on the highlighted area beside the display.
8. Commission all other secondary battery cabinets in the same way.

Also see:

- Safety when Commissioning the Battery ⇒ page 92
- Checking the Mounting and Connection Work ⇒ page 89
- Design of the Battery Cabinet ⇒ page 36
- Connection Area of the Battery Management System ⇒ page 75
- Battery Event Messages ⇒ page 152

9.4.8 Commissioning the Primary Battery Cabinet**⚠ QUALIFIED PERSON****i Performing system registration**

To complete commissioning, a system registration must be performed

- Use the following link for the system registration: <https://my.sma-service.com/>.

Requirements:

- The inverter has been correctly mounted and connected.
- The inverter enclosure cover is securely closed.
- The battery has been correctly mounted and connected.
- All battery cabinets are securely closed.
- The supplied energy meter has been correctly mounted and connected (see manufacturer's manual).

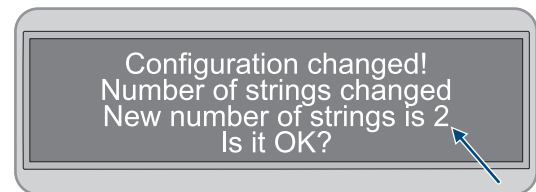
- The DC distributor has been correctly mounted and connected (see manufacturer's manual).
- The secondary battery cabinets have been commissioned.

Procedure:

1. If a SMA Data Manager is available, activate the SMA Data Manager (see manual for the SMA Data Manager).
2. On the primary battery cabinet, press the external switch on the outside of the cabinet door.
3. On the battery management system of the primary battery cabinet, press the **SWITCH** control element.
4. Activate the display on the battery management system. To do this, tap with the fingers on the highlighted area beside the display.

- The display on the primary battery cabinet shows the number of battery cabinets detected (**Number of Strings**). If, for example, a primary and a secondary battery cabinet were installed, the display would show **Number of Strings = 2**.

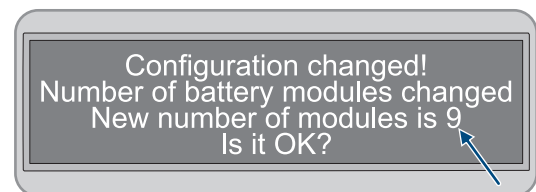
5. If the number of battery cabinets detected does not match the number of battery cabinets installed, disconnect the battery from the voltage source. Disconnecting from voltage sources and check all CAN communication connections.



6. If the number of battery cabinets detected is still incorrect after eliminating any CAN communication faults, contact Service.
7. If the number of battery cabinets detected matches the number of battery cabinets installed, confirm the correct number of battery cabinets. To do this, tap with the fingers on the highlighted area beside the display.
8. Activate the next menu item. To do this, tap with the fingers on the highlighted area beside the display.

- The battery management system display on the primary battery cabinet shows the number of battery modules detected.

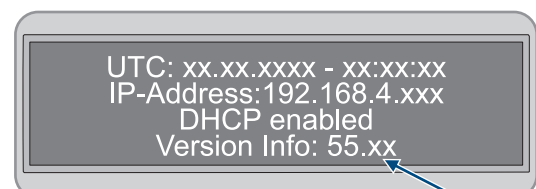
9. If the number of battery modules detected does not match the number of battery modules installed, disconnect the battery from the voltage source and check all battery communication connections.



10. If the number of battery modules detected is still incorrect after eliminating any battery communication faults, contact Service.
11. If the number of battery modules detected matches the number of battery modules installed, confirm the correct number of battery modules. To do this, tap with the fingers on the highlighted area beside the display.
12. Activate the next menu item. To do this, tap with the fingers on the highlighted area beside the display.

- The battery management system display on the primary battery cabinet shows the installed firmware version and the assigned IP address.

13. Check that the installed firmware version begins with **55.xx**.

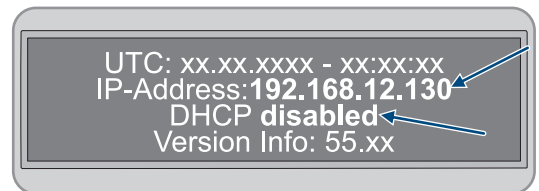


14. If the displayed firmware version is different, contact Service.

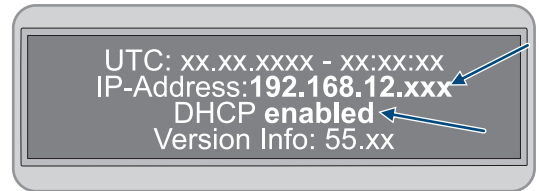
15. **i** **DHCP protocol disabled or enabled**

Performing the next step depends on whether the DHCP protocol for the inverter's battery communication interface is enabled or disabled.

16. If the DHCP protocol is disabled on the battery management system and the IP address is specified, set the IP address of the battery management system to **192.168.12.130** during commissioning of the inverter.



17. If the DHCP protocol is enabled on the battery management system and the IP address is variable, do not make any changes to the configuration of the battery communication during commissioning of the inverter. The default battery communication settings will be automatically used.



18. Activate the next menu item. To do this, tap with the fingers on the highlighted area beside the display.

- The battery management system display on the primary battery cabinet changes from the **Status** to **INIT** mode.
- The **SWITCH** control element flashes.

19. Commission the inverter.

- Once commissioning of the inverter is complete, the battery management system display on the primary battery cabinet changes from the **Status** to **PRECH** mode. This indicates that precharging mode of the battery has started.
- Precharging mode is complete once the battery management system display on the primary battery cabinet changes from the **Status** to **OK** mode. The battery is now ready for operation.

Also see:

- [Checking the Mounting and Connection Work](#) ⇒ page 89
- [Design of the Battery Cabinet](#) ⇒ page 36
- [Connection Area of the Battery Management System](#) ⇒ page 75
- [Commissioning the Inverter](#) ⇒ page 90
- [Safety when Commissioning the Battery](#) ⇒ page 92
- [Wiring of the Battery Modules](#) ⇒ page 78
- [Overview of the CAN Communication System](#) ⇒ page 81
- [Battery Event Messages](#) ⇒ page 152

9.5 Configuring the Temperature and Humidity Sensor

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1. Commission the temperature and air humidity sensor (see manual for the temperature and humidity sensor).
2. Set the sampling rate for the ambient temperature and humidity measurement to 120 s.
3. Start the temperature sensor recording. To do this, press and hold the **LOGGER** button on the temperature sensor for more than 2 seconds.
4. Check that the message **DATALOGGER** appears on the temperature sensor display. This indicates that the temperature sensor has started recording.
5. If the message **DATALOGGER** does not appear on the temperature sensor display, start the temperature sensor recording again.

9.6 Registration in Sunny Portal

9.6.1 Profiles for data communication

Different profiles are available to control the intensity of data communication in the system.

The profiles can be edited in the system properties at any time in Sunny Portal to adjust the intensity. Note that when switching from a low to a high intensity data communication, the data from the past is not retroactively adjusted. The adjustment applies from the date of the change.

The following profile can be selected for data communication:

Profile	Explanation
High (default setting)	Devices send all relevant data to the Sunny Portal every 5 minutes.
Medium	Devices send all relevant data to the Sunny Portal every 15 minutes.
Low	Devices send the most important data to the Sunny Portal 6 times per day.

9.6.2 Register as a new user in Sunny Portal

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Requirements:

- The product is in operation and connected to the local network via an Internet router.
- The access data for the registration in Sunny Portal on the back of the supplied quick reference guide are present.
- The operation LED is glowing green.
- An active Internet connection is established.

Procedure:

1. Call up the Internet address <https://ennexOS.SunnyPortal.com> in the web browser.
2. Select **I require a user account**.
3. Enter the necessary data for registration.
4. Select [**Register**].
 - After a few minutes you will receive an e-mail containing a confirmation link for registration in Sunny Portal.
5. If you have not received an e-mail from Sunny Portal, check whether the e-mail has been redirected to a folder for junk mail or whether an incorrect e-mail address has been entered.
6. Follow the confirmation link in the e-mail within 48 hours.
 - Sunny Portal opens a separate window to confirm successful registration.
7. Call up the Internet address <https://ennexOS.SunnyPortal.com> in the web browser.
8. Enter the e-mail address and the Sunny Portal password in the fields **User** and **Password**.
9. Select [**Login**].

9.6.3 Log in to Sunny Portal as an existing user

QUALIFIED PERSON

Requirement:

- You must have access to a user account in Sunny Portal, Sunny Places or Sunny Design.
- The product is in operation and connected to the local network via an Internet router.
- The operation LED is glowing green.
- An active Internet connection is established.

Procedure:

1. Call up the Internet address <https://ennexOS.SunnyPortal.com> in the web browser.

2. Enter the e-mail address and the Sunny Portal password in the fields **User** and **Password**.
3. Select [**Login**].

9.6.4 Create new PV system

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The system setup assistant is a step-by-step guide to the processes required for the registration of your system in Sunny Portal.

Service access

To ensure the best service quality possible, activate the switch for service access during registration.

Requirements:

- You must have access to a user account in Sunny Portal, Sunny Places or Sunny Design.
- The product is in operation and connected to the local network via an Internet router.
- The operation LED is glowing green.
- An active Internet connection is established.

Procedure:

1. Log into Sunny Portal.
2. Select the menu **Configuration**.
3. Select [**Create system**] in the context menu.
 - The system setup assistant opens.


9.6.5 Add product to an existing system

QUALIFIED PERSON

Requirement:

- You must have access to a user account in Sunny Portal, Sunny Places or Sunny Design.
- The product is in operation and connected to the local network via an Internet router.
- The operation LED is glowing green.
- An active Internet connection is established.

Procedure:

1. Log into Sunny Portal.
2. Select system.
3. Select the menu **Configuration**.
4. Select [**Device management**] in the context menu.
5. Select the  button.
 - The system setup assistant opens.

10 Operation

10.1 Safety Functions

10.1.1 Setting the Safe State

The safe state of the system is always set to **Disconnected**.

In this state, both contactors are open and the battery is not connected to an inverter or a load. This configuration guarantees that neither charging or discharging can take place and that the battery is isolated from any external electrical load.

Continuous monitoring of the contactors and feedback contacts are performed in this state. If a contactor error is detected, the system remains in an **ERROR** state and cannot be switched on.

10.1.2 Objective of a Safety Function

A safety function in the context of this installation manual refers to a specific system function that has been specifically developed to minimize the risks in connection with identified dangers. Its main objective is to quickly recognize and respond to potentially dangerous situations in order to prevent or reduce harm to people, the environment, or property.

10.1.3 Overview of Safety Functions

Designation	Description
V_String, V_DC_EXT	Plausibility check against V_String voltage
V_DC_EXT	Check of polarity reversal
Bat-Com Slave Count	Comparison of number of detected battery modules and number of parameterized modules ("greater than" semantics)
Battery Current	Check of I_String1
Battery Module	Check of each connected battery module (Bat-Com) with regard to cell voltages, temperatures, temperature imbalance in module, and string/voltage imbalance
Bat-Com Time Out	Check of Bat-Com communication timeout
Precharge	Check of time and voltage difference between V_String and V_DC_EXT during precharging
Contactors	Plausibility check of auxiliary contacts compared to main contactor switching condition
E-Stop	Check of whether E-Stop is active
Parameter valid check	Cyclical redundancy check
Firmware valid check	CRC check
CPU diagnostic	Check of timers, ports, and watchdog, etc.
VREF2	CRC check
V_REF_INT	Check of timers, ports, and watchdog, etc.
Fault Hardware Logic	Internal status signal FLT of hardware safety circuit
RAM	Test and check of microcontroller RAM

Designation	Description
Watchdog trigger	Internal watchdog check, check of timeout watchdog
Cyclic ADC conversion	Check of values
External Watchdog Trigger	Triggering of hardware safety logic - timeout of hardware safety block = 1000 ms
Temperature and voltage dependent Current Monitoring (I_String1)	Comparison of I_String1 and actual charging and discharging limits

Also see:

- [Setting the Safe State](#) ⇒ page 102
- [Objective of a Safety Function](#) ⇒ page 102

10.2 Control Elements

Control element	Description
User interface of the inverter	The user interface of the inverter is used to configure and monitor the system, but primarily the inverter and battery. If there are multiple inverters installed, one inverter can be configured as the System Manager. The user interface of the System Manager is used to configure and monitor all inverters and batteries in the system.
Optional: User interface of the SMA Data Manager	If there is an SMA Data Manager installed, the SMA Data Manager is configured as the System Manager. The user interface of the System Manager is used to configure and monitor all inverters and batteries in the system.
LED indicators on the inverter	The LEDs indicate the operating state of the inverter.
Battery management system display	The battery management system display is used to make some basic settings during commissioning of the battery. The display also shows the event messages for the battery.
External switch on the battery cabinet door SWITCH control element on the battery management system	The external switch on the battery cabinet door and the SWITCH control element on the battery management system are used for commissioning and for disconnecting the battery from voltage sources. The LED in the SWITCH control element on the battery management system indicates the battery operating state.

Also see:

- [LED Signals of the Inverter](#) ⇒ page 34
- [LED Signals of the Battery](#) ⇒ page 37
- [Inverter Event Messages](#) ⇒ page 133
- [Battery Event Messages](#) ⇒ page 152
- [Connecting to the Inverter User Interface](#) ⇒ page 104
- [Design of the User Interface](#) ⇒ page 106

10.3 Activating the Battery Management System Display

- To activate the display, tap with the fingers on the highlighted area beside the display.
- The display remains active for approx. 2 minutes and then is automatically deactivated.

10.4 Connecting to the Inverter User Interface

10.4.1 Establishing a Direct Connection via Ethernet

i IP address of the product

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

i Usage of cookies

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

Requirements:

- An end device (e.g. laptop) with an Ethernet interface must be available.
- The product must be connected directly to the end device.

Procedure:

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

3. **i** **Web browser displays warning**

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

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

- The login page of the user interface opens.

Also see:

- [Design of the User Interface](#) ⇒ page 106

10.4.2 Establishing a Connection via Ethernet in the local network

i New IP address for connecting with a local network

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

- Generally applicable access address: IP address manually assigned or assigned by the DHCP server (router) (identification via network scanner software or network configuration of the router).


i Usage of cookies

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

Requirements:

- The product must be connected to the local network via a network cable (e.g. via a router).
- The product must be integrated into the local network. Tip: There are various methods of integrating the product into the local network with the aid of the installation assistant.
- The end device (e.g. laptop or tablet) must be in the same local network as the product.

Procedure:

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

Also see:

- [Design of the User Interface](#) ⇒ page 106

10.4.3 Direct connection via Wi-Fi

10.4.3.1 Information on Direct Connection via Wi-Fi

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

The following connection options are available:

- Connection via SMA 360° app (see Section 10.4.3.2, page 105)
- Connection via WPS (see Section 10.4.3.3, page 105)
- Connection via device-specific Wi-Fi password (WPA2-PSK) (see Section 10.4.3.4, page 106)

Also see:

- [Design of the User Interface](#) ⇒ page 106

10.4.3.2 Wi-Fi Connection via SMA 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. Activate the Wi-Fi access point of the inverter. To do this, tap on the enclosure lid of the inverter twice.
 - The blue LED flashes slowly for approx. 2 minutes. The Wi-Fi access point is then activated for approx. 30 minutes. Once this period has expired, the Wi-Fi access point is deactivated automatically.
2. Open the SMA 360° App and login with the Sunny Portal account details.
3. Select **QR-Code Scan** in the menu.
4. Scan the QR Code on your product via the SMA 360° App.
 - The smart device automatically connects to the product. The web browser of your smart device opens and the login page of the user interface is displayed.
5. If the web browser of the smart end device does not open automatically and the login page of the user interface is not displayed, open the web browser and enter **http://smalogs.net** in the address bar.

10.4.3.3 Wi-Fi Connection via WPS

Requirements:

- The smart device must have a WPS function.

Procedure:

1. Activate the Wi-Fi access point of the inverter. To do this, tap on the enclosure lid of the inverter twice.
 - The blue LED flashes slowly for approx. 2 minutes. The Wi-Fi access point is then activated for approx. 30 minutes. Once this period has expired, the Wi-Fi access point is deactivated automatically.
2. Search for Wi-Fi networks with your smart device.
3. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
4. Enable the WPS function on the inverter. To do this, tap on the cover of the inverter enclosure another two times one after the other.
 - The blue LED flashes for approx. 2 minutes. The WPS function is then activated for approx. 2 minutes. After this time, the WPS function is deactivated automatically.
5. Open the web browser of your smart end device and enter <http://smalogin.net> in the address bar.
6. If the login page of the user interface does not open, enter the IP address **192.168.12.3** or, if your smart end device supports mDNS services, **SMA[serial number].local** or [http://SMA\[serial number\]](http://SMA[serial number]) in the address bar of the web browser.

10.4.3.4 Wi-Fi Connection via Device-specific Wi-Fi Password (WPA2-PSK)

1. Activate the Wi-Fi access point of the inverter. To do this, tap on the enclosure lid of the inverter twice.
 - The blue LED flashes slowly for approx. 2 minutes. The Wi-Fi access point is then activated for approx. 30 minutes. Once this period has expired, the Wi-Fi access point is deactivated automatically.
2. Search for Wi-Fi networks with your smart device.
3. Select the SSID of the product **SMA[serial number]** in the list with the detected Wi-Fi networks.
4. Enter the device-specific Wi-Fi password (see WPA2-PSK on the type label).
5. Open the web browser of your smart end device and enter <http://smalogin.net> in the address bar.
 - The welcome or login page of the user interface is displayed.
6. If the login page of the user interface does not open, enter the IP address **192.168.12.3** or, if your smart end device supports mDNS services, **SMA[serial number].local** or [http://SMA\[serial number\]](http://SMA[serial number]) in the address bar of the web browser.

10.5 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.

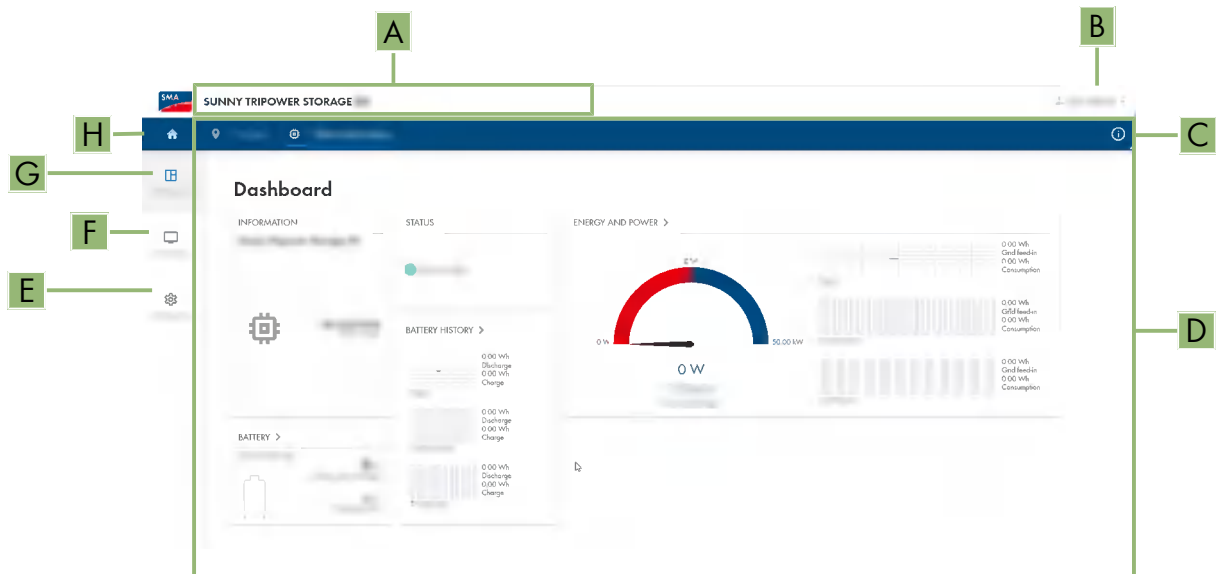


Figure 36: Design of the User Interface

Position	Designation	Description
A	Focus navigation	Enables the navigation between the following levels: <ul style="list-style-type: none"> • System • Device
B	User settings	Provides the following functions: <ul style="list-style-type: none"> • Configuring personal data • Logout
C	System information	Displays the following information: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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

10.6 Changing the Password

The password for the currently logged in user can be changed in the user interface of the product.

Procedure:

1. Open the user interface.
2. Log into the user interface.
3. Select the menu **User settings**.
4. Select [**Personal data**].
5. Click on [**If you want to change your password, please click here**].
6. To change the password, first enter the old password and then the new password repeatedly.
7. Click on [**Save**] to save the changes.

10.7 Country standard

The product is set to a generally valid country standard by default. While commissioning the product using the installation assistant, a country standard appropriate for the installation site and intended purpose must be selected for the product to start operating.

You can change the country standard via the user interface.

i The country data set must be set correctly.

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

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

Channel	Name	Group	Settings
Country	Set the country standard	Grid monitoring > Grid monitoring	Selection of different country data sets

10.8 Energy management

10.8.1 Home page of the energy management

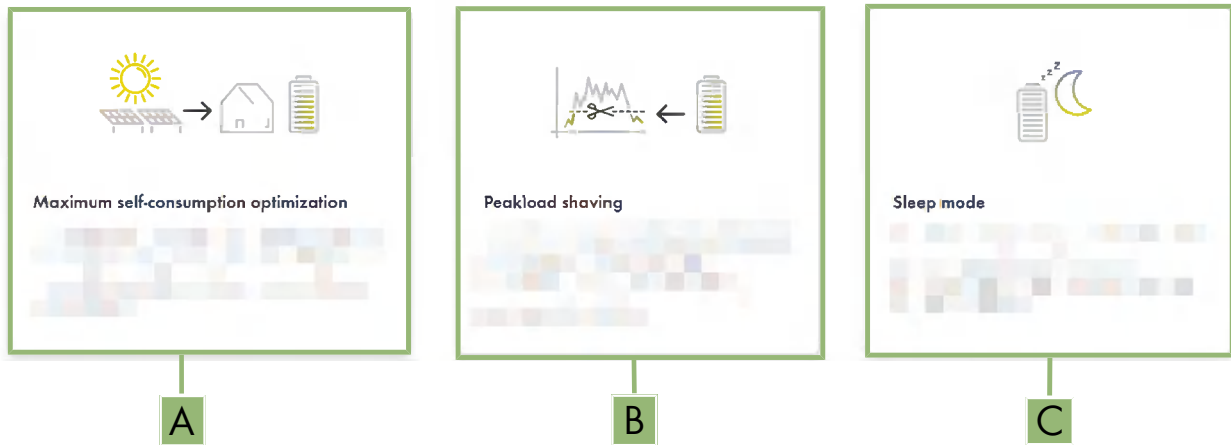


Figure 37: Energy management profiles on the home page of the energy management

Position	Energy management profile
A	Maximum increased self-consumption
B	Peak load shaving
C	Sleep mode

When energy management is started for the first time after commissioning, the energy management home page always appears first. The home page of the energy management shows predefined energy management profiles that are stored in the product. These profiles form the basis for configuring the energy management.

Also see:

- [Overview of used energy management profiles](#) ⇒ page 110
- [Creating a new energy management profile](#) ⇒ page 111

10.8.2 Overview of used energy management profiles

Energy management

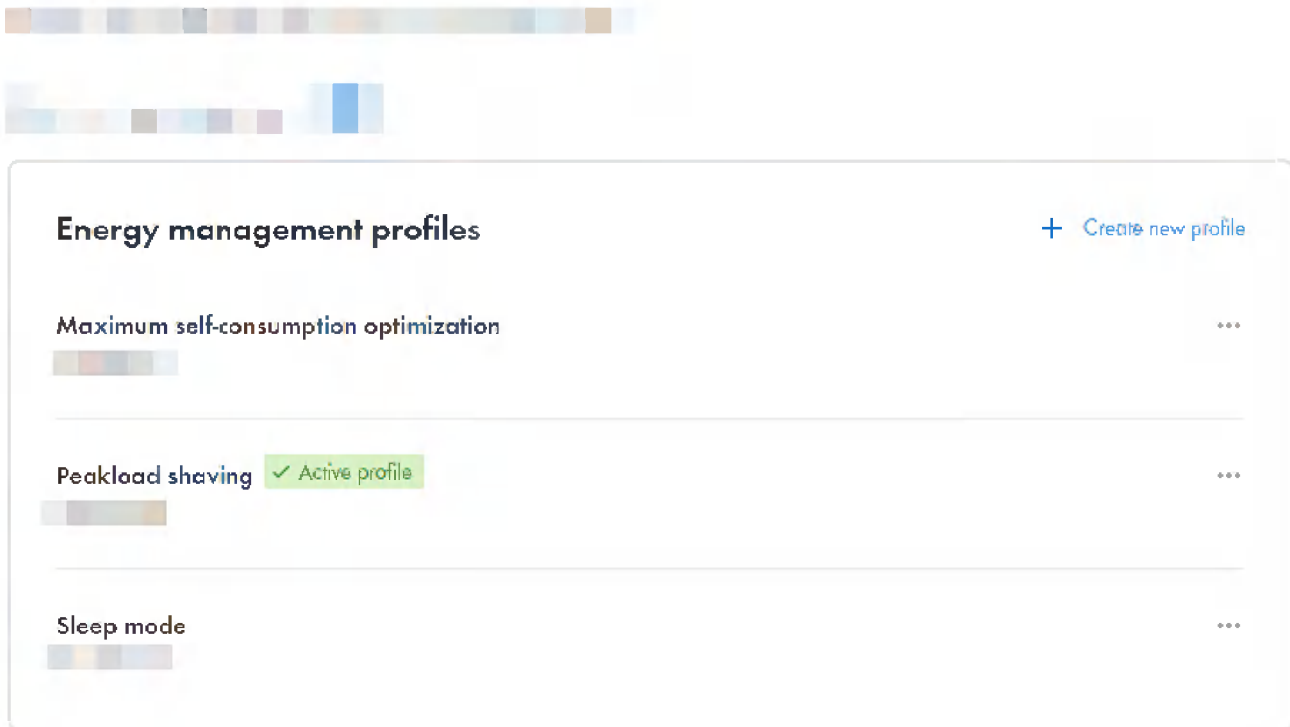


Figure 38: Overview of the used energy management profiles (example)

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

Also see:

- [Home page of the energy management](#) ⇒ page 109
- [Creating a new energy management profile](#) ⇒ page 111
- [Activating the energy management](#) ⇒ page 112
- [Deactivating the energy management](#) ⇒ page 112
- [Changing an energy management profile](#) ⇒ page 113

10.8.3 Parameter description for peak load shaving

Parameter	Explanation
Limiting 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.
Averaging 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.

Parameter	Explanation
Adjustment	<p>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.</p> <p>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.</p>
Autom. threshold adjustment	<p>Only if a value for the Averaging interval in the tariff is specified, can the function Autom. threshold adjustment be used.</p> <p>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.</p> <p>Optionally, the threshold for peak load shaving can be reset to the originally entered value at the end of the billing period.</p>
Battery charging	<p>The parameter Battery charge controls the charging behavior of the inverter during peak load shaving:</p> <p>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.</p> <p>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.</p>

Also see:

- [Creating a new energy management profile ⇒ page 111](#)

10.8.4 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.
- The user interface is open and you are logged in.

Procedure:

1. Select the menu item **Energy management** in the menu **Configuration**.
 - If no energy management profile has been created yet, the home page of the energy management opens.
 - If at least 1 energy management profile has been created, the overview of the energy management profiles used opens.
2. To open the home page of the energy management, select the button [**Create new profile**] in the overview of the energy management profile used.

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 profile **Peak load shaving**, 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.

Also see:

- Home page of the energy management ⇒ page 109
- Overview of used energy management profiles ⇒ page 110
- Parameter description for peak load shaving ⇒ page 110

10.8.5 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:

- Overview of used energy management profiles ⇒ page 110

10.8.6 Activating the energy management

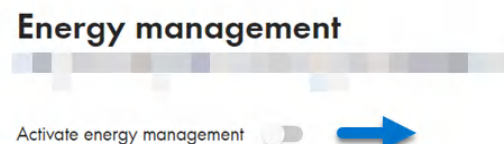
⚠ QUALIFIED PERSON

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:

- [Overview of used energy management profiles ⇒ page 110](#)

10.8.7 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:

- [Overview of used energy management profiles ⇒ page 110](#)

10.9 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 is open and you are logged in.

Procedure:

1. Log into the user interface of the product.
 2. Select the menu item **Battery configuration** in the menu **Configuration**.
 3. Follow the installation assistant steps and carry out the configuration for 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.

10.10 Modbus function

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

To access SMA products with SMA Modbus® or SunSpec® Modbus®, the Modbus interface must be activated. After enabling the interface, the communication ports of both IP protocols can be changed.

i Measures for data security during activated Modbus interface

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

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

- Set up a firewall.
- Close unnecessary network ports.
- Only enable remote access via VPN tunnel.
- Do not set up port forwarding at the communication port in use.

If you would like to deactivate an activated Modbus interface again, you can reset the product to the default settings or deactivate the activated parameters again.

Also see:

- [Modbus](#) ⇒ page 33

10.11 Updating Firmware with Update File via the User Interface

⚠ QUALIFIED PERSON

Requirements:

- An update file with the desired inverter firmware must be available. You can download the update file from the product page under www.SMA-Solar.com.
- You are logged in on the user interface as **Installer** or **Administrator**.

Procedure:

1. Select the inverter via the focus navigation.
2. Select the menu **Configuration > Update and backup**.
3. 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.
4. If the user interface does not confirm the compatibility of the update file, replace the update file.
5. Select [**Start update**].
6. Follow the instructions in the dialog.
7. Open the user interface and check the events to see whether the firmware update has been completed successfully.

Also see:

- [Design of the User Interface](#) ⇒ page 106
- [Inverter Event Messages](#) ⇒ page 133

10.12 Activating Speedwire encryption of the system communication

Speedwire encryption is used to encrypt system communication between all compatible Speedwire devices. In order to be able to use the Speedwire encryption in the system, all connected Speedwire devices, apart from the SMA Energy Meter, must support the SMA Speedwire Encrypted Communication function.

Requirements:

- All devices in the local network must be in operation and connected to the product via an Internet router.
- All devices must support the Speedwire encryption.
- The user interface must be open and you must be logged in.

Procedure:

1. Select the menu **Configuration**.
2. Select the **Device management** menu item.
3. Select the **+** button.
4. Select **SMA Speedwire devices** and confirm with [**Next**].
 - All SMA Speedwire devices in the systems are searched for and displayed.
5. Enable SMA Speedwire encryption and select [**Continue**].
6. Assign a new system password and select [**Save**].

10.13 Backup file

10.13.1 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

10.13.2 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 for encrypting the backup file and confirm with [**Create and download backup**]. Please note that the password will be needed later for importing the backup file.
 - An lbd file with all parameter settings is downloaded.

Also see:

- [Function and content of the backup file](#) ⇒ page 115

10.13.3 Uploading the 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 welcome page opens.
3. If the welcome page does not open, reset the inverter to the default settings.
4. On the welcome page in the row **Reset device to default settings**, select the option [**Start restoration**].
5. Select the desired backup file and enter the backup file password.
6. Confirm with [**Upload backup file**].
 - The lbd file with all parameter settings will be uploaded to the product. The product restarts automatically. This process can take several minutes.

Also see:

- [Function and content of the backup file](#) ⇒ page 115
- [Resetting the product to default setting](#) ⇒ page 116

10.14 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. 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:

- [Configuring the Inverter](#) ⇒ page 91
- [Uploading the backup file](#) ⇒ page 116

10.15 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 33](#)

10.16 Stopping 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 **Stop**.
5. Call up the home page of the user interface of the inverter.
 - In the "Energy and power" area, 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.

10.17 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**.

10.18 Restarting the Battery

10.18.1 Options for Restarting the Battery

You have the following options to restart the battery:

- Restarting the battery on the battery management system
- Restarting the battery via the BatMon battery monitoring software

Also see:

- [Restarting the Battery on the Battery Management System ⇒ page 117](#)
- [Restarting the Battery via the Battery Monitoring Software ⇒ page 118](#)

10.18.2 Restarting the Battery on the Battery Management System

QUALIFIED PERSON

1. Switch off the battery. To do this, press the **SWITCH** control element on the battery management system.

2. Switch on the battery. To do this, press the **SWITCH** control element on the battery management system.
3. Start the inverter.

Also see:

- [Connection Area of the Battery Management System](#) ⇒ page 75
- [Restarting the Battery via the Battery Monitoring Software](#) ⇒ page 118

10.18.3 Restarting the Battery via the Battery Monitoring Software

QUALIFIED PERSON

Requirements:

- A mobile end device (e.g., laptop) must be available.
- The BatMon battery monitoring software must be open and you must be logged in with Installer rights at a minimum.

Procedure:

1. Stop the inverter.
2. Select **Parameter > Reset APU**.
3. Follow the steps in the battery monitoring software.
 - The battery monitoring software restarts the battery.
4. Start the inverter.

Also see:

- [Menu Structure of the Battery Monitoring Software](#) ⇒ page 123
- [Restarting the Battery on the Battery Management System](#) ⇒ page 117

11 Disconnecting from voltage sources

11.1 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

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

⚠ WARNING

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

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

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

NOTICE

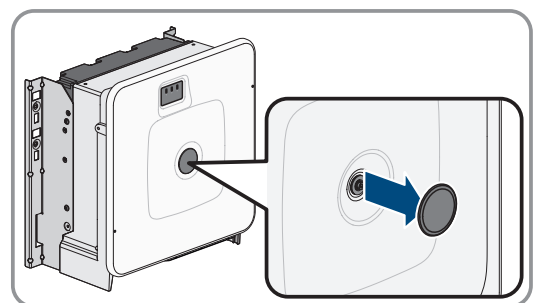
Damage to the inverter due to switching operations on the transformer

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.

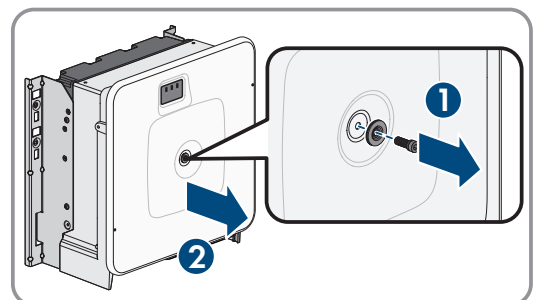
- Disconnect the inverter from voltage sources before performing any switching operations on the transformer.

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. Disconnect the DC terminal of the inverter via the load-break switch of the battery or the external DC switch.
4. Wait 15 minutes. This will ensure that the capacitors are discharged.
5. Wait until the LEDs have gone out.
6. Remove the cover from the enclosure lid.

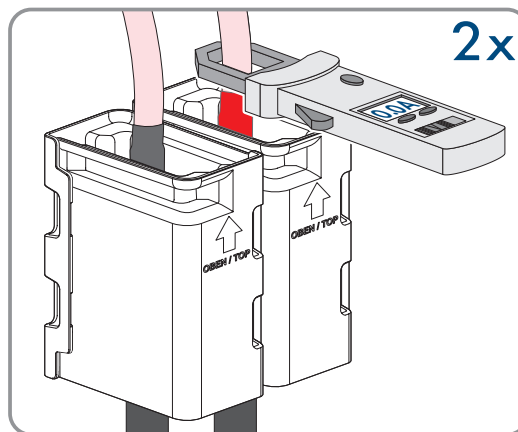


7. Unscrew the screw on the enclosure lid (hex socket, AF10) and remove the enclosure lid.

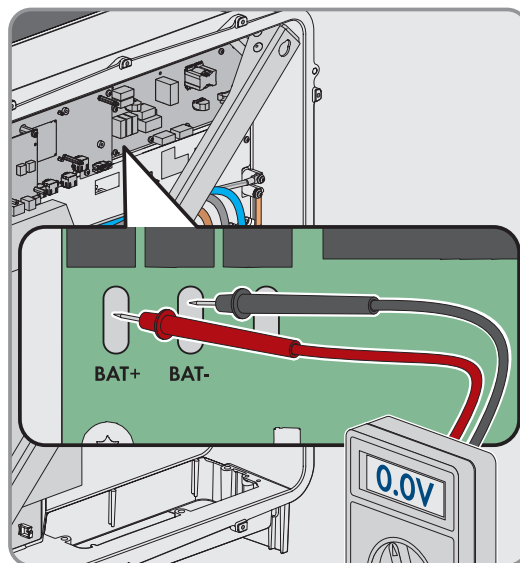


8. Set the screw, cover and cover of the enclosure aside and store safely.

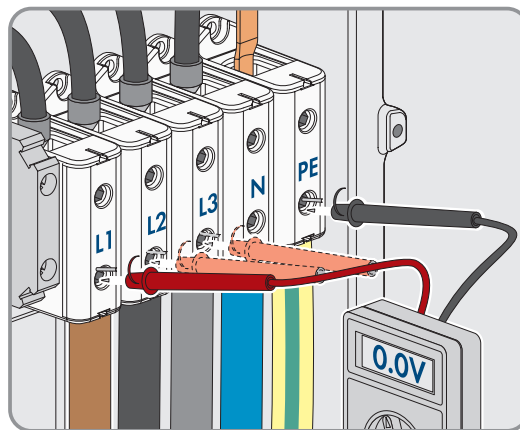
9. Use a current clamp to ensure that no current is present in the DC cables. As a result, a possible residual current can be detected.



10. 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-**.



11. 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.



12. Optional: Shut off the transformer.

Also see:

- [Stopping the inverter](#) ⇒ page 117

11.2 Disconnecting the Battery from Voltage Sources

⚠ QUALIFIED PERSON

⚠ 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.

- Have the inverter and the battery mounted, installed and commissioned only by qualified persons with the appropriate skills.
- Disconnect the system from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Wear suitable personal protective equipment for all work on the product.

⚠ WARNING

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

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

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

⚠ CAUTION

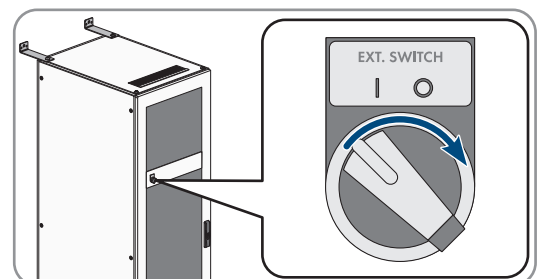
Risk of injury due to electric shock after decommissioning.

Voltages of 60 V can be present at the DC intermediate circuit between the battery and inverter even after the battery is decommissioned. Touching live components in the DC intermediate circuit can result in injury, even if the voltage in question is low.

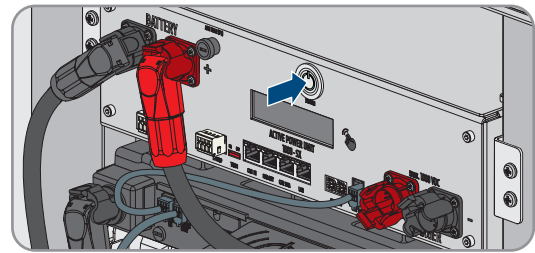
- Do not touch any live components in the DC intermediate circuit.

Procedure:

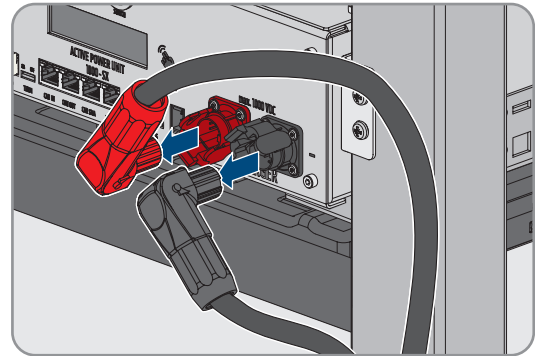
1. Disconnect the inverter from all voltage sources (see Section 11.1, page 119).
2. Switch off the external switch on the outside of the battery cabinet door.



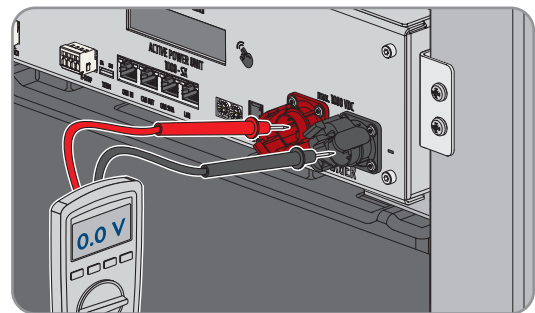
3. Press the **SWITCH** control element on the battery management system.



4. Disconnect the DC cables at the **CHARGER+** and **CHARGER-** connections on the battery management system.



5. Use a suitable measuring device to ensure that no voltage is present at the **CHARGER+** and **CHARGER-** connections.



12 Battery Monitoring Software

12.1 Menu Structure of the Battery Monitoring Software

Battery	Cells	Events	Parameter	System	Select
Charging/Discharging Capacity	Cell Voltage	Event Logbook	Battery parameters	Current Faults	Master
				Version BatMon	Slave
Battery voltage	Cell Temperature	Clear Events	Load Default ¹⁰⁾	Expert Level	
Charging/Discharging Current	SoC (Cell)	Save Events	Save Default ¹⁰⁾		-
Battery temperature	SoH (Cell)	-	Reset APU ¹⁰⁾	Start Logging ¹⁰⁾	-
Balancing Mode	Module Voltage	-	-	Firmware Download ¹⁰⁾	-
Charge Cycle (kWh)	Charging/Discharging Capacity	-	-	Communication Port ¹⁰⁾	-
Discharge Cycle (kWh)	Temperature DBO (Dynamix Battery Optimizer)	-	-	-	-
SoC (State of Charge)	-	-	-	-	-
SoH (State of Health)	-	-	-	-	-
Warning - Time	-	Data Displayed	Expert Settings ¹⁰⁾	Functions	-
Temperature APU (Battery Management System)	-		Only with Password ¹⁰⁾	-	-

12.2 Installing the Battery Monitoring Software

QUALIFIED PERSON

Requirements:

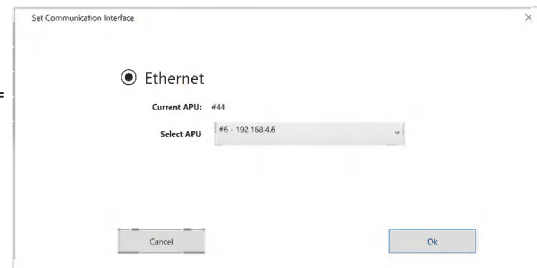
- A mobile end device (e.g., laptop) must be available as a service PC.
- A Microsoft Windows-based operating system must be installed on the service PC.
- The communication between the battery and battery inverter must be conducted via the supplied switch.
- The service PC must be connected to this switch.
-
- The file containing the current BatMon battery monitoring software must be available. The battery monitoring software is available for download on the product page at www.SMA-Solar.com.

¹⁰⁾ This parameter has a direct impact on the battery and is exclusively reserved for certified professionals. Therefore, it is password-protected. The password can be requested directly from Service.

- The serial number of battery management system must be known. If there is more than one battery cabinet, the serial number of the battery management system of the primary battery cabinet must be used. The serial number is on the underside of the battery management system enclosure or is shown on the battery management system display.
- The IP address of battery management system must be known. If there is more than one battery cabinet, the IP address of the battery management system of the primary battery cabinet must be used. The IP address can be queried via the battery management system display.

Procedure:

1. Start the installation of the battery monitoring software.
2. Following the instructions in the installation program. Do not change the installation path suggested by the installation program.
3. Launch the **BatMon.exe** file and follow the instructions in the program.
 - A prompt asking whether full access in the network should be possible appears automatically.
4. Check all boxes in this prompt.
5. If the automatic prompt about network access does not appear, open the **System** menu.
6. Click the **Communication Port** button.
7. In the **Select APU** input field, enter the serial number and IP address of the battery management system as shown in the graphic as an example (example: serial number = 6, IP address = 192.168.4.6)



- The battery monitoring software establishes the connection to the battery management system.
- If the configuration is correct and the connection to the battery management system is successful, a green continuous circle and the display **online** appear in the bottom right corner of the battery monitoring software user interface.

12.3 Loading Default Parameters

⚠ QUALIFIED PERSON

Requirements:

- A mobile end device (e.g., laptop) must be available.
- The BatMon battery monitoring software must be open and you must be logged in with Installer rights at a minimum.

Procedure:

1. Select **Parameter > Load Default**.
2. Follow the steps in the battery monitoring software.

Also see:

- [Menu Structure of the Battery Monitoring Software](#) ⇒ page 123

12.4 Changing the Network Configuration of the Battery

QUALIFIED PERSON

Requirements:

- A mobile end device (e.g., laptop) must be available.
- The BatMon battery monitoring software must be open and you must be logged in with Installer rights at a minimum.

Procedure:

1. Select **System > Communication Port**.
2. Follow the steps in the battery monitoring software.

Also see:

- [Menu Structure of the Battery Monitoring Software](#) ⇒ page 123

13 Cleaning and Maintenance

13.1 Safety Information for Cleaning and Maintenance

⚠ 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.

- Have the inverter and the battery mounted, installed and commissioned only by qualified persons with the appropriate skills.
- Disconnect the system from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Wear suitable personal protective equipment for all work on the product.

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 inverter and all its components only with a cloth moistened with clear water.
- Clean all battery components with a dry cloth only.

i Maintenance work

Follow the local regulations and standards whenever performing maintenance work.

13.2 Maintenance Interval

The cleaning and maintenance work must be performed every 12 months at the latest.

i Adverse ambient conditions reduce maintenance intervals

Location and ambient conditions influence the maintenance intervals. Note that cleaning and corrosion protection may be required more frequently depending on the conditions at the installation site.

- If the product is subject to adverse ambient conditions, a reduction of the maintenance intervals is recommended. Above all, the intervals between cleaning work and corrosion protection should be reduced.
- SMA recommends a monthly optical inspection to determine the maintenance requirement.

13.3 Cleaning and Maintenance Materials

- Torque wrench
- Brush or broom for cleaning the interspaces
- Clean cloth (dry)
- Water-free lubricant suitable for spraying
- Mobiles end device (e.g., laptop) with BatMon software

13.4 Torques

Bolted connection	Tools	Torque
Grounding of battery management system	Hexagon socket, AF10	6 Nm
Central grounding point in battery cabinet	Hexagon socket, AF13	8 Nm

Bolted connection	Tools	Torque
Attaching battery management system and battery modules	PH2	3 Nm
Connecting DC cables in inverter	Hexagon socket, AF16	24 Nm \pm 2 Nm

13.5 Cleaning and Maintenance Procedure

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

Procedure	See
1. Disconnect the battery and inverter from voltage sources.	Section 11, page 119
2. Check electrical connections.	Section 13.6, page 127
3. Perform visual inspection of battery.	Section 13.7, page 128
4. Clean and maintain battery cabinet.	Section 13.8, page 128
5. Clean and maintain battery management system.	Section 13.9, page 129
6. Clean and maintain battery modules.	Section 13.10, page 130
7. Document system condition.	Section 13.11, page 130
8. Clean inverter fans.	Section 13.12, page 130
9. Recommission battery and inverter.	Commissioning
10. Check inverter fans.	Section 13.13, page 132

13.6 Checking Electrical Connections

QUALIFIED PERSON

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.

- Have the inverter and the battery mounted, installed and commissioned only by qualified persons with the appropriate skills.
- Disconnect the system from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Wear suitable personal protective equipment for all work on the product.

Maintenance work

Follow the local regulations and standards whenever performing maintenance work.

These electrical connections must be checked every 12 months:

Requirements:

- A mobile end device (e.g., laptop) must be connected to the battery management system.

- The BatMon software must be installed on this end device.

Procedure:

1. Disconnect the inverter from voltage sources (see Section 11.1, page 119).
2. Disconnect the battery from voltage sources (see Section 11.2, page 121).
3. Check and resecure all connectors in the battery cabinet.
4. Check that all screwed electrical connections have been tightened with the correct torque.
5. If any connections are not tightened with the correct torque, tighten with a suitable torque wrench.
6. Check the state of charge (SoC), state of health (SoH), cell voltages, and temperatures of the battery modules for irregularities. Use the BatMon software for this.
7. If you find any irregularities, contact Service.
8. In the BatMon software, open the **Battery** and **Cell** pages for each battery module and document the content of these pages as a screenshot.
9. Archive all screenshots together with the event messages as a PDF.

Also see:

- [Torques](#) ⇒ page 126
- [Battery Monitoring Software](#) ⇒ page 123

13.7 Performing a Visual Inspection of the Battery

QUALIFIED PERSON

1. Check that the supplied battery cabinet type label and the supplied battery room label are correctly affixed.
2. Check that the ambient conditions of the battery still meet the climatic requirements. Consult the data recorded by the temperature and humidity sensor for this.
3. If the ambient conditions of the battery do not meet the climatic requirements, decommission the system and contact Service for a more detailed examination of the system. Find and eliminate the causes of the deviation in the ambient conditions.
4. Check for any visible signs of moisture around the battery.
5. If there are visible signs of moisture around the battery, decommission the system and contact Service for a more detailed examination of the system. Find and eliminate the causes of the moisture.
6. Check for any changes to the network.
7. Check that all electrical safety devices (e.g., AC miniature circuit breaker, circuit breaker in the DC distributor, and external switches in the battery cabinet doors) are intact.
8. If an electrical safety device is defective, find and eliminate the causes of the defect. Contact Service, if required.
9. Check for any conversions to or around the system.
10. Check that the system is working in accordance with the system operator's expectations.
11. Document all inspection results.
12. Remove dirt or dust deposits with a dry cloth.

Also see:

- [Safety Information for Cleaning and Maintenance](#) ⇒ page 126

13.8 Cleaning and Maintaining the Battery Cabinet

QUALIFIED PERSON

1. Disconnect the battery and inverter from voltage sources (see Section 11, page 119).

2. Ensure that the front of the battery cabinet is not obstructed.
3. Ensure that the ventilation slots in the battery cabinet are unobstructed.
4. Check the battery cabinet enclosure for any damage such as scratches, dents, or corrosion damage.
5. If the battery cabinet enclosure exhibits damage, contact Service.
6. Spray all moving parts of the latch with a suitable, water-free lubricant.
7. Spray all moving parts of the door hinges with a suitable, water-free lubricant.
8. Ensure that the battery cabinet ground is firmly tightened (hexagon socket, AF13, torque: 8 Nm).
9. Document all inspection results.

Also see:

- [Safety Information for Cleaning and Maintenance](#) ⇒ page 126

13.9 Cleaning and Maintaining the Battery Management System

QUALIFIED PERSON

Overwriting of custom settings during firmware update

After the update, the parameter defaults must be loaded. This overwrites custom settings.

- Contact Service for the firmware update. Advise Service of the custom settings.

Procedure:

1. Disconnect the battery and inverter from voltage sources (see Section 11, page 119).
2. Start the BatMon software and connect it to the battery management system.
3. Update the firmware. Contact Service for this.
4. Restart the battery management system. To do this, press the external switch on the battery cabinet door and the **SWITCH** control element on the battery management system.
5. Check for any events reported by the battery management system during the restart.
6. If the battery management system reports an event during the restart, investigate the cause of the event message.
7. If error messages are shown on the display during the restart of the battery management system, find and eliminate the error causes.
8. Ensure that the connectors of all DC cables and all communication cables on the battery management system are tight.
9. Check that the display turns on after it is tapped and turns off again after 10 seconds.
10. Switch off the battery management system. To do this, press the **SWITCH** control element on the battery management system and the external switch on the battery cabinet door.
11. Clean the battery management system with a dry cloth.
12. Document all inspection results.

Also see:

- [Battery Monitoring Software](#) ⇒ page 123
- [Battery Event Messages](#) ⇒ page 152
- [Activating the Battery Management System Display](#) ⇒ page 104
- [Safety Information for Cleaning and Maintenance](#) ⇒ page 126

13.10 Cleaning and Maintaining the Battery Modules

⚠ QUALIFIED PERSON

1. Disconnect the battery and inverter from voltage sources (see Section 11, page 119).
2. Check the battery modules for any damage such as scratches, dents, or corrosion damage.
3. Ensure that the connectors of all DC cables and all communication cables on the battery modules are tight.
4. Remove all dirt (e.g., foreign objects) between the battery modules.
5. Clean the battery modules with a dry cloth.
6. Clean the battery module fan with a soft brush, a paint brush, or a dry cloth.
7. Document all inspection results.

Also see:

- [Safety Information for Cleaning and Maintenance](#) ⇒ page 126

13.11 Documenting the System Status

⚠ QUALIFIED PERSON

Documenting the system status helps Service and may be requested if an error diagnosis is required.

Requirements:

- A mobile end device (e.g., laptop) must be available.
- The BatMon battery monitoring software must be open and you must be logged in.

Procedure:

1. Read the current measured values on the energy meters.
2. Document the charging capacity (**Charge**) and discharging capacity (**Discharge**).
3. Using the BatMon battery monitoring software, read the current values of the parameters **A_EOL_COUNT** / **A_Contactor_Count** / **A_Contactor_Count_OC** and document them.
4. Using the BatMon battery monitoring software, read the status of the battery modules at module level.
5. Document the status of the battery modules at module level with screenshots.
6. Using the BatMon battery monitoring software, document the current state of charge, state of health, cell voltage, and temperature.
7. If the current state of charge, state of health, cell voltage, or temperature are not as expected, decommission the system and contact Service.
8. Using the BatMon battery monitoring software, save the event messages displayed by the battery.

13.12 Cleaning the fans of the inverter

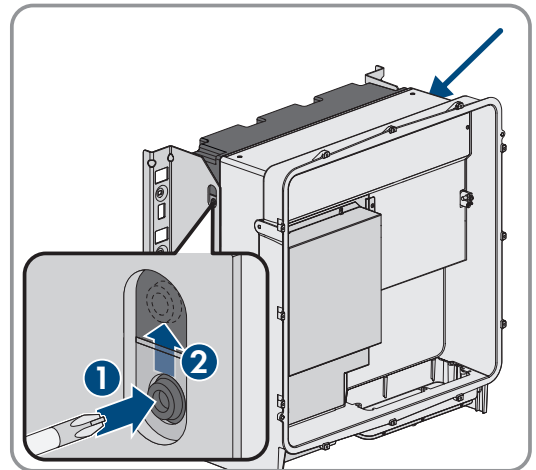
⚠ QUALIFIED PERSON

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.

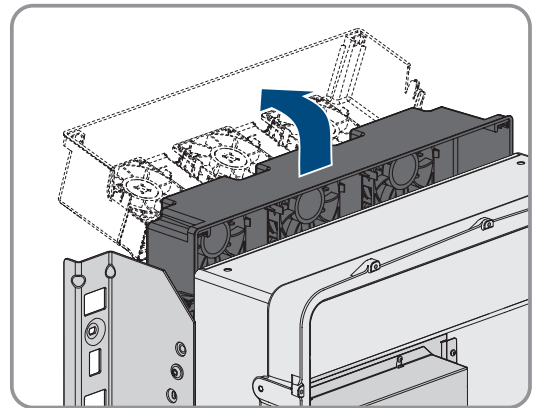
Procedure:

1. Disconnect the inverter from all voltage sources (see Section 11.1, page 119).

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



- 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.

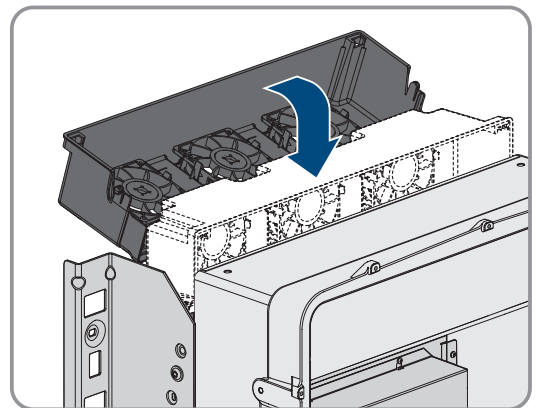


4.

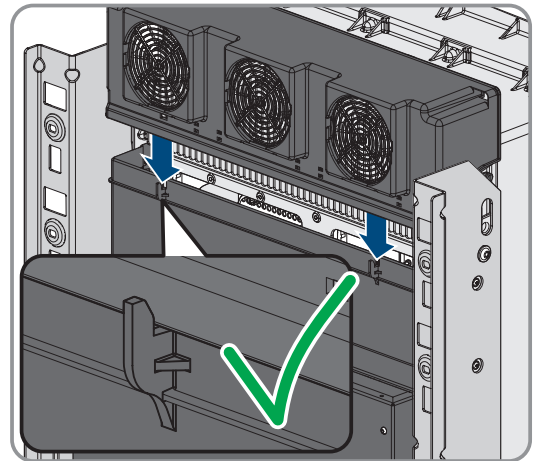
NOTICE**Damage to the fans due to compressed air**

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

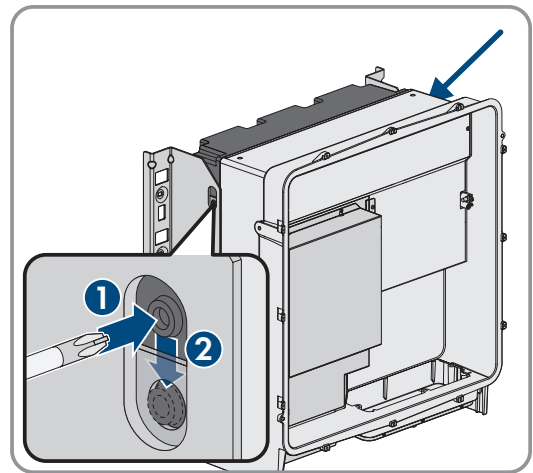
- If the cooling fins are dirty, clean them using a soft brush.
- Insert the locking tabs on the left and right of the fan bracket into the recesses and the top into the suspensions.



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. Recommission the inverter.

Also see:

- [Commissioning the Inverter](#) ⇒ page 90

13.13 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 parameter **Lüftertest** or **Fan test** and set it to **Lüfter Kühlkörper** or **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 parameter **Lüftertest** or **Fan test** and set to **Aus** or **Off**
5. Save settings.

14 Troubleshooting

14.1 Displaying Event Messages

Type of event messages	Indication
Battery event messages	<p>Battery event messages are shown on the battery management system display. Battery event messages are shown with a 3-digit ID number and an event type:</p> <ul style="list-style-type: none"> • Information (I): Status information, not an error • Warning (W): Battery continues to run. Restrictions may be imposed. • Fault (F): Battery switches off.
Inverter event messages	<p>Inverter event messages are shown via the inverter user interface. The existence of a warning or error is additionally indicated by the red LED on the inverter.</p>

Also see:

- [LED Signals of the Inverter](#) ⇒ page 34
- [Inverter Event Messages](#) ⇒ page 133
- [Battery Event Messages](#) ⇒ page 152

14.2 Inverter Event Messages

14.2.1 Event 101

QUALIFIED PERSON

Event message:

- Grid incident

Explanation:

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

Corrective measures:

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.
If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

14.2.2 Event 102

QUALIFIED PERSON

Event message:

- Grid incident

Explanation:

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

Corrective measures:

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.
If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.
If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

14.2.3 Event 103**⚠ QUALIFIED PERSON****Event message:**

- Grid incident

Explanation:

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

Corrective measures:

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.
If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.
If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

14.2.4 Event 105**⚠ QUALIFIED PERSON****Event message:**

- Grid incident

Explanation:

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

Corrective measures:

- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.
If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.
If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

14.2.5 Event 202**⚠ QUALIFIED PERSON****Event message:**

- Grid incident

Explanation:

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

Corrective measures:

- Ensure that the miniature circuit breaker is switched on.
- Ensure that the AC cable is not damaged and that it is connected correctly.
- Ensure that the country standard has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

14.2.6 Event 203

⚠ QUALIFIED PERSON**Event message:**

- Grid incident

Explanation:

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

Corrective measures:

- Ensure that the miniature circuit breaker is switched on.
- Ensure that the AC cable is not damaged and that it is connected correctly.
- Ensure that the country standard has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

14.2.7 Event 206

⚠ QUALIFIED PERSON**Event message:**

- Grid incident

Explanation:

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

Corrective measures:

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

- Ensure that the country standard has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.
If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must agree with an adjustment of the voltage at the feed-in point or with a change of the monitored operating limits.
If the grid voltage is permanently within the permissible range and this message is still displayed, contact the Service.

14.2.8 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.

14.2.9 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.

14.2.10 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.

14.2.11 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 his approval, discuss any changes to the operating parameters with the Service.

14.2.12 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.

14.2.13 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 cabling 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 his approval, discuss any changes to the operating parameters with the Service.

14.2.14 Event 1302

QUALIFIED PERSON

Event message:

- Wait for grid voltage
- Grid connection installation error
- Check grid connections 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.

14.2.15 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.

14.2.16 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.

14.2.17 Event 3401

QUALIFIED PERSON

Event message:

- DC overvoltage
- Disconnecting the DC side

Explanation:

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

Corrective measures:

- **Immediately** disconnect the inverter from all voltage sources.
- Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC cables to the inverter.
- If the DC voltage is above the maximum DC voltage of the inverter, ensure that the correct battery has been selected.
- If this message is repeated frequently, contact the Service.

14.2.18 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.

14.2.19 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.

14.2.20 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.

14.2.21 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.

14.2.22 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.

14.2.23 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.

14.2.24 Event 6001-6468

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Device fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.25 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.

14.2.26 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.

14.2.27 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.

14.2.28 Event 6511

QUALIFIED PERSON

Event message:

- 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.

14.2.29 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 .

14.2.30 Event 6602

QUALIFIED PERSON

Event message:

- Overvoltage grid (AF)

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.

14.2.31 Event 6603

QUALIFIED PERSON

Event message:

- Self-diagnosis

- Overcurrent grid

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.32 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.

14.2.33 Event 6804

Event message:

- Self-diagnosis > Device disturbance

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.34 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.

14.2.35 Event 7702

⚠ QUALIFIED PERSON**Event message:**

- Self-diagnosis
- Device fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.36 Event 7703**⚠ QUALIFIED PERSON****Event message:**

- Self-diagnosis
- Device fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.37 Event 7727**⚠ QUALIFIED PERSON****Event message:**

- DC relay opened unintentionally

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.38 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.

14.2.39 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.

14.2.40 Event 8003**⚠ QUALIFIED PERSON****Event message:**

- Active power limit Temperature

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.

14.2.41 Event 8104**⚠ QUALIFIED PERSON****Event message:**

- Communication failure

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.42 Event 9002**⚠ QUALIFIED PERSON****Event message:**

- SMA Grid Guard 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.

14.2.43 Event 9003

QUALIFIED PERSON

Event message:

- Grid parameters 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.

14.2.44 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 the Service.

14.2.45 Event 9102

QUALIFIED PERSON

Event message:

- Permanent operation inhibition

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.46 Event 9107

QUALIFIED PERSON

Event message:

- Self-diagnosis
- Device fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.47 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.

14.2.48 Event 9307

QUALIFIED PERSON

Event message:

- Defect or fault in the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.49 Event 9308

QUALIFIED PERSON

Event message:

- The timeout monitoring system of the 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).

14.2.50 Event 9311

QUALIFIED PERSON

Event message:

- Overvoltage battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.51 Event 9312

QUALIFIED PERSON

Event message:

- Undervoltage battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.52 Event 9313

QUALIFIED PERSON

Event message:

- Overtemperature battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.53 Event 9314

QUALIFIED PERSON

Event message:

- Undertemperature battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.54 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 Service.

14.2.55 Event 9316

QUALIFIED PERSON

Event message:

- Internal battery hardware fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.56 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.

14.2.57 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 Service.

14.2.58 Event 9352

QUALIFIED PERSON

Event message:

- Battery system short circuit

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.59 Event 9353

QUALIFIED PERSON

Event message:

- Error thermal management 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.

14.2.60 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.

14.2.61 Event 9392

QUALIFIED PERSON

Event message:

- Overcurrent charge battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.62 Event 9393

QUALIFIED PERSON

Event message:

- Overcurrent discharge battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

14.2.63 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.

14.2.64 Event 9395

Event message:

- Battery separated externally

Explanation:

The DC power connection to the battery was disconnected.

14.2.65 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 Service.

14.2.66 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.

14.2.67 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.

14.2.68 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.

14.3 Battery Event Messages

14.3.1 Event I102

QUALIFIED PERSON

Event message:

- I102 Reset

Explanation:

Battery management system restart.

After five unsuccessful restart attempts, the battery management system enters sleep mode.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.2 Event F104

QUALIFIED PERSON

Event message:

- F104 Current Sensing Error

Explanation:

Erroneous current measurement.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.3 Event I110

Event message:

- I110 Precharge

Explanation:

Battery management system starts precharging of the battery inverter.

14.3.4 Event F121

QUALIFIED PERSON

Event message:

- F121 Parameter Fault

Explanation:

A parameter value is outside the safety range.

Corrective measures:

- Load default parameters.
- Perform a restart. This overwrites the parameters adapted on a system-specific basis.

14.3.5 Event I122

Event message:

- I122 Event buffer cleared

Explanation:

The message memory has been cleared.

14.3.6 Event I123

Event message:

- I123 Default Parameter loaded

Explanation:

The default parameter values have been loaded.

Corrective measures:

- Contact Service to have system-specific parameter settings restored.

14.3.7 Event F201

QUALIFIED PERSON

Event message:

- F201 IsoSPI Connection Timeout

Explanation:

Communication between the battery management system and battery modules has been interrupted.

Corrective measures:

- Check the communication cable connections in the battery cabinet.
- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.8 Event W202

QUALIFIED PERSON

Event message:

- W202 Master/Slave Communication time out

Explanation:

Communication fault between the battery management systems of the individual battery cabinets.

Corrective measures:

- Check the address and terminator settings on the battery management systems of all battery cabinets.
- Check the communication cable connections in the battery cabinet.

14.3.9 Event W203

⚠ QUALIFIED PERSON**Event message:**

- W203 SPI Fault

Explanation:

Communication fault between the battery modules.

Corrective measures:

- Check the communication cables between the battery management system and battery modules.
- Replace defective communication cables.
- If the error persists, contact Service.

14.3.10 Event F205

⚠ QUALIFIED PERSON**Event message:**

- F205 No. Modules Master/Slave not consistent

Explanation:

A secondary battery cabinet has a different number of battery modules than the primary battery cabinet.

Corrective measures:

- Check the communication cable connections in the battery cabinets.
- Check the address and terminator settings on the battery management systems of all battery cabinets.
- Disconnect the battery and inverter from voltage sources.
- Recommission each battery cabinet and check the number of displayed battery modules.

14.3.11 Event F206

⚠ QUALIFIED PERSON**Event message:**

- F206 Balancing Selftest (Startup) failed

Explanation:

The self-test of the DynamiX Battery Optimizer in one battery module failed.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery from voltage sources.
- Contact the Service.

14.3.12 Event F207

QUALIFIED PERSON

Event message:

- F207 Module Configuration Fault

Explanation:

Different number of configured and communicating battery modules.

Corrective measures:

- Perform a restart.
- Perform a reconfiguration.
- If the error persists, decommission the system.
- Contact the Service.

14.3.13 Event F208

QUALIFIED PERSON

Event message:

- F208 I_String1 Offset Fault

Explanation:

The measured current value is implausible.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery from voltage sources.
- Contact the Service.

14.3.14 Event F209

QUALIFIED PERSON

Event message:

- F209 Cell Configuration Fault

Explanation:

Voltage detected at a measurement channel of the DynamiX Battery Optimizer in a battery module that should not have any battery cell connected to it.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery from voltage sources.
- Contact the Service.

14.3.15 Event F211

QUALIFIED PERSON

Event message:

- F211 Difference $V_{\text{String}}/V_{\text{ext}}$ too high

Explanation:

Difference between external and internal voltage measurement is too high.

Corrective measures:

- Perform a restart.
- Check the module configuration and correct errors in the module configuration.
- If the error persists, decommission the system.
- Contact the Service.

14.3.16 Event F212

QUALIFIED PERSON

Event message:

- F212 Reverse Polarity detected V_{ext}

Explanation:

Negative voltage measured at the output.

Corrective measures:

- Check all DC cable connections in the system.
- If the error persists, decommission the system.
- Contact the Service.

14.3.17 Event F213

QUALIFIED PERSON

Event message:

- F213 Contactor Fault

Explanation:

Contactor is defective.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.18 Event F214

QUALIFIED PERSON

Event message:

- F214 Reference Voltage Fault

Explanation:

Hardware fault detected.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Check whether all DC cables are connected correctly on the battery.
- Check whether all AC and DC cables are connected correctly on the inverter.
- Contact the Service.

14.3.19 Event W215

⚠ QUALIFIED PERSON**Event message:**

- W215 High Temperature Difference (Module) Warning

Explanation:

An excessively high temperature difference has been measured in a battery module.

The system makes the regular power available again once the temperature difference is in the permitted range.

Corrective measures:

- If the warning is more frequent or continuous, check around the battery for external heat or cold sources.
- If there are any external heat or cold sources around the battery, remove them.

14.3.20 Event W216

⚠ QUALIFIED PERSON**Event message:**

- W216 High Temperature Difference (String) Warning

Explanation:

An excessively high temperature difference has been measured in a battery cabinet.

The system makes the regular power available again once the temperature difference is in the permitted range.

Corrective measures:

- If the warning is more frequent or continuous, check around the battery for external heat or cold sources.
- If there are any external heat or cold sources around the battery, remove them.

14.3.21 Event F217

⚠ QUALIFIED PERSON**Event message:**

- F217 Balancing Selftest Fault

Explanation:

The self-test of the DynamiX Battery Optimizer failed.

Corrective measures:

- Perform a restart.
- Check the current error messages for any reported hardware errors.

14.3.22 Event F218

QUALIFIED PERSON

Event message:

- F218 Temperature NTC open wire

Explanation:

Contact fault in temperature line.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.23 Event F219

QUALIFIED PERSON

Event message:

- F219 Temperature NTC short circuit

Explanation:

Contact fault in temperature line.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.24 Event F220

QUALIFIED PERSON

Event message:

- F220 LTC Diagnose: Open Wire

Explanation:

Contact fault between DynamiX Battery Optimizer and battery cell.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.25 Event F221

QUALIFIED PERSON

Event message:

- F221 LTC Diagnose Fault: Category 1

Explanation:

Internal DynamiX Battery Optimizer fault.

Corrective measures:

- Perform a restart.

- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.26 Event F222

QUALIFIED PERSON

Event message:

- F222 LTC Diagnose Fault: Category 2

Explanation:

Internal DynamiX Battery Optimizer fault.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery and inverter from voltage sources.

14.3.27 Event F223

QUALIFIED PERSON

Event message:

- F223 LTC Diagnose Fault: Sum of Cell Fault

Explanation:

Internal DynamiX Battery Optimizer fault.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.28 Event F301

QUALIFIED PERSON

Event message:

- F301 DBO Board Temperature Max

Explanation:

DynamiX Battery Optimizer overtemperature fault. The battery will be disconnected and the balancing feature will be disabled.

Corrective measures:

- Allow the battery to cool down.
- Perform a restart.
- If the error is more frequent, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.29 Event F305

QUALIFIED PERSON

Event message:

- 305 Balancer Temperature High

Explanation:

DynamiX Battery Optimizer balancer overtemperature fault.

Corrective measures:

- If the error is more frequent, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.30 Event W310

Event message:

- W310 Contactor EOL Warning

Explanation:

The contactors are nearing the end of their service life. Maintenance or replacement is required.

Corrective measures:

- Contact the Service.

14.3.31 Event W311

Event message:

- W311 Contactor EOL OC Warning

Explanation:

The contactors are nearing the end of their service life as a result of shutdowns due to overcurrent. Maintenance or replacement is required.

Corrective measures:

- Contact the Service.

14.3.32 Event F360

Event message:

- F360 Contactor EOL reached

Explanation:

The contactors have reached the end of their service life. Maintenance or replacement is required.

Corrective measures:

- Contact the Service.

14.3.33 Event F361

Event message:

- F361 Contactor EOL OC reached

Explanation:

The contactors have reached the end of their service life as a result of shutdowns due to overcurrent. Maintenance or replacement is required.

Corrective measures:

- Contact the Service.

14.3.34 Event I701**⚠ QUALIFIED PERSON****Event message:**

- I701 External Heart Timeout.

Explanation:

More than 15 minutes have passed since a heartbeat signal was received via the Modbus interface.

Corrective measures:

- Check the network connection and network configuration.

14.3.35 Event F911**⚠ QUALIFIED PERSON****Event message:**

- F911 Permanent System Lock

Explanation:

The system was operated in a manner that is not compliant with its intended use and has been shut down for safety reasons. The display shows **SYS LOCK**.

This error cannot be acknowledged. A on-site inspection of the system by Service is required.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.36 Event F921**Event message:**

- F921 Cell Max Voltage

Explanation:

Battery cell overvoltage fault.

Corrective measures:

- Contact the Service.

14.3.37 Event F922**Event message:**

- F922 Cell Min Voltage

Explanation:

Battery cell undervoltage fault.

Corrective measures:

- Contact the Service.

14.3.38 Event F923**⚠ QUALIFIED PERSON****Event message:**

- F923 Battery Max Temperature

Explanation:

A battery cell has exceeded the upper temperature limit.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Allow the battery to cool to at least 25°C.
- Ensure that all cables on the battery modules are connected correctly.
- Ensure that aeration and ventilation of the battery-storage systems is working properly.
- Recommission the system.

14.3.39 Event F924**⚠ QUALIFIED PERSON****Event message:**

- F924 Battery Min Temperature

Explanation:

A battery cell has exceeded the lower temperature limit.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Raise the battery ambient temperature to at least 5°C.
- Recommission the system.

14.3.40 Event F927**⚠ QUALIFIED PERSON****Event message:**

- F927 Battery High Current (I_MAX)

Explanation:

Shutdown due to overcurrent. This error is automatically acknowledged three times.

Corrective measures:

- If the error is more frequent, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.41 Event F928

QUALIFIED PERSON

Event message:

- F928 Hardware Safety Block / HW High Current

Explanation:

Hardware shutdown due to overcurrent. This error is automatically acknowledged three times.

Corrective measures:

- If the error is more frequent, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.42 Event F931

QUALIFIED PERSON

Event message:

- F931 Dynamic Cell Imbalance Fault

Explanation:

Dynamic cell imbalancing detected. This can indicate a defective battery cell.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.43 Event F932

QUALIFIED PERSON

Event message:

- F932 Static Cell Imbalance Fault

Explanation:

Static cell imbalancing detected. This can indicate defective a battery cell.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.44 Event F933

QUALIFIED PERSON

Event message:

- F933 APU Temperature Max

Explanation:

The temperature limit value of the battery management system has been reached.

Corrective measures:

- Allow the battery to cool down. The battery then reconnects automatically.
- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.45 Event F934**⚠ QUALIFIED PERSON****Event message:**

- F934 Precharge Fault

Explanation:

Precharge fault. This error is automatically acknowledged twice.

Corrective measures:

- Check all DC cables on the battery for reverse polarity.
- If there is no reverse polarity, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.46 Event F935**⚠ QUALIFIED PERSON****Event message:**

- F935 Battery EOL reached

Explanation:

A battery module has reached the end of its service life.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.47 Event W937**⚠ QUALIFIED PERSON****Event message:**

- W937 Cell High Voltage

Explanation:

Battery cell overvoltage fault in the battery module.

Corrective measures:

- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.48 Event W938

QUALIFIED PERSON

Event message:

- W938 Cell Low Voltage

Explanation:

Battery cell undervoltage fault in the battery module.

Corrective measures:

- If the error persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.49 Event W939

QUALIFIED PERSON

Event message:

- W939 Battery High Temperature

Explanation:

Battery cell overtemperature fault. The permitted charge and discharge current will be limited.

Corrective measures:

- If the error is more frequent, ensure that all cables on the battery modules are connected correctly.
- Ensure that aeration and ventilation of the battery-storage systems is working properly.

14.3.50 Event W940

QUALIFIED PERSON

Event message:

- W939 Battery Low Temperature

Explanation:

Cell undertemperature fault. The permitted charge and discharge current will be limited.

Corrective measures:

- If possible, raise the battery ambient temperature to at least 5°C.

14.3.51 Event F943

QUALIFIED PERSON

Event message:

- F943 Battery High Current (Temperature Derating)

Explanation:

Overcurrent fault.

Corrective measures:

- Perform a restart.
- If the error persists, disconnect the battery and inverter from voltage sources.

- Contact the Service.

14.3.52 Event W947

QUALIFIED PERSON

Event message:

- W947 Dynamic Cell Imbalance Warning

Explanation:

Dynamic cell imbalancing. Dynamic cell imbalancing can indicate defective battery cells.

Corrective measures:

- If the warning is more frequent, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.53 Event W948

QUALIFIED PERSON

Event message:

- W948 Static Cell Imbalance Warning

Explanation:

Static cell imbalancing.

Corrective measures:

- If the warning persists, disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.54 Event W949

Event message:

- W949 APU Temperature High

Explanation:

Battery management system overtemperature fault. The system performance will be limited to 50%.

Corrective measures:

- If the warning is more frequent, contact the Service.

14.3.55 Event W951

Event message:

- W951 Battery EOL Warning

Explanation:

The battery is nearing the end of its service life.

Corrective measures:

- Contact the Service.

14.3.56 Event F972

QUALIFIED PERSON

Event message:

- F972 Isolation Fault

Explanation:

DC cabling insulation fault: The differential current measured is too high.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Check the grounding connection on the battery cabinet.
- Check the grounding connection on the battery management system.
- Check the DC cabling.
- Contact the Service.

14.3.57 Event F973

QUALIFIED PERSON

Event message:

- F973 Isolation sensor Selftest Fault

Explanation:

The differential current sensor is faulty.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

14.3.58 Event F974

QUALIFIED PERSON

Event message:

- F974 Isolation sensor Selftest Fault (Offset)

Explanation:

The differential current sensor is faulty.

Corrective measures:

- Disconnect the battery and inverter from voltage sources.
- Contact the Service.

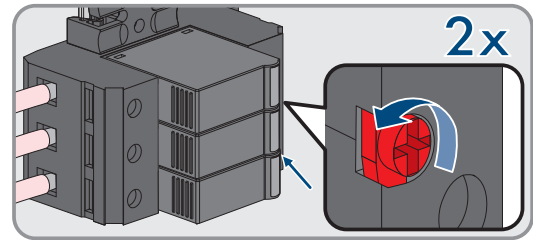
14.4 Replacing the Surge Arrester

QUALIFIED PERSON

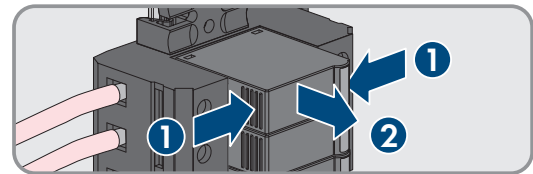
If the inverter displays event number 7801, an error is present in the surge arresters or the surge arresters have tripped. If the surge arresters have tripped, replace the tripped surge arresters with new surge arresters.

Procedure:

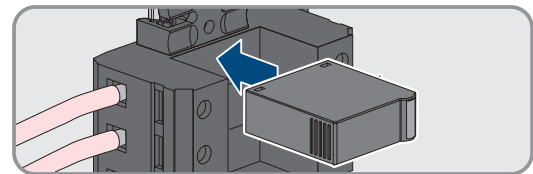
1. Disconnect the product from voltage sources (see Section 11.1, page 119).
2. Unlock the surge arresters by using a screwdriver to turn the latch to the open position.



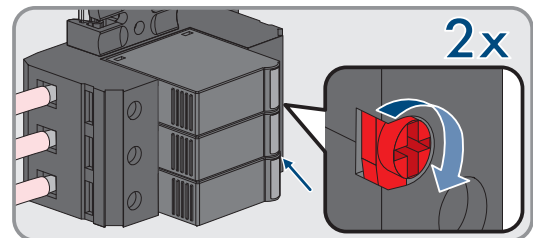
3. Pull the surge arresters out of the slots.



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. Put the product into operation again.

14.5 Cleaning the fans of the inverter

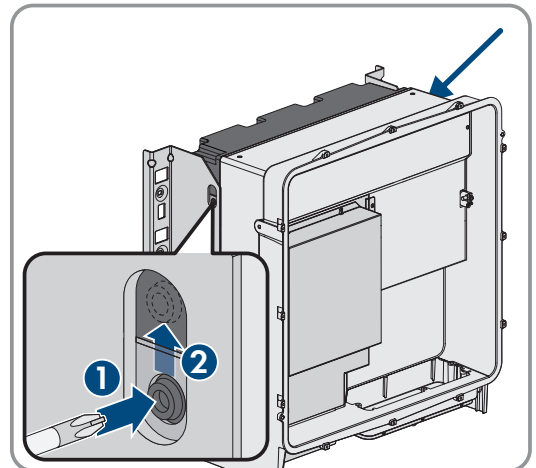
⚠ QUALIFIED PERSON

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.

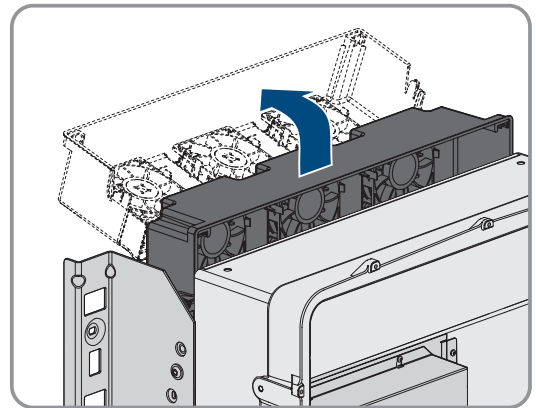
Procedure:

1. Disconnect the inverter from all voltage sources (see Section 11.1, page 119).

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



- 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.

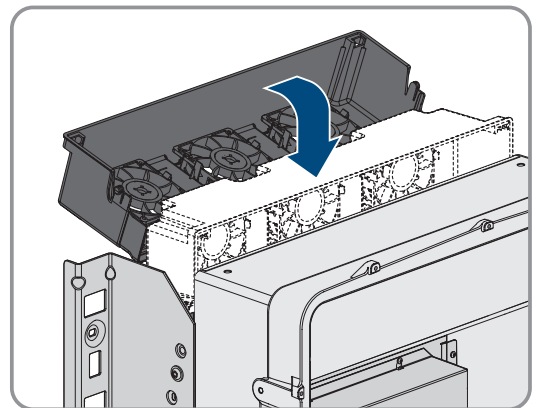


4.

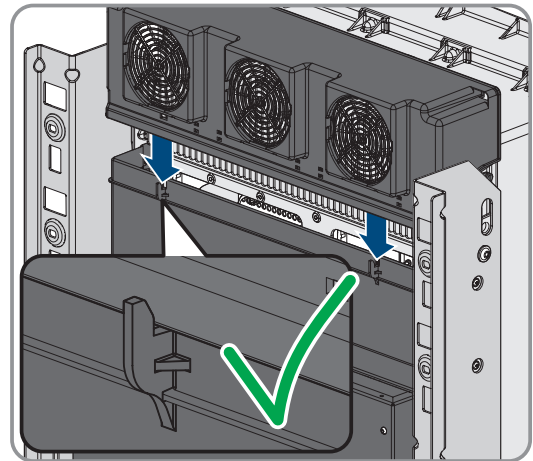
NOTICE**Damage to the fans due to compressed air**

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

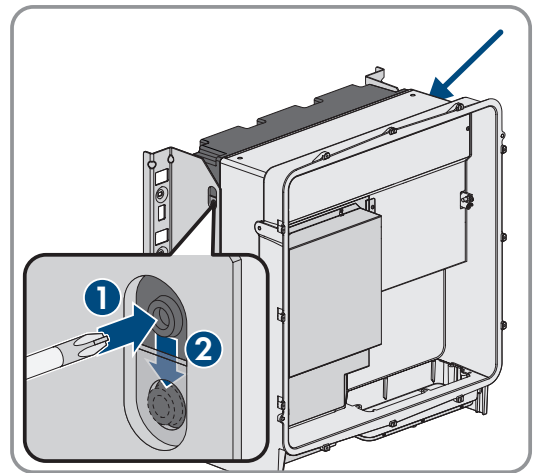
- If the cooling fins are dirty, clean them using a soft brush.
- Insert the locking tabs on the left and right of the fan bracket into the recesses and the top into the suspensions.



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. Recommission the inverter.

Also see:

- [Commissioning the Inverter](#) ⇒ page 90

15 Decommissioning

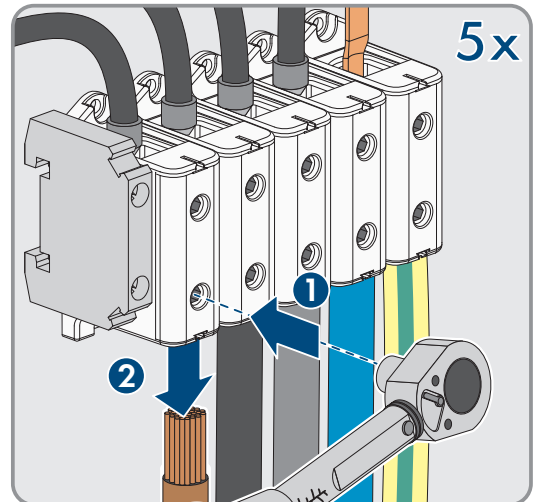
15.1 Disconnect the terminals on the inverter

⚠ QUALIFIED PERSON

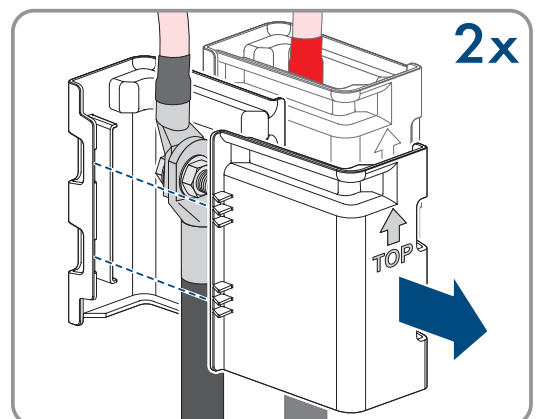
To decommission the product completely upon completion of its service life, first disconnect all connections from the product.

Procedure:

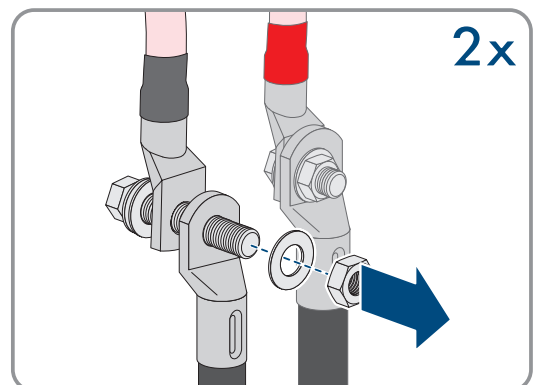
1. Disconnect the product from voltage sources (see Section 11.1, page 119).
2. Remove the AC cable from the inverter. To do so, loosen the screws (AF5) and pull the cables out of the terminal.



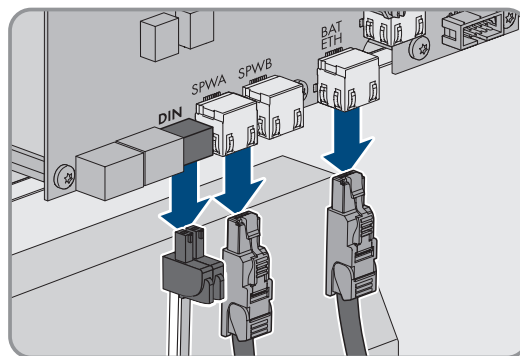
3. Remove the protection elements against contact from the terminal lugs for the DC connection. To do so, unlock the side brackets.



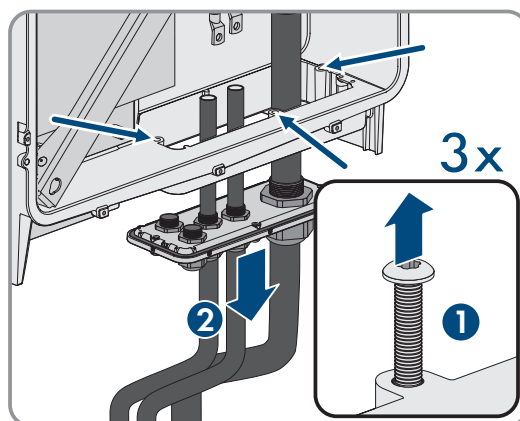
4. Remove the DC cable connection. Loosen the hex nuts (AF10) and remove the combined hexagon head screw (AF16).



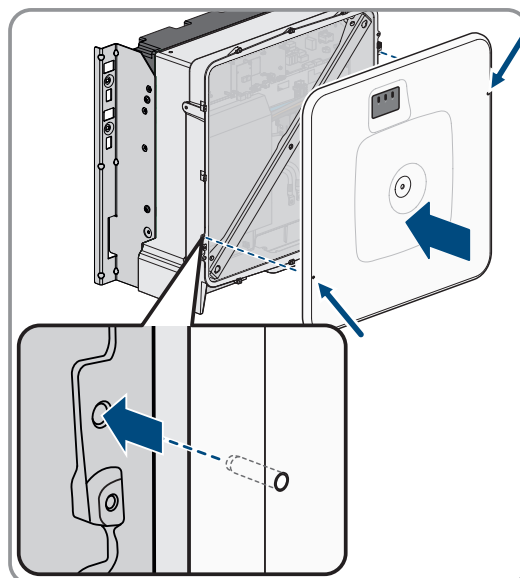
5. Remove the network cables, the battery data cables and the signal cables from the sockets.



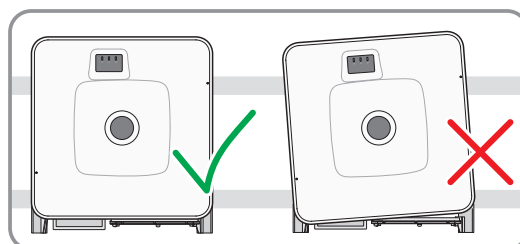
6. Remove all cable glands from the connecting plate. To do so, unscrew the counter nuts from inside and remove the cable glands from the opening.
7. Dismantle the connecting plate. To do so, unscrew the three screws (TX40).



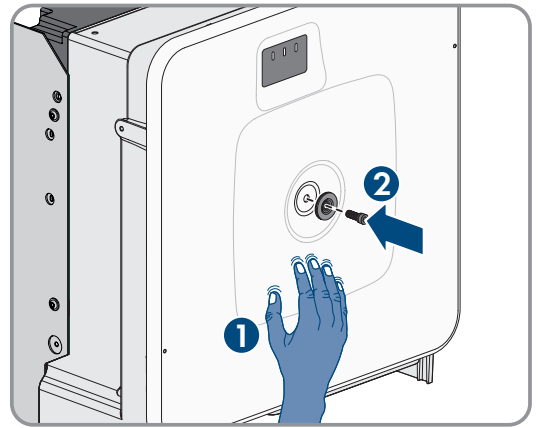
8. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure lid.



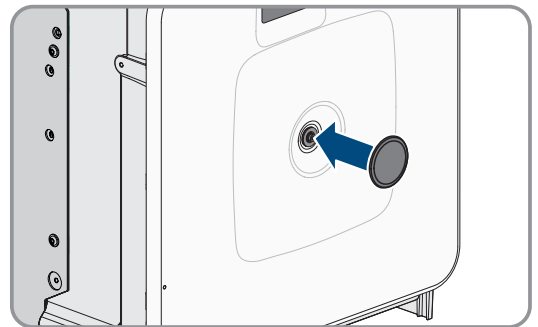
9. Ensure that the cover sits straight on the enclosure.



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 15.3, page 174).



15.2 Disconnecting the Connections on the Battery

⚠ QUALIFIED PERSON

1. Disconnect the battery from voltage sources (see Section 11.2, page 121).
2. On the battery management system of each battery cabinet, detach the connection cable of the external switch from the **EXT SWITCH** socket.
3. On the battery management system of each battery cabinet, disconnect the connectors of the communication cables.
4. On the battery management system of each battery cabinet, disconnect the connectors of the DC cables.
5. On the battery modules of each battery cabinet, disconnect the connectors of the communication cables.
6. On the battery modules of each battery cabinet, disconnect the connectors of the DC cables.
7. On the central ground point of each battery cabinet, undo the bolted ground conductor connection (hexagon socket, AF13).
8. Remove all cables from the battery cabinet.
9. Detach the grounding cable of the battery management system from the grounding point. To do this, loosen the M6 terminal lug (hexagon socket, AF10).

15.3 Disassembling the Inverter

⚠ QUALIFIED PERSON

⚠ CAUTION

Risk of injury due to the weight of the inverter

Injuries may result if the inverter is lifted incorrectly or dropped while being transported or when mounting it to the wall mounting bracket.

- Transport and lift the inverter carefully. In doing so, keep in mind the weight of the inverter.
- Wear suitable personal protective equipment for all work on the product.
- Transport the inverter using the carrying handles or hoist. In doing so, keep in mind the weight of the inverter.
- 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 inverter to attach the hoist system.

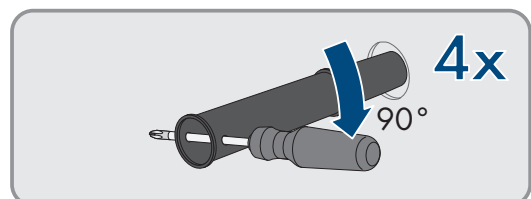
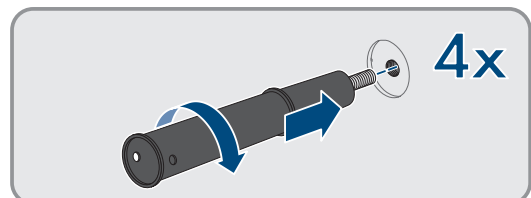
To decommission the inverter completely upon completion of its service life, disassemble the inverter as described in the following.

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.

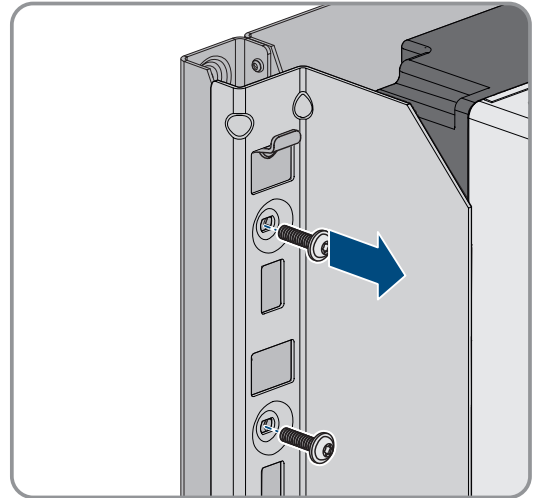
Procedure:

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.

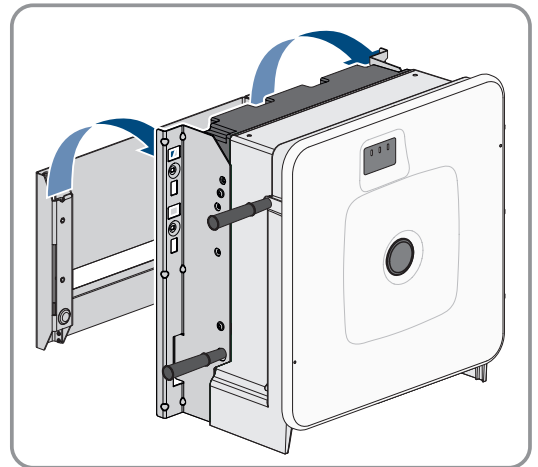


3. If the product should be lifted from the mounting bracket with the help of a hoist, screw the eye bolts into the threads on the top of the product and attach the hoist to them. The hoist must be suitable for the weight of the product.

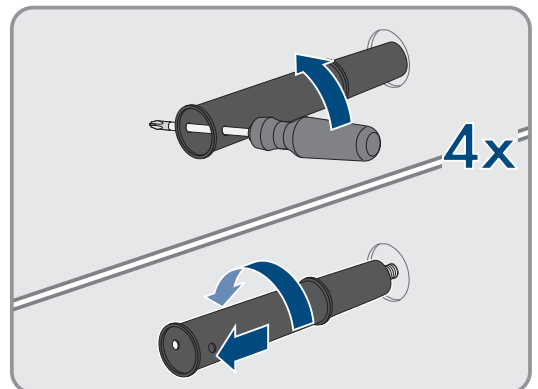
4. Unscrew the screw for securing the product to the mounting brackets on the right and left (TX40).



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:

- [Disconnect the terminals on the inverter](#) ⇒ page 171

15.4 Disassembling the Battery

⚠ QUALIFIED PERSON

⚠ WARNING

Risk of injury due to the weight of the battery components

Injuries may result if the battery components are lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery components carefully. Take the weight of each individual component into account.
- Transport battery components individually only.
- Wear suitable personal protective equipment, at a minimum safety footwear with a non-slip sole and steel cap, for all work on the battery.

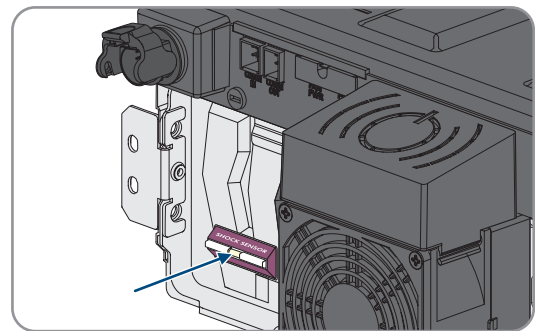
To decommission a battery cabinet completely upon completion of its service life, disassemble it as described in the following.

Requirements:

- All connections in the battery cabinet are disconnected.
- Original packaging or packaging suitable for the weight and dimensions of the battery cabinet is available.
- Original packaging or packaging suitable for the weight and dimensions of the battery management system is available.
- Original packaging or packaging suitable for the weight and dimensions of the battery modules is available.
- Euro pallet for battery cabinet, battery management system, and battery modules are available.
- Mounting material for attaching the packaging on the Euro pallets is available (e.g., tie-down straps).

Procedure:

1. On the uppermost battery module, loosen the bolted connections of the four cage nuts (PH2).
2. Pull the uppermost battery module out of the battery cabinet. Move the battery module carefully so the cage nuts do not fall down.
3. On the battery module, check whether the shock sensor on the front of the battery module has tripped. Tripping of the shock sensor is indicated by a red color in the indication panel.



4. If the shock sensor on a battery module has tripped, document the battery module condition using photographs and contact Service.
5. If the battery module is to be stored or shipped, place it in packaging. Use the original packaging or packaging that is suitable for the weight and dimensions of the battery module for this.
6. Disassemble the rest of the batteries, working from the top to the bottom. Proceed as described for the first battery module.
7. On the battery management system, loosen the bolted connections of the four cage nuts (PH2).
8. Pull the battery management system out of the battery cabinet. Move the battery management system carefully so the cage nuts do not fall down.

9. Detach the battery management system grounding cable from the grounding bolt on the back of the battery management system (hexagon socket, AF10).
10. If the battery management system is to be stored or shipped, place it in packaging. Use the original packaging or packaging that is suitable for the weight and dimensions of the battery management system for this.
11. Ensure that there are no more moving parts (e.g., dropped cage nuts) in the battery cabinet.
12. Close the battery cabinet.
13. Detach the battery cabinet fixing brackets from the wall.
14. Undo the bolted connection of the fixing brackets on the battery cabinet (TX55).
15. To transport the battery cabinet with a crane, remove the four fastening screws (TX55) on the cabinet cover and attach the four supplied eye bolts to the battery cabinet.
16. If the battery cabinet is to be stored or shipped, place the battery cabinet, fixing brackets, and other mounting accessories (e.g., screws) in packaging. Use the original packaging or packaging that is suitable for the weight and dimensions of the battery cabinet for this.
17. Secure all packages to the Euro pallets with tie-down straps.

Also see:

- [Disposal](#) ⇒ page 183
- [Storage](#) ⇒ page 182
- [Disconnecting the Connections on the Battery](#) ⇒ page 173

16 Extension of the Battery

16.1 Safety when Extending the Battery

NOTICE

Damage to battery components and inverters due to high balancing currents

When an additional battery cabinet is integrated into an existing battery, different states of charge and different DC output voltages can cause high balancing currents. High balancing currents can damage battery components and inverters.

- Before connecting a new battery cabinet to the mains, balance the states of charge and DC output voltages.

NOTICE

Damage to battery components and inverters due to incorrect settings on battery management systems

When an additional battery cabinet is integrated into an existing battery, incorrect settings on the battery management systems of the battery cabinets can result in parallel operation of primary battery cabinets. The parallel operation of primary battery cabinets can result in damage to battery components and the inverter.

- Before connecting a new battery cabinet to the mains, balance the states of charge and DC output voltages.

16.2 Possible System Configurations

The storage system can be extended both in terms of the energy content and the charging and discharging capacity. Take the specifications relating to the possible system configurations into account (see Technical Information "System Configuration - SMA Commercial Storage Solution").

Also see:

- [Installing an Additional Battery Module](#) ⇒ page 179
- [Installing an Additional Battery Cabinet](#) ⇒ page 180

16.3 Requirements for Output Voltage and State of Charge

Before extension of the battery can begin, the battery must meet the following requirements for DC output voltage and state of charge.

	Storage-30-20
DC output voltage with four battery modules	313.4 V to 315.4 V
DC output voltage with five battery modules	392 V to 394 V
DC output voltage with six battery modules	470.6 V to 472.6 V
State of charge	20 %
	Storage-50-20
DC output voltage with seven battery modules	549.2 V to 551.1 V
DC output voltage with eight battery modules	627.8 V to 629.8 V
DC output voltage with nine battery modules	706.4 V to 707.4 V
DC output voltage with ten battery modules	785 V to 787 V
State of charge	20 %

16.4 Installing an Additional Battery Module

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Additional battery cabinets may be installed in this battery cabinet a maximum of six months after the battery cabinet is first commissioned.

Procedure:

1. By measuring the voltage at **-POL** and **+POL**, verify whether the DC output voltage of each new battery module is between 78.4 V and 78.6 V.
2. If the DC output voltage of a new battery module is outside the 78.4 V to 78.6 V range, contact Service.
3. By measuring the voltage at **Charger+** and **Charger-**, verify whether the DC output voltage of each installed battery cabinet is in the specified range.
4. If the DC output voltage of an installed battery cabinet is not in the specified range, contact Service.
5. Increase the state of charge of the battery cabinets already installed to 20%. To do this, charge or discharge the battery.
6. Disconnect the battery and battery inverter from voltage sources (see Section 11, page 119).
7. Mount additional battery modules in the battery cabinet.
8. For the additional battery modules, connect the DC cables within the battery cabinet.
9. For the additional battery modules, connect the communication cables within the battery cabinet.
10. Recommission the individual battery cabinets.
11. Commission the inverter.
12. Reconfigure the inverter.

Also see:

- Positioning the battery cabinet ⇒ page 54
- Installing the battery management system ⇒ page 55
- Installing the battery modules ⇒ page 57
- Earthing the battery cabinet ⇒ page 79
- Connecting the External Switch to the Battery Management System ⇒ page 85
- Connecting DC Cables within the Battery Cabinet ⇒ page 83
- Routing DC Cables to the Inverter or DC Distributor in the Battery Cabinet ⇒ page 84
- Connecting DC Cables to the Inverter or DC Distributor in the Battery Cabinet ⇒ page 85
- Setting the Address and Terminator ⇒ page 94
- Connecting the Battery Communication System within the Battery Cabinet ⇒ page 80
- Connecting the battery communication system to the inverter ⇒ page 81
- Connecting the CAN Communication System ⇒ page 81
- Commissioning Secondary Battery Cabinets ⇒ page 96
- Commissioning the Primary Battery Cabinet ⇒ page 97
- Commissioning the Inverter ⇒ page 90
- Configuring the Inverter ⇒ page 91
- Requirements for Output Voltage and State of Charge ⇒ page 178
- Safety when Extending the Battery ⇒ page 178

16.5 Installing an Additional Battery Cabinet

⚠ QUALIFIED PERSON

1. By measuring the voltage at **-POL** and **+POL**, verify whether the DC output voltage of each new battery module is between 78.4 V and 78.6 V.
2. If the DC output voltage of a new battery module is outside the 78.4 V to 78.6 V range, contact Service.
3. By measuring the voltage at **Charger+** and **Charger-**, verify whether the DC output voltage of each installed battery cabinet is in the specified range.
4. If the DC output voltage of an installed battery cabinet is not in the specified range, contact Service.
5. Increase the state of charge of the battery cabinets already installed to 20%. To do this, charge or discharge the battery.
6. Disconnect the battery and battery inverter from voltage sources (see Section 11, page 119).
7. Install the additional battery cabinet.
8. Mount the battery management system and battery modules in the additional battery cabinet.
9. Ground the additional battery cabinet.
10. Connect the DC cables within the battery cabinet.
11. Connect the communication cables within the battery cabinet.
12. Connect the additional battery cabinet to the CAN communication system between the battery cabinets.
13. Connect the DC cables to the DC distributor.
14. Set addresses and terminators on the battery management systems of all battery cabinets as appropriate to the current system variant.
15. Connect the external switch of the additional battery cabinet to the battery management system.
16. Commission secondary battery cabinets. Configure the additional battery cabinet as a secondary battery cabinet.
17. Commission the primary battery cabinet.
18. Commission the inverter.
19. Reconfigure the inverter.

Also see:

- [Positioning the battery cabinet ⇒ page 54](#)
- [Installing the battery management system ⇒ page 55](#)
- [Installing the battery modules ⇒ page 57](#)
- [Earthing the battery cabinet ⇒ page 79](#)
- [Connecting the External Switch to the Battery Management System ⇒ page 85](#)
- [Connecting DC Cables within the Battery Cabinet ⇒ page 83](#)
- [Routing DC Cables to the Inverter or DC Distributor in the Battery Cabinet ⇒ page 84](#)
- [Connecting DC Cables to the Inverter or DC Distributor in the Battery Cabinet ⇒ page 85](#)
- [Setting the Address and Terminator ⇒ page 94](#)
- [Connecting the Battery Communication System within the Battery Cabinet ⇒ page 80](#)
- [Connecting the battery communication system to the inverter ⇒ page 81](#)
- [Connecting the CAN Communication System ⇒ page 81](#)
- [Commissioning Secondary Battery Cabinets ⇒ page 96](#)
- [Commissioning the Primary Battery Cabinet ⇒ page 97](#)
- [Commissioning the Inverter ⇒ page 90](#)

- [Configuring the Inverter ⇒ page 91](#)
- [Requirements for Output Voltage and State of Charge ⇒ page 178](#)
- [Safety when Extending the Battery ⇒ page 178](#)

17 Storage

17.1 Climatic Conditions for Battery Storage

State of charge (SOC)	Storage temperature	Maximum storage period
15% to 25%	5 °C to 28 °C	6 months
	-20 °C to +30 °C	3 months
	-20 °C to +40 °C	1 month

Also see:

- [Storing the Battery](#) ⇒ page 182

17.2 Permitted storage positions of battery modules

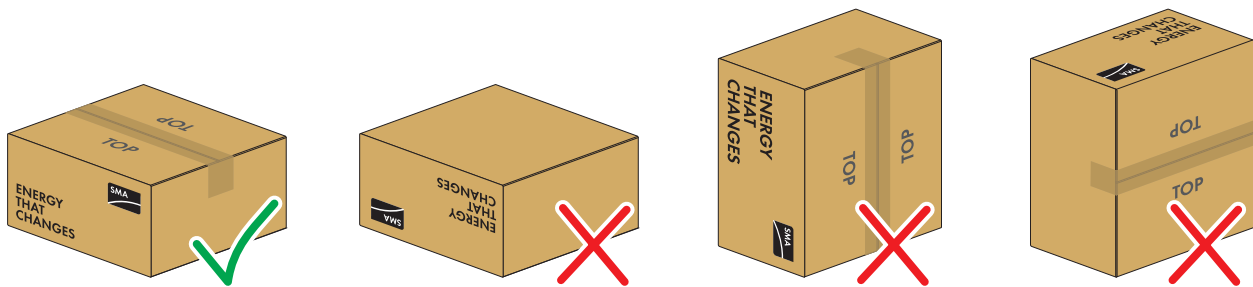


Figure 39: Permitted and prohibited storage positions of a packed battery module

Storage conditions:

- Battery modules may only be stored in the permitted storage position.
- Do not store more than five battery modules on top of one another.

Also see:

- [Storing the Battery](#) ⇒ page 182

17.3 Storing the Battery

⚠ QUALIFIED PERSON

1. Detach the connected DC cable from the **BATTERY+** connection on the battery management system and the **POL+** connection on the uppermost battery module.
2. Detach the connected DC cable from the **BATTERY-** connection on the battery management system and the **POL-** connection on the lowermost battery module.
3. Store the battery modules in the permitted storage positions only.
4. Ensure that the climatic conditions for storing the battery are safely observed for the entire storage duration. Evidence that the storage conditions have been observed must be provided using suitable means.
5. Have the batteries cycled after six months of storage at the latest. Contact Service for this.

Also see:

- [Climatic Conditions for Battery Storage](#) ⇒ page 182
- [Connection Area of the Battery Management System](#) ⇒ page 75
- [Permitted storage positions of battery modules](#) ⇒ page 182

18 Disposal

18.1 Disposing of the Inverter

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

18.2 Specifications for Battery Disposal

SMA battery modules installed in Germany are covered by the free GRS return system.

- All requirements for safe transport of the battery must be observed.
- Batteries may only be disposed of in accordance with the regulations for used batteries valid at the time of disposal.
- There is a legal obligation to return used batteries. Batteries must not be disposed of as with household waste.
- Used batteries may contain harmful substances which may harm the environment or your health if not properly stored or disposed of.
- Batteries contain important raw materials, such as iron, zinc, manganese, copper, cobalt, or nickel, and can be recycled.

Also see:

- [Transporting the battery ⇒ page 40](#)

18.3 Disposing of the Battery

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1. Immediately decommission the battery if damaged.
2. Contact your installer or sales partner.
3. Ensure that the battery is not exposed to moisture or direct sunlight.
4. Ensure that defective batteries are taken away as quickly as possible.

Also see:

- [Specifications for Battery Disposal ⇒ page 183](#)
- [Transporting the battery ⇒ page 40](#)

19 Technical Data

19.1 Technical Data for Inverter

19.1.1 General Data

STPS30-20 / STPS50-20	
Width x height x depth without feet and without disconnectors	772 mm x 837.8 mm x 443.8 mm
Weight with enclosure lid and connecting plate	104 kg
Weight without enclosure lid and connecting plate	97 kg
Length x width x height of the packaging	1 150 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)
Self-consumption (when AC and DC devices are connected)	25 W
Topology	Three-phase
Cooling method	Active
Number of external fans	3
Number of internal fans	2
Degree of protection (as per 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 terminal	Screw terminals

19.1.2 DC Input

	STPS30-20	STPS50-20
Maximum power DC power	30600 W	51000 W
Voltage range	200 V to 980 V	200 V to 980 V
Rated input voltage	750 V	750 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 mm ² to 95 mm ²	50 mm ² to 95 mm ²
Overvoltage category (according to IEC 60664-1)	II	II
Maximum fuse protection (all poles)	160 A	160 A

19.1.3 AC Output

	STPS30-20	STPS50-20
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 ¹¹⁾	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 ¹¹⁾	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at grid frequency 50 Hz ¹¹⁾	44 Hz to 55 Hz	44 Hz to 55 Hz
Operating range at grid frequency 60 Hz ¹¹⁾	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

¹¹⁾ Depending on the configured country data set

	STPS30-20	STPS50-20
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 mm ² to 95 mm ²	16 mm ² to 95 mm ²
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

19.1.4 Efficiency

	STPS30-20	STPS50-20
Maximum efficiency	98%	98%
European weighted efficiency	97.6%	97.2%

19.1.5 Protective Devices

	STPS30-20 / STPS50-20
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

19.1.6 Climatic Conditions

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

	STPS30-20 / STPS50-20
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

STPS30-20 / STPS50-20	
Temperature range	-40°C to +70°C

19.1.7 Torques

STPS30-20 / STPS50-20	
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 mm ² to 95 mm ²	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

19.1.8 System Limits

STPS30-20 / STPS50-20	
Total number of supported devices when a Sunny Tripower Storage is the system manager ¹²⁾	10
Centralized commissioning of all devices in the system	Available
Remote parameterization of SMA devices with Sunny Portal powered by ennexOS	Available
In preparation: Total number of supported devices when an SMA Data Manager M is the system manager ¹²⁾	50

19.2 Technical Data for Battery**19.2.1 General Data for Battery**

	Storage-30-20	Storage-50-20
Width x height x depth of battery cabinet (without hand bracket)	608 mm x 1408 mm x 808 mm	608 mm x 2008 mm x 808 mm
Width x height x depth of battery cabinet (with hand bracket)	608 mm x 1408 mm x 990 mm	608 mm x 2008 mm x 990 mm
Tilt dimension of battery cabinet to front and rear	1607 mm	2155 mm

¹²⁾ Supported devices: SMA EV Charger, PV inverter and Sunny Tripower Storage

	Storage-30-20	Storage-50-20
Tilt dimension of battery cabinet to side	1519 mm	2090 mm
Weight of battery cabinet with battery management system and with maximum number of battery modules	356 kg	555 kg
Weight of battery cabinet without battery management system and without battery modules	119 kg	150 kg
Weight of battery module	56 kg	56 kg
Weight of battery management system (APU)	13 kg	13 kg
Maximum installation height above MSL	2000 m	2000 m
Degree of protection (as per IEC 60529)	IP20	IP20
Protection class (according to IEC 62109-1)	I	I
Pollution Degree	PD 2	PD 2
Maximum noise emission per running fan in battery cabinet	65 dB	65 dB
System warranty	10 years	10 years
Capacity warranty	10 years	10 years
Recycling	Free collection of batteries within Germany	Free collection of batteries within Germany
Certificates and standards for battery cell	IEC 62619, UL 1642, UN 38.3	IEC 62619, UL 1642, UN 38.3
Certificates and standards for battery module	UN 38.3, UL 1973, IEC 62619:2022, IEC 62620:2014	UN 38.3, UL 1973, IEC 62619:2022, IEC 62620:2014
Certificates and standards for battery	CE, UN 38.3, IEC 62619:2022, IEC 61010-1+A1:2016, IEC 61508:2010, IEC 61000-6-2:2016, IEC 61000-6-4:2019, IEC 61000-6-7:2015, 2006/66/EC (Battery Directive)	CE, UN 38.3, IEC 62619:2022, IEC 61010-1+A1:2016, IEC 61508:2010, IEC 61000-6-2:2016, IEC 61000-6-4:2019, IEC 61000-6-7:2015, 2006/66/EC (Battery Directive)
Battery designation in accordance with DIN EN 62620:2015	INP46/175/127/[1P22S]M/-20+60/90	INP46/175/127/[1P22S]M/-20+60/90

19.2.2 DC connection

	Storage-30-20	Storage-50-20
Energy (at 100% depth of discharge)	32 kWh (with four battery modules)	56 kWh (with seven battery modules)
Nominal voltage	324 V	567 V
Voltage range	290 V to 365 V	508 V to 639 V
Nominal charge/discharge current	100 A	100 A
Maximum C rate	1C (in conjunction with STPS30-20)	1C (in conjunction with STPS50-20)
Overvoltage category	III	III
Cell	Lithium NMC prismatic (Samsung SDI)	Lithium NMC prismatic (Samsung SDI)
Battery balancing	DynamiX Battery Optimizer	DynamiX Battery Optimizer
Anticipated cycles at 100% DoD, 70% SoH, 23°C +/-5°C and 1C/1C ¹³⁾	6000	6000
Anticipated cycles at 100% DoD, 70% SoH, 23°C +/-5°C and 0.5C/0.5C ¹³⁾	8000	8000
Guaranteed cycles at 100% DoD, 70% SoH, 23°C +/-5°C and 1C/1C ¹³⁾	4500	4500
Guaranteed cycles at 100% DoD, 70% SoH, 23°C +/-5°C and 0.5C/0.5C ¹³⁾	6000	6000
Battery efficiency	Up to 98%	Up to 98%
Self-consumption in standby mode (without battery inverter)	5 W	5 W

19.2.3 Efficiency

	Storage-30-20 / Storage-50-20
Maximum battery efficiency	98 %

19.2.4 Climatic Conditions

	Storage-30-20 / Storage-50-20
Operating temperature (maximum)	0°C to 50°C
Operating temperature (recommended) ¹⁴⁾	20°C to 30°C

¹³⁾ DoD: Depth of discharge

SoH: State of health of battery

The specification 1C/1C means that the entire battery charges or discharges in 1 hour. The specification 0.5C/0.5C means that the entire battery charges or discharges in 2 hours.

¹⁴⁾ The full battery power can only be achieved above an operating temperature of 20°C.

Storage-30-20 / Storage-50-20	
Operating temperature for 10 year capacity warranty	10°C to 45°C
Ambient temperature	0°C to 50°C
Humidity (non-condensing)	0% to 80%
Cooling concept	Passive via ventilation slots and active via fan

19.2.5 Battery extendability

	Storage-30-20	Storage-50-20
Number of battery modules per battery cabinet ¹⁵⁾	4 to 6	7 to 10
Power per battery module	8 kWh	8 kWh
Power per battery cabinet with minimum number of battery modules	32 kWh	56 kWh
Power per battery cabinet with maximum number of battery modules	48 kWh	80 kWh
Number of cabinets per battery inverter	1 to 4	1 to 4
Power per battery inverter with maximum number of battery cabinets	192 kWh	320 kWh

19.3 Technical Data for Energy Meter

	COM-EMETER-A-20	COM-EMETER-B-20	Janitza UMG 604Pro
Product name	SMA Commercial Energy Meter 600 A	SMA Commercial Energy Meter 200 A	Power Quality Analyser UMG 604 E
External current transformer	3x 600 A	3x 200 A	Not included in the scope of delivery
Voltage supply	from voltage measurement input	from voltage measurement input	via power supply unit CLCONPWRSUPPLY
Maximum cable length to current transformer	2 m	2 m	-
Width x height x depth of energy meter	88 mm x 35 mm x 65 mm	88 mm x 35 mm x 65 mm	107.5 mm x 90 mm x 82 mm
Weight of energy meter	< 200 g	< 200 g	350 g
Width x height x depth of current transformer	57.5 mm x 85.2 mm x 41.4 mm	23 mm x 40 mm x 26 mm	Not included in the scope of delivery
Weight of current transformer (one current transformer)	470 g	250 g	Not included in the scope of delivery

¹⁵⁾ Additional battery cabinets may be installed a maximum of six months after the battery cabinet is commissioned.

	COM-EMETER-A-20	COM-EMETER-B-20	Janitza UMG 604Pro
Maximum cable diameter at current transformer	36 mm	24 mm	Not included in the scope of delivery
Total weight (one energy meter + three current transformers)	1.6 kg	1.0 kg	0.35 kg
Standard measuring interval	200 ms	200 ms	200 ms
Operating temperature	-25°C to +55°C	-25°C to +55°C	-10°C to +55°C
Mounting	DIN rail	DIN rail	DIN rail

19.4 Technical Data for DC Distributor

	Bat Breaker (160-4x-HV100)
Width x height x depth of DC distributor	360 mm x 540 mm x 171 mm
Weight of DC distributor	approx. 4.54 kg
Operating temperature	-25°C to +40°C

20 Accessories

You will find the accessories for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
ioLogik E1214	I/O system by Moxa Europe GmbH	124179-00.01
ioLogik E1242	I/O system by Moxa Europe GmbH	eIO-E1242
WAGO-I/O-SYSTEM 750	I/O system by WAGO Kontakttechnik GmbH & Co. KG	115214-00.01
ES 100 L SCT4	SMA Commercial Energy Meter 600 A from TQ-Systems	COM-EMETER-A-20
ES 100 L SCT3	SMA Commercial Energy Meter 200 A from TQ-Systems	COM-EMETER-B-20
Janitza UMG 604Pro	Power Quality Analyser UMG 604 E from Janitza electronics	JANITZA-SP

21 EU Declaration of Conformity

within the scope of the EU directives

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



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

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

22 UK Declaration of Conformity

according to the regulations of England, Wales and Scotland



- 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>.

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

SMA Solar UK Ltd.

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23 Contact

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

- Device type
- Serial number
- Firmware version
- 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
- Detailed description of the problem

You can find your country's contact information at:



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